City Council Meeting Agenda

Date: Monday, March 20, 2023
Time: 4:00 o'clock p.m.

Location: Council Chambers, 1st Floor, Windsor City Hall

All members will have the option of participating in person in Council Chambers or electronically and will be counted towards quorum in accordance with Procedure By-law 98-2011 as amended, which allows for electronic meetings. The minutes will reflect this accordingly. Any delegations have the option to participate in person or electronically.

MEMBERS:

Mayor Drew Dilkens

Ward 1 - Councillor Fred Francis

Ward 2 - Councillor Fabio Costante

Ward 3 – Councillor Renaldo Agostino

Ward 4 – Councillor Mark McKenzie

Ward 5 - Councillor Ed Sleiman

Ward 6 - Councillor Jo-Anne Gignac

Ward 7 – Councillor Angelo Marignani

Ward 8 - Councillor Gary Kaschak

Ward 9 - Councillor Kieran McKenzie

Ward 10 - Councillor Jim Morrison

ORDER OF BUSINESS

Item #	Item Description
1.	**ORDER OF BUSINESS**
2.	**CALL TO ORDER** - Playing of the National Anthem

READING OF LAND ACKNOWLEDGEMENT
We [I] would like to begin by acknowledging that the land on which we gather is the traditional territory of the Three Fires Confederacy of First Nations, which includes the Ojibwa, the Odawa, and the Potawatomie. The City of Windsor honours all First Nations, Inuit and Métis peoples and their valuable past and present contributions to this land.

3. **DISCLOSURE OF PECUNIARY INTEREST AND THE GENERAL NATURE THEREOF**

4. **ADOPTION OF THE MINUTES**

5. **NOTICE OF PROCLAMATIONS**

Flag Raising Ceremony

"13th Pakistan Day" – March 19, 2023
"Run for Rocky Day" - April 6, 2023 – April 10, 2023

Illumination

"World Down Syndrome Day" – March 21, 2023
"Epilepsy Awareness Day" – March 26, 2023

6. **COMMITTEE OF THE WHOLE**

7. **COMMUNICATIONS INFORMATION PACKAGE** (This includes both Correspondence and Communication Reports)

7.2. Mayor, Councillors and Appointees Statement of Remuneration and Expenses for 2022 **(C 31/2023)**

7.3. 2022 Status Report regarding City's response to Cannabis Retail Store Applications provided to AGCO – City Wide **(C 37/2023)**

8. **CONSENT AGENDA**

8.1. Cabana Corridor Improvements Phase 4 - Mount Carmel Drive to Highway 3; Legal Agreements with St. Clair College - Ward 1 **(C 42/2023)**

8.2. Private Access Culvert within the Little 10th Concession Drain for 3940 Lauzon Road - Ward 9 **(C 29/2023)**

8.3. Sunset Avenue From Wyandotte to College Project; Legal Agreements with University of Windsor - Ward 2 **(C 33/2023)**

8.4. Private Access Culvert within the 5th Concession Drain for 4088 and 4096 Sixth Concession Road - Ward 9 **(C 30/2023)**

CONSENT COMMITTEE REPORTS

8.5. Windsor Bicycling Committee 2022 Annual Report **(SCM 65/2023)** & **(SCM 3/2023)**

8.6. Minutes of the Windsor Bicycling Committee of its meeting held December 13, 2022 **(SCM 66/2023)** & **(SCM 22/2023)**

8.7. Grove Avenue (Janette Avenue to Bruce Avenue) Traffic Calming - Ward 3 **(SCM 67/2023)** & **(S 8/2023)**

8.8. West Windsor Flood Risk Study - Climate Change Risk Assessment - Report Endorsement - Wards 1 & 2 **(SCM 68/2023)** & **(S 20/2023)**

8.9. E-Scooter Update - City-wide **(SCM 69/2023)** & **(C 7/2023)**

8.10. Response to CQ 9-22 – Driveway Culvert Rehabilitation & Backyard Drainage Implementation Programs **(SCM 70/2023)** & **(C 2/2023)**

8.11. Effectiveness of Salting Residential Streets During Winter Control Incident Response to Prevent Ice Formation **(SCM 71/2023)** & **(C 227/2022)**

8.12. Response to CQ 15-2021 – July 16, 2021 Rain Event (City Wide) **(SCM 72/2023)** & **(C 8/2023)**

8.13. CQ5-2022 Non-BIA Commercial Areas as Community Safety Zones - City-wide **(SCM 73/2023)** & **(C 4/2023)**

8.14. Update to Transit Windsor Signing Authorities - City Wide **(SCM 76/2023)** & **(S 18/2023)**

8.15. Zoning By-law Amendment Application for property known as 478 Janette Avenue; Applicant: 1413600 Ontario Ltd.; File No. Z-029/22, ZNG/6847; Ward 3. **(SCM 84/2023)** & **(S 26/2023)**

8.16. Approval of a Plan of Condominium with Exemption under Section 9(3) of the Condominium Act, 4755, 4775 & 4785 Walker Road; Applicant: 5042667 Ontario Ltd.; File# CDM 002-22 [CDM-6829]; Ward 9 **(SCM 85/2023)** & **(C 25/2023)**

8.17. Official Plan & Zoning Bylaw Amendments, Draft Plan of Subdivision Applications - Z 027-22 [ZNG-6832], OPA 163 [OPA-6833], SDN001/22 [SDN6834] - 1027458 Ontario Inc. - 0 Clover Avenue - NE Corner Florence & Beverly Glen - Ward 7 **(SCM 86/2023)** & **(S 24/2023)**

8.18. Closure of part of E. C. Row Avenue East right-of-way, west of Banwell Road, Ward 9, SAS-6835 **(SCM 87/2023)** & **(C 155/2022)**

8.19. Downtown Windsor Enhancement Strategy and Community Improvement Plan Grant Applications made by Micheal de Rita for 2734844 Ontario Ltd. for 261-267 Pelissier Street, Ward 3 **(SCM 88/2023)** & **(S 16/2023)**

8.20. Brownfield Redevelopment Community Improvement Plan (CIP) application submitted by Edna (Windsor) Inc., Walkerville Commercial Centre Inc., and Walkerville Walker Developments Inc for 0 Edna Street, 0 St. Luke Road, and part of 890 Walker Road (Ward 5) **(SCM 89/2023)** & **(S 5/2023)**

8.21. United Way - ProsperUs Collective Impact Initiative - Progress of the PropserUS Cradle to Career Strategy for Windsor **(SCM 80/2023)** & **(SCM 78/2023)**

8.22. 2023 Municipally Significant Event Status, Wards 2,3,4,6,7 **(SCM 82/2023)** & **(S 21/2023)**

8.23. Asylum Claimants Transferred to Windsor Hotels by Immigration, Refugees and Citizenship Canada (IRCC) – City Wide **(SCM 81/2023)** & **(S 22/2023)**

9. REQUEST FOR DEFERRALS, REFERRALS AND/OR WITHDRAWALS

10. PRESENTATIONS AND DELEGATIONS

11. REGULAR BUSINESS ITEMS (Non-Consent Items)

11.1. Hosting 2023 Western Ontario Regional FireFit Competition - City Wide **(C 38/2023)**

12. CONSIDERATION OF COMMITTEE REPORTS

12.1. (i) Report of the Special In-Camera meeting or other Committee as may be held prior to Council (if scheduled)

13. BY-LAWS (First and Second Reading)

14. **MOVE BACK INTO FORMAL SESSION**

15. **NOTICES OF MOTION**

16. **THIRD AND FINAL READING OF THE BY-LAWS**

17. **PETITIONS**

18. **QUESTION PERIOD**

19. **STATEMENTS BY MEMBERS**

20. **UPCOMING MEETINGS**

Committee of Management for Huron Lodge
Wednesday, March 15, 2023
9:00 a.m. (via Zoom)

Vision Zero Stakeholder Group
Wednesday, March 22, 2023
2:00 p.m., via Zoom

City Hall Square Plaza Project Committee
Thursday, March 23, 2023
2:00 p.m., Suite 140, 350 City Hall Square West

Windsor Licensing Commission
Wednesday, March 29, 2023
9:30 a.m.

Environment, Transportation & Public Safety Standing Committee
Wednesday, March 29, 2023
4:30 p.m., Council Chambers

Special Meeting of Council – 2023 Operating & Capital Budgets
Monday, April 3, 2023
10:00 a.m., Council Chambers

Community Services Standing Committee
Wednesday, April 5, 2023
9:00 a.m., Council Chambers

Development & Heritage Standing Committee
Wednesday, April 5, 2023
4:30 p.m., Council Chambers

21. **ADJOURNMENT**

THE CITY OF WINDSOR ONTARIO, CANADA

Council Report: C 31/2023

Subject: Mayor, Councillors and Appointees Statement of Remuneration and Expenses for 2022

Reference:

Date to Council: March 20, 2023
Author: Jocelyn De Luna
Financial Analyst
519-255-6100 Ext 6334
jdeluna@citywindsor.ca
Financial Accounting
Report Date: 3/1/2023
Clerk's File #: ACO/7090

To: Mayor and Members of City Council

Recommendation:

THAT the report of the City Treasurer regarding the Mayor, Councillors and Appointees 2022 Statement of Remuneration and Expenses **BE RECEIVED** for information.

Executive Summary:

N/A

Background:

Statement of Remuneration

In compliance with the Municipal Act, each year the City Treasurer provides a report to council that itemizes the remuneration paid and expenses reimbursed in the previous year to:

(a) each member of council in respect of his or her services as a member of the council or any other body, including a local board, to which the member has been appointed by council or on which the member holds office by virtue of being a member of council;

(b) each member of council in respect of his or her services as an officer or employee of the municipality or other body described in clause (a); and

(c) each person, other than a member of council, appointed by the municipality to serve as a member of any body, including a local board, in respect of his or her services as a member of the body.

Additionally, in order to fully reflect travel cost, the report also includes travel related expenses that were not reimbursed but paid directly by the municipality and attributable to an individual.

Furthermore, on April 16, 2012 Council Resolution M182-2012 directed as follows:

"That the report of the City Treasurer dated March 30, 2012 regarding Councillors and Appointees 2011 Statement of Remuneration and Expenses **BE RECEIVED** for information, and further, that Administration **BE DIRECTED**, on a go-forward basis, to **ENDEAVOR** to include in future reports, the same information currently collected for City Councillors, for City appointees to City agencies, boards and commissions, provided that they are not subject to any legislative restrictions."

As required by Council Resolution M182-2012, the additional information collected is reflected in Appendix D – Schedule of Mayor, Council and Appointees Remuneration and Expenses for 2022 from City ABC's (Direct Payments Made by the Listed Organizations) attached.

Discussion:

The following schedules are attached relative to the Statement of Remuneration requirements:

Appendix A – Schedule of Mayor and Council Remuneration for 2022

Appendix B – Schedule of Council and Appointees Expenses for 2022

Appendix C – Schedule of Appointees Remuneration for 2022

Appendix D – Schedule of Mayor, Council and Appointees Remuneration and Expenses for 2022 from City Agencies, Boards, Commissions

Appendix E – Schedule of Mayor's Business and Travel Expenses for 2022

Risk Analysis:

Failure to provide this information to City Council would result in non-compliance with the Municipal Act.

Climate Change Risks

Climate Change Mitigation:

N/A.

Climate Change Adaptation:

N/A.

Financial Matters:

See Appendices.

Consultations:

Individuals consulted in the preparation of this report included:

1. Kelly Paul, Payroll
2. Becky Murray, Council Services
3. Christine Chauvin, Mayor's Office

Conclusion:

This report is provided to Council for information purposes.

Approvals:

Name	Title
Dan Seguin	Deputy Treasurer - Financial Accounting and Corporate Controls
Joe Mancina	Commissioner Corporate Services - Chief Financial Officer & City Treasurer
Steve Vlachodimos	City Clerk
Onorio Colucci	Chief Administrative Officer

Notifications:

Name	Address	Email
N/A		

Appendices:

Appendix A – Schedule of Mayor and Council Remuneration for 2022

Appendix B – Schedule of Council and Appointees Expenses for 2022

Appendix C – Schedule of Appointees Remuneration for 2022

Appendix D – Schedule of Mayor, Council and Appointees Remuneration and Expenses for 2022 from City Agencies, Boards, Commissions

Appendix E – Schedule of Mayor's Business and Travel Expenses for 2022

THE CORPORATION OF THE CITY OF WINDSOR
SCHEDULE OF MAYOR AND COUNCIL REMUNERATION FOR 2022

NAME	BASE SALARY	TAXABLE BENEFITS	TAXABLE AMOUNT
Mayor			
DILKENS, ANDREW "DREW"	$ 199,168.06	$ 9,909.00	$ 209,077.06
Councillor			
AGOSTINO, RENALDO [2]	$ 6,113.28	$ 18.15	$ 6,131.43
BORTOLIN, RINO	$ 41,491.60	$ 196.46	$ 41,688.06
COSTANTE, FABIO	$ 47,604.77	$ 214.61	$ 47,819.38
FRANCIS, FRED	$ 47,604.77	$ 214.61	$ 47,819.38
GIGNAC, JO ANNE	$ 47,604.77	$ 214.61	$ 47,819.38
GILL, JEEWEN	$ 41,491.60	$ 196.46	$ 41,688.06
HOLT, CHRIS	$ 41,491.60	$ 196.46	$ 41,688.06
KASCHAK, GARY	$ 47,604.77	$ 214.61	$ 47,819.38
MARIGNANI, ANGELO [2]	$ 6,113.28	$ 18.15	$ 6,131.43
MCKENZIE, KIERAN	$ 47,604.77	$ 214.61	$ 47,819.38
MCKENZIE, MARK [2]	$ 6,113.28	$ 18.15	$ 6,131.43
MORRISON, JAMES	$ 47,604.77	$ 214.61	$ 47,819.38
SLEIMAN, AOUNAD	$ 47,604.77	$ 214.61	$ 47,819.38
TOTAL COUNCILLORS	**$ 476,048.03**	**$ 2,146.10**	**$ 478,194.13**

Note:

1. As of January 2019, the annual salaries no longer include the tax-free Municipal Officers Allowance.
2. City Councillors officially sworn in Tuesday, November 15, 2022.

SCHEDULE OF COUNCIL AND APPOINTEES EXPENSES FOR 2022

Councillor	Description	Destination	From	To	Amount	Total [1]
Agostino, Renaldo [2]	(no amounts for 2022)					
						$ -
Bortolin, Rino	(no amounts for 2022)					
						$ -
Costante, Fabio [4]	FCM Annual Conference and Trade Show - Registration	Regina, Saskatchewan	2-Jun-22	5-Jun-22	$ 939.75	
						$ 939.75
Francis, Fred	(no amounts for 2022)					
						$ -
Gignac, Jo-Anne	(no amounts for 2022)					
						$ -
Gill, Jeewen	(no amounts for 2022)					
						$ -
Holt, Chris	(no amounts for 2022)					
						$ -
Kaschak, Gary	(no amounts for 2022)					
						$ -
Marignani, Angelo [2]	Cable for laptop		20-Nov-22	20-Nov-22	$ 31.62	
						$ 31.62
McKenzie, Kieran	(no amounts for 2022)					
						$ -
McKenzie, Mark [2]	(no amounts for 2022)					
						$ -
Morrison, James	(no amounts for 2022)					
						$ -
Sleiman, Aounad "Ed"	HP Laserjet Color Printer [3]		8-Feb-22	8-Feb-22	$ 615.65	
	HP Laserjet Toner [3]		1-Mar-22	31-Mar-22	$ 443.63	
						$ 1,059.28

Notes:
1. Amounts listed are Canadian Equivalents.
2. Officially sworn in Tuesday, November 15, 2022.
3. Councillors are provided a $2,500 monetary consideration/allowance (2018-2022 term).
4. Councillor Costante unable to attend the conference. Registration is non-refundable.

SCHEDULE OF COUNCIL AND APPOINTEES EXPENSES FOR 2022

Appointee	Description	Destination	From	To	Amount	Total [1]
Balsamo, Giuseppe *(Committee of Adjustment)*	Local Mileage	Windsor, ON	Jan 28, 2021	Nov 18, 2021	$ 295.59	**$ 295.59**
McMahon, Tom *(Committee of Adjustment)*	Local Mileage	Windsor, ON	Jan 17, 2022	June 13, 2022	$ 178.73	**$ 178.73**
Sleiman, Mike *(Committee of Adjustment)*	Local Mileage	Windsor, ON	Jan 28, 2021	Nov 18, 2021	$ 348.10	**$ 348.10**

Note:
1. Paid in 2022

SCHEDULE OF APPOINTEES REMUNERATION FOR 2022

APPOINTEES	WINDSOR POLICE SERVICES BOARD	TOTAL
Ghanam, Denise	6,500.04	6,500.04
DiCarlo, Aldo	5,669.54	5,669.54
de Verteuil, Robert	6,500.04	6,500.04
TOTAL	**$ 18,669.62**	**$ 18,669.62**

SCHEDULE OF MAYOR, COUNCIL AND APPOINTEES REMUNERATION AND EXPENSES FOR 2022 FROM CITY AGENCIES, BOARDS, COMMISSIONS (DIRECT PAYMENTS MADE BY THE LISTED ORGANIZATIONS *)

*** This information was provided by the organizations listed below. Amounts were paid by these organizations directly to or on behalf of these individuals.**

		REMUNERATION				ALL OTHER EXPENSES			
(1) NAME	(2) POSITION WITHIN ORGANIZATION	(3) BASE RETAINER/ MEETING ATTENDANCE FEES ADHOC INDIVIDUAL MEETING PAYMENTS	(4) BOARD PAYMENTS	(5) TAXABLE BENEFITS	(6)=(3)+(4)+(5) SUBTOTAL OF REMUNERATION	(7) DESCRIPTION	(8) DATES (FROM/ TO)	(9) AMOUNT OF ALL OTHER EXPENSES	(10)=(6)+(9) TOTAL OF REMUNERATION AND ALL OTHER EXPENSES
Downtown Windsor Business Improvement Association									
Yeomans, Brian	Chair	$ -			$ -	OBIAA Conference	Apr 24-27, 2022	$ 1,550.62	$ 1,550.62
Yeomans, Brian	Chair	$ -			$ -	Business Excellence Awards	May 19, 2022	$ 180.00	$ 180.00
Yeomans, Brian	Chair	$ -			$ -	Business Meeting	April 2022	$ 116.68	$ 116.68
Papadeas, Pat	Vice Chair	$ -			$ -	OBIAA Conference	Apr 24-27, 2022	$ 1,197.15	$ 1,197.15
Papadeas, Pat	Vice Chair	$ -			$ -	Parking Tokens	July 17, 2022	$ 12.50	$ 12.50
Patterson, Jeff	Treasurer	$ -			$ -	Small Business & Entrepreneurship Centre (Event)	Nov 21, 2022	$ 250.00	$ 250.00
Bortolin, Rino	Councillor	$ -			$ -	2022 Mayoral Debate	Sept 29, 2022	$ 40.00	$ 40.00
Zanetti, Geoff	Director	$ -			$ -	Parking Tokens	July 17, 2022	$ 12.50	$ 12.50
Enwin Utilities Ltd									
Fenn, Garnett	Director	$ 20,460.96			$ 20,460.96	Ontario Energy Conf, Cyber Risk Oversight, APPrO Conf	2022	$ 2,525.13	$ 22,986.09
Ioanidis, Gregory	Director	$ 15,060.96			$ 15,060.96	The Dir College C-Dir Module 3	Nov 3-5, 2022	$ 4,370.00	$ 19,430.96
Muzzati, Leo	Director	$ 14,610.96			$ 14,610.96			$ -	$ 14,610.96
Orr, Andrea	Director	$ 17,310.96			$ 17,310.96			$ -	$ 17,310.96
Taqtaq, Abe	Director	$ 22,710.96			$ 22,710.96			$ -	$ 22,710.96
Roseland Golf & Curling Club (Note 1)									
Wintemute, Bruce	Board Member	$ -			$ -	Board Benefit-2022 Season	2022	$ 852.00	$ 852.00
Windsor Canada Utilities Ltd (includes ENWIN Energy Ltd)									
Laforet, Kevin	Director	$ 15,510.96			$ 15,510.96			$ -	$ 15,510.96
Udell, Jerry	Director	$ 17,310.96			$ 17,310.96			$ -	$ 17,310.96
Windsor Essex Community Housing Corp									
Clemens, Marina	Board Chair	$ -			$ -	Mileage	2022	$ 804.10	$ 804.10
Morris, Mark	Board Vice Chair	$ -			$ -	Mileage	2022	$ 299.20	$ 299.20
Meloche, Leo	Board Treasurer	$ -			$ -	Mileage	2022	$ 74.26	$ 74.26
Constante, Fabio	Board Director	$ -			$ -	Mileage	2022	$ 25.30	$ 25.30
Coltman, Linda	Board Director	$ -			$ -	Mileage	2022	$ 31.82	$ 31.82
Sullens, Jack	Board Director	$ -			$ -	Mileage	2022	$ 78.34	$ 78.34

Note:

1. Roseland Board Members have the option if they so choose , to golf once per week: 18 holes at Roseland with a guest and one golf cart or 9 holes at Little River with a guest and one cart.

SCHEDULE OF MAYOR, COUNCIL AND APPOINTEES REMUNERATION AND EXPENSES FOR 2022 FROM CITY AGENCIES, BOARDS, COMMISSIONS (DIRECT PAYMENTS MADE BY THE LISTED ORGANIZATIONS *)

*** This information was provided by the organizations listed below. Amounts were paid by these organizations directly to or on behalf of these individuals.**

(1) NAME	(2) POSITION WITHIN ORGANIZATION	REMUNERATION				ALL OTHER EXPENSES			(10)=(6)+(9) TOTAL OF REMUNERATION AND ALL OTHER EXPENSES
		(3) BASE RETAINER/ MEETING ATTENDANCE FEES ADHOC INDIVIDUAL MEETING PAYMENTS	(4) BOARD PAYMENTS	(5) TAXABLE BENEFITS	(6)=(3)+(4)+(5) SUBTOTAL OF REMUNERATION	(7) DESCRIPTION	(8) DATES (FROM/ TO)	(9) AMOUNT OF ALL OTHER EXPENSES	
Windsor Utilities Commission									
Hawkins, Julian	Commissioner	$ 8,658.96			$ 8,658.96			$ -	$ 8,658.96
Lawson, Doug	Commissioner	$ 8,658.96			$ 8,658.96			$ -	$ 8,658.96
Sonego, Mario	Commissioner	$ 8,658.96			$ 8,658.96			$ -	$ 8,658.96
Sovran, Egidio	Commissioner	$ 8,658.96			$ 8,658.96			$ -	$ 8,658.96
Your Quick Gateway (Windsor) Inc.									
Chisholm, John	Board Member	$ 750.00	$ 3,999.84		$ 4,749.84			$ -	$ 4,749.84
Discenza, Renato	Board Member	$ 1,200.00	$ 3,999.84		$ 5,199.84			$ -	$ 5,199.84
Scislowski, Toni	Board Member	$ 1,200.00	$ 3,999.84		$ 5,199.84			$ -	$ 5,199.84
Virk, Kulveer	Board Member	$ 1,200.00	$ 3,999.84		$ 5,199.84			$ -	$ 5,199.84
Note 1: The following organizations reported zero amounts.									
Ford City BIA		$ -	$ -	$ -	$ -			$ -	$ -
Invest Windsor Essex (formerly Windsor-Essex Economic Development Corp)		$ -	$ -	$ -	$ -			$ -	$ -
Olde Riverside BIA		$ -	$ -	$ -	$ -			$ -	$ -
Olde Sandwich Improvement Area (BIA)		$ -	$ -	$ -	$ -			$ -	$ -
Ottawa Street BIA		$ -	$ -	$ -	$ -			$ -	$ -
Pillette Village BIA		$ -	$ -	$ -	$ -			$ -	$ -
Transit Windsor		$ -	$ -	$ -	$ -			$ -	$ -
Via Italia / Erie St. BIA		$ -	$ -	$ -	$ -			$ -	$ -
Walkerville BIA		$ -	$ -	$ -	$ -			$ -	$ -
Windsor-Essex County Health Unit		$ -	$ -	$ -	$ -			$ -	$ -
Windsor-Detroit Borderlink Limited		$ -	$ -	$ -	$ -			$ -	$ -
Windsor Police Services Board		$ -	$ -	$ -	$ -			$ -	$ -
Windsor Public Library		$ -	$ -	$ -	$ -			$ -	$ -
Wyandotte Town Centre BIA		$ -	$ -	$ -	$ -			$ -	$ -

SCHEDULE OF MAYOR'S BUSINESS AND TRAVEL EXPENSES FOR 2022

MAYOR DREW DILKENS					
Description	**Location**	**Date**		**Expense** [1]	**Total City Expense** [1]
		From	**To**		
Consumer Technology Association - CES 2022 Technology Event [2]	Las Vegas, USA	4-Jan-22	7-Jan-22	$947.63	
Economic Development	Wroclaw, Poland & Munich, Germany	16-Apr-22	22-Apr-22	$5,889.13	
Ambassador Bridge Meeting	Warren, Michigan USA	16-May-22	16-May-22	$39.45	
Cabinet Swearing-In	Toronto, Ontario	23-Jun-22	24-Jun-22	$653.24	
AMO, TWEPI Event	Ottawa & Toronto, Ontario	14-Aug-22	18-Aug-22	$3,461.58	
Throne Speech in Queen's Park	Toronto, Ontario	8-Aug-22	9-Aug-22	$893.59	
Federal Public Emergency Commission	Gatineau-Ottawa, QC	5-Nov-22	8-Nov-22	$2,598.93	
Appearance, Senate & Parliamentary Committee	Ottawa, Ontario	23-Nov-22	25-Nov-22	$2,095.21	
Economic Development	Seoul, Korea	13-Dec-22	20-Dec-22	$7,283.53	
					$23,862.29

Notes:

1. Amounts listed are Canadian Equivalent.
2. Mayor unable to attend due to Covid restrictions in place on Dec 16, 2021.

THE CITY OF WINDSOR ONTARIO, CANADA

Council Report: C 37/2023

Subject: 2022 Status Report regarding City's response to Cannabis Retail Store Applications provided to AGCO – City Wide

Reference:

Date to Council: March 20, 2023
Author: Larissa McCorkell
Senior Manager of Administration, Executive Assistant to CAO (A)
lmccorkell@citywindsor.ca
519-255-6100 ext. 6607
CAO Office
Report Date: 2023-03-03
Clerk's File #: GP/13047

To: Mayor and Members of City Council

Recommendation:

THAT the report of the Chief Administrative Officer dated March 1, 2023 regarding the City's response to Cannabis Retail Store Applications provided to the Alcohol and Gaming Commission of Ontario (AGCO) for 2022 **BE RECEIVED** for information.

Executive Summary:

N/A

Background:

During the Council Meeting on July 27, 2020, discussions ensued regarding Report C 149/2020: Application for a Cannabis Retail Store Authorization at 3514 Walker Road, Unit 2. Councillor Holt gave notice that he intended to introduce the following draft motion for Council's consideration at the August 4, 2020 meeting of Council, pending administrative comment at that meeting:

> *"That with regards to the City of Windsor receiving requests for written submissions regarding an application for a Cannabis Retail Store Authorization, from the Alcohol and Gaming Commission of Ontario (AGCO), that Administration BE DIRECTED to follow provincial guidelines for locations of cannabis retail stores as the City of Windsor's new municipal guidelines, as well as the City of Windsor's zoning requirements, and to approve accordingly those applications that meet these minimum standards, without the need for Council approval; and further,*

That Administration BE DIRECTED to report back to Council as communication items on the application submissions that have been forwarded to the AGCO."

Subsequent to the notice of motion, the Mayor and City Council requested additional information from Administration, specifically regarding what the City's existing approved guidelines were on the matter in comparison to the provincial guidelines.

At the August 24, 2020 Council Meeting, Administration provided City Council with additional information for a Notice of Motion regarding Municipal Guidelines for Cannabis Retail Stores. The following was approved by City Council at that meeting by CR442/2020:

"*That with regards to the City of Windsor receiving requests for written submissions regarding an application for a Cannabis Retail Store Authorization, from the Alcohol and Gaming Commission of Ontario (AGCO), that Administration* ***BE DIRECTED*** *to follow provincial guidelines for locations of cannabis retail stores as the City of Windsor's municipal guidelines, as well as the City of Windsor's zoning requirements, and to approve accordingly those applications that meet these minimum standards, without the need for Council approval, and further,*

That Administration ***BE DIRECTED*** *to report back to Council as communications items on the application submissions that have been forwarded to the AGCO.*"

Discussion:

From January 2022 to December 2022, The Office of the CAO received a total of nine (9) notifications from iAGCO regarding Cannabis Retail Store Authorization Applications Undergoing Public Notice. The public notice offers the municipality and residents of the municipality in which the premises is located an opportunity to respond to the application within the time period identified on the posting and on the placard. The Office of the CAO, in conjunction with the Planning Department, responded to all nine (9) notifications based on the Province's guidelines for cannabis retail store applications.

As per the Province's guidelines, the City will only object to applications that are within 150 metres of a school and those that are in a location where the zoning does not permit a retail store.

A listing of Cannabis Retail Store Applications for 2022 is attached to this report as Appendix A.

Risk Analysis:

The level of risk is low. Comments to the AGCO must be submitted by the municipality within fifteen (15) calendar days. If comments are not received within this period, they

will not be considered. However, the AGCO is the provincial authority in cannabis retail licenses and the City has no recourse if the AGCO issues a license despite any objections made. Since the new resolution, there has been little issue in being able to submit comments to the AGCO within the public notice time period.

Climate Change Risks

Climate Change Mitigation:

N/A

Climate Change Adaptation:

N/A

Financial Matters:

N/A

Consultations:

Connor Cowan, Zoning Coordinator, Planning Department

Zaid Zwayyed, Zoning Coordinator, Planning Department

Karina Richters, Supervisor, Environmental Sustainability & Climate Change

Conclusion:

The annual status report is provided to City Council to fulfill an ongoing commitment for submitting comments regarding Cannabis Retail Store Applications to the AGCO on behalf of the municipality.

Planning Act Matters:

N/A

Approvals:

Name	Title
Larissa McCorkell	Senior Manager of Administration / Executive Assistant to CAO (A)
Onorio Colucci	Chief Administrative Officer

Notifications:

Name	Address	Email

Appendices:

1 Appendix A - 2022 Cannabis Retail Store Applications Submitted to AGCO

2022 Cannabis Retail Store Applications

(Listed in order City was notified by iAGCO)

	STORE ADDRESS	STORE NAME	WARD	RESOLUTION
1	2155 Wyandotte St W, Suite B	Harvest Bud Cannabis	2	Approved by Administration
2	3099 Forest Glade Dr	Regulators Cannabis	7	Approved by Administration
3	1747 University Ave W	Endless Heights Cannabis	2	Approved by Administration
4	2783 Howard Ave	Discounted Cannabis	10	Approved by Administration
5	6711 Tecumseh Rd E, Unit 8A	Canna Cabana	8	Approved by Administration
6	11500 Tecumseh Rd E, Unit 4	Pop's Cannabis Co	7	Approved by Administration
7	1332 Wyandotte St E	Discounted Cannabis	4	Approved by Administration
8	1916 Wyandotte St W	Value Buds	2	Approved by Administration
9	4450 Walker Rd	Discounted Cannabis	9	Approved by Administration

THE CITY OF WINDSOR ONTARIO, CANADA

Council Report: C 42/2023

Subject: Cabana Corridor Improvements Phase 4 - Mount Carmel Drive to Highway 3; Legal Agreements with St. Clair College - Ward 1

Reference:

Date to Council: March 20, 2023
Author: Jane Z. He
Engineer III (Construction Standards Lead)
(519) 255-6100 Ext. 6358
jhe@citywindsor.ca
Design - Engineering
Report Date: 2023-03-03
Clerk's File #: SW/14546

To: Mayor and Members of City Council

Recommendation:

I. THAT Council **APPROVE** entering into a cost sharing and consent to enter agreements with St. Clair College for the road improvement work on the College lands as part of the Cabana Corridor Improvements Phase 4 tender #151-22, as follows:

a. St. Clair College to reimburse the City of Windsor the amount of $450,000 plus HST for the road improvement work on the College Lands as part of the Cabana Corridor Improvements Phase 4 Project; and

b. St. Clair College to provide a Consent to Enter to the City and its Contractors , during and until the final completion date of the Cabana Phase 4 construction project, to enter upon part of the lands municipally known as 3995 & 3900 Geraedts Drive, and 2000 Talbot Road, as shown on the aerial image and work drawing attached as Appendix A.1 & A.2 and legally described as SANDWICH WEST CON 4; PT LOT 2; PLAN 1363; BLKS K; L; M N; P & PT BLK O; LANE; LOTS 811 TO 842; 853 TO 866; PT RANKIN AVENUE; PLAN 1438; LOTS 1 TO 3 & 10; PT LOTS 11 TO 17; PT BLK J; PT ALLEY; RP 12R24499 (the "**Land**");

and;

II. THAT the Chief Administrative Officer and the City Clerk **BE AUTHORIZED** to sign a Cost Sharing and Consent to Enter Agreements with St. Clair College, as described in recommendation I, satisfactory in form to the Commissioner of Legal & Legislative Services, in technical content to the Commissioner of Infrastructure Services, and in financial content to the Commissioner of Corporate Services CFO/City Treasurer.

Executive Summary:

N/A

Background:

City Council approved the multi-phased Cabana Corridor Improvements project in the 2016-2019 capital budget to proceed with the corridor engineering and construction work. The first three construction phases are complete.

Request for tender(RFT) #151-22 Cabana Corridor Improvements Phase 4, from Highway 3 to Mount Carmel Drive, closed on February 2, 2023. Amico Infrastructures Inc. is the low bidder and will be City's Contractor for the Phase 4 construction.

The Phase 4 construction work includes the intersection of Cabana Road W- Glenwood Avenue/Geraedts Drive. The south leg of the intersection is fully located on the St. Clair College lands.

Discussion:

Cost Sharing with the College

City's project team worked closely with the College during the design and tendering process. The St. Clair College board approved the proposed cost sharing in the amount of $450,000 plus HST during their February 28, 2023 meeting.

Consent to Enter

A Consent to Enter agreement with the College is required for the City and its contractors to conduct the construction activities on the Lands while also providing indemnity protection for the College.

Risk Analysis:

There is no significant risk with approving this report. The Consent to Enter protects the City from risks associated with the potential of damaging existing conditions during project construction and maintenance periods.

Climate Change Risks:

N/A

Financial Matters:

The Financial Planning Administrator for Engineering has confirmed there is sufficient funding in the capital project 7152001 – Cabana/Division Corridor Improvements. The cost sharing amount represents works on private property and the recovery is incorporated into the overall budget.

Consultations:

Aaron Farough – Legal Counsel – Legal, Real Estate & Risk Management

Linda Mancina– Financial Planning Administrator

Michael Dennis – Financial Manager of Asset Planning

Conclusion:

Administration recommends entering into the Cost Sharing and Consent to Enter agreement with St. Clair College.

Planning Act Matters:

N/A

Approvals:

Name	**Title**
Fahd Mikhael	Manager of Design
France Isabelle-Tunks	Executive Director of Engineering / Deputy City Engineer
Chris Nepszy	Commissioner of Infrastructure Services

Name	Title
Shelby Askin Hager	Commissioner of Legal & Legislative Services
Joe Mancina	Commissioner of Corporate Services/ Chief Financial Officer
Onorio Colucci	Acting Chief Administrative Officer

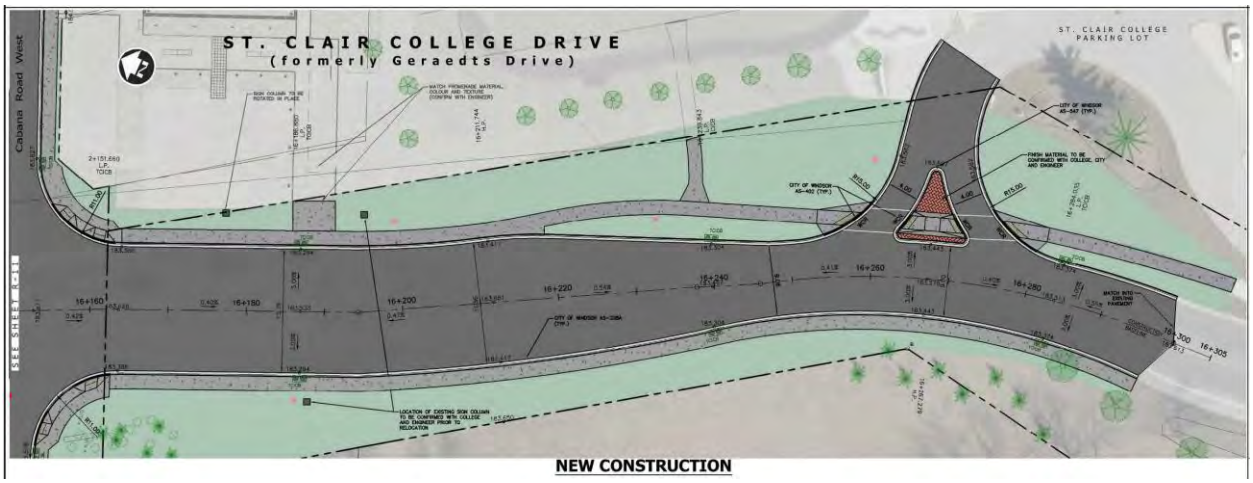
Notifications:

Name	Address	Email
Rebecca Demchuk Associate Vice President Safety, Security & Facilities Management	St. Clair College 2000 Talbot Road, Windsor ON	rdemchuk@stclaircollege.ca

Appendices:

1 Appendix A.1 - Cabana Corridor Improvements Phase 4 Work Area on the College Land - Aerial Map
2 Appendix A.2 - Cabana Corridor Improvements Phase 4 Work Area on the College Land – Proposed Work

Appendix A.1 Cabana Phase 4 Work Area on the St. Clair College Land – Aerial Map



Appendix A.2 Cabana Corridor Improvements Phase 4 – Tendered Work on the College Lands

THE CITY OF WINDSOR ONTARIO, CANADA

Council Report: C 29/2023

Subject: Private Access Culvert within the Little 10th Concession Drain for 3940 Lauzon Road - Ward 9

Reference:

Date to Council: March 20, 2023
Author: Tom Graziano
Engineer III – Drainage Superintendent
(519) 255-6257 Ext 6490
tgraziano@citywindsor.ca
Development - Engineering
Report Date: 2023-02-28
Clerk's File #: SW2023

To: Mayor and Members of City Council

Recommendation:

I. That City Council **ADOPT** the Drainage Engineer's Report for improvements to the Little 10th Concession Drain completed by Baird AE, dated February 2, 2023 to install private access culverts for the property at 3940 Lauzon Road in accordance with Section 45 of the Drainage Act; and,

II. That City Council **APPROVE** By-law ____/2023 in accordance with Section 58 of the Drainage Act.

Executive Summary:

N/A

Background:

The Little 10th Concession Drain is designated as a Municipal Drain requiring an engineer's drainage report under Ontario's Drainage Act to grant approval for enclosing any portion of it.

The property owner had submitted a Section 78 Request for Drainage Improvement for a driveway culvert to access the property at 3940 Lauzon Road.

At the meeting of August 8, 2022, City Council adopted CR 350/2022 as follows:

I. *"THAT the firm of Baird AE **BE APPOINTED** as the Drainage Engineer in accordance with section 8 of the Drainage Act, to prepare a Drainage Report for a new access bridge over the Little 10th Concession Drain, serving municipal address 3940 Lauzon Road (Property Roll No. 090-040-01900), under Section 78 of the Drainage Act."*

Discussion:

The Engineer's Report addresses the owner's request to enclose a portion of the drain to install a culvert over the Little 10th Concession Drain at 3940 Lauzon Road.

Council Resolutions CR388/2007 and CR64/2015 confirm that the municipality would absorb all municipal drain maintenance costs through the general tax levy, except for private access structures and "special benefit" works benefiting individual properties, as authorized by the Province of Ontario through the *City of Windsor Act, 1968*. The private structure(s) proposed for this location are for the sole benefit of the property owners and will not be funded through the general levy.

Traditionally, the engineer's drainage report is considered at a meeting of Council and provisionally adopted by by-law when given two readings in accordance with Section 45 of the Drainage Act. The Drainage Report shall then be deemed to be adopted and the by-law shall be known as a Provisional By-law. Council shall then, within 30 days after adoption of the Drainage Report, send a copy of the Provisional By-law and Notice of the Court of Revision meeting to all affected landowners listed in the schedule of assessment.

The owner of the properties at 3940 Lauzon Road has agreed to pay the full costs of the assessment as stated in the Drainage Report, and therefore no costs shall be borne to the upstream property owners or the City. A copy of the engineer's report, dated February 2, 2023, is attached.

Therefore, there is no reason to proceed with a Court of Revision hearing. All three readings of the By-law are proposed to be considered for this meeting of City Council and the By-law may be passed by giving third reading of the by-law.

Risk Analysis:

There are no major risks inherent with the recommendation. Adoption of the recommendation will ensure that the development remains compliant with Drainage Act and that the conveyance capacity of the proposed culvert is confirmed by an engineer.

Climate Change Risks

Climate Change Mitigation:

The recommendation does not contribute to the mitigation of climate change.

Climate Change Adaptation:

The recommendation does not contribute to the adaptation for climate change.

Financial Matters:

The property owner(s) will pay directly for all costs inherent with the authoring of the Drainage Report and the construction of the associated works.

Consultations:

Wira Vendrasco, Deputy City Solicitor, Legal & Real Estate

Linda Mancina, Financial Planning Administrator

Conclusion:

Administration recommends that City Council pass the By-law to adopt the report prepared by Baird AE., dated February 2, 2023 as the Drainage Engineer for improvements to the Little 10th Concession Drain in accordance with Section 45 and Section 58 of the Drainage Act with all costs payable by the property owner.

Planning Act Matters:

N/A

Approvals:

Name	Title
Stacey McGuire	Manager of Development
France Isabelle-Tunks	Executive Director of Engineering / Deputy City Engineer
Chris Nepszy	Commissioner, Infrastructure Services
Shelby Askin Hager	Commissioner of Legal and Legislative Services
Onorio Colucci	Chief Administrative Officer

Notifications:

Name	Address	Email
Halliday Pearson, P. Eng.	27 Princess St, Unit 102, Leamington, ON N8H 2X8	hpearson@bairdae.ca
James Bryant, Essex Region Conservation Authority	360 Fairview Ave West, Suite 311, Essex, ON, N8M 1Y6	JBryant@erca.org

Appendices:

1 New Driveway Access and Drain Enclosures Over the Little 10th Concession Drain - Drainage Engineer's Report - Baird AE, February 2, 2023

New Access Culvert over the Little 10th Concession Drain

For Roll No. 090-040-01900

The City of Windsor

February 2, 2023

Project No. 22-060

BAIRD|AE
architecture + engineering
27 Princess St., Unit 102
Leamington, ON N8H 2X8
519.326.6161 TF 1.844.842.9188
bairdAE.ca

February 2, 2023

BAIRD|AE
architecture + engineering

27 Princess St.
Unit 102
Leamington, ON
N8H 2X8
519.326.6161
1.844.842.9188
bairdAE.ca

The City of Windsor
City Hall
Windsor ON N9A 6S1

Mayor and Members of Council,

Subject: New Culvert over the Little 10th Concession Drain
Roll No. 090-040-01900
In the City of Windsor
Our File Reference 22-060

1.0 Authorization

A request was received by the City of Windsor from the landowner of parcel 090-040-01900 for the construction of a new culvert over the Little 10th Concession Drain. Council accepted the request under Section 78 of the Drainage Act (the Act) and on August 8, 2022, appointed the undersigned to prepare a report for the construction of said culvert.

2.0 Purpose of Report and Current Engineer's Report

The purpose of this report is to provide plans and specifications for the construction of a new culvert to provide access for a proposed dwelling. This report provides a description and estimated cost of the proposed work and a recommendation for distribution of the construction and incidental costs related to the work. This report further provides for the distribution of future maintenance costs. The assessments provided in this report are based on the estimated cost of the work. These assessments will be pro-rated to the actual cost of the project upon completion of the work.

The last repair and improvement were made to the Little 10th Concession Drain based on a report prepared by Tim Oliver, P.Eng. dated August 15, 2013. Under this report, the drain was improved through brushing, cleaning of the drain bottom and replacement of numerous bridges.

Prior to the 2013 report, the Little 10th Concession Drain was last improved under a report prepared by C.G. Russell Armstrong, P.Eng., dated October 3, 1968.

3.0 Site Meeting

On November 16, 2022, a meeting was held to discuss the proposed work.

The following people were in attendance:

Name	Address
Mike St. Jules	3945 Lauzon Road
Dan Nicodeni	3575 Lauzon Road
Andy Schentzer	4000 Lauzon Road
Sevgi Koprulu	3930 Lauzon Road
Alessia Mussio	Town of Tecumseh
Joseph Lappalainen	Town of Tecumseh
Tom Graziano, P.Eng	City of Windsor
Halliday Pearson, P.Eng.	Baird AE
David Basilious, P.Eng.	Baird AE

Mr. Graziano welcomed attendees and explained that this meeting was being held to discuss the culvert proposed for the new residence at 3940 Lauzon Road.

All construction costs will be assessed to the subject parcel. Future maintenance of the new primary culvert will be shared between the owner and the upstream lands and roads.

Mr. Basilious discussed the Drainage Act process. After the report is received by the City, it takes approximately three (3) months to move through the process. A meeting to consider the technical aspects of the report will be held before Council. As the owner is being assessed 100% of the construction cost, a Court of Revision waiver may be signed. The Engineer and/ or the Drainage Superintendent will contact the owner at the appropriate time to discuss the waiver.

4.0 Survey and Investigation

The subject section of the Little 10th Concession Drain flows northwesterly along the east side of Lauzon Road. A plan showing the drain layout and proposed culvert location is attached to this report.

Cross-section information was obtained at the desired location of the new access culvert, approximately 315 metres north of County Road 42. Drain bottom elevations and downstream culvert information were also recorded.

Approximately 32 metres downstream of the proposed culvert location, there is an existing culvert constructed of 8m of 1780mm x 1360mm aluminized CSPA with concrete jute bag headwalls providing access to a residential parcel. The upstream culvert provides access to agricultural lands and consists of 11m of 1780mm x 1360mm aluminized CSPA with concrete jute bag headwalls, approximately 209 metres south of the proposed culvert.

5.0 Recommendations

Based on our hydraulic calculations, site survey, investigations and discussions with the City and landowners, we would recommend the following:

> 7.32 metres of 1220x 1920mm reinforced elliptical concrete pipe, Class HE I with poured concrete headwalls.

We have based the proposed invert elevations on the existing drain bottom elevations, upstream and downstream culvert inverts and the design grade provided in the 2013 report. The work shall be carried out in accordance with the attached specifications, accompanying drawings and under the provisions of the Act.

6.0 Fisheries Issues

The Little 10th Concession Drain is a Type 'F' drain. We would recommend the following measures be utilized to mitigate damage to the drain during construction:

- No work shall be undertaken between March 15 and June 30;
- All work shall be completed in the dry;
- Culverts shall be installed with a minimum of 10.0% embedment;
- All disturbed soils shall be stabilized upon completion of the work;
- Sediment control shall be implemented during construction;
- Contractor shall prevent entry of petroleum products, debris and deleterious substances into the water.

An ERCA permit will be required for the construction of this access culvert as the Little 10th Concession Drain is located within the regulated area and is under the jurisdiction of ERCA.

A Species at Risk Screening was completed. The screening indicates that snake species are a concern for this work area. Standard mitigation measures apply and are available by contacting the Drainage Superintendent.

A self-assessment was completed to determine if Fisheries and Oceans Canada (DFO) would need to review this project. Based on the DFO Self-Assessment website, we have determined that the work laid out in this report does not require DFO review. However, standard measures for fish and habitat mitigation should be implemented.

7.0 Drawing and Specifications

Attached to this report is Drawing No. 22-060, which consists of plans showing the location of the proposed works, the land affected and the details and cross-sections of the recommended work. The design drawings are attached to this report in Appendix B.

Specifications are included in this report describing the dimensions, grades, disposal of material, working areas for construction and future maintenance, and other particulars of the recommended work. Specifications can be found in Appendix A of this report.

8.0 Working Area

The Contractor shall complete the work from the Lauzon Road right-of-way.

9.0 Estimate of Cost

Our estimate of the total cost of this work, including all incidental expenses, is the sum of **SIXTY TWO THOUSAND ONE HUNDRED AND FIFTY** ------ dollars (**$62,150.00**) made up as follows:

CONSTRUCTION

Item	Quantity	Description		Amount
1.	L.S.	Price includes supply and placement of 7.32 metres of 1220x 1920mm reinforced elliptical concrete pipe, Class HE I; supply, placement and compaction of new granular 'A' material; supply and construction of poured concrete headwalls; cleaning of existing drain 6.0 metres from each end of pipe; traffic control; supply, installation and maintenance of silt fence downstream of culvert	$	40,000
2.	L.S.	Existing field tiles to be extended to downstream end of pipe at both culvert locations, as required.	$	1,500
3.	L.S.	Supply and placement of good quality topsoil, hydroseed and mulch on all disturbed portions of the drain	$	1,000
Total for Construction (excluding HST)			$	**42,500**

INCIDENTALS

Estimated cost of site meeting and survey	$	1,200
Estimate cost of design, report, assessment, estimate and specifications	$	5,300
Estimated cost of assistants, expenses and drafting	$	2,000
Estimated cost of letting contract	$	1,000
Estimated cost of supervision and inspection during construction	$	1,500
Attendance at public meetings	$	1,000
Estimated cost of ERCA permit	$	500
		=======
Total for Incidentals (excluding HST)	**$**	**12,500**
Total for Construction (brought forward)	$	42,500
Sub-Total for Incidentals and Construction	**$**	**55,000**
HST Payable	$	7,150
		=======
TOTAL ESTIMATE	**$**	**62,150**
		=======

10.0 Construction Assessment

This culvert shall provide primary access to the adjacent parcel. Therefore, the cost of the culvert shall be assessed 100% to parcel 090-040-01900.

11.0 Maintenance Assessment

Future maintenance of the subject culvert shall be undertaken using the attached specifications. The maintenance cost shall be assessed 50% to parcel 090-040-01900 with the remaining cost being assessed as Outlet to the upstream lands and roads on an affected area basis in accordance with the current by-law.

The cost of future maintenance on surface materials other than Granular 'A' and the cost of any special features shall also be assessed 100% as Benefit to the lands served by the culvert.

12.0 Grant

In accordance with the provisions of Sections 85, 86 and 87 of the Act, a grant in the amount of 33-1/3 percent of the assessment eligible for a grant may be made in respect to the assessment made under this report upon privately owned lands used for agriculture.

The subject lands do not qualify for this Provincial grant.

All of which is respectfully submitted,

BAIRD AE
27 PRINCESS STREET, SUITE 102
LEAMINGTON, ONTARIO
N8H 2X8

Halliday Pearson, P.Eng.

APPENDIX A
Specifications

Construction Specifications

1.0 Pipe Material

The Contractor shall supply and place 7.32 metres of 1220x 1920mm reinforced elliptical concrete pipe, Class HE I.

2.0 Working Area

The Contractor shall complete the works from the Lauzon Road right-of-way as provided for under Section 63 of the Act. The Contractor is responsible for providing appropriate traffic control per Book 7 Temporary Conditions.

3.0 Excavated Material

The Contractor shall cast all excavated material on the adjacent agricultural lands. Excavated material shall be spread to a depth of no more than 100 mm and shall be kept at least 0.5 metres clear from the finished edge of the drain, care being taken not to fill any existing tiles, ditches, furrows or drains with the excavated material. Debris (garbage, wood pieces, concrete, etc.) shall be removed from the excavated material and disposed of offsite at a location determined by the Contractor at their expense.

4.0 Location and Elevation of Culvert

The proposed location and elevations of the culvert shall be according to the drawings, 22-060.

5.0 Placement of Culvert & Headwalls

The Contractor shall construct suitable dykes in the drain so that installation of the culvert can be completed in the dry. The Contractor shall perform the excavation, placement of pipe and backfill in a dry condition and shall provide all required pumps and/ or equipment to enable the work to proceed in the dry. The Contractor shall ensure that flows in the open drain are maintained and that the dyked drain does not result in flooding upstream of the construction area. Weather conditions shall be monitored by the Contractor.

The Contractor shall excavate all vegetation, topsoil and existing granular material from the bank slopes and bottom of the existing drain. Excavated material shall be spread as described in Item 3.0.

The required work includes supply and placement of the pipe specified in 1.0 Pipe Material. The Contractor shall supply new granular ‘A’ materials. The pipe shall be installed per OPSD 802.050 and 807.050.

The Contractor shall carefully unload, handle and place the specified pipe so as not to damage. Damaged material or distorted from improper installation will not be accepted.

The Contractor shall construct poured concrete headwalls at either end of the pipe. These headwalls shall conform to OPSD 804.040 and City of Windsor AS-209A. The Contractor shall supply to the Engineer a shop drawing for approval prior to commencing construction.

6.0 Granular ‘A’ Driveways

The Contractor shall construct a driveway approach from the edge of the road across the drain to a minimum of 1.0 metre beyond the north drain bank. The Contractor shall supply, place and compact a minimum of 300mm of granular ‘A’ for the driveway surface. At the road edge, the driveway shall be widened as shown on the attached plans.

7.0 Alignment

The alignment of the pipes throughout shall be to the full satisfaction of the Drainage Superintendent or Engineer in charge. The whole of the work shall be done in a neat, thorough and workmanlike manner to the full satisfaction of the Drainage Superintendent or Engineer.

8.0 Location of Structures, Etc.

The Contractor shall satisfy himself as to the exact location, nature and extent of any existing structure, utility or other object which he may encounter during the course of the work. The Contractor shall indemnify and save harmless, the Municipality and the Engineer for any damages which he may cause or sustain during the progress of the work. He shall not hold the Municipality or the Engineer liable for any legal action arising out of any claims brought about by such damage caused by him.

9.0 Damage to Travelled Portion of Municipal Road

The Contractor will be responsible for any damage caused by him to any portion of the municipal road system, especially to the travelled portion. When excavation work is being carried out and the excavation equipment is placed on the travelled portion of a road, the travelled portion shall be protected by having the excavation equipment placed on satisfactory timber planks or timber pads. If any parts of the travelled portion of the road is damaged by the Contractor, the road authority shall have the right to have the necessary repair work done by its employees and the cost of all labour and materials used to carry out the repair work shall be deducted from the Contractor's contract and credited to the road authority.

10.0 Construction Safety

The Contractor shall comply with all the requirements of the Occupational Health and Safety Act, 1990 and the regulations passed in connection therewith, as administered by the Ontario Ministry of Labour and all subsequent amendments of the said Act.

The Contractor shall exercise all possible precaution against injury to persons or property resulting from his work. The Contractor shall leave no trenches, pits, holes or excavations uncovered, without providing sufficient protection at all times. The Contractor shall install, erect and provide barricades, signs, traffic cones, flashers, lights, plates, warning and other devices, materials and personnel as may be required and at his own expense in order to provide for the safe passage and control of traffic and to ensure public safety. All traffic control shall be in accordance with the latest standards of the Ministry of Transportation.

11.0 Certificate of Clearance

The Contractor will be required to submit to the Municipality a Certificate of Good Standing from the Workplace Safety & Insurance Board prior to the commencement of the work and the Contractor will be required to submit to the Municipality, a Certificate of Clearance for the project from the Workplace Safety & Insurance Board before final payment is made to the Contractor.

12.0 Progress Orders

Monthly progress orders for payment shall be furnished to the Contractor by the Commissioner in charge; said orders shall not be for more than 90% of the value of the work done and the materials furnished on the site. The paying of the full 90% does not imply that any portion of the work has been accepted. The remaining 10% will be paid 60 days after the final acceptance and completion of the work.

13.0 Cleaning Up

The Contractor shall leave the whole of the site of the work in a neat, thorough and workmanlike appearance to the full satisfaction of the Drainage Superintendent or Engineer. The Contractor shall haul away any excess earth from the site. He shall haul to the site, sufficient earth to fill any depressions caused by his work at his own expense. The site shall be left as close as possible in the same condition as it was prior to the commencement of the work.

14.0 Measurement and Payment

Payment for the work shall be on a unit price basis unless otherwise indicated and shall include all the work shown on the accompanying drawings and specifications.

15.0 Maintaining Flow

The Contractor shall maintain the flow of any drainage works encountered in the progress of the work and at no expense to the Owner. The Contractor shall obtain written approval from the Drainage Superintendent or Engineer in charge to stop up any drain and if necessary provide pumping equipment, build necessary by-passes, etc. at no expense to the Owner.

16.0 Notification of Work

Prior to commencing any work of installing the extension of the culvert or removing any existing structures, the Contractor shall inform the Drainage Superintendent of his intent to commence work at least 48 hours prior to commencing any work. The Owner or Contractor shall endeavour to install and complete the new structure without delay once he has commenced the work. If for any reason the work does not proceed continuously then the

Owner or Contractor shall notify the Drainage Superintendent in advance of any backfilling operation or headwall construction so that he may schedule inspection of same. The completed work must be done to the satisfaction of the Drainage Superintendent and be approved by him.

17.0 Final Inspection

Upon completion of the work, the Drainage Superintendent and/ or Engineer shall perform a final inspection to ensure the work complies with the drawings and specifications provided herein. Should deficiencies be noted, the Contractor shall immediately make repairs satisfactory to the Drainage Superintendent and/ or Engineer.

18.0 Maintenance

The Contractor shall repair and make good at his expense any damages or faults in the work that may appear within one year after its completion (as evidenced by the final inspection report), as the result of imperfect or defective work done or materials furnished. Nothing herein contained shall be construed as any way restricting or limiting the liability of the Contractor under the appropriate laws under which the work is being done.

19.0 Tile Drains

Should the Contractor encounter tile drains with the proposed culvert limit, the Contractor shall re-route the tile drain in consultation with the Drainage Superintendent and/ or Engineer. The tiles shall be extended and routed downstream. Tile drain connections through the wall of the pipe will not be permitted.

20.0 Restoration

The complete maintenance works shall be done in a neat, thorough, and workmanlike manner, and shall be cleaned up to the full satisfaction of the Consultant.

The whole of the work shall be satisfactorily cleaned up and during the course of the construction no portion shall be left in any untidy or incomplete state before subsequent portions are undertaken.

All driveways, access bridges, or any other means of access onto the job site shall be fully restored to their former condition at the Contractor's expense. Before authorizing Final Payment, the Consultant shall inspect the work in order to be sure that the proper restoration has been performed.

The Contractor will be fully responsible for the restoration of all areas disturbed by his operations in the carrying out of this work. The Contractor shall supply topsoil so that he can place a minimum of 100 mm in depth of topsoil over the restoration area. Any depressions caused by equipment or due to the movement of materials shall be backfilled with topsoil and satisfactorily levelled and raked in place on all lawn areas to be restored. The Contractor shall seed and mulch said areas in accordance with 21.0 Seeding and Mulching.

21.0 Seeding and Mulching

The Contractor shall fine grade the finished surfaces and shall apply hydroseeding and mulch. The seeding and mulching operation shall be carried out according to O.P.S.S. Spec. 572 or as amended herein and the operation shall include the supplying and placing of the following:

A)	Seed Mixture	- Creeping Red Fescue	- 50%
		- Red Top	- 20%
		- Canada Blue Grass	- 15%
		- Kentucky Blue Grass	- 15%
B)	Nurse Crop	- Oats if seeding and mulching is performed during May or June.	
		- Annual Rye Grass if seeding and mulching is performed during Sept. or Oct.	
C)	Fertilizer	- 5·20·10 mixture	
D)	Mulch	- Wood Cellulose Fibre or Straw	
E)	Adhesive	- Asphalt Emulsion if straw mulch used	
		- Liquid Polyvinyl Acetate if wood fibre mulch used	

The application rates shall be as follows:

A)	Grass Seed Mixture	- 90 lbs./acre
B)	Fertilizer	- 350 lbs./acre
C)	Nurse Crop Seed	- 55 lbs./acre
D)	Mulch	- 1300 lbs./acre if wood fibre used
		- 1" to 2" depth if straw used
E)	Adhesive	- 200 imp.gal/acre for Asphalt Emulsion
		- 205 lbs./acre for Liquid Polyvinyl Acetate

The seeding and mulching operation shall be only carried out as weather conditions permit during the months of May and June in the Spring, and September and October in the Fall. If the excavation work is carried out during the months of May and June, or September or October, the Contractor has the option of contacting the Drainage Superintendent and if the Contractor receives his written permission, the seed mixture as above specified, may be placed on the excavated side slopes by the Contractor by hand, daily, at the completion of his daily excavation operation. If the Contractor has been given written permission by the Drainage Superintendent to place the seeding mixture by hand daily, at the completion of his daily excavation operation, the Contractor shall be responsible to give the side slopes a rough, harrowed texture prior to placing the seed mixture.

22.0 Fires and Disposal of Wastes

Fires and burning of rubbish on site will be permitted only with special approval from the City.

The Contractor shall not bury rubbish and waste materials on site unless approved by the Engineer and all applicable approving authorities. The site shall be maintained free of accumulated waste and rubbish. All waste materials should be disposed of in a legal manner at a site approved by all local approving authorities and the Engineer.

The Contractor shall not allow deleterious substances, waste or volatile materials such as mineral spirits, or paint thinner, to enter into waterways, storm or sanitary sewers.

23.0 Pollution Control

The Contractor shall maintain under this Contract temporary erosion, sediment and pollution control features installed. The Contractor shall control emissions from equipment and plant to local authorities' emission requirements. The Contractor shall not cause excessive turbidity when performing in-water work. The Contractor shall not allow any debris, fill or other foreign matter to enter into the waterway. The Contractor shall remove from the waterway, all extraneous materials resulting from in-water work.

The Contractor shall abide by local noise By-Laws for the duration of the Contract.

Spills of deleterious substances into waterways and on land shall be immediately contained by the Contractor and the Contractor shall clean up in accordance with Provincial regulatory requirements. All spills shall be reported to the Ontario Spills Action Centre (1-800-268-6060), local authorities having jurisdiction and the Engineer.

To reduce the risk of fuel entering the waterway, refuelling of machinery must take place a safe distance from the waterway. The Contractor shall note that the Engineer or the Owner takes no responsibility for spills, this shall be the sole responsibility of the Contractor.

24.0 Drainage

The Contractor shall not pump water containing suspended materials into waterways, sewers or drainage systems. The Contractor shall be solely responsible for the control, disposal or runoff of water containing suspended materials or other harmful substances in accordance with these specifications, and local authority requirements. The Contractor shall provide temporary drainage and pumping as necessary to keep excavations and site free from water. The Contractor shall install and maintain sediment control devices as indicated on the Contract Drawing and as directed by the Engineer.

25.0 Protection of Vegetation

The Contractor shall exercise the utmost caution to ensure that existing trees and plants on-site and on adjacent properties are not damaged or disturbed unless noted otherwise in the Removals Special Provisions of this Contract. The Contractor shall restrict tree removal to areas indicated on the Contract Drawings and/or designated on-site. No trees or shrubs shall be removed without the approval of the Engineer.

26.0 Dust Control

The Contractor will be solely responsible for controlling dust nuisance resulting from his operations, both on the site and within adjacent right-of-ways.

Water and calcium chloride shall be applied to areas on or adjacent to the site as authorized

by the Engineer as being necessary and unavoidable for the prevention of dust nuisance or hazard to the public. No payment will be made for dust control unless otherwise specified in the Special Provisions.

27.0 Restrictions for In-Water Works

The Contractor shall only perform in-water works during times when conditions permit reasonable production rates to be achieved. The Contractor shall be required to adopt good housekeeping practices that minimize disturbance to the site and the adjacent waterway.

The Contractor shall note that this Project is subject to approval from the Essex Region Conservation Authority and as such, any possible turbidity caused by the construction of the shore protection works is of key importance.

The Contractor shall minimize the turbidity (sedimentation) produced by any in-water works construction or operations. The Contractor will be ordered to cease operations if, in the opinion of the Engineer or authorities having jurisdiction, the in-water work is producing unacceptable amounts of turbidity in the waterway. Based on this, the Contractor shall either adjust his operation(s) to produce lower turbidity levels, wait for more favourable conditions before operations will be allowed to continue, or undertake approved mitigating measures (e.g. sediment control, etc.). All costs associated with the above will be the sole responsibility of the Contractor, and no claims for extras or delays will be considered.

28.0 Fish Habitat

No work shall be undertaken when there is likelihood of adverse effects on fish spawning or fish habitat in downstream water.

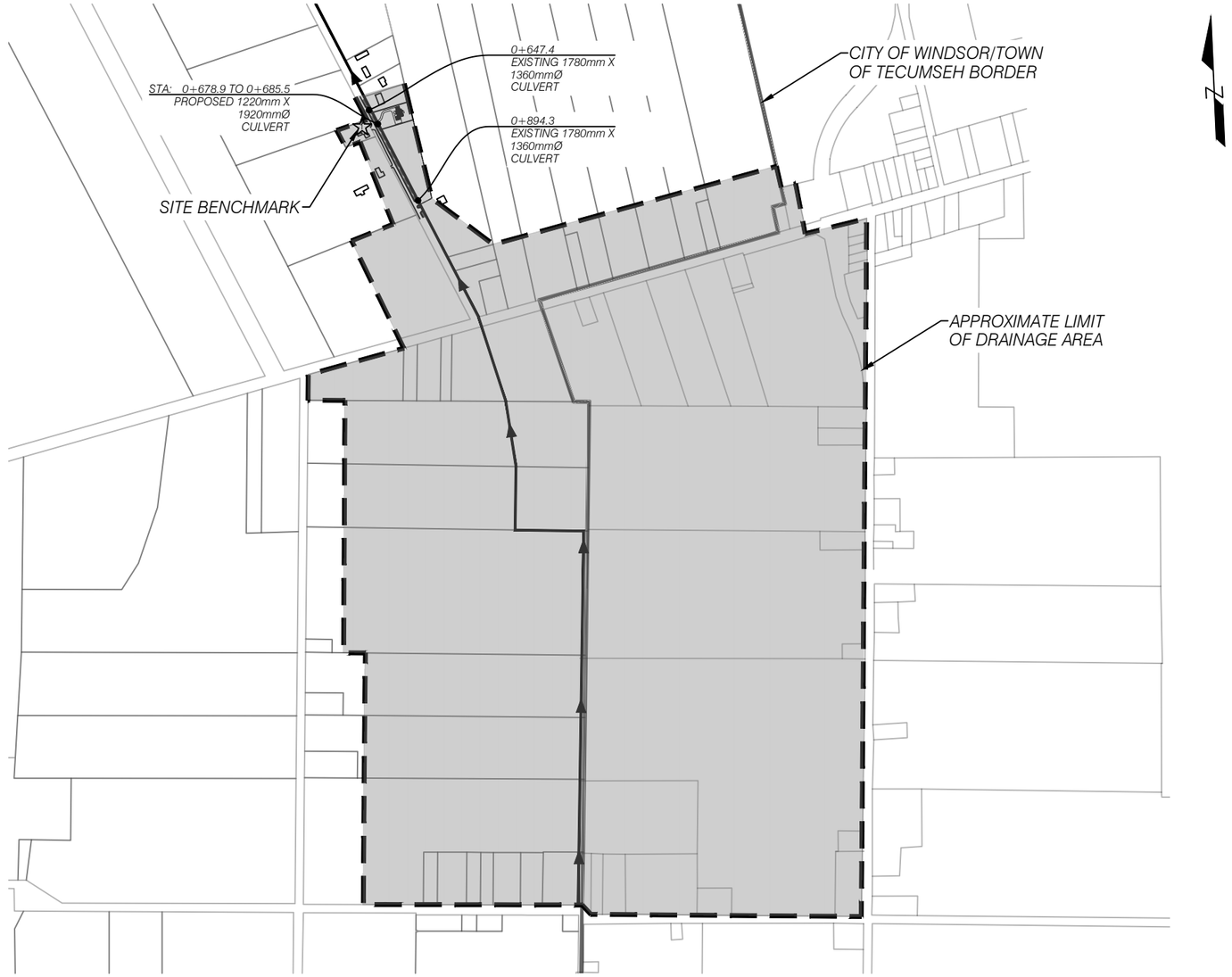
APPENDIX B
Drawings

SHEET INDEX:

SHEET NUMBER	SHEET TITLE
SHEET 1	TITLE PAGE & DRAINAGE AREA
SHEET 2	PROPOSED CULVERT DETAILS

BENCHMARK:

BENCHMARK 1: ☆
TOP NUT OF FIRE HYDRANT ON LAUZON RD
ELEVATION *183.003*m



LITTLE 10th CONCESSION DRAIN

SCALE: N/A

BAIRD|AE
architecture + engineering

27 PRINCESS STREET, SUITE #102
LEAMINGTON, ONTARIO
N8H 2X8

700 – 1350 PROVINCIAL ROAD,
WINDSOR, ONTARIO
N8W 5W1

PROJECT TITLE:

LITTLE 10th CONCESSION DRAIN - NEW CULVERT
3940 LAUZON ROAD - CONCESSION 3 PT. LOT 136, CITY OF WINDSOR, ON

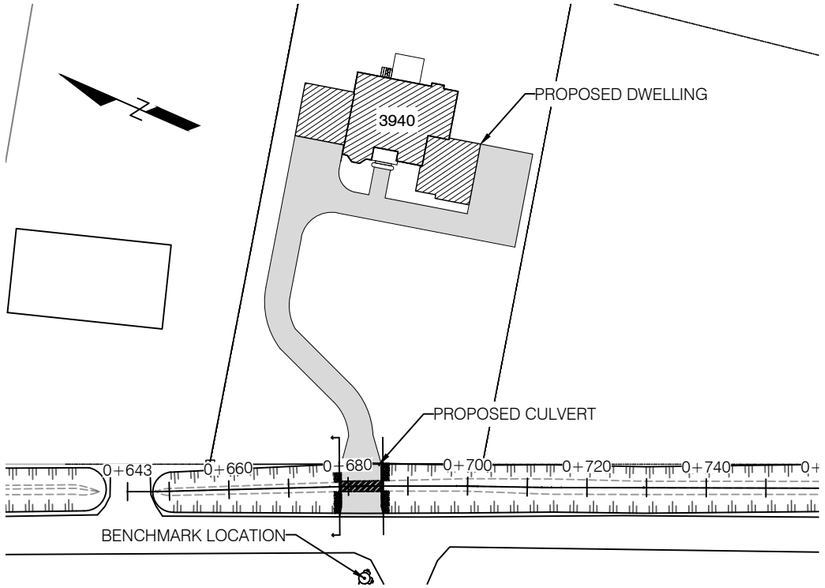
SHEET:

TITLE PAGE & DRAINAGE AREA

LICENSED PROFESSIONAL ENGINEER
H.P. PEARSON
100155936
23/02/02
PROVINCE OF ONTARIO

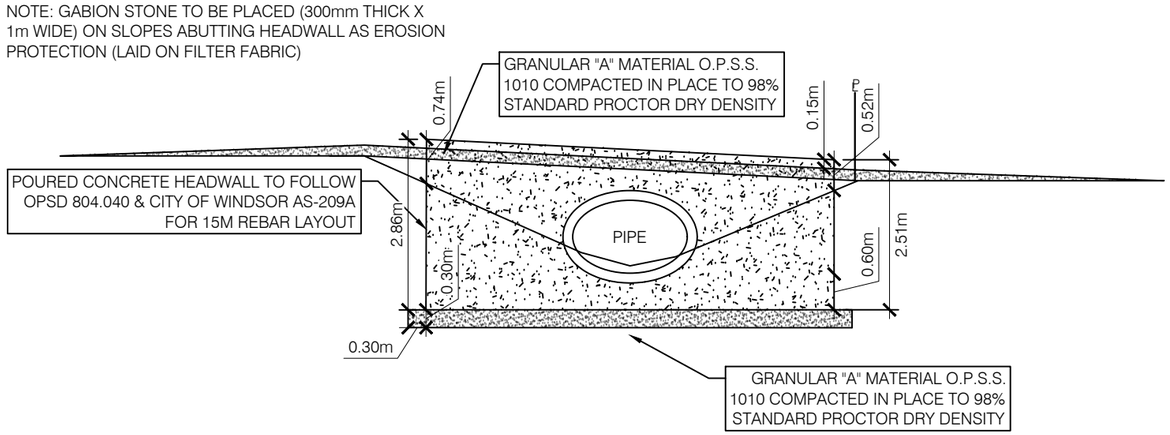
HALLIDAY P. PEARSON, P.ENG.

DRAWN BY:	SCALE:	DATE:
J.H.	AS NOTED	FEB 02, 2023
CHCK'D BY:	SHEET No. :	PROJECT No. :
H.P.P.	1 OF 2	22-060



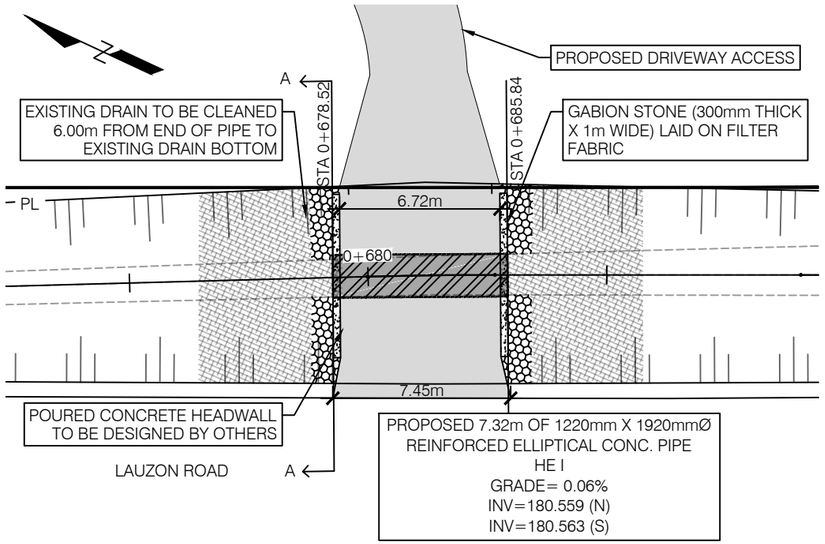
PLAN VIEW- CULVERT

SCALE: 1:1000



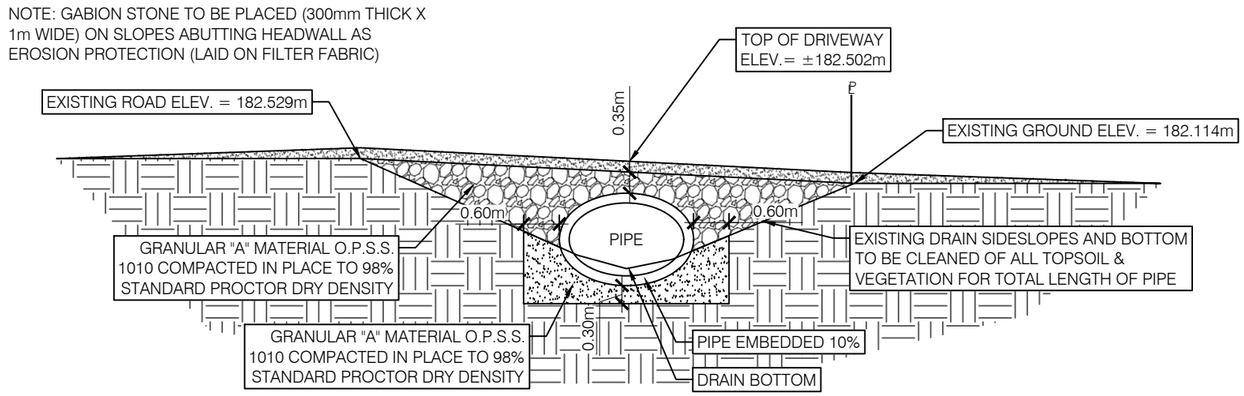
TYPICAL - POURED CONCRETE WALL

SCALE: 1:100



PLAN VIEW- CULVERT

SCALE: 1:250



CROSS SECTION - SECTION 'A' - 'A'

SCALE: 1:100

PROJECT TITLE:
LITTLE 10th CONCESSION DRAIN - NEW CULVERT

3940 LAUZON ROAD - CONCESSION 3PT. LOT 136, CITY OF WINDSOR, ON

SHEET TITLE:
PROPOSED CULVERT CROSS-SECTIONS

DRAWN BY:	SCALE:	DATE:
J.H.	AS NOTED	FEB 02, 2023
CHCK'D BY:	SHEET No. :	PROJECT No. :
H.P.P.	2 OF 2	22-060

BENCH MARK ELEVATION: 183.003m

BENCH MARK LOCATION: TOP NUT OF FIRE HYDRANT |

CULVERT SIZE	PIPE LENGTH	PIPE GAUGE	CORRUGATIONS	CULVERT TYPE	PIPE INVERT ELEVATIONS	FINISHED DRIVEWAY ELEVATIONS
1220mm X 1920mm CLASS HE I	7.32	HE I	N/A	REINFORCED ELLIPTICAL CONCRETE PIPE	UPSTREAM END: 180.563 DOWNSTREAM END: 180.559	182.502

Subject: Sunset Avenue From Wyandotte to College Project; Legal Agreements with University of Windsor - Ward 2

Reference:

Date to Council: March 20, 2023
Author: Isak Quakenbush
Engineer II
(519) 255-6100 ext. 6407
iquakenbush@citywindsor.ca
Design – Engineering
Report Date: 2023-03-02
Clerk's File #: APM/14495

To: Mayor and Members of City Council

Recommendation:

I. THAT Council **APPROVE** entering into a cost sharing agreement with the University of Windsor, for works associated with the University's steam tunnel currently encroaching within Sunset Avenue right of way, as part of the Sunset Avenue Sewer Rehabilitation Project; and,

II. THAT the Chief Administrative Officer and the City Clerk **BE AUTHORIZED** to sign an agreement with the University of Windsor, as described in recommendation I, satisfactory in form to the Commissioner of Legal & Legislative Services, in technical content to the Commissioner of Infrastructure Services, and in financial content to the Commissioner of Corporate Services CFO/City Treasurer; and,

III. THAT **APPROVAL BE GIVEN** to an easement acquisition on the following terms:

1. SELLER: **University of Windsor**
Attention: Richard Taylor, Director of Legal Services
Room 314 – Assumption Hall
400 Huron Church Road
Windsor, Ontario N9C 2J9
(Hereinafter the "**Seller**")

2.	**EASEMENT:**	A 360 m^2 (3,875 sq. ft.) permanent sanitary and storm easement through the property municipally known as 0 College Avenue (hereinafter the "**Subject Easement**")
3.	**LEGAL DESCRIPTION:**	Part of Sunset Avenue (closed), Registered Plan 693, to be further described on a Plan of Survey to be registered,
4.	**ACQUISITION PRICE:**	$1, plus HST if applicable. The City shall also be responsible for all reasonable legal fees and disbursements incurred by the Seller in connection with the transfer of the Subject Easement

IV. THAT the transaction identified in recommendation III **BE COMPLETED** electronically, where it is available, pursuant to By-Law 366-2003 and that the Chief Administrative Officer and the City Clerk **BE AUTHORIZED** to execute all documents necessary to complete the transaction, as required, and that the Commissioner of Legal & Legislative Services **BE AUTHORIZED** to execute documents standard to the real estate transaction; and,

V. THAT a Consent to Enter Agreement **BE AUTHORIZED** with the University of Windsor, for access to an additional 480 m^2 of the University's property, municipally known as 0 College Avenue to accommodate the construction of the City's sanitary sewer concurrent to registration of the easement identified in recommendation III and IV above, and that the Chief Administrative Officer and the City Clerk **BE AUTHORIZED** to sign such agreement; and,

VI. THAT Council **APPROVE** an amendment to the existing encroachment agreement with the University of Windsor for the portion of the tunnel that shall remain in the Sunset right of way; and that the encroachment application fee, and all annual encroachment fees in accordance with M67-2015 **BE WAIVED**; and,

VII. THAT the Chief Administrative Officer and the City Clerk **BE AUTHORIZED** to sign the amended encroachment agreement with the University of Windsor, satisfactory in form to the Commissioner of Legal & Legislative Services, in technical content to the Commissioner of Infrastructure Services, and in financial content to the Commissioner of Corporate Services CFO/City Treasurer.

Executive Summary:

N/A

Background:

The Sunset Avenue project from Wyandotte Street East to College Avenue was included in the 2019 capital budget under the city wide sewer rehabilitation program. During the design stage, the University requested to relocate their encroaching steam tunnel prior to the construction of the City's Sunset Avenue project. The University attempted to relocate the steam tunnel out of the right of way, tendering twice, but failed to award the contract due to their budget limitations. In June 2022, the University advised the City that they would not be moving the tunnel. After further discussions and coordination with the University, the City re-engaged the consultant to complete the design of Sunset Avenue Sewer Rehabilitation project with the tunnel remaining in place. The design is being completed and administration intends to tender and construct this summer.

Discussion:

The Following four items have been identified as needed by administration to ensure that the Sunset Avenue Sewer Rehabilitation project can move forward without further delay.

Reimbursement Agreement:

The University of Windsor owns a steam tunnel that encroaches on the public right of way along the majority of Sunset Avenue. The existing encroachment agreements, attached as Appendix A, outline that the University is responsible for costs associated with their encroachments' presence. As such, Administration has identified and presented to the University items that require reimbursement. These items included but were not limited to, consultant costs associated with design changes and delays, the associated impact to the design and costs of construction of the sewers and roadway. The reimbursement will be based on actual construction costs incurred.

Easement and Consent to Enter Agreement through Parking Lot H:

An easement and consent to enter agreements through Parking Lot H, owned by University of Windsor, known as 0 College Avenue, are required for the installation of the new sanitary sewer.

The permanent easement will encompass the new sanitary and existing storm sewer infrastructure to allow for construction and future maintenance. The approximate size of the permanent easement will measure 9 metres wide and the length of the parking lot which is approximately 40 metres (360 m^2).

The temporary consent to enter agreement will include the area of easement as well as extend 6 meters either side of the permanent easement to provide access and laydown areas for the contractor throughout the life of this project, including the maintenance period. The consent to enter agreement will increase the area available during construction by 480 m^2.

Encroachment Agreement for Sunset Avenue:

There are two existing encroachment agreements related to the University's tunnel, located within the Sunset Avenue right of way. These agreements do not cover the full length of the tunnel.

As part of the Sunset Avenue Sewer Rehabilitation project, a portion of the tunnel will be removed.

Once construction is complete, a new agreement that encompasses the full extent of the University's tunnel encroachment will be needed.

The easement acquisition price is estimated to be similar to the fees associated with the new encroachment agreement therefore waiving the encroachment fees associated with the ultimate tunnel is recommended.

Risk Analysis:

The cost sharing agreement will reduce the financial burden and risk of overrun due to work associated with the encroaching tunnel. The language will protect the City from risks associated with the tunnel and its existing condition during project construction and maintenance periods.

The permanent and temporary working easement through the University of Windsor's Parking Lot H are necessary to complete the sewer separation project and to ensure that the City has a registered interest in the subject land to protect its right to access the underground City infrastructure for maintenance, repair and/or replacement in the future.

The existing encroachment agreements are not sufficient or will be rendered not applicable by the Sunset Ave project. A new agreement that covers the full length of Sunset Avenue will reduce the City's risk and ensure that any legal obligations are clear moving forward.

Climate Change Risks:

N/A

Financial Matters:

Council has previously approved a budget of $3,610,571 for Project 7171003 - Sunset from Wyandotte to College. Financial Planning Administrator has confirmed there is sufficient funding in Project 7171003. The University of Windsor will reimburse the City for costs associated with work to accommodate the encroaching tunnel. This amount is estimated at $415,000 plus taxes, but as noted above, it will be based on the actual costs incurred during construction.

Consultations:

Aaron Farough – Legal Council – Legal & Real Estate

Linda Mancina– Financial Planning Administrator

Michael Dennis – Financial Manager of Asset Planning

Adam Pillon – Manager of Right of Way

Denise Wright – Lease Administrator

Wira Vendrasco – Deputy City Solicitor

Karina Richters – Supervisor Environmental Sustainability and Climate Change

Conclusion:

In order to move the Sunset Avenue Sewer Rehabilitation project forward, Administration recommends entering into the following agreements with the University of Windsor:

1. A cost sharing agreement for costs attributed to the encroaching steam tunnel.
2. A permanent easement to locate and allow for future maintenance of the sanitary and storm sewers.
3. A consent to enter agreement to facilitate the construction of the sanitary sewer.
4. A new encroachment agreement for the University steam tunnel.

Planning Act Matters:

N/A

Approvals:

Name	Title
Fahd Mikhael	Manager of Design
France Isabelle-Tunks	Executive Director of Engineering / Deputy City Engineer
Chris Nepszy	Commissioner of Infrastructure Services

Name	Title
Shelby Askin Hager	Commissioner of Legal & Legislative Services
Joe Mancina	Commissioner of Corporate Services/ Chief Financial Officer
Onorio Colucci	Acting Chief Administrative Officer

Notifications:

Name	Address	Email
Dan Castellan – Manager, Facility Planning, Renovations and Construction Richard Taylor – Director of Legal Services	University Of Windsor 401 Sunset Avenue, Windsor, ON, N9B-3P4	danc@uwindsor.ca richard.taylor@uwindsor.ca

Appendices:

1 Appendix A.1 - Encroachment Agreement - 2285 Wyandotte Street West - Service Tunnel Encroachment, CAO 1213, Indexed as Agreement A29195
2 Appendix A.2 - Encroachment Agreement - 712 Sunset - Multiple Conduits on California Ave and Sunset Ave, CAO 0334, Indexed as Agreement A33398

CORPORATION OF THE CITY OF WINDSOR

MISSION STATEMENT:
"The City of Windsor, with the involvement of its citizens, will deliver effective and responsive municipal services, and will mobilize innovative community partnerships"

Council Services/City Clerk

DATE: October 6, 2009 **FILE:** TS/7847

TO: City Engineer,
Attention: Wade Bondy, Manager of Right-of-Way
City Solicitor, AGR/4520
Attention: Patrick T. Brode, Senior Legal Counsel

FROM: Manager of Council/Community Services & Deputy Clerk

RE: **Encroachment Agreement – 2285 Wyandotte Street West– Service Tunnel Encroachment**
CAO1213

Enclosed for your records is a fully executed copy of the subject agreement indexed as Agreement A29195

Gary Cian

/J. Autterson
Manager of Council/Community Services & Deputy Clerk

/ja

Enclosure

THE CITY OF WINDSOR

COUNCIL SERVICES DEPARTMENT

VALERIE CRITCHLEY
CITY CLERK

IN REPLY, PLEASE REFER
TO OUR FILE NO. TS/7847

October 6, 2009

University of Windsor
Attn: Gary McMann, P.Eng.
Manager – Projects & Construction Facility Services
401 Sunset Avenue
Windsor, ON N9B 3P4

Dear Mr. McMann:

RE: Encroachment Agreement –
Service Tunnel on Sunset Avenue & California Avenue-
South of Wyandotte Street
CAO1213

Enclosed for your records are two fully executed counterparts of the subject agreement.

Should you have any questions with respect to this matter please contact Wade Bondy, Manager of Right-of-Way at 519-255-6351 extension 6145.

Yours very truly,

Gary Cian

Gary Cian
Manager of Council/Community Services & Deputy Clerk

/ja

Enclosure

Room 203-350 City Hall Square West ◆ City Hall ◆ Windsor, Ontario N9A 6S1
E-MAIL: clerks@city.windsor.on.ca ◆ TEL (519) 255-6211 ◆ FAX (519) 255-6868

THIS AGREEMENT made in triplicate, this 2nd day of June, 2009.

BETWEEN:

THE CORPORATION OF THE CITY OF WINDSOR,

Hereinafter called the CORPORATION of the FIRST PART

- and -

UNIVERSITY OF WINDSOR,

Hereinafter called the LICENSEE of the SECOND PART

WHEREAS the Licensee is the registered owner of certain lands and premises in the City of Windsor, in the County of Essex and Province of Ontario, more particularly described in Schedule "A" annexed hereto and forming part of this agreement.

AND WHEREAS the Licensee has applied to the Council of the Corporation for permission to construct a service tunnel, approximately 90.45 square metres (973.6 square feet), under Sunset and California Avenues in the vicinity of 2285 Wyandotte Street West, hereinafter called the encroachment, to be used in conjunction with the adjoining lands and premises municipally known as 2285 Wyandotte Street West, Windsor, Ontario. The encroachment is more particularly described in Schedule "B" annexed hereto and forming part of this agreement.

NOW THEREFORE WITNESSETH THAT:

1. The Corporation permits the Licensee to occupy and use the public highway for the purpose of the encroachment for a maximum term not exceeding the life of the encroaching structure. In the event of any disagreement as to the estimated or actual lifetime of such encroachment, the opinion of the Corporation's City Engineer shall prevail and be final and binding on the parties. Notwithstanding the foregoing, the term hereof shall automatically terminate and be at an end in the event that the portion of such public highway under encroachment shall be closed or stopped up by the Corporation such as to no longer constitute a public highway.

2. The Licensee covenants and agrees to furnish to the Corporation, at the Licensee's expense, a strata survey prepared by an Ontario Land Surveyor of the encroachment, in quadruplicate, showing the location, dimensions and invert elevations of the encroachment, satisfactory to the Corporation's City Engineer.

3(1). The Licensee shall at its entire expense construct the said encroachment and appurtenances thereto as shown on Schedule "B" and maintain the encroachment(s) to the satisfaction of the Corporation's City Engineer and General Manager of Public Works.

3(2). The Licensee shall, and at its entire expense, be responsible for protecting any utilities presently buried in the vicinity of the said encroachment.

3(3). The Licensee shall apply for a Street Opening Permit from the General Manager of Public Works, and shall ensure that it has obtained such permit prior to any work in the public right-of-way.

4. The Licensee covenants and agrees to pay to the Corporation a one-time encroachment fee of ONE THOUSAND NINE HUNDRED AND FORTY-SEVEN DOLLARS AND TWENTY CENTS ($1,947.20) which payment shall become due and payable on the earlier of:

(a) the execution of this agreement; and

(b) the installation or assumption of the encroachment.

Without limiting the generality of the foregoing, the Licensee covenants and agrees to pay any Federal Goods and Services or like taxes leviable by any Federal or Provincial authority relative to any or all said fees.

5. The Licensee shall comply with all by-laws, laws, ordinances, regulations and orders imposed by any Provincial or Canadian statute or authority or the Corporation, Enwin Utilities and The Windsor Utilities Commission, and observe and obey such by-laws, laws, ordinances, regulations and orders governing the installation, repair and maintenance of the said encroachment and indemnify and save harmless the Corporation from any damages, charges, actions or costs for non-compliance with or violation of any of the said by-laws, laws, ordinances, regulations and orders.

6. The Licensee shall assume and be responsible for and pay any additional costs or charges which may be incurred by the Corporation, Enwin Utilities, The Windsor Utilities Commission, Bell Canada, Union Gas Limited or any other public utility or body in the performance of any work or installation of their services or utilities, or the future installation thereof, occasioned by the existence of the said encroachment and further that the Licensee shall defend, hold harmless and indemnify the Corporation against any claims which may arise due to the necessity of undertaking emergency repairs to any services or utilities buried beneath the area

being occupied by the Licensee.

7. Upon completion of the installation or future repairs or maintenance of the said encroachment, the Licensee shall restore the existing right-of-way and repair and replace the surface of the said public highway at the location where such installation, repair or maintenance takes place to the satisfaction of the said City Engineer.

8. The Licensee shall remove the said encroachment and restore the said public highway to its condition existing immediately prior to the installation thereof, upon sixty (60) days written notice given by the Corporation to the Licensee and such notice having been given, this agreement shall terminate and be of no further force and effect on the expiration of the said sixty (60) days save with respect to any costs or damages which may be incurred by the Corporation resulting from the failure of the Licensee to remove the said encroachment and restore the said public highway as aforesaid.

9. The Licensee further covenants and agrees to maintain the said encroachment in good repair at all times and to the satisfaction of the Corporation's City Engineer and General Manager of Public Works.

10. If the Corporation at any time exercises its power or right to terminate this agreement as aforesaid, the Corporation shall not be liable to pay any compensation for any loss, costs or damages which may be incurred by the Licensee or any person claiming under the Licensee by reason of such termination.

11. The Licensee further agrees with the Corporation that if the Licensee fails to comply with the provisions of paragraph 8 hereof, the Corporation shall have the right to remove the said encroachment at the expense of the Licensee and restore the said public highway as aforesaid and any payment of the costs, charges and expenses, including storage charges incurred in consequence thereof may be enforced by the Corporation in the same manner as realty taxes payable and collectable in respect of the lands owned by the Licensee.

12. It is further understood and agreed by and between the parties hereto that if the Licensee agrees to sell the said lands described in Schedule "A" hereto annexed, the Licensee shall give notice to the Corporation of such sale at least ten (10) days prior to the completion thereof.

13. The Licensee further agrees that all notices, demands and requests which may be or are required to be given under the provisions of this agreement by either party to the

other herein, shall be in writing and may be mailed or delivered and shall be addressed in the case of the Licensee to the Licensee at 401 Sunset Avenue, Windsor, Ontario, N9B 3P4, and in the case of the Corporation to the City Clerk, City Hall, P.O. Box 1607, Windsor, Ontario, N9A 6S1, or to such other address as either party may from time to time designate by written notice to the other party.

14. By the execution of this agreement, the Licensee does hereby expressly and completely release the Corporation from any and all liabilities, suits, claims and demands (whether for property damage or for personal injury or death and whether founded in tort, contract or equity) which at any time may be exerted by the Licensee arising out of the existence of the encroachment in the public highway or out of any act or omission of the Corporation.

15. The Licensee further covenants and agrees to provide and maintain public liability and property damage insurance in a form (containing endorsements naming the Corporation as an additional named insured and providing a cross-liability/separation of insureds clause) in the amount of at least TWO MILLION DOLLARS ($2,000,000.00) and satisfactory in form and content (including policy limit) to the Corporation's Risk Management Coordinator, and a true copy of the said insurance policy shall be filed with the Clerk of the Corporation. Licensee acknowledges and agrees that the Corporation shall be entitled to require that such policy limit amount be increased from time to time during the term hereof to take into account inflationary pressures and relevant judicial awards.

16. The Licensee shall indemnify and save harmless the Corporation from and against all loss, costs or damages which it may suffer or be put to and from and against all claims or actions which may be made or brought against the Corporation by reason of the said encroachment, its construction, existence, repair or maintenance or resulting therefrom in any way whatsoever.

17. It is further understood and agreed between the parties hereto that this agreement shall be binding upon and enure to the benefit of the parties hereto, it being acknowledged that in the event of the Licensee selling, conveying, transferring or entering into an agreement for sale or of transfer of any title to or interest in part or all of the Schedule "A" lands to a purchaser or transferee the written consent of the Corporation must be obtained (which consent may not be unreasonably withheld by the Corporation, but may be made subject to conditions including a condition that such purchaser or transferee enter into a fresh encroachment

agreement with the Corporation in the Corporation's then standard or usual form and for the fees as applicable at that time). If such written consent is not obtained, then the Corporation may forthwith terminate this agreement or demand the immediate removal of the encroachment or forthwith revoke the permission granted for the encroachment, and may enter upon the Schedule "A" lands in whole or in part and remove the said encroachment and restore the lands encroached upon and the expense of such removal and restoration shall be paid by the Licensee or by such unapproved purchaser or transferee forthwith on demand or, at the Corporation's option, the payment of such expense may be enforced in the same manner as property taxes payable in respect of the Schedule "A" lands; and the Corporation shall not be liable to pay any compensation for any loss, costs or damages which may be incurred by the Licensee or by such unapproved purchaser or transferee by reason of such termination, demand, revocation, entry, removal, or restoration.

PROVIDED HOWEVER, that notwithstanding the foregoing, the permission to encroach and this agreement shall be assignable to and assumable by a bona fide mortgagee or chargee of the Schedule "A" lands.

THE PARTIES HERETO have executed and delivered this agreement as of the day and year first hereinbefore written.

The terms and conditions as per Council Resolution/ CAO Approval dated CAO 1213 - June 2, 2009 have been satisfied.
Signature Oct 1/09 Date

Authority CAO1213 Approved as to Technical Content City Engineer

Authority CAO1213/2009 Approved As To Form Legal Counsel

THE CORPORATION OF THE CITY OF WINDSOR:

~~JOHN SKOROBOHACZ~~ HELGA REIDEL (Chief Administrative Officer)

GARY CIAN (Deputy Clerk)

UNIVERSITY OF WINDSOR:

APPROVED LEGAL

Name: STEPHEN A. WILLETTS
Position: VP. ADMIN + FINANCE.

I have authority to bind the corporation.

Additional Property Identifier(s) and/or Other Information

PT LT 66 CON 1 SANDWICH WEST AS IN R1288643 EXCEPT PT 1 12R19255.

PIN 01223-0354 (LT)

City of Windsor,
County of Essex
Land Registry Office of Essex (No. 12)

SCHEDULE "B"

THE CORPORATION OF THE CITY OF WINDSOR – DEPARTMENT OF PUBLIC WORKS
PROPOSED UNDERGROUND ENCROACHMENT OF NEW SERVICE TUNNEL TO SERVICE PROPOSED ENGINEERING BUILDING ON WYANDOTTE ST. WEST
MARIO SONEGO, P. ENG., CITY ENGINEER
DWN BY: M.L.D.
CHECKED BY: T.R.
SCALE: NTS
DATE: MAY, 2009
DWG. NO.
C-3029
U OF W PROPERTY
UNIVERSITY OF WINDSOR PROPERTY
EXISTING SERVICE TUNNEL
U OF W PROPERTY
SUNSET AVE ENCROACHMENT AREA CHAMBER & TUNNEL 456.9 SQ. FT. (42.45 sq. meters)
P/L
P/L
P/L
CALIFORNIA AVE ENCROACHMENT AREA CHAMBER & TUNNEL 516.7 SQ. FT. (48 sq. meters)
NEW ENGINEERING BUILDING
NEW SERVICE TUNNEL
UNIVERSITY OF WINDSOR PROPERTY
CALIFORNIA AVE
SUNSET AVE
EXISTING SERVICE TUNNEL
WYANDOTTE ST WEST
U OF W PROPERTY
U OF W PROPERTY
N

THE CORPORATION OF THE CITY OF WINDSOR

COUNCIL SERVICES/CITY CLERK

Memo

DATE: March 20, 2015 File: SE/2014

TO: City Engineer,
Attention: Tiffany Pocock, Project Administrator *Your File No.: TE/9633*
City Solicitor

FROM: City Clerk

RE: 712 Sunset
CAO0334

Enclosed for your records is a fully executed copy of the subject agreement indexed as *A33398*

Valerie Critchley

/per S. Beaulieu

City Clerk

/sb

Enclosure

THIS AGREEMENT made in triplicate, this 6th day of June, 2006.

BETWEEN:

THE CORPORATION OF THE CITY OF WINDSOR,

Hereinafter called the CORPORATION of the FIRST PART

- and -

UNIVERSITY OF WINDSOR,

Hereinafter called the LICENSEE of the SECOND PART

WHEREAS the Licensee is the registered owner of certain lands and premises in the City of Windsor, in the County of Essex and Province of Ontario, more particularly described in Schedule "A" annexed hereto and forming part of this agreement.

AND WHEREAS the Licensee has applied to the Council of the Corporation for permission to retain communication conduits and building services (steam and chilled water pipes), approximately 551.5 square metres (5936.5 square feet), under Sunset Avenue in the vicinity of 764 Sunset Avenue and also under a portion of California Avenue, hereinafter called the encroachment, to be used in conjunction with the adjoining lands and premises municipally known as 764 Sunset Avenue, Windsor, Ontario. The encroachment is more particularly described in Schedule "B" annexed hereto and forming part of this agreement.

NOW THEREFORE WITNESSETH THAT:

1. The Corporation permits the Licensee to occupy and use the public highway for the purpose of the encroachment for a maximum term not exceeding the respective lives of the encroaching structures. In the event of any disagreement as to the estimated or actual lifetime of such encroachment, the opinion of the Corporation's chief engineer shall prevail and be final and binding on the parties. Notwithstanding the foregoing, the term hereof shall automatically terminate and be at an end in the event that the portion of such public highway under encroachment shall be closed or stopped up by the Corporation such as to no longer constitute a public highway.

2. The Licensee covenants and agrees to furnish to the Corporation, at the Licensee's expense, an as-constructed drawing of the encroachment, in quadruplicate, showing the location and dimensions of the encroachment, satisfactory to the Corporation's City Engineer.

3(1). The Licensee shall at its entire expense construct the said encroachment and appurtenances thereto as shown on Schedule "B" and maintain the encroachment(s) to the satisfaction of the Corporation's City Engineer and General Manager of Public Works.

3(2). The Licensee shall, and at its entire expense, be responsible for protecting any utilities presently buried in the vicinity of the said encroachment.

3(3). The Licensee shall apply for a Street Opening Permit from the General Manager Public Works, and shall ensure that it has obtained such permit prior to any work in the public right-of-way.

4. The Licensee covenants and agrees to pay to the Corporation a one-time encroachment fee of FIFTEEN THOUSAND FOUR HUNDRED AND THIRTY-FOUR DOLLARS AND EIGHTY-EIGHT CENTS ($15,434.88) which payment shall become due and payable on the earlier of:

(a) the execution of this agreement; and

(b) the installation or assumption of the encroachment.

Without limiting the generality of the foregoing, the Licensee covenants and agrees to pay any federal Goods and Services or like taxes leviable by any federal or provincial authority relative to any or all said fees.

5. The Licensee shall comply with all by-laws, laws, ordinances, regulations and orders imposed by any Provincial or Canadian statute or authority or the Corporation, Enwin Utilities and The Windsor Utilities Commission, and observe and obey such by-laws, laws, ordinances, regulations and orders governing the installation, repair and maintenance of the said encroachment and indemnify and save harmless the Corporation from any damages, charges, actions or costs for non-compliance with or violation of any of the said by-laws, laws, ordinances, regulations and orders.

6. The Licensee shall assume and be responsible for and pay any additional costs or charges which may be incurred by the Corporation, Enwin Utilities, The Windsor Utilities Commission, Bell Canada, Union Gas Limited or any other public utility or body in the performance of any work or installation of their services or utilities, or the future installation thereof, occasioned by the existence of the said encroachment and further that the Licensee shall defend, hold harmless and indemnify the Corporation against any claims which may arise due to

the necessity of undertaking emergency repairs to any services or utilities buried beneath the area being occupied by the Licensee.

7. Upon completion of the installation or future repairs or maintenance of the said encroachment, the Licensee shall restore the existing right-of-way and repair and replace the surface of the said public highway at the location where such installation, repair or maintenance takes place to the satisfaction of the said City Engineer.

8. The Licensee shall remove the said encroachment and restore the said public highway to its condition existing immediately prior to the installation thereof, upon sixty (60) days written notice given by the Corporation to the Licensee and such notice having been given, this agreement shall terminate and be of no further force and effect on the expiration of the said sixty (60) days save with respect to any costs or damages which may be incurred by the Corporation resulting from the failure of the Licensee to remove the said encroachment and restore the said public highway as aforesaid.

9. The Licensee further covenants and agrees to maintain the said encroachment in good repair at all times and to the satisfaction of the Corporation's City Engineer and General Manager of Public Works.

10. If the Corporation at any time exercises its power or right to terminate this agreement as aforesaid, the Corporation shall not be liable to pay any compensation for any loss, costs or damages which may be incurred by the Licensee or any person claiming under the Licensee by reason of such termination.

11. The Licensee further agrees with the Corporation that if the Licensee fails to comply with the provisions of paragraph 8 hereof, the Corporation shall have the right to remove the said encroachment at the expense of the Licensee and restore the said public highway as aforesaid and any payment of the costs, charges and expenses, including storage charges incurred in consequence thereof may be enforced by the Corporation in the same manner as realty taxes payable and collectable in respect of the lands owned by the Licensee.

12. It is further understood and agreed by and between the parties hereto that if the Licensee agrees to sell the said lands described in Schedule "A" hereto annexed, the Licensee shall give notice to the Corporation of such sale at least ten (10) days prior to the completion thereof.

13. The Licensee further agrees that all notices, demands and requests which may be or are required to be given under the provisions of this agreement by either party to the other herein, shall be in writing and may be mailed or delivered and shall be addressed in the case of the Licensee to the Licensee at 401 Sunset Avenue, Windsor, Ontario, N9B 3P4, and in the case of the Corporation to the City Clerk, City Hall, P.O. Box 1607, Windsor, Ontario, N9A 6S1, or to such other address as either party may from time to time designate by written notice to the other party.

14. By the execution of this agreement, the Licensee does hereby expressly and completely release the Corporation from any and all liabilities, suits, claims and demands (whether for property damage or for personal injury or death and whether founded in tort, contract or equity) which at any time may be exerted by the Licensee arising out of the existence of the encroachment in the public highway or out of any act or omission of the Corporation.

15. The Licensee further covenants and agrees to provide and maintain public liability and property damage insurance in a form (containing endorsements naming the Corporation as an additional named insured and providing a cross-liability/separation of insureds clause) in the amount of at least TWO MILLION DOLLARS ($2,000,000.00) and satisfactory in form and content (including policy limit) to the Corporation's Risk Management Coordinator, and a true copy of the said insurance policy shall be filed with the Clerk of the Corporation. Licensee acknowledges and agrees that the Corporation shall be entitled to require that such policy limit amount be increased from time to time during the term hereof to take into account inflationary pressures and relevant judicial awards.

16. The Licensee shall indemnify and save harmless the Corporation from and against all loss, costs or damages which it may suffer or be put to and from and against all claims or actions which may be made or brought against the Corporation by reason of the said encroachment, its construction, existence, repair or maintenance or resulting therefrom in any way whatsoever.

17. It is further understood and agreed between the parties hereto that this agreement shall be binding upon and enure to the benefit of the parties hereto, it being acknowledged that in the event of the Licensee selling, conveying, transferring or entering into an agreement for sale or of transfer of any title to or interest in part or all of the Schedule "A" lands to a purchaser or transferee the written consent of the Corporation must be obtained (which

consent may not be unreasonably withheld by the Corporation, but may be made subject to conditions including a condition that such purchaser or transferee enter into a fresh encroachment agreement with the Corporation in the Corporation's then standard or usual form and for the fees as applicable at that time). If such written consent is not obtained, then the Corporation may forthwith terminate this agreement or demand the immediate removal of the encroachment or forthwith revoke the permission granted for the encroachment, and may enter upon the Schedule "A" lands in whole or in part and remove the said encroachment and restore the lands encroached upon and the expense of such removal and restoration shall be paid by the Licensee or by such unapproved purchaser or transferee forthwith on demand or, at the Corporation's option, the payment of such expense may be enforced in the same manner as property taxes payable in respect of the Schedule "A" lands; and the Corporation shall not be liable to pay any compensation for any loss, costs or damages which may be incurred by the Licensee or by such unapproved purchaser or transferee by reason of such termination, demand, revocation, entry, removal, or restoration.

PROVIDED HOWEVER, that notwithstanding the foregoing, the permission to encroach and this agreement shall be assignable to and assumable by a bona fide mortgagee or chargee of the Schedule "A" lands.

THE PARTIES HERETO have executed and delivered this agreement as of the day and year first hereinbefore written.

THE CORPORATION OF THE CITY OF WINDSOR:

Valerie Critchley per:

~~JOHN SKOROBOHACZ~~ (Chief Administrative Officer)
HELGA REIDEL

Valerie Critchley

~~GARY CIAN~~ (~~Deputy~~ Clerk)
VALERIE CRITCHLEY

Authority
CAO334-2006
Approved
As To Form
Barrister & Solicitor

Authority
CAO334-2006
Approved
as to Technical Content
City Engineer

UNIVERSITY OF WINDSOR:

Name:
Position:

I have authority to bind the corporation.

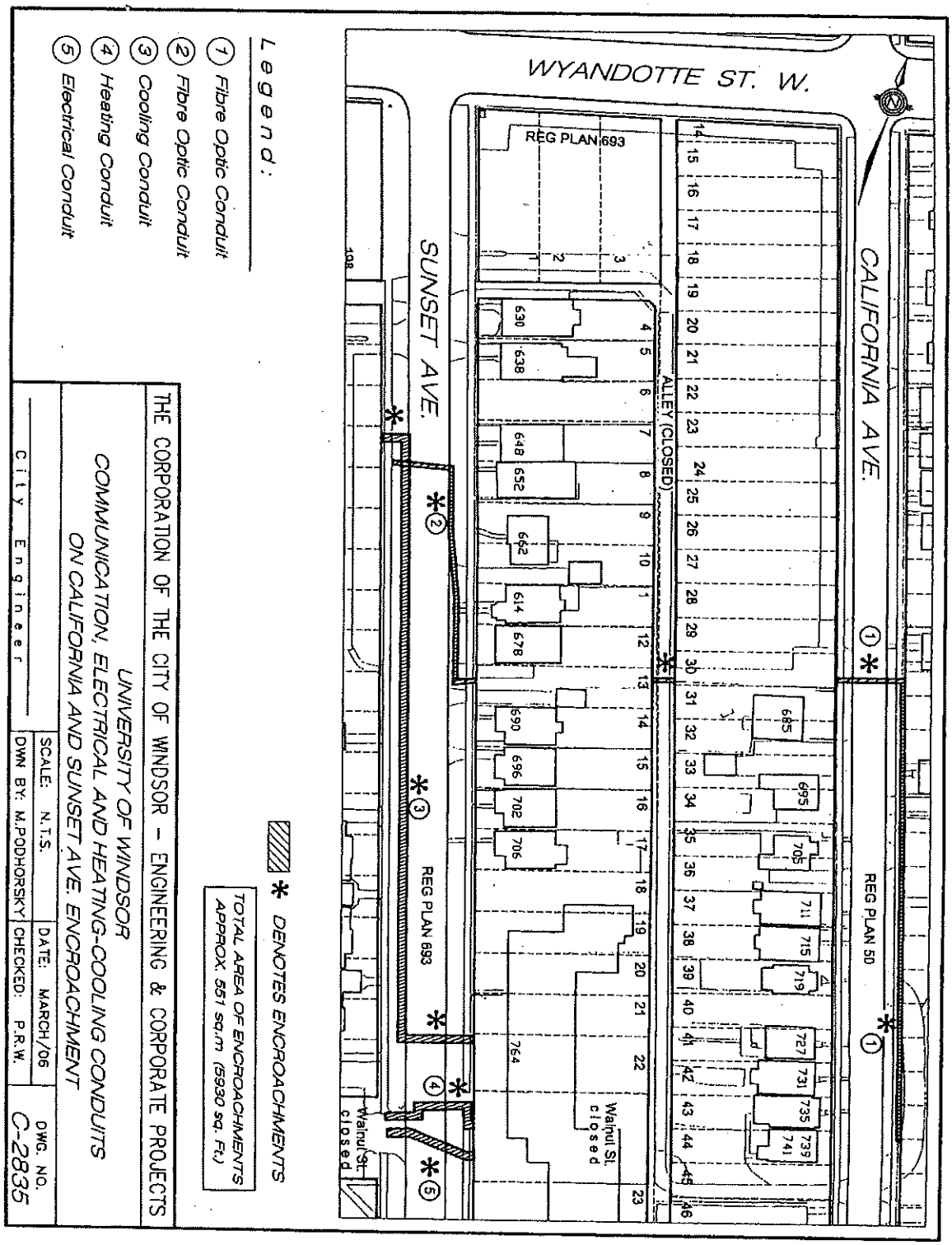
Additional Property Identifier(s) and/or Other Information

Lots 18 to 28, both inclusive, Registered Plan 693

in the City of Windsor, County of Essex

FOR OFFICE USE ONLY

SCHEDULE "B"


WYANDOTTE ST. W.
CALIFORNIA AVE.
SUNSET AVE.
ALLEY (CLOSED)
REG PLAN 693
REG PLAN 50
REG PLAN 693
Walnut St. closed
Walnut St. closed
630
638
648
652
662
614
678
690
696
702
706
685
695
705
711
715
719
727
731
735
739
741
764
Legend:
1 Fibre Optic Conduit
2 Fibre Optic Conduit
3 Cooling Conduit
4 Heating Conduit
5 Electrical Conduit
* DENOTES ENCROACHMENTS
TOTAL AREA OF ENCROACHMENTS APPROX. 551 sq.m (5930 sq. Ft.)
THE CORPORATION OF THE CITY OF WINDSOR – ENGINEERING & CORPORATE PROJECTS
UNIVERSITY OF WINDSOR
COMMUNICATION, ELECTRICAL AND HEATING-COOLING CONDUITS
ON CALIFORNIA AND SUNSET AVE. ENCROACHMENT
City Engineer
SCALE: N.T.S.
DATE: MARCH/06
DWN BY: M.PODHORSKY
CHECKED: P.R.W.
DWG. NO. C-2835

Subject: Private Access Culvert within the 5th Concession Drain for 4088 and 4096 Sixth Concession Road - Ward 9

Reference:

Date to Council: March 20, 2023
Author: Tom Graziano
Engineer III
(519) 255-6257 Ext 6490
tgraziano@citywindsor.ca
Development - Engineering
Report Date: 2023-02-28
Clerk's File #: SW2023

To: Mayor and Members of City Council

Recommendation:

I. That City Council **ADOPT** the Drainage Engineer's Report for improvements to the 5th Concession Drain, completed by R.C. Spencer Associates Inc., dated January 27, 2023, to install a private access culvert for the properties at 4088 and 4096 Sixth Concession Road in accordance with Section 45 of the Drainage Act; and,

II. That City Council **APPROVE** By-law ____/2023 in accordance with Section 58 of the Drainage Act.

Executive Summary:

N/A

Background:

The 5th Concession Drain is an open municipal drain that runs along the east side of Sixth Concession Road. Because the 5th Concession Drain is designated as a Municipal Drain, the commissioning of a Drainage Report under Ontario's Drainage Act is required to grant approval for enclosing any portion of it.

The property owners, 1670094 Ontario Limited and 1722912 Ontario Limited, had submitted a Section 78 Request for Drainage Improvement for the driveway culverts on Lots 1 & 2 of the Rockport Subdivision fronting on Sixth Concession Road (Figure 1).

At the meeting of May 4, 2020, City Council adopted CR184/2020 as follows:

> *"That the firm of R.C. Spencer Associates Inc.* ***BE APPOINTED*** *as Drainage Engineer to prepare a Drainage Report under Section 78 of the Drainage Act for improvements to the 5th Concession Drain."*

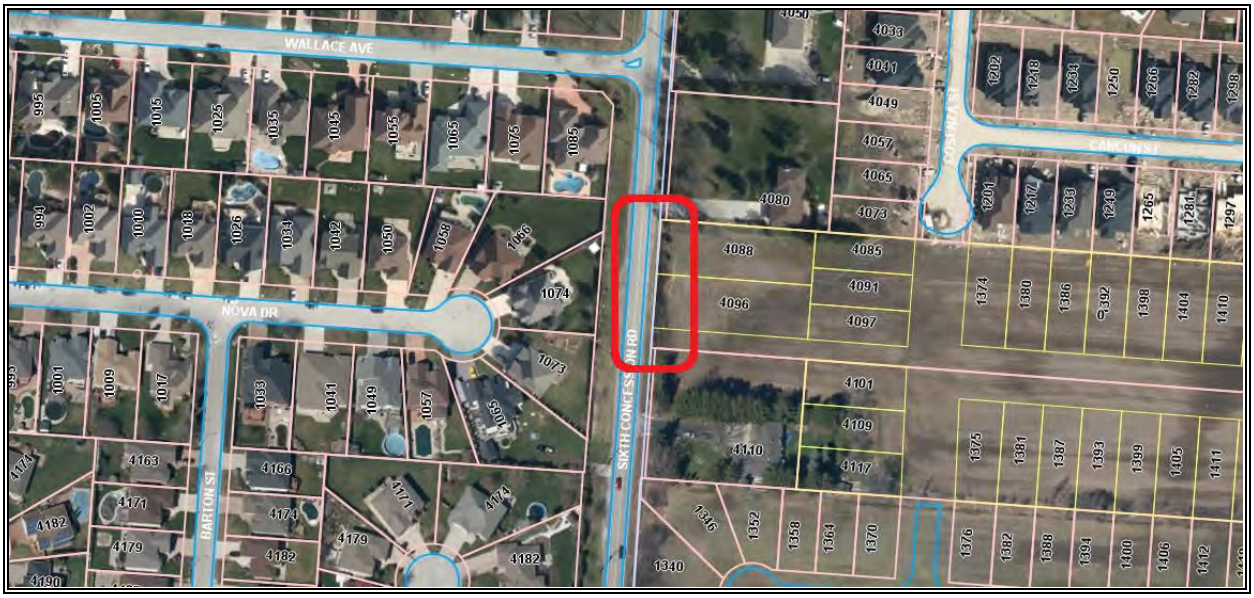


Figure 1: Area for Consideration

Discussion:

The Engineer's Report addresses the owner's request to enclose a portion of the drain by installing a culvert over the 5th Concession Drain along Sixth Concession Road in front of the entire width of the subject properties. The municipal addresses are 4088 and 4096 Sixth Concession Road.

Council Resolutions CR388/2007 and CR64/2015 confirm that the municipality would absorb all municipal drain maintenance costs through the general tax levy, except for private access structures and "special benefit" works benefiting individual properties, as authorized by the Province of Ontario through the *City of Windsor Act, 1968*. The private

structure(s) proposed for this location are for the sole benefit of the property owners and will be paid for by the property owners and not funded through the general levy.

Traditionally, the engineer's drainage report is considered at a meeting of Council and provisionally adopted by by-law when given two readings in accordance with Section 45 of the Drainage Act. The Drainage Report shall then be deemed to be adopted and the by-law shall be known as a Provisional By-law. Council shall then, within 30 days after adoption of the Drainage Report, send a copy of the Provisional By-law and Notice of the Court of Revision meeting to all affected landowners listed in the schedule of assessment.

The owners of the properties at 4088 and 4096 Sixth Concession Road have agreed to pay the full costs of the assessment as stated in the Drainage Report, and therefore no costs shall be borne to the upstream property owners or the City. A copy of the revised report, dated January 27, 2023, is attached.

Therefore, there is no reason to proceed with a Court of Revision hearing. All three readings of the By-law are proposed to be considered for this meeting of City Council and the By-law may be passed by giving third reading of the by-law.

Risk Analysis:

There are no major risks inherent with the recommendation. Adoption of the recommendation will ensure that the development remains compliant with Drainage Act and that the conveyance capacity of the proposed culvert is confirmed by an engineer.

Climate Change Risks

Climate Change Mitigation:

The recommendation does not contribute to the mitigation of climate change.

Climate Change Adaptation:

The recommendation does not contribute to the adaptation for climate change.

Financial Matters:

The property owner(s) will pay directly for all costs inherent with the authoring of the Drainage Report and the construction of the associated works.

Consultations:

Wira Vendrasco, Deputy City Solicitor, Legal & Real Estate

R.C. Spencer Associates Inc.

Conclusion:

Administration recommends that City Council pass the By-law to adopt the report prepared by R.C. Spencer Associates Inc., dated January 27, 2023, as the Drainage Engineer for improvements to the 5th Concession Drain in accordance with Sections 45 and 58 of the Drainage Act with all costs payable by the property owners.

Planning Act Matters:

N/A

Approvals:

Name	Title
Stacey McGuire	Manager of Development
France Isabelle-Tunks	Executive Director of Engineering / Deputy City Engineer
Chris Nepszy	Commissioner, Infrastructure Services
Shelby Askin Hager	Commissioner of Legal and Legislative Services
Onorio Colucci	Chief Administrative Officer

Notifications:

Name	Address	Email
Mr. Shane Lafontaine, P. Eng. & Mr. Richard C. Spencer, P. Eng.	800 University Avenue West, Windsor, ON N9A 5R9	slafontaine@rcspencer.ca; rcspencer@rcspencer.ca
Haider Habib	5335 Outer Drive Oldcastle, ON N9G 0C4	haider@hddevelopmentgroup.com
James Bryant, Essex Region Conservation Authority	360 Fairview Ave West, Suite 311, Essex, ON, N8M 1Y6	JBryant@erca.org

Appendices:

1 New Driveway Access and Drain Enclosures Over the 5th Concession Drain - Drainage Engineer's Report - RC Spencer Associates Inc., January 27, 2023

MUNICIPAL DRAINAGE REPORT

NEW DRIVEWAY ACCESS AND DRAIN ENCLOSURES OVER THE 5TH CONCESSION DRAIN

IN THE CITY OF WINDSOR

RC SPENCER ASSOCIATES INC.
Consulting Engineers
Windsor: 800 University Avenue W. – Windsor ON N9A 5R9
Leamington: 18 Talbot Street W. – Leamington ON N8H 1M4
Chatham-Kent: 49 Raleigh Street – Chatham ON N7M 2M6

File No. 20-978

27 January 2023

27 January 2023

Mayor and Municipal Council
City of Windsor
350 City Hall Square East
Windsor, Ontario N9A 6S1

Re: New Driveway Access and Drain Enclosures over the 5th Concession Drain
In the City of Windsor
Project No. 20-978

Mayor and Municipal Council:

1.0 AUTHORIZATION

In accordance with your instructions under Section 78 of the Drainage Act, we have prepared the following report for the installation of a driveway culvert and drain enclosure over the 5th Concession Drain for two properties. Accordingly, the firm of RC Spencer Associates Inc. has performed all the necessary surveys, investigations, etc., and we report thereon as follows.

2.0 DRAINAGE HISTORY

The 5th Concession Drain is an existing open municipal drain that runs along the east side of 6th Concession Road. A review of the records indicates that the last major work of repair and improvement of the 5th Concession Drain was carried out under a report prepared by J. S. Laird dated 22 June 1925. Under that report, the entire length of the drain was repaired and improved by means of deepening and cleanout of the accumulated sediment.

3.0 SITE MEETING

After reviewing the drainage information and the previous Engineer's reports on the drain, a virtual on-site meeting was held on 23 November 2021 with the landowners in the watershed. The landowner of Parcel No. 8 and 9 requested the installation of a culvert to provide for a driveway access and drain enclosure fronting both properties.

4.0 INSPECTION AND SURVEY

Our survey and examination along the length of the 5th Concession Drain was carried out in September 2022. The survey comprised of the recording of topographic data and examining the drain for available depth necessary to provide sufficient drainage. The closest upstream and downstream culverts to Parcels No. 8 and 9 were surveyed and inspected.

5.0 WATERSHED DESCRIPTION

The watershed of the 5th Concession Drain North is irregular in shape and has a drainage area of approximately 5.2 Ha (12.85 Ac) upstream of Parcel No. 9.

The soil type in the watershed is comprised entirely of Brookston Clay Loam based on the Windsor and Essex Region Soils Mapping. This soil is categorised as Hydrologic Soil Group (HSG) 'D'. This category of soils is classified to have very slow infiltration rates when thoroughly wetted. This means that in a heavy rainfall event, the majority of storm water is conveyed as overland flow. The lands in the drainage area are comprised largely of residential properties and municipal Right-of-Ways.

6.0 LANDOWNER REQUEST

The owner of Parcel No. 8 and 9 has requested to install driveway culverts and drain enclosures for the two properties. The driveways will be located as shown on the design drawings with the drain enclosures extending to the property limits.

7.0 RECOMMENDATIONS

Based on our review of the history, the information obtained during the on-site meeting, subsequent discussions with the landowners and the City, a review of the survey data and our detailed analysis and designs, we recommend the following:

a) That proper sediment control measures be implemented during construction.

b) The provision of a schedule of assessment for the work recommended under this report on the 5th Concession Drain.

c) The provision of a schedule of assessment for the cost of any future works of repair and/or maintenance carried out on the drain enclosures in the 5th Concession Drain.

d) We recommend that these works be done and the related costs be assessed under the provisions of the Drainage Act.

e) We recommend that the drain enclosure for Parcels No. 8 and 9 consist of a 42.2m length of 900mm diameter HDPE BOSS 2000 with a 320kPa pipe stiffness and Poly-tite joint system.

f) We recommend the installation of three 600mm diameter HDPE inline sump pit catch basins with frame and cover using prefabricated 900x600mm HDPE tee.

g) We recommend the installation of two 150mm diameter PVC private storm connections for Parcels No. 8 and 9 connected to the new 900mm diameter HDPE BOSS 2000.

h) We recommend that the new drain enclosure for Parcels No. 8 and 9 be formally incorporated as part of the 5th Concession Drain and be maintained by the City of Windsor.

8.0 DRAWINGS AND SPECIFICATIONS

As part of this report, we have attached design drawings for the proposed driveway culverts and drain enclosures. There is a set of 2 drawings showing:

a) A watershed plan indicating the drainage area boundary for the 5th Concession Drain; and

b) Culvert design drawings and details.

Attached as **Appendix 'B'** are:

a) **'Special Provisions'** for the construction which set out specifications and construction details for the various aspects of the required works to be conducted under this report;

b) **'General Specifications for Open Drains'**; and,

c) **'Environmental Protection Special Provisions'**.

9.0 ALLOWANCES

We have not provided any allowances under Section 29 of the Drainage Act as the culverts will be located within the limits of the existing municipal drain. Also, we have not included any allowances under Section 30 of the Drainage Act for damages to lands and crops (if any) caused by the construction and repair and improvement of the farm and access crossings and the operation of equipment as all excess materials will be hauled off-site and no crops are involved.

10.0 ESTIMATE OF COSTS

Our estimate of the total cost of the proposed work, including the cost of the engineer's report and all incidental expenses, is made up as follows:

Driveway Culvert and Drain Enclosure for Parcels No. 8 and 9

a)	Earth excavation and grading.	**$**	**4,000.00**
b)	Supply and install 42.2m of 900mm diameter High Density Polyethyline (HDPE) BOSS 2000 with a 320kPa pipe stiffness and Poly-tite joint system.	**$**	**33,760.00**
c)	Supply, place and compact all granular 'A' material for pipe bedding and backfill, being approximately 210 tonnes.	**$**	**6,275.00**
d)	Supply, place and compact all granular 'A' backfill in driveway areas, being approximately 115 tonnes.	**$**	**3,450.00**
e)	Supply, place and compact imported clay material for drain backfill in green areas, being approximately 130 cubic metres.	**$**	**3,900.00**
f)	Supply and place 100mm thick imported topsoil and hydroseed per City of Windsor specification S-15 and S-34 in all green areas shown on the design drawings, being approximately 200 square metres.	**$**	**4,000.00**
g)	Supply and install three 600mm diameter HDPE inline sump pit catch basin with frame and cover per AS-301. Connect using prefabricated 900x600mm HDPE tee.	**$**	**7,200.00**
h)	Supply and install two 150mm diameter PVC private drain connections and connect to 900mm diameter HDPE BOSS 2000.	**$**	**3,000.00**
i)	Remove existing broken concrete headwall and connect new HDPE pipe to existing corrugated steel pipe.	**$**	**3,000.00**
j)	Supply and install block headwall including geotextile tieback system and granular base per precast manufacturer specifications, being approximately 6 linear metres. Price to include submission of shop drawings.	**$**	**9,000.00**
k)	Traffic Control	**$**	**1,500.00**
l)	Construct, maintain during construction, and remove clay earth dams, bypass pump and silt fencing including dewatering.	**$**	**1,500.00**
	SUB TOTAL FOR CONSTRUCTION	**$**	**80,585.00**
	H.S.T. ON CONSTRUCTION (1.76% NET)	**$**	**1,420.00**
	TOTAL FOR CONSTRUCTION – (including net H.S.T.)	**$**	**82,005.00**

INCIDENTALS

Survey, report, estimate, specifications and drawings	$	11,000.00
Contract administration and inspection	$	3,000.00
Contingency allowance	$	5,000.00
SUBTOTAL FOR INCIDENTALS	$	19,000.00
H.S.T. ON INCIDENTALS (1.76% NET)	$	335.00
TOTAL FOR INCIDENTALS (including net H.S.T.)	$	19,335.00
TOTAL ESTIMATED COST	$	101,340.00

The estimate provided in this report was prepared according to current materials and installation prices as of the date of this report. In the event of delays from the time of filing the report by the Engineer to the time of tendering the work, it is understood that the estimate of cost is subject to inflation. The rate of inflation shall be calculated using the Consumer Price Index applied to the cost of construction from the date of the report to the date of tendering.

11.0 UTILITIES

It may become necessary to temporarily or permanently relocate utilities that may conflict with the construction recommended under this report. If this occurs, in accordance with Section 26 of the Drainage Act, we assess any relocation cost against the public utility having jurisdiction. Under Section 69 of the Drainage Act, the public utility is at liberty to do the work with its own forces, but if it should not exercise this option within a reasonable length of time, the Municipality will arrange to have this work completed and the costs will be charged to the appropriate public utility.

12.0 ASSESSMENT

Under the Drainage Act, assessments against individual properties are normally comprised of three (3) assessment components:

i. *Benefit (advantages relating to the betterment of lands, roads, buildings, or other structures resulting from the improvement to the drain).*

ii. *Outlet Liability (part of cost required to provide outlet for lands and roads).*

iii. *Special Benefit (additional work or feature that may not affect function of the drain).*

We have assessed the estimated costs against the affected lands and roads as listed in Schedule 'A-1' under "Value of Special Benefit," "Value of Benefit" and "Value of Outlet." Schedule 'A-1' relates to the estimated cost of the construction recommended in this report. Schedule 'A-2' attached to this report is to be used to assess future maintenance costs and will not be levied at this time.

The Special Benefit assessments shown in Schedule 'A-1' were derived as follows:

1. Culvert for Parcel No. 8
   The cost of the installation of the driveway culvert and drain enclosure for Parcel No. 8 is estimated at $40,292.50 plus net HST of $710.00. The engineering, inspection and other incidentals costs associated with this new drain enclosure is $9,500.00 plus net HST of $167.50. Therefore, the total estimated cost of the driveway culvert and drain enclosure for Parcel No. 8 is $50,670.00. Since this access culvert is a new installation, the estimated cost of this work is assessed at 100% against the adjoining property as a Special Benefit, as shown in Schedule 'A-1'. Therefore, no Outlet or Benefit assessments have been made as part of the construction of the driveway access and drain enclosure.

2. Culvert for Parcel No. 9
   The cost of the installation of the driveway culvert and drain enclosure for Parcel No. 9 is estimated at $40,292.50 plus net HST of $710.00. The engineering, inspection and other incidentals costs associated with this new drain enclosure is $9,500.00 plus net HST of $167.50. Therefore, the total estimated cost of the driveway culvert and drain enclosure for Parcel No. 9 is $50,670.00. Since this access culvert is a new installation, the estimated cost of this work is assessed at 100% against the adjoining property as a Special Benefit, as shown in Schedule 'A-1'. Therefore, no Outlet or Benefit assessments have been made as part of the construction of the driveway access and drain enclosure.

The items of work recommended in this report shall be pro-ratable items of work for the purposes of levying the actual final assessments.

13.0 FUTURE MAINTENANCE

After completion, the driveway culverts and drain enclosures installed under this report shall be maintained by the City of Windsor using Schedule 'A-2' included in Appendix 'A'. Schedule 'A-2' is based upon an arbitrary maintenance cost of $5,000. The actual maintenance assessments will be determined by pro-rating the actual maintenance costs in the proportions set out in Schedule 'A-2'. We recommend that the future works of repair and maintenance of the culverts be carried out by the City of Windsor. These costs are to be assessed as described in the following paragraphs.

Schedule 'A-2' represents all of the lands and roads that drain through the culvert for Parcel No. 9. When calculating the outlet assessments for the cost of maintaining a particular culvert, only the properties or proportions of properties that drain through the culvert shall be assessed and the remainder of the properties shall be eliminated from the schedule prior to prorating the outlet assessments. The Outlet assessments shown in Schedule 'A-2' are each based upon an arbitrary amount of $ 5,000.

The owner of Parcel No. 8 has chosen to enclose the drain fronting the entire width of the property. The Special Benefit was calculated based upon 70% rate for the estimated cost of a standard access culvert (7.0 m wide driveway) and 100% rate for the estimated cost of any additional length used to further enclose the drain. The remaining proportion shall be assessed as Outlet only against the lands and roads upstream of this culvert that drain through it.

The owner of Parcel No. 9 has also chosen to enclose the drain fronting the entire width of the property. The Special Benefit was calculated based upon 70% rate for the estimated cost of a standard access culvert (7.0 m wide driveway) and 100% rate for the estimated cost of any additional length used to

further enclose the drain. The remaining proportion shall be assessed as Outlet only against the lands and roads upstream of this culvert that drain through it.

The division between Special Benefit and Outlet Assessment for the future maintenance of each driveway culvert and drain enclosure shall be as follows:

Owner(s) / Parcel No.	Type	Special Benefit	Outlet
Parcel No. 8	Driveway Culvert and Drain Enclosure	74%	26%
Parcel No. 9	Driveway Culvert and Drain Enclosure	74%	26%

14.0 FISHERIES ISSUES

The Federal Fisheries Act requires that no deleterious substances be introduced to fish habitat and that there be no net loss of fish habitat as a result of any undertaking. Any activities that may introduce deleterious substances or result in loss of fish habitat may require a permit from the Minister of Fisheries, Oceans and the Canadian Coast Guard.

A self-assessment of the project has been completed and an application for a DFO review was submitted. To avoid and mitigate the potential for serious harm to fish, DFO recommends implementation of the measures listed below:

- Complete all work in the dry.
- Utilize appropriate erosion and sediment control measures.
- Stabilize any disturbed banks as soon as possible.
- Complete all works outside of the provincial restricted activities timing window for spring spawning fish (March 15 to July 15)

Provided that the above measures are followed by the Contractor, DFO is of the view that the proposed work will not result in serious harm to fish or prohibited effects on listed aquatic species at risk. As such, an authorization under the Fisheries Act or a permit under the Species at Risk Act are not required.

The Contractor will be responsible to meet the other requirements of federal, provincial and municipal agencies. In addition, the Environmental Specifications attached to this report provides appropriate avoidance and mitigation measures for the Contractor to adhere to.

15.0 ENVIRONMENTAL REQUIREMENTS

Construction involved with the replacement and new installation of the farm and access culverts must comply with the “Environmental Protection Special Provisions” in Appendix ‘B’ and the “Species at Risk Act”.

The Essex Region Conservation Authority has completed a preliminary review and are in support of the proposed works. In consideration of the location of the proposed works, the contributing upstream watershed area and site specific characteristics, an approval from ERCA is not required.

16.0 GRANTS

In accordance with the provisions of Sections 85, 86 and 87 of the Drainage Act, a grant in the amount of 33–1/3 percent of the assessment eligible for a grant may be made in respect to the assessment made under this report upon privately owned lands used for agricultural purposes. The assessments levied against privately owned agricultural land must also satisfy all other eligibility criteria set out in the Agricultural Drainage Infrastructure Program policies. There are no assessed properties that are privately owned lands used for agricultural purposes in the 5th Concession Drain watershed. Therefore, none of the assessed properties are eligible for grant.

All of which is respectfully submitted.

RC SPENCER ASSOCIATES INC.

PREPARED BY:

Shane Lafontaine, P.Eng.

Designated Engineer
27 January 2023

REVIEWED BY:

Marvel Hormiz, P. Eng.

Review Engineer
27 January 2023

APPENDIX 'A'

SCHEDULES OF ASSESSMENT

SCHEDULE A-1 - Schedule of Assessment for Construction

SCHEDULE A-2 - Schedule of Assessment for Future Maintenance of Culverts

NEW DRIVEWAY ACCESS AND DRAIN ENCLOSURES
OVER THE 5TH CONCESSION DRAIN

CITY OF WINDSOR

SCHEDULE A-1
SCHEDULE OF ASSESSMENT FOR CONSTRUCTION

NEW DRAIN ENCLOSURES OVER THE 5TH CONCESSION DRAIN
CITY OF WINDSOR

A) PRIVATELY OWNED - NON-AGRICULTURAL LANDS (NON-GRANTABLE)

PARCEL NO.	TAX ROLL NO.	CON. OR PLAN NO.	LOT OR PART OF LOT	AREA OWNED (Hectares)	AREA AFFECTED (Hectares)	OWNER	(SECTION 22) VALUE OF BENEFIT	(SECTION 23) OUTLET LIABILITY	(SECTION 24) VALUE OF SPECIAL BENEFIT	TOTAL ASSESSMENT
8	150-01502	12M-665	LOT 2	0.117	0.117		$ -	$ -	$ 50,670.00	$ 50,670.00
9	150-01501	12M-665	LOT 1	0.119	0.119		$ -	$ -	$ 50,670.00	$ 50,670.00
			Total Affected Lands (Hectares)		**0.236**					
						Total Assessment on Municipal Roads	**$ -**	**$ -**	**$ 101,340.00**	**$ 101,340.00**

TOTAL ASSESSMENT FOR SCHEDULE A-1	**$ -**	**$ -**	**$ 101,340.00**	**$ 101,340.00**

TOTAL LANDS AFFECTED (Ha)	
A) Municipal Roads	0.000
B) Non-Agricultural Lands	0.236
C) Agricultural Lands (Grantable)	0.000
D) Agricultural Lands (Non-grantable)	0.000
Total Lands Affected:	0.236

NOTE: Assessment Values have been rounded to the nearest whole dollar for presentation purposes.

1 Hectare = 2.471 Acres

SCHEDULE A-2
SCHEDULE OF ASSESSMENT FOR FUTURE MAINTENANCE OF CULVERTS

NEW DRAIN ENCLOSURES OVER THE 5TH CONCESSION DRAIN
CITY OF WINDSOR

A) MUNICIPAL ROADS

PARCEL NO.	Description	AREA OWNED (Hectares)	AREA AFFECTED (Hectares)	OWNER	(SECTION 22) VALUE OF BENEFIT	(SECTION 23) OUTLET LIABILITY	(SECTION 24) VALUE OF SPECIAL BENEFIT	TOTAL ASSESSMENT
1	Dougall Parkway (East of 6th Concession Road)	-	2.057	Ministry of Transportation of Ontario	$ -	$ 2,278.00	$ -	$ 2,278.00
2	Dougall Parkway	-	0.321	City of Windsor	$ -	$ 355.00	$ -	$ 355.00
3	6th Concession Road	-	1.467	City of Windsor	$ -	$ 1,624.00	$ -	$ 1,624.00
	Total Affected Lands (Hectares)		**3.845**					
	Total Assessment on Municipal Roads				**$ -**	**$ 4,257.00**	**$ -**	**$ 4,257.00**

B) PRIVATELY OWNED - NON-AGRICULTURAL LANDS (NON-GRANTABLE)

PARCEL NO.	TAX ROLL NO.	CON. OR PLAN NO.	LOT OR PART OF LOT	AREA OWNED (Hectares)	AREA AFFECTED (Hectares)	OWNER	(SECTION 22) VALUE OF BENEFIT	(SECTION 23) OUTLET LIABILITY	(SECTION 24) VALUE OF SPECIAL BENEFIT	TOTAL ASSESSMENT
4	150-00510	CON 6	PT LOT 13	0.400	0.400		$ -	$ 195.00	$ -	$ 195.00
5	150-00520	CON 6	PT LOT 16	0.442	0.442		$ -	$ 208.00	$ -	$ 208.00
6	150-00797	CON 6	PT LOT 14	0.273	0.273		$ -	$ 155.00	$ -	$ 155.00
7	150-01581	12M-665	BLOCK 81	0.068	0.042		$ -	$ 28.00	$ -	$ 28.00
8	150-01502	12M-665	LOT 2	0.117	0.117		$ -	$ 78.00	$ -	$ 78.00
9	150-01501	12M-665	LOT 1	0.119	0.119		$ -	$ 79.00	$ -	$ 79.00
			Total affected Lands (Hectares)		**1.393**					
						Total Assessment on Privately Owned Non-Agricultural Lands (Non-Grantable)	**$ -**	**$ 743.00**	**$ -**	**$ 743.00**

TOTAL ASSESSMENT FOR SCHEDULE A-2	**$ -**	**$ 5,000.00**	**$ -**	**$ 5,000.00**

TOTAL LANDS AFFECTED (Ha)	
A) Municipal Roads	3.845
B) Non-Agricultural Lands	1.393
C) Agricultural Lands (Grantable)	0.000
D) Agricultural Lands (Non-grantable)	0.000
Total Lands Affected:	5.238

NOTE: Assessment Values have been rounded to the nearest whole dollar for presentation purposes.

1 Hectare = 2.471 Acres

APPENDIX 'B'

SPECIAL PROVISIONS AND SPECIFICATIONS

NEW DRIVEWAY ACCESS AND DRAIN ENCLOSURES OVER THE 5TH CONCESSION DRAIN

CITY OF WINDSOR

SPECIAL PROVISIONS

1.0 GENERAL SPECIFICATIONS

The General Specifications attached hereto are part of Appendix 'B'. It forms part of this specification and is to be read with these specifications and the Drawings contained in the report. Where there is a difference between the requirements of the Special Provisions and the General Specifications, the Special Provisions shall take precedence.

2.0 DESCRIPTION OF WORK

The accompanying Engineer's report deals with the installation of two driveway culverts and drain enclosures. The work to be carried out under this Contract generally comprises the supply of all materials, equipment and labour required to construct a culvert that extends across the entire frontage of Parcels No. 8 and 9. Granular backfill shall be placed in the location of the driveways shown on the design drawings. The remaining drain enclosure shall consist of clay backfill with a surface of topsoil and hydroseed. The new culvert shall be connected to the adjacent driveway culvert to the north. End treatment on the south end of the new drain enclosure shall consist of a precast concrete block headwall. The work includes the installation three sump pit catch basins as well as the installation of a private drain connection for both parcels that shall be connected to the new culvert. The work also includes the removal of all brush, trees and surplus materials required to complete the new culvert installation. This material shall be removed and disposed off-site at an approved disposal site at the Contractor's expense. Where drain banks and grassed areas are disturbed, the areas will be restored to pre-existing conditions with screened topsoil and hydroseed.

Dewatering, Silt Control and Traffic Control measures will be implemented during construction.

Tile outlet pipes will be replaced if required and as designated by the Drainage Superintendent in the field.

3.0 WORKING AREA

The working area for the new culvert installations shall have a width of 10 m located along the east side of the drain and extends north and south across the frontage of Parcels No. 8 and 9.

Any damages to lands and/or roads from the Contractor's work shall be rectified to pre-existing conditions at the Contractor's expense.

4.0 CULVERT CONSTRUCTION

4.1 Location of Access Culvert

The culvert ends shall extend to the property limit of Parcel No. 8 and connect to the property adjacent to Parcel No. 9 at the north end. The granular driveways shall be installed at the locations shown on the design drawings. Prior to installation, the Contractor shall contact the Drainage Superintendent to confirm the exact location for the new culvert. The Drainage Superintendent, in consultation with the property owner, shall establish the exact location for the new culvert in the field.

4.2 Reference Specifications

The contractor shall supply all materials, labour and equipment necessary for the proper completion of the work, unless otherwise stated in the Specifications or the Tender documents. City of Windsor standards and specifications to supersede OPS references.

Materials shall be as follows:

High Density Polyethylene (HDPE) BOSS 2000

All HDPE pipes to have 320kPa pipe stiffness and conform to OPSS 1854. HDPE pipes shall be joined using poly-tite bell and gasket joint system.

Erosion Stone for Sloping End Protection

All stone to be used for erosion protection shall be 150-300 mm clear quarried rock or OPSS 1004, minimum 300 mm thickness. Round field stone is not acceptable.

Bedding Below and up to Springline of Culvert Pipe Invert

20-25mm clear stone conforming to OPSS Division 10.

Backfill Material

Granular 'A' conforming to OPSS Division 10.

Driveway Surface Material

Granular 'A' conforming to OPSS Division 10.

Filter Fabric

"Non-Woven" geotextile filter fabric with a minimum strength equal to or greater than Terrafix 270R, Amoco 4546, Mirafi 140NC or approved equivalent.

4.3 Dry Culvert Installation

Suitable dykes shall be constructed in the drain so that the installation of the pipe can be accomplished in the dry. The drain bottom shall be cleaned, prepared, shaped and compacted to suit the new culvert configuration, as shown on the drawings. Granular materials shall be compacted to 100% of their maximum dry density.

4.4 Vertical End Protection

Endwalls shall be constructed of vertical precast concrete block material, as shown on the Drawings. Each endwall shall be designed by the manufacturer and a shop drawing must be submitted to the engineer for review.

4.5 Lateral Tile Drains

Should the Contractor encounter any lateral tiles within the proposed culvert limits as shown and also those not shown on the attached drawings, the Contractor shall re-route the outlet tile drain(s) in consultation with the Drainage Superintendent, as required, to accommodate the new culvert. **Tile drain outlets through the wall of the new culvert pipe will not be permitted.** All costs associated with re-routing lateral tile drains (if any) shall be at the Contractor's expense.

4.6 Silt Control

Although it is anticipated that the culvert installation at this site will be undertaken in the dry, the Contractor shall supply and install a temporary straw bale check dam in the drain bottom immediately downstream of the culvert site during the time of construction. The straw bale check dam shall be to the satisfaction of the Drainage Superintendent and must be removed upon completion of the construction. All costs associated with the supply and installation of this straw bale check dam shall be included in the cost bid for that item.

4.7 Seeding

The disturbed grassed areas resulting from the construction of the culvert and proposed seeding areas shall be seeded as specified herein. The surface area over the backfilled trench shall be finely graded to match the original grade. The surface shall be predominantly fine and free from weeds and other unwanted vegetation. All other loose surface litter shall be removed and disposed of.

All seeding shall be completed per City of Windsor standard specification S-15 (Construction Specification for Seeding). All topsoil placement shall be completed per City of Windsor standard specification S-34 (Topsoil).

The seeding shall be deemed "Completed by the Contractor" when the seed has established in all areas to the satisfaction of the Engineer. Re-seeding and/or other methods required to establish the grass will be given consideration to achieve the end result and the costs shall be incidental to the works.

5.0 MAINTENANCE OF FLOWS

Should rainfall events generate flows in the drain, the contractor is responsible for maintaining the flows in the open drain so that flooding does not occur and for maintaining flows in the covered drains so that subsurface drainage is maintained.

6.0 ENVIRONMENTAL REQUIREMENTS

The Contractor shall comply with the requirements of the attached “Environmental Protection Special Provisions” in Appendix ‘B’ and “Species at Risk Act”, which will be provided during Tender period. The Contractor shall also comply with the approval requirements of the Fisheries and Oceans Canada and the Essex Region Conservation Authority.

To avoid and mitigate the potential for serious harm to fish, DFO recommends implementation of the measures listed below:

- Complete all work in the dry.
- Utilize appropriate erosion and sediment control measures.
- Stabilize any disturbed banks as soon as possible.
- Complete all works outside of the provincial restricted activities timing window for spring spawning fish (March 15 to July 15)

GENERAL SPECIFICATION FOR OPEN DRAINS

(Revised 2016 11 25)

SECTION 1 - AGREEMENT AND GENERAL CONDITIONS

(1) Payment for the work shall be on a lump sum basis unless otherwise indicated. The Contractor agrees to enter into a formal contract with the Municipality upon acceptance of the tender. The General Conditions of the contract shall be those of the Stipulated Price Contract CCDC2-Engineers, 2008 or the most recent revision of this document. The form of agreement between Owner and Contractor shall be that of the previously stated document or a form of agreement specifically prepared by the Municipality for this purpose.

(2) All work shall be in first class condition, comply fully with the report, Special Provisions, General Specifications and the Drainage Act, and be carried out to the satisfaction and approval of the Drainage Superintendent for the Municipality. Upon completion of the project, the work will be inspected by the Engineer and the Drainage Superintendent. Any deficiencies noted during the final inspection shall be immediately rectified by the Contractor. Final inspection will be made by the Engineer within 20 days after the Drainage Superintendent has received notice in writing from the Contractor that the work is completed, or as soon thereafter as weather conditions permit.

(3) The Contractor shall complete all work on or before the date fixed at the time of tendering. The Contractor will be held liable for any damages or expenses occasioned by his/her failure to complete the work on time and for any expenses of inspection, superintending, re-tendering or re-surveying, due to their neglect or failure to carry out the work satisfactorily or in a timely manner. Any such expenses or damages may be deducted by the Drainage Superintendent from the amount of the contract or may be recovered by the Municipality from the Contractor and his sureties.

(4) The Contractor shall be required to submit to the Municipality a Certificate of Good Standing from the Workplace Safety and Insurance Board prior to the commencement of the work and the Contractor shall be required to submit to the Municipality a Certificate of Clearance for the project from the Workplace Safety and Insurance Board before final payment is made to the Contractor.

(5) The Contractor shall keep the work under his/her personal control, and shall not assign, transfer, or sublet any portion without first obtaining the written consent of the Municipality.

SECTION 2 - EXAMINATION OF SITE, PLANS AND SPECIFICATIONS

(1) Each tenderer must visit the site and review the plans and specifications before submitting his tender and must satisfy himself as to the extent of the work and local conditions to be met during the construction. He is not to claim at any time after submission of his tender that there was any misunderstanding of the terms and conditions of the contract relating to site conditions. The Contractor will be at liberty, before bidding, to examine any data in the possession of the Municipality or of the Engineer.

(2) The quantities shown or indicated on the drawings or in the report are estimates only and are for the sole purpose of indicating to the tenderers the general magnitude of the work. The tenderer is responsible for checking the quantities for accuracy prior to submitting his tender.

SECTION 3 - CONTRACTOR'S LIABILITY

(1) The Contractor, his/her agents and all workmen or persons under his control including sub-contractors, shall use due care that no person or property is injured and that no rights are infringed in the prosecution of the work. The Contractor shall be solely responsible for all damages, by whomsoever claimable, in respect to any injury to persons or property of whatever description and in respect of any infringement of any right, privilege or easement whatever, occasioned in the carrying on of the work, or by any neglect on the Contractor's part.

(2) The Contractor shall indemnify and hold harmless the Municipality and the Engineer, their agents and employees from and against claims, demands, losses, costs, damages, actions, suits, or proceedings arising out of or attributable to the Contractor's performance of the contract.

SECTION 4 – ONTARIO PROVINCIAL STANDARDS

(1) Ontario Provincial Standard Specifications (OPSS) and Ontario Provincial Standard Drawings (OPSD) shall apply and govern at all times unless otherwise amended or extended in these Specifications or on the Drawing. Access to the electronic version of the Ontario Provincial Standards is available online through the MTO website, free of charge to all users. To access the electronic standards on the Web, go to http://www.mto.gov.on.ca/english/transrd/. Under the title Technical manuals is a link to the Ontario Provincial Standards. Users require Adobe Acrobat to view all pdf files.

SECTION 5 – APPROVALS, PERMITS AND NOTICES

(1) The construction of the works and all operations connected therewith are subject to the approval, inspection, by-laws and regulations of all Municipal, Provincial, Federal and other authorities having jurisdiction in respect to any matters embraced in this Contract. The Contractor shall obtain all approvals and permits and notify the affected authorities when carrying out work in the vicinity of any public utility, power, underground cables, railways, etc.

SECTION 6 – NOTIFICATION OF WORK

(1) Prior to commencing any work of installing any new bridge or removing any existing structures, the Contractor shall inform the Municipal Drainage Superintendent of his intent to commence work at least 48 hours prior to commencing any work. The Owner or Contractor shall endeavor to install and complete the new structure without delay once the work has commenced. If for any reason the work does not proceed continuously then the Owner or Contractor shall notify the Drainage Superintendent in advance of any backfilling operation or headwall construction so that he may schedule inspection of same

SECTION 7 – CONSTRUCTION SAFETY

(1) The Contractor shall comply with all the requirements of the Occupational Health and Safety Act, 2013, and the regulations passed in connection therewith, as administered by the Ontario Ministry of Labour and all subsequent amendments of the said Act.

(2) The Contractor shall exercise all possible precaution against injury to persons or property resulting from his work. The Contractor shall leave no trenches, pits, holes or excavations uncovered, without providing sufficient protection at all times. The Contractor shall install, erect and provide barricades, signs, traffic cones, flashers, lights, plates, warning and other devices, materials and personnel as may be required at his own expense in order to provide for the safe passage and control of traffic and to ensure public safety. All traffic control shall be in accordance with the latest standards of the Ministry of Transportation.

SECTION 8 – TRAFFIC CONTROL

(1) The Contractor shall not perform excavation operations from the travelled portion of the roadway nor close a road or reduce the width or number of traffic lanes available for traffic except as specified in the contract documents or approved by the Engineer.

(2) The Contractor will be required to control vehicular and pedestrian traffic along roads at all times and shall, at his/her own expense, provide for placing and maintaining such barricades, signs, flags, lights and flag persons as may be required to ensure public safety. The Contractor will be solely responsible for controlling traffic and shall appoint a representative to maintain the signs and warning lights at night, on weekends and holidays and at all other times that work is not in progress. The costs associated with provision of proper signage, barricades, lights and flag persons shall be considered incidental to the works to remove the old bridge and complete the new bridge installation.

(3) **During all phases of the project, adjoining public roadways shall remain open to through traffic with at least one lane being open to through traffic at all times.**

(4) All traffic control during construction shall be strictly in accordance with the **Occupational Health and Safety Act** and the current version of the **Ontario Traffic Manuals**. Access to the electronic version of the **Ontario Traffic Manual** is available online through the MTO website, free of charge to all users. To access the electronic standards on the Web, go to http://www.mto.gov.on.ca/english/transrd/, click on "Library Catalogue", under the "Title", enter "Ontario Traffic Manual" as the search. Open the applicable "Manual(s)" by choosing the "Access Key", once open look for the "Attachment", click the PDF file. Users require Adobe Acrobat to view all PDF files.

(5) **Contractors are reminded of the requirements of the Occupational Health and Safety Act pertaining to Traffic Protection Plans for workers and Traffic Control Plan for Public Safety.**

SECTION 9 – GENERAL CO-ORDINATION

(1) The Contractor shall be responsible for the coordination between the working forces of other organizations and utility companies in connection with this work. The Contractor shall have no cause of action against the Municipality or the Engineer for delays based on the allegation that the site of the work was not made available to him by the Municipality or the Engineer by reason of the acts, omissions, misfeasance or non-feasance of other organizations or utility companies engaged in other work.

SECTION 10 – STATIONS AND BENCHMARKS

(1) Reference Stations measured in meters, are indicated on the drawings and represent stations along the course of the work. Stationing is shown along the profile at 25 m intervals numbered consecutively, 0+000, 0+025, 0+050, 0+075, etc. Where cut depths are shown on the profile, they represent the approximate depth, in meters, of the finished drain as measured from the surface of the ground to the design gradeline for the bottom of the open drain. Where excavation depths are shown on the profile, they represent the approximate depth, in meters, from the existing drain bottom down to the design gradeline for the bottom of the open drain.

(2) The Contractor will be held responsible during the progress of the work for the preservation of all reference stakes, benchmarks and survey markers which fall within the limits of the work. The cost of replacing any benchmark or survey marker defaced or destroyed by the Contractor as a result of his work will be deducted from any monies due the Contractor.

SECTION 11 - ALIGNMENT

(1) Except where specified otherwise, the excavation will follow as nearly as possible the course of the existing drain with sloping and widening carried out on each bank as required to produce the specified cross-section. Wherever sharp or irregular bends occur, all sloping and widening is to be done on that side of the drain that will tend to reduce the curve and improve the alignment of the channel.

(2) Where one drain bank adjoins the travelled part of any roadway or laneway, all sloping and widening is to be done on that side of the drain farthest from the roadway unless otherwise directed by the Engineer.

(3) Where the drain bank adjoins an existing fence which is not specified for removal or relocation all required sloping and widening shall be carried out on that side of the drain farthest from the fence.

(4) Where a drain is to be moved off a road allowance and onto adjoining lands, the top edge of the nearest finished drain bank is to be not closer than 1 metre to the limit of the road allowance or top edge of the abandoned channel. The centreline of the new channel is to be as straight as possible even though this 1 metre dimension is exceeded in places.

(5) Where a new drain is constructed, its centre line will be as straight as possible and any changes in direction shall be in the form of smooth, regular bends.

(6) Where a new drain is to be constructed adjoining an existing fence line, the Contractor shall lay out a suitable centre line such that the top edge of the adjacent drain bank, at its widest point, will not be closer than 1 metre to the fence and the Contractor shall use this centre line to establish the drain location.

(7) The Contractor must lay out the proposed centre line in the field for approval by the Drainage Superintendent prior to construction.

SECTION 12 - PROFILE

(1) The excavation of the drain must be at least to the depth intended by the grade line shown on the Profile, which grade line is governed by the benchmarks. The Profile shows, for the convenience of the Contractors and others, the approximate depth of excavation from the surface of the ground to the final invert of the channel in metres and decimals of a metre and also the approximate depth of excavation from the bottom of the existing channel to the final invert of the channel. Benchmarks, which have been established along the course of the drain, shall govern the final elevation of the drain. The location and elevation of the benchmarks are shown on the Drawings.

SECTION 13 - BOTTOM WIDTH AND SIDE SLOPES

(1) The bottom widths and the side slopes of the various sections of the finished drain are to be true to line and grade as shown on the Profile.

(2) Contractors will not be restricted to the exact dimensions specified but must excavate clear of the specified cross-sections and may excavate such additional depth or width as may be required to accommodate the use of suitable excavating equipment or to allow for minor sedimentation prior to final inspection provided that at no place are the side slopes of the excavation to be cut steeper than the slope specified on the Profile. The Contractor is not to excavate the drain bottom so much deeper than the grade line as to result in the formation of pockets in the drain bottom that will cause water to stand in pools along the drain. Should over-excavation of the drain bank occur, the Contractor will **not** be permitted to repair with native material packed into place by the excavator and reshaped. Should over-excavation occur, the Contractor will be required to have a bank repair detail engineered by a Professional Engineer (hired by the Contractor), to ensure long term stability of the bank is maintained. Such repairs shall be subject to approval by the Engineer and will be at no extra cost to the item.

SECTION 14 - OBSTRUCTIONS

(1) All brush, timber, logs, stumps, stones, or other obstructions encountered within the limits of the channel along the course of the drain are to be removed by the Contractor. Timber, logs and stumps are to be dealt with in the same manner as specified for brush and trees. Large stones and other similar materials are to be piled near the limit of the spread area so as not to interfere with the spreading of the excavated material. The disposal of this material shall be the owner's responsibility.

SECTION 15 - BRUSH AND TREES

(1) Brushing shall be carried out on the entire drain within the above identified sections of the drain where required and as specified herein. **All** brush and trees located within the drain side slopes shall be cut parallel to the side slopes, as close to the ground as practicable. Tree branches that overhang the drain shall be trimmed. Small branches and limbs are to be disposed of by the Contractor along with the other brush. Tree stumps, where removed to facilitate the drain excavation and reshaping of the drain banks, may be burned by the Contractor where permitted; otherwise, they shall be disposed of, off the site. All thorn trees shall be disposed of off-site.

(2) Where the existing bottom widths and side slopes of the drain are sufficient to permit the specified deepening of the drain without disturbing the existing banks above the present drain bottom, the Contractor will be required to cut the brush and trees on the sloping banks flush with the surface of the banks but he will not be required to remove their roots and stumps unless they will obviously create obstructions to the flow of water in the drain.

(3) Where it is necessary to widen the drain and excavate material from the sloping banks, all brush and trees within the limits of the channel and within 1 metre of the top of the drain banks and within the spread area are to be cut and those roots and stumps in the drain bottom and on the banks where the widening takes place shall be completely removed unless the Drainage Superintendent permits the Contractor to cut the roots and stumps flush with the surface of the finished banks.

(4) The Contractor shall make every effort to preserve mature trees which are beyond the drain side slopes, and the working corridors. If requested to do so by the Drainage Superintendent, the Contractor shall preserve certain mature trees within the designated working corridors.

(5) Where there is a fence adjoining the drain, he will be required to cut the brush in the fence line and on the side of the fence opposite the drain only if the excavating equipment will be operated from this side or excavated material is to be placed and levelled on this side.

(6) The Contractor shall cut off flush with the ground all brush and trees having a diameter of 150 mm or less from the disposal area. Should the Contractor find it necessary to remove trees having a diameter of 150 mm or larger from the disposal area in order to permit the efficient excavation of the drain or spreading of excavated material, he will be at liberty to do so only on permission of the Drainage Superintendent in charge of the work.

(7) All trees over 200 mm in diameter that are cut are to be trimmed of branches, and the trunks, along with branches over 200 mm in diameter, are to be cut up into log lengths and piled for the use of the adjoining owner unless the owner advises the Drainage Superintendent he does not want them, in which case they are to be disposed of by the Contractor along with the other brush. Small branches and limbs are to be disposed of by the Contractor along with the other brush. Tree stumps may be burned by the Contractor where permitted; otherwise, they shall be disposed of by him away from the site of the work.

(8) Following completion of the work, the Contractor is to trim up any broken or damaged limbs on trees which remain standing, disposing of the branches cut off along with other brush and leaving the trees in a neat and tidy condition.

(9) Brush and trees removed from the drain and banks thereof and from the disposal area are to be put into piles by the Contractor, in locations where they can be safely burned, and are to be burned by the Contractor after obtaining the necessary permits, as required. If, in the opinion of the Drainage Superintendent, any of the piles are too wet or green to be burned, he will so advise the Contractor who may then arrange, to the Drainage Superintendent's satisfaction, an agreement in writing, with the owners where the piles are located, for them to burn the material when dry enough. If a satisfactory agreement cannot be made, the Contractor to haul away the unburned materials to an approved dump site.

(10) Since the trees and brush that are cut off flush with the earth surface may sprout new growth later, it is strongly recommended that the Municipality make arrangements for spraying this new growth at the appropriate time so as to kill the trees and brush.

(11) Prior to and during the course of burning operations the Contractor shall comply with the guidelines prepared by the Air Quality Branch of the Ontario Ministry of the Environment and shall ensure that the Environmental Protection Act is not violated.
(12) In no case will brush or trees be buried in the spoil bank or within the excavated material.
(13) The Contractor will be required to brush rake the excavated material to remove brush and trees from the spoil if so instructed by the Drainage Superintendent.
(14) As part of this work, the Contractor shall remove any loose timber, logs, stumps, large stones or other debris from the drain bottom and from the side slopes. Timber, logs, stumps, large stones or other debris shall be disposed of off-site.

SECTION 16 – EXCAVATION OF DRAIN

(1) All excavated material shall be handled as specified in the following section. Materials deposited on the farmlands shall be within the working corridors, at least 2.0 m from the top of the drain bank, or as specified on the drawings. Upon allowing drying of excavated materials (if necessary) and as approved by the Drainage Superintendent, the Contractor shall level excavated materials as specified. Excavated material shall not be placed on dykes, in ditches, tiles or depressions intended to conduct water into the drain.
(2) Seeding of the disturbed drain banks shall be completed immediately following drain construction as specified in the Special Provisions.
(3) All excavation work shall be done in such a manner as to not harm any vegetation or trees, not identified in this report or by the Drainage Superintendent for clearing. Any damages to trees or vegetation caused by the Contractors work shall be rectified to the satisfaction of the Drainage Superintendent.
(4) The Contractor shall exercise caution around existing tile inlets and shall confirm with the property owners that all tiles have been located and tile ends repaired as specified.

SECTION 17 - DISPOSAL OF EXCAVATED MATERIAL

(1) Where a part of the drain is being relocated, the Contractor shall strip the topsoil from the alignment of the new course and stockpile it for re-use following the completion of the subsoil operations. Subsoil excavated from the new course is to be used first to fill the existing course which is to be abandoned. Where the Contractor can conveniently do so, he may deposit the material in the old course as he excavates it from the new course but where the distance separating the new course from the old course is too great to permit this the excavated material must be loaded onto trucks, hauled to the abandoned drain and placed in the old channel. The material shall be placed in the abandoned channel in layers no greater than 300 mm in thickness. Each layer shall be thoroughly compacted with the levelling equipment available at the site prior to the placement of the subsequent layers. The abandoned channel shall be filled to an elevation at least 300 mm higher than the adjacent natural ground elevation to allow for settlement. If insufficient material is available to fill the old course, the surface of the material shall be graded so as to eliminate any low areas that would collect water.
(2) Excess excavated material not required for the filling of an abandoned channel or material excavated from the drain under normal construction, repair, or improvement shall be deposited and spread on the immediately adjoining farmlands in the locations set out in the Special Specifications. The material shall be deposited and spread no closer than 2 metres from the top edge of the adjacent drain bank and at least 1 metre clear of all fences.
(3) Where the excavated material is deposited in bush land, it is to be spread and levelled in the form of a spoil bank over at least the full width of the strip that has been cleared to permit the passage of excavating equipment but in no case is the top surface to be left more than 600 mm above the natural ground level even though this may require additional clearing to produce a sufficient disposal area. On completion, the spoil bank is to be left so that it is smooth enough to drive an ordinary farm vehicle along it.
(4) Where the adjoining land is sufficiently clear to permit cultivation, the Contractor shall deposit the excavated material on the property and spread the material over a width that, after spreading, the excavated material will generally have a thickness of approximately 150 mm. The Contractor shall utilize a minimum spread width of 6 metres and a maximum spread width of 20 metres even though this results in a depth of material in excess of 150 mm. The material shall be thoroughly spread and levelled with suitable equipment and left in a condition which permits cultivation with ordinary farm equipment without causing undue hardship on farm machinery and personnel.
(5) After the excavated material has been spread and levelled, any stockpiled topsoil is to be spread over it to a depth of no more than 100 mm.
(6) No excavated material is to be placed on lawns or ornamental shrubbery but is to be deposited on either or both sides of the lawn on the farmlands immediately adjacent to the lawn.
(7) Excavated material or topsoil shall not be placed in ditches, tiles or depressions intended to conduct water into the drain.
(8) The material shall be sufficiently levelled to allow further working by agricultural implements.
(9) All stones and other debris removed from the drain, which may interfere with agricultural implements, shall be disposed of off-site.
(10) The Drainage Superintendent in charge will be the sole judge as to the proper disposal of material under the contract and this specification

SECTION 18 - FENCES

(1) Where it is necessary to remove any fences which parallel the course of the drain in order to permit the excavation of the drain or the disposal of excavated material the Contractor shall remove the fence. An allowance will be made to the owners of the properties to compensate them for damages to fences which are considered capable of restraining cattle. The Contractor shall notify the owner of his intentions to remove the fence at least 7 days prior to doing so. Any owner has the option to salvage his fencing materials but must do so sufficiently in advance of the Contractor's operations so as to cause no unnecessary delays to him. If the owner does not remove his fences, the Contractor shall carefully take down the fence and leave the materials neatly placed beyond the limit of the spread area for disposal or reconstruction by the owner. The owner will be responsible to construct and maintain any temporary fencing during the progress of the work. The landowners and not the Contractor will be

responsible for the control of livestock in the adjoining field during the period of construction. Unless otherwise specified, the Contractor will not be required to reconstruct the fences following the completion of the work of excavation and levelling.

(2) No permanent fencing shall be constructed or reconstructed without the approval of the Drainage Superintendent. Any fences that are constructed or reconstructed along the course of the drain are to be kept at least 1 metre clear of the top edge of the adjacent drain bank.

(3) Where the Contractor finds it necessary to remove any fences which cross the drain, he shall remove the fencing materials in a careful, workmanlike manner. Unless otherwise directed the Contractor shall reconstruct the cross fences in as good a condition as the old material permits.

SECTION 19 - ROAD CROSSINGS

(1) Where the drain crosses the travelled part of a road through a bridge, the Contractor shall excavate the drain to its specified dimensions through the bridge opening, using care to avoid damaging it. If after the drain has been excavated at any bridge structure it appears to the Drainage Superintendent that repairs or replacement may be required, he shall so advise the Road Authority having jurisdiction over the particular bridge.

(2) Where a new bridge is required or where any underpinning, strengthening or repairs is rendered necessary by the work, it is to be carried out by the Road Authority at its own expense.

(3) Where the drain crosses the travelled part of a road through a pipe that does not have to be replaced or lowered, the Contractor shall clean the pipe to its full cross-sectional area using care to avoid damaging it.

(4) Where the existing pipe is of sufficient size and is in a good state of repair but requires to be lowered, the Contractor shall carefully remove it, clean it to its full cross-sectional area and replace it in the drain as specified herein.

(5) Where the existing pipe must be replaced, the Contractor shall carefully remove it from the drain, clean it to its full cross-sectional area, and leave it beside the drain for removal by the Road Authority. Unless otherwise instructed he shall install the new road culvert as supplied by the Road Authority. All backfill material shall be compacted granular material supplied by the Road Authority, unless otherwise specified.

(6) The Contractor shall notify the Road Authority having jurisdiction over the structure under construction at least 72 hours in advance of any construction activities.

SECTION 20 - FARM AND ACCESS CULVERTS

(1) Where a farm or access culvert or bridge does not have to be replaced or lowered, the Contractor shall clean it to its full cross-sectional area using care to avoid causing damage to it in the process.

(2) Where a pipe culvert is to be lowered, the Contractor shall carefully remove it, clean it to its full cross-sectional area and replace it in the drain with its invert set 10% of the pipe diameter below the grade line.

(3) Where a culvert is to be replaced, the Contractor shall carefully remove it from the drain, clean it to its full cross-sectional area and leave it on the drain bank. If the pipe was originally supplied and installed by the property owner, it shall be left for disposal by the owner. If the pipe was installed under the provisions of The Drainage Act, it shall be disposed of as directed by the Drainage Superintendent and any salvage value from the sale of the pipe shall be credited to the drain. Wooden or concrete farm or access bridges which must be removed from the drain shall be disposed of in the same manner.

(4) Where a pipe culvert is to be installed in the drain, all materials shall be supplied by the Drainage Superintendent as an expense to the drain. The Contractor shall install the pipe in the location directed by the Drainage Superintendent in accordance with the specifications governing the installation.

(5) Where a new culvert is to be installed, the owner may request the Drainage Superintendent to have it placed in a different location from the existing one and this will be permitted so long as the relocation does not result in an increase in the area draining through the culvert. Adequate notice of the change must be given to the Contractor. In no case may the existing culvert be left in the drain when it has been specified that it is to be removed.

SECTION 21 - FARM AND ACCESS PIPE CULVERT INSTALLATION

21.1 - Location and Elevation of Access Culvert or Farm Culvert

(1) In general, the new access or farm culvert shall be installed as shown on the drawings attached to the engineer's report. Prior to installation, the Contractor shall contact the Drainage Superintendent to confirm the exact location for the new culvert. The Drainage Superintendent, in consultation with the property owner, shall establish the exact location for the new culvert in the field.

(2) The invert (inside bottom) bottom of the pipe shall be set according to the elevations shown on the accompanying plans. For the purpose of construction, the benchmark indicated on the accompanying plans shall be used to determine the elevation of the proposed enclosure.

21.2 Dry Culvert Installation

(1) Suitable dykes shall be constructed in the drain so that the installation of the pipe can be accomplished in the dry. The Contractor shall perform the excavation, placement of bedding, pipe and backfill in a dry condition and shall provide all required pumps and/or equipment to enable the work to proceed in the dry.

21.3 Pipe Installation

(1) The required pipe shall be set in the drain to the dimensions shown on the accompanying drawings and the Contractor shall carry out all required excavation to install the pipe and specified rip-rap end treatment. The drain bottom shall be cleaned, prepared, shaped and compacted to suit the new culvert configuration, as shown on the drawings. The Contractor shall excavate sufficient material from the drain banks and bottom to permit placement of the pipe and backfill material. The minimum trench width as shown on the drawings, shall be provided from the face of the pipe to the excavated trench wall along each bank to provide working room to compact the backfill material.

(2) The surface on which the culvert is to be laid shall be true to grade and alignment and shaped to accept the materials to be placed. The pipe shall be laid to the alignment and grade shown in the report but may not be placed on a bed containing frozen materials.
(3) The end protection to each end of the pipe structure shall be as specified in the Special Provisions and on the Drawings and in accordance with the following applicable specifications.
(4) All newly excavated portions of the drain bank shall be seeded.
(5) The Contractor shall dispose of all surplus excavated material at an approved disposal site at his expense.
(6) Riveted corrugated steel pipe shall be laid with the inside circumferential laps pointing in the direction of the flow. The longitudinal laps shall be located in the upper half of the pipe.
(7) All helical corrugated steel pipe shall be supplied with re-rolled annular ends and shall be installed so that the helix angle is constant for the total length of the installation and each pipe section shall be installed next to the previous section such that the lock-seam forms a continuous helix.
(8) Corrugated steel pipe sections shall be joined together by means of plant fabricated couplers having a minimum wall thickness of 1.6 mm and a 10 c width. The couplers shall be installed to lap approximately equal portions of the pipe sections being connected, such that the corrugations or projections of the coupler properly engage the pipe corrugations.
(9) Where fabrication of structural plate structures by the Contractor is specified, they must be assembled in the trench or at the side of the excavation. If the assembled structure has to be moved to its final position, it shall be moved in such a manner that no damage or distortion is caused to the structure. The materials shall be assembled and handled in accordance with the manufacturer's specifications and directions.
(10) The whole of the work shall be done in a neat, thorough and workmanlike manner such that the alignment of the bridge pipe at each location meets the full satisfaction of the drainage superintendent.

21.4 Backfilling and Compaction

(1) Backfill and cover material on each side of the culvert pipe shall be carefully placed simultaneously on each side of the pipe so that damage to or movement of the pipe is avoided. At no time shall the levels on each side differ by more than the 300 mm uncompacted layer. Then, a 300mm thick layer of Granular 'A' material, O.P.S.S. Spec 1010 shall be constructed as a road base. All backfill materials shall be placed in layers not exceeding 300mm (12") in thickness, loose measurement. Each layer shall be thoroughly compacted in place to a Standard Proctor Density of 100% by means of mechanical compactors. The Contractor shall provide sufficient water to the granular material such that optimum compaction levels are achieved. The equipment used and method of compacting the backfill material shall be to the full satisfaction of the Drainage Superintendent.

SECTION 22 – LATERAL TILE DRAINS

(1) Should the Contractor encounter any lateral tiles within the proposed culvert limits as shown and also those not shown on the attached drawings, the Contractor shall re-route the outlet tile drain(s) in consultation with the Drainage Superintendent, as required, to accommodate the new culvert. **Tile drain outlets through the wall of the new culvert pipe will not be permitted.** All costs associated with re-routing lateral tile drains (if any) shall be at the Contractor's expense. Care must be taken in handling plastic drain pipe in cold weather to avoid causing damage.
(2) Plastic drain pipe shall be held in position on planned grade immediately after installation by careful placement of backfill material.

SECTION 23 – CULVERT END PROTECTION - SLOPING RIP-RAP

(1) Where specified, the Contractor shall install quarried rip-rap erosion protection materials on the slopes at both ends of the pipe. The backfill and quarried rip-rap protection over the ends of the pipe shall be sloped at 1.5 horizontal to 1 vertical or to a flatter slope specified on the drawings. All stone used for rip-rap culvert end protection shall be 125-225 mm clear quarried rock or OPSS.MUNI 1004 and be placed with a minimum thickness of 300mm thickness. Prior to placing rip-rap materials on the backfill materials, the Contractor shall lay a non-woven geotextile filter fabric equal to a "Terrafix 270R" or approved equal. The geotextile filter fabric shall extend from the bottom of the pipe to the top of each side slope of the drain and between both side slopes of the drain. No portion of the filter fabric shall remain exposed to sunlight. The Contractor shall take extreme care to not damage the geotextile filter fabric when placing the rip-rap on top of the filter fabric. The geotextile filter fabric and quarried stone shall be placed to the complete satisfaction of the Drainage Superintendent. **Concrete rip-rap or round stone will not be permitted.**
(2) Where a clay layer is specified beneath the Rip-Rap End Protection, it shall be a 500 mm thick layer of cohesive clay material that is dry select earth material free of topsoil, organic matter, broken concrete, steel, wood and deleterious substances. It shall be placed and shaped before the filter fabric layer is placed.

SECTION 24 - BAGGED CONCRETE HEADWALLS – SINGLE BAG THICKNESS

(1) Sacked concrete end walls that do not exceed 1.8 m in height shall be constructed of a single row of sacked concrete. The installation of the end wall shall be governed by the drawings. The end wall treatment shall extend to the same elevation as the finished travelled surface and fit to the top of bank elevation on both banks and in any event be a minimum of 300 mm above the crown of the pipe.
(2) Where specified and after the Contractor has set in place the new pipe and partially backfilled same, he shall install new concrete filled jute bag headwalls at each end of the pipe. When constructing the concrete jute bag headwalls, the Contractor shall place the bags so that the completed headwall will have a slope inward from the bottom of the pipe to the top of the finished headwall, the slope of the headwall shall be one unit horizontal to five units vertical.
(3) The Contractor shall completely backfill in behind the new concrete jute bag headwalls with granular material, Granular "B" per O.P.S.S. 1010, and the granular material shall be compacted in place with a Standard Proctor Density of 100%. The placing of the jute bag headwalls and the backfilling shall be performed in lifts simultaneously. The granular backfill shall be placed and compacted in lifts not to exceed 300mm (12") in thickness.

(4) The concrete jute bag headwalls shall be constructed by filling jute bags with concrete. All concrete used to fill the jute bags shall have a minimum compressive strength of 20 MPa in 28 days and shall be provided and placed only as a wet mix. Under no circumstances shall the concrete to be used for filling the jute bags be placed as a dry mix. The jute bags, before being filled with concrete, shall have a dimension of 460mm x 660mm (18" x 26"). The jute bags shall be filled with concrete so that when they are laid flat, they will be approximately 100mm (4") thick, 300mm (12") to 380mm (15") wide and 460mm (18") long.

(5) The concrete jute bag headwall to be provided at the end of the pipe shall be of single bag wall construction or as specified otherwise. The concrete filled bags shall be laid so that the 460mm (18") dimension is parallel with the longitudinal length of the new pipe. The concrete filled bags shall be laid on a footing of plain concrete being 460mm (18") wide or as otherwise specified, extending for the full length of the wall, and from 0.3 metres (1.0') below the bottom of the corrugated pipe to the bottom of the culvert pipe. All concrete used for the footing shall have a minimum compressive strength of 20 MPa in 28 days.

(6) The completed jute bag headwalls shall be securely embedded a minimum of 0.50m (20") into the side slopes of the drain. At the roadside of the bridge the Contractor shall flair outwards each headwall approximately 1.5m (5.0') as directed by the Drainage Superintendent.

(7) Upon completion of the jute bag headwall the Contractor shall cap the top row of concrete filled bags with a layer of plain concrete, 150mm (6") thick, and hand trowelled to obtain a pleasing appearance. The concrete cap shall be the same width as the bagged wall and excess concrete will not be allowed to be placed on the cap area. The concrete cap shall not overhang the bagged wall on the driveway side of the wall.

(8) The Contractor shall fill all voids between the concrete filled jute bags and the corrugated steel pipe with concrete, particular care being taken underneath the pipe haunches to fill all voids.

SECTION 25 – BAGGED CONCRETE HEADWALLS – DOUBLE BAG THICKNESS

(1) Sacked concrete end walls that exceed 1.8 m in height shall be constructed of double rows of sacked concrete.

(2) The concrete filled bags are to be laid so that the 460mm (18") dimension is perpendicular (at right angles) to the longitudinal length of the new pipe. Therefore, the long dimension of the bag will be visible when the headwall is complete.

SECTION 26 – GROUTED CONCRETE RIP-RAP WALL

(1) Where specified, the Contractor may construct a grouted concrete rip rap headwall. The specifications for the installation of a concrete filled jute bag headwall shall be followed with the exception that broken sections of concrete may be substituted for the jute bags. The concrete rip rap shall be approximately 460mm (18") square and 100mm (4") thick and shall have two flat parallel sides. The rip rap shall be fully mortared in place using a mixture composed of three parts of clean, sharp sand to one part of Portland Cement.

SECTION 27 – PRECAST CONCRETE HEADWALLS

(1) Where specified as an alternative, the Contractor may supply and install precast concrete headwalls. Said precast headwalls shall be a custom-made product, manufactured by Underground Specialties (Windsor) or similar provider.

(2) The precast concrete headwall or precast blocks or modules shall be of the shape, size and dimensions shown on the drawings.

(3) Precast provider to provide stamped engineering drawing for precast headwall and Geotextile restrainers for approval.

(4) Excavation for the headwalls shall be in conformance with O.P.S.S. Section 902.

(5) The supply and placement of concrete shall be in conformance with O.P.S.S. Section 904. All concrete shall have a strength of 33 MPa after 28 days. All concrete shall be air entrained to an air content of 6% $\pm$ 1.5% by volume for 19mm maximum size of aggregate. Minimum cover for concrete shall be 40mm (1 ½").

(6) The supply and placement of reinforcing steel shall be in conformance with O.P.S.S. Section 905. The reinforcing steel shall be grade 400 and shall be of the size and type shown on the drawings.

(7) The Contractor shall place the precast headwall so that it is straight and plumb. The method of backfilling the side slope trenches shall be such that no voids remain under the haunches of the sloping concrete headwall. The Contractor's method of achieving this shall be approved prior to start of construction.

(8) The Contractor shall provide a sufficient opening in the headwalls so that when the headwalls are set and plumb the corrugated steel pipe may be inserted or adjusted to grade. The void between the corrugated steel pipe and opening in the headwall shall be fully mortared in place using a mixture composed of three parts of clean, sharp sand to one part of Portland Cement.

(9) After the corrugated steel pipe has been set and partially backfilled with Granular "B" per O.P.S.S. 1010 and compacted to 100% Standard Proctor Density, geotextile tie backs to the precast concrete headwalls in accordance to approved stamped headwall and restraining devices.

SECTION 28 - TILE OUTLET PIPES AND ROAD DRAINS

(1) Where existing tile outlet pipes of cast iron, asbestos cement, corrugated steel or other rigid material are encountered along the course of the drain, and where they will be removed or rendered useless by the work, the Contractor, as part of his work, shall reinstall the outlet pipes in the re-graded bank.

(2) Where, in the course of the grading operation tile drains having no outlet pipe are encountered or the existing outlet pipe is not suitable for re-installation, the Contractor shall install an outlet pipe manufactured for that purpose. The outlet pipe shall be one size larger than the diameter of the tile, 3 metres in length, and supplied by the Drainage Superintendent as an expense to the drain.

(3) All outlet pipes installed shall be at least 3 metres long and shall be embedded 2.5 metres into the bank of the drain and shall protrude 0.5 metres beyond its face. The outlet end shall be fitted with a removable wire rodent guard.

(4) Where a drain adjoining a road is relocated, the Drainage Superintendent shall arrange to have all existing private and road drains which cross beneath the road extended across the old course of the drain to the drain in its new location. The cost of all pipe materials to extend these drains together with the installation costs will be borne by the Road Authority having jurisdiction.

SECTION 29 – RIP-RAP EROSION PROTECTION

(1) The Contractor shall supply and install the required quantities of graded stone rip-rap erosion protection materials where specified All stone used for rip-rap culvert end protection shall be 125-225 mm clear quarried rock or OPSS.MUNI 1004 and be placed with a minimum thickness of 300mm thickness. Prior to placing rip-rap materials on the backfill materials, the Contractor shall lay a non-woven geotextile filter fabric equal to a "Terrafix 270R" or approved equal. No portion of the filter fabric shall remain exposed to sunlight. The Contractor shall take extreme care to not damage the geotextile filter fabric when placing the rip-rap on top of the filter fabric. The geotextile filter fabric and quarried stone shall be placed to the complete satisfaction of the Drainage Superintendent. **Concrete rip-rap or round stone will not be permitted.**

SECTION 30 – LOCATION OF STRUCTURES, ETC.

(1) The Contractor shall satisfy himself as to the exact location, nature and extent of any existing structure, utility or other object which he may encounter during the course of the work. The Contractor shall indemnify and save harmless the Municipality and the Engineer for any damages which he may cause or sustain during the progress of the work. He shall not hold the Municipality or the Engineer liable for any legal action arising out of any claims brought about by such damage caused by him.

SECTION 31 - LAWN RESTORATION

(1) Where the construction works cross a lawn, the Contractor shall take extreme care to avoid damaging the lawn, shrubs and trees encountered. Upon completion of the work, the Contractor shall completely restore the area by the placement and fine grading of topsoil and seeding or sodding the area as specified by the Engineer or Drainage Superintendent.

SECTION 32 – PROPERTY BARS AND SURVEY MONUMENTS

(1) The Contractor shall be responsible for marking and protecting all property bars and survey monuments during construction. All missing, disturbed or damaged property bars and survey monuments shall be replaced at the Contractor's expense, by an Ontario Land Surveyor.

SECTION 33 - CLEAN UP AND RESTORATION

(1) The Contractor shall leave the whole of the site of the work in a neat, thorough and workmanlike appearance to the full satisfaction of the Drainage Superintendent. He shall haul away any excess earth from the site. He shall haul to the site, at his own expense, sufficient earth to fill any depressions caused by his work. All debris and waste materials specified for disposal by others shall be left in a neat condition. All materials to be disposed of under this contract shall be removed by the Contractor and the site left in a neat and tidy condition. The site shall be left, as closely as possible, in the same condition it was in prior to the commencement of the work.

(2) As part of the work and upon completion, the Contractor shall remove and dispose of, off-site any loose timber, logs, stumps, large stones, rubber tires, cinder blocks or other debris from the drain bottom and from the side slopes. Where the construction works cross a lawn, the Contractor shall take extreme care to avoid damaging the lawn, shrubs and trees encountered. Upon completion of the work, the Contractor shall completely restore the area by the placement and fine grading of topsoil and seeding or sodding the area as specified by the Engineer or Drainage Superintendent.

SECTION 34 - UTILITIES, RAILWAYS, ETC.

(1) The Contractor shall note that overhead and underground utilities such as hydro, gas, telephone and water are not necessarily shown on the drawings. Before commencing work, the Contractor will investigate the location of any and all railways, utility lines, wires, pipes, poles, towers, cables, etc. which may interfere with the proposed work. He will take all necessary steps to avoid damaging these. The Contractor will be liable for any damage to utilities and should any damage result to them from his operations, he will be completely responsible for these damages and will save harmless the Municipality and the Engineer from any legal actions which may arise as a result of such damage.

(2) If permits are required to allow the work to be carried out on or adjacent to any utilities, pipelines, railways, etc., the Contractor shall obtain these at his own expense.

(3) All work on or adjacent to any utility, pipeline, railway, etc., is to be carried out in accordance with the requirements of the utility, pipeline, railway, or other, as the case may be, and its specifications for such work form part of this specification and apply.

(4) In accordance with Section 26 of the Drainage Act, if utilities are encountered during the installation of the drainage works that conflict with the work, the operating utility company shall relocate the utility at their own costs. The Contractor however will be responsible to co-ordinate these required relocations and their co-ordination work shall be considered incidental to the project.

SECTION 35 – DAMAGE TO TRAVELLED PORTION OF MUNICIPAL ROADS

(1) The Contractor shall be responsible for any damage caused by him to any portion of the municipal road system, especially to the travelled portion. When excavation work is being carried out and the excavation equipment is placed on the travelled portion of a road, the travelled portion shall be protected by having the excavation equipment placed on satisfactory timber planks or timber pads. If any parts of the travelled portion of the road are damaged by the Contractor, the Municipality shall have the right to have the necessary repair work done by its employees and the cost of all labour and materials used to carry out the repair work shall be deducted from the Contractor's contract and credited to the Municipality.

SECTION 36 – MAINTAINING FLOWS

(1) The Contractor shall maintain the flow of any drainage works encountered in the progress of the work at no expense to the Owner. The Contractor shall obtain written approval from the Engineer in charge to stop up any drain and if necessary, provide pumping equipment, build necessary by-passes, etc. at no expense to the Owner.

SECTION 37 – MAINTENANCE

(1) The successful Tenderer shall guarantee the work for a period of one (1) year from the date of acceptance (as evidenced by the final inspection report), thereof from deficiencies that, in the opinion of the Engineer, were caused by faulty workmanship or materials. The successful Tenderer shall, at his/her own expense, make good and repair deficiencies and every part thereof, all to the satisfaction of the Engineer. Should the successful Tenderer for any cause, fail to do so, then the Municipality may do so and employ such other person or persons as the Engineer may deem proper to make such repairs or do such work, and the whole costs, charges and expense so incurred may be deducted from any amount due to the Tenderer or may be collected otherwise by the Municipality from the Tenderer. Nothing herein contained shall be construed as in any way restricting or limiting the liability of the Contractor under the appropriate laws under which the work is being done.

SECTION 38 - DRAINAGE SUPERINTENDENT

(1) Where the word "Drainage Superintendent" is used in this specification, it shall mean the person or persons appointed by the Council of the Municipality having jurisdiction, to superintend the work.

(2) The Drainage Superintendent will be permitted to make minor variations in the, work so long as these variations will result in either a more satisfactory drain or a more economical one. These variations, however, must not be such as to change the intent of the work performed nor are they to reduce the standard of quality.

SECTION 39 - SPECIAL PROVISIONS

(1) The Part of the Specifications headed "Special Provisions" which is attached hereto forms part of this Specification and is to be read with it. Where there is any difference between the requirements of this General Specification and those of the Special Provisions, the Special Provisions shall govern.

RC SPENCER ASSOCIATES INC.
Windsor, Leamington & Chatham, Ontario

ENVIRONMENTAL PROTECTION
SPECIAL PROVISIONS

(Revised 2016 11 25)

SECTION 1 – GENERAL

(1) These Environmental Protection Special Provisions shall apply and form part of this Contract. All costs associated to confirming with these Special Provisions shall be included in the Tender prices bid.

SECTION 2 - FIRES

(1) Fires and burning of rubbish on site will be permitted only with special approval from the Municipality.

SECTION 3 - DISPOSAL OF WASTES

(1) The Contractor shall not bury rubbish and waste materials on site unless approved by the Engineer and all applicable approving authorities. The site shall be maintained free of accumulated waste and rubbish. All waste materials should be disposed of in a legal manner at a site approved by all local approving authorities and the Engineer.
(2) The Contractor shall not allow deleterious substances, waste or volatile materials such as mineral spirits, or paint thinner, to enter into waterways, storm or sanitary sewers.
(3) The disposal of dredge material where applicable shall be in accordance with the above.

SECTION 4 - POLLUTION CONTROL

(1) The Contractor shall maintain under this Contract temporary erosion, sediment and pollution control features installed.
(2) The Contractor shall control emissions from equipment and plant to local authority's emission requirements.
(3) The Contractor shall not cause excessive turbidity when performing in-water work. The Contractor shall not allow any debris, fill or other foreign matter to enter into the waterway. The Contractor shall remove from the waterway, all extraneous materials resulting from in-water work.
(4) The Contractor shall abide by local noise By-Laws for the duration of the Contract.
(5) Spills of deleterious substances into waterways and on land shall be immediately contained by the Contractor and the Contractor shall cleanup in accordance with Provincial regulatory requirements. All spills shall be reported to the Ontario Spills Action Centre (1-800-268-6060), local authorities having jurisdiction and the Engineer. To reduce the risk of fuel entering the waterway, refuelling of machinery must take place a safe distance from the waterway. The Contractor shall note that the Engineer or the Owner takes no responsibility for spills, this shall be the sole responsibility of the Contractor.

SECTION 5 - WHMIS

(1) The Contractor shall comply with the requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials and regarding labelling and the provision of material safety data sheets acceptable to Labour Canada.

SECTION 6 - DRAINAGE

(1) The Contractor shall not pump water containing suspended materials into waterways, sewers or drainage systems. The Contractor shall be solely responsible for the control, disposal or runoff of water containing suspended materials or other harmful substances in accordance with these specifications, and local authority requirements. The Contractor shall provide temporary drainage and pumping as necessary to keep excavations and the site free from water.
(2) The Contractor shall install and maintain sediment control devices as indicated on the Contract Drawing and as director by the Engineer.

SECTION 7 - PROTECTION OF VEGETATION

(1) The Contractor shall exercise the utmost caution to ensure that existing trees and plants on-site and on adjacent properties are not damaged or disturbed unless noted otherwise in the Removals Special Provisions of this Contract. The Contractor shall restrict tree removal to areas indicated on the Contract Drawings and/or designated on-site. No trees or shrubs shall be removed without the approval of the Engineer.

SECTION 8 - DUST CONTROL

(1) The Contractor will be solely responsible for controlling dust nuisance resulting from his operations, both on the site and within adjacent rights-of-way.
(2) Water and calcium chloride shall be applied to areas on or adjacent to the site as authorized by the Engineer as being necessary and unavoidable for the prevention of dust nuisance or hazard to the public. No payment will be made for dust control unless otherwise specified in the Special Provisions.

SECTION 9 - RESTRICTIONS FOR IN-WATER WORKS

(1) The Contractor shall only perform in-water works during times when conditions permit reasonable production rates to be achieved. The Contractor shall be required to adopt good housekeeping practices that minimize disturbance to the site and the adjacent waterway.

(2) The Contractor shall note that this Project is subject to approval from the Essex Region Conservation Authority and as such, any possible turbidity caused by the construction of shore protection works is of key importance.
(3) The Contractor shall minimize the turbidity (sedimentation) produced by any in-water works construction or operations. The Contractor will be ordered to cease operations if, in the opinion of the Engineer or authorities having jurisdiction, the in-water work is producing unacceptable amounts of turbidity in the waterway. Based on this, the Contractor shall either adjust his operation(s) to produce lower turbidity levels, wait for more favourable conditions before operations will be allowed to continue, or undertake approved mitigating measures (e.g., sediment control, etc.). All costs associated with the above will be the sole responsibility of the Contractor, and no claims for extras or delays will be considered.

SECTION 10 - FISH HABITAT

No work shall be undertaken when there is likelihood of adverse effects on fish spawning or fish habitat in downstream waters. The Contractor shall implement the following measures to avoid causing harm to fish and fish habitat:

10.1 - Site Selection

(1) Design and plan activities and works in the water body such that loss or disturbance to aquatic habitat is minimized and sensitive spawning habitats are avoided.
(2) Design and construct approaches to the water body such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation.
(3) Undertake all instream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse.

10.2 - Standard Practices

(1) Work will not be conducted at times when flows are elevated due to local rain events, storms or seasonal floods. Construct the work 'in the dry' and cut only trees necessary to do the work (no clear-cutting) and as specified in the Construction Specifications. All disturbed areas and all disturbed soils on both banks and within the channel, including spoil, must be stabilized immediately, and upon completion of work returned to a pre-disturbed state or better as soon as conditions allow.

10.3 - Timing Windows

(1) For spring spawning fish in southwestern Ontario, the timing window for construction, is July 15 to March 15. This covers all warm water fish species, which is the type of fish that will be found in essentially all the small watercourses and drains in southwestern Ontario. Do not carry out in-water work and any work affecting fish or fish habitat outside of the timing window without prior authorization from the appropriate authorities for emergency situations affecting public safety.

10.4 - Contaminant and Spill Management

(1) Plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, poured concrete, or other chemicals do not enter the watercourse. All activities should be controlled to prevent the entry of petroleum products, debris, rubble, concrete or other deleterious substances into the water.
(2) Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance and keep an emergency spill kit on site.
(3) Ensure that building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish.

10.5 - Erosion and Sediment Control

(1) Develop and implement an 'Erosion and Sediment Control Plan' for the site that minimizes risk of sedimentation of the water body during all phases of the project. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the water body or settling basin, and runoff water is clear. The plan should, where applicable, include:

- Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the water body.
- Measures for managing water flowing into the site, as well as water being pumped/diverted from the site such that sediment is filtered out prior to the water entering a water body. For example, pumping/diversion of water to a vegetation area, construction of a settling basin or other filtration system.
- Site isolation measures (e.g., silt boom or silt curtain) for containing suspended sediment where in-water work is required (e.g., dredging, culvert work). To prevent sediment entry into the Drain, in the event of an unexpected rainfall, silt barriers and/or traps must be placed in the channel during the works and until the site has been stabilized. All sediment and erosion control measures are to be in accordance with related Ontario Provincial Standards. It is incumbent on the proponent and his/her contractors to ensure that sediment and erosion control measures are functioning properly and are maintained/upgraded as required.
- Measures for containing and stabilizing waste material (e.g., dredging spoils, construction waste and materials, uprooted or cut aquatic plants, accumulated debris) above the high-water mark of nearby water bodies to prevent re-entry.
- Regular inspection and maintenance of erosion and sediment control measures and structures during the course of construction. Repairs to erosion and sediment control measures and structures if damage occurs. Sediment in the barriers/traps must be removed and stabilized on land to prevent entry of sediment into the water. Removal of non-biodegradable erosion and sediment control materials once the site is stabilized.

10.6 - Fish Protection

(1) Ensure that all in-water activities, or associated in-water structures, do not interfere with fish passage, constrict the channel width, or reduce flows.

(2) Retain a qualified professional to ensure applicable permits for relocating fish are obtained and to capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters. Fish may need to be relocated again, should flooding occur on the site.

(3) Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself.

(4) Avoid using explosives in or near water. Use of explosives in or near water produces shock waves that can damage a fish's swim bladder and rupture internal organs. Blasting vibrations may also kill or damage fish eggs or larvae.

10.7 - Operation of Machinery

(1) Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species, and noxious weeds. Wash, refuel, and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.

(2) Whenever possible operate machinery on land above the high-water mark, on ice, or from a floating barge in a manner that minimizes disturbance to the banks and bed of the water body.

(3) To cross a municipal drain or watercourse, use the existing crossing structures within the designated working corridors or construct temporary crossing structures approved by the Engineer. Fording will not be permitted unless approved by the Engineer and carried out by the Contractor according to the requirements determined by the Engineer.

10.8 - Culvert Work

(1) It is important to apply the relevant mitigation measures outlined above, to ensure that no deleterious materials reach fish habitat and that there are no detrimental impacts to physical fish habitat.

(2) Existing culverts may be repaired, replaced, and removed, and debris may be removed from them, without contacting DFO. Important things to consider are:

- the timing window, which will be July 15 to March 15 for almost 100% of projects;
- that fish passage must not be obstructed;
- that the channel cannot be realigned;
- that culverts are designed for a minimum embedment of 10% below grade;
- that new material placed below the high-water mark must be properly stabilized and protected from erosion;
- that the channel must not be narrowed; and
- that work must be done when there is no flowing water.

(3) It is best to time work when stream flows are at a minimum, but contingency measures should be in place in the event that a heavy rain occurs. Coffer dams or other features should be used above the area of construction and water above it should be pumped into the stream channel downstream of the construction. If the initial dewatering strands fish, they should be captured and placed downstream in the wetted area. It may be necessary to get a permit from MNRF to move the fish.

SECTION 11 - ENDANGERED SPECIES ACT

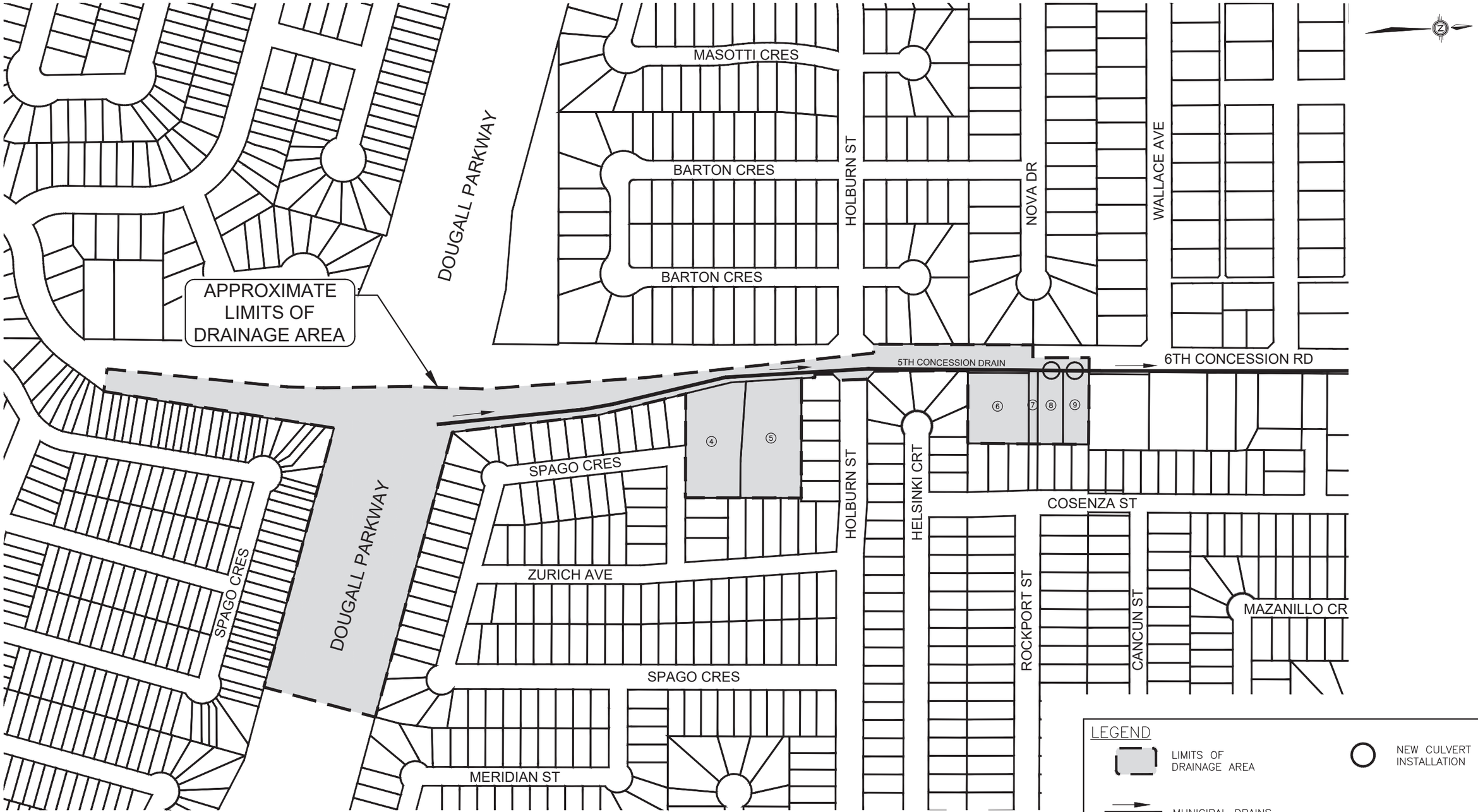
(1) All work must comply with the current version of the Ontario Endangered Species Act, 2007, S.O. 2007, c.6; O. Reg.230/08: (Species at Risk in Ontario); and O. Reg. 242/08: (General).

(2) The Municipality shall obtain the most current Endangered Species information available from MNRF and other sources. A designated persons employed by the Municipality will be responsible for reviewing habitat maps to determine if registration of prescribed activities or full review and approval by MNRF and other agencies is required.

(3) Prior to the start of any construction activities, the Contractor shall meet with the Municipal Designate to obtain a copy of specific mitigation procedures for dealing with endangered species should they be encountered anytime during construction.

RC SPENCER ASSOCIATES INC.

Windsor, Leamington & Chatham, Ontario



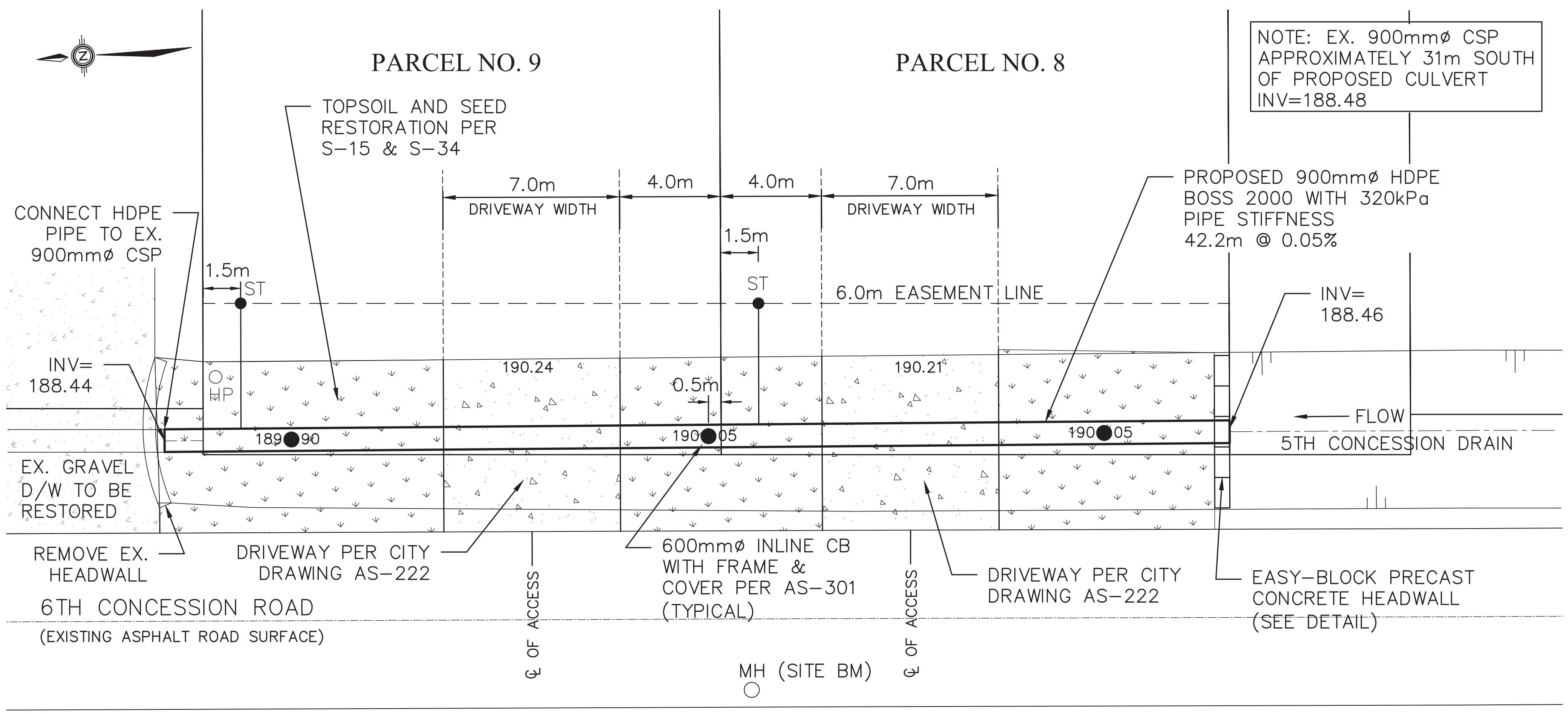
RC SPENCER ASSOCIATES INC.
Consulting Engineers
Windsor: 800 University Ave. W.- Windsor, ON N9A 5R9
Leamington: 18 Talbot St. W.- Leamington, ON N8H 1M4
Chatham-Kent: 49 Raleigh St.- Chatham, ON N7M 2M6
Professional Engineers

DESIGN	M.M.H.
CHECKED	S.M.L.
DRAWN	M.M.H.
CHECKED	S.M.L.
DATE	27 JAN. 2023
SCALE	1:3,000

5TH CONCESSION DRAIN CULVERTS

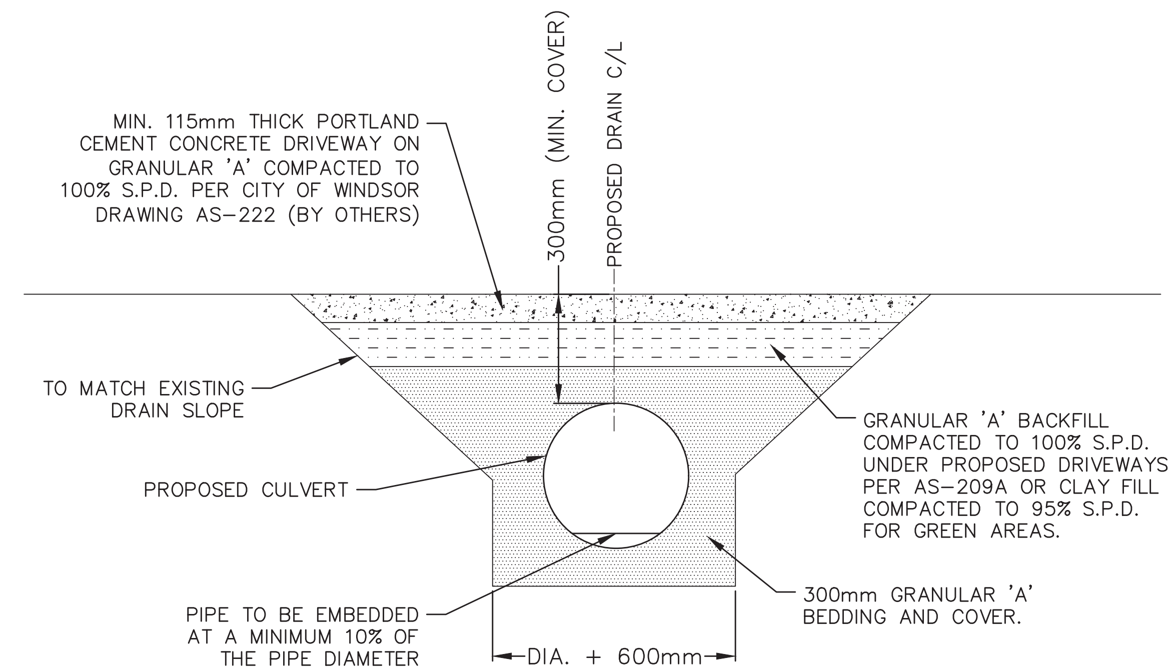
DRAINAGE AREA PLAN

PROJECT NO. 20-978
SHEET NO. 1
OF 2



PLAN VIEW

SCALE: 1:250

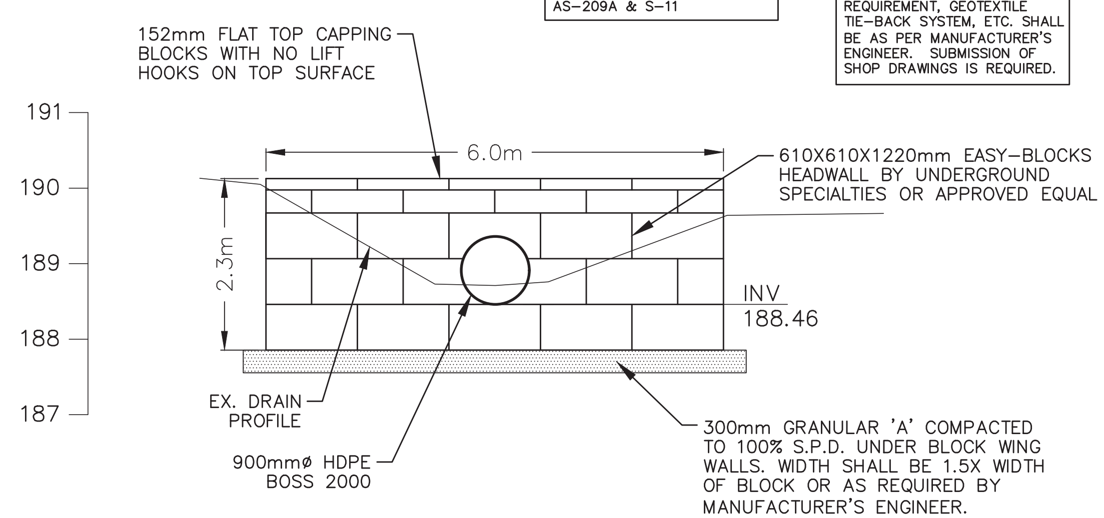


CROSS-SECTION DETAIL (TYPICAL)

NOT TO SCALE

NOTE:
CULVERT INSTALLATION TO COMPLY WITH ALL APPLICABLE CITY STANDARDS AND SPECIFICATIONS INCLUDING AS-209A & S-11

NOTE:
BLOCK HEADWALL LAYOUT IS INCLUDED FOR SCHEMATIC PURPOSES ONLY. DETAILED BLOCK LAYOUT, BOTTOM WIDTH REQUIREMENT, GEOTEXTILE TIE-BACK SYSTEM, ETC. SHALL BE AS PER MANUFACTURER'S ENGINEER. SUBMISSION OF SHOP DRAWINGS IS REQUIRED.



HEADWALL DETAIL

SCALE: 1:100

CULVERT SPECIFICATIONS FOR PARCEL 8 & 9 (NEW CULVERT INSTALLATION)	
PIPE SIZE	900mm DIAMETER
PIPE LENGTH	42.2m
PIPE GAUGE	N/A
CORRUGATION PROFILE	N/A
TYPE OF PIPE	HDPE BOSS 2000 WITH 320kPa PIPE STIFFNESS
UPSTREAM PIPE INVERT	188.46
DOWNSTREAM PIPE INVERT	188.44
PIPE GRADE	0.05%

SITE BENCHMARKS:
CENTER OF MANHOLE LOCATED AT THE SOUTHBOUND LANE OF 6TH CONCESSION ROAD FRONTING PARCELS NO. 8 AND 9. ELEV= 190.092

RC SPENCER ASSOCIATES INC.
Consulting Engineers
Professional Engineers

DESIGN	M.M.H.
CHECKED	S.M.L.
DRAWN	M.M.H.
CHECKED	S.M.L.
DATE	27 JAN. 2023
SCALE	AS SHOWN

5TH CONCESSION DRAIN CULVERTS

CULVERT DETAILS

PROJECT NO. 20-978

SHEET NO. 2 OF 2

Committee Matters: SCM 65/2023

Subject: Windsor Bicycling Committee 2022 Annual Report

Moved by: Councillor Kieran McKenzie
Seconded by: Councillor Mark McKenzie

Decision Number: ETPS 925
That the Windsor Bicycling Committee 2022 Annual Report **BE APPROVED.**
Carried.

Report Number: SCM 3/2023
Clerk's File: MB2023

Clerk's Note:

1. The recommendation of the Environment, Transportation & Public Safety Standing Committee and the Advisory Committee are the same.

2. Please refer to Item 7.1 from the Environment, Transportation & Public Safety Standing Committee Meeting held on February 22, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: http://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230222/-1/9386

Committee Matters: SCM 3/2023

Subject: Windsor Bicycling Committee 2022 Annual Report

WINDSOR BICYCLING COMMITTEE
2022 Annual Report

COMMITTEE BUSINESS

In 2022, the Windsor Bicycling Committee (WBC) received reports on the status of current and a summary of past City cycling initiatives.

The WBC provided input and feedback for the development of the City Bicycle Parking Policy and reviewed the finalized policy.

The Committee approved the establishment of Community Acknowledgement Awards, to recognize members of the community who are promoting cycling.

The Committee provided feedback on Windsor-Essex Cycling presentations of the C3Tech cycling application (app), and will continue to fund the design of the app.

The following budget items were addressed in 2022, and motions were passed for funding support to:

- Upset amount for costs associated with bottle water purchase for Bike to Work Day participants: $500
- Upset amount for costs associated with Fireworks Bike Corral fencing and promotional materials: $500
- The Bike Kitchen's Winter Wheels: $2,500
- C3Tech Cycling App: $1,000

STANDING COMMITTEE & COUNCIL

In 2022, the Windsor Bicycling Committee made recommendations to Council on the following items:

- **E-scooter Pilot** - recommended a report to Council outlining the progress of the e-scooter pilot.
- **New Bike Parking Policy** – recommended that the policy be supported by Council.

EVENTS & OUTREACH

Windsor Bicycling Committees event and outreach activities for 2022 were as follows:

- **Bike to Work Event** – Week of May 15th, 2022, in partnership with Bike Windsor-Essex, to promote commuter cycling and which culminated in a Bike to Work Day, on May 20th, 2022, where cyclists were invited to meet at Jackson Park for a ride along the park, view cycling maps and leave comments.
- **Fireworks Bike Corral** – June 27, 2022, WBC, in partnership with CUPE Local 82, to provide free, secure bike parking for fireworks attendees.
- **Windsor International Film Festival** – WBC sponsored a cycling film at the festival.

Committee Matters: SCM 66/2023

Subject: Minutes of the Windsor Bicycling Committee of its meeting held December 13, 2022

Moved by: Councillor Gary Kaschak
Seconded by: Councillor Renaldo Agostino

Decision Number: ETPS 926
That the Minutes of the Windsor Bicycling Committee of its meeting held December 13, 2022 **BE RECEIVED.**
Carried.

Report Number: SCM 22/2023
Clerk's File: MB2023

Clerk's Note:

1. The recommendation of the Environment, Transportation & Public Safety Standing Committee and the Advisory Committee are the same.

2. Please refer to Item 7.2 from the Environment, Transportation & Public Safety Standing Committee Meeting held on February 22, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: http://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230222/-1/9386

Committee Matters: SCM 22/2023

Subject: Minutes of the Windsor Bicycling Committee of its meeting held

December 13, 2022

Windsor Bicycling Committee

Meeting held December 13, 2022

A meeting of the Windsor Bicycling Committee is held this day commencing at 4:30 o'clock p.m. via Zoom video conference, there being present the following members:

Councillor Kieran McKenzie, Chair
Ken Acton
Klaus Dohring
Robert Hicks
Teena Ireland
Jessica Macasaet-Bondy
Ellen van Wageningen

Regrets received from:

Erika Valvasori
Kevin Morse

Guests in attendance:

Doug Sartori, and Lauren Hedges regarding the Cycling App Presentation

Also present are the following resource personnel:

Jeff Hagan, Transportation Planning Senior Engineer
Kathleen Quenneville, Active Transportation Coordinator
Karen Kadour, Committee Coordinator

1. Call to Order

The Chair calls the meeting to order at 4:30 o'clock p.m. and the Committee considers the Agenda being Schedule "A" attached hereto, matters which are dealt with as follows:

2. Declaration of Conflict

J. Macasaet-Bondy discloses an interest on Item 4.4 (Bike Windsor-Essex Winter Wheels Program) as her husband was selected as a participant for Winter Wheels.

3. Adoption of the Minutes

Moved by K. Acton, seconded by K. Dohring,

That the minutes of the Windsor Bicycling Committee of its meeting held May 4, 2022 **BE ADOPTED** as presented.

Carried.

Presentation – Cycling App

Doug Sartori, Windsor Hackforge and Lauren Hedges, Project Lead for the C3Tech initiative, appear before the Windsor Bicycling Committee.

Doug Sartori provides an overview of the progress of the Cycling App over the past year as follows:

- In addition to the funding provided by the WBC, they also secured some resources from the County Wide Active Transportation System (CWATS), and the Ontario Tourism Innovation Lab.
- In the technical work, they now have a releasable product which can announced to the community at any time. They are adding more to the App as they go along.
- A Contract Developer has been hired with some of the funds secured in order to move the project forward and to make the best product possible.
- The strategy behind this application was to start from an open source foundation and build from there. The application that they chose to build on uses Open Street Map (OSM) which is a global database of map data.
- Lauren Hedges has worked diligently to connect with the Open Street Map community to spread OSM knowledge in our community, improve our local OSM data and coordinate with local municipalities to get their data directly into OSM.
- Have had discussions to have the launch date coincide with the Bike to Work Week.
- Over the next few months will continue to improve the quality of the OSM data that they have locally, develop the safety features of the application with a stretch goal of turn by turn navigation.

Lauren Hodges provides a demonstration and details of how the app works:

- WindsorEssexCycling.ca is a bicycle-oriented map maintained by Windsor Hackforge as part of the City-County Cycling Tech (C3 Tech) initiative, built on top of OpenStreetMap.
- All of this information is based on data that users have submitted to OSM.
- Provides a demonstration of the routing. In the top left corner, there is a tool bar and clicks on the marker icon which can be used to place markers. Are able to place up to five markers at a time and the system will rout between them in the order that they are placed.

- In terms of how it is choosing the route that is taken, it goes back to the OSM data. The way that OSM works is that there are features that can be tagged with different data points.
- The routing will only be as good as the underlying data.
- Did start OSM Windsor Essex which is a user group focused on people who are interested in using, improving and contributing to OSM.
- The next step is to integrate those turn-by-turn directions. Also looking to ensure that all of the local cycling routes are added onto the map. The waterfront trail and some of the CWATS are available at this time but each municipality has their own set of cycling routes.

In response to a question asked by J. Macasaet-Bondy regarding the upkeep of data and the turn-by-turn navigation, L. Hodges responds that all of the information that exists about Windsor-Essex in OSM was imported around 2005 to 2015 so it is outdated. There is much more cycling infrastructure and changes to roadways that have occurred since then so adding that data is a process. OSM encourages manual edits rather than large scale imports.

D. Sartori adds that curation of data is a never ending task. One of the reasons that the OSM interest group was created was to generate community interest and to build on this data. Also working to educate municipal staff about OSM because the best source and most current source of data will be the municipalities themselves.

E. van Wageningen asks if the WBC can assist in any way to make more people aware of this map and how are they approaching accessibility.

L. Hodges responds that when it comes to mapping, there are so many accessibility concerns, so they will be working with an accessibility advisor in early 2023 to get a sense of what they can do to help improve the map in general.

In response to the question asked by E. van Wageningen regarding what can the WBC do to help, D. Sartori suggests that the WBC have a conversation with the City of Windsor around the licensing terms for the open data portal. There is a technical mismatch between the licensing regime that OSM requires in order to be able to take open data directly and work with it and the licence for use that the City of Windsor has.

K. Acton asks if the presenters are looking for opportunities for additional funding.

D. Sartori responds that they are hoping to continue to export this application and solution to other parts of Ontario. He notes that there was some interest from Chatham-Kent and they would like to add them in the future. The more resources they have, the faster they will be able to do this work. He adds that a small amount of funding will assist with sustainability.

J. Hagan advises that going forward, the City will be updating the map as new bikeway infrastructure is constructed.

Moved by J. Macasaet-Bondy, seconded by E. van Wageningen,
That the Presentation. by Doug Sartori, Windsor Hackforge and Lauren Hodges, C3Tech Initiative regarding the Cycling App **BE RECEIVED.**
Carried.

4. Business Items

4.4 2022 WBC Operating Budget

The Chair recalls that in 2021, the WBC sponsored the Bike Windsor-Essex Winter Wheels Program which was very successful.

Moved by K. Acton, seconded by T. Ireland,
That **APPROVAL BE GIVEN** to an expenditure in the upset amount of $2,500 from the 2022 WBC Operating Budget for the Bike Windsor-Essex Winter Wheels Program.
Carried.
J. Macasaet-Bondy discloses an interest and abstains from voting on this matter as her husband was selected as a participant for Winter Wheels.

Moved by E. van Wageningen, seconded by J. Macasaet-Bondy,
That **APPROVAL BE GIVEN** to an expenditure in the upset amount of $1,000 payable to Windsor Hackforge for further development of the Cycling App.
Carried.

Moved by R. Hicks, seconded by T. Ireland,
That **APPROVAL BE GIVEN** to an expenditure in the upset amount of $415.59 for the purchase of miscellaneous cycling accessories to be given to participants at events.
Carried.

Clerk's Note:

After further review of the financial information relating to the WBC's remaining 2022 Operating Budget, it was determined that an invoice previously approved was not submitted to the Committee Coordinator for payment. Therefore, the foregoing motion relating to the purchase of miscellaneous cycling accessories in the amount of $415.59 will not be honoured as these funds are required to pay the previous invoice.

4.1 Current Cycling Projects

J. Hagan introduces Kathleen Quenneville, new Active Transportation Coordinator.

K. Quenneville reviews the Cycling Infrastructure Projects that are currently underway.

K. Acton refers to the integration of the bike lanes, and asks if the city is considering raised crossings in situations where traffic calming is becoming an issue.

J. Hagan responds that this is in the Traffic Calming Policy and this is something to consider on a larger traffic calming project like for a collector road. There are difficulties in putting raised crosswalks in as a retrofit as they can impact drainage. Typically the cost of putting one in is not just the crossing itself it is putting a catch basin in on either side to avoid ponding.

Moved by J. Macasaet-Bondy, seconded by K. Acton,
That the Current Cycling Projects update provided by Kathleen Quenneville, Active Transportation Coordinator **BE RECEIVED**.
Carried.

4.2 Bike Parking Policy

J. Hagan advises that the Memo from the Policy Analyst and Transportation Planning Senior Engineer entitled “Bicycle Parking Policy” dated December 13, 2022 is a proposed draft of the Bike Parking Policy integrating the feedback received from the Committee. It is important to note that this Policy is not the entire picture of bike parking requirements in the city. The other piece will be the Zoning Bylaw which will dictate bike parking requirements for new developments or redevelopment. The structure of the Policy is one main policy with several procedures under it dealing with general bike parking standards and guidelines, bike parking for city facilities, bike parking in the right-of-way, temporary bike parking and events. They all address long term and short time bike parking.

K. Dohring provides two comments relating to the new bike racks located east on Wyandotte and he expresses concern relating to the way they are anchored (as excessive salt is used in winter on the sidewalks so there is heavy corrosion). In terms of the geometry of the bike racks, they are tall with a narrow base. When the laws of physics are applied, a person can exert a significant torque by a force at the top because the lever is very much to the advantage of whoever pushes them sideways. He fears that in a year or two there will be damage there so that the design of the bike racks needs to be such that it will be durable.

K. Acton asks if consideration has been given to municipal parking garages to provide shelter and cover, and to reduce the amount of parking in sheltered garages. He suggests Pelisser Street Parking Garage and the possibility of long term parking being integrated there.

J. Hagan responds that the suggestion by K. Acton has been considered and the exact form of that varies dependent on the parking garage. There is opportunity to provide more secure bike parking at the Pelissier Street Parking Garage.

K. Acton advises that he is aware that there will be discussion with Transit as it relates to parking areas based on stops and ridership and asks if there will an opportunity for public input..

J. Hagan responds that they have not reached out to transit riders but have spoken at length to Transit Windsor. The intent is to provide bike parking at transit terminals as well as looking at stops with a large number of transfers to see where parking should be provided there.

The Chair notes that it was stated that some of the work is to be split between Transportation Planning and Planning. In the past there was discussion around the idea of creating incentives for developers to add additional bike parking and bike parking facilities in new development. Asks Administration to respond regarding if this is something that Planning is proposing as a further incentive for more robust bike parking facilities in developments.

J. Hagan responds that there have been conversations with Planning to determine the feasibility of city-wide bike parking in a community improvement plan. Planning is looking at bike parking subsidies or benefits in future community plans perhaps as a facade improvement grant.

Moved by E. van Wageningen, seconded by J. Macasaet-Bondy,
That the proposed Draft Bike Parking Policy **BE SUPPORTED.**
Carried.

4.3 Cycling Initiatives 2018-2022

J. Hagan provides an overview of the cycling related initiatives carried out over the term of the current Windsor Bicycling Committee (2018-2022) which includes the following:

- Vision Zero Policy
- Traffic Calming Policy Update, including introduction of the Bikeway Traffic Calming Procedure (2021)

- Policy measures currently under development relating to cycling –
    - Bicycle Parking Policy
    - Complete Streets Policy
    - School Neighbourhood Policy Update
    - Vision Zero Action Plan
- Key Projects –
    - Dougall Avenue Multi-use Trail Tunnel
    - Hawthorne Drive Cycle Track
    - Rhodes Drive Multi-use Trail
    - Little River Corridor Pump Track
    - Malden Park Mountain Bike Trails
- Outreach Activities –
    - Annual Parks & Trails Map
    - Open Streets Windsor
    - Bike to Work Day
    - Bike to Fireworks
    - Art in the Park Bike Valet

Moved by J. Macasaet-Bondy, seconded by K. Acton,

That the overview of the cycling related initiatives carried out over the term of the current Windsor Bicycling Committee (2018-2022) **BE RECEIVED.**

Carried.

4.5 Bird E-Scooters

K. Dohring states that in the summer and fall, there is a large number of Bird e-scooters littering his neighbourhood, particularly around Willistead Park and the waterfront. He suggests that Bird have dedicated pick-up and drop-off locations as the concept of having a van pick up the e-scooters in the evening is falling short.

J. Hagan responds that a scooter blocking the sidewalk is an issue, however, when they receive complaints, Bird immediately moves the scooters and have been working proactively to ensure that their users are putting the scooters in the area where they are supposed to go. We certainly see areas in the city where the scooters are parked in high demand areas, i.e. the riverfront where they blocking the walking path and there can be quite a few scooters. The agreement that the city has with Bird does allow (in problem areas) to set up hubs and require the scooters to be parked there. The number of complaints received have been low so there has been no need to go to that option. He adds the agreement with Bird will be expiring in 2022 and are looking into putting out an RFP over the winter to allow a new scooter-share program to run starting in the spring. He notes that most of the scooter share providers do run that dock less model without hubs unless there is a specific problem to address.

K. Dohring responds that he is supportive of scooters being available, however the scooters are littering the walkways and suggests that perhaps the Walkerville area should have a dedicated pickup and drop-off location.

J. Macasaet-Bondy responds as a Bird scooter user, you cannot lock up the scooter anywhere, it must be placed in a specific area and to take a picture of it. She notes that certain spots around Walkerville may not be suitable for lock up, and suggests adding more spaces where lock-up is not available. She further proposes getting public feedback on where those spaces should be located.

The Chair states as the pilot project has ended, he asks if the public will be able to comment on the new scooter share program.

J. Hagan responds that the opportunity to comment on the new scooter share program will be when Council approves the award of the RFP.

T. Ireland leaves the meeting at 5:43 o'clock p.m.

E. van Wageningen asks if a report will be provided to Council that provides an overview of the two year Bird e-scooter pilot project.

J. Hagan responds that a report was provided to Council following the first year of the pilot project with a suggestion to renew for another year.

The Chair suggests that a report relating to the two year pilot project be provided to Council.

Moved by E. van Wageningen, seconded by K. Acton,
That Administration **BE REQUESTED** to prepare an updated report on the Bird E-Scooter Pilot Project for consideration by City Council.
Carried.

5. Date of Next Meeting

The next meeting date to be determined.

6. Adjournment

There being no further business, the meeting is adjourned at 5:56 o'clock p.m.

CHAIR

COMMITTEE COORDINATOR

THE CITY OF WINDSOR ONTARIO, CANADA

Committee Matters: SCM 67/2023

Subject: Grove Avenue (Janette Avenue to Bruce Avenue) Traffic Calming - Ward 3

Moved by: Councillor Kieran McKenzie
Seconded by: Councillor Renaldo Agostino

Decision Number: ETPS 927
That Administration **BE DIRECTED** to install speed humps and associated signs and pavement markings on Grove Avenue between Bruce Avenue and Janette Avenue.
Carried.

Report Number: S 8/2023
Clerk's File: ST/13863

Clerk's Note:

1. The recommendation of the Environment, Transportation & Public Safety Standing Committee and Administration are the same.

2. Please refer to Item 8.5 from the Environment, Transportation & Public Safety Standing Committee Meeting held on February 22, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: http://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230222/-1/9386

Subject: Grove Avenue (Janette Avenue to Bruce Avenue) Traffic Calming - Ward 3

Reference:

Date to Council: February 22, 2023
Author: Jeff Hagan
Transportation Planning Senior Engineer
519-255-6100 ext 6003
jhagan@citywindsor.ca
Public Works - Operations
Report Date: January 13, 2023
Clerk's File #: ST/13863

To: Mayor and Members of City Council

Recommendation:

THAT Administration **BE DIRECTED** to install speed humps and associated signs and pavement markings on Grove Avenue between Bruce Avenue and Janette Avenue.

Executive Summary:

N/A

Background:

The City of Windsor Traffic Calming Policy was first adopted in 2005. The Policy underwent major updates in 2015 and 2021.

When the 2021 Traffic Calming Policy was brought before Council at its April 19, 2021 meeting, in addition to adopting the proposed policy, Council directed that Administration report back with additional policy measures related to traffic calming (CR168/2021):

> *That administration BE DIRECTED to report back to Council with a policy, including a rollout plan, that would allow residents to request speed bumps if the majority in the subject block wish to see that happen.*

The requested report back was brought before Council on May 9, 2022. The report provided a new Local Road Speed Hump Procedure as well as related minor amendments to the Traffic Calming Policy in order to implement the new procedure. Council adopted this new Procedure.

Discussion:

A resident request for traffic calming was received for Grove Avenue between Bruce Avenue and Janette Avenue in May 2022. The street was reviewed and confirmed to be eligible for speed humps under the Local Road Speed Hump Program. A resident survey to determine neighbourhood support was carried out from October 14, 2022 to November 13, 2022. Residents were able to vote online or via 311. The results of the survey are summarized in Table 1.

Table 1: Traffic Calming Approval Survey Results

Criteria	Required	Actual		Result
Level of Support	50% of households or commercials properties voting "yes" (8 of 15 households and commercial properties)	Yes	67% (10 households or commercial properties)	**Pass**
		No	0% (0 households or commercial properties)	
		Did Not Vote	33% (5 households or commercial properties)	

Some residents provided additional comments when voting. A summary of comments received are as follows:

- From study area residents voting in support of speed humps:
    - Grove is used as a cut-through to get between one-way streets (Bruce and Janette)
    - This block of Grove has many kids
    - Please also look at crime in the area
- From study area residents voting against speed humps:
    - *None (no votes against speed humps were received from the study area)*

In addition to votes by residents in the study area, one response was received from an address outside the study area. This respondent opposed speed humps on Grove Avenue.

Risk Analysis:

No critical or significant risks have been identified with the report recommendations.

Construction costs for speed humps are subject to normal price variability for materials and tender costs. These financial risks are mitigated by following the procedures in the Purchasing By-law and normal project management practices.

Climate Change Risks

Climate Change Mitigation:

N/A

Climate Change Adaptation:

N/A

Financial Matters:

The estimated cost to install speed humps and related signage on Grove Avenue between Bruce Avenue and Janette Avenue is summarized in Table 2. There are sufficient funds in Traffic Calming capital budget project 7069022 for initial installation.

Table 2: Cost Estimate – Grove Avenue Traffic Calming

Item	Unit	Cost per Unit		Quantity	Total Cost	
		Initial Installation	Annual Maintenance		Initial Installation	Annual Maintenance
Speed humps and associated signs and pavement markings	Each	$8,250	$770	2	$16,500	$1,540
"Traffic Calmed Neighbourhood" Signs	Each	$350	$5	2	$700	$10
Grand Total					**$17,200**	**$1,550 per year**

The ongoing annual maintenance cost is estimated as $1,550 per year (speed hump maintenance: $700 per year; signs and markings: $850 per year). Maintenance costs for initiatives such as this project have not been previously identified within operating budgets and therefore this cost may not be able to be accommodated in the existing Signs and Markings operating budget. Should Council approve the traffic calming plan, a budget increase will brought forward as part of the 2024 operating budget submission.

Consultations:

Staff Consultation

- Operations: Phong Nguy
- Traffic Operations: Ian Day
- Human Resources: Gayle Jones
- Windsor Fire Rescue Services: Mike Coste
- Windsor Police Service: Insp. Jennifer Crosby, Barry Horrobin
- Transit Windsor: Jason Scott

Public Consultation

The resident approval survey was carried out from October 14 to November 13, 2022. Methods used for resident notification and outreach were as follows:

- Mailout to all property owners and tenants in the project area, attached as Appendix A (October 12, 2022)
- A follow-up mailout to property owners and tenants who had not yet voted (November 2, 2022)
- Social media posts (October 14, 2022)
- Notification signs posted in the survey area

Conclusion:

Having met the criteria for speed humps in the Local Road Speed Humps Procedure under the Traffic Calming Policy, Administration recommends installing speed humps on Grove Avenue between Bruce Avenue and Janette Avenue.

Planning Act Matters:

N/A

Approvals:

Name	Title
Cindy Becker	Financial Planning Administrator
Shawna Boakes	Executive Director of Operations & Deputy City Engineer
Chris Nepszy	Commissioner of Infrastructure Services and City Engineer
Joe Mancina	Commissioner of Corporate Services and Chief Financial Officer
Onorio Colucci	Chief Administrative Officer

Notifications:

Name	Address	Email
Councillor Agostino		
Area residents and survey respondents (list provided to Clerks)		

Appendices:

1 October 12, 2022 Letter to Grove Avenue Residents

THE CITY OF WINDSOR
ONTARIO, CANADA

TRANSPORTATION PLANNING

October 12, 2022

RE: TRAFFIC CALMING SPEED HUMP REVIEW SURVEY
GROVE AVENUE (JANETTE AVENUE TO BRUCE AVENUE)

Dear Resident,

We are requesting your input on a potential traffic calming speed hump project in your area.

A request for traffic calming has been received for **Grove Avenue.** Grove Avenue currently qualifies for traffic calming speed humps. To determine whether traffic calming speed humps would be supported by neighbourhood residents, a survey is being carried out. We request that you submit your vote online or call 311 to indicate whether you would support traffic calming speed humps on Grove Avenue. **Please place your vote before November 13, 2022 to ensure that your vote is counted.**

In order to place your vote, please fill out the survey: https://tiny.one/grove2survey

You may also call 311 and state that you are responding to the **traffic calming survey for Grove Avenue.** You will be asked for your name, address, your vote on the traffic calming survey, and given an opportunity for any other comments. After the 30-day survey period, results will be posted to the City's website at https://tiny.one/speedhumpresults.

One vote per household or business will be considered.

The plan will be brought forward to Council for approval if the required level of residential support described below is reached:

- A minimum of 50% of the households and commercial properties in the survey area must indicate their support for the traffic calming speed humps.

For more information on traffic calming please go to https://tinyurl.com/tcalming or search for "traffic calming" on the City website (www.citywindsor.ca). If you have any questions and/or concerns, please do not hesitate to contact Awele Nwaesei, Transportation Planning Coordinator, at 519-255-6267, ext. 6831 at your convenience.

Yours truly,

Jeff Hagan, P. Eng, PTOE
Transportation Planning Senior Engineer
JH/an
Attachment
C.c. Chief Building Official
Ward 3 Councillor

Survey Area

Grove Avenue (Janette Ave to Bruce Ave)

Aug 26, 2022

Scale 1: 1,500

0 50 100 metres

N

THE CITY OF WINDSOR ONTARIO, CANADA

Committee Matters: SCM 68/2023

Subject: West Windsor Flood Risk Study - Climate Change Risk Assessment - Report Endorsement - Wards 1 & 2

Moved by: Councillor Gary Kaschak
Seconded by: Councillor Kieran McKenzie

Decision Number: ETPS 928
That Council **ENDORSE** the "West Windsor Flood Risk Study – Climate Change Risk Assessment", attached as Appendix A, as a planning document with recommendations and conclusions, as identified and prepared by Dillon Consulting, dated January 2023.
Carried.

Report Number: S 20/2023
Clerk's File: SW2023

Clerk's Note:

1. The recommendation of the Environment, Transportation & Public Safety Standing Committee and Administration are the same.

2. Please refer to Item 8.7 from the Environment, Transportation & Public Safety Standing Committee Meeting held on February 22, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: http://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230222/-1/9386

Subject: West Windsor Flood Risk Study - Climate Change Risk Assessment - Report Endorsement - Wards 1 & 2

Reference:

Date to Council: March 29, 2023
Author: Aojeen Issac
Engineer II
(519) 255-6100 ext. 6368
aissac@citywindsor.ca
Design - Engineering
Report Date: February 3, 2023
Clerk's File #: SW2023

To: Mayor and Members of City Council

Recommendation:

I. THAT Council **ENDORSE** the "West Windsor Flood Risk Study – Climate Change Risk Assessment", attached as Appendix A, as a planning document with recommendations and conclusions, as identified and prepared by Dillon Consulting, dated January 2023.

Executive Summary:

N/A

Background:

The Sewer and Coastal Flood Protection Master Plan (Windsor SCFPMP) was formally adopted on January 25, 2021, subsequent to the required completion period for adoption of the report under the Municipal Class Environmental Assessment process.

Section 7 of Appendix "E" of the Windsor SCFPMP recommends:

> *"Coastal flood risk assessments and solutions for the West Windsor areas will be done through a separate study."*

City Council approved a budget for the West Windsor Flood Risk Study project (the Study) and authorization to apply for the National Disaster Mitigation Program (NDMP) Intake 6 grant on November 23, 2020 by CR 571/2020. The total Federal Government

funding amount for the Study is $200,000; and the Non-Federal Government funding amount is $200,000. The total funding for this study is $400,000. On May 3, 2021, Public Safety Canada advised that the funding application was approved and that the Study may proceed under this grant.

RFP #64-21, titled *West Windsor Flood Risk Study*, closed on Tuesday, May 4, 2021. Dillon Consulting was the successful proponent to complete the study report for $374,583.00 plus HST.

Discussion:

Study Summary

High water levels in the Detroit River have resulted in surface flooding, increased inflow and infiltration into the municipal sewer system, as well as influenced operations at the Lou Romano Water Reclamation Plant.

The Study report was developed by Dillon Consulting in accordance with recommendations of the Windsor SCFPMP. This Study report identifies critical municipal infrastructure and lands within the study area that are prone to flood risk under the condition of high water levels in the Detroit River and the impact of high water levels during rainfall events. The Study report presents conceptual design solutions and recommendations to mitigate these risks.

The study area is bounded by the Detroit River to the west and north, Huron Church Road and Essex Terminal Railway Right-of-Way to the east, and the municipal boundary with the Town of LaSalle to the south.

Study Report Process

Dillon Consulting used the Public Infrastructure Engineering Vulnerability Committee (PIEVC) protocol to complete the Study. PIEVC was developed by Engineers Canada in partnership with Natural Resources Canada to assess the risks and vulnerability of infrastructure to current and future extreme weather events and climate changes. The PIEVC process includes 5 steps: project definition, data gathering and sufficiency, risk assessment, engineering analysis, and conclusions and recommendations. This report presents recommended flood risk solutions for the study area, with a proposed implementation plan categorized from short term, medium term, and long term.

Stakeholders Consultation

Dillon Consulting arranged for several virtual meetings with key City staff, a Stakeholders Consultation Workshop, and a Stakeholders Consultation Meeting to discuss existing issues, data collection, and to review proposed solutions. In addition, Dillon had one-on-one virtual interviews with key stakeholders to discuss additional details and specific topics related to the study. Stakeholders

included, but were not limited to; key City departments (Engineering, Pollution Control, Parks, and Operations), ERCA, Police Services, the Windsor Port Authority, ENWIN, Windsor Essex Catholic District School Board, and Greater Essex County District School Board.

Public Consultation

One Public Information Center (PIC) was completed and advertised on the City's social media page. Due to COVID-19 pandemic, the PIC was virtual, with all material posted to the City of Windsor project website on October 6, 2022. The PIC was presented as a pre-recorded slideshow, describing the study area, depicting the project scope and objective, explaining the methodology used for the study, the effects of the flooding, and alternative solutions to mitigate the impact of known flooding concerns. The public was given the opportunity to provide feedback through an online survey or via email. A two-week period was originally provided for the public to review the PIC presentation until October 20, 2022, but was later extended to October 27, 2022 to provide the public more time to review the material. As part of the PIC process, six respondents completed the online survey, with three comments collected. Of the comments collected, none were identified to be relevant to the Study.

Next Steps

Pending Council endorsement of the Study report, attached as Appendix A, the final documents will be uploaded on the project's website.

West Windsor Flood Assessment Study (citywindsor.ca)

A notice of Study completion will be posted on City's social media page, and Stakeholders involved and consulted during the Study process will be notified via email.

Risk Analysis:

There are no significant or critical risks in accepting this study report.

Climate Change Risks

Climate Change Mitigation:

There are no significant risks to Community or Corporate Greenhouse gas inventories associated with the recommendations outlined in this report. During detailed design, consideration should be given to reduce emissions associated with construction and operation (i.e. high efficiency pumps).

Climate Change Adaptation:

As part of the PIEVC protocol steps, Dillon Consulting completed data gathering, risk assessment, and engineering analysis in order to determine the estimated 100-year Detroit River water level, while considering the impact on climate change for future projections (2050s and 2080s).

Utilizing the data collected and completing an extreme value analysis, the estimated 100-year Detroit River water level was determined to be 176.1 m.

Based on the review of publicly available climate change studies relating to the rising of future water levels through the Great Lakes, the highest predicted increase in peak water levels was determined to be 20 cm. This assessment identified a projected climate change 100-year Detroit River water level of 176.3 m. The study also looked at the susceptibility of flooding under a number of joint probability events where significant rainfall occurred during times of high water levels within the Detroit River.

With the 100-year Detroit River water level of 176.3 m and the assessment of joint probability scenarios with rainfall events, the Study presented a number of solutions and an implementation plan related to short term, medium term, and long term needs. The solutions and recommended implementation plan will assist the City to reduce the susceptibility of flood risk due to high water levels in the Detroit River and ultimately allow each solution to adapt to both current and projected future conditions.

The recommendations outlined within the final Study report include, but are not limited to; roadway and boulevard grading improvements, combined sewer separations, maintenance of municipal drains and roadside ditch, rain catcher installations, backflow prevention measure installations at combined sewer outlets, building downspout and foundation drain disconnections, and private property backflow prevention measures.

Financial Matters:

As previously approved by Council (CR571/2020- National Disaster Mitigation Program Intake 6), there are sufficient funds allocated for this study through Project ID 7211017– SMP Program.

Any future funding requirements resulting from recommendations in the study will be brought forward in a separate report with detailed financial implications and funding options for Council's consideration and approval.

Consultations:

Linda Mancina – Financial Planning Administrator

Karina Richters – Environmental Sustainability and Climate Change

Ryan Langlois – Water & Wastewater Engineer

Conclusion:

Engineering is recommending the endorsement of the West Windsor Flood Risk Study – Climate Change Risk Assessment, prepared by Dillon Consulting, dated January 2023, as a planning document with recommendations and conclusions.

Approvals:

Name	Title
Fahd Mikhael	Manager of Design
France Isabelle-Tunks	Executive Director, Engineering / Deputy City Engineer
Chris Nepszy	Commissioner, Infrastructure Services
Shelby Askin Hager	Commissioner, Legal and Legislative Services
Tony Ardovini	On behalf of Commissioner, Corporate Services CFO/City Treasurer
Onorio Colucci	Chief Administrative Officer

Notification:

Name	Address	Email
Fred Francis, Ward 1 Councillor	350 City Hall Square West, Suite 220, Windsor, ON N9A 6S1	ffrancis@citywindsor.ca
Fabio Costante, Ward 2 Councillor	350 City Hall Square West, Suite 510, Windsor, ON, N9A 6S1	fcostante@citywindsor.ca
Nick Emery, Project Manager	Dillon Consulting Limited, 130 Dufferin Avenue, Suite 1400, London, Ontario, N6A 5R2	nemery@dillon.ca

Appendices:

1 Appendix A (1-Report)
2 Appendix A (2A-Figures)
3 Appendix A (2B-Figures)
4 Appendix A (3-Appx A-B)
5 Appendix A (3-Appx C-D)
6 Appendix A (4-Appx E)
7 Appendix A (4-Appx F)
8 Appendix A (5-Appx G & H)

DILLON CONSULTING

City of Windsor

West Windsor Flood Risk Study

Climate Change Risk Assessment

January 2023 – 21-2409

January 24, 2023

City of Windsor
Engineering Department
350 City Hall Square, Suite 310
Windsor, Ontario
N9A 6S1

Attention: Aojeen Issac, M.Eng., P.Eng.
Engineer II

West Windsor Flood Risk Study

We are pleased to present this complete final report for the West Windsor Flood Risk Study for your review and comment.

Sincerely,

DILLON CONSULTING LIMITED

Nick Emery, P.Eng.
Project Manager, Associate

NE:tfn

Our file: 21-2409

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Figures

Follows text

Appendices

References

Acronyms and Abbreviations

AR4 – Fourth Assessment Report Released by IPCC

AR5 – Fifth Assessment Report Released by IPCC

C-Clap – Clausius-Clapeyron Temperature Scaling Method

CCRA – Climate Change Risk Assessment

CGVD – Canadian Geodetic Vertical Datum

CMIP5 – Coupled Model Intercomparison Project 5

CSO – Combined Sewer Overflow

DMAF – Disaster Mitigation and Adaptation Funding

EA – Environmental Assessment

ECCC – Environment and Climate Change Canada

ETR – Essex Terminal Railway

EVA – Extreme Value Analysis

GCM – Global Climate Model

GEV – Generalized Extreme Value Analysis

GHG – Greenhouse Gas

HGL – Hydraulic Grade Line

HIRA – County of Essex Hazard Identification and Risk Assessment

IPCC – Intergovernmental Panel on Climate Change

IGLD'85 – International Great Lakes Datum 1985

I&I – Inflow and Infiltration

LOS – Level of Service

LRWRP – Lou Romano Water Reclamation Plant

MEA – Municipal Engineers Association

MH – Maintenance Hole

NOAA – National Oceanic and Atmospheric Administration

PIC – Public Information Centre

PIEVC – Public Infrastructure Engineering Vulnerability Committee

ROW – Right-of-Way

RTB – Retention Treatment Basin

SCFPMP – City of Windsor Sewer and Coastal Flood Protection Master Plan

TBL – Triple Bottom Line Analysis

WPA – Windsor Port Authority

Executive Summary

The Detroit River has undergone a period of high water levels in recent years, peaking in May 2020. The West Windsor area experienced localized flooding at a number of shoreline properties and municipal roadways in proximity to the riverfront. In addition, the elevated river levels during this time caused a substantial increase of flow to enter the Lou Romano Water Reclamation Plant.

The West Windsor Flood Risk Study and Climate Change Risk Assessment (the Study) was developed in accordance with recommendations of the City of Windsor Sewer and Coastal Flood Protection Master Plan (Windsor SCFPMP) (Dillon and Aquafor Beech, 2020) which recognized the West Windsor shoreline as being vulnerable to high river levels. Due to the noted increased vulnerability within the area, the Windsor SCFPMP recommended the completion of an additional Flood Risk Assessment for the West Windsor Area.

The primary goals of the Study were to:

1. Using the Public Infrastructure Engineering Vulnerability Committee (PIEVC) protocol, evaluate the vulnerability of assets within the study area related to coastal flooding and inflow and infiltration into the municipal sewer system caused by extreme Detroit River levels;
2. Identify problem areas based on the evaluation of assets; and
3. Present conceptual design solutions and recommendations to mitigate these flood risks.

The Study was completed in accordance with the PIEVC protocol. This protocol is a step-by-step methodology of risk assessment with further optional engineering analysis for evaluating the impacts of a changing climate on existing infrastructure.

As part of the Study, four main types of flooding were identified to be linked to high Detroit River levels in the West Windsor area:

1. **Direct Coastal Flooding** – Potential to affect shoreline properties that are lower than the 1:100 year Detroit River water level.

2. **Inflows to the Wastewater System** – Coastal water due to high Detroit River levels have the potential to flow directly into the combined sewer system through Combined Sewer Overflows and catchbasins that are lower than the 1:100 year Detroit River water level.

3. **Basement Flooding** – Coastal waters during high Detroit River levels are not a direct cause of basement flooding, but can increase the extent and severity of basement flooding by reducing the available capacity in the sewer network during storm events.

4. **Local Surface Flooding** – Surface flooding during large storm events has the potential to be further exacerbated due to limited available capacity in the local storm and combined drainage systems during periods of high Detroit River levels.

The PIEVC protocol was used to develop flood risk scores for each asset affected by the evaluated climate change scenarios. Each risk score was the product of the probability of flooding occurring at each asset and the severity of the consequences of flooding on that asset. The consequences ranged from a minor temporary nuisance, to the need for repairs, or complete loss of the asset. The overall resulting risk scores were used to identify assets requiring enhancements for a more robust flood protection solution. Feedback from City Administration and stakeholders were collected through a workshop on May 19, 2022 to guide the development of proposed solutions.

The Study also identified target levels of service for the proposed solutions, which included:

- Reducing dry weather flow volumes entering the LRWRP under high river levels to similar magnitudes as low river levels;
- Eliminating surface ponding within the right-of-ways (ROWs) for all storm events up to and including the 1:5 year under all Detroit River Level conditions;
- Limiting the maximum ponding depths within the ROWs to 0.30 m during the 1:100 year storm event year under all Detroit River water level conditions;
- Reduce Hydraulic Grade Lines (HGL)s in the sanitary/combined systems to 1.8 m below the existing ground elevation for all design events up to and including the 1:100 year storm event under all Detroit River water level conditions; and

- Recommending a minimum target design elevation of 176.4 m for all proposed solutions intended to limit the direct encroachment of river water into inland areas.

Each solution was developed to mitigate the impact of high Detroit River water levels on the study area and to meet the targeted level of service where feasible. A summary of the proposed solutions developed as part of the Study include:

- Recommendations for individual site improvements on shoreline properties to limit coastal flooding;
- Improvements to the following ROWs to limit coastal flooding:
  - Mill Street west of Russell Street;
  - Prospect Avenue; and
  - Sandwich Street from McKee Road to Ojibway Parkway.
- Recommendations for the proposed McKee Park improvements to limit coastal flooding;
- Recommendations for an adaptive response strategy to manage coastal flooding on Russell Street near Chappell Avenue;
- Installation of rain catchers at low lying sanitary sewer maintenance holes;
- Installation of backflow preventers at combined sewer overflows (CSOs) to reduce the risk of river water entering the wastewater system;
- Recommendations for individual site improvements to mitigate the impacts of local flooding; and
- Improvements to the drainage systems on the following ROWs to limit local flooding:
  - Morton Avenue;
  - Russell Street;
  - Ojibway Parkway; and
  - Sprucewood Avenue and Maplewood Drive.

Additionally, the following projects previously identified within the study area will also mitigate the potential impacts of high river levels:

- LRWRP retention treatment basin (RTB);
- Prince Road Trunk Storm Sewer Outfall and Pump Station;
- Detroit Street Trunk Outfall;
- Combined sewer separation program; and
- Private property basement flood protection measures.

1.0 Introduction

Peak water levels in the Detroit River have risen significantly in recent years, peaking during May 2020. These high water levels have had significant impacts on the City of Windsor (City)'s coastal areas and municipal storm, sanitary and combined sewer infrastructure.

Notably, high river levels in recent years have increased the volume of Inflow and Infiltration (I&I) into the existing municipal sewer system through connections to the Detroit River during dry weather periods. This increased I&I has ultimately affected operations at the Lou Romano Water Reclamation Plant (LRWRP) as well as other critical pieces of infrastructure across the City of Windsor (the City). The latest I&I monitoring of the LRWRP identified an approximately 50 percent increase of inflow volume in 2019 compared to 2014. This surge in treatment volume resulted in an approximately 30 percent increase in greenhouse gas (GHG) emissions over the City's 2014 baseline GHG inventory.

Beyond the increase in I&I to the treatment plant, high river levels have ultimately reduced the capacity of the City's drainage system. Extreme water levels within the Detroit River have the potential to exacerbate the risk of flooding caused by heavy rainfall events, similar to the basement and surface flooding experienced during the severe storm events that occurred in 2016 and 2017.

The overall purpose of this study is to develop a flood risk profile for the West Windsor area under extreme Detroit River water levels and to identify recommended flood protection solutions. A climate risk assessment was prepared using the Public Infrastructure Engineering Vulnerability Committee (PIEVC) protocol to evaluate the impacts of extreme weather and climate change on coastal flooding in the West Windsor study area. Solutions are targeted at reducing coastal flooding, and I&I into the municipal infrastructure system due to extreme Detroit River water levels.

1.1 Project Scope and Objectives

Extreme Detroit River water levels present a flood risk to the West Windsor area. Under changing climate conditions, there is a risk that the frequency of extreme river levels

may increase. Furthermore, extreme river levels combined with other extreme weather events may exacerbate known flood risks.

The goals of the West Windsor Flood Risk Assessment are to:

1. Using the PIEVC Protocol, evaluate the vulnerability of assets within the study area related to coastal flooding and I&I into the municipal sewer system caused by extreme Detroit River levels;
2. Identify problem areas based on the evaluation of assets; and
3. Present recommendations to mitigate these flood risks.

Implementation of flood protection solutions developed through this study are expected to improve the performance of the existing municipal infrastructure and operations at the LRWRP during high Detroit River water levels. The recommended improvements from this study will ultimately result in more sustainable municipal infrastructure and will reduce the risk of both surface and basement flooding, including reducing the impacts of high river levels on the treatment plant. The project objectives are itemized as follows:

- Reduce the susceptibility of West Windsor to coastal flooding;
- Reduce the impact of increased I&I into the municipal system from high Detroit River water levels;
- Improve the performance of the existing infrastructure during high water levels and reduce peak flows at the Lou Romano WRP;
- Provide more sustainable municipal infrastructure; and,
- Reduce the risk of surface and basement flooding.

1.2 PIEVC Approach and Process

The Study was completed in accordance with the PIEVC protocol. The Protocol is a step-by-step methodology of risk assessment and optional engineering analysis for evaluating the impact of a changing climate on infrastructure. The PIEVC protocol is one of several ISO 31000 compliant climate change risk assessment (CCRA) frameworks meeting Infrastructure Canada's Climate Lens requirements. The protocol, currently managed by the Climate Risk Institute and the Institute for Catastrophic Loss and Reduction, was developed between 2005 and 2012 by Engineers Canada in partnership with Natural

Resources Canada. The Protocol is a structured, rigorous quantitative process to assess the risks and vulnerabilities of infrastructure or infrastructure systems to current and future extreme weather events and climatic changes.

The PIEVC Protocol is comprised of a five step process. Within each step of the process, recommended tasks are designed to allow the Protocol users to adequately prepare for and manage the project, and to produce reliable outputs.

1.2.1 Step 1 – Project Definition

This stage of the process requires an assessment and finalization of project parameters. This includes preparation for the project, including identification of infrastructure for assessment (existing or new) and determination of assessment scope, including budget, timeline, and participants. Additional project definition includes:

- **Define structural and non-structural infrastructure components;**
- **Define climate parameters of interest/concern;**
- **Define future climate period(s) of interest;**
- **Define geographic location and boundaries;**
- **Develop risk levels and scoring (e.g., five or seven point scale); and**
- **Identify high, medium and low risk scores.**

1.2.2 Step 2 – Data Gathering and Sufficiency

Once the project scope and boundaries were defined, the project team worked with infrastructure owners and operators to secure documentation, drawings, maintenance schedules, jurisdictional constraints, codes and standards, etc.

In this Step, climate parameters were defined and climate thresholds were identified, in relation to infrastructure/component damage or failure. For each climate parameter, the threshold at which infrastructure performance is affected was identified based on design guidelines, operating and maintenance procedures, standards and professional judgement. Both historical climate data and future climate projections were evaluated to identify the probability that each threshold may be exceeded within the study time horizon. Consultation with key stakeholders (e.g., operators and managers) was an important part of this stage of the process.

Before entering Step 3, a data gap analysis was completed to verify that there were sufficient data to move forward with the risk assessment.

1.2.3 Step 3 – Risk Assessment

The risk assessment Step includes the quantitative analysis of risk, using the following two term equation:

Risk = Probability (P) x Severity (S)

An assessment of interactions among defined assets/components and climate hazards was addressed first. This was completed by conducting a yes/no analysis to identify whether each climate parameter was likely to affect the asset.

Next, the Probability scores for exceedance of climate thresholds were developed for both current and future climate conditions. Then, Severity scores were developed for each asset/climate interaction. Risk assessment workshops were completed with asset owners and operators to gather feedback on the Severity scoring values.

Risk scores were calculated for all climate/component interactions and documented in risk matrices. Matrices were developed for both current climate conditions and the future climate conditions. Of greatest concern are increases in risk scores from current to future climate conditions, especially where the risk level is shifted into the high category. High risk interactions require earlier and possibly immediate adaptation action.

1.2.4 Step 4 – Engineering Analysis

This is an optional Step within the PIEVC protocol. The need to complete this step is determined from the risk assessment results. Typically, the Engineering Analysis is completed only for assets that are characterized with high risk. However, assets with interactions characterized by very low likelihood but very high consequence, or vice versa (also called “special cases”) may also be evaluated in this Step. Other assets characterized by very high risk, or that are critical components to infrastructure functionality, may be evaluated in this Step as well. The analysis involves quantifying the quantifying both the magnitude of each climate parameter and the capacity of each asset to accommodate it. Vulnerabilities are identified where infrastructure has insufficient capacity to withstand the anticipated loads from the evaluated climate

parameters. Infrastructure is resilient when it has sufficient capacity to withstand increasing loads caused by climate change.

1.2.5 Step 5 – Conclusions and Recommendations

This Step includes the development of adaptation measures or solutions, designed to address medium and high risks, and some of the "special cases". These can include structural modifications, design requirements (e.g., loading factor changes), policy and procedure recommendations, and nature-based solutions.

1.2.6 PIEVC Outputs

PIEVC outputs include a list of assets/asset components and their associated risk profiles, showing how risk changes over time, and which assets are at greatest risk now and into the future. Prioritization of action typically follows the risk assessment: medium and high risk assets and components should be addressed sooner than low risk components. Additionally, timelines for adaptation action can be derived from risk profile results – assets for which risk increases slowly over the timeframe(s) in scope may be able to be addressed later in the future; whereas for assets at risk now and with increasing risk in the future, adaptation action should be taken in the more immediate future.

Adaptation solutions, as developed in Step 5 of the PIEVC Protocol, are designed to support risk mitigation. Implementation of these measures, in the timeframes recommended, should work to reduce risk scores – aiming to reduce the consequence of impact, and improving the time it takes to bounce back from a climate hazard event.

1.3 Assumptions and Limitations

A risk assessment provides a snapshot in time of the overall system vulnerability and resiliency. This is based on the information available to the study team as of May 2022, including reports, modelling results, mapping, discussions with staff, professional experience of team members and workshop participant comments. The risks scores calculated in this assessment are based solely on the current state and capacity of assets (i.e., not taking into account future replacements, modifications, or degradation).

This report was prepared by Dillon Consulting Limited (Dillon) for the sole benefit of the City for the purposes outlined in our approved scope of work. The material in this report

reflects Dillon's best judgment in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Dillon accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

2.0 Project Definition (PIEVC Step 1)

The first step of the PIEVC protocol is the development of the project definition, which outlines the scope of the climate change vulnerability assessment. Step 1 includes the following components:

- Identify the existing infrastructure to be evaluated for climate change vulnerability;
- Identify the climate parameters that will be considered in the evaluation;
- Identify the time horizon for projecting future climate trends and evaluating the infrastructure;
- Describe the study area geography; and,
- Identify jurisdictions, laws, regulations, guidelines and administrative processes that are applicable to the infrastructure included in the assessment.

Each of these components is discussed in further detail in the following sections and the completed PIEVC Worksheet Step 1 is presented in **Appendix A**.

2.1 Infrastructure Included in Assessment

An infrastructure asset list was developed based on available City of Windsor GIS information, mapping, and input from City and stakeholder staff to document the assets within West Windsor to be evaluated through the PIEVC assessment. The infrastructure included in the West Windsor Flood Risk Study includes infrastructure at risk of experiencing impacts from riverine and pluvial flooding, including storm, sanitary, combined sewers, the LRWRP (not including internal plant operations), and key adjacent city and third party assets (schools, parks, arterial roads, etc.).

The PIEVC Protocol is scalable and can be applied to different levels and scales of infrastructure assessment. Considering the purpose of the study, the significant geographic coverage, and the depth and breadth of analysis required for each infrastructure asset included, this study identified infrastructure classes (e.g., combined water and storm water assets), and specified infrastructure assets (e.g., combined sewers) for inclusion.

The following infrastructure classes were included in this study:

- **Storm, Sanitary and Combined conveyance assets;**
- **End-of-pipe wastewater systems assets;**
- **End-of-pipe stormwater systems assets;**
- **Shoreline stormwater and flood protection infrastructure;**
- **Transportation assets;**
- **Institutional buildings;**
- **Park assets;**
- **Energy and communications infrastructure;**
- **Residential buildings;**
- **Commercial buildings; and**
- **Industrial assets.**

2.2 Climate Parameters

Climate parameters are defined by climate trends and weather events that are considered through the PIEVC assessment to assess infrastructure vulnerability. For the West Windsor Flood Risk Study, both the direct effects of high Detroit River levels and the combined effects of high river levels with severe rainfall events were identified as the main concerns. Additional climate parameters were also considered, including extreme winds, ice storms, and freeze/thaw cycles. A comprehensive list of the climate parameters considered in the West Windsor Flood Risk study is provided in the PIEVC Worksheet presented in **Appendix A**.

2.3 Time Horizon

The Study time horizons for the West Windsor Flood Risk Assessment are based on:

- Expected service life of infrastructure and components;
- Consideration of climate "normals" – a meteorological record of 30 years; and
- Uncertainty of future climate change projections.

For this Study, 30-year time frames were selected to balance the considerations between expected service life of individual components, the standard averaging period for climate data, and future climate uncertainty. Climate hazard projections for 2050

and 2080 were then developed for the West Windsor Flood Risk Study. As part of this initial assessment, the following process was used:

- Climate hazard probabilities based on average climate conditions for baseline normals period (1981-2010, the official and most recent available); and
- Climate change projections compiled for the time period of 2041 to 2070 (i.e. 2050), and 2071 to 2100 (i.e., 2080).

The climate change projections were developed using the full Coupled Model Intercomparison Project 5 (CMIP5) ensemble of 37 Global Climate Models (GCM) released by the Intergovernmental Panel on Climate Change (IPCC) (2013).

2.4 Study Area Geography

The Study Area for the flood risk profile is generally bounded by the Detroit River to the west, Huron Church Road and Ambassador Bridge to the north, the Essex Terminal Railway and College Street to the east, and the Town of LaSalle municipal boundary to the south.

The LRWRP is located within the Study Area, but its service area extends beyond the Study Area limits and includes a portion of the Town of LaSalle. The service area within the City includes approximately 420 km of sanitary sewers, 46 km of storm sewers and 184 km of combined sewers. Within the service area, there are approximately 25 storm gravity outlets with connections to the Detroit River and 28 CSOs with either connections to the respective storm system or direct outfalls to the Detroit River. The sanitary and combined sewer systems include ten pumping stations. A map of the Study Area is shown in **Figure 1**.

As shown on **Figure 2,** the Study Area was divided into three zones based on the predominant land uses, average elevation, and local sewer servicing, as follows:

- **Zone 1** is the northeast portion of the Study Area and includes Sandwich Street West and the inland neighborhoods to the east. The ground elevations within this zone are typically 4 m or more above the Detroit River shoreline. The land use within this zone is primarily a mix of residential and industrial. Approximately 46% of the total area is residential, 32% is industrial and the remaining balance is

institutional and commercial. The wastewater servicing for most of this area is primarily provided by combined sewers, though sewer separation has been completed in some areas south of Brock Street. The LRWRP is located within this zone along Ojibway Parkway.

- **Zone 2** includes the shoreline properties located along the Detroit River, west of Russell Street and north of Broadway Street. The land-use in this zone is primarily industrial. The Riverside Drive interceptor trunk sewer generally follows the Russell Street right-of-way (ROW) and conveys wastewater from central Windsor to the LRWRP. The average ground elevations in Zone 2 are significantly lower than Zone 1, with portions of the shoreline properties lower than the current conditions 1:100 year Detroit River water level.
- **Zone 3** includes the southern portion of the Study Area. Most of the properties in this zone are industrial with wastewater servicing provided by a separated sanitary sewer system that drains to the LRWRP. A sanitary forcemain on Ojibay Parkway conveys wastewater from the Town of LaSalle to the LRWRP. Stormwater servicing for most of this area is provided by roadside ditches. Stormwater runoff from this area is shown to drain both directly to the Detroit River and to Turkey Creek. Similar to Zone 2, the average ground elevations in Zone 3 are typically lower than Zone 1, with portions of the shoreline properties lower than the current conditions 1:100 year Detroit River water level.

The Study Area topography generally slopes from east to west, towards the Detroit River, and from north to south. The highest ground elevations are approximately 185 m and are located near the northeast portion of the study area. The lowest ground elevations are less than 176 m and are located along the Detroit River shoreline.

Based on the information presented on the Soil Map of Essex County, the soils within West Windsor are predominately Burford Loam, with patches of Berrein Sand and Granby Sand.

2.5 Jurisdictional Considerations

In accordance with the PIEVC process, the various laws, regulations, guidelines and administrative processes that apply to the infrastructure within the West Windsor study area have been documented in the PIEVC Worksheet presented in **Appendix A**.

3.0 Data Gathering and Sufficiency (PIEVC Step 2)

This step involves information gathering and data set development. For Step 2, the following tasks were completed:

- Development of asset listings based on potentially affected infrastructure previously scoped and identified in Step 1. A site visit and interviews with key City staff were completed to support the development of the overall asset list;
- Development of climate hazard listings, including 1:100 year flood levels for current and future timeframes, as well as extreme rainfall events that have resulted in urban flooding impacts; and
- Evaluation of the existing infrastructure performance under the identified climate hazards.

Corresponding PIEVC Step 2 Worksheet is presented in **Appendix A**

3.1 Background Documents

The following background reports and studies relevant to the Study Area were reviewed by the Project Team as part of this study:

- Windsor Port Authority Climate Change Risk Assessment (Dillon, 2021);
- Windsor Sewer and Coastal Flood Protection Master Plan (Dillon, 2020);
- ERCA Floodplain Prioritization Study Report (Dillon, 2022);
- City of Windsor Official Plan, Municipal Cultural Master Plan (2010);
- Prince Road Sewer Study (Stantec, 2001);
- Windsor Riverfront West CSO Control "Schedule C" Class EA (Stantec, 2019);
- Functional Design Report - Sanitary Sewerage and Stormwater Drainage - Malden/Prairie Grass (Dillon, 1993);
- Ojibway Sanitary Sewer Infrastructure Rehabilitation Needs Study (La Fontaine, 1992);
- ERCA Shoreline Management Plan (N.K. Becker, 1986);
- Ontario Ministry of Natural Resources Great Lake Systems and Water Related Hazards and Other Extreme Lake Levels (1989);
- Windsor Archeological Master Plan (CRM Group, 2005);

- Proposed Sewer and Sanitary Sewer Prince Road (Golder, 1986);
- Prince Road Trunk Storm Sewer Study (James F. MacLaren, 1978a); and,
- Interim Report on Investigations of the Ojibway Sanitary Sewerage Area (James F. MacLaren, 1978b).

3.2 Climate Analysis Methodology

The risk assessment necessitates the analysis of both historical and future climate information. Historical climate information serves two key purposes:

1. Provides a baseline for historical operating conditions for the assets under study; and,
2. Provides a reference point to establish necessary context for climate change projections (i.e., how far will changes in climate deviate from current conditions?).

From a climate change perspective, a historical background investigation is critical to providing a point of reference for climate change information. Historical and recent climate conditions can indicate the type of operating environment which has already interacted with the assets under this study. Based on previous experience, climate projections can provide little value unless the projected changes are provided within the context of these current operating conditions.

3.2.1 Historical Data

The majority of historical climate baseline information used in this project was derived from climate observations at climate stations available representing climate near the assets being evaluated. A meteorological record of 30 years (1981 to 2010), a so-called “climate normals” period, was used for historical baseline data calculations. Historical climate data was obtained from Environment and Climate Change Canada using the Windsor International Airport location. Additionally, river level data was obtained from the US Army Corps of Engineers for the Fort Wayne station.

3.2.2 Climate Change Projections

Having established a historical baseline, the analysis then required guidance to assess potential changes in key hazards and climate parameters under a changing climate. The

methodology employed here uses the "Delta" or *change factor* method to both downscale GCM projections to the local scale needed for decision making, and to account for climate model biases. This method assumes that future changes to the climate of the study location will mainly be driven by changes to the climate at coarse scales and that relationships between variables at the local scale are assumed to remain relatively constant in the future period. Most studies indicate that credible climate change projections at the local to regional scale are highly contingent upon GCMs being able to faithfully represent the large-scale processes and relevant features of the climate system (IPCC, 2013).

This method of model bias correction and downscaling is able to make use of many models – called a "multi-model" ensemble – with the reliability of the outputs being much improved over the use of any single, higher resolution model. The selection of a single model or a small subset of climate models has the potential to lead to costly maladaptive decisions, particularly since the use of ensembles helps to moderate the effects of differing assumptions inherent in each model.

Employing this method, this study used an ensemble of all Fifth Assessment Report (AR5) global climate models initially released by the Intergovernmental Panel on Climate Change (IPCC) in 2013, with outputs for the climate parameters of interest and representative of the Windsor region. First, average climate conditions were obtained for the baseline normals period (1981-2010, the official and most recent available), and then the average change in climate conditions for the future periods (i.e., 2050s and 2080s) were obtained from the multi-model ensemble. The *change* from baseline to future produced by the model ensemble was then added to the actual historical station observations. This method avoids any inherent model biases by only considering the change – or "delta" – of the projections and adding this to the analyses of the historically observed climate.

From an ensemble of 37 GCMs, the grid point value corresponding to the City location was selected. Grid point size differs between models but is approximately 150 km x 150 km when all models are re-gridded to a common scale prior to averaging. The use of an ensemble of models is approved by the IPCC (2013). In effect, this method applies a climate change factor to a baseline high resolution observation (i.e., station corresponding to the Windsor study area) to estimate future climate conditions.

3.2.3 Climate Projections for Complex Hazards

Complex hazards, meaning those that are characterized being highly localized (with respect to model grid scales described above), short duration, extremes, and/or combined or concurrent (synergistic) events, require specialized studies and are not directly available as raw outputs from GCMs. In these cases, future climate conditions for the Windsor area were derived from specialised studies available in the peer-reviewed published literature (e.g., Cheng et al., 2012, 2014 for high winds and ice storms; Diffenbaugh et al. 2013 for changes in severe thunderstorm activity). Where projection guidance was not available in any form, professional judgement was applied based on an integration and assessment of all available guidance (e.g., trends in parameters contributing to a given hazard) and the climate expertise of the Dillon team.

In particular, a comprehensive review of all climate change and Great Lakes level studies undertaken by Canada or the United States since 2011 was used to assess and update the future lake level projections provided for the earlier Riverside East and Windsor Port Authority PIEVC risk assessments. Several new water level studies were reviewed that included either more recent climate change models, a greater number of climate change models, added regional scale climate modelling results, more GHG emission assumptions and/or improved lake dynamics modelling.

3.3 Detroit River Water Levels

A hydrologic analysis was completed to estimate the 1:100 year Detroit River flood level for the West Windsor study area. The 1:100 year flood level is the sum of the mean river level and storm surge with a combined probability of a 1:100 year return period (i.e., on average, has a 1 percent probability of occurring in any given year or on average once in 100 years). A detailed description of the hydrologic analysis is provided in the Climate Data and Analysis Summary presented in **Appendix D**.

Provided below is a brief description of the methodology and results of the hydrologic analysis.

3.3.1 Previous Studies

The Great Lakes System Flood Levels and Water Related Hazards report (OMNR, 1989) provides estimates of the 1:100 year flood level at several locations along the Detroit

River. The West Windsor study area is shown to fall within river reach DR-3 of the OMNR report which has a reported 1:100 year flood level of 176.0 m (IGLD'85).

The International Great Lakes Datum 1985 (IGLD'85) is often used with respect to water levels and bathymetry, and Geodetic Datum (CGVD) is often used with respect to topographic survey and LiDAR data. It is important to recognize that there is a slight difference between IGLD'85 and Geodetic at the project location. At Tecumseh, the closest site where this datum discrepancy is defined, IGLD'85 is 0.01 m lower than Geodetic. Survey data can therefore be adjusted using the equation below:

$$IGLD'85 - CGVD = 0.01\ m$$

The MNR study states that no climate change considerations were included in the estimate of these 1:100 year flood levels.

3.3.2 Historical Water Level Data

The National Oceanic and Atmospheric Administration (NOAA) Detroit River Gauge at Fort Wayne (Station # 9044036) is located on the opposite bank the river from the West Windsor study area. As shown on **Figure 3**, the gauge is located in the United States, approximately 600 m from the West Windsor shoreline. Hourly water level measurements were available for this gauge for the historical period from 1970 to 2021. The data from this gauge was determined to be the most accurate available information at this time for extreme water level analysis due to the fact that:

- The gauge is located close to the study area, and consequently the measured water levels should be representative of the river conditions in West Windsor;
- The available period of record spans approximately 50 years, which should provide sufficient data to accurately estimate the 1:100 year water level; and,
- The data set is reasonably complete with few gaps.

The long-term average of the recorded water level measurements is 174.94 m, IGLD'85. The maximum measured water level was 175.87 m, recorded in July of 2019. A probability of exceedance curve developed based on the historical data suggests that the recorded water level exceeds 175.6 m just under 1% of the period of record, and 175.7 m approximately 0.1 % of the time.

3.3.3 Extreme Value Analysis

An extreme value analysis (EVA) was completed on the Fort Wayne gauge data to identify peak water levels for the Study Area. The EVA defines the cumulative probability distribution using several statistical distributions. The results of the EVA can be used to define extreme values for a variety of defined return periods.

To reduce the dataset, the maximum monthly water levels were used as the inputs for the EVA. The cumulative probability distribution was estimated using four statistical distributions:

- General Pareto Distribution;
- Generalized Extreme Value Analysis (GEV);
- Weibull; and
- Log-Normal.

As summarized in the following table, each distribution shows a strong correlation (r-squared value) with the peak gauge data. However, the Weibull and GEV distributions are shown to have the best fit with the lower frequency (higher return period) events.

Table 1: Summary of Extreme Value Analysis Fort Wayne (Station #9044036)

Return Period	Water Level (m, IGLD'85)			
	General Pareto Distribution	Generalized Extreme Value	Weibull	Log-Normal
1	175.76	175.62	175.63	175.63
2	175.79	175.66	175.67	175.67
5	175.83	175.76	175.79	175.79
10	175.85	175.81	175.86	175.88
20	175.86	175.86	175.93	175.95
25	175.86	175.87	175.95	175.97
50	175.86	175.90	176.01	176.04
100	175.87	175.93	176.07	176.11
r^2 value	**0.991**	**0.999**	**0.998**	**0.997**

3.3.4 Existing Condition 1:100 Year Detroit River Water Level

As part of this analysis, the EVA results were compared with peak values from the 1989 MNR study. The GEV distribution was identified to have a better fit with the peak data, and the Weibull distribution being shown to be more consistent with the previous study by MNR. Both distributions are shown to have a close correlation with the monthly maximum.

Although the MNR study does not mention which cumulative probability distribution was used to estimate the peak water levels, the Weibull distribution was likely used since it was a commonly used probability distribution at the time of the study publication. Based on this assumption and the findings noted above, the EVA results using the Weibull distribution for the West Windsor Flood Risk Study was selected as the preferred.

Based on the historical data, the Detroit River 1:100 year water level was estimated to be 176.1 m, IGLD'85 for the purposes of this study.

3.3.5 Climate Change 1:100 Year Detroit River Water Level

A review of five recently published studies that predict the effects of climate change on the Great Lakes was completed to assess how peak water levels on the Detroit River may change in the future. Each study used a different analysis methodology with varying conclusions. The review results identified four common trends:

1. All of the reviewed studies acknowledged that the interactions of the factors that influence the Great Lakes water levels are very complex;
2. All of the studies recognized that there is uncertainty associated with predicting future lake levels and that these uncertainties increase the further along you predict into the future;
3. Rapid changes due to low lake levels to high lake levels and vice versa can be anticipated; and
4. All of the studies predicted an inverse correlation between global future greenhouse gas emissions and lake levels. Increasing GHG emissions are shown to be linked to lower future Great Lakes water levels.

Each of the reviewed Great Lakes studies relied on the results of different climate models and considered different scenarios to predict future lake levels. As a result, each study provided a range of future water level predictions based on different assumptions. Most of the climate models generally predict that lake levels will likely decrease in the future.

However, for the West Windsor Flood Risk Study a conservative estimate of the future flood elevations is required to address the considerable uncertainty associated with these predictions, and develop a design elevation for proposed flood protection solutions. Based on the reviewed climate change studies, the highest reasonable predicted increase in peak water levels is shown to be approximately 20 cm.

Adding this increase to the existing condition water level calculated from the extreme value analysis results in a future condition 1:100 year Detroit River water level of 176.3 m IGLD'85 for the purposes of this study.

3.4 Climate Parameters/Hazards

The climate hazards considered in the PIEVC assessment are described in the following sections.

3.4.1 Precipitation/Drainage/Flooding Events

These types of events are climate hazards capable of causing primary or direct impacts to critical infrastructure. These factors include high water levels (river), multi-day rainfall events, and combination probability events (high water level and rainfall events).

3.4.1.1 High Water Levels

The extreme river levels used in the risk assessment and the methodologies used to develop them are documented in Section 3.3 of this report.

3.4.1.2 Rainfall Events

Two rainfall events were considered as part of this Study; Major (1:100 year storm, 82 mm) and Minor (1:5 year storm, 50 mm) events. These events were used to model and evaluate the performance of the infrastructure systems.

Climate change projections indicate that both events show significant increases in likelihood under climate warming. In particular, the 82 mm event, currently considered the Major or 1:100 year storm, is projected by mid-century to increase in frequency by over 3 times, reducing it to an approximate 1:30 year return period. The 82 mm storm is also expected to increase in frequency towards the end of the century, roughly equivalent to a
1:15 year return period by the 2080s. These rainfall projections were based on the Clausius-Clapeyron (C-Clap) temperature scaling method (Ball et al., 2016), as described in the Climate Data and Analysis Summary presented in **Appendix D**.

3.4.1.3 Combined Probability Events

The combined events considered for this study include simultaneous occurrence of high water levels and rainfall events. The variety of climate and hydrological/hydraulic processes operating at different time scales and influencing lake levels suggest that it is not reasonable to determine whether patterns influencing heavy precipitation events

are linked to other conditions that influenced high to extreme lake levels. It is also uncertain how these relationships would change when considering climate change.

For the purposes of this Study, a local analysis was undertaken to determine whether there is any relationship between extreme precipitation events and extremes of water levels and the impact on flooding. The extreme precipitation events were compared against water level observations at two locations: St. Clair Shores and Fort Wayne.

Based on the statistical analyses conducted for rainfall and extreme lake level events, it was concluded that combined event probabilities can be treated as statistically independent events. Since extreme rainfall and high Detroit river levels can be treated as statistically independent, their individual likelihoods are simply *multiplied* to arrive at an overall likelihood of simultaneous occurrence for both events.

3.4.2 Secondary and Long-Term Impacts

Additional hazards and secondary climatic events were investigated for their potential to cause long-term (gradual) damage to drainage and shoreline protection infrastructure or exacerbate impacts to drainage and sanitary systems (e.g., through reduced or blocked surface transportation access, loss of power to treatment plants and pumps, etc.).

3.4.2.1 Shoreline Erosion

As part of the background investigation, no historical database of shoreline erosion for the Detroit River was found. The respective impacts and rate of change therefore could not be statistically evaluated. However, through City staff interviews, stakeholder consultation as well as the County of Essex Hazard Identification and Risk Assessment (HIRA) (County of Essex, 2019) indicated significant concerns regarding shoreline erosion. This was therefore included as a key hazard consideration within the findings of the flood assessment.

3.4.2.2 Weathering

Many municipalities and other infrastructure and asset owners across Canada have suggested that weather related deterioration of assets may have accelerated in recent years. The assignment of cause in these cases is difficult given other potential contributing factors (e.g., under-investment in long-term asset maintenance), but these

observations do highlight the importance of slow, creeping processes on the degradation of critical assets.

The impact of freeze-thaw cycles relating to the weathering of critical assets were evaluated based on laboratory tests of reinforced concrete samples. These tests indicate that visible damage can begin after approximately 30 cycles (Sun et al. 1999; Ruedrich et al,2011).

In summary, when considering both factors, while the total number of freeze-thaw cycles decreases, this decrease is not substantial, and weathering from this process is expected to continue through the rest of the century.

3.4.2.3 Ice Storms

At this time, there is no existing national database for ice storm events for Canada. As part of this Study, research was completed to identify historical events through literature review and media searches (Klaassen et al., 2003; Mclachlan and Smith, 1976). A statistical analysis was then calculated based on these events and compared for consistency against ice accretion design data in infrastructure standards (i.e., CSA 2010). A downscaled climate projection of ice storm activity from the literature (Cheng et al. 2011) was then applied to future time periods. As part of this analysis, two thresholds were used; 15 mm for when power outages tend to occur due to tree contacts from large branches, and 25 mm, which is the minimum design threshold for overhead systems.

Cheng et al. (2011) produced downscaled projections based on weather patterns obtained for major historical ice storm events, which suggested a slight increase in event frequency under warming climate conditions. A more recent study by Jeong et al. (2019) is consistent with Cheng et al.'s (2011) earlier findings, indicating an increase in 50-year return period ice loads for a global average warming of 3°C or less. However, results from Jeong et al. (2019) were not presented in a format allowing derivation of the numerical event frequency values and changes. These findings are also in general agreement with earlier research from Klaassen et al. (2003). The earlier study noted that higher ice accretion values had occurred in recent decades for ice storm events occurring immediately south of Canada-U.S. border in the states of Michigan and New York. The same storm events tended to generate lower ice accretion values or heavy snowfall in adjacent areas of Ontario and Quebec. The study proposed that a poleward

shift in storm tracks has the potential to increase significant ice storm events in adjacent portions of southern Canada. However, it is noted that these changes in event frequencies result in little future change for ice impacts compared to the baseline. For example, the approximately 10 % projected increase in event frequency for 25 mm ice storms still results in a low overall event frequency, increasing from 8 % per year to 9 % per year annual probability.

3.4.2.4 High Winds – Severe Thunderstorms, Tornadoes

The consideration of high winds as part of this study used two different thresholds for the analysis; Gusts in excess of 120 km/hr (year round, localized severe thunderstorm driven winds, and tornadoes of EF2 and higher intensity.

Wind Gusts - All Event Types

A threshold of 120 km/h was used to help identify potentially high impact wind cases that may result in significant secondary impacts to critical services such as electrical power and surface transportation. A statistical analysis was completed based on data directly from wind observations at Windsor Airport and cross-referenced with the Detroit Wayne County Airport data.

At this time, wind gusts are not directly available as outputs from a global or regional climate models. Guidance from specialized downscaling studies available within the literature Cheng et al. (2012) and Cheng et al. (2014) conducted a number of statistical downscaling climate projection studies using approaches similar to the work referenced earlier for ice storm events. Their findings indicate potential increases in the number of days with wind gusts exceeding damaging thresholds. Recent research using a smaller set of regional climate models by Jeong and Sushama (2019) also support the potential for increases in wind gust frequency and more year-to-year variability in extreme wind gusts by the end of the century.

Tornado and other Localized Severe Thunderstorm Winds

Severe thunderstorm winds were evaluated using a review of Environment and Climate Change Canada (ECCC) storm spotter damage reports (Chadwick, 2005), media searches and case study review of high impact historical events. The frequency of occurrence, specifically how often severe thunderstorm wind damage is reported, but not detected

at Windsor Airport, was used to estimate the true prevalence and frequency of these events.

Tornado frequency was evaluated using the National Tornado Database (Cheng et al. 2013) and counting all tornadoes above the defined thresholds that occurred anywhere within the City of Windsor. Most large tornadoes affecting Windsor have crossed the Detroit River (in one case twice), when entering/exiting the City, and so the total frequency is representative of events which could impact shoreline assets and properties directly.

Due to the extremely complex nature of tornadoes and other severe thunderstorm related hazards, understanding the effects of climate change on their behaviour has shown to be challenging. Unlike other hazards, tornadoes are the result of a combination and balance of a set of meteorological conditions, which at least partly explains their rarity compared to other atmospheric hazards. Only recently have detailed studies of climate change effects on severe thunderstorm activity been able to provide some indication of the potential impacts of climate change on tornado hazards over the North American continent.

Recent studies of historical tornado activity trends in the United States indicate no discernable changes in total frequency of tornadoes over recent decades, but a decreasing trend in the total number of days experiencing tornadic activity (Brooks et al., 2014). However, several climate change projection studies using both previous IPCC Fourth Assessment Report (AR4) and AR5 era global climate models (Trapp et al. 2007; Diffenbaugh et al. 2013) indicate the potential for significant increases in the number of days with favourable conditions for severe thunderstorm outbreaks (including tornadoes). This suggests that the frequency of these events may increase in some regions.

More recent research on trends in tornado activity in the United States. (Strader et al., 2017; Gensini & Brooks, 2018) indicate both historically recent and future projected shifts in conditions conducive to tornado occurrence, which are of potential relevance to the City of Windsor and surrounding areas. Gensini and Brooks (2018) also report an observed increase in days with potential for significant (i.e., EF2 or stronger) tornado development in northeastern North America over the past approximately 40 years.

3.5 Existing Drainage Infrastructure Assessment Summary

A hydrologic/hydraulic assessment was completed to evaluate the performance of the existing drainage infrastructure. The assessment process is detailed in **Appendix E** and a brief summary is provided below.

The hydrologic/hydraulic model completed as part of the Windsor SCFPMP was used as to develop baseline conditions for the current analysis. The modelling analysis was completed using the Infoworks-ICM modelling package, distributed by Innovyze. While the Windsor SCFPMP Infoworks model takes into consideration high water levels as a downstream boundary condition for the sewer system and at CSO outfalls, it does not simulate overland flooding along the shoreline due to high water levels. The model is not set-up to simulate the effects of dynamic wave action in addition to fixed high Detroit River water levels.

For the purposes of this study, the existing conditions calibrated Windsor SCFPMP hydrologic/hydraulic model was used to complete the analysis. The model represents the City infrastructure condition as of 2020, and City administration confirmed that there have been no subsequent changes to the infrastructure in the Study Area. Boundary conditions, in the form of fixed water levels at sewer outfall locations in the Detroit River, were updated for the current analysis, as summarized below:

- 1:100 year return period – 176.10 m; and
- 1:100 year return period (considering impacts of climate change) – 176.30 m.

To remain consistent with the original modelling approach used for the SCFPMP, the original design storm events from the SCFPMP were used for the analysis within this Study. The objective of the modelling analysis was to evaluate flood risk during a number of joint probability events. These scenarios evaluated the estimated flood risk and respective impact on municipal infrastructure that could occur under a simultaneous high water level and synthetic design rainfall event on the watershed.

Under the existing conditions analysis, the following modelling scenarios were evaluated:

- 1:100 year return period water levels in Detroit River occurring concurrently with:
  - 1:5 year return period design storm event; and
  - 1:100 year return period design storm event.
- Low water levels in Detroit River occurring concurrently with:
  - 1:5 year return period design storm event; and
  - 1:100 year return period design storm event.

The design storm events for this analysis used 4-hour synthetic rainfall events with 10-minute time intensity intervals using the Chicago distribution.

3.5.1 Evaluation Criteria

For the current analysis, the Level of Service (LOS) criteria developed through the Windsor SCFPMP were used to evaluate the performance of the existing drainage infrastructure. The flood risk due to each joint probability event was analysed using the HGL elevations in the sewer systems, and surface flooding due to sewer surcharging. Sewers are typically considered to be surcharged when the HGL elevation is above the obvert of the sewer pipes.

The SCFPMP recommends that the HGL in sanitary and combined sewers to remain 1.8 m below the existing ground elevation. This 1.8 m was originally assumed to be the approximately basement floor depth from ground. HGLs in the sanitary and combined sewer systems above this elevation are shown to represent an estimated high risk of basement flooding due to sewer surcharging. The Windsor SCFPMP recommends surface flooding depth on roadways during a 1:100 year rainfall event are not to exceed 0.30 m.

Additionally, the SCFPMP recommends surface flooding depths on major roadways (arterial and collector streets) during a climate change rainfall event to not exceed 0.30 m. Although this criterion has not been adopted regionally in the Windsor/Essex Region Stormwater Management Standards Manual (December, 2018) or within the City of Windsor Development Manual, it has been used for the current climate change analysis for joint probability simulations when considering 1:100 year return period

water levels within the Detroit River. This includes a sensitivity assessment to identify roadway flooding when considering climate change impacts.

3.5.2 Existing Condition Modelling Results

Two modelling scenarios representing two joint probability event scenarios were simulated using the 1:100 year return period water levels in the Detroit River as downstream boundary conditions. Results from these simulations are represented in **Figure 4** and **Figure 5**.

Most combined sewers in Zone 1 are observed to be surcharged during the 1:5 year return period rainfall event simulation. Storm sewers conveying stormwater runoff to gravity outfalls are surcharged due to high water levels in the River backing up through the sewers. The Riverside Drive interceptor sewer, shown on **Figure 1**, conveying sewage from central Windsor to the LRWRP is also surcharged during the 1:5 year simulation. The sanitary sewer system servicing industrial development in Zone 3 is also surcharged, and HGL elevations in the system are estimated to be above the assumed basement floor elevation. No significant surface flooding is observed along municipal ROWs during the 1:5 year rainfall event simulation.

The outlet sewer from the LRWRP is surcharged during these simulations due to high water levels in the Detroit River, potentially affecting operations at the LRWRP.

During the 1:100 year rainfall event simulation, a larger number of combined sewer maintenance holes (MHs) in Zone 1 show an estimated higher risk of basement flooding, with HGLs above the assumed basement floor elevation. In addition, a number of sanitary and storm MHs in areas that are serviced by separated sewers are also estimated in the model to have high HGLs throughout the system. Estimated surface flooding along municipal roadways with depths great than 0.30 m are observed along both Russell Street and Sandwich Street.

3.5.3 Climate Change Drainage Infrastructure Assessment

As part of the climate change analysis, the following modelling scenarios were evaluated:

- 1:100 year return period climate change water levels in Detroit River occurring concurrently with:
  - Existing 1:5 year return period design storm event; and,
  - Existing 1:100 year return period design storm event.

The results from each joint probability event, with consideration of higher water levels in the Detroit River due to impacts of climate change, show estimated higher HGLs in the sewer systems. This is due to a higher tailwater effect caused by the higher water levels within the Detroit River. Results for these simulations are represented in **Figure 6** and **Figure 7**.

Correspondingly, the surface flooding extents along municipal ROWs representing flooding with depths estimated to be greater than 0.30 m are higher during the joint probability event using 1:100 year rainfall event.

3.6 Flood Mechanisms

The following information was used to identify locations of estimated flood occurrence during the simulated events and potentially why flooding occurs within the study area:

- Topographic mapping to identify areas below the Detroit River 1:100 year water level;
- Computer aided modelling (Infoworks ICM) to assess the City's sewer and drainage networks; and
- Anecdotal observations of previous flooding from City operations staff and stakeholders.

Four main types of flooding were identified to be linked to high Detroit River levels for the West Windsor area based on investigation of the above noted items:

1. **Direct Coastal Flooding** – Potential to affect shoreline properties that are lower than the anticipated peak Detroit River levels.

2. **Inflows to the Wastewater System** – Coastal water due to high Detroit River levels have the potential to flow directly into the combined system through CSOs and catchbasins that are lower than the anticipated peak Detroit River levels.
3. **Basement Flooding** – Coastal waters during periods of high Detroit River levels are not a direct cause of basement flooding, but can increase the extent and severity of basement flooding by reducing the available capacity in the sewer network during storm events.
4. **Local Surface Flooding** –Surface flooding during large storm events has the potential to be further exacerbated due to limited available capacity in the local drainage systems during high Detroit River levels.

3.6.1 Coastal Flooding

Coastal flooding is shown to affect lands that are currently lower than the 1:100 year Detroit River level. These are properties located near the shoreline that are directly flooded when the river levels are high. A topographic analysis was completed to identify the areas lower than the target river levels as shown on **Figures 8, 8a, 8b, 8c** and **8d**.

A summary of affected assets in the study area is presented in the following table.

Table 2: Infrastructure Affected by Coastal Flooding

Asset Class	Description
Parks	McKee Park
	Black Oak Heritage Park
Roads	Mill Street
	Russell Street
	Prospect Avenue
	Sandwich Street
	Morton Avenue
Shoreline Properties	HMCS Hunter
	WPA Lands
	Shoreline Industrial Properties

3.6.2 Inflows to the Wastewater System

During periods of high water levels in the Detroit River, water from the coastline has the potential to enter into the sanitary and combined sewer system at a number of CSO locations. A review of each location and respective spill elevation in the West and Central

Windsor region showed that most CSO spill elevations are lower than the historical 1:100 year return period water level in the Detroit River. These findings suggest that the infrastructure would be at risk of taking in water during periods of high water level in the Detroit River. The additional volume entering the sanitary/combined system during rainfall events ultimately sends additional flow to the LRWRP for treatment. During heavy rainfall events, flow to the treatment plant is high due to Rainfall Derived I&I entering the combined/sanitary system. The additional volume entering through backflow at CSO locations further exacerbates the problem, resulting in surcharging at the treatment plant. This causes sanitary and combined sewers to back up and increases the likelihood of basement flooding due to sanitary/combined sewer surcharging within the LRWRP service area. The impact at the LRWRP can also have the potential to cause excessive surface flooding in areas serviced by combined sewers.

3.6.3 Basement Flooding

Basement flooding occurs during wet weather events when the water level in the municipal sanitary or combined sewer is higher than the elevation of the basement. Runoff enters the wastewater system both through direct connections and through sources of I&I such as pipe joints and MH lids.

These inflows have the potential to overwhelm the wastewater system and cause backups through existing building floor drains and into the structure. The likelihood of basement flooding is therefore increased by extreme river levels due to a portion of the capacity of the wastewater system being used up by river water.

3.6.4 Local Surface Flooding

Local surface flooding occurs during storm events when the local drainage system surcharges due to insufficient capacity to convey incoming flows. Surcharging of the conveyance system results in peak water level rising above the maximum design level in the drainage system. Within a storm sewer, this is when water levels within MHs exceed ground level elevations. For a ditch system, this is when the water level rises above the top of bank. High river levels can exacerbate the local flooding condition by reducing the available capacity of the local storm drainage system.

The results of the West Windsor flood assessment suggest that the following locations are prone to local flooding which is likely to be exacerbated by high Detroit River levels:

- **Morton Avenue** – Existing roadside ditch inverts are estimated to be lower than the Detroit River 1:100 year climate change water level. High tailwater elevations have the potential to contribute to localized flooding during severe storm events.
- **Sprucewood Avenue and Maplewood Drive** – Similar to Morton Avenue, the roadside ditch inverts on Sprucewood Avenue are estimated to be lower than the Detroit River 1:100 year water level. The ditches within this drainage system are considered a designated municipal drain and a recent drainage report (Meritech, 2021) suggests that their capacity is very limited.
- **Ojibway Parkway** – Anecdotal observations from Dillon project team members suggests that prolonged surface ponding occurs on Ojibway Parkway during moderate storm events.
- **Sandwich Street near McKee Creek** – The available topographic information suggests that the Sandwich Street profile near McKee Creek Drain is relatively low. Drainage Reports reviewed for the McKee Drain suggests that the existing drain capacity downstream of Sandwich Street is limited due to undersized structures, sediment accumulation, and vegetation growth.
- **Russell Street** – Existing roadside ditch inverts are estimated to be lower than the Detroit River 1:100 year water level. Based on information provided by project stakeholders, portions of the roadside ditches north of Chippewa Street frequently contain standing water.

4.0 Risk Assessment (PIEVC Step 3)

The purpose of the risk assessment is to identify conditions where the risks posed by high Detroit River water levels result in adverse effects on assets within the study area that may require flood protection solutions.

The probability of each climate occurring within the project 30-year time horizons was estimated and assigned a corresponding probability score. Severity scores were then developed for each asset category to quantify the anticipated consequences of flooding. Risk scores were calculated for each asset/hazard interaction by multiplying the probability and severity scores. A risk assessment workshop was completed with key City staff and stakeholders to gather feedback and revisions on the preliminary probability, severity, and risk scoring. Assets with high calculated risk scores were then identified for further assessment in Step 4.

The supporting PIEVC worksheets are presented in **Appendix A** and a summary of the risk assessment process is provided in the following sections.

4.1 Probability Rating Scale

As part of the climate change scenarios for the Study, climate hazards of concern were developed by the PIEVC team and validated and revised through City staff interviews, historical event research, and stakeholder workshop discussions. The climate hazards included in the study are presented in the following table. The table also includes annual frequency of the event, and a 30-year probability score based on a 7 point scale. Annual frequencies and scores are presented for the current timeframe, and two future timeframes (2050s and 2080s).

Table 3: Climate Hazard Probability Scores

Hazard	Threshold		Current		2050s		2080s	
			Estimated 30-Year Probability (%)	Score	Estimated 30-Year Probability (%)	Score	Estimated 30-Year Probability (%)	Score
Extreme Rainfall	1:5 Year Storm		> 99	7	> 99	7	100	7
	1:100 Year Storm		20	4	> 60	6	> 85	7
Extreme River Levels	Current HWL		25	4	30	5	> 30	5
	Projected CC HWL		20	4	25	4	25	4
Combination Events	Current HWL + 1:100 Year Storm		7	2	12	2	26	4
	Current HWL + 1:5 Year Storm		26	4	30	4	> 30	5
	Projected CC HWL + 1:100 Year Storm		5	2	16	4	23	4
	Projected CC HWL + 1:5 Year Storm		26	4	26	4	30	4
	HWL + Wave Action (freeboard)		> 95	7	N/A	7	N/A	7
Secondary Impact Events	Major Ice Storm		25	4	30	4	25	4
	Extreme Wind Event		80	6	85	7	85	7
	Tornado - (E)F2+		5	2	7	2	9	2
	Freeze/ Thaw	Total Cycles	100	7	100	7	100	7
		30 Cycle Increments	> 99	7	> 99	7	> 99	7

As part of this assessment, several hazards were removed from consideration after extensive stakeholder engagement and historical events research. These included:

- Extreme air temperature (hot and cold);
- Heavy snowfall events and seasonal snow accumulation; and
- Rainfall plus hail combination events.

Other hazards removed from this assessment included shoreline erosion, river ice and ice jam flood events, as they were not able to be statistically analyzed for frequency of occurrence due to lack of reliable data.

4.2 Severity Rating Scale

To characterize the severity of climate change impacts, the PIEVC Protocol makes use of a standardized impact scoring scale ranging from 0 to 7. As part of this study, the criteria for assigning each severity rating was developed for each type of asset.

4.2.1 Storm Drainage Infrastructure

The criteria used to evaluate the severity of flood impacts on storm drainage infrastructure is summarized in the following table.

Table 4: Storm Drainage Infrastructure Severity Ratings

Severity Rating	Original PIEVC Severity Descriptors	Evaluation Criteria
0	Negligible; Not applicable	No Impacts
1	Very Low; Some measurable change	Regular use, peak flow < 50% capacity
2	Low; Slight loss of serviceability	Regular use, peak flow > 50% capacity
3	Moderate loss of serviceability	Peak flow approaching capacity limit (≥ 80%)
4	Major loss of serviceability; Some loss of capacity	Several segments approaching capacity limit, one or two nodes fully surcharged (but surface ponding < 0.3 m above ground surface)
5	Loss of capacity; Some loss of function	Multiple conveyance segments fully surcharged, maximum ponding depth < 0.3 m above ground surface
6	Major; Loss of function	Trunk storm sewers fully surcharged, one or more nodes 0.3 m to 0.5 m above ground surface
7	Extreme; Loss of Asset	Multiple trunk lines fully surcharged, ponding at one or more nodes > 0.5 m above ground surface

4.2.2 Lou Romano Treatment and Wastewater Drainage Infrastructure

The criteria used to evaluate the severity of flood impacts on wastewater infrastructure is summarized in the following table.

Table 5: Wastewater Infrastructure Severity Ratings

Severity Rating	Original PIEVC Severity Descriptors	Evaluation Criteria
0	Negligible; Not applicable	No Impacts
1	Very Low; Some measurable change	Peak flow/wastewater volume greater than dry weather flow
2	Low; Slight loss of serviceability	Peak flow/wastewater greater than average annual maximum
3	Moderate loss of serviceability	Multiple maintenance access covers and drains partially blocked
4	Major loss of serviceability; Some loss of capacity	Multiple maintenance access covers and drains fully blocked
5	Loss of capacity; Some loss of function	Flow at treatment plant approaching max capacity; Some pump stations no longer functioning, may require significant repair
6	Major; Loss of function	Treatment Plant Shut-Off – sewer back-up 10s of properties; Individual pump stations damaged, needing replacement
7	Extreme; Loss of Asset	Treatment Plant Shut-Off – sewer back-up 100s properties; Most pump stations destroyed or offline - sewer back-up 100s properties

4.2.3 Shoreline Infrastructure

The criteria used to evaluate the severity of flood impacts on shoreline infrastructure is summarized in the following table.

Table 6: Shoreline Infrastructure Severity Ratings

Severity Rating	Original PIEVC Severity Descriptors	Evaluation Criteria
0	Negligible; Not applicable	No Impacts
1	Very Low; Some measurable change	Regular seasonal erosion/wear-and-tear on shoreline (soft soils)
2	Low; Slight loss of serviceability	Excessive seasonal erosion, resulting in more mass loss than usual
3	Moderate loss of serviceability	Excessive seasonal erosion, resulting in need for greater than normal maintenance
4	Major loss of serviceability; Some loss of capacity	Water level begins to overtop unprotected shoreline
5	Loss of capacity; Some loss of function	Water level beings to overtop protected shoreline; Erosion of unprotected shoreline will require repairs (i.e., soil replacement)
6	Major; Loss of function	Shoreline protection damaged with some assets requiring significant repairs; levees or other riverine flood protection begin to be overtopped
7	Extreme; Loss of Asset	Shoreline protection destroyed with assets requiring replacement; levees or other riverine flood protection are overtopped resulting in standing water > 0.5 m deep in formerly protected areas

4.2.4 Surface Transportation Routes

The criteria used to evaluate the severity of flood impacts on roadways and railways is summarized in the following table.

Table 7: Surface Transportation Route Severity Ratings

Severity Rating	Original PIEVC Severity Descriptors	Evaluation Criteria
0	Negligible; Not applicable	No Impacts
1	Very Low; Some measurable change	Regular rainfall events
2	Low; Slight loss of serviceability	Sufficient rainfall for ground saturation
3	Moderate loss of serviceability	Surface flow transports leaf litter, branches, etc. from properties, partially blocking drainage
4	Major loss of serviceability; Some loss of capacity	Temporary ponding in low lying areas (e.g., immediately surrounding drains), maximum depth < 0.1 m
5	Loss of capacity; Some loss of function	Standing water < 0.3 m (for 1:100 year storm) or HGL > 0.3 m BGS (1:5 year storm)
6	Major; Loss of function	Standing water 0.3 to 0.5 m above ground surface (1:100 year storm) - passenger/commercial vehicles may be stranded; any partial erosion of roadbeds, embankments, water crossing footings/foundations; *Any* ponding/standing water from 1:5 year storm
7	Extreme; Loss of Asset	> 0.5 m AGL depth - vehicles may become buoyant; Any washouts due to any failure (e.g., culvert failures, road bed erosion, slope failure, etc.) resulting in loss of one or more lanes of traffic

4.3 Risk Assessment Workshops

An initial internal risk assessment workshop was conducted with the project engineering team leads from the City and Dillon to identify relevant climate-asset interactions (the so-called “Yes/No” analysis) and to estimate preliminary numerical risk score values. The results of this internal risk assessment were presented during a facilitated half-day workshop with key City staff and stakeholders, at which the consulting team refined scoring based on feedback and requested revisions. As per the PIEVC Protocol, future risk scores were calculated based on current consequence/severity scores, and projected future climate hazard probabilities. The risk assessment workshop information is documented in **Appendix B**.

4.4 Risk Scoring

The range of potential risk scores based on the product of the probability and severity ratings is summarized in the following table. The risk scores were ranked as shown to identify assets that require a response to address the corresponding climate hazard.

Table 8: Risk Scores

Severity Rating	Probability Rating							
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7
2	0	2	4	6	8	10	12	14
3	0	3	6	9	12	15	18	21
4	0	4	8	12	16	20	24	28
5	0	5	10	15	20	25	30	35
6	0	6	12	18	24	30	36	42
7	0	7	14	21	28	35	42	49

Low Risk – No further action
Special Case – Operation, planning and/or management response
Medium Risk – Requires monitoring, possible engineering analysis
High Risk – Response required

4.5 Risk Assessment Results

A summary of the risk assessment results for each Zone in the Study Area is provided in the following sections.

4.5.1 Zone 1

The Zone 1 infrastructure components with high calculated risk scores associated with the evaluated climate hazards is summarized in the following table.

Table 9: Zone 1 Risk Assessment Summary

Infrastructure Component	Climate Hazard	Potential Impact	Risk Score		
			Current	2050s	2080s
LRWRP	Extreme River Levels, Combination Events, Extreme Rainfall	Inflows to the Wastewater System, Basement Flooding	49	49	49
Sandwich Street at McKee Creek Drain	Extreme Rainfall, Combination Events	Local Surface Flooding	35	36	42
ETR Rail at Sandwich Street	Extreme Rainfall, Combination Events	Local Surface Flooding	35	36	49
Felix Avenue – Combined Sewer	Extreme Rainfall	Basement Flooding	35	36	42
Mill Street – Combined Sewer	Extreme Rainfall	Local Surface Flooding, Basement Flooding	24	36	42
Riverside Drive – Combined Sewer	Extreme Rainfall	Local Surface Flooding, Basement Flooding	21	30	35
Sandwich Street - Combined Sewer	Extreme Rainfall	Local Surface Flooding, Basement Flooding	42	42	42
Canada South Science City	Extreme Rainfall	Basement Flooding	35	36	42
West Windsor Mosque	Extreme Rainfall	Basement Flooding	42	42	42
Islamic Academy/St Vincent de Paul Society/Sandwich Teen Action Group	Extreme Rainfall	Basement Flooding	42	42	42
Commercial and Residential Areas Serviced by Combined Sewers	Extreme Rainfall	Local Surface Flooding, Basement Flooding	42	42	49
Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre	Extreme Rainfall	Local Surface Flooding	49	49	49

Infrastructure Component	Climate Hazard	Potential Impact	Risk Score		
			Current	2050s	2080s
General Brock Public School	Extreme Rainfall	Basement Flooding	35	35	35
Sandwich First Baptist Church	Extreme Rainfall	Basement Flooding	21	30	35

With the exception of the LRWRP and the Sandwich Street ROW at McKee Creek Drain, the risk scores at assets located in Zone 1 are not influenced by extreme Detroit River levels. This result is expected since the ground elevations in most of Zone 1 are significantly higher than the extreme river levels. Basement flooding and local surface flooding caused by extreme rainfall events are the prominent potential impacts within most of Zone 1. The risk assessment scores at many of these assets suggest increasing potential risk of impacts due to climate change in the future.

High risks of impacts at the LRWRP are caused by extreme river levels, extreme rainfall events, and combination events. Additional wastewater flows to the LRWRP caused by these climate hazards could exceed the plant capacity, resulting in upstream basement flooding.

The high risk on Sandwich Street and the Essex Terminal Rail (ETR) rail line at McKee Creek Drain is due to the relatively low ground elevations at this location and the limited capacity of the existing local storm drainage system.

4.5.2 Zone 2

The Zone 2 infrastructure components with high calculated risk scores associated with the evaluated climate hazards is summarized in the following table.

Table 10: Zone 2 Risk Assessment Summary

Infrastructure Component	Climate Hazard	Potential Impact	Risk Score		
			Current	2050s	2080s
Prospect Avenue	Extreme River Levels, Extreme Rainfall, Combination Events	Coastal Flooding, Local Surface Flooding	35	36	42
Windsor Salt (Prospect Avenue)	Extreme Rainfall, Combination Events	Local Flooding	42	42	49
Russell Street	Extreme Rainfall	Local Surface Flooding	24	36	42
Mill Street – West of Russell Street	Extreme River Levels, Combination Events	Coastal Flooding	35	42	42
McKee Road - Pumping Station	Extreme River Levels, Extreme Rainfall	Local Surface Flooding	35	42	42
McKee Creek Drain	Extreme River Levels, Extreme Rainfall	Coastal Flooding, Local Surface Flooding	35	42	42
Brighton Beach Generation Station	Extreme Rainfall	Local Surface Flooding	49	49	49
Keith Transmission Station - Hydro One	Extreme Rainfall	Local Surface Flooding	21	30	42
Chateau Park LTC	Extreme Rainfall	Basement Flooding	35	35	35
Great Lakes Institute for Environmental Studies	Extreme Rainfall	Basement Flooding	35	35	35
McKee Park	Extreme River Levels	Coastal Flooding	35	35	35
ETR Rail at Russell Street	Extreme River Levels, Extreme Rainfall, Combination Events	Coastal Flooding, Local Surface Flooding	35	36	49
Windsor Biosolids Processing Plant	Extreme Rainfall, Combination Events	Local Surface Flooding	35	42	42
Brock Street - Outfall	Erosion	Erosion	28	28	35
HMCS Hunter	Extreme River Levels	Coastal Flooding	35	35	42

Infrastructure Component	Climate Hazard	Potential Impact	Risk Score		
			Current	2050s	2080s
CSOs	Extreme River Levels, Combination Events	Inflows to the Wastewater System, Basement Flooding	35	35	35
Residential Areas Serviced by Combined Sewers	Extreme Rainfall	Local Surface Flooding, Basement Flooding	49	49	49
Commercial Areas Serviced by Combined Sewers	Extreme Rainfall	Local Surface Flooding	42	42	49

Infrastructure assets located in Zone 2 with high calculated risk scores include ROWs and shoreline properties. Since the ground elevations in Zone 2 are generally low relative to the Detroit River, assets in this zone are prone to extreme river levels.

The Brock Street storm sewer outfall consists of twin concrete box pipes located in a drainage easement west of Russell Street. Both the Windsor Port Authority (WPA) and City administration noted concerns with the condition of the outfall. Erosion of the ground surface above the pipes suggests that deterioration of the pipe barrels has occurred. Climate change impacts are likely to exacerbate the existing deterioration.

4.5.3 Zone 3

The Zone 3 infrastructure components with high calculated risk scores associated with the evaluated climate hazards is summarized in the following table.

Table 11: Zone 3 Risk Assessment Summary

Infrastructure Component	Climate Hazard	Potential Impact	Risk Score		
			Current	2050s	2080s
Ojibway Parkway	Extreme Rainfall, Combination Events	Local Surface Flooding	35	42	49
Windsor Salt Mine – Morton Avenue	Extreme River Levels, Extreme Rainfall, Combination Events	Local Surface Flooding	49	49	49
Detroit-Windsor Truck Ferry	Extreme Rainfall, Combination Events	Local Surface Flooding	42	42	49
Sprucewood Avenue	Extreme Rainfall, Combination Events	Local Surface Flooding	42	42	49
Black Oak Heritage Park	Extreme Rainfall, Combination Events	Local Surface Flooding	35	35	35
Railway Tracks – Ojibway Parkway	Extreme Rainfall, Combination Events	Local Surface Flooding	35	42	49

Stormwater servicing in Zone 3 is generally provided by roadside ditches that discharge to the Detroit River. The infrastructure assets in Zone 3 with high calculated risk scores may be prone to local surface flooding caused by the limited available capacity of the roadside ditches, which could be exacerbated by extreme river levels.

4.5.4 General Study Area

The following table summarizes infrastructure components dispersed throughout the Study Area with high calculated risk scores associated with the evaluated climate hazards.

Table 12: Study Area-Wide Risk Assessment Summary

Infrastructure Component	Climate Hazard	Potential Impact	Risk Score		
			Current	2050s	2080s
Overhead Electrical Distribution Equipment	Extreme Wind Events	Loss of Electrical Power	30	35	35
Pad-Mounted Electrical Distribution Equipment	Extreme Rainfall	Loss of Electrical Power, Electrical Safety	28	42	49
Communications Equipment	Extreme Wind Events	Disruption of Monitoring Equipment	30	35	35

5.0 Engineering Assessment (PIEVC Step 4)

Based on the findings of the PIEVC risk assessment and joint probability modelling scenarios, the project team identified flood protection measure objectives and the study target levels of service of future flood protection measures. These were then used to develop flood mitigation solutions for assets identified as being highly vulnerable to the evaluated climate hazards.

5.1 Flood Protection Measure Objectives

The following objectives were developed for the proposed West Windsor flood protection solutions:

- Reduce susceptibility of coastal flooding within the study area;
- Reduce impact of increased I&I into the municipal system from high Detroit River water levels;
- Improve the performance of the existing infrastructure during high water levels and reduce peak flows at the LRWRP;
- Provide more sustainable municipal infrastructure; and
- Reduce risk of surface and basement flooding.

5.2 Target Level of Service

The target the LOS criteria is based on recommendations from the Windsor SCFPMP (Dillon and Aquifor Beech, 2020). The following is a summary of the target LOS criteria for the study area:

- Reduce dry weather flow volumes entering the LRWRP under high river levels to similar magnitudes as during low river levels;
- Eliminate surface ponding within the ROW for all storm events up to and including the 1:5 year storm event under all Detroit River Level conditions;
- Allow no more than 0.30 m in maximum surface ponding depths within the ROW during 1:100 year storm event year under all Detroit River water level conditions; and

- Reduce HGLs in the sanitary/combined systems to 1.8 m below the existing ground elevation for all design events up to and including the 1:100 year storm event under all Detroit River Level conditions.

In addition to the SCFPMP criteria summarized above, a design elevation to mitigate the risk of flooding caused by Detroit River extreme water levels was developed. As described in Section 3.3, an extensive literature analysis was conducted for extreme high water levels, including considerations for climate change. Although there have been a number of projections made in previously completed studies, most include a high degree of uncertainty. Given that these future high water level projections are considered to be highly uncertain, it is recommended for this study that high river level resilience actions address the current 100-year historical high water level of 176.1 m plus 0.3 m of freeboard that includes include margins for climate change, rather than to select a highly uncertain climate change water level. The resulting target design elevation for solutions to mitigate the risk of coastal flooding is therefore 176.4 m.

5.3 Solutions Identification and Development

Based on the information presented in Steps 1 through 3 of the PIEVC procedure, the study developed a number of solutions to mitigate the impacts of high river levels on the Study area and critical assets to attempt to meet the targeted level of service criteria. Feedback from City Administration and stakeholders was gathered through a workshop on May 19, 2022, which was used to guide the development of the proposed solutions. The workshop presentation is provided in **Appendix B**.

5.3.1 Coastal Flooding

The following solutions were developed to address direct flooding impacts caused by extreme Detroit River levels.

5.3.1.1 Shoreline Properties

The need for a continuous landform barrier similar to the solutions proposed in the East Riverside Flood Risk Assessment (Landmark, 2019) and SCFPMP (Dillon and Aquafor Beech, 2020) to protect shoreline properties in West Windsor from high river levels was evaluated. The results suggest that this is not a viable solution for the West Windsor area for the following reasons:

- The vast majority of the shoreline properties in West Windsor are industrial lands that require direct access to the Detroit River shoreline for their operations;
- Most of the shoreline properties are privately owned, making access for construction and future maintenance of any proposed flood protection works problematic; and,
- The shoreline flooding limits in West Windsor does not significantly encroach inland beyond the shoreline properties. Consequently, only the shoreline properties themselves would benefit from any proposed flood protection measures.

Coastal flooding on privately owned shoreline properties is best to be mitigated by individual site solutions implemented by the individual property owners. Private site coastal flooding solutions include:

1. Temporary measures implemented during periods of high river levels such as sandbag barriers or temporary changes to site operations such as relocating affected activities to locations outside of the flooded areas; and,
2. Permanent measures such as site grading improvements to raise critical portions of the site above the Detroit River high water level, or constructing permanent flood protection barriers such as berms.

The minimum recommended design elevation for individual site solutions to mitigate coastal flooding on the shoreline properties is 176.4 m.

5.3.1.2 Mill Street

The western portion of Mill Street adjacent to HMCS Ojibway is lower than the existing 1:100 year water level of 176.1 m and has the potential to experience prolonged surface ponding during periods of extreme river levels. The existing road profile is

recommended to be raised to provide safe access the HMCS Ojibway site. The available topographic information suggests that raising the Mill Street profile to the minimum recommended design flood protection elevation of 176.4 m likely isn't feasible due to adjacent site grading constraints. Instead, the Mill Street road profile should be raised to a minimum design elevation of 176.1 m, as shown on **Figure 9**.

The proposed grading design should be coordinated with any proposed flood protection measures on the HMCS Ojibway site. Additionally, the proposed road profile should be design to direct overland flows from the right-of-way away from the HMCS Ojibway site entrance. The existing Mill Street storm sewer outfall should also be inspected to assess its condition and capacity.

5.3.1.3 Russell Street at Chappell Avenue

The southern portion of Russell Street near Chappell Avenue is lower than the existing 1:100 year water level of 176.1 m and may experience prolonged surface ponding greater than 0.30 m deep during periods of extreme high water elevations. The ETR spur line located near the Russell Street/Chappell Avenue intersection limits the possibility of raising the existing Russell Street profile to the minimum recommended design elevation of 176.4 m to prevent local roadway ponding. For this area, an adaptive solution is recommended, as shown on **Figure 10**.

During periods of extreme river levels, it is recommended that the City assess mitigation measures during this time, including consideration to temporarily close the southern portion of Russell Street, using appropriate road closure signage. Traffic diversion during these closures would be required, including acceptable diversion of trucking routes. The consideration for road closure would still allow local traffic to access 3795 Russell Street via the existing secondary driveway entrance from Chappell Street. The maximum ponding depths at the existing 3800 Russell Street site entrance are anticipated to be less than 0.3 m, and consequently should not prevent site access.

Flooding encroachment onto the adjacent private properties from the Russell Street ROW can be mitigated through site improvements implemented by individual property owners. Typically, this involves modifying the site grading to direct water away from homes and businesses and reduce maximum ponding depths. Any modifications to site grading will need to be reviewed and accepted by the City of Windsor.

5.3.1.4 Prospect Avenue

To provide a flooding solution to protect Prospect Avenue during extreme Detroit River levels, the existing roadside ditches and drains are recommended to be improved and a permanent pump station constructed at the storm sewer outlet to the Detroit River. As part of these improvements, the roadside ditch on the north side of Prospect Avenue will need to be extended, while culverts will need to be installed at driveway and road crossings along the west end of Prospect Avenue to outlet to the Detroit River via the proposed pump station outlet, as shown on **Figure 11**.

The proposed Prospect Avenue stormwater pump station will provide for a hydraulic disconnection from the drainage system to the Detroit River during periods of high river levels. Grading along Prospect Avenue is to be designed to maintain the overland flow route from Sandwich Street to the Detroit River at a minimum longitudinal slope of approximately 0.3%.

The proposed Prospect Avenue improvements and outlet works are expected to be coordinated with the proposed LRWRP Retention Treatment Basin project. Opportunities to use the future RTB outlet to convey discharges from the proposed stormwater pump station to the Detroit River should be evaluated.

5.3.1.5 Sandwich Street Drainage Improvements

The currently ongoing Gordie Howe International Bridge construction includes improvements along Sandwich Street from Ojibway Parkway to McKee Street. The proposed improvements include providing an urban cross section complete with curb and gutter and a proposed storm sewer, as shown on **Figure 12**. The proposed storm sewer is shown to discharge into the existing roadside ditch located on the south side of Prospect Avenue, which conveys stormwater westward to the Detroit River. The proposed storm sewer design is being completed by others and has not been evaluated through this project.

The proposed Prospect Avenue stormwater pump station will provide for a hydraulic disconnection from the drainage system to the Detroit River during periods of high river levels. The drainage design for the proposed Sandwich Street Improvements should be coordinated with the proposed Prospect Avenue improvements.

5.3.1.6 McKee Park Improvements

The City is planning proposed improvements at McKee Park that include replacing the existing riverside boardwalk, asphalt trails, a gazebo, lighting, and benches. The study team met with City Staff to review flood protection solutions for McKee Park.

Providing a flood protection barrier or grading the site to the minimum recommended protection elevation of 176.4 m to raise McKee Park above extreme Detroit River levels is not feasible at this time due to grading constraints. Installing a protection barrier would block surface runoff during rainfall events from travelling to the Detroit River and cause interference with the existing boat ramp. In lieu of this solution, an adaptive strategy is recommended:

- Construct all proposed pathways and surface works to a minimum design elevation of 176.1 m (1:100 year historical Detroit River water level);
- Flood proof all electrical systems to a minimum elevation of 176.4 m; and
- It is recommended that the City of Windsor develop a response plan for the park during high river level conditions to protect public safety.

5.3.2 Inflows to Wastewater System

Solutions to reduce inflows to the wastewater system include both source control measures and previously planned capital projects. Examples of source control measures include rain catchers at sanitary sewer MH lids and backflow prevention measures at CSOs.

Recommendations developed from previously completed studies for the area and future capital improvement projects identify additional solutions already proposed to reduce inflows into the wastewater system. This includes the proposed LRWRP RTB, Prince Road Trunk Storm Sewer Outfall, and a number of streets for combined sewer separation.

5.3.2.1 Rain Catchers

The installation of rain catchers within existing sanitary sewer MHs has been identified as an immediate improvement that will provide benefit for the sanitary system through a reduction of rainfall derived and coastal water inflow from entering the sanitary MHs.

Rain catchers are seals placed between the MH frame and cover to reduce surface water flows from entering the sanitary system.

To assist the City in developing a feasible plan for installing these units, an assessment was completed to identify locations where the potential for inflow is highest and where MH sealing should be prioritized. The MHs to be prioritized in the study area were selected where rim elevations are below the 1:100 year historical Detroit River water level of 176.1 m and the future climate change water level of 176.3 m. **Table 7** below summarizes the MHs in the study area to be prioritized for the installation of rain catchers, and their locations are shown on **Figure 13**.

Table 13: Rain Catcher Locations

MH ID	Rim Elevation (m)	Street Name/Location
Manholes below 1:100 Year HWL of 176.10 m		
5S607	175.54	Ojibway Parkway at Prospect Avenue
5S609	175.98	Ojibway Parkway at Prospect Avenue
5S721	176.01	Russell Street
5S724	176.01	ETR Railway
5S935	175.53	Below Ambassador Bridge
Manholes below Climate Change Event HWL of 176.30 m		
5S722	176.12	Russell Street
5S723	176.21	ETR Railway
5S987	176.21	North Prospect Avenue

The MH elevations within this table are taken from City Lidar elevation surface data that is assigned to each location within the City InfoWorks ICM model. A Field investigation and/or topographic survey of each location is recommended to confirm final elevations.

5.3.2.2 Combined Sewer Outlet Protection

As part of protecting combined sewer outlets from high Detroit River levels, two possible solutions were evaluated to reduce water from entering the wastewater system during periods of extreme river levels. This included:

- Backflow preventers such as flap gates or inline check valves to prevent reverse flows from the river through the CSOs; and
- Raising the existing internal structure CSO weir elevations to the estimated Detroit River 1:100 year future climate change water level of 176.30 m.

Backflow preventers are devices that allow water to flow in only one direction. The devices are to be oriented to prevent Detroit River water from entering the combined storm sewer during high lake levels, while allowing overflows to enter the Detroit River during periods of severe rainfall, thereby protecting upstream homes and businesses from basement flooding.

Under extreme rainfall events and high Detroit River levels, backflow preventers require additional upstream head to open and release overflows to the Detroit River, resulting in slightly higher upstream water levels within the combined and sanitary system. This prevention measure has the potential for higher risks of basement and surface flooding during times when the backflow device is fully closed. A hydraulic analysis was completed to evaluate the impacts of backflow preventers on the wastewater system performance. To complete this task, the City SCFPMP Baseline Infoworks model was modified as follows:

- Boundary conditions were set at both the historical and climate change 1:100 year return period Detroit River water levels; and
- Backflow prevention devices were modelled in each noted CSO with spill elevations lower than 176.3 m using default head loss coefficients[1].

[1] Flow characteristics at flap gates modelled in Infoworks are calculated using the following equation:
$Q = (1/C_d)\ A_m\ V_m$
Where
A_m – average cross sectional area (m^2)
V_m – average velocity (m/s)
C_d – discharge coefficient
Q – discharge (m^3)

The modified Infoworks model was used to simulate the following storm scenarios and the Detroit River 1:100 year future climate change water level of 176.30 m under the river levels stated above:

- 1:5 year return period rainfall event; and
- 1:100 year return period rainfall event.

The modelling results identify that the calculated peak HGLs during the 1:5 year rainfall event are slightly higher in isolated areas of the service area when compared to the scenario without backflow prevention devices installed at CSO locations. The calculated peak HGLs during the 1:100 year rainfall event are generally lower across the service area when compared to a similar scenario without backflow prevention devices installed at CSO locations.

Instead of backflow prevention devices, an alternative is to raise the CSO overflow weirs to the Detroit River 1:100 year future climate change water level of 176.3 m. Raising the weirs will reduce the volume of untreated wastewater being diverted into the Detroit River during high flow events and will decrease the volume of river water entering the LRWRP during high water levels. This solution was considered as part of the Windsor SCFPMP which concluded that while there is a meaningful increase in HGL upstream of each weir, this increase only propagates slightly upstream of each structure. Any increases in HGL during periods of low Detroit River water levels is expected as the HGL in the system would need to increase to the new weir elevation before a spill occurs.

Both options are shown to decrease the risk of backflow from the Detroit River entering the combined and sanitary system. However, backflow prevention devices offer the following advantages:

- They are less likely than weirs to raise the upstream HGLs during wet weather events when the Detroit River water levels are low; and
- They will reduce the possibility of inflow from the river if the Detroit River water levels rise above the estimated 1:100 year climate change elevation.

The default discharge coefficient of 1.0 corresponds to a steel check valve.

Based on the modelling analysis completed and discussed through this section, a combination of flap gates and check valves are recommended as backflow prevention devices. **Flap gates** are proposed at all CSOs requiring backflow prevention where it is feasible to install the backflow prevention device at the open downstream outlet to the Detroit River and the pipe diameter is greater than or equal to 1800 mm. **Inline check valves** are proposed at all CSOs requiring backflow prevention where the pipe diameter is less than 1800 mm. All inline check valves must be installed in the existing combined sewer upstream of the Detroit River and in close proximity to a maintenance hole. If there are no nearby MHs, a new structure will be required. The proposed backflow preventer locations are documented in **Appendix G** and their locations are shown on **Figure 14**.

5.3.2.3 Lou Romano Retention Treatment Basin

In 2019, the City of Windsor completed an environmental assessment for a proposed retention treatment basin (RTB) at the LRWRP (Stantec, 2019). The RTB will provide primary treatment of wastewater during wet weather events when the flows to the plant are greater than the plant capacity. Wet weather flows include both wastewater from residential properties and businesses, as well as storm runoff that enters the sewer network either intentionally through combined systems or unintentionally through inflow and infiltration sources. Additionally, the RTB will provide primary treatment of wastewater during emergencies, such as a catastrophic failure at the plant. The proposed RTB location is shown on **Figure 15**.

As part of the recent City award of the Disaster Mitigation and Adaptation Funding (DMAF) for the RTB, detailed design for the project is expected to begin in 2023, with construction estimated to begin in 2026/2027.

In addition to the RTB, conveyance from the CSO chambers on Hill Avenue, Detroit Street and Bridge Avenue will be improved during wet weather flow events. A proposed CSO collection sewer extension will convey these additional flows to the proposed RTB.

5.3.2.4 Prince Road Trunk Storm Sewer Outfall and Pump Station

The City of Windsor SCFPMP completed in 2020 (Dillon and Aquafor Beech) identified the need to separate all combined sewers with separate storm and sanitary systems.

One of the projects recommended to support this goal is the construction of a new stormwater pumping station and outfall from the Prince Road trunk storm sewer to the Detroit River. This new outfall will provide a stormwater outlet to direct stormwater that would otherwise go to the LRWRP to the Detroit River.

The City of Windsor completed an Environmental Assessment to establish the location of the proposed outfall works (Stantec, 2022). The proposed location of the outfall and pump station is detailed in **Figure 16.**

Construction of the proposed outfall and pumping station will allow disconnection of the existing Russell Street catchbasins located south of Hill Avenue from the combined sewer system.

5.3.2.5 Detroit Street Trunk Outfall

Similar to the proposed Prince Road Trunk Storm Sewer Outfall, the SCFPMP recommended construction of a new trunk storm sewer and outfall from Detroit Street in the northern portion of the West Windsor study area. This new outfall will provide a stormwater outlet to allow upstream combined sewer separation to proceed, and direct stormwater that would otherwise go to the LRWRP to the Detroit River. The proposed outfall location is shown on **Figure 17**.

Several challenges are anticipated with the proposed outfall construction. The existing storm sewer easement from Detroit Street to the Detroit River is located on industrial land currently used for stockpiling aggregates. The proposed outfall is expected to be designed to bear the anticipated loading of the stockpiled material and equipment. Construction activities will also need to be coordinated to reduce risk of impacts to the ongoing site operations.

5.3.2.6 Combined Sewer Separation

Currently, stormwater runoff enters the LRWRP through the upstream combined sewer system. Separating the stormwater flows from the combined sewers in the Study area is a collection system improvement that will reduce flows to the LRWRP. This recommended improvement involves installing a separate storm sewer conveyance system to take all stormwater runoff flows from the study area directly to the Detroit River without entering the LRWRP. The combined sewer locations within the Study Area are shown on **Figure 18**.

The City of Windsor has a number of ongoing projects to eliminate stormwater flows into its combined sewer system. However, given the many kilometers of existing combined sewers, it is expected to take many years for a full separation of the Study area.

5.3.3 Basement Flooding

Each of the solutions for reducing inflows the wastewater system is expected to help reduce basement flooding. However, these programs will take time to implement. Property owners are expected to have a role to play in protecting their residences and businesses from basement flooding. These solutions can be implemented readily and provide immediate protection to individual properties while programs to improve the municipal drainage systems are implemented. Examples of private property improvements that can provide basement flood mitigation are shown on **Figure 19** and include:

- Disconnecting downspouts from foundation drains and directing them instead to the ground surface;
- Disconnecting foundation drains from the private drain connection and directing them instead to a sump pump;
- Installing a backflow preventer to prevent wastewater backups into the residence; and
- Providing separate private drain connections, one for sanitary flows and one for storm flows, in areas serviced by separate storm and sanitary systems.

The City of Windsor currently has two programs to help homeowners protect their homes from basement flooding.

1. The Downspout Disconnection Program provides free assistance to help property owners safely redirect the flows from their eaves troughs to the ground surface; and
2. The Basement Flood Protection Subsidy Program provides homeowners with up to $2,800 per property towards the costs of installing eligible flood protection measures such as backflow preventers, new sump pump installations, and foundation drain disconnections.

The City of Windsor provides information on these programs on City's official website. Additional education and outreach is recommended to increase participation in these programs for properties located within the Study area. Potential outreach measures could include program information provided with existing communications to property owners such as property tax bills.

5.3.4 Local Surface Flooding

Local surface flooding is generally the result of limited available drainage capacity and is further exacerbated during periods of high Detroit River water levels.

5.3.4.1 Right-of-Ways

As part of this study, local improvements are recommended in the following ROWs to manage local surface flooding:

- Morton Avenue;
- Russell Street;
- Ojibway Parkway; and
- Sprucewood Avenue and Maplewood Drive.

The currently known inverts of the Morton Avenue ditches are shown to be lower than the Detroit River 1:100 year climate change water level of 176.30 m, and consequently the ditch capacity may be reduced under periods of extreme river levels. A detailed assessment of ditch capacities is recommended to verify whether ditch improvements are required. The location of the proposed Morton Avenue improvements is shown on **Figure 20**.

The majority of Russell Street is currently serviced by roadside ditches and frequent surface ponding has been observed, based on anecdotal information provided by stakeholders. The available topographic information suggests that portions of the roadside ditches have invert elevations lower than the Detroit River 1:100 year climate change water level of 176.30 m. Since Russell Street provides access to industrial properties, there is concern that heavy truck traffic on the saturated road structure will lead to pavement deterioration. Furthermore, a significant portion of Russell Street drains via an outlet that is not located with a municipal drainage easement. Future maintenance of this outlet could be problematic. It is recommended that drainage

improvements along the portion of Russell Street shown on **Figure 21** should be completed to:

- Reduce the frequency and severity of local ponding;
- Establish outlets to the Detroit River located in drainage easements or on municipally owned lands; and
- Provide an outlet to the southern portion of Russell Street via the proposed Prince Street storm sewer outlet.

Surface ponding frequently occurs along Ojibway Parkway during heavy rainfall events. Roadside ditch maintenance is recommended to improve the drainage system capacity as shown on **Figure 22**. The roadway is recommended to be monitored to evaluate whether additional drainage improvements are required. The available topographic information suggests that the Ojibway Parkway roadside ditches invert elevations are higher than the Detroit River 1:100 year climate change water level of 176.30 m.

Based on the information presented in a recent drainage report (Meritech, 2021), the Sprucewood Avenue and Maplewood Drive roadside ditches currently do not prove sufficient capacity to convey the peak flow from a 1:2 year design rainfall event. Furthermore, the available topographic information suggests that portions of the roadside ditches have invert elevations lower than the Detroit River 1:100 year climate change water level of 176.30 m, as shown on **Figure 23**. These roads provide access to industrial properties and the Detroit-Windsor Truck Ferry. Drainage improvements are required to reduce the possibility of local flooding in these ROWs. Any drainage improvements will need to be completed in accordance with the provisions of the *Drainage Act*.

5.3.4.2 McKee Creek Municipal Drain

As part of this study, drainage improvements are recommended to the McKee Creek Municipal Drain to reduce the possibility of local surface flooding caused by limited drain capacity and high river levels. A previously completed engineer's report evaluated the existing drain condition and recommended improvements on behalf of the City of Windsor. The proposed improvements to the McKee Creek Drain are presented in the Drainage Report for the McKee Drain (Landmark, 2022) are shown on **Figure 24** and include the following measures within the Study area:

- Clearing and grubbing the drain from the west side of Sandwich Street to the Detroit River;
- Removing accumulated sediment and reprofiling the drain from Sandwich Street to the Detroit River; and
- Replacing the existing ETR bridge located approximately 260 m downstream from Sandwich Street.

These proposed improvements are expected to reduce the possibility of local flooding within the McKee Creek Municipal Drain drainage area by increasing the drain capacity. The increased capacity will improve the drain performance during periods of high river levels.

5.3.4.3 Site Improvements

Local flooding along private properties can be mitigated through site improvements implemented by individual property owners. Typically this involves modifying the site grading to direct water away from homes and businesses, and reduce maximum ponding depths. Any modifications to site grading will need to be reviewed and accepted by the City of Windsor.

5.4 Public Consultation

A virtual Public Information Centre (PIC) for the West Windsor Flood Risk Study was posted to the project page on the City of Windsor website on October 6, 2022. The PIC was presented as a pre-recorded slideshow that described the West Windsor study area, the project scope and purpose, the flood risk study methodology, the effects of the flooding and flood mitigation solutions. The PIC slides and corresponding script are presented in **Appendix F**.

5.4.1 PIC Announcement

Advertising for the PIC was completed through social media postings and by email circulated to stakeholders. A copy of the stakeholder contact list and the corresponding email is presented in **Appendix F**.

5.4.2 PIC Feedback

PIC attendees were given the opportunity to provide feedback to the project team through an online survey or via email. The online survey questions and a summary of the collected feedback and corresponding responses is presented in **Appendix F**.

A total of six respondents completed the online survey and three comments were provided. None of the comments provided through the online survey were relevant to the West Windsor Flood Risk Study nor did any of the survey respondents provide their contact information.

5.5 Cost Estimates

In order to assist the City with projection planning and implementation of the proposed works, estimated construction costs have been developed. All costs are based on a conceptual design and general extents of the proposed improvements and do not represent pre-design costs. The capital construction costs for the various recommended solutions are based on 2022 construction prices.

During further design of any solutions, updates to the cost estimates should be completed to more accurately estimate overall costs for the proposed improvements. This section includes a summary of the costing assumptions and methodology as well as the high-level costs related to the proposed solutions.

5.5.1 Costing Assumptions and Methodology

The cost assumptions for all recommended improvements include, but are not limited to, the following:

- Construction cost estimates, including labour, are based on 2022 unit prices and the accuracy of each estimate is +/- 30 % and dependent on the timing of implementation;
- Future engineering costs calculated as 20 % of capital construction costs;
- Due to material supply issues, global increase in fuel costs and local market fluctuations a Contingency cost of 30 % has been applied to all construction costs; and
- Costs exclude any further studies required for each recommended solution, including municipal drainage assessments.

Land acquisition costs required to construct any recommended solutions on private property are not included in the cost estimates. Land acquisition requirements and the associated costs shall be confirmed during detailed design.

5.5.2 Unit Prices

Approximate unit prices were developed based on 2022 average construction costs for similar projects. The unit prices were utilized to determine the total construction costs for the recommended solutions within the Study Area. To simplify the costs for the proposed works, majority of the unit prices were developed on a per metre basis, with a few others developed on a per item basis.

5.5.3 Implementation Variances

Due to the scale of the proposed works and the implementation schedule, actual construction costs may vary significantly depending on the year of implementation and market conditions. Priority projects recommended for implementation in the near future will have a higher degree of cost accuracy than works to be completed many years in the future.

5.5.4 Operation and Maintenance Costs

The costs to operate and maintain the various infrastructure improvements that have been recommended were not included in the cost estimate. Due to the implementation time horizon, operation and maintenance costs could vary significantly. The City will need to include the recommended solution to its operations and maintenance programs once they are constructed. As the improvements are constructed, the City should have a better idea of what the costs are to maintain the infrastructure.

On-going monitoring and maintenance will need to take place to ensure that the infrastructure is not altered in any way that could make the system vulnerable to failure. The costs for maintenance may vary significantly from year to year, so it is important to be conservative when estimating the City's operation maintenance costs.

5.5.5 Cost Estimate Summary

The following table summarizes the total cost for each solution based on the estimated construction cost, engineering cost, and contingency cost as detailed above.

Table 14: Cost Estimate Summary

Solution	Solution Cost	Additional Costs
Install Backflow Prevention at CSOs along Detroit River	$2.7 M	Functional Design, Property Acquisition if Required
LRWRP RTB[1]	$75 M	Property Acquisition if Required
Combined Sewer Separation[2]	$747 M	Property Acquisition if Required
Prince Road Trunk Storm Sewer Outfall and Pumping Station[3]	$8.3 M	Property Acquisition if Required
Detroit Street Trunk Storm Sewer and Outfall[2]	$3.3 M	Property Acquisition if Required
Sandwich Street Drainage Improvements	$1.8 M	Property Acquisition if Required
McKee Creek Drain Maintenance from Detroit River to Sandwich Street[4]	$0.2 M	Monitoring of Drain Performance
McKee Creek Drain ETR Culvert Replacement[4]	$0.4 M	Monitoring of Drain Performance
Prospect Avenue Drainage Improvements	$2.7 M	Property Acquisition if Required
Mill Street Improvements	$0.3 M	
Maplewood Drive and Sprucewood Avenue Drainage Maintenance	$1.6 M	Monitoring of Drain Performance
Ojibway Parkway Roadside Ditch Maintenance – Broadway Avenue to Morton Drive	$1.7 M	Monitoring of Ditch Performance
Ojibway Parkway Drainage Improvements – Broadway Avenue to Morton Drive	$3.8 M	Functional Design, Property Acquisition if Required
Install Rain Catchers at Low Lying Sanitary Manholes	$0.1 M	
Russell Street Local Drainage Improvements	$2.4 M	Functional Design, Property Acquisition if Required
Morton Avenue Roadside Ditch Maintenance	$0.8 M	Monitoring of Ditch Performance
TOTAL	**$852.1 M**	

Notes:

1. Based on costs presented in the corresponding Environmental Assessment (Stantec, 2019).
2. Based on costs presented in the SCFPMP (Dillon and Aquifor Beech, 2020).
3. Based on costs presented in the corresponding Environmental Assessment (Stantec, 2022).
4. Based on costs presented in the Drainage Report (Landmark, 2022).

Further supporting documentation for the cost estimates is presented in **Appendix H**.

5.6 Triple Bottom Line Assessment

Upon completion of the PIEVC process to identify the medium and high climate and infrastructure risks, the next step is to develop an adaptation evaluation to allow the City to focus on solutions that provide the greatest risk reduction and increases current and future resilience.

Although unusual, the most comprehensive PIEVC Protocol assessments include an additional Triple Bottom Line (TBL) analysis on the various proposed adaptation options. The TBL analysis considers the economic efficacy and the social and environmental benefits and costs of the different alternative adaptation options for the community. The PIEVC TBL is not intended as a substitute or an addition to the risk assessment process, but to ensure that the adaptation recommendations consider their economic, social and environmental implications under current and future climates. The end result should be balanced recommendations that optimize the City's investments without compromising the core purpose of the asset and system. The multi-factored TBL analyses also should incorporate consultation with an appropriate range of stakeholders.

Table 15 depicts a set of economic, social and environmental TBL criteria. The TBL criteria, indicators and scores borrow heavily from and are consistent with the City of Windsor's Sewer and Coastal Flood Protection Master Plan completed in late 2020. These TBL criteria are applied across sub-drainage areas and proposed solutions. While the proposed solutions mainly refer to City actions, they do require a partnership between private property owners and the City since private property improvements are needed to reduce flood risk and to mitigate impacts to the municipal system.

Table 15: Scoring of Adaptation Options using TBL Criteria and Indicators

TBL Ranking Criteria	Methodology and Indicator	Weighting	Comparison Score: 0/5/10			Source of Comparison Data and Comments
			0	5	10	
ECONOMIC						
Cost effectiveness	Projects with lower capital costs impacts taxpayers the least and will require less budget allocation.	2	Cost > $4M	Cost Between $1-4M	Cost/< $1M or Private Property Costs.	Based on 2022 Estimated Project Construction Costs and does not factor inflation.
Asset Risk Rating	Higher priority if asset condition indicates need for refurbishment or replacement.	1	<10% rated as poor condition, acceptable condition or new infrastructure.	10-30% Rated as poor condition	>30% Rated as poor condition	Condition ratings were obtained via the City's Information System as of 2017.
Synergistic implementation, timing with other projects or opportunities (*e.g., Gordie Howe Bridge, Sandwich Street reconstruction, Great Lakes WQA)*	Higher priority and advantages for earlier action if synergistic opportunities support co-funding or achieve similar goals (*e.g., Intl Bridge; GLWQA)*	2	Likely no synergies or opportunities for overlapping funding or receiving support from other projects	Potential for synergies with one other project or potential funding opportunity	Potential for synergy with MORE than one other project or funding is available.	Survey of potential opportunities for synergistic projects.
If solution fails or is not implemented, high replacement costs or extreme challenges if catastrophic failure occurs (e.g., high costs to replace, time without services)	Higher priority for action if high costs or long disruptions could be incurred from catastrophic failure of critical asset (*e.g., Lou Romano WWTP, pumping stations)*	1	Low Reduction	Median Reduction	High Reduction	If solutions are not implemented what is the extent of property damage or failure of 3rd party assets during high river level events.
Ease, cost and complexity of measure's ongoing operations and maintenance.	Higher acceptance for action if ongoing O&M efforts are relatively lower.	2	Poor acceptance of measure, unknown technology and significant number of labour hours for maintenance and operation.	Some training needed. Mid-level number of labour hours for maintenance and operation.	Known technology and minimal labour hours are acceptable.	
Level of Basement Flooding	Higher priority and need for action in areas with greatest basement flooding risks and for solutions that mitigate basement flood risk.	2	Lowest amount of basement flooding risk mitigation by the solution.	Not Used	Highest amount of basement flooding risk mitigation by the solution.	Solutions that will reduce extraneous flows entering the system or will reduce sanitary sewer system hydraulic gradeline levels.
Level of Extent of Surface and Coastal Flooding	Higher priority and need for action in areas with greatest flooding risks associated with high water levels and for solutions that mitigate surface flood risk.	2	Lowest amount of flooding risk mitigated by the solution.	Not Used	Highest amount of flooding risk mitigated by the solution.	Total Area of 1:100 year flood risk being removed.

TBL Ranking Criteria	Methodology and Indicator	Weighting	Comparison Score: 0/5/10			Source of Comparison Data and Comments
			0	5	10	
Access Risk - Level of Risk to Roadways or Railway Crossing	Higher priority and need for action if surface flooding along major arterial roadways impacts for emergency access and continue critical transportation connections.	2	Solution mitigates flooding along Collector roadways.	Solution mitigates flooding along Arterial Roadways	Solution mitigates flooding along Arterial roadways and Railway Corridors – Including critical connections (hospital routes, border access).	Road classifications from the City's Data System (2021).
Public Confidence and City Reputation	Higher priority and need for action if greater population density in area (reflecting potentially displeased citizens)	1	Low Density of homes/businesses within area impacted by potential service disruptions.	Mid Level Density of homes/businesses within area impacted by potential service disruptions.	High Density of homes/businesses within area impacted by potential service disruptions.	High Density = Residential/Urban Areas Mid Level Density = Commercial Developments, Industrial Sites Low Level Density = Vacant and Industrial Sites.
Level of Disruption to Archaeological and Cultural Heritage Resources	Higher priority and need for action in areas with greatest flooding risks associated with high water levels and for solutions that mitigate surface flood risk.	2	Significant impact to Archaeological and Cultural Heritage Resources due to construction excavations and new infrastructure.	Not Used	Minimal impact to Archaeological and Cultural Heritage Resources due to construction excavations and new infrastructure.	Any excavation works along the waterfront areas (high archaeological risks) or construction impacts to private property areas that may contain built heritage features and/or cultural landscapes such as parks, naturalized areas.
ENVIRONMENTAL						
CSO overflows	Higher priority and need for action if solution reduces CSO overflow risks.	2	Lowest reduction of CSO Frequency.	Not Used	Highest reduction of CSO Frequency.	High reduction of CSO events may be attributed to solutions that reduce stormwater inflow or reduces the HGL in the into the sanitary system.
Risk of contaminants reaching Detroit River or other sensitive habitat.	Higher priority and support for action if solution reduces land contamination risks for sensitive habitat and the Great Lakes Area of Concern	2	Does NOT notably reduce contaminant risks.	**Reduces** amount of contaminants from reaching Detroit River or sensitive habitat.	**Prevents** or contains land contaminants from reaching Detroit River or sensitive habitat.	Contaminant risk associated with sewage backup from combined sewer on surface.
Reduces GHG and/or air quality emissions.	Higher priority and support for action if solution offers emission or GHG reductions (e.g. reduces loads on LRWRP, reduced electricity for pumping)	2	May add to GHG emissions (e.g., increased electricity, fossil fuel needs).		Potential for emission reductions.	Qualitative evaluation (e.g., additional electricity, additional LRWRP treatment, etc.)

TBL Ranking Criteria	Methodology and Indicator	Weighting	Comparison Score: 0/5/10			Source of Comparison Data and Comments
			0	5	10	
Human Health and/or Well-Being	Higher priority and support for action if the public can be warned and can take action to reduce their health and safety risks, encourage inclusion and well-being (e.g., shading, parks, recreation).	2	Does not increase public response times to reduce of health and safety risks (e.g., sewer backup, escape from heavy flooding hazards). Does not improve well-being or human health.	Improves at least one of: Increases public response times to reduce health and safety risks; Improves well-being or human health.	Improves two or more of: Increases public response times to reduce health and safety risks; Improves well-being or human health.	Human health is associated with reduction in basement flood risk or reduction of surface flooding. Well being is associated odour nuisance, aesthetics, beneficial uses, well-being and associated human health.

Weighting: Weighting applied to the Score, where 1 indicates that the calculated score is used and 2 indicates a doubling (weighted as a 2).

Assumptions:

(1) Costs effectiveness considers the capital construction costs to implement the recommended solutions within each respective drainage area.

(2) Costs exclude source control, private property measures and/or operation and maintenance costs.

(3) Conditions rating are based on available information provided by the City of Windsor.

Where possible, it will be important to identify opportunities for synergies or overlap with other ongoing projects in the West Windsor region. This includes opportunities for funding or flood risk reduction actions supported through other projects (e.g., Gordie Howe International Bridge stormwater management, LRWRP RTB, road reconstruction projects).

Other projects and funding sources may provide similar opportunities for coordination of timing or implementation of adaptation solutions to reduce the PIEVC identified higher risk assets and regions. In other cases, the Great Lakes Water Quality Agreement may be able to support some work to reduce local and Detroit River contamination risks and habitat creation or protection.

Prior to completing this evaluation and project comparison, there were a number of solutions that were excluded:

- Projects that involve additional monitoring, engineering study or implementation of small-scale works that can more easily be accommodated within the City's operational budget and will depend on climate trends and/or other flood protection initiatives; and
- Improvements to private property areas have been excluded as these improvements must be initiated and maintained by the individual property owners.

Table 16 and **Table 17** summarize those projects.

Table 16: Projects Requiring Monitoring and Operation

Project
Recalibrate Sanitary Service Area Model
Monitoring River Levels
Black Oak Heritage Park - Develop an Emergency Response Plan for Park When Flooded

Table 17: Projects Requiring Private Property Improvements

Project
Russell Street - Private Site Improvements (entrance grading)
Private Solutions to Prevent Surface Flooding from High Water Levels
Private Solutions to Prevent Surface Flooding from Local Flooding
Windsor Biosolids Plant - Site Drainage and Grading Improvements

The detailed TBL assessment is included in **Appendix H**. Based on the total score for each solution, an optional adaptation project list (**Table 18**) has been developed. This list applies priorities to solutions based on the assessment, high, medium and low which shall be used as a reference to assist with the planning and implementation of projects. These results are supplementary to the PIEVC assessment and should be used in tandem to schedule necessary capital projects.

Table 18: Adaptation Options

Solution	Score
High Priority	
Prince Road Trunk Storm Sewer Outfall and Pump Station	140
Install Rain Catchers	140
Install Backflow Prevention at CSOs along Detroit River	135
LRWRP RTB	130
Combined Sewer Separation	120
McKee Creek Drain Maintenance from Detroit River to Sandwich Street	120
Prospect Avenue Drainage Improvements	120
Ojibway Parkway Drainage Improvements	120
Medium Priority	
Install Basement Flood Protection Measures	110
Sandwich Street Drainage Improvements	110
Mill Street Drainage Improvements	110
McKee Park Improvements	110
Detroit Street Trunk Storm Sewer and Outfall	100
Russell Street Local Drainage Improvements	100
Ojibway Parkway - Roadside Ditch Maintenance	90
Low Priority	
McKee Creek Drain Improvements	85
Brock Street - Inspect Shoreline/Outfall Condition and Local Repair Plan	85
Maplewood Drive and Sprucewood Avenue Drainage Maintenance	80
Morton Avenue Drainage Improvements	80
Maplewood Drive Sanitary Pump Station Monitoring	40

6.0 Recommendations and Conclusions (PIEVC Step 5)

The following sections summarize the next steps and recommendations to reduce climate change vulnerability in the Study Area.

6.1 Class EA Implications

A high-level screening was completed to identify future Class Environmental Assessment (EA) implications based on the recommended flood mitigation measures. Anticipated Class EA Schedules were selected based on Municipal Engineers Association (MEA) guidance. A brief summary is provided in the following table.

Table 18: Class EA Requirements

Project	Anticipated EA Schedule	Notes
Prospect Avenue Improvements	A	Assumes that no land acquisition is required and that the outlet works will be coordinated with the LRWRP RTB design.
Ojibway Parkway Roadside Ditch Maintenance – Broadway Avenue to Morton Drive	A	Surface drainage services existing municipal road.
McKee Creek Drain Improvements (Clearing and Grubbing)	N/A	Works regulated under the *Drainage Act* are exempt under the *Ontario EA Act.*
Install Rain Catchers	A	Modification to an existing sewage collection system.
Detroit Street Trunk Outfall	B	Based on MEA guidance, this could be interpreted as a Schedule A project, since the existing outfall is located in an existing road allowance and utility corridor. However, given the likely technical challenges and potential impacts of the proposed works, a Schedule B undertaking is recommended, consistent with the SCFPMP recommendations.
Install Backflow Prevention at CSOs along Detroit River	A	Modification to an existing sewage collection system. Assumes that no land acquisition is required.
Morton Avenue Drainage Improvements	A	Surface drainage services existing municipal road.
Russell Street Drainage Improvements	B	Additional property will likely be required for improvements to the drainage system.
Sprucewood Avenue and Maplewood Drive Drainage Improvements	N/A	Works regulated under the *Drainage Act* are exempt under the *Ontario EA Act.*
Mill Street	A	Reconstructed for the same use, capacity, and at the same location.
McKee Creek Drain Improvements (ETR Culvert Replacement)	N/A	Works regulated under the *Drainage Act* are exempt under the *Ontario EA Act.*
Combined sewer separation	A+	Establish a sewage collection system to an existing sewage outlet. Assumes that no land acquisition is required.

6.2 Implementation Plan

An implementation plan was developed based on the results of the TBL and the anticipated timelines of previously identified projects. A summary of the recommended implementation plan for the proposed solutions is provided in the following table.

Table 19: Solution Implementation Summary

Timing	Project	Notes
Short Term	Lou Romano Retention Treatment Basin	EA has been completed. Design to begin in 2023.
	Prospect Avenue Improvements	Outlet for proposed Prospect Avenue pump station and drainage improvements recommended to be coordinated with the Lou Romano Retention Treatment Basin outlet design.
	Sandwich Street Improvements	Drainage strategy recommended to be coordinated with the Lou Romano Retention Treatment Basin and Prospect Avenue Improvements.
	Prince Road Trunk Storm Sewer Outfall	EA completed in 2022.
	Ojibway Parkway Roadside Ditch Maintenance	Complete ditch maintenance and monitor drainage system performance.
	McKee Park Improvements	Incorporate flood mitigation measures into proposed park improvement design.
	McKee Creek Drain Improvements	Clear and grub drain from Sandwich Street to Detroit River.
	Install Rain Catchers	Field verify MH lid elevations. Include in current implementation plan under East Windsor MH seals installation.
Medium Term	Detroit Street Trunk Outfall	EA will be required. Completion of the outfall works will permit separation of the upstream combined sewer system.
	Combined Sewer Outlet Protection	Install backflow prevention measures concurrent with other sewer rehabilitation projects.
	Morton Avenue Drainage Improvements	Complete drainage assessment to evaluate need for additional improvements.
	Russell Street Drainage Improvements	Develop drainage strategy for proposed improvements.
	Sprucewood Avenue and Maplewood Drive Drainage Improvements	Develop drainage strategy for proposed improvements.
	Mill Street	Raise profile of west limit of Mill Street.
Long Term	Combined Sewer Separation	To be completed concurrent with other servicing and transportation projects.
	McKee Creek Drain Improvements	Replace ETR bridge. To be completed in accordance with the *Drainage Act.*

6.3 Recommendations

The following comments and recommendations were developed based on the results of the PIEVC assessment:

- Design of the LRWRP RTB should be coordinated with the proposed Sandwich Street and Prospect Avenue improvements. Opportunities to coordinate the proposed RTB outlet and the proposed Prospect Avenue pumping station outlet designs should be evaluated;
- A functional drainage analysis for the Prospect Avenue improvements should be completed to identify the proposed pumping station capacity and design requirements;
- The feasibility of completing a soft separation of the combined sewer on Russell Street south of Hill Avenue in conjunction with the construction of the proposed Prince Road pump station and outfall should be considered;
- A monitoring plan to evaluate the performance of the roadside ditches on Ojibway Parkway, Morton Avenue, Sprucewood Avenue, and Maplewood Drive should be developed;
- A functional drainage analysis of the Russell Street Drainage system should be completed to identify specific system improvements;
- Permanent physical flood protection measures implemented on shoreline properties will require ERCA approval through a permit in accordance with Section 28 of the Conservation Authorities Act;
- The existing Brock Street storm sewer outfall should be inspected to document its condition and capacity;
- A traffic study should be completed to identify alternate truck route if temporary closure of Russell Street at Chappell Avenue is required during periods of extreme river levels; and
- Prepare an emergency response plan for Black Oak Heritage Park and McKee Park to manage these facilities during periods of extreme river levels.

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Figures

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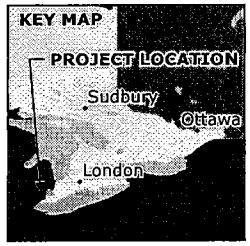
WEST WINDSOR
FLOOD RISK STUDY

STUDY AREA
FIGURE 1

- Study Area
- Lou Romano WRP
- Railway
- Utility Line
- Watercourse
- Municipal Boundary
- Provinically Significant Wetland
- Water Body
- Wooded Area
- Riverside Drive Interceptor Sewer



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MAP CREATED BY: LMM
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PROJECT: 21-2409
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WEST WINDSOR

FLOOD RISK STUDY

STUDY AREA ZONES

FIGURE 2

- Study Area

Zone (Land Area)

- Zone 1 (205 ha)
- Zone 2 (252 ha)
- Zone 3 (385 ha)
- Railway
- Utility Line
- Watercourse

SCALE 1:30,000

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WEST WINDSOR

FLOOD RISK STUDY

NOAA FORT WAYNE GAUGE LOCATION

FIGURE 3

- NOAA Fort Wayne Gauge Location
- Study Area
- Zone 1
- Zone 2
- Zone 3
- Railway
- Utility Line
- Watercourse

SCALE 1:30,000

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WEST WINDSOR

FLOOD RISK STUDY

EXISTING SYSTEM PERFORMANCE (1:5 YEAR STORM AND 1:100 YEAR DETROIT RIVER WATER LEVEL)

FIGURE 4

- Combined Manhole
- Sanitary Manhole
- Storm Manhole
- Combined - Surcharged
- Sanitary - Surcharged
- Storm - Surcharged
- Surface Ponding >0.3m
- Study Area
- Lou Romano WRP
- Railway
- Utility Line
- Watercourse

SCALE 1:30,000

0 400 800 1,600 m

N W E S

MAP DRAWING INFORMATION:
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DATE: 2022-12-23

WEST WINDSOR

FLOOD RISK STUDY

EXISTING SYSTEM PERFORMANCE (1:100 YEAR STORM AND 1:100 YEAR DETROIT RIVER WATER LEVEL)

FIGURE 5

- Combined Manhole
- Sanitary Manhole
- Storm Manhole
- Surface Ponding >0.3m
- Study Area
- Lou Romano WRP
- Railway
- Utility Line
- Watercourse

SCALE 1:30,000

0 400 800 1,600 m

MAP DRAWING INFORMATION:
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MAP CREATED BY: LMM
MAP CHECKED BY: NE
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STATUS: FINAL
DATE: 2022-12-23

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WEST WINDSOR

FLOOD RISK STUDY

EXISTING SYSTEM PERFORMANCE (1:5 YEAR STORM AND 1:100 YEAR CLIMATE CHANGE DETROIT RIVER WATER LEVEL)

FIGURE 6

- Combined Manhole
- Sanitary Manhole
- Storm Manhole
- Combined - Surcharged
- Sanitary - Surcharged
- Storm - Surcharged
- Surface Ponding >0.3m
- Study Area
- Lou Romano WRP
- Railway
- Utility Line
- Watercourse

SCALE 1:30,000

0 400 800 1,600 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS)

MAP CREATED BY: LMH
MAP CHECKED BY: NE
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

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STATUS: FINAL
DATE: 2022-12-23

WEST WINDSOR

FLOOD RISK STUDY

EXISTING SYSTEM PERFORMANCE (1:100 YEAR STORM AND 1:100 YEAR CLIMATE CHANGE DETROIT RIVER WATER LEVEL)

FIGURE 7

- Combined Manhole
- Sanitary Manhole
- Storm Manhole
- Surface Ponding >0.3m
- Study Area
- Lou Romano WRP
- Railway
- Utility Line
- Watercourse

SCALE 1:30,000

0 400 800 1,600 m

MAP DRAWING INFORMATION:
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WEST WINDSOR

FLOOD RISK STUDY

COASTAL FLOODING LOCATIONS - KEY PLAN

FIGURE 8

- Study Area
- Page Extent
- Lou Romano WRP
- 100-year Climate Change Water Level (176.3 m)
- Railway
- Utility Line
- Watercourse
- Municipal Boundary
- Water Body
- Areas Below 176.3m

SCALE 1:30,000

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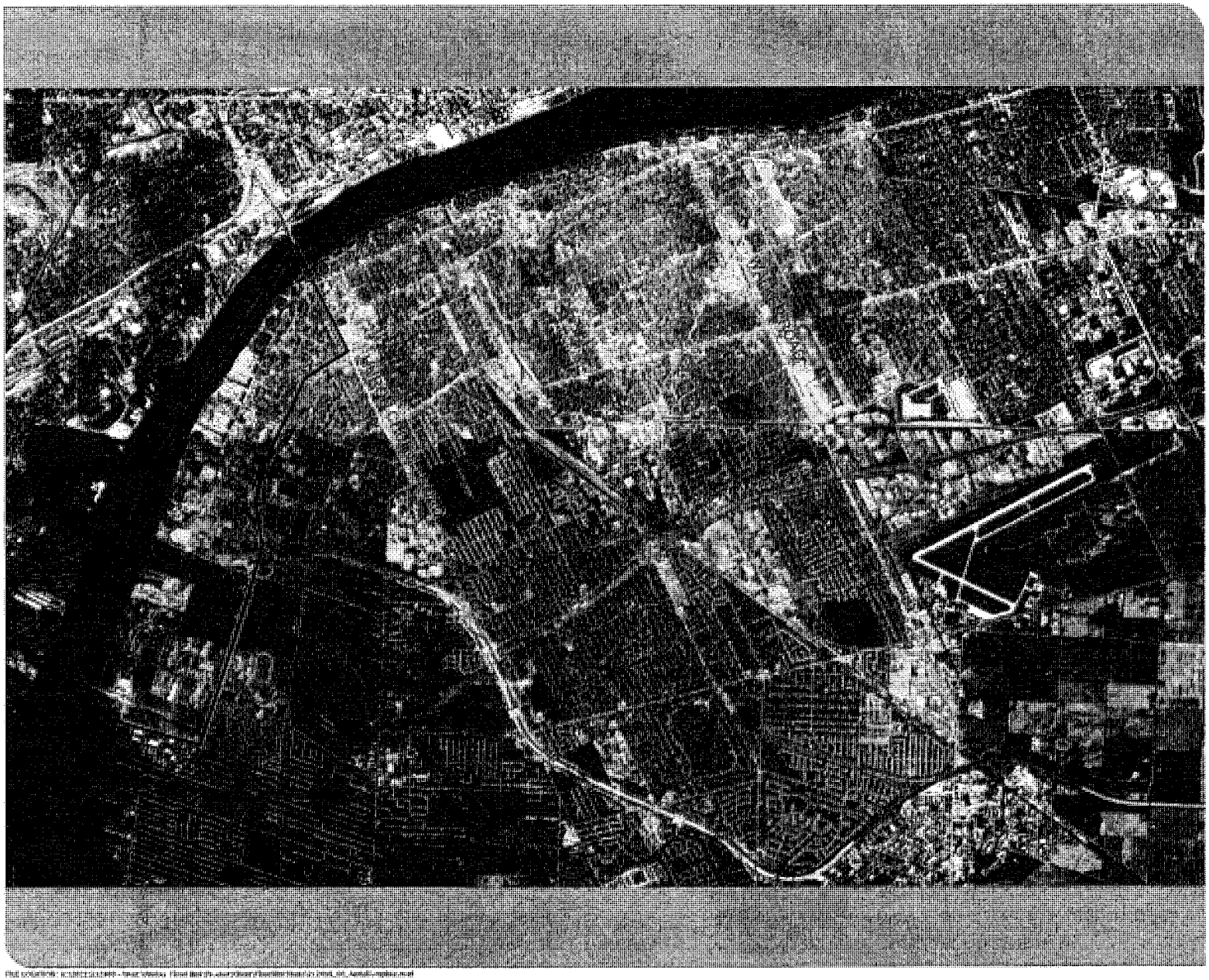

WEST WINDSOR
FLOOD RISK STUDY

COMBINED SEWER OUTLET PROTECTION
FIGURE 14

- LRWRP Service Area
- CSO Location
- Trunk Sanitary Sewer
- Study Area Boundary

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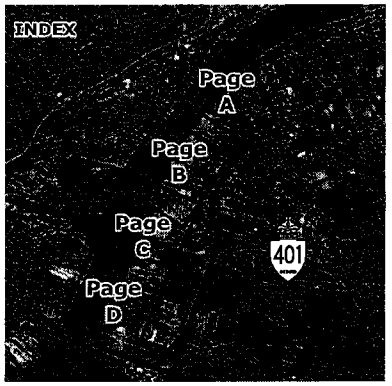
WEST WINDSOR

FLOOD RISK STUDY

COASTAL FLOODING LOCATIONS

FIGURE 8-A

- Study Area
- 100-year Climate Change Water Level (176.3 m)
- Railway
- Areas Below 176.3m



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0 95 190 380 m

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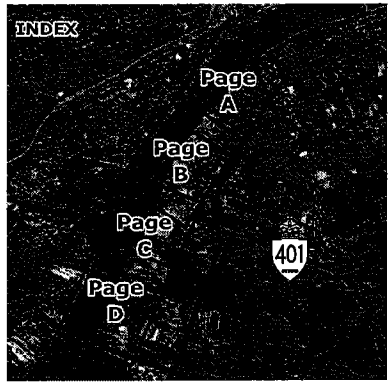
WEST WINDSOR
FLOOD RISK STUDY

COASTAL FLOODING LOCATIONS
FIGURE 8-B

- Study Area
- Lou Romano WRP
- 100-year Climate Change Water Level (176.3 m)
- Railway
- Water Body
- Watercourse
- Areas Below 176.3m



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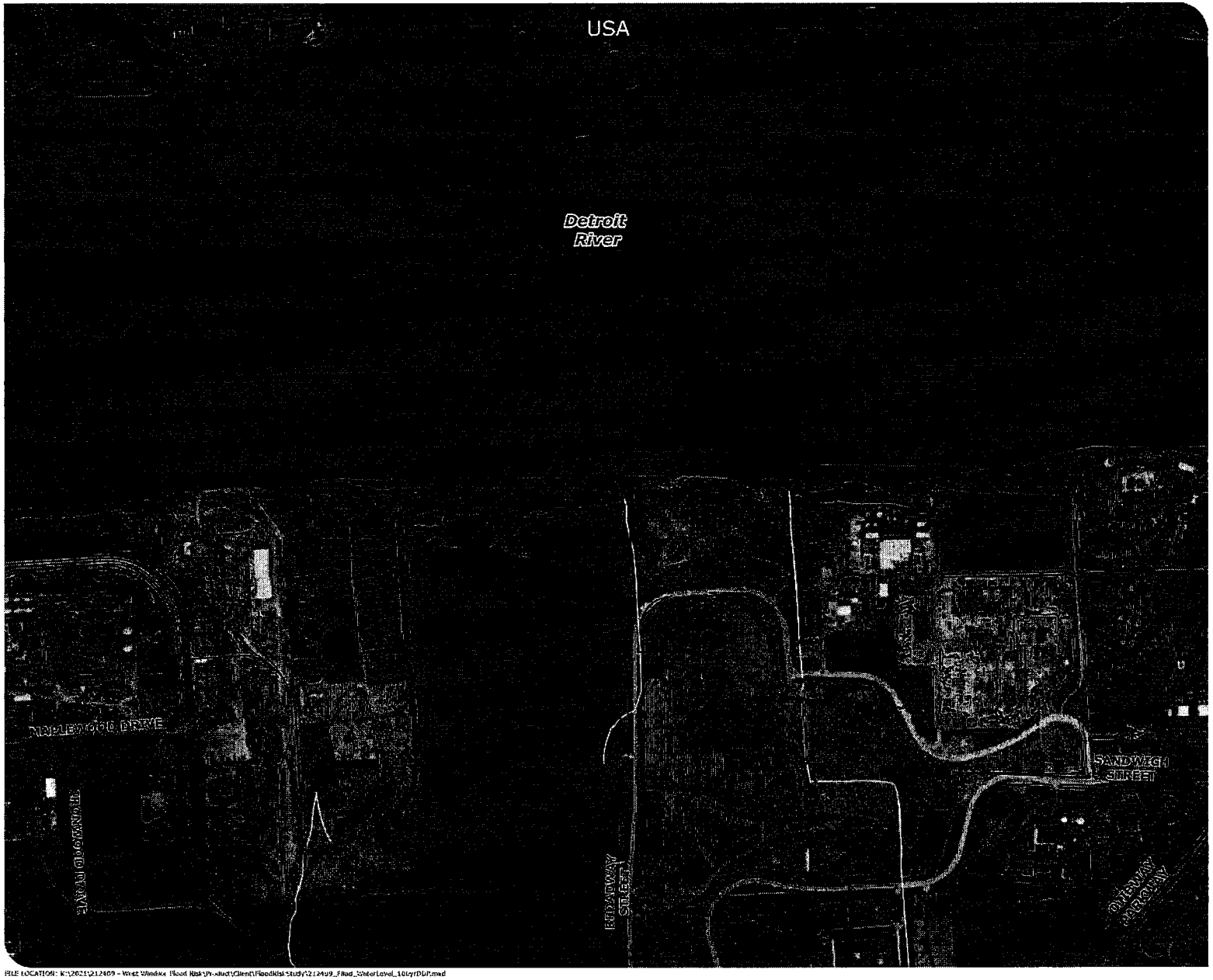

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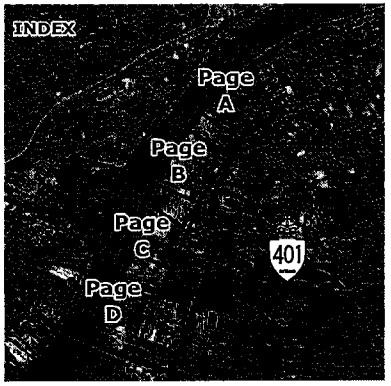
WEST WINDSOR

FLOOD RISK STUDY

COASTAL FLOODING LOCATIONS

FIGURE 8-C

- Study Area
- Lou Romano WRP
- 100-year Climate Change Water Level (176.3 m)
- Railway
- Watercourse
- Areas Below 176.3m



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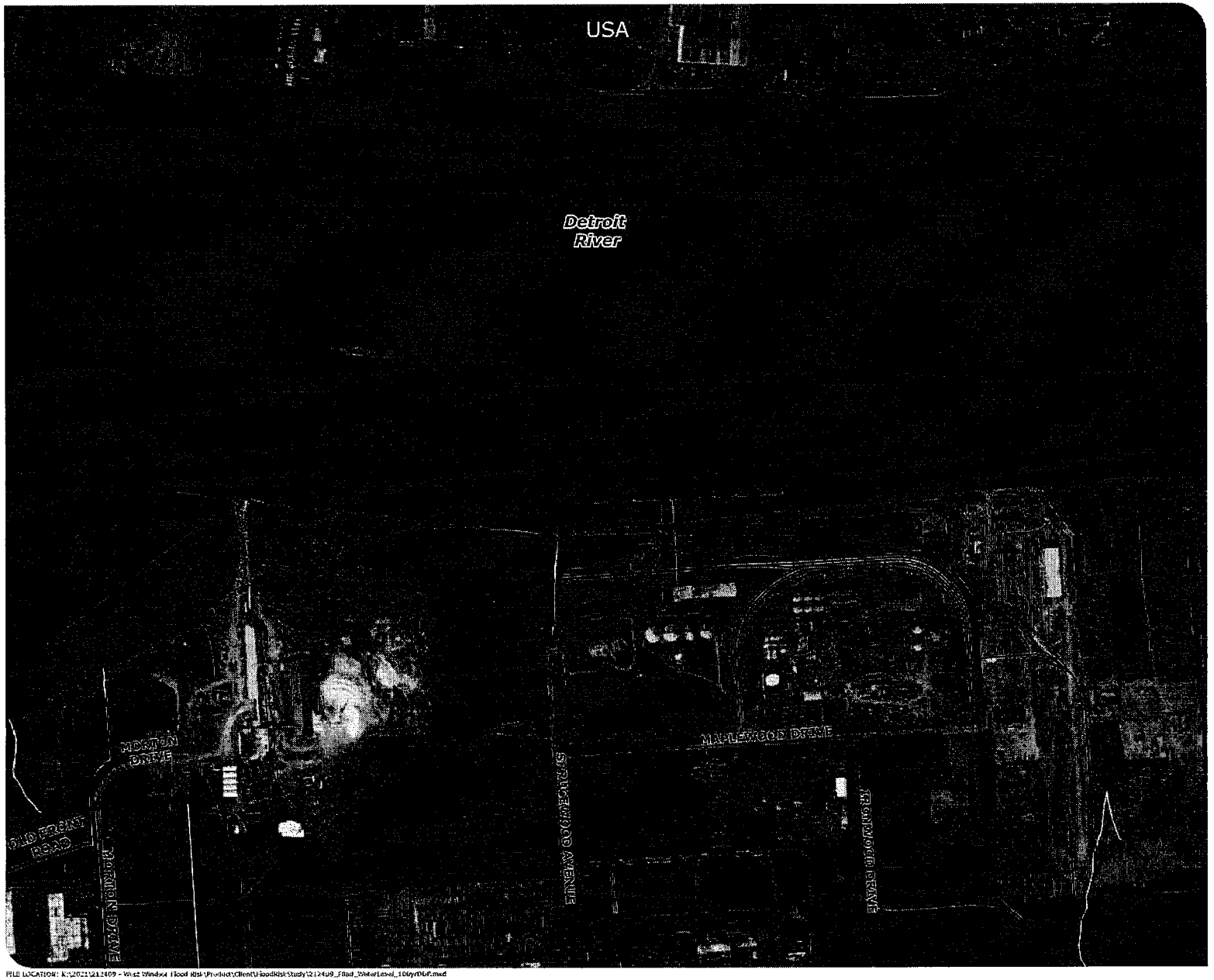

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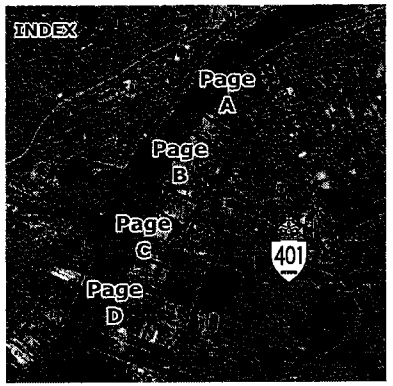
WEST WINDSOR

FLOOD RISK STUDY

COASTAL FLOODING LOCATIONS

FIGURE 8-D

- Study Area
- 100-year Climate Change Water Level (176.3 m)
- Railway
- Watercourse
- Areas Below 176.3m



SCALE 1:7,000

0 95 190 380 m

MAP DRAWING INFORMATION:
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MAP CHECKED BY: NE
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

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STATUS: FINAL
DATE: 2022-12-23

WEST WINDSOR

FLOOD RISK STUDY

MILL STREET COASTAL FLOOD MITIGATION

FIGURE 9

- Existing Combined Sewer
- Existing Sanitary Sewer
- Existing Storm Sewer
- Approximate Limits of Proposed Road Improvements

SCALE 1:1,000

0 12.5 25 50 m

N W E S

MAP DRAWING INFORMATION:
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MAP CREATED BY: LMM
MAP CHECKED BY: KE
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

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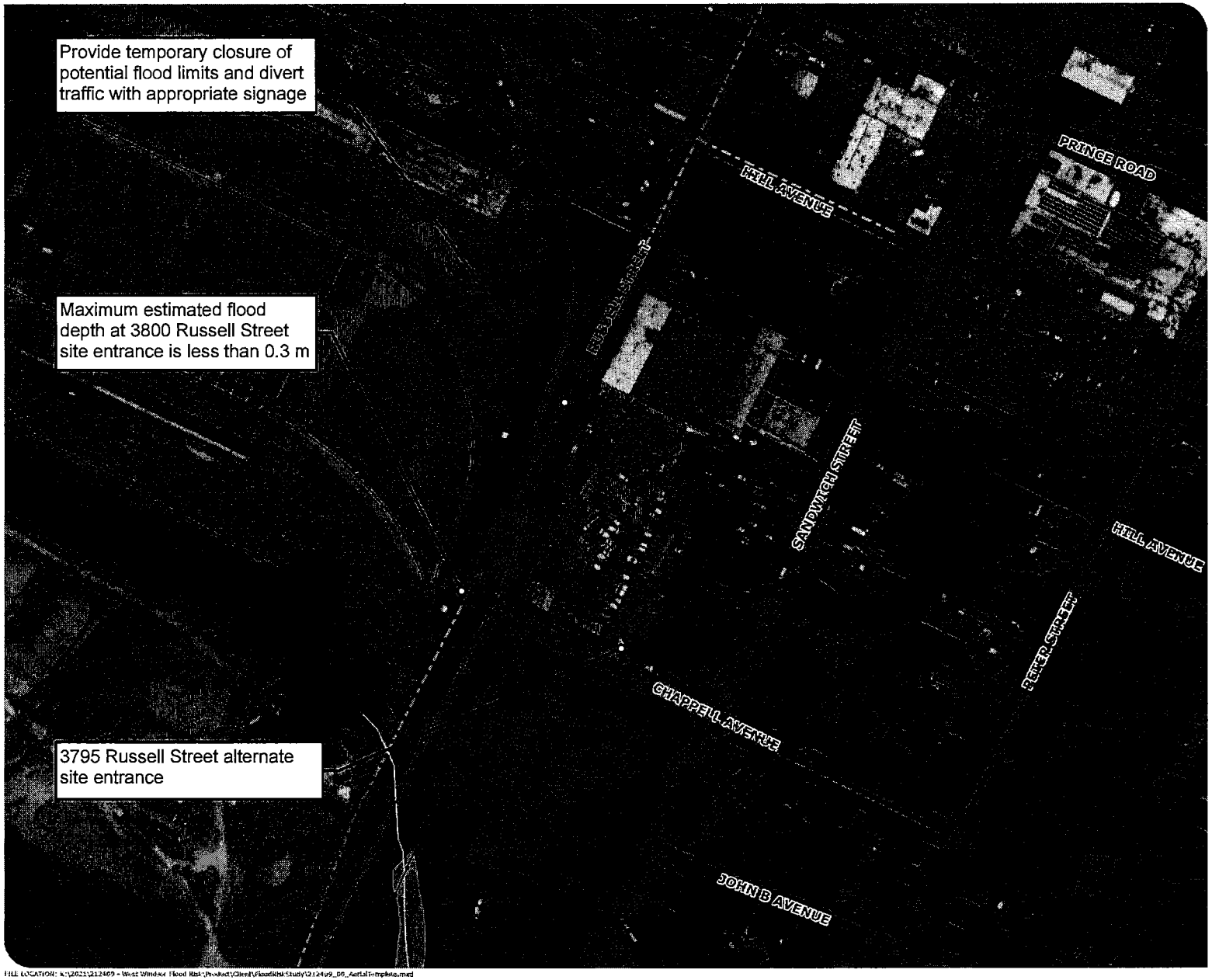

WEST WINDSOR

FLOOD RISK STUDY

RUSSELL STREET AT CHAPPELL AVENUE COASTAL FLOOD MITIGATION

FIGURE 10

- Existing Combined Sewer
- Existing Sanitary Sewer
- Existing Storm Sewer
- Approximate Limits of Potential Coastal Flooding in ROW (176.3 m)

SCALE 1:2,000

0 25 50 100 m

MAP DRAWING INFORMATION:
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MAP CREATED BY: LMM
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MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 21-2409
STATUS: FINAL
DATE: 2022-12-23

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FILE LOCATION: K:\21\21-2409 - West Windsor Flood Risk\Products\Client\FloodRisk Study\21-2409_09_AerialT-mplate.mxd

WEST WINDSOR

FLOOD RISK STUDY

PROSPECT AVENUE COASTAL FLOOD MITIGATION

FIGURE 11

- Existing Combined Sewer
- Existing Sanitary Sewer
- Existing Storm Sewer
- Proposed LRWRP RTB Outlet
- Approximate Limits of Proposed Drainage Improvements
- Proposed Sandwich Street Storm Sewer

SCALE 1:2,000

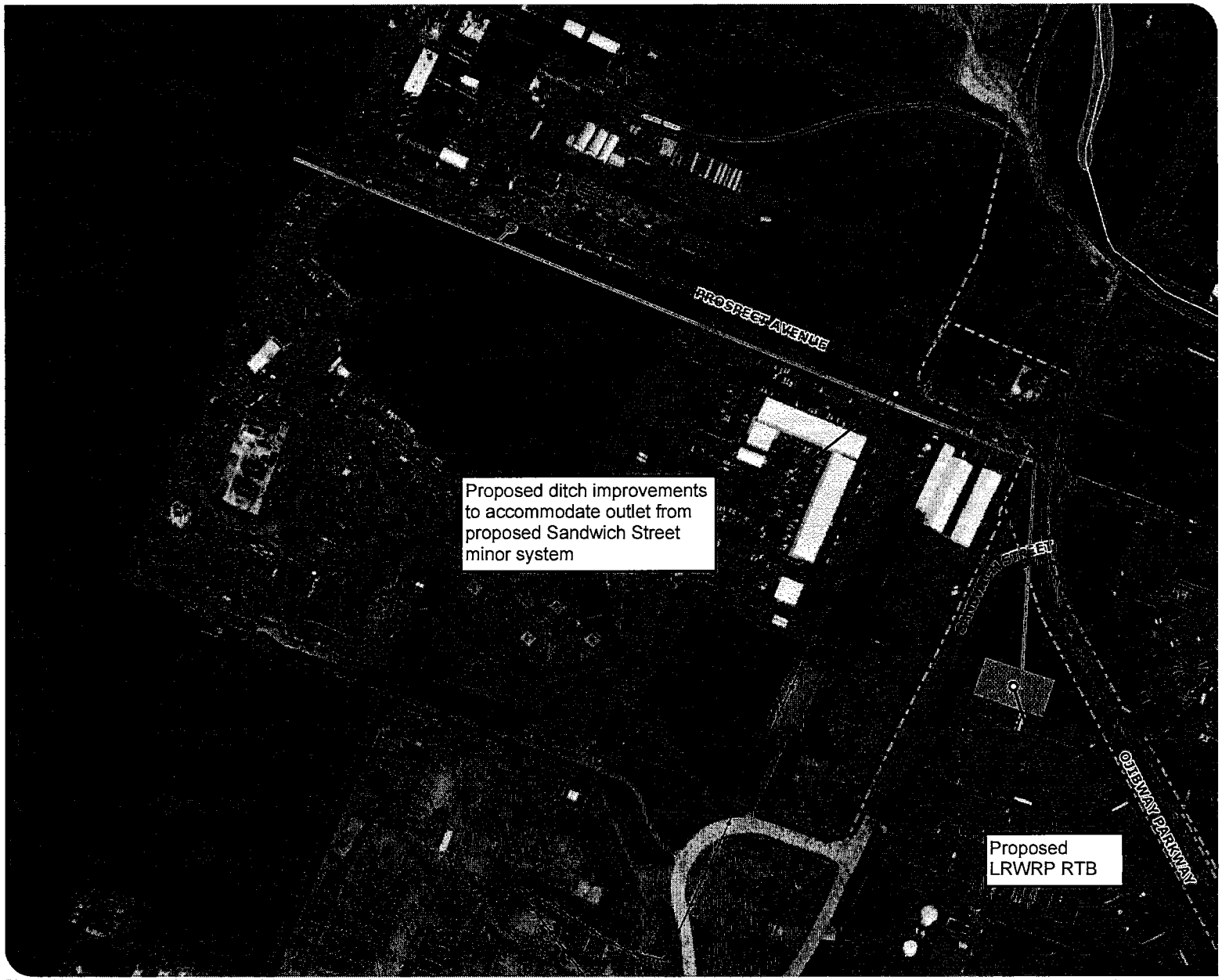
0 25 50 100 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI Imagery BaseMap

MAP CREATED BY: LMM
MAP CHECKED BY: NE
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 21-2409
STATUS: FINAL
DATE: 2022-12-23



WEST WINDSOR

FLOOD RISK STUDY

SANDWICH STREET COASTAL FLOOD MITIGATION

FIGURE 12

- Existing Combined Sewer
- Existing Sanitary Sewer
- Existing Storm Sewer
- Proposed LRWRP RTB Outlet
- Approximate Limits of Proposed Drainage Improvements
- Proposed Sandwich Street Storm Sewer

SCALE 1:3,000

0 40 80 160 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI Imagery BaseMap

MAP CREATED BY: LHM
MAP CHECKED BY: ME
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 21-2409
STATUS: FINAL
DATE: 2022-12-23

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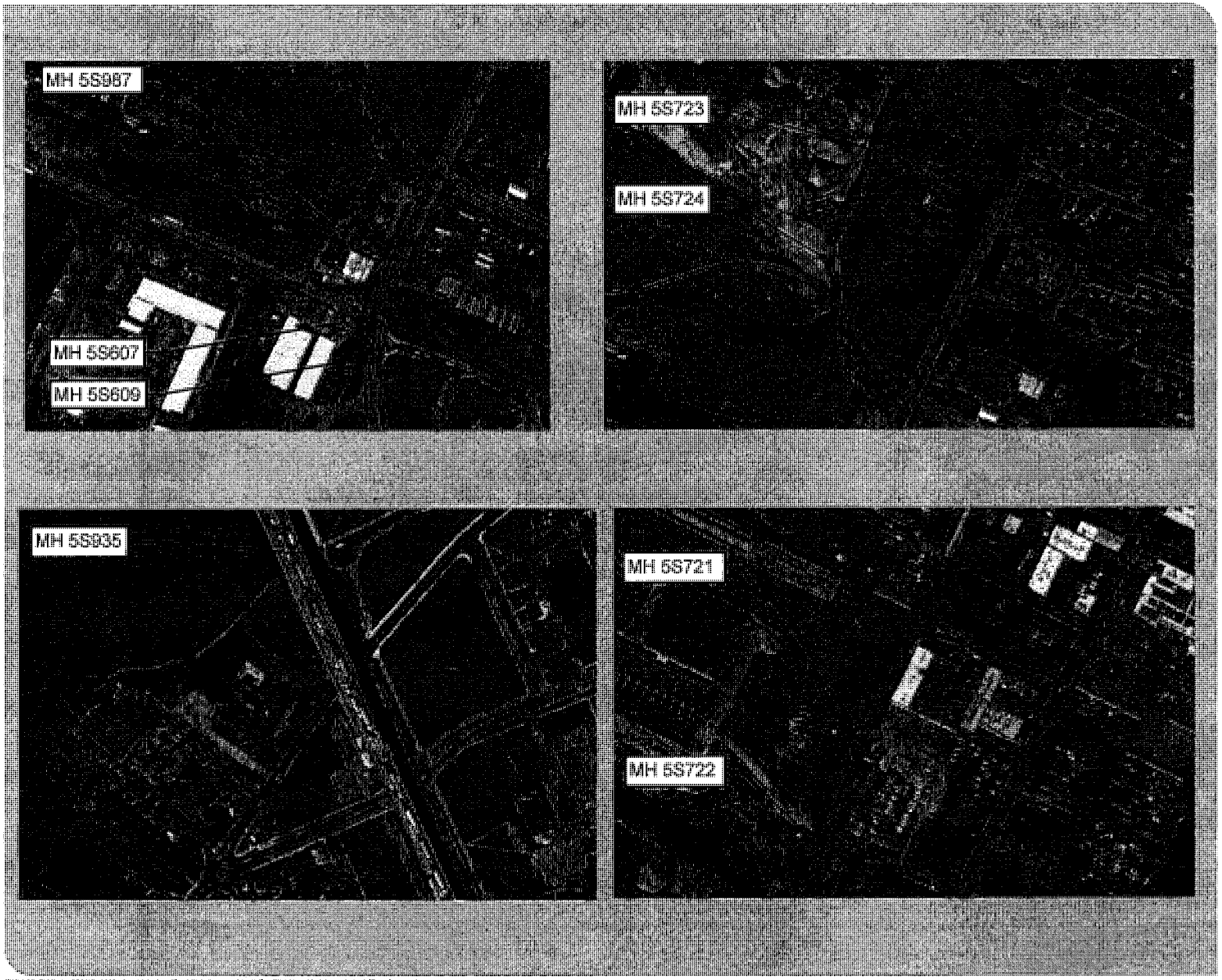

WEST WINDSOR

FLOOD RISK STUDY

PROPOSED RAIN CATCHER LOCATIONS

FIGURE 13

- Existing Sanitary Sewer Maintenance Hole

N
W E
S

MAP CREATED BY: LMM
MAP CHECKED BY: NE
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 21-2409
STATUS: FINAL
DATE: 2022-12-23

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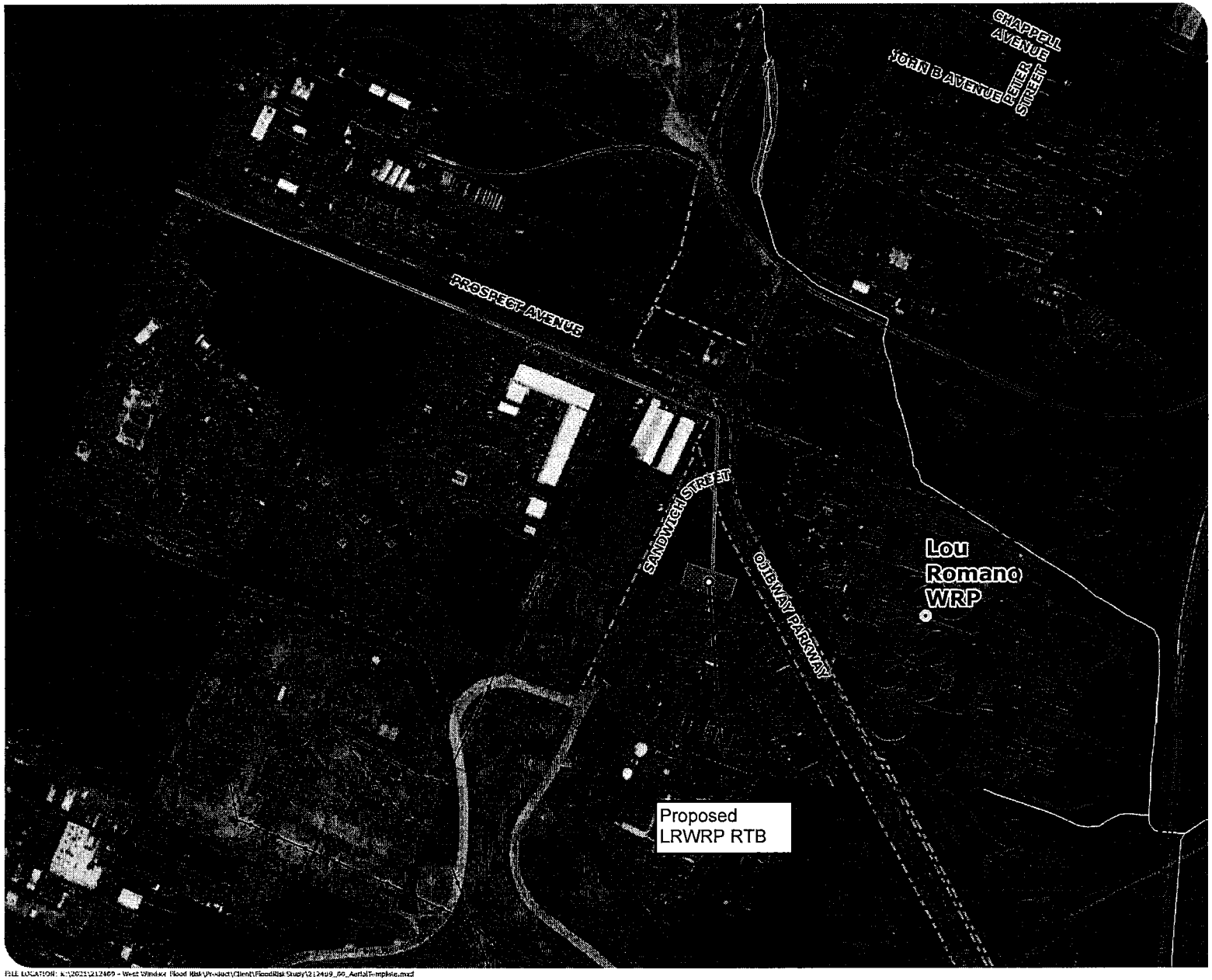

WEST WINDSOR

FLOOD RISK STUDY

LOU ROMANO RETENTION TREATMENT BASIN

FIGURE 15

- Existing Combined Sewer
- Existing Sanitary Sewer
- Existing Storm Sewer
- Proposed LRWRP RTB Outlet

SCALE 1:4,000

0 55 110 220 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI Imagery BaseMap

MAP CREATED BY: LMM
MAP CHECKED BY: ME
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 21-2409
STATUS: FINAL
DATE: 2022-12-23

FILE LOCATION: K:\2021\212409 - West Windsor Flood Risk\Project\Client\FloodRisk Study\212409_00_AerialTemplate.mxd

WEST WINDSOR

FLOOD RISK STUDY

PRINCE ROAD TRUNK STORM SEWER OUTLET AND PUMP STATION

FIGURE 16

- Existing Combined Sewer
- Existing Sanitary Sewer
- Existing Storm Sewer
- Proposed Storm Sewer

SCALE 1:2,000

0 25 50 100 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI Imagery BaseMap

MAP CREATED BY: MM
MAP CHECKED BY: NE
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 21-2409
STATUS: FINAL
DATE: 2022-12-23

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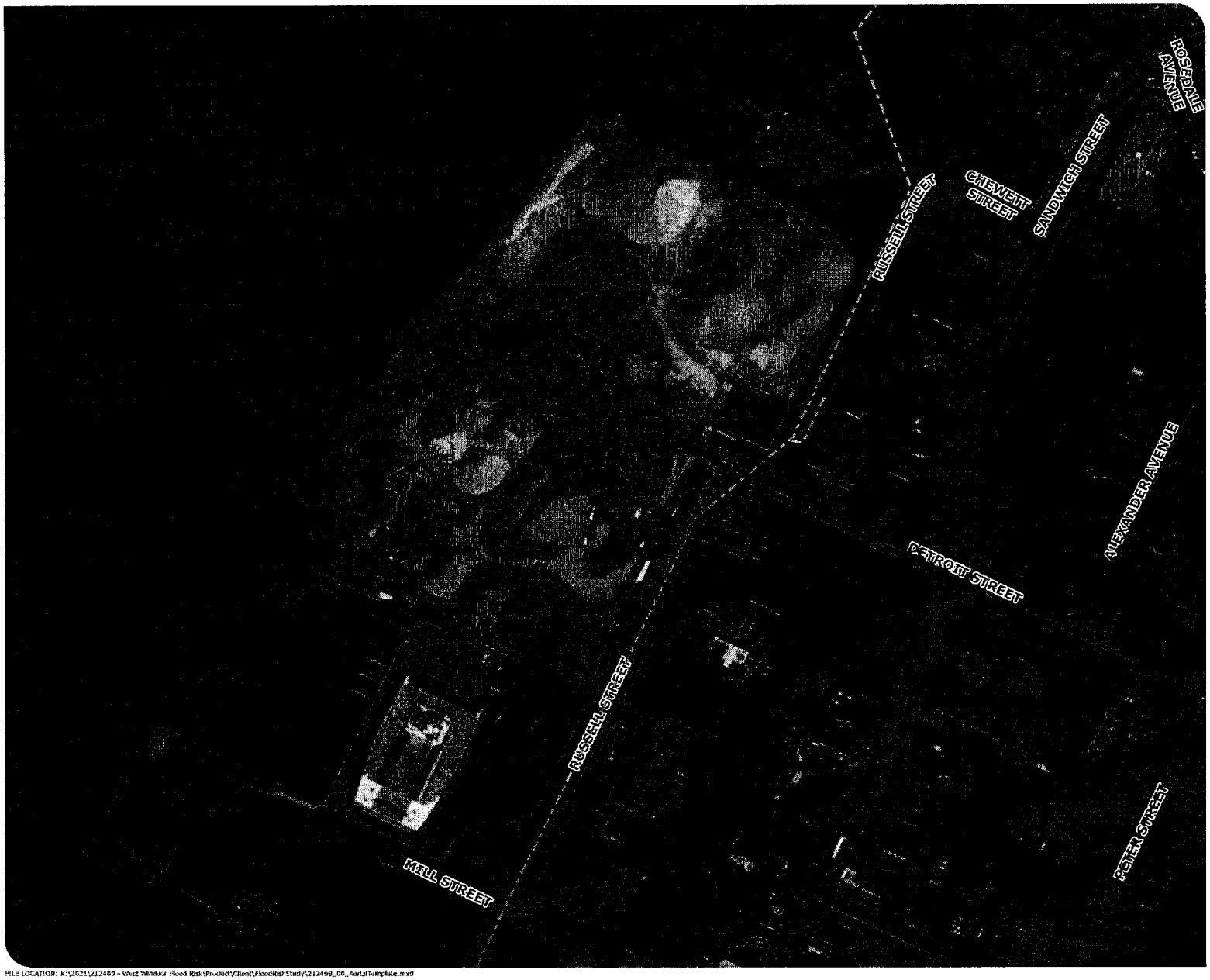

WEST WINDSOR
FLOOD RISK STUDY

DETROIT STREET TRUNK OUTFALL

FIGURE 17

- Existing Combined Sewer
- Existing Sanitary Sewer
- Existing Storm Sewer
- Proposed Storm Sewer

SCALE 1:2,000

0 25 50 100 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI Imagery BaseMap

MAP CREATED BY: LMM
MAP CHECKED BY: ME
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 21-2409
STATUS: FINAL
DATE: 2022-12-23

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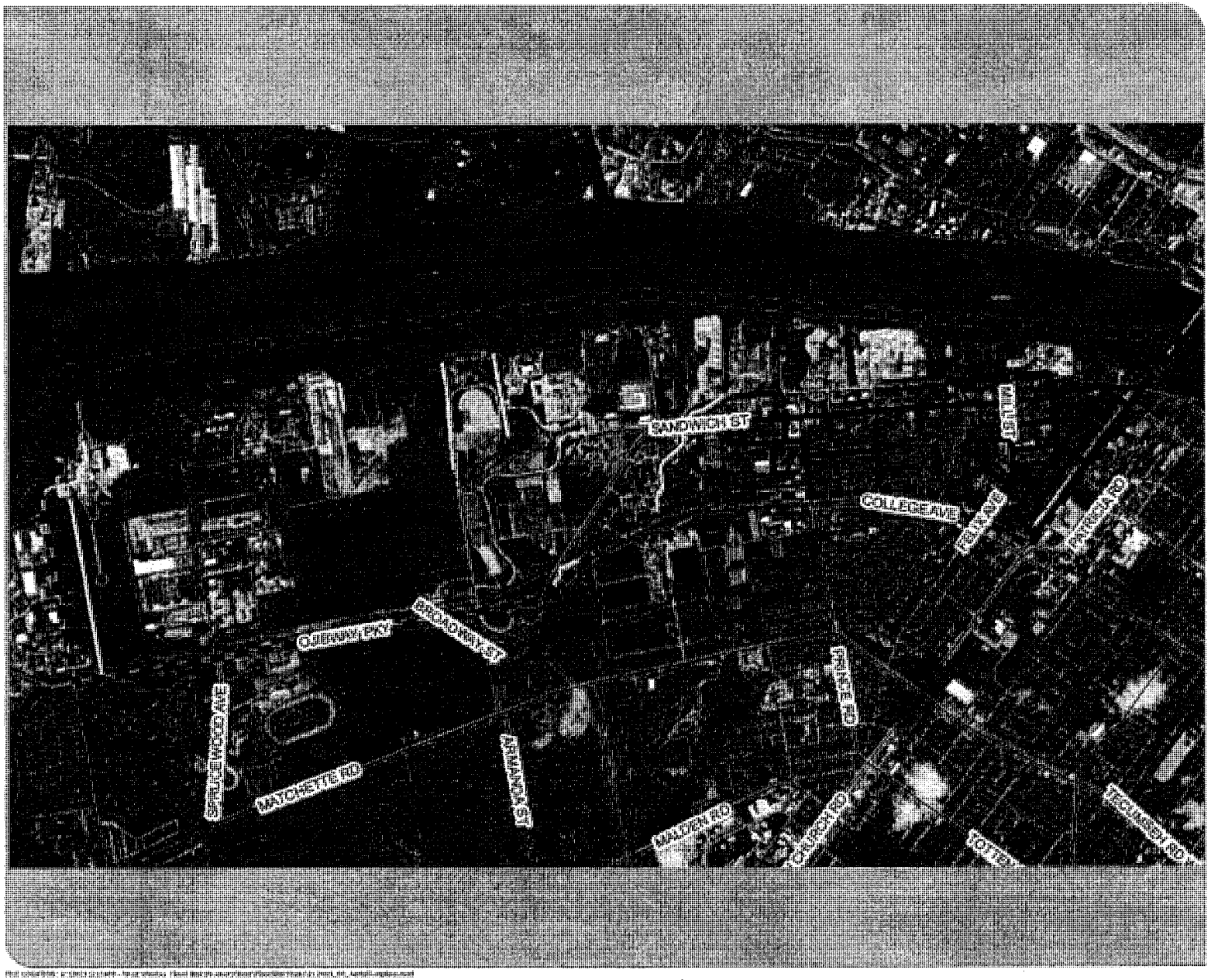


WEST WINDSOR

FLOOD RISK STUDY

EXISTING COMBINED SEWER LOCATIONS

FIGURE 18

Existing Combined Sewer

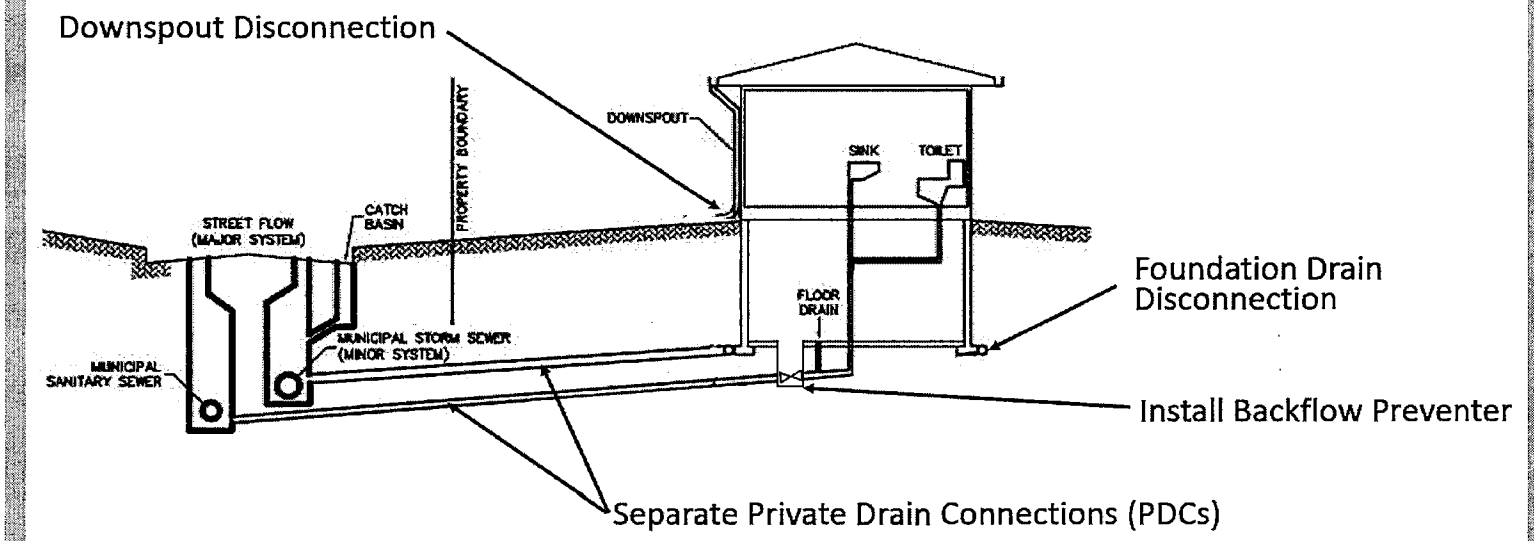
MAP CREATED BY: NE
MAP CHECKED BY: NE
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 21-2409
STATUS: FINAL
DATE: 2022-12-23

WEST WINDSOR
FLOOD RISK STUDY

BASEMENT FLOOD MITIGATION MEASURES
FIGURE 19



MAP CREATED BY: ME
MAP CHECKED BY: ME
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 21-2409
STATUS: FINAL
DATE: 2022-12-23

FILE LOCATION: K:\2021\212409 - West Windsor Flood Risk\Product\Client\FloodRiskStudy\212409_09_AerialT-mplete.mxd

WEST WINDSOR

FLOOD RISK STUDY

MORTON AVENUE LOCAL DRAINAGE IMPROVEMENTS

FIGURE 20

- Existing Sanitary Sewer
- Railway
- Watercourse
- Provinically Significant Wetland
- Approximate Limits of Proposed Drainage Improvements

SCALE 1:4,000

0 55 110 220 m

N W E S

MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI Imagery BaseMap

MAP CREATED BY: LHH
MAP CHECKED BY: RE
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 21-2409
STATUS: FINAL
DATE: 2022-12-23

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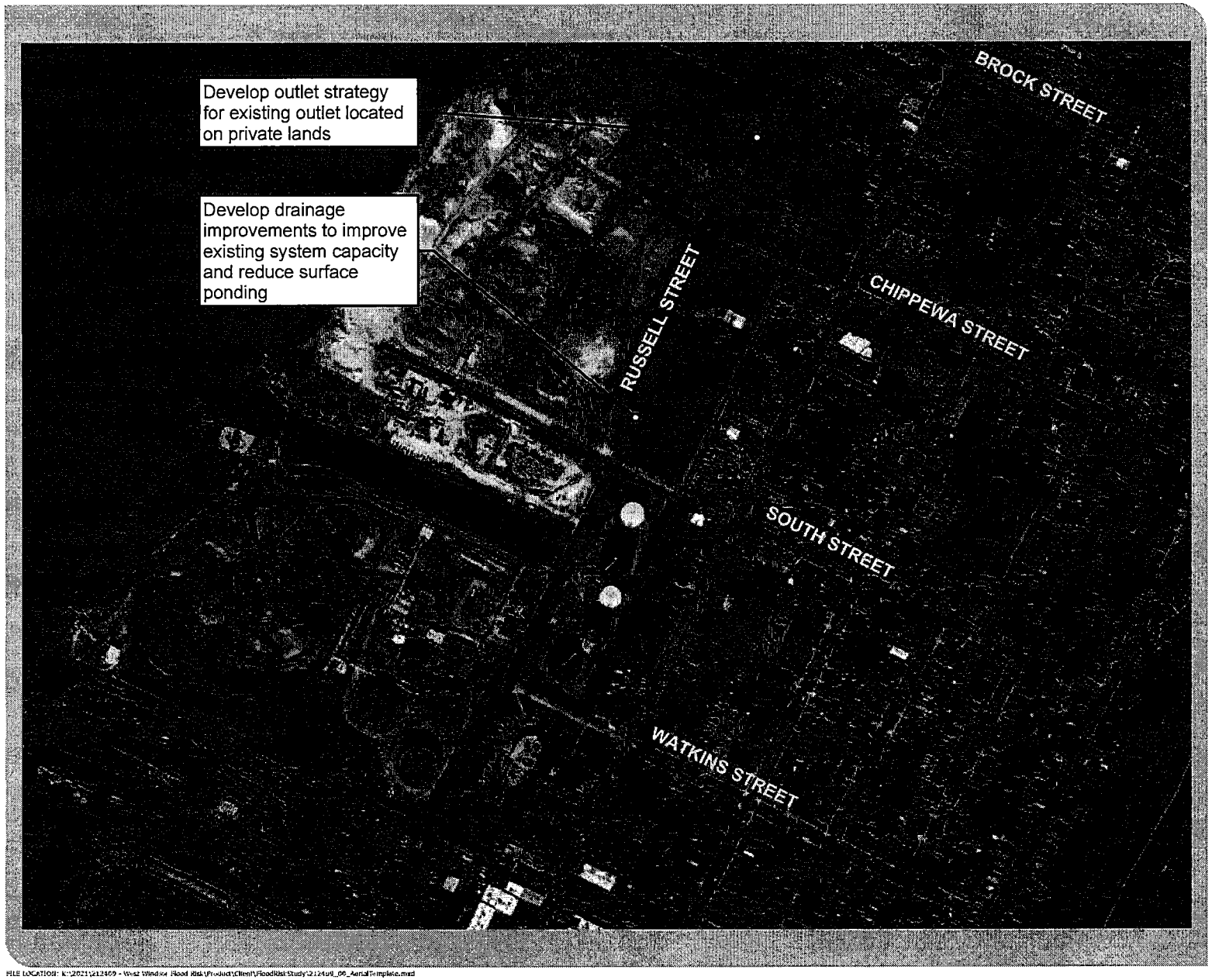

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WEST WINDSOR

FLOOD RISK STUDY

RUSSELL STREET DRAINAGE IMPROVEMENTS

FIGURE 21

Approximate Limits of Proposed Drainage Improvements

N
W E
S

MAP CREATED BY: NE
MAP CHECKED BY: NE
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 21-2409
STATUS: FINAL
DATE: 2022-12-23

FILE LOCATION: K:\26211\21-2409 - West Windsor Flood Risk\Product\Client\FloodRiskStudy\21-2409_09_AerialTemplate.mxd

WEST WINDSOR
FLOOD RISK STUDY

OJIBWAY PARKWAY LOCAL DRAINAGE IMPROVEMENTS
FIGURE 22

- Existing Sanitary Sewer
- Existing Storm Sewer
- Railway
- Utility Line
- Watercourse
- Provinically Significant Wetland
- Approximate Limits of Proposed Drainage Improvements

SCALE 1:9,000

0 120 240 480 m

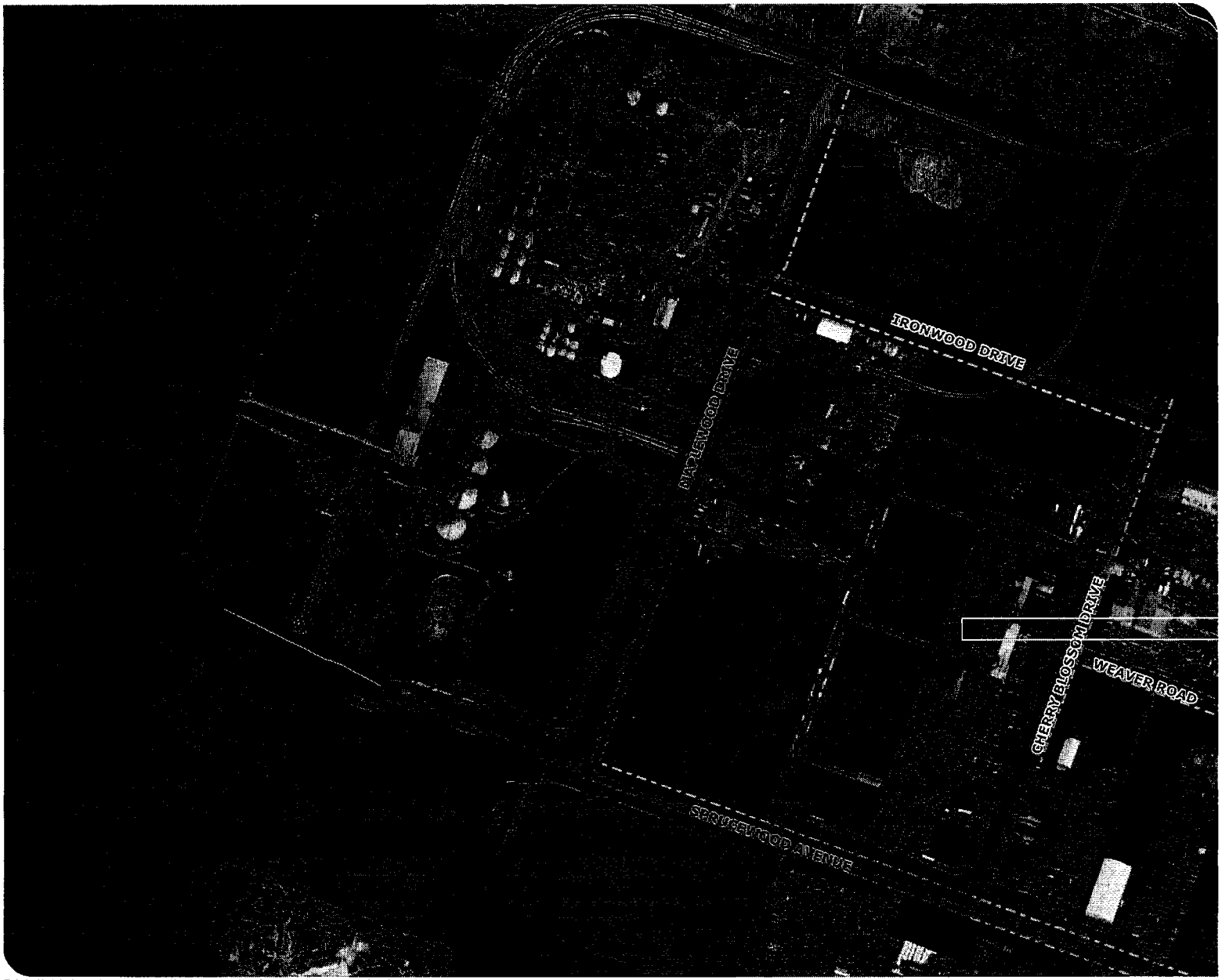
N W E S

MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI Imagery BaseMap

MAP CREATED BY: LHH
MAP CHECKED BY: ME
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 21-2409
STATUS: FINAL
DATE: 2022-12-23



WEST WINDSOR
FLOOD RISK STUDY

SPRUCEWOOD AVENUE AND MAPLEWOOD AVENUE LOCAL
FIGURE 23

- Existing Sanitary Sewer
- Existing Storm Sewer
- Railway
- Watercourse
- Provinically Significant Wetland
- Approximate Limits of Proposed Drainage Improvements

SCALE 1:4,000

0 55 110 220 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI Imagery BaseMap

MAP CREATED BY: LMM
MAP CHECKED BY: NE
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 21-2409
STATUS: FINAL
DATE: 2022-12-23

FILE LOCATION: K:\2021\212409 - West Windsor Flood Risk\Project\Client\FloodRisk\Study\212409_00_AerialT-mpltsle.mxd

WEST WINDSOR

FLOOD RISK STUDY

MCKEE CREEK DRAIN IMPROVEMENTS

FIGURE 24

- Existing Combined Sewer
- Existing Sanitary Sewer
- Existing Storm Sewer
- Railway
- Utility Line
- Watercourse
- Approximate Limits of Proposed Drainage Improvements

SCALE 1:2,000

0 25 50 100 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI Imagery BaseMap

MAP CREATED BY: LMM
MAP CHECKED BY: RE
MAP PROJECTION: NAD 1983 CSRS UTM Zone 17N

DILLON CONSULTING

PROJECT: 21-2409
STATUS: FINAL
DATE: 2022-12-23

FILE LOCATION: K:\2021\212409 - West Windsor Flood Risk\Product\Client\FloodRisk Study\212409_09_AerialTemplate.mxd

Appendix A

PIEVC Protocol Worksheets

Appendix A – PIEVC Protocol Worksheets

1. Worksheet Step 1 – Project Definition
2. Worksheet Step 2 – Data Gathering and Sufficiency
3. Worksheet Step 3 – Risk Assessment
4. Worksheet Step 4 – Engineering Analysis
5. Worksheet Step 5 – Recommendations and Conclusions

PIEVC Engineering Protocol

For

Infrastructure Vulnerability Assessment and Adaptation to a Changing Climate

Worksheet Step 1

Project Definition

Revision 1.1

Effective March 30, 2020, the PIEVC Program is operated jointly by the Institute for

Catastrophic Loss Reduction (ICLR), the Climate Risk Institute (CRI), and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

For further information about this ***Engineering Protocol*** or the ***PIEVC Program*** please contact ICLR.

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(416) 364-8677 Ext. 3212

Instructions

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Complete Every Field

To ensure complete coverage of the Protocol steps, when completed, the practitioner should have entered a response in every field of this worksheet.

Document Tasks That Do Not Apply

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- Enter **N/A** in the relevant field of this worksheet and
- Provide rational for the decision in the comments field of the task.

Document Tasks That Are Omitted

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Protocol for Changing Climate Infrastructure Vulnerability Assessment

Practitioners are strongly cautioned to avoid the following common pitfalls in executing a vulnerability assessment based on the Protocol.

i. ***Skipping Protocol tasks***.

Although it is acceptable to select to not execute a particular task, the practitioner should nonetheless evaluate the question posed by that task and document the basis for the decision.

ii. Using previous case study reports as a template for the analysis.

Although previous studies provide an excellent reference, the application of the Protocol is highly specific to infrastructure. Applying previous case studies as a template can often lead the practitioner to miss key factors that contribute to the overall risk profile of the infrastructure.

iii. Using the worksheets without reference to the Protocol.

Although the worksheets parallel the Protocol, they do not provide supplementary context that may be necessary to correctly address the specified Protocol task.

1 Step 1 – Project Definition

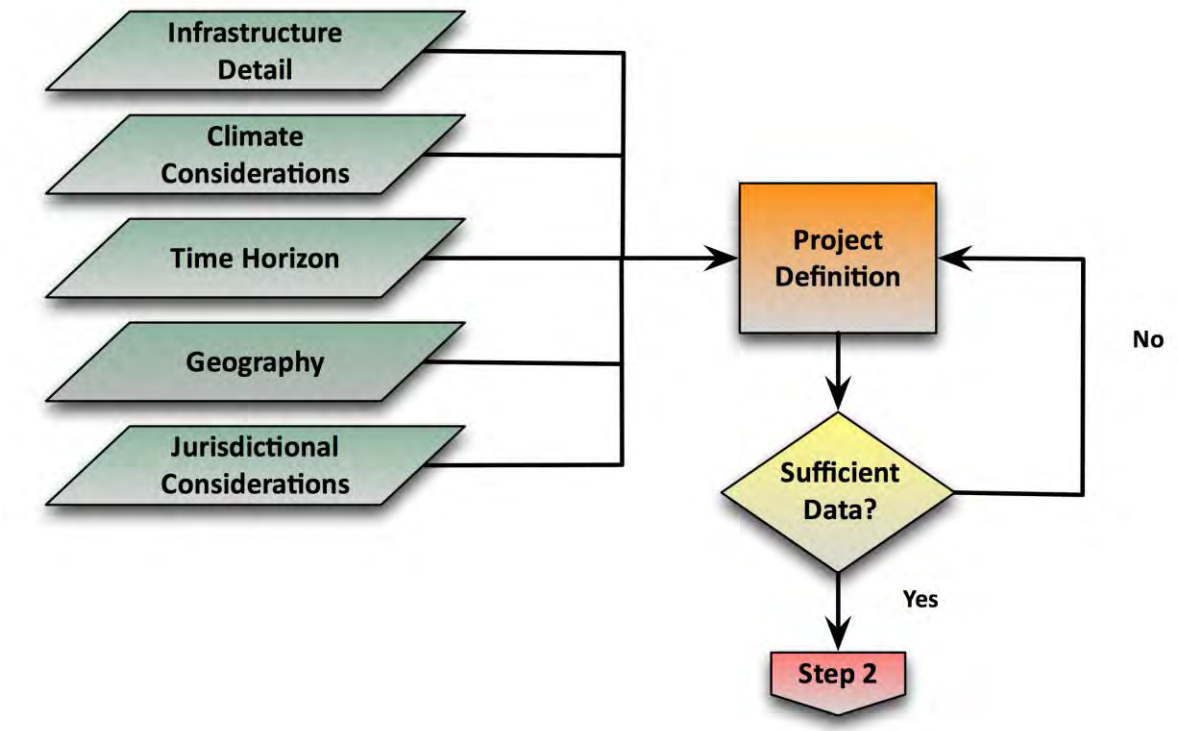
In this step the practitioner will define the global project parameters and boundary conditions for the engineering vulnerability assessment. This step will define:

- Which infrastructure is being assessed;
- Its location;
- Climatic, geographic considerations; and
- Uses of the infrastructure.

This is the first step of narrowing the focus to allow efficient data acquisition and vulnerability assessment.

The process flowchart for Step 1 of the Protocol is presented in **Figure 1**.

Figure 1: Step 1 – Project Definition Process Flowchart



1.1 Prepare Step 1 Worksheet

	Enter ***Yes*** or ***No***	
a. Use this ***Worksheet***; or	Yes	
b. Prepare practitioner specific documentation. i. Practitioner specific documentation ***MUST*** detail each task outlined in this step of the Protocol.		
Comments and Observations Additional documentation also provided in the main Assessment Report, including Triple Bottom Line solutions costing and benefits.		

1.2 Identify the Infrastructure

a. Choose the infrastructure to be evaluated for changing climate vulnerability.	Storm water infrastructure (pump stations), sewage infrastructure (sewers, catch basins, and backflow preventers), drainage infrastructure, storage infrastructure, sanitary and combined sewer infrastructure, storm sewer infrastructure. Public and private Infrastructure
b. Provide a general description of the infrastructure.	Basic and physical systems and services that are needed in order for the waste and storm water and for transportations systems to function properly
c. Reference additional background and detailed information sources.	Asset listing excel and master plan reports, as references in the main Assessment Report and in subsequent worksheets.
Comments and Observations More detailed infrastructure systems details found in worksheets and main report.	

1.3 Identify Climate Parameters

a. State the climate parameters that will be considered in the evaluation.

Add rows as necessary.

i. Based on professional judgement, identify which climate trends and weather events may contribute to infrastructure vulnerability.
• Extreme rainfall – extreme 4 hour rainfall at 5 and 100 year return periods
• Extreme wind gusts
• Heavy snowfall accumulations, snowmelt + rainfall events
• Tornado frequencies
• Regionally extreme ice storms
• Weathering via freeze-thaw processes – annual, frequencies above threshold numbers
• Extreme High Water Level (100 year climate change potential HWL)
• Weathering: Freeze Thaw Cycles annually; frequency of at least 30 freeze-thaw cycles
• Extreme heat events, if relevant to assets
ii. Based on professional judgement, identify which climatic trends and/or weather events may *combine* to create infrastructure vulnerability.
• Current High Water Level + wave action (freeboard)
• Combination events: Current High water levels (100 year HWL) + minor event rainfalls (5 year return period)
• Combination events: Current High water levels (100 year HWL) + major event rainfalls (100 year return period)
• Combination events: Extreme High water levels (100 year climate change potential HWL) + major event rainfalls (100 year return period)
• Combination events: Extreme High water levels (100 year climate change potential HWL) + minor event rainfalls (5 year return period)
• Combination events: Extreme High water levels (100 year climate change potential HWL) + major event rainfalls (100 year return period)

1.4 Identify the Time Horizon

a. Define the period over which the infrastructure must operate and for	Baseline or Current, 2050s and 2080s

which climate trends will be projected for the engineering vulnerability assessment.	
Comments and Observations N/A	

1.5 *Identify the Geography*

Add rows as necessary.

a. Summarize site-specific, local, and/or geographical features relevant to the evaluation.
• Located on the south bank of Detroit River
• The topography of this area is mostly flat without significant change in slopes. The area lies within Little River, Turkey Creek and Detroit River watersheds
• The majority of Windsor consists of clay soils, which have low infiltration rates
• Within the city, the two major wastewater treatment plants are: (1) Lou Romano Water Reclamation Plant (LRWRP) and (2) Little River Pollution Control Plant (LRPCP)
• The main receiving water courses that influence flood relief solutions include: Detroit River, Little River, Grand Marais Drain, Lennon Drain and Cahill Drain
• The West Windsor study area is divided into three specific zones that account for similarities in climate, hydrology, land use and river influences : (1) Zone 1 “inland” residential, institutional and industrial; (2) Zone 2 shoreline industrial; and (3) Zone 3 industrial and parkland
b. Provide references.
• Appendix D - Technical Volume 1: Sewer Model Development & Existing Conditions, Sewer and Coastal Flood Protection Master Plan Report
• Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) Soil distribution
Comments and Observations

1.6 *Identify Jurisdictional Considerations*

Add rows as necessary.

a. List the jurisdictions, laws, regulations, guidelines and administrative processes that are applicable to the infrastructure. • **1995 National Marine Policy** - laid out a detailed framework for Canada’s marine transportation system.
• **1998 Canada Marine Act** (S.C. 1998, c. 10) – created 17 ports, designated others a public ports, gave Minister of Transport certain authorities
• **Section 10 of the Rivers and Harbours Act of 1899** (33 U.S.C. 403) - U.S.

federal jurisdiction applies to projects affecting federal navigation works
• **Section 404 of the Clean Water Act** (33 U.S.C. 1344) - U.S. federal jurisdiction applies to projects affecting federal navigation works
• **Natural Resources Environmental Protection Act** - This statute is divided into numerous parts, which address many of the different and complex components of resource management and environmental protection
• **Section 33 Fisheries Act (**R.S.C., 1985, c. F-14) - Projects affecting levels and flows in Canadian waters come under federal aegis through federal responsibilities for fisheries
• **Navigable Waters Protection Act** (R.S.C., 1985, c. N-22) - Projects affecting levels and flows in Canadian waters come under federal aegis through federal responsibilities for fisheries
• **Canadian Environmental Assessment Act of 1995** (S.C. 2012, c. 19, s. 52)
• **Public Lands Act (R.S.O. 1990, c. P.43)** - Provincial control is exercised through the Ontario Ministry of Natural Resources and its Public Lands Act and Lakes and Rivers Improvement Act
• **Rivers Improvement Act** (R.S.O. 1990, c. L.3) - Provincial control is exercised through the Ontario Ministry of Natural Resources and its Public Lands Act and Lakes and Rivers Improvement Act
• **Emergency Management and Civil Protection Act** (R.S.O. 1990, c. E.9) – enables emergency response plans
• **Conservation Authorities Act (**R.S.O. 1990, c. C.27) - Control has also been delegated to the local level through the Conservation Authorities Act
• **By-Law No. 1** Harbour Fees and Cargo Rates - effective May 1, 2019 - a By-Law fixing the fees to be paid to enter or use the Port of Windsor
• **By-Law No. 2** Wharfage Rates - effective May 1, 2019 - a By-Law fixing the fees to be paid in respect of Wharfage
• **Boundary Waters Treaty of 1909**
• **Canada Coast Guard and WPA Memorandum of Understanding**
• **St. Clair and Detroit River Navigation Safety Regulations (SOR/84-335)**
• **Port Authorities Operations Regulations (SOR/2000-55)**
• **Port Authorities Management Regulations (SOR/99-101)**
• **Marine Transportation Security Regulations (SOR/2004-144)**
• **Port of Windsor Practices and Procedures**
• **Federation of Canadian Municipalities (FCM)**
• **Canadian Society of Civil Engineers (CSCE),**
• **Canadian Public Works Association (CPWA)**
• **Canadian Construction Association (CCA)**
b. Provide references.
• City of Windsor – Corporate Asset Management Plan, July 16, 2019

- *See main report for various climate study references*

Comments and Observations

1.7 Site Visit

a. Conduct a site visit.

If Site Visit Not Conducted – Explain Why and Provide Supporting Information

COVID-19 restrictions limited site visits for much of the study period. Several of the team members are located in Windsor and provided needed site and regional information. As well, many of the assets and sites were investigated when various Dillon team members developed a 2020 City of Windsor Sewer and Coastal Flood Master Plan Report. The Dillon Project Manager also undertook a personal site visit.

b. Based on information gathered to date, conduct interviews with facility owners and operating personnel in order to field-test and validate initial project definition findings.

Notes and Observations from Interviews

Several online interviews were arranged, including discussions with: City Parks; Wastewater operators including manager; ENWIN Utilities Ltd who manage the electricity distribution system and Water Utilities Commission services for the City of Windsor; Windsor Port Authority; other City of Windsor employees (see next paragraph).

Note: Several workshops and many discussions were undertaken with stakeholders to discuss approach, preliminary findings, interim and final results and solution options. Stakeholders in discussions included City of Windsor staff (≥ 10 members) as well as police, Conservation Authority, Windsor Port Authority, County of Essex, etc.

c. Examine infrastructure and local geographical features as they may apply to the vulnerability assessment.

See an attached list of critical assets approved by City of Windsor for risk assessment.

Notes and Observations from Infrastructure Examination

i. Note key observations and areas for follow-up in subsequent assessment steps.

Key Observations • Threshold criteria established based on interview results, forensic investigation of past high impact events, hydraulic and hydrological modelling results (calibrated as best possible for events and against elevations and locations) and approved by City . • See attached Tailored Thresholds Severity Scale and see Main Report for summaries of key observations and subsequent forensic investigations of events.
Additional Comments and Observations N/A

1.8 Assess Data Sufficiency

Review the data set developed in **Sections 1.1 through 1.7**.

Add rows as necessary.

a. Where assumptions are proposed for the assessment, identify these as such and provide a rationale for their use.

Assumption	**Rationale**
Nil	N/A
Very few assumptions were required for this assessment since the assets and their conditions were relatively well known in developing the 2020 Sewer Master Plan. The climate data was available from the Windsor International airport with climatologically representative measurements and since calibrated hydrology and hydraulic modelling was available for integration with the climate analyses. Climate change projections were based on peer-reviewed literature and studies and, as needed, from ensemble climate change projections based on the IPCC AR5 models.	

b. Document where there is insufficient information currently available to proceed with an element of the assessment.

See section (a) above. This study was a comprehensive PIEVC assessments that included significant and comprehensive hydrology and hydraulic modelling support, previous asset condition information and was complemented with a full costing and evaluation of risk reduction solutions, benefits and environmental impacts via a Triple Bottom Line assessment.

Insufficient Information	i. Where there is insufficient information currently available, identify a process to develop or infill that data.	ii. Where data cannot be developed, identify the data gap as a finding in Step 5 of the Protocol – Recommendations.
Projections for future lake levels were conflicting. A recent flooding risk assessment of assets just north of this study area indicated that the lake level results from a 2011 study used in that risk assessment required review and updating, particularly in light of the extreme low and high levels of the past decade.	Projections of Great Lake and connecting river levels are exceedingly complex and conflicting. A comprehensive literature review of all Great Lake level studies was undertaken to update the earlier PIEVC assessment for nearby region. Additional study results were added to the earlier 2011 lake level projections under future climate conditions.	The earlier suggested lake level increases based on a previous PIEVC study (i.e. based on a 2011 study) were modified to indicate that future lake levels could not be projected with confidence, that the previous projected lake levels likely were high compared to more recent studies and climate change projections and that lake levels were likely to remain highly variable.
Further information is needed on river ice conditions, impacts of ice jams on river water levels (relatively short-lived) and on shoreline erosion risk locations.	Databases would need to be developed on historical river ice conditions and erosion impacts for the shorelines of interest. Relatively to other risks, this would require significant efforts.	See main report and PIEVC sheet #2.

Worksheet Step 1 – Project Definition

Date:	November 15, 2022
Prepared by:	Simon Eng and Heather Auld

PIEVC Engineering Protocol

For

Infrastructure Vulnerability Assessment and Adaptation to a Changing Climate

Worksheet Step 2

Data Gathering and Sufficiency

Revision 1.1

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M5C 2R9

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2 Step 2 – Data Gathering and Sufficiency

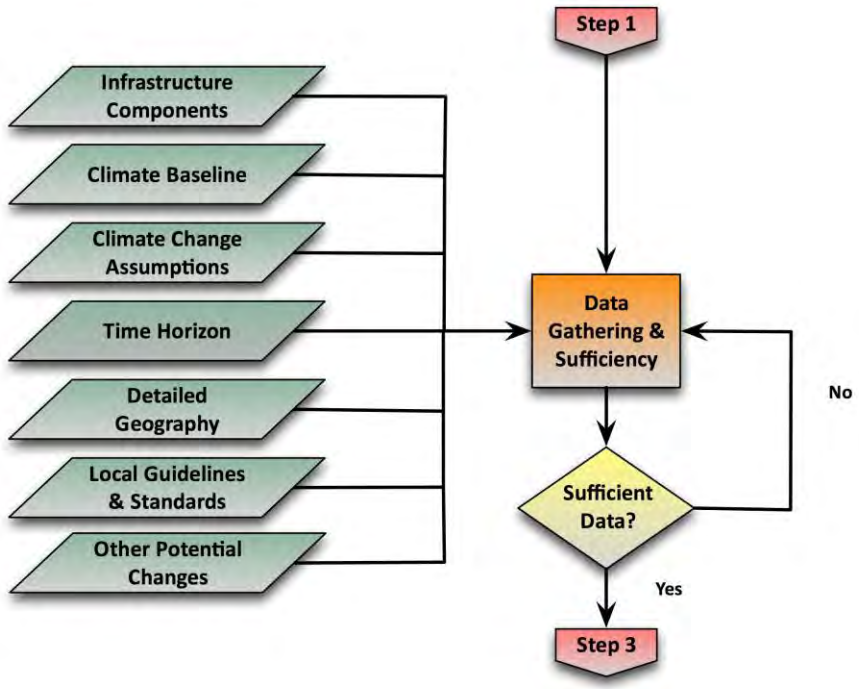
In this step the practitioner will provide further definition regarding the infrastructure and the particular climate trends that are being considered in the evaluation. The practitioner will undertake a data acquisition exercise and identify where, in their professional judgment, the data is insufficient. Data insufficiency may arise from:

- Poor quality;
- High levels of uncertainty; or
- Lack of data altogether.

This step further focuses the evaluation and starts to establish activities to infill poor quality or missing data.

The process flowchart for Step 2 of the Protocol is presented in **Figure 2**.

Figure 2: Step 2 – Data Gathering and Sufficiency Process Flowchart



2.1 Prepare Step 2 Worksheet

	Enter ***Yes*** or ***No***	
a. Use this ***Worksheet***; or	Yes	
b. Prepare practitioner specific documentation. i. Practitioner specific documentation ***MUST*** detail each task outlined in this step of the Protocol.		
Comments and Observations Tasks also outlined in the main Assessment Report.		

2.2 State Infrastructure Components

Add rows as necessary.

a. List the major components of the infrastructure that are influenced by climate. i. Only select those infrastructure components that, in the practitioner's professional judgment, are relevant to this assessment. ii. Where available, review operations incident reports, daily logs and reports to assist in the identification of infrastructure components with a history that could result in vulnerability and are relevant to this process. iii. Interview infrastructure owner's operators and maintenance staff to identify historical events that may not be documented or retrievable from databases and evaluate if these events are relevant to this assessment.
• Lou Romano Water Reclamation Plant (and storage)
• Stormwater Infrastructure including catchment basins
• Sewage Infrastructure; Combined sewers; Combined sewer outfalls; Pumping stations
• Drainage Infrastructure (channel drainage, monitoring systems)
• Gordie Howe Bridge (under final construction) and its approaches, drainage,etc; Ambassador Bridge entrances and ramps
• Public Infrastructure (road surfaces, culverts)
• Other Public/Private infrastructure (rail lines, electrical distribution systems, drinking water systems, Port, Biosolids Processing Plant, etc)

• Parklands and boat launches; Black Oat Heritage Park; Port; Playgrounds; Walking trails, etc
• Private Infrastructure (buildings, facilities, etc)
• Windsor salt Mine, facilities, buildings, etc
• Rail tracks and lands
• Detroit-Windsor Truck Ferry facilties
• Other critical Third party Assets – electrical transmission and distribution stations
• Residental areas serviced by combined sewers
• Detroit River and its water levels (+ ice cover + shoreline erosion)
b. Provide references.
See attached listing of assets and climate thresholds used for these assets. Worksheets #3 and #4 also include a detailed listing of all assets that were included in the PIEVC assessment.
Comments and Observations N/A

2.3 *State the Time Horizon for the Assessment*

a. State the period over which the infrastructure must operate. *Windsor Asset Management Plan, 2018*	1. Roads and Alleys: 25-45 years 2. Structures: 100 years 3. Wastewater: 24-75 years 4. Stormwater: 75-100 years 5. Riverfront Parks Shore wall: 50-75 years 6. Trails: 20 years, a few trails with 30-50 years
b. State the design life of the infrastructure components. *City of Windsor Asset Management Plan, 2018 and City of Windsor Sewer and Coastal Flooding Master Plan Report, 2020*	1. Temporary structures: 10 years. 2. Replaceable structural parts: 10 to 25 years.

	3. Agricultural and similar buildings: 15 to 30 years. 4. Building structures and other common structures: 50 years. 5. Monumental building structures, bridges and other civil engineering structures: 100 years. 6. Storm Sewer: 1:2 year to 1:5 year Rainfall Event
c. Document the maintenance and/refurbishment schedule for the infrastructure as it may apply to the useful service life of the infrastructure. *City of Windsor Asset Management Plan, 2018 – Sections 3, 5 and Appendix G*	1. Road segment inspection schedule: once a year to a minimum of once in 7 year 2. Structures (i.e. bridges and culverts (over a 3m span)) are inspected every two years in accordance with the Ontario Structure Inspection Manual (OSIM) 3. Storm and Sanitary Sewer Network: The zoom camera sewer inspection project will be formulated for a 5-year city-wide cycle program to cover 90% of the entire network. Buried or not found manholes will be inspected on a 2-year basis as they are located 4. Projected maintenance schedule for Lou Romano Water Reclamation Plant,

	Little River Plant and 45 Pump Stations is 20 years 5. Roads that are in fair condition need rehabilitation within 5 to 10 years of becoming deficient 6. Roads that are in good condition need rehabilitation within 6 to 10 years of becoming deficient
d. State the useful service life remaining in the infrastructure components.	Variable. Some assets are well beyond their serviceable lifespans, others within 5 years of remaining service life while other assets have recently been replaced or will be constructed in the near future.
Comments and Observations References and sources include: Client interviews and workshops; Various sections and appendices of the 2018 City of Windsor Asset Management Plan; 2020 City of Windsor Sewer and Coastal Flooding Master Plan Report. All assets for consideration in the assessment were approved by the City of Windsor and collaborating agencies.	

2.4 State the Geography

Add rows as necessary.

a. List the major features of the local geography that may influence the microclimate of the infrastructure or impose peripheral risk. i. Specifically identify hills, valleys, river systems, lakes, ocean frontage that may moderate the climate parameters considered in the evaluation. ii. Only select those geographical features that, in the practitioner's professional judgment, are relevant to this assessment.

• Site area is located on the south bank shoreline of the Detroit River
• The topography of this area is mostly flat without significant change in slopes, although the general slope of the land surface is towards the Detroit River
• The soil type within the study area mainly consists of native silty clay, often overlain with thin and discontinuous sand and gravel deposits closer to the Detroit River. Industrial land use areas, especially near the Detroit River, include landfills, salt mine waste, quarries, aggregate excavations and sewage lagoons. Soils along the bank of the Detroit River are considered to be relatively well drained with higher infiltration rates. Further inland, soils are relatively poorly drained with lower infiltration rates. Some shoreline areas are subject to soil erosion, particularly during high water levels.
b. Provide references.
• Geotechnical Review of Selected Sites for the City of Windsor Sewer and Coastal Flooding Master Plan Report, 2020
• Appendix D - Technical Volume 1: Sewer Model Development & Existing Conditions, Sewer and Coastal Flood Protection Master Plan Report
• Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) Soil distribution
• Flood Risk study memo
Comments and Observations N/A

2.5 *State Specific Jurisdictional Considerations*

a. As applicable, itemize:		b. Provide references.
▪ Jurisdictions that have direct control/influence on the infrastructure;	1. 1995 National Marine Policy 2. Section 404 of the Clean Water Act (33 U.S.C. 1344) 3. Section 10 of the Rivers and Harbours Act of 1899 (33 U.S.C. 403)	Publicly available
▪ Sections of laws and bylaws that are relevant to the infrastructure;	1. By-Law No. 1 Harbour Fees and Cargo Rates - effective May 1, 2019 - a By-Law fixing the fees to be paid to enter or use the Port of Windsor 2. By-Law No. 2 Wharf age	Publicly available

	Rates - effective May 1, 2019 - a By-Law fixing the fees to be paid in respect of Wharf age	
▪ Sections of regulations that are relevant to the infrastructure;	Natural Resources Environmental Protection Act: - This statute is divided into numerous parts, which address many of the different and complex components of resource management and environmental protection	Publicly available
▪ Standards that are relevant to the design, operation and maintenance of the infrastructure;	1. City of Windsor Standard Specifications for Sewers (January, 1999) 2. City of Windsor Standard Specifications for Maintenance Holes and Catch basins (March 2018) 3. City of Windsor Standard Specifications for Sewer Pipeline and Culvert Rehabilitation by Cured-in-Place Pipe (May, 2017) 4. City of Windsor Standard Specifications for Culverts, Headwalls and Roadside Drainage (May, 2017) 5. City of Windsor Standard Specifications for Cleaning of Gravity Sewers, Manholes and Catch basins (January, 2015) 6. City of Windsor Standard Specifications for Bridges 7. Highway Drainage Design Standards, Ontario Ministry of Transportation 8. Ministry of the Environment Design guidelines for Sewage Works	Standard Specifications, City of Windsor (https://www.citywindsor.ca/business/buildersanddevelopers/Pages/Standard-Specifications.aspx)
▪ Guidelines that are relevant to the design, operation and maintenance of the infrastructure; and	1. Windsor/Essex Region Stormwater Standard Manual: Provides guidelines regarding detailed design of storm sewer infrastructure 2. City of Windsor Development	City of Windsor Website: https://www.citywindsor.ca/business/buildersanddevelopers/Pages/Municipal

	Manual 3. Street Lighting Design and Installation Guidelines, City of Windsor 4. MECP (May 2020) LID stormwater management guidance manual	-Infrastructure-Requirements.aspx
▪ Infrastructure owner/operator administrative processes and policies as they apply to the infrastructure.	City of Windsor Standard Specifications for Replacement of Private Drain Connections (May, 2017)	Also see City of Windsor Sewer and Coastal Flooding Master Plan Report
Comments and Observations N/A		

2.6 State Other Potential Changes that May Affect the Infrastructure

a. Identify and document other factors that can affect the design, operation, and maintenance of the infrastructure:	
i. Document changes in use pattern that increase/decrease the capacity of the infrastructure.	• City's population is expected to grow over the next 25 years - up to 35% population growth projected overall, but not all areas will be equally impacted. The assets and services for the increased population need to become climate resilient. (Ontario Ministry of Finance, 2021) • City's capital plan includes improved traffic flow; reduced basement flooding; repairs to various bridges and sidewalks; expanded park facilities and trails; upgraded building facilities. • The construction of the Gordie Howe International Bridge under Windsor-Detroit Bridge Authority provides some benefits to the City via traffic redirection, regional drainage upgrades and improvements and plans to upgrade and slightly raise Sandwich Street. • Other in progress changes include construction or upgrades to the Lou Romano RTP, McKee Park and the Prince Road Outlet as potential solutions to existing flooding issues.
ii. Document operation and maintenance practices that increase/decrease the capacity or useful life of the infrastructure.	Roads and Sidewalks: • **Alley Maintenance:** Paved alleys are maintained on an as-needed basis, Gravel alleys are re-graded twice per year • **Bridge Maintenance:** The City of Windsor maintains 84 bridges and 216 municipal culverts Repairs include parapet walls, bearing plates, deck rehabilitation, foundation repairs, bridge washing, and total reconstruction • **Public Fence Repair:** The Operations Department repairs damaged public

	fences in right-of-ways, such as walkways and along railways. The Parks Department repairs fences within the City's parks. • **Road Maintenance**: Includes pothole repair, road rehabilitation, repairing and replacing curb and gutter. Shoulder grading is carried out twice per year on all rural cross section roads
iii. Document changes in management policy that affect the load pattern on the infrastructure.	• Community Energy Plan (CEP) by the City of Windsor: Identifies ways to improve energy efficiency, improve energy security, and reduce greenhouse gas emissions while contributing to the overall quality of life of the Windsor • Climate Resilient Home: The City of Windsor has retrofitted a City-owned home built in the City's core in the 1920s with the goal of reducing the risk of basement flooding • Sewer Master Plan: The Sewer Master Plan will take a system-wide approach to identify specific improvement projects that can be undertaken by the City to improve sewer efficiency and reduce the risk of flooding caused by wet weather • Corporate Climate Action Plan (CCAP) • Climate Change Adaptation Plan
iv. Document changes in laws, regulations and standards that affect the load pattern on the infrastructure.	Changes in Ontario Building Code and relevant standards from their historical load requirements were considered as needed.
Comments and Observations N/A References: City of Windsor web site • City of Windsor web site https://www.citywindsor.ca/residents/building-Windsors-Future/Pages/Capital-Plan.aspx • City of Windsor Asset Management Plan, • https://www.citywindsor.ca/residents/environment/climate-change-adaptation/climate-	

resilient-home/Pages/default.aspx

2.7 *Identify Relevant Climate Parameters*

Add rows as necessary.

a. List the relevant climate parameters associated with the design, development, and management of the infrastructure. i. Use the ***Climate Parameter List*** provided in **Appendix A** as a guideline. ii. Additional guidance can be found in: ▪ The ***PIEVC Data Integrity and Availability Review*** and/or ▪ ***Environment Canada's National Climate Data Archive*** (http://climate.weatheroffice.ec.gc.ca/Welcome_e.html).	b. State the climate information source(s). Sources may include, but are not limited to: ▪ National Building Code of Canada Appendix Tables ▪ Intensity Duration Frequency (IDF) curves, ▪ Flood plain mapping, ▪ Heat units, ▪ Water elevation ▪ Etc.
Extreme Rainfall	City of Windsor guidance and recommendations; Forensic analysis of past events; Interviews, Analysis of Windsor and Detroit Airport rainfall data; Review of published and climatologically representative studies on historical rainfall events; Newspaper reports, etc; Detailed hydrology and hydraulics modelling for Detroit River and sewer systems. See Assessment Report for more details.
Great Lakes and Detroit River Water Levels	Analysis of historical water level records and

and associated Flooding; Extreme River Levels	return periods associated with past events; IJC, NOAA and MNRF (Ontario) evidence and studies on lake levels; Peer reviewed literature on past and future lake and river flooding frequencies; Detailed hydrology and hydraulics modelling. Includes preliminary review of river/lake ice and ice jam contributions to water levels (less significant than persistent high levels). Literature review of climate change projected lake levels, watersheds and hydraulics/routing modelling studies to update earlier lake level information. Hydraulic and hydrological analysis of extreme low water levels combined with extreme rainfalls.
Snow accumulation/Melt	Analyses of Windsor and Detroit airport historical records together with forensic evidence; Newspaper reports; Professional expertise on rainfall, water level, snowpack and snowfall events
Tornado frequencies	ECCC and UWO updated tornado database events; Newspaper reports; Professional expertise on severe convective storm and tornado events
Heat Events	Analysis of Windsor Airport data; Professional expertise to identify critical heat thresholds
Major Ice Storm	Analysis of past ice storm events; Professional expertise and interpretation of major ice storm events and associated modelling results (i.e. for overhead system designs, etc); Review of several (scarce) ice storm events, newspaper reports, etc.
Extreme Wind	Analysis of historical wind data from Windsor and Detroit Airports (as relevant, mainly captures synoptic scale events); Building Code design limits and updates; Newspaper damage reports, interviews; Professional expertise in extreme wind events and impacts on infrastructure.
Freeze/ thaw	Analysis of Windsor Airport freeze-thaw

	frequencies; Studies on critical thresholds for freeze-thaw weathering impacts on concrete and other materials; Professional expertise
Combined Events (HWL+Rainfall)	Detailed hydrology and hydraulics modelling combined with analysis of IJC river level data and rainfall data, published studies, newspaper reports
Climate Change Projections	Analysis of an ensemble of IPCC AR5 climate change projections using the Dillon climate analytical system, peer-reviewed studies and lake level modelling and projections (e.g. McGill group, NOAA), ECCC climate change guidance documentation, discussions with U.S. Great Lakes Integrated Science and Assessments (GLISA) unit, Great Lakes Environmental Research Laboratory (GLERL) studies, etc.
Comments and Observations Data on river ice, ice jams and on shoreline erosion susceptible not available for further analysis.	

2.8 Identify Infrastructure Threshold Values

Add rows as necessary.

a. For each climate parameter selected, identify a threshold value above which, or below which, the infrastructure performance will be affected.

i. Threshold values may be based on:

- Codes;
- Standards;
- Engineering Guidelines;
- Operating or Maintenance Procedures;
- Professional Judgement; and/or
- Other, as appropriate.

ii. As appropriate, a number of different thresholds may be identified for a specific climate parameter based on varying degrees of infrastructure response arising from parameter values changing over a broader range.

- In such cases, each parameter-threshold pair would be treated as a separate event within the context of the assessment.

Threshold Value	b. Clearly document the source of the threshold value.	c. Provide justification for the threshold value selected.
Extreme Rainfall: • "Major" 100-yr Storm - 82 mm in 4 hrs, peak rate of 145 mm/h • "Minor" 5-year Storm - 50 mm in 4 hrs, peak rate 29.5 mm/hr	Discussions with City, interviews, design criteria, forensic analysis of past events	See attached document "West Windsor flood PIEVC Assessment Tailored Severity Scale" for summary of tailored thresholds identified to be critical for various stakeholders, impacts, city services in the
Rapid Snowmelt of snowpack: Snow water equivalent - 85mm	Threshold based on 2014 record breaking snowpack (also 133 year Detroit record broken); Flooding impacts noted for study region; Past	Forensic analysis of past snowmelt flooding events (greatest snowpack); Results compared using snowpack data and impacts for Detroit;

	emergency evacuations of facilities due to snowmelt flooding	Events where rivers and ditches reached flood crest stage by late winter. Later stage stakeholder consultations eventually identified this parameter as having lesser importance for flooding (e.g. also dependent on rates of late winter warming).
Snow Accumulations: Accumulation 250cm	See above snowpack threshold for snow water equivalent amounts. Record-breaking 2013-14 Windsor Airport snowfall accumulations >250cm - agrees with snowpack data from Detroit. Note that the 2013-14 winter broke the previous record for 2004-05 accumulations of 226cm (previous record).	High transportation impacts; drainage assets buried; Many of the rivers and ditches reached flood crest stage from water, snow or ice; Local flooding; Building snow overloading risks regionally. Later stage stakeholder consultations eventually identified this parameter as having lesser importance for flooding (e.g. also dependent on rate of late winter warming).
Major Ice Storm: >28mm accretion	Design ice loading criteria for critical overhead systems (electrical, communications); Peer-reviewed studies and professional expertise of severe ice storms and ice loading.	Internal Ontario ice storm database to 2005; Peer-reviewed studies on severe ice storm events and risks. Ice storms with more than 25 mm of freezing rain are typically associated with significant damage to trees, telecom and overhead infrastructure, and correspond with design thresholds for failure of overhead electrical systems.
Extreme Wind: >120km/hr	Analysis of Windsor Airport wind gust records; Building Code design criteria identified 120 km/hr as a damage	Widespread power outages, potential structural damages (beyond building cladding); Professional expertise on

	threshold See main report.	design wind pressures/speeds with potential for structural damages
Tornado: (E)F2+	ECCC and UWO tornado database	Reasonable design considerations for critical assets; Professional expertise on design basis tornadic events and impact thresholds
Weathering or Freeze/Thaw cycling	Analysis of Windsor Airport data Annual frequencies and number of 30-cycle plus years	Freeze-thaw cycle impacts are based on laboratory tests of reinforced concrete samples, which indicated that visible damage can begin after approximately 30 freeze-thaw cycles annually. In both scenarios (total cycles and 30-cycle increments), although the future total number of freeze-thaw cycles decreases, this decrease is not substantial but is likely to remain of concern during the mid-winter months.
Coastal Erosion Processes City staff interviews, stakeholder consultation as well as the County of Essex Hazard Identification and Risk Assessment (HIRA; County of Essex, 2019) all indicated significant concerns regarding shoreline erosion, and it was therefore included initially as a hazard for consideration	No historical database could be identified that captured shoreline erosion risks along the Detroit River. As a result, the relative impacts, risks and rate of change could not be statistically evaluated	Not evaluated due to lack of data
High River Levels (HWL): • Current 100 year return period HWL = 175.9 m from 2020	Detroit River IJC water level records for representative gauge site; Extreme value analyses including extreme high levels from 2020;	Significant coastal/river flooding impacts resulted from record high levels in 2020. Note that record low levels were recorded in the

• "Likely" (potentially extreme) climate change HWL = 176.1 m	Comparison to analyses by OMNRF for extreme high water levels during the 1980s and comparison to historical data	period leading up to 2013.
Combination Events: Detroit R High Water Levels + Storm Rainfall	**See next section 2.9**	
Comments and Observations N/A		

2.9 Identify Potential Cumulative or Synergistic Effects

Add rows as necessary.

a. Review the selected climate parameters and threshold values and evaluate the potential cumulative impact of combining or sequencing weather events and/or climate trends to assess the possibility of these combined events yielding a higher impact compound event.

b. Include relevant cumulative or synergistic events on the list of climate parameters carried forward for risk assessment.

i. The practitioner must exercise professional judgment in establishing conceivable combined or synergistic events to avoid assessing multiple, improbable, combinations.

Cumulative and/or Synergistic Event	Threshold Value	Justification
Combination Events: Detroit R High Water Levels + Storm Rainfall	See different thresholds below	

Current 100 yr HWL + Major rainstorm (100-year return period, 4 hour)	Hydrology and hydraulic modelling of the representative portion of Detroit River; Detailed elevation data; Calibration against past flooding events	Historical/current worst case high water levels with extreme rain storm (also needed to assess performance of river risk reduction options under a major extreme rainstorm and for TBL evaluations of solutions)
Current 100 yr HWL + Minor rainstorm (5-year return period, 4 hour)	Hydrology and hydraulic modelling of representative portion of Detroit River; Detailed elevation data; Calibration against past flooding events	Historical/current worst case high water levels with minor rain storm (also needed to assess river flood risk reduction options under moderate rainstorms for TBL evaluations of solutions)
Potential Extreme Climate Change HWL + Major rain storm (100 year RP, 4-hour)	Hydrology and hydraulic modelling of representative portion of Detroit River under best estimate of future climate change high water levels together with a major extreme rainstorm; detailed elevation data	Future climate change worst case increased high water levels combined with major extreme rain storm (needed to assess river flood risk reduction options for land drainage under extreme rainstorms). See main report discussions on probabilities of lowering extreme high lake levels under climate change with high GHG emissions.
Potential Extreme Climate Change HWL + Minor rain storm (5 year RP, 4-hour)	Hydrology and hydraulic modelling of representative portion of Detroit River under best estimate of future climate change high water levels together with a minor rainstorm; detailed elevation data	Future climate change worst case high water levels combined with minor rain storm (needed to assess river flood risk reduction options for land drainage under minor rainstorms). See main report discussions on probabilities of lowering extreme high lake levels under climate change with high GHG emissions.
Current 100-year return period HWL + wave action (freeboard)	Hydrology and hydraulic modelling of representative portion of Detroit River + “safety factor” allowance for	Essex County HIRA + historical forensic events for extreme flooding conditions. Note that climate change

	freeboard (wave action)	projections of future river levels are conflicting, with more estimates for decreasing levels after 2050s than increases. Climate variability from extreme high to extreme low levels will remain a concern.
Rainfall + hail and wind for debris	Not evaluated in risk assessment – other hazards pose much greater risks	Considered for debris blocking stormwater drainage. Considered as having a minor impact relative to other flooding risks

Comments and Observations

- Initial investigation undertaken of impacts of ice jam and breakup events on extreme winter flooding risks, but would need a database of ice jam and breakup events to investigate further and quantify.
- Shoreline erosion impacts also of concern, but no databases are known that can capture shoreline erosion risks along the Detroit River. As a result, the relative impacts and rate of change could not be statistically evaluated

2.10 State Climate Baseline

Add rows as necessary.

a. List historical extreme weather events:

   i. Identify the frequency of the events
   ii. Identify the duration of the events
   iii. Identify the date(s) of the events
   iv. Identify the magnitude/intensity of the events

b. If data is not available:

   i. Based on professional judgement, infill missing data using reasonable assumptions
   ii. Provide written justification/substantiation for the assumptions.

c. List the values that are chosen.

d. Provide references.

Historic Extreme Weather Event	Value	Reference
See West Windsor Flood PIEVC Assessment Study Tailored Severity Scale (attached)	Various	
EXAMPLE EVENTS – Many other events collected		
Significant surface and basement Flooding: September 28, 2016	100 mm of rainfall over 24 hours on the east side of the city	Appendix D - Technical Volume 1: Sewer Model Development & Existing Conditions, Sewer and Coastal Flood Protection Master Plan Report
Significant surface and basement Flooding: June 4,5,6, 2010	90 mm of rain fell in Windsor between 11:00 pm June 5th and 3:00 am June 6th	Appendix D - Technical Volume 1: Sewer Model Development & Existing Conditions, Sewer and Coastal Flood Protection Master Plan Report
Significant surface and basement Flooding: August 28/29, 2017	A maximum measured rainfall amount of 212 mm was logged southwest of Huron Estates PS and 189 mm at the Howard Grade Separation PS.	Appendix D - Technical Volume 1: Sewer Model Development & Existing Conditions, Sewer and Coastal Flood Protection Master Plan Report
February 12, 2019	Morning, mainly impacts to commute (vehicles, pedestrians); However, localized power outages in City, including scattered outages in S Windsor, and ~1,000 customers out in Riverside and Pillet areas lasting a few hours (as of 3 PM same day); imagery suggests total accumulations ~10-15 mm	Windsor Star - February 13, 2019

Date unknown, occurred in 1999 or 2000	Ice storm generated widespread Power outages, requiring door-to- door well checks of local residents.	P. Berry, pers. comm.
March 1-7, 1976	"Main brunt of the freezing rain came on the 2nd and 3rd with isolated thunderstorms giving 20–40 mm of freezing rain from Windsor to just west of Hamilton. Power outages in some localities lasted as long as eight days." Mclaughlan and Smith indicate up to 10 or more locally	Klaassen et al. (2003); Mclachlan and Smith (1976)
February 24, 2016 and March 3, 2015: Events with several hours of freezing rain reported in media and in airport weather records, but no direct impacts could be confirmed		Windsor Star; ECCC Online Climate Data for Windsor Airport
Record-breaking snowfall accumulations winter 2013-14; Previous record at 225.5 cm from 2004-05	249cm from Nov, 2013 to April 2014; Previous record 2004-05 at 225.5 cm for Windsor Airport (record dates from 1940)	Windsor CTV News: https://windsor.ctvnews.ca/it-s-official-windsor-has-broken-its-all-time-snowfall-record-1.1725689 https://www.csmonitor.com/USA/Latest-News-Wires/2014/0415/Detroit-snow-breaks-records-topples-power-lines-creates-flooding-risk
Extreme Snowstorm: Feb. 1, 2015	More than 40 centimeters of snow	CBC News, January 1, 2020
Flooding from 50mm rainfall plus snowmelt, 2017-18	50mm rainfall on snowmelt	Windsor CTV news https://windsor.ctvnews.ca/flooding-remains-a-possibility-for-windsor-essex-and-chatham-kent-1.3813067
Tornado: June 6, 2010	A series of tornadoes tracked through Essex County	CBC News, January 1, 2020
Comments and Observations		

N/A

3 State the Changing Climate Assumptions

Add rows as necessary.

a. Assess the relevancy and applicability of observed global, regional or site-specific changing climate trends with respect to the infrastructure. i. Document how these trends influence the infrastructure.	
Trend	**Influence**
Increased precipitation: • Average (mean) annual precipitation increased across Canada from 1948 to 2012. Due to insufficient data coverage nationally, national precipitation trend analyses of precipitation cannot be updated after 2012. • For the Windsor area, total precipitation trends from 1981-2019 indicate small increases over the period (~60mm), although the totals are highly variable from year-to-year. The greatest increases were observed for the autumn period. Similar trends have been noted for the Detroit area. Nonetheless, intense, localized storms have been observed outside of the Windsor Airport and within the City, resulting in widespread flooding. The most significant short duration rainfall trend increases are noted for 24 hour rainfall durations.	Increased total annual precipitation over time has the potential to increase lake and river levels, also depending strongly on winter ice cover and summer temperature influences on Great Lakes multi-year balances between precipitation, runoff and evaporation. It is the small differences between incoming precipitation and runoff and outgoing evaporation processes that pose many uncertainties and challenges for projections of future lake levels. Extreme rainfall (or snowmelt with rainfall) events can locally or regionally overwhelm stormwater and combined sewer systems, even when river water levels are not impacting the systems. Time for drainage increases while pumping systems may not be effective locally when lake/river water levels are high.
High and Low Great Lakes and Connecting Rivers Water Levels • Water levels on the Great Lakes and Detroit River typically fluctuate on multi-	High water levels result in coastal flooding, severe coastline erosion, damages or an inability to use coastal and port assets, damages to coastal road and walk ways,

decadal time scales, but recent fluctuations between lows and highs have been more rapid and extreme. Record low levels on the Detroit River from 1999-2013 and rose to record highs in the 2019-20 period. Levels have slowly declined since 2020. • The more recent record low levels resulted largely from warming air and water temperatures, reduced winter ice cover and increased lake evaporation over an extended season. The rapid recovery from record low levels began from winter 2013-14 after a particularly cold polar vortex winter, heavier ice cover and less lake evaporation that was followed by heavier precipitation seasons and some notable extreme precipitation events.	ineffective pumping, inundation of storm and waste water sewers and a potentially overwhelmed wastewater treatment plant. Some of these assets may require significant repairs or rebuilding. Note that the County of Essex was under flood watch or warning status for 182 days in 2019. As noted in the main PIEVC report, future lake levels will depend on future GHG levels, with the possibility that lake levels might be even higher than recent records if GHG emissions are reduced and climate warming is restricted. Gradually lowering lake levels appear more probable under the more realistic high GHG assumptions after mid-century. Based on the results from five studies after 2011, an additional 20 cm of lake level rise by mid-century would likely represent an almost worst case, and would be more likely for lower global GHG emissions scenarios.
Increased annual temperature: • The average (mean) annual temperature in *Canada* increased by 1.7 °C from 1948 to 2016, about double the global rate. • Mean annual temperatures in the *Windsor Airport* area have increased steadily over the period 1981-2019. • The number of hot days with temperatures above 31°C are also increasing as the warm season gradually lengthens. The number of these hot days is expected to roughly double (from 5 to 10 days/year) by the 2050s under high GHG emission scenarios.	Warmer summer and winter temperatures result in greater evaporative loss from the Great Lakes and connecting river systems surface and from the land basin areas. Warmer lake and river temperatures have the potential to support growth of algae locally, depending on wind and flow rates. The warm convective rainfall season is expected to lengthen with warming. Since warmer air has the potential to "hold" more moisture for precipitation, it is expected that convective or thunderstorm type rainfall events could persist into a later autumn or develop earlier in the spring season. Note that Windsor currently records more thunder and lightning storms than any other city in Canada, reflecting the region's relatively longer and more active convective precipitation season.
River Ice Cover • Highly variable. Warming or shorter	Decreasing ice cover can shoreline areas more exposed to storm action and more prone

winter cold seasons potentially will reduce the amount of ice cover on the Great Lakes and connecting rivers.	to erosion and winter flooding. Decreasing ice cover is also associated with increased evaporation from the Great Lakes.
Changes in Snow: • Ironically, while the number of days with snow on the ground has gradually decreased across much of southern Canada, the seasonal snowfall amounts and extreme snowfall amounts can follow different trends. • Snowfall accumulations have broken long-term records twice in the period 2004-2014. Potential exists for lake effect snowfall events in the presence of cold Polar Vortex weather systems when the Great Lakes are relatively warm and ice-free in early winter.	Changes in patterns of seasonal snow accumulation in Canada pose a risks for infrastructure and its operations and maintenance. For example, increased winter snow or lake effect snow events during a shorter snow accumulation period can increase the potential of roof collapse. Rapid warming and significant mid to late winter rainfall events plus snowmelt can fill drainage channels, block stormwater catch basins, flood streets, etc.
Weathering/ Freeze-Thaw Cycling • The number of freeze-thaw cycles are expected to gradually decrease as winter and the shoulder seasons warm. The frequency could actually increase during the mid-winter months, indicating that winter weathering may shift seasonally and could increase in mid-winter.	In both scenarios (total cycles and 30-cycle increments), the future total number of freeze-thaw cycles decrease, although this decrease is not substantial and is likely to remain of concern during the mid-winter months. Winter weathering processes impact the durability, lifespan and maintenance requirements for concrete and masonry based assets. Weathering processes also impact shoreline erosion processes, especially under conditions of reduced ice cover.
Shoreline Erosion • Decreasing lake and river ice cover trends and extreme high water levels will increase shoreline erosion risks, which are already of significant concern.	City staff interviews, stakeholder consultation as well as the County of Essex Hazard Identification and Risk Assessment (HIRA; County of Essex, 2019) all indicated significant concerns regarding shoreline erosion, and it was therefore included as a key hazard consideration for the flood risk assessment. Unfortunately, no databases or collected data is available to assess the shoreline erosion risks along the Detroit River and their trends.
Comments and Observations	

See notes on shoreline erosion and river ice cover influences on water levels. Further discussion in the main PIEVC report.

b. Where appropriate, identify incremental changes to the **Climate Baseline** conditions based on the trends identified in (a) above.

Incremental Change	**Influence**

Comments and Observations
N/A. Covered in the above discussion in section (a)

c. Where appropriate, identify incremental changes to the **Climate Baseline** conditions based on sensitivity analysis.
   i. Increase or decrease Climate Baseline conditions by percentages selected based on the practitioner's professional judgement.
   ii. Provide written justification/substantiation for the assumptions and incremental values used in the sensitivity analysis.

Incremental Change	**Justification**

Comments and Observations
N/A. Thresholds were confirmed via processes discussed earlier.

d. Where appropriate, use surrogate information from other geographic areas to respond to identified data gaps and uncertainties.

i. Document the source of the infill data.
ii. Provide written justification/substantiation for using the infill data.

Incremental Change	Justification
N/A.	Local to regional climate information and localized hydrologic and hydraulic modelling were used in the assessment.

Comments and Observations

N/A. Not required except for some consultation with NOAA and Detroit studies.

e. Where appropriate, arbitrarily define changing climate assumptions or predictions.

i. Provide written justification/substantiation for using the assumptions.

Incremental Change	Justification
Climate trends analyses, published studies and ensemble climate change projections were incorporated throughout the study.	Assumptions were few (except for future levels of GHG emissions). All risk assessments were based on expert climatological analyses, peer reviewed studies and approaches, hydrological and hydraulic modelling, forensic analyses, etc.

Comments and Observations
N/A

f. Where appropriate, employ regional climate change models to project changing climate effects in the region of the infrastructure. ii. Review the basis and basic assumptions of the model(s). iii. Provide written justification/substantiation for using the model in the evaluation.	
Incremental Change	**Justification**
Temperatures and Precipitation: Temperatures and seasonal precipitation trends indicate ongoing increases. The greatest changes are expected for high temperature extremes and short and longer duration precipitation extremes. Many future extremes for precipitation types, winds, etc are difficult or impossible to infer from models alone and detailed peer reviewed studies and extensive professional climate experience and expertise were needed to assess trends into the future. Changes in high extremes will impact all of the assets considered.	Interviews, historical codes and standards, discussions with stakeholders and forensic analysis of past climate impacted events and risks were all used to confirm the importance of future trends leading to increased climate risks. The study team included climatologists and climate change experts with collective experience spanning many decades.
Extreme Climate Variables and River Water Levels: Any climate change driven increases in extreme coastal lake/river and precipitation processes will increase flooding and risks for the wastewater and stormwater assets. Other increases in extremes e.g. severe ice storms, extreme winds, tornadoes, etc will have secondary impacts that include structural damages, prolonged loss of power, electrical hazards, emergency responses and were assessed as secondary impacts.	High extremes will impact all assets and flooding processes. Low water levels were also considered in this study. The study team members have years to multiple decades of recognized climate and climate change expertise. The climatologists were able to undertake extreme and forensic analysis of events and to interpret the published literature.
Changes in Climate Models: Climate change models change over time too. Temperature and Precipitation changes were projected using an ensemble of climate	The latest IPCC climate change models and projections from the 2021 release were compared to the sets of climate change models still widely in use (i.e. 2013 released

change projections from both the IPCC AR5 models (2013) and AR6 models (2021) assuming conservative or limited future reductions in GHG emissions i.e. AR5 models using RCP8.5 emissions and AR6 models using SSP370 (SSP3) emissions. The differences in future trends of temperature and precipitation averages (Normals) was minimal for these GHG assumptions.	AR5 models). It was important to ensure that the results and guidance from this PIEVC assessment could be used to guide infrastructure investments well into the future and that the results could be more readily updated into the future.
Extreme River Water Levels: Extremes in lake levels and their variability strongly influence river/lake coastal flooding as well as basement and land flooding risks. The efficacy of the wastewater, stormwater and combined sewer systems are sensitive to river level influences for many sections of the study area. Record breaking low and high water levels have been experienced in the past decade and it is critical that their changes be considered for the future.	This study included a comprehensive review and assessment of all Great Lakes level projections under climate change for updates, improvements and changes since 2011, when Great Lakes process and routing models were revised for improved land runoff evaporation. The previous Windsor coastal flooding study was based on a 2011 study of Great Lakes levels that incorporated a limited number of older driving climate change models. These results were updated using Great Lakes level studies released since 2011 that incorporated a greater number of more recent driving climate change models as well as improved processes influencing on Great Lakes water levels.
Downscaling for Climate Change Projections – Other Approaches: Downscaling approaches for climate change projections – use of dynamic or regional climate models or statistical downscaling. Most climate change models do not handle trends in localized extremes well (ie perform "better" for average trends) and alternate but scientifically recognized approaches were used.	A mixture of downscaling approaches were included in the study. The statistical delta approach was used where direct downscaling from ensembles of climate change models were needed. The peer reviewed climate change projection studies incorporated into the PIEVC assessment used a mix of dynamic (regional models) and statistical downscaling approaches.
Comments and Observations N/A	

3.2 *Establish Changing climate Probability Scores*

a. From **Figure 3**, choose Method A or Method B to define probability scores. i. Record in project documentation the Method that was used. ii. Use the same method for all probabilities used in the evaluation.	**Method** **Enter Either A or B** Quantitative Method B Scores based on changes in Likelihood
b. Choose the changing climate probability scoring approach. Either: i. Assign scores for the probability of climate parameters changing over the time horizon of the assessment such that the infrastructure threshold is triggered. ▪ If this approach is selected, go to **Task 2.12.c**	**Method** **Enter Either Yes or No** **Yes** (absolute risk)
OR: i. Assign scores for the probability of climate parameters triggering infrastructure thresholds in the baseline climate and assign scores for the probability that climate parameters will trigger the infrastructure thresholds in the future climate. Changing climate impacts are assessed from the difference between the two scores. ▪ If this approach is selected, go to **Task 2.12.d**	**Method** **Enter Either Yes or No** No

c. Scoring Changing climate Probability

Add rows as necessary.

Climate Parameter	Infrastructure Indicator	Will the Interaction Change Over Time Horizon of Assessment?	More-Same-Less?	Projected Change in [illegible]	Projected Change in Frequency	Robustness of Forecast?	Professional Judgment	Probability Score
		Y/N	+ 0 -	H M L	H M L	H M L	Comments	0-7
		☟	☟	☟	☟	☟	P = ƒ (A,B,C,D, & E)	
		A	B	C	D	E	☞	P

ALTERNATIVELY

d. Scoring Probability for Both Baseline and Future Climates

For the Baseline Climate

Add rows as necessary.

		Thresholds Triggered?	Magnitude of Event	Frequency of Event	Robustness of Forecast	Professional Judgment	Probability Score
		Y N	H M L	H M L	H M L	Comments	0-7
		☟	☟	☟	☟	P = ƒ (A,B,C,D, & E)	
Climate Parameter	Infrastructure Indicator	B	C	D	E	☞	P

For the Future Climate

Add rows as necessary.

Climate Parameter	Infrastructure Indicator	Thresholds Triggered? Y N	Magnitude of Event H M L	Frequency of Event H M L	Robustness of Forecast H M L	Professional Judgment	Probability Score
						Comments	0-7
						P = ƒ (A,B,C,D, & E)	
		B	C	D	E	☞	P

e. As appropriate, the practitioner may select an alternative probability scoring methodology.

i. If the practitioner selects an alternative scoring methodology they are directed to substantiate and document this choice in the project report.
ii. Whatever method is used, it must be used consistently throughout the probability scoring process.

Methodology	Substantiation

Figure 3: Probability Score Definitions

The practitioner is directed to express a professional opinion regarding the probability that a climate event that triggers an infrastructure threshold will occur. This should not be confused with the consequences of that climate event. The practitioner is asked to score the probability of the event in this step and assess the severity and/or consequences in the next step of the protocol.

Score	Probability	
	Method A	Method B
0	Negligible Not Applicable	< 0.1 % < 1 in 1,000
1	Highly Unlikely Improbable	1 % 1 in 100
2	Remotely Possible	5 % 1 in 20
3	Possible Occasional	10 % 1 in 10
4	Somewhat Likely Normal	20 % 1 in 5
5	Likely Frequent	40 % 1 in 2.5
6	Probable Very Frequent	70 % 1 in 1.4
7	Highly Probable Approaching Certainty	> 99 % > 1 in 1.01

3.3 Assess Data Sufficiency

Review the data set developed in **Sections 2.1 through 2.12**. a. For data selected for the evaluation, assess and comment on:	
▪ Data gaps;	Windsor International Airport represented the main climate station used for relevant climate variables, with comparison to results from the Detroit Airport. IJC lake and connecting river measurements were analyzed for lake/river level studies and return period estimates. Hydrological and hydraulic modelling was calibrated against flow, forensic evidence and guidance from Conservation Authority and City staff. In many cases where information was not available, published climate studies were incorporated into the assessment.
▪ Data quality;	The quality of the Airport climate data was reasonably complete and records were long while the hydraulic and hydrology (H&H) modelling was comprehensive. Efforts were made to ensure that the H&H modelling reflected observed conditions. Published studies used had undergone peer review processes.
▪ Data accuracy;	See above comment.
▪ The applicability of trends;	Considered and incorporated. See previous section 3(f). All climate team members have significant experience and recognized expertise in climate extremes analyses, climate change projections, marine and lake levels, forensic analysis and in undertaking PIEVC assessments and can interpret and develop climate trends and projection information.
▪ Reliability of selected climate model(s);	Best climate change projection and downscaling practices were incorporated, considering the uncertainties of the climate and climate change information and the

	sensitivities of the assets to climate/weather.
▪ Reliability of changing climate assumptions or scenarios; and	The latest climate change model outputs (IPCC AR6, 2021) were compared to the still more widely used IPCC AR5, 2013 released models and changes in the means/averages were limited. All studies used ensembles of climate change models and/or applied peer reviewed studies. Significant stakeholder consultations were undertaken in spite of COVID-19 challenges at the time.
▪ Other factors.	N/A
Comments and Observations N/A	

b. Clarify and summarize the priority of the documentation referenced in the evaluation.

i. Present these in a tabulated prioritized form

Document	**Priority**
Comments and Observations	

c. Document where there is insufficient information currently available to proceed with a particular portion of the assessment.

Insufficient Information	i. Where there is insufficient information currently available, identify a process to develop or infill that data.	ii. Where data cannot be developed, identify the data gap as a finding in Step 5 of the Protocol – Recommendations.
Lake and river ice	Additional ice cover information	It is likely that the influence will

influences on water levels	and documentation of events would be needed.	be less or of considerably shorter duration than the longer duration trends during fluctuating lake levels. An updated risk assessment in future would benefit from updated and improved lake level models that integrate the new IPCC AR6 climate change models and update relevant lake level processes.
Shoreline Erosion Risks	A database of shoreline erosion events needs to be collected (locally variable) for further analysis	Initial attempts to develop an Detroit River erosion event database would be helpful for the City. The database should also include Lake St Clair events.

Date:	November 17, 2022
Prepared by:	Simon Eng and Heather Auld (UWO and Dillon Consultants)

Climate change risk assessment of the City of Windsor's West Windsor public, private and institutional assets and third party risks, focussing on flooding risks

This PIEVC risk assessment is divided into 4 parts. Parts 1, 2 and 3 reference Zones 1, 2 and 3 respectively, and refer to assets with medium to high climate change risks. These higher risks were identified via City of Windsor guidance, interviews, forensic analysis of past impacts, other reports and informed by modelling of the City's sewer, surface and river level flows. Part 4 refers to system-wide risks and third party services.

Highlighted Infrastructure components indicate Medium to High site risks

Current Conditions

#	Infrastructure Class	Infrastructure Components	1 Extreme Rainfall: "Major" 100-yr Storm - 82mm in 4 hours (Peak rate of 145 mm/h)				Model storms 4-hour Chicago distribution based on peak rainfall rate	2 Extreme Rainfall: "Minor" 5-year Storm - 50mm in 4 hours (peak rate of 29.5 mm/hr)				Model storms 4-hour Chicago distribution based on peak rainfall rate	3 Extreme River Levels: "Likely" high CC HWL - 176.1 m				Adjusted HWL for our study - Based on HA's lit review and extensive group discussion
			Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score
	Part 1																
	Zone 1 - E of Russel S																
	Combined Sewers	Felix Avenue - Combined sewer		4	6	24	Max risk 35= Combined prob event; fails 5 year design storm criteria		7	5	35			4	7	28	
		Mill St - combined sewer		4	6	24	Max 24= 100 yr rain		7	3	21			4	5	20	
		Riverside Dr - combined sewer		4	5	20	Max 21=100 year rain		7	3	21			4	4	16	
2		Interceptor Maintenance Holes (MH)		4	5	20			7	3	21			4	7	28	
3	Wastewater System Assets	Sanitary Sewers		4	5	20			7	4	28			4	7	28	
4		Maintenance Covers		4	2	8			7	2	14			4	7	28	
5		Pump Stations		4	5	20			7	4	28			4	7	28	
		Lou Romano Water Reclamation Plant (LRWRP): *Inflow from Western Trunk line specifically* (<<100 year water levels for impacts)		4	6	24	Max 49 = <<100 yr HWL; comb events with high river		7	4	28			4	6	24	
		Lou Romano Water Reclamation Plant (LRWRP)		4	7	28	Max 49 risk w<<100 yr HWL; Blockage main outfall, backflow into plant for treatment river water; loss capacity		7	5	35			4	7	28	
7	Stormwater System Assets	Open drainage channels		4	4	16			7	2	14			4	7	28	
		Russell Street - open channel drainage		4	6	24	Max 24=xtrm rain		7	2	14			4	3	12	
8		Storm Sewers		4	5	20			7	2	14			4	7	28	
9		Outfalls		4	4	16			7	2	14			4	7	28	
#		Maintenance holes		4	5	20			7	2	14			4	7	28	
#		Catch Basins		4	5	20			7	2	14			4	7	28	
#		Drains		4	5	20			7	2	14			4	7	28	
#		Culverts		4	5	20			7	2	14			4	7	28	
14	Transportation	Major Roadway - Felix Avenue (due combined sewer)		4	6	24	Fails 5 yr; 35=Max due xtrm rain; combination events		7	5	35			4	7	28	
#		Major Roadway - Huron Church Road		4	4	16			7	2	14			4	4	16	
16		Major Roadway - Mill Street (due combined sewer)		4	6	24	Max 24=due 100yr rain		7	2	14			4	4	16	
#		Major Roadway - Ojibway Parkway		4	4	16			7	2	14			4	3	12	
#		Major Roadway - Prince Road		4	4	16			7	2	14			4	3	12	
19		Major Roadway - Riverside Drive (due combined sewer)		4	5	20	Max 21= 100yr rain, LOS requirements		7	3	21			4	4	16	
20		Major Roadway - Sandwich Street		4	6	24	Max 35=100 yr rain; combination, high HGL, mdt ponding		7	4	28			4	5	20	
#		Major Roadway - University Avenue		4	4	16			7	3	21			4	4	16	
#		Major Roadway - Wyandotte Street W		4	4	16			7	3	21			4	4	16	
23		Ambassador Bridge/Canadian Border Services: Entrance/onramp		4	6	24	Max 35= 100 yr rain; combination		7	4	28	35=Master due xtrm rain; combination (??)		4	4	16	
24		Rail Tracks		4	3	12	Max 35=combination events		7	2	14			4	6	24	
#	Institutional Buildings	St Michael's Adult Secondary School		4	3	12			7	2	14			4	5	20	
#		Duff - Baby House (museum)		4	3	12			7	2				4	5	20	
27		Canada South Science City - Tourist Attraction		4	6	24	Max 35=due 100yr & 5yr rain; high HGL		7	5	35			4	5	20	
28		West Windsor Musallah - Mosque		4	7	28	Max 42= 100 yr or 5yr rain & combination; High HGL		7	6	42			4	5	20	
29		Windsor Essex Community Health - Community Centre		4	3	12			7	2	14			4	4	16	
30		Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre		4	7	28	Max 49=100 yr or 5yr rain & combination; sig bsmt flood - emerg response critical		7	7	49			4	6	24	
#		Mackenzie Hall Cultural Centre		4	3	12			7	2	14			4	4	16	
#		St John's Anglican Church - historic site		4	3	12			7	2	14			4	4	16	
33		Islamic Academy Windsor		4	6	24	Max 42= 5 & 100yr & combination		7	6	42			4	5	20	
34		Society of St Vincent de Paul		4	6	24	Max 42= 5 & 100yr & combination		7	6	42			4	5	20	
35		General Brock Public School		4	5	20	Max 35=5 & 100yr & combination		7	5	35			4	5	20	
36		Sandwich Teen Action Group		4	6	24	Max 42=5 & 100yr & combination		7	6	42			4	5	20	
37		Sandwich First Baptist Church		4	5	20	Max 21= due 100yr rain		7	3	21			4	2	8	
	Park Assets	Paterson Park		4	4	16			7	2	14			4	3	12	
		Bradley Park		4	4	16			7	2	14			4	2	8	
		Mackenzie Hall Park		4	4	16			7	2	14			4	2	8	
41	Energy and Communications Infrastructure	Overhead electrical distribution		4	3	12	Max 30= sensitive to wind, ice abv gnd; Also 100yr rain & HWL blo gnd;		7	2	14			4	2	8	
42		Sub-grade vaults and/or transformers		4	7	28	Max 28= due 100yr rain & HWL blo gnd; wind, ice abv gnd		7	2	14			4	5	20	
43		Telecommunication		4	4	16	Max 30=due wind, ice abv gnd; Alao 100yr rain & HWL below gnd;		7	2	14			4	3	12	
	Other Residential Buildings	See Part 4															
	Other Commercial Buildings	See Part 4															
	Industrial Assets	*Sterling Fuels - Office and tank farm E of Russel St*		4	4	16			7	2	14			4	4	16	
		Other Industrial Buildings - See Part 4															
	Part 2																
	Zone 2 - W of Russel St., N of Broadway St., W to shoreline																
	Wastewater System Assets	Ojibway Parkway - Combined Sewer		4	5	20	21=100 yr rainfall; sig HGLs		7	3	21			4	3	12	
		Riverside Dr - Combined Sewer		4	5	20	21=100 yr rainfall; sig HGLs		7	3	21			4	3	12	
		Sandwich Street - Combined Sewer		4	6	24	42=5 yr & 100 yr rainfall; mdt sfc flooding (0.5-1m)		7	6	42			4	4	16	
		Interceptor Maintenance Holes (MH)		4	5	20			7	3	21			4	7	28	
		Sanitary Sewers - See Part 4		4	5	20			7	4	28			4	7	28	
		Maintenance Covers		4	2	8			7	2	14			4	7	28	
		Pump Stations		4	5	20			7	4	28			4	7	28	
		Prospect Ave Pump Station (temporary) - power + outfall Ave		4	6	24	35=Most high water levels (<< 100 year event)		7	3	21			4	7	28	
		Pump Station - McKee Road		4	7	28	35=<100 yr HWL; extreme rain; backflow during HWL. Street flooding		7	3	21			4	7	28	
	Stormwater System Assets	Open drainage channels		4	4	16			7	2	14			4	7	28	
		Storm Sewers		4	5	20			7	2	14			4	7	28	
		Brock Street Outfall		4	5	20	28=significant shoreline erosion		7	2	14			4	6	24	
		Maintenance holes		4	5	20			7	2	14			4	7	28	
		Catch Basins		4	5	20			7	2	14			4	7	28	
		McKee Creek catch basin		4	7	28	35 = <100 yr HWL & extreme rain; submerged HWK & surcharged extreme rain		7	3	21			4	7	28	
		Drains		4	5	20			7	2	14			4	7	28	
		Culverts		4	5	20			7	2	14			4	7	28	
	Shoreline Stormwater/ Flood Protection Infrastructure	Outfall for Lou Romano Water Reclamation Plant (LRWRP)		4	7	28	Max 49 risk w<<100 yr HWL; Blockage main outfall, backflow into plant for treatment river water		7	5	35			4	7	28	
		Mill St - Outfall, CS & catchment basin		4	6	24	35=<100 year HWL, combined river level or wave/freeboard		7	3	21			4	7	28	
	Transportation	Major Roadway - Ojibway Parkway		4	6	24	35=100 year rain, outfall higher than ditch, floods right over		7	5	35			4	5	20	
		Road & Open Ditch - Prospect Ave		4	6	24	35=100 year rain possibly lower, outfall higher than ditch, floods right over		7	5	35			4	5	20	
		Major Roadway - Riverside Drive		4	5	20			7	2	14			4	3	12	
		Major Roadway - Sandwich Street		4	6	24			7	6	42			4	4	16	
		Ambassador Bridge/Huron-Church catch basin, outfall, weir		4	7	28	35=extreme rain with <<100 yr HWL; 100 yr rain; 5 yr rain		7	5	35			4	6	24	
		Prospect Ave - Road and open drainage		4	6	24	36=100 year rain possibly lower, outfall higher than ditch, floods right over		7	5	35			4	5	20	
		ETR Rail and Gore Creek		4	6	24	35=extreme rain and HWL; Gore Ck flooding across Sandwich St, ETR rail and siding		7	3	21			4	6	24	
		ETR Rail and McKee Creek		4	6	24	35=extreme rain and HWL; Road flooding, flagged by City		7	3	21			4	6	24	
		Rail Tracks		4	3	12	Max 35=combination events		7	2	14			4	6	24	
		St Michael's Adult Secondary School		4	3	12			7	2	14			4	5	20	
		Duff - Baby House (museum)		4	3	12			7	2	14			4	5	20	
		Canada South Science City - Tourist Attraction		4	6	24	Max 35=due 100yr & 5yr rain; high HGL		7	5	35			4	5	20	
		West Windsor Musallah - Mosque		4	7	28	Max 42= 100 yr or 5yr rain & combination; High HGL		7	6	42			4	5	20	

Infrastructure Components	4 Extreme River Levels: Current HWL - 175.9 m				Current 100 year level for Detroit River in region; 100 year level in 2020	5 Combination Events: Current 100 yr HWL + extreme rainfall (100 year storm)				Combined probability event modeling results: HWL + extreme 4-hour rainfall event	6 Combination Events: Current 100 yr HWL + Moderate Rainfall (5-year storm)				Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check	7 Combination Events: Climate Chg HWL + extreme rainfall (100 year storm)				Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check
	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score
Part 1 – Zone 1																				
Felix Avenue - Combined sewer		4	5	20			2	7	14			4	7	28			4	7	28	
Mill St - combined sewer		4	6	24			2	6	12			4	6	24			4	6	24	
Riverside Dr - combined sewer		4	4	16			2	6	12			4	4	16			4	5	20	
Interceptor Maintenance Holes (MH)		4	7	28			2	7	14			4	7	28			4	7	28	
Sanitary Sewers		4	7	28			2	7	14			4	7	28			4	7	28	
Maintenance Covers		4	7	28			2	7	14			4	7	28			4	7	28	
Pump Stations		4	7	28			2	7	14			4	7	28			4	7	28	
LRWRP: Inflow from Western Trunk line specifically (<<100 year water levels for impacts)		4	5	20			2	7	14			4	7	28			4	7	28	
Lou Romano Water Reclamation Plant (LRWRP)		4	7	28			2	7	14			4	7	28			4	7	28	
Open drainage channels		4	7	28			2	6	12			4	7	28			4	7	28	
Russell Street - open channel drainage		4	2	8			2	6	12			4	3	12			4	6	24	
Storm Sewers		4	7	28			2	6	12			4	7	28			4	7	28	
Outfalls		4	7	28			2	6	12			4	7	28			4	7	28	
Maintenance holes		4	7	28			2	6	12			4	7	28			4	7	28	
Catch Basins		4	7	28			2	6	12			4	7	28			4	7	28	
Drains		4	7	28			2	6	12			4	7	28			4	7	28	
Culverts		4	7	28			2	6	12			4	7	28			4	7	28	
Major Roadway - Felix Avenue (due combined sewer)		4	6	24			2	7	14			4	7	28			4	7	28	
Major Roadway - Huron Church Road		4	N/A				2	5	10			4	2	8			4	5	20	
Major Roadway - Mill Street (due combined sewer)		4	4	16			2	6	12			4	3	12			4	6	24	
Major Roadway - Ojibway Parkway		4	3	12			2	4	8			4	2	8			4	3	12	
Major Roadway - Prince Road		4	3	12			2	4	8			4	2	8			4	5	20	
Major Roadway - Riverside Drive (due combined sewer)		4	4	16			2	5	10			4	4	16			4	5	20	
Major Roadway - Sandwich Street		4	4	16			2	7	14			4	5	20			4	7	28	
Major Roadway - University Avenue		4	4	16			2	5	10			4	4	16			4	5	20	
Major Roadway - Wyandotte Street W		4	4	16			2	5	10			4	4	16			4	5	20	
Ambassador Bridge/Canadian Border Services: Entrance/onramp		4	4	16			2	7	14			4	6	24			4	7	28	
Rail Tracks		4	5	20			2	7	14			4	6	24			4	7	28	
St Michael's Adult Secondary School		4	5	20			2	6	12			4	5	20			4	6	24	
Duff - Baby House (museum)		4	5	20			2	5	10			4	5	20			4	5	20	
Canada South Science City - Tourist Attraction		4	4	16			2	7	14			4	6	24			4	7	28	
West Windsor Musallah - Mosque		4	4	16			2	7	14			4	6	24			4	7	28	
Windsor Essex Community Health - Community Centre		4	4	16			2	4	8			4	4	16			4	4	16	
Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre		4	6	24			2	7	14			4	7	28			4	7	28	
Mackenzie Hall Cultural Centre		4	4	16			2	4	8			4	4	16			4	4	16	
St John's Anglican Church - historic site		4	4	16			2	4	8			4	4	16			4	4	16	
Islamic Academy Windsor		4	4	16			2	7	14			4	6	24			4	7	28	
Society of St Vincent de Paul		4	4	16			2	7	14			4	6	24			4	7	28	
General Brock Public School		4	4	16			2	6	12			4	5	20			4	7	28	
Sandwich Teen Action Group		4	4	16			2	7	14			4	6	24			4	7	28	
Sandwich First Baptist Church		4	2	8			2	5	10			4	3	12			4	5	20	
Paterson Park		4	3	12			2	5	10			4	2	8			4	5	20	
Bradley Park		4	2	8			2	2	4			4	2	8			4	2	8	
Mackenzie Hall Park		4	2	8			2	2	4			4	2	8			4	2	8	
Overhead electrical distribution		4	1	4			2	3	6			4	2	8			4	2	8	
Sub-grade vaults and/or transformers		4	2	8			2	7	14			4	6	24			4	7	28	
Telecommunication		4	2	8			2	4	8			4	3	12			4	4	16	
See Part 4 (Other Residential Buildings)																				
See Part 4 (Other Commercial Buildings)																				
Sterling Fuels - Office and tank farm E of Russel St		4	3	12			2	5	10			4	4	16			4	6	24	
Other Industrial Buildings - See Part 4																				
Part 2 – Zone 2																				
Ojibway Parkway - Combined Sewer		4	2	8			2	7	14			4	3	12			4	5	20	
Riverside Dr - Combined Sewer		4	2	8			2	7	14			4	3	12			4	5	20	
Sandwich Street - Combined Sewer		4	3	12			2	7	14			4	6	24			4	7	28	
Interceptor Maintenance Holes (MH)		4	7	28			2	7	14			4	7	28			4	7	28	
Sanitary Sewers - See Part 4		4	7	28			2	7	14			4	7	28			4	7	28	
Maintenance Covers		4	7	28			2	7	14			4	7	28			4	7	28	
Pump Stations		4	7	28			2	7	14			4	7	28			4	7	28	
Prospect Ave Pump Station (temporary) - power + outfall Ave		4	5	20			2	7	14			4	6	24			4	7	28	
Pump Station - McKee Road		4	6	24			2	7	14			4	6	24			4	7	28	
Open drainage channels		4	7	28			2	6	12			4	7	28			4	7	28	
Storm Sewers		4	7	28			2	6	12			4	7	28			4	7	28	
Brock Street Outfall		4	5	20			2	7	14			4	6	24			4	7	28	
Maintenance holes		4	7	28			2	6	12			4	7	28			4	7	28	
Catch Basins		4	7	28			2	6	12			4	7	28			4	7	28	
McKee Creek catch basin		4	6	24			2	7	14			4	5	20			4	7	28	
Drains		4	7	28			2	6	12			4	7	28			4	7	28	
Culverts		4	7	28			2	6	12			4	7	28			4	7	28	
Outfall for Lou Romano Water Reclamation Plant (LRWRP)		4	7	28			2	7	14			4	7	28			4	7	28	
Mill St - Outfall, CS & catchment basin		4	6	24			2	6	12			4	6	24			4	7	28	
Major Roadway - Ojibway Parkway		5	5	25			2	7	14			4	5	20			4	7	28	
Road & Open Ditch - Prospect Ave		4	5	20			2	7	14			4	5	20			4	7	28	
Major Roadway - Riverside Drive		4	2	8			2	7	14			4	3	12			4	5	20	
Major Roadway - Sandwich Street		4	3	12			2	7	14			4	6	24			4	7	28	
Ambassador Bridge/Huron-Church catch basin, outfall, weir		4	6	24			2	7	14			4	6	24			4	6	24	
Prospect Ave - Road and open drainage		4	5	20			2	7	14			4	5	20			4	7	28	
ETR Rail and Gore Creek		4	5	20			2	6	12			4	5	20			4	7	28	
ETR Rail and McKee Creek		4	5	20			2	6	12			4	5	20			4	7	28	
Rail Tracks		4	5	20			2	7	14			4	6	24			4	7	28	
St Michael's Adult Secondary School		4	5	20			2	6	12			4	5	20			4	6	24	
Duff - Baby House (museum)		4	5	20			2	5	10			4	5	20			4	5	20	
Canada South Science City - Tourist Attraction		4	4	16			2	7	14			4	6	24			4	7	28	
West Windsor Musallah - Mosque		4	4	16			2	7	14			4	6	24			4	7	28	

Infrastructure Components	8 Combination Events: Climate Chg HWL + moderate rainfall (5 year storm)				Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check	9 Combination Events: HWL + wave action (freeboard)				Case Studies (from HIRA): November 13-15, 1972, March 31 & April 6, 1985, April 4, 1987, June 2015, Spring 2019	10 Secondary Impact Events: Major ice storm - 28mm or more				Multi-day loss of power - CSA Overhead Design 100 year event - between reliability 1 and 2
	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score
Part 1 – Zone 1															
Felix Avenue - Combined sewer		4	7	28			7	4	28			4	3	12	
Mill St - combined sewer		4	6	24			7	4	28			4	3	12	
Riverside Dr - combined sewer		4	4	16			7	4	28			4	3	12	
Interceptor Maintenance Holes (MH)		4	7	28			7	N/A				4	3	12	
Sanitary Sewers		4	7	28			7	N/A				4	3	12	
Maintenance Covers		4	7	28			7	N/A				4	4	16	
Pump Stations		4	7	28			7	N/A				4	4	16	
LRWRP: Inflow from Western Trunk line specifically (<<100 year water levels for impacts)		4	7	28			7	7	49			4	4	16	
Lou Romano Water Reclamation Plant (LRWRP)		4	7	28			7	7	49			4	4	16	
Open drainage channels		4	7	28			7	N/A				4	5	20	
Russell Street - open channel drainage		4	3	12			7	3	21			4	2	8	
Storm Sewers		4	7	28			7	N/A				4	2	8	
Outfalls		4	7	28			7	N/A				4	2	8	
Maintenance holes		4	7	28			7	N/A				4	4	16	
Catch Basins		4	7	28			7	N/A				4	5	20	
Drains		4	7	28			7	N/A				4	4	16	
Culverts		4	7	28			7	N/A				4	5	20	
Major Roadway - Felix Avenue (due combined sewer)		4	7	28			7	N/A				4	3	12	
Major Roadway - Huron Church Road		4	4	16			7	N/A				4	2	8	
Major Roadway - Mill Street (due combined sewer)		4	4	16			7	N/A				4	2	8	
Major Roadway - Ojibway Parkway		4	3	12			7	N/A				4	3	12	
Major Roadway - Prince Road		4	4	16			7	N/A				4	2	8	
Major Roadway - Riverside Drive (due combined sewer)		4	4	16			7	3	21			4	3	12	
Major Roadway - Sandwich Street		4	6	24			7	5	35			4	3	12	
Major Roadway - University Avenue		4	4	16			7	N/A				4	3	12	
Major Roadway - Wyandotte Street W		4	4	16			7	N/A				4	3	12	
Ambassador Bridge/Canadian Border Services: Entrance/onramp		4	5	20			7	5	35			4	5	20	
Rail Tracks		4	6	24			7	5	35			4	3	12	
St Michael's Adult Secondary School		4	5	20			7	N/A				4	4	16	
Duff - Baby House (museum)		4	5	20			7	N/A				4	4	16	
Canada South Science City - Tourist Attraction		4	7	28			7	5	35			4	3	12	
West Windsor Musallah - Mosque		4	7	28			7	4	28			4	3	12	
Windsor Essex Community Health - Community Centre		4	4	16			7	N/A				4	5	20	
Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre		4	7	28			7	N/A				4	5	20	
Mackenzie Hall Cultural Centre		4	4	16			7	N/A				4	4	16	
St John's Anglican Church - historic site		4	4	16			7	N/A				4	4	16	
Islamic Academy Windsor		4	6	24			7	4	28			4	3	12	
Society of St Vincent de Paul		4	6	24			7	4	28			4	3	12	
General Brock Public School		4	5	20			7	4	28			4	4	16	
Sandwich Teen Action Group		4	6	24			7	4	28			4	3	12	
Sandwich First Baptist Church		4	3	12			7	3	21			4	3	12	
Paterson Park		4	2	8			7	3	21			4	3	12	
Bradley Park		4	2	8			7	1	7			4	3	12	
Mackenzie Hall Park		4	2	8			7	1	7			4	3	12	
Overhead electrical distribution		4	2	8			7	1	7			4	5	20	
Sub-grade vaults and/or transformers		4	3	12			7	4	28			4	5	20	
Telecommunication		4	2	8			7	2	14			4	4	16	
See Part 4 (Other Residential Buildings)															
See Part 4 (Other Commercial Buildings)															
Sterling Fuels - Office and tank farm E of Russel St		4	5	20			7	3	21			4	5	20	
Other Industrial Buildings - See Part 4															
Part 2 – Zone 2															
Ojibway Parkway - Combined Sewer		4	3	12			7	2	14			4	2	8	
Riverside Dr - Combined Sewer		4	3	12			7	2	14			4	2	8	
Sandwich Street - Combined Sewer		4	6	24			7	2	14			4	3	12	debris generation
Interceptor Maintenance Holes (MH)		4	7	28			7	N/A				4	3	12	
Sanitary Sewers - See Part 4		4	7	28			7	N/A				4	3	12	
Maintenance Covers		4	7	28			7	N/A				4	4	16	
Pump Stations		4	7	28			7	N/A				4	5	20	power outages
Prospect Ave Pump Station (temporary) - power + outfall Ave		4	7	28			7	5	35			4	5	20	power outage
Pump Station - McKee Road		4	7	28			7	5	35			4	5	20	power outage
Open drainage channels		4	7	28			7	N/A				4	5	20	
Storm Sewers		4	7	28			7	N/A				4	2	8	
Brock Street Outfall		4	6	24			7	4	28			4	2	8	
Maintenance holes		4	7	28			7	N/A				4	4	16	
Catch Basins		4	7	28			7	N/A				4	5	20	
McKee Creek catch basin		4	6	24			7	5	35			4	2	8	
Drains		4	7	28			7	N/A				4	4	16	
Culverts		4	7	28			7	N/A				4	5	20	
Outfall for Lou Romano Water Reclamation Plant (LRWRP)		4	7	28			7	7	49			4	4	16	
Mill St - Outfall, CS & catchment basin		4	7	28			7	5	35			4	3	12	
Major Roadway - Ojibway Parkway		4	5	20			7	4	28			4	4	16	
Road & Open Ditch - Prospect Ave		4	5	20			7	4	28			4	4	16	
Major Roadway - Riverside Drive		4	3	12			7	2	14			4	2	8	
Major Roadway - Sandwich Street		4	6	24			7	2	14			4	3	12	debris generation
Ambassador Bridge/Huron-Church catch basin, outfall, weir		4	6	24			7	5	35			4	3	12	
Prospect Ave - Road and open drainage		4	5	20			7	4	28			4	4	16	
ETR Rail and Gore Creek		4	6	24			7	5	35			4	2	8	
ETR Rail and McKee Creek		4	6	24			7	5	35			4	2	8	
Rail Tracks		4	6	24			7	5	35			4	3	12	
St Michael's Adult Secondary School		4	5	20			7	N/A				4	4	16	
Duff - Baby House (museum)		4	5	20			7	N/A				4	4	16	
Canada South Science City - Tourist Attraction		4	7	28			7	5	35			4	3	12	
West Windsor Musallah - Mosque		4	7	28			7	4	28			4	3	12	

Infrastructure Components	11 Secondary Impact Events: Extreme Wind Event - 120 km/h				debris generation, loss of site access, damage to above-ground infrastructure (plant, pump houses)	12 Secondary Impact Events: Tornado - (E)F2+				debris generation, loss of site access, severe damage to above-ground infrastructure (plant, pump houses)	13 Secondary Impact Events: Weathering (freeze thaw) - Concrete and masonry impacts - total cycles					14 Secondary Impact Events: Weathering (freeze thaw) - Concrete and masonry impacts - 30-cycle increments				
	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score
Part 1 – Zone 1																				
Felix Avenue - Combined sewer		6	3	18			2	5	10			7	3	21			7	3	21	
Mill St - combined sewer		6	3	18			2	5	10			7	3	21			7	3	21	
Riverside Dr - combined sewer		6	3	18			2	5	10			7	3	21			7	3	21	
Interceptor Maintenance Holes (MH)		6	3	18			2	5	10			7	1	7			7	1	7	
Sanitary Sewers		6	3	18			2	4	8			7	1	7			7	1	7	
Maintenance Covers		6	2	12			2	5	10			7	3	21			7	3	21	
Pump Stations		6	4	24			2	5	10			7	1	7			7	1	7	
LRWRP: Inflow from Western Trunk line specifically (<<100 year water levels for impacts)		6	4	24			2	7	14			7	2	14			7	2	14	
Lou Romano Water Reclamation Plant (LRWRP)		6	4	24			2	7	14			7	2	14			7	2	14	
Open drainage channels		6	5	30			2	7	14			7	3	21			7	3	21	
Russell Street - open channel drainage		6	2	12			2	5	10			7	2	14			7	2	14	
Storm Sewers		6	3	18			2	5	10			7	2	14			7	2	14	
Outfalls		6	2	12			2	3	6			7	2	14			7	2	14	
Maintenance holes		6	3	18			2	6	12			7	2	14			7	2	14	
Catch Basins		6	5	30			2	7	14			7	2	14			7	2	14	
Drains		6	4	24			2	5	10			7	2	14			7	2	14	
Culverts		6	5	30			2	6	12			7	3	21			7	3	21	
Major Roadway - Felix Avenue (due combined sewer)		6	3	18			2	6	12			7	3	21			7	3	21	
Major Roadway - Huron Church Road		6	2	12			2	6	12			7	3	21			7	3	21	
Major Roadway - Mill Street (due combined sewer)		6	2	12			2	6	12			7	3	21			7	3	21	
Major Roadway - Ojibway Parkway		6	3	18			2	7	14			7	3	21			7	3	21	
Major Roadway - Prince Road		6	2	12			2	6	12			7	3	21			7	3	21	
Major Roadway - Riverside Drive (due combined sewer)		6	3	18			2	7	14			7	3	21			7	3	21	
Major Roadway - Sandwich Street		6	4	24			2	7	14			7	3	21			7	3	21	
Major Roadway - University Avenue		6	3	18			2	7	14			7	3	21			7	3	21	
Major Roadway - Wyandotte Street W		6	3	18			2	7	14			7	3	21			7	3	21	
Ambassador Bridge/Canadian Border Services: Entrance/onramp		6	5	30			2	7	14			7	3	21			7	3	21	
Rail Tracks		6	3	18			2	3	6			7	2	14			7	2	14	
St Michael's Adult Secondary School		6	4	24			2	7	14			7	2	14			7	2	14	
Duff - Baby House (museum)		6	4	24			2	7	14			7	2	14			7	2	14	
Canada South Science City - Tourist Attraction		6	4	24			2	7	14			7	2	14			7	2	14	
West Windsor Musallah - Mosque		6	4	24			2	7	14			7	2	14			7	2	14	
Windsor Essex Community Health - Community Centre		6	5	30			2	7	14			7	2	14			7	2	14	
Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre		6	5	30			2	7	14			7	2	14			7	2	14	
Mackenzie Hall Cultural Centre		6	4	24			2	7	14			7	2	14			7	2	14	
St John's Anglican Church - historic site		6	4	24			2	7	14			7	2	14			7	2	14	
Islamic Academy Windsor		6	4	24			2	7	14			7	2	14			7	2	14	
Society of St Vincent de Paul		6	4	24			2	7	14			7	2	14			7	2	14	
General Brock Public School		6	4	24			2	7	14			7	2	14			7	2	14	
Sandwich Teen Action Group		6	4	24			2	7	14			7	2	14			7	2	14	
Sandwich First Baptist Church		6	3	18			2	7	14			7	2	14			7	2	14	
Paterson Park		6	4	24			2	6	12			7	2	14			7	2	14	
Bradley Park		6	4	24			2	6	12			7	2	14			7	2	14	
Mackenzie Hall Park		6	4	24			2	6	12			7	2	14			7	2	14	
Overhead electrical distribution		6	5	30			2	7	14			7	2	14			7	2	14	
Sub-grade vaults and/or transformers		6	4	24			2	5	10			7	2	14			7	2	14	
Telecommunication		6	5	30			2	7	14			7	2	14			7	2	14	
See Part 4 (Other Residential Buildings)																				
See Part 4 (Other Commercial Buildings)																				
Sterling Fuels - Office and tank farm E of Russel St		6	4	24			2	7	14			7	2	14			7	2	14	
Other Industrial Buildings - See Part 4																				
Part 2 – Zone 2																				
Ojibway Parkway - Combined Sewer		6	2	12			2	6	12			7	2	14			7	2	14	
Riverside Dr - Combined Sewer		6	2	12			2	6	12			7	2	14			7	2	14	
Sandwich Street - Combined Sewer		3	4	12	debris generation; tree uprooting		2	5	10			7	2	14			7	2	14	
Interceptor Maintenance Holes (MH)		6	3	18			2	5	10			7	1	7			7	1	7	
Sanitary Sewers - See Part 4		6	3	18			2	4	8			7	1	7			7	1	7	
Maintenance Covers		6	2	12			2	5	10			7	3	21			7	3	21	
Pump Stations		6	5	30	power outages, debris		2	5	10			7	1	7			7	1	7	
Prospect Ave Pump Station (temporary) - power + outfall Ave		6	5	30	power outage, debris		2	6	12			7	2	14			7	2	14	
Pump Station - McKee Road		6	5	30			2	6	12			7	2	14			7	2	14	
Open drainage channels		6	5	30			2	7	14			7	3	21			7	3	21	
Storm Sewers		6	3	18			2	5	10			7	2	14			7	2	14	
Brock Street Outfall		6	2	12			2	6	12			7	3	21			7	3	21	
Maintenance holes		6	3	18			2	6	12			7	2	14			7	2	14	
Catch Basins		6	5	30			2	7	14			7	2	14			7	2	14	
McKee Creek catch basin		6	2	12			2	6	12			7	2	14			7	2	14	
Drains		6	4	24			2	5	10			7	2	14			7	2	14	
Culverts		6	5	30			2	6	12			7	3	21			7	3	21	
Outfall for Lou Romano Water Reclamation Plant (LRWRP)		6	4	24			2	7	14			7	2	14			7	2	14	
Mill St - Outfall, CS & catchment basin		6	3	18			2	6	12			7	2	14			7	2	14	
Major Roadway - Ojibway Parkway		6	3	18			2	6	12			7	2	14			7	2	14	
Road & Open Ditch - Prospect Ave		6	3	18			2	6	12			7	2	14			7	2	14	
Major Roadway - Riverside Drive		6	2	12			2	6	12			7	2	14			7	2	14	
Major Roadway - Sandwich Street		6	4	24	debris generation; tree uprooting		2	5	10			7	2	14			7	2	14	
Ambassador Bridge/Huron-Church catch basin, outfall, weir		6	3	18			2	6	12			7	3	21			7	3	21	
Prospect Ave - Road and open drainage		6	3	18			2	6	12			7	2	14			7	2	14	
ETR Rail and Gore Creek		6	3	18			2	6	12			7	3	21			7	3	21	
ETR Rail and McKee Creek		6	3	18			2	6	12			7	3	21			7	3	21	
Rail Tracks		6	3	18			2	3	6			7	2	14			7	2	14	
St Michael's Adult Secondary School		6	4	24			2	7	14			7	2	14			7	2	14	
Duff - Baby House (museum)		6	4	24			2	7	14			7	2	14			7	2	14	
Canada South Science City - Tourist Attraction		6	4	24			2	7	14			7	2	14			7	2	14	
West Windsor Musallah - Mosque		6	4	24			2	7	14			7	2	14			7	2	14	

		1 Extreme Rainfall				2 Extreme Rainfall			3 Extreme River Levels			4 Extreme River Levels			5 Combination Events			6 Combination Events			7 Combination Events			8 Combination Events			9 Combination Events		10 Secondary Impact Events		11 Secondary Impact Events		12 Secondary Impact Events		13 Secondary Impact Events		14 Secondary Impact Events	
Infrastructure Class	**Infrastructure Components**	**"Major" 100-yr Storm - 82mm in 4 hours (Peak rate of 145 mm/h)**			Model storms 4-hour Chicago distribution based on peak rainfall rate	**"Minor" 5-year Storm - 50mm in 4 hours (peak rate of 29.5 mm/hr)**			Model storms 4-hour Chicago distribution based on peak rainfall rate	**"Likely" high CC HWL - 176.1 m**			Adjusted HWL for our study - Based on HA's lit review and extensive group discussion	**Current HWL - 175.9 m**			Current 100 year level for Detroit River in region; 100 year level in 2020	**Current 100 yr HWL + extreme rainfall (100 year storm)**			Combined probability event modeling results; HWL + extreme 4-hour rainfall event	**Current 100 yr HWL + Moderate Rainfall (5-year storm)**			Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check	**Climate Chg HWL + extreme rainfall (100 year storm)**			Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check	**Climate Chg HWL + moderate rainfall (5 year storm)**			Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check	**HWL + wave action (freeboard)**		Case Studies (from HIRA): November 13-15, 1972, March 31 & April 6, 1985, April 4, 1987, June 2015, Spring 2019	**Major ice storm - 28mm or more**		Multi-day loss of power - CSA Overhead Design 100 year event - between reliability 1 and 2	**Extreme Wind Event - 120 km/h**		debris generation, loss of site access, damage to above-ground infrastructure (plant, pump houses)	**Tornado - (E)F2+**		debris generation, loss of site access, severe damage to above-ground infrastructure (plant, pump houses)	**Weathering (freeze thaw) -** Concrete and masonry impacts - total cycles			**Weathering (freeze thaw) -** Concrete and masonry impacts - 30-cycle increments		
Institutional Buildings	Windsor Essex Community Health - Community Centres	4	3	12		7	2	14		4	4	16		4	4	16		2	4	8		4	4	16		4	4	16		7	N/A			4	5	20		6	5	30		2	7	14		7	2	14		7	2	14	
	Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre	4	7	28	Max **49**=100 yr or 5yr rain & combination; sig bsmt flood - emerg response critical	7	7	**49**		4	6	24		4	6	24		2	7	14		4	7	28		4	7	28		7	N/A			4	5	20		6	5	30		2	7	14		7	2	14		7	2	14	
	Mackenzie Hall Cultural Centre	4	3	12		7	2	14		4	4	16		4	4	16		2	4	8		4	4	16		4	4	16		7	N/A			4	4	16		6	4	24		2	7	14		7	2	14		7	2	14	
	St John's Anglican Church - historic site	4	3	12		7	2	14		4	4	16		4	4	16		2	4	8		4	4	16		4	4	16		7	N/A			4	4	16		6	4	24		2	7	14		7	2	14		7	2	14	
	Islamic Academy Windsor	4	6	24	Max 42= S & 100yr & combination	7	6	**42**		4	5	20		4	4	16		2	7	14		4	6	24		4	7	28		7	4	28		4	3	12		6	4	24		2	7	14		7	2	14		7	2	14	
	Society of St Vincent de Paul	4	6	24	Max 42= S & 100yr & combination	7	6	**42**		4	5	20		4	4	16		2	7	14		4	6	24		4	7	28		7	4	28		4	3	12		6	4	24		2	7	14		7	2	14		7	2	14	
	General Brock Public School	4	5	20	Max 35=IS & 100yr & combination	7	5	**35**		4	5	20		4	4	16		2	6	12		4	5	20		4	7	28		7	4	28		4	4	16		6	4	24		2	7	14		7	2	14		7	2	14	
	Sandwich Teen Action Group	4	6	24	Max 42=IS & 100yr & combination	7	6	**42**		4	5	20		4	4	16		2	7	14		4	6	24		4	7	28		7	4	28		4	3	12		6	4	24		2	7	14		7	2	14		7	2	14	
	Sandwich First Baptist Church	4	5	**20**	Max 30= due 100yr rain	7	3	21		4	2	8		4	2	8		2	5	10		4	3	12		4	5	20		7	3	21		4	3	12		6	3	18		2	7	14		7	2	14		7	2	14	
	Chateau Park LTC Centre	4	6	24	35=100 year rain; wind, waves	7	3	21		4	5	20		4	5	20		2	6	12		4	6	24		4	5	20		7	5	**35**		4	5	20		6	5	30		2	7	14		7	3	21		7	3	21	
	Great Lakes Institute for Environmental Studies /U of Windsor	4	6	24	35=100 year rain; High HGL?; basement flooding/	7	3	21		4	5	20		4	5	20		2	6	12		4	5	20		4	6	24		7	5	**35**		4	5	20		6	5	30		2	7	14		7	2	14		7	2	14	
	HMCS Hunter Navy Facility	4	3	12	35=>100 year HWL;erosion; WPA shoreline property, high scour building	7	2	14		4	7	28		4	6	24		2	6	12		4	6	24		4	7	28		7	5	**35**		4	3	12		6	5	30		2	7	14		7	3	21		7	3	21	
Park Assets	**McKee Park - Sandwich and Chewett Streets**	4	3	12	35= < 100 year HWL; shoreline flooding	7	2	14		4	5	20		4	5	20		2	5	10		4	5	20		4	5	20		7	5	**35**		4	2	8		6	2	12		2	7	14		7	3	21		7	3	21	
	Brock Park	4	4	16		7	2	14		4	4	16		4	3	12		2	4	8		4	5	20		4	5	20		7	4	28		4	2	8		6	3	18		2	6	12		7	3	21		7	3	21	
	Mill Park	4	4	16		7	2	14		4	2	8		4	2	8		2	4	4		4	2	8		4	2	8		7	2	14		4	2	8		6	4	24		2	6	12		7	2	14		7	2	14	
	Queen's Park	4	4	16		7	2	14		4	2	8		4	2	8		2	4	4		4	2	8		4	2	8		7	2	14		4	2	8		6	4	24		2	6	12		7	2	14		7	2	14	
	Chateau Park - Ambassador Bridge area	4	3	12	35=<100 year HWL; retaining wall submerged	7	1	7		4	6	24		4	5	20		2	5	10		4	6	24		4	6	24		7	5	**35**		4	2	8		6	2	12		2	5	10		7	3	21		7	3	21	
Energy and Communications Infrastructure	**JC Keith Transformer Station**	4	5	20	21HrBoding w high HGLS; critical 3rd party infrastructure, further study	7	3	**21**		4	4	16		4	3	12		2	6	12		4	4	16		4	4	16		7	3	21		4	5	20		6	3	18		2	6	12		7	2	14		7	2	14	
	Overhead electrical distribution	4	3	12	Max 30= sensitive to wind, ice abv grd; Also 100yr rain & HWL blo grd	7	2	14		4	2	8		4	1	4		2	3	6		4	2	8		4	2	8		7	1	7		4	5	20		6	5	**30**		2	7	14		7	2	14		7	2	14	
	Sub-grade vaults	4	7	**28**	Max 28= due 100yr rain & HWL blo grd; wind, ice abv grd	7	2	14		4	5	20		4	2	8		2	7	14		4	6	24		4	7	**28**		7	4	28		4	5	20		6	4	24		2	5	10		7	2	14		7	2	14	
	Sub-grade transformers	4	4	16	Max 30=due wind, ice abv grd; Also 100yr rain & HWL below grd	7	2	14		4	3	12		4	2	8		2	4	8		4	3	12		4	4	16		7	2	14		4	4	16		6	5	**30**		2	7	14		7	2	14		7	2	14	
	Telecommunication	4	4	16	Max 30=due wind, ice abv grd; Also 100yr rain & HWL below grd	7	2	14		4	3	12		4	2	8		2	4	8		4	3	12		4	4	16		7	2	14		4	4	16		6	5	**30**		2	7	14		7	2	14		7	2	14	
Industrial Assets	**Shoreline Properties - Mortrem Ltd; ADM Windsor**	4	5	20		7	3	21		4	3	12		4	2	8		2	6	12		4	4	16		4	5	20		7	4	28		4	6	24		6	4	24		2	6	12		7	2	14		7	2	14	
	Windsor Salt Mine - ditch entrance	4	7	28	49=HWL +100 yr; Combined prob; 100 year rain/ 5 year rain	7	5	35		4	6	24		4	6	24		2	7	14		4	7	28		4	7	28		7	7	**49**		4	2	8		6	2	12		2	6	12		7	2	14		7	2	14	
	Windsor Salt Mine	4	7	28	49=1 & 100 year extreme rain; Combined probabilities; surface flooding 0.75->1m; extreme HGLs	7	5	35		4	6	24		4	6	24		2	7	14		4	6	24		4	7	28		7	7	**49**		4	2	8		6	4	24		2	6	12		7	3	21		7	3	21	
	Shoreline Protection - retaining walls, rip-rap	4	3	12		7	1	7		4	5	20		4	4	16		2	5	10		4	6	24		4	5	20		7	4	28		4	2	8		6	3	18		2	5	10		7	3	21		7	3	21	

Part 3

Zone 3 - W of Ojibway Pkwy., N of Morten Dr. to Broadway St.

Wastewater and Stormwater System Assets	**Sprucewood Ave - Combined Sewer**	4	7	28	42=Combined event; 100 year and 5 year rain; ~1m flooding at rain events; Sig HGL/surcharge	7	6	**42**		4	5	20		4	4	16		2	7	14		4	6	24		4	7	28		4	6	24		7	5	35		4	5	20	power and pumping needed	6	5	30	power	2	6	12		7	2	14		7	2	14	
	Sprucewood Ave - Open ditches	4	6	24	42 = Extreme 5 & 100 year rain; workshop surchcharge indicated	7	6	**42**		4	4	16		4	3	12		2	7	14		4	6	24		4	7	28		4	6	24		7	4	28		4	3	12		6	3	18		2	6	12		7	3	21		7	3	21	
	Maintenance Covers	4	2	8		7	2	14		4	7	28		4	7	28		2	7	14		4	7	28		4	7	28		7	N/A			4	4	16		6	2	12		2	5	10		7	3	21		7	3	21	
	Pump Stations	4	5	20		7	4	28		4	7	28		4	7	28		2	7	14		4	7	28		4	7	28		7	N/A			4	5	20	power outages	6	5	30	power outages, debris	2	5	10		7	1	7		7	1	7	
	Open drainage channels	4	4	16		7	2	14		4	7	28		4	7	28		2	6	12		4	7	28		4	7	28		7	N/A			4	5	20		6	5	30		2	7	14		7	3	21		7	3	21	
	Storm Sewers	4	5	20		7	2	14		4	7	28		4	7	28		2	6	12		4	7	28		4	7	28		7	N/A			4	2	8		6	3	18		2	5	10		7	2	14		7	2	14	
	Outfalls - Location Specific	4	4	16		7	2	14		4	7	28		4	7	28		2	6	12		4	7	28		4	7	28		7	N/A			4	2	8		6	2	12		2	3	6		7	2	14		7	2	14	
	Maintenance holes	4	5	20		7	2	14		4	7	28		4	7	28		2	6	12		4	7	28		4	7	28		7	N/A			4	4	16		6	3	18		2	6	12		7	2	14		7	2	14	
	Catch Basins	4	5	20		7	2	14		4	7	28		4	7	28		2	6	12		4	7	28		4	7	28		7	N/A			4	5	20		6	5	30		2	7	14		7	2	14		7	2	14	
	Drains	4	5	20		7	2	14		4	7	28		4	7	28		2	6	12		4	7	28		4	7	28		7	N/A			4	4	16		6	4	24		2	5	10		7	2	14		7	2	14	
	Culverts	4	5	20		7	2	14		4	7	28		4	7	28		2	6	12		4	7	28		4	7	28		7	N/A			4	5	20		6	5	30		2	6	12		7	3	21		7	3	21	
Shoreline Stormwater/ Flood Protection Infrastructure	**CSOs**	4	5	20		7	4	28		4	6	24		7	5	35		2	7	14		4	5	20		4	7	28		7	N/A		Location specific	4	4	16		6	4	24		2	5	10		7	3	21		7	3	21	
Transportation	**Major Roadway - Ojibway Parkway**	4	7	28	35=Combined prob events; 100 year rain, 5 year rain; LOS for 63% road	7	5	**35**		4	2	8		4	2	8		2	7	14		4	6	24		4	7	28		4	7	28		7	5	35		4	4	16		6	4	24		2	6	12		7	2	14		7	3	21	
	Major Roadway - Sprucewood Avenue	4	7	28	42=100 year & 5 year rain; adjacent to wetland; modeling	7	6	**42**		4	2	8		4	2	8		2	7	14		4	6	24		4	7	28		4	6	24		7	2	14		4	4	16		6	3	18		2	6	12		7	2	14		7	2	14	
	Detroit-Windsor Truck Ferry	4	7	28	42=100 year rain, 5 year rain; Combined prob event; 0.75-1m surface flooding, trade importance	7	6	**42**		4	3	12		4	2	8		2	7	14		4	6	24		4	7	28		4	5	20		7	5	35		4	5	20		6	5	30		2	6	12		7	2	14		7	2	14	
	Rail Tracks	4	7	28	35=100 year & 5 year rain;Combined events; mdt surface flooding for 100 year rain	7	5	**35**		4	2	8		4	2	8		2	6	12		4	5	20		4	6	24		4	5	20		7	2	14		4	4	16		6	3	18		2	6	12		7	2	14		7	2	14	
Park Assets	**Black Oak Heritage Park**	4	5	20	35=100 year rain & combined; Extreme wind, ice storm; sfc flooding >0.3m in 100 year rain	7	3	21		4	2	8		4	2	8		2	6	12		4	3	12		4	6	24		4	4	16		7	3	21		4	5	20		6	5	**30**		2	6	12		7	2	14		7	2	14	
Energy and Communications Infrastructure	**Overhead electrical distribution**	4	3	12	Max 30= sensitive to wind, ice abv grd; Also 100yr rain & HWL blo grd	7	2	14		4	2	8		4	1	4		2	3	6		4	2	8		4	2	8		7	1	7		4	5	20		6	5	**30**		2	7	14		7	2	14		7	2	14	
	Sub-grade vaults	4	7	**28**	Max 28= due 100yr rain & HWL blo grd; wind, ice abv grd	7	2	14		4	5	20		4	2	8		2	7	14		4	6	24		4	7	**28**		4	3	12		7	4	28		4	5	20		6	4	24		2	5	10		7	2	14		7	2	14	
	Sub-grade transformers	4	4	16	Max 30=due wind, ice abv grd; Also 100yr rain & HWL below grd	7	2	14		4	3	12		4	2	8		2	4	8		4	3	12		4	4	16		4	2	8		7	2	14		4	4	16		6	5	**30**		2	7	14		7	2	14		7	2	14	
	Telecommunication	4	4	16	Max 30=due wind, ice abv grd; Also 100yr rain & HWL below grd	7	2	14		4	3	12		4	2	8		2	4	8		4	3	12		4	4	16		4	2	8		7	2	14		4	4	16		6	5	**30**		2	7	14		7	2	14		7	2	14	
Industrial Assets	**Shoreline Properties - Mortrem Ltd; ADM Windsor**	4	5	20		7	3	21		4	3	12		4	2	8		2	6	12		4	4	16		4	6	24		4	5	20		7	4	28		4	6	24		6	4	24		2	6	12		7	2	14		7	2	14	
	Windsor Salt Mine - ditch entrance	4	7	28	49=HWL +100 yr; Combined prob; 100 year rain/ 5 year rain	7	5	35		4	6	24		4	6	24		2	7	14		4	7	28		4	7	28		4	7	28		7	7	**49**		4	2	8		6	2	12		2	6	12		7	2	14		7	2	14	
	Windsor Salt Mine	4	7	28	49=1 & 100 year extreme rain; Combined probabilities; surface flooding 0.75->1m; extreme HGLs	7	5	35		4	6	24		4	6	24		2	7	14		4	6	24		4	7	28		4	7	28		7	7	**49**		4	2	8		6	4	24		2	6	12		7	3	21		7	3	21	
	Shoreline Protection - retaining walls, rip-rap	4	3	12		7	1	7		4	5	20		4	4	16		2	5	10		4	6	24		4	5	20		7	4	28		4	2	8		6	3	18		2	5	10		7	3	21		7	3	21	

Part 4

System-Wide Risks for Similar Assets and Critical Third Party Services - Generic

System-Wide (assuming nearly worst case)	*Zone 1* Residential Areas serviced by combined sewers	4	6	24	Max 42=Combined prob; 5 & 100 year rain generally	7	6	**42**		4	4	16		4	4	16		2	7	14		4	6	24		4	7	28		4	6	24		7	4	28		4	4	16		6	4	24		2	7	14		7	2	14		7	2	14	
	Zone 1 Commercial Areas serviced by combined sewers	4	7	28	Max 42=Combined prob; 5 & 100 year rain generally; Likely basement flooding; Surface flooding extreme rain	7	6	**42**		4	4	16		4	4	16		2	7	14		4	6	24		4	7	28		4	6	24		7	4	28		4	4	16		6	4	24		2	7	14		7	2	14		7	2	14	
	Zone 1 Industrial Buildings serviced by combined sewers	4	6	24	Max 42=100 & 5 year rain; Mainly surface & basement flooding	7	6	**42**		4	4	16		4	3	12		2	7	14		4	6	24		4	7	28		4	6	24		7	4	28		4	4	16		6	4	24		2	7	14		7	2	14		7	2	14	
	Zone 2 Combined Sewer Outfalls	4	5	20	Max 35=Combined prob events in high river levels above 174m; Blocked outfalls and backflooding into combined system; Lost sewer capacity for extreme rain	7	3	21		4	7	28		4	6	24		2	7	14		4	6	24		4	7	28		4	6	24		7	5	**35**		4	2	8		6	3	18		2	5	10		7	3	21		7	3	21	
	Zone 2 Residential Areas serviced by combined sewers	4	7	28	Max 49 = Heavy rainfalls; Surface flooding >1m; Potential basement flooding	7	7	**49**		4	4	16		4	3	12		2	7	14		4	7	28		4	7	28		4	7	28		7	3	21		4	5	20		6	5	30		2	6	12		7	2	14		7	2	14	
	Zone 2 Commercial Areas serviced by combined sewers	4	7	28	Max 42 = Heavy rainfall; Surface flooding >1m	7	6	**42**		4	2	8		4	2	8		2	7	14		4	6	24		4	7	28		4	6	24		7	3	21		4	2	8		6	3	18		2	6	12		7	2	14		7	2	14	
	Loss of Electrical power delivery - Pumps	4	4	16	30 =Any events damaging power delivery; Any assets below-grade (water intrusion); Power assets in Zone 2 flagged for further study	7	2	**14**		4	2	8		4	2	8		2	5	10		4	3	12		4	6	24		4	3	12		7	3	21		4	6	24		6	5	**30**		2	7	14		7	2	14		7	2	14	
	Loss of Comumunications - equipment monitoring	4	4	16	Max 30=Events giving damage to telephone lines; Below grade assets	7	3	21		4	2	8		4	2	8		2	5	10		4	3	12		4	6	24		4	3	12		7	3	21		4	5	20		6	5	**30**		2	7	14		7	2	14		7	2	14	
	Surface drainage and surface transportation (emergency response)	4	5	20	Max 30 = any wind >102 kph gusts or other damaging event affecting emergency response; Debris generation	7	3	21		4	2	8		4	2	8		2	5	10		4	3	12		4	5	20		4	3	12		7	3	21		4	6	24		6	5	**30**		2	7	14		7	1	7		7	1	7	
	Pad mounted electrical	4	7	**28**	Max 28= 100 year rainfall event; Extremely sensitive to surface flooding < 1m or more in depth; potential public safety risk	7	1	7		4	1	4		4	1	4		2	7	14		4	2	8		4	7	28		4	2	8		7	2	14		4	4	16		**6**	2	12		2	7	14		7	2	14		7	2	14	

Climate change risk assessment of the City of Windsor's West Windsor public, private and institutional assets and third party risks, focussing on flooding risks

This PIEVC risk assessment is divided into 4 parts. Parts 1, 2 and 3 reference Zones 1, 2 and 3 respectively, and refer to assets with medium to high climate change risks. These higher risks were identified via City of Windsor guidance, interviews, forensic analysis of past impacts, other reports and informed by modelling of the City's sewer, surface and river level flows. Part 4 refers to system-wide risks and third party services.

Highlighted Infrastructure components indicate Medium to High site risks

Future Condition - 2050

Hazards (column groups):

- 1 – Extreme Rainfall: "Major" 100-yr Storm - 82mm in 4 hours (Peak rate of 145 mm/h) — Models storms 4-hour Chicago distribution based on peak rainfall rate
- 2 – Extreme Rainfall: "Minor" 5-year Storm - 50mm in 4 hours (peak rate of 29.5 mm/hr) — Models storms 4-hour Chicago distribution based on peak rainfall rate
- 3 – Extreme River Levels: "Likely" CC HWL - 176.1 m — Adjusted HWL for our study - Based on HA's lit review and extensive group discussion
- 4 – Extreme River Levels: Current HWL - 175.9 m — Current 100 year level for Detroit River
- 5 – Combination Events: Current 100 yr HWL + extreme rainfall (100 year storm) — Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check
- 6 – Combination Events: Current 100 yr HWL + Moderate Rainfall (5-year storm) — Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check
- 7 – Combination Events: Climate Chg HWL + extreme rainfall (100 year storm) — Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check
- 8 – Combination Events: Climate Chg HWL + moderate rainfall (5 year storm) — Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check
- 9 – Combination Events: HWL + wave action (freeboard) — Case Studies (from HIRA): November 13-15, 1972, March 31 & April 6, 1985, April 4, 1987, June 2015, Spring 2019
- 10 – Secondary Impact Events: Major ice storm - 28mm or more — Multi-day loss of power - CSA Overhead Design 100 year event - between reliability 1 and 2
- 11 – Secondary Impact Events: Extreme Wind Event - 120 km/h — debris generation, loss of site access, damage to above-ground infrastructure (plant, pump houses)
- 12 – Secondary Impact Events: Tornado - (E)F2+ — debris generation, loss of site access, severe damage to above-ground infrastructure (plant, pump houses)
- 13 – Secondary Impact Events: Weathering (freeze thaw) - Concrete and masonry impacts - total cycles
- 14 – Secondary Impact Events: Weathering (freeze thaw) - Concrete and masonry impacts - 30-cycle increments

Part 1

Zone 1 - E of Russel S

No.	Infrastructure Class	Infrastructure Components	1 Y/N	1 P	1 S	1 R	1 Rationale For Severity Score	2 Y/N	2 P	2 S	2 R	2 Rationale For Severity Score	3 Y/N	3 P	3 S	3 R	3 Rationale For Severity Score	4 Y/N	4 P	4 S	4 R	4 Rationale For Severity Score
	Wastewater System Assets	Felix Avenue - Combined sewer		6	6	36	Max risk 36= Combined prob event; fails 5 year design storm criteria		7	5	35			4	7	28			4	5	20	
		Mill St - combined sewer		6	6	36	Max 36 = risk w 100 yr rain		7	3	21			4	5	20			4	6	24	
		Riverside Dr - combined sewer		6	5	30	Max 36 = risk w 100 yr rain		7	3	21			4	4	16			4	4	16	
2		Interceptor Maintenance Holes (MH)		6	5	30	Location specific		7	3	21	Location specific		4	7	28	worst case-see specific sites		5	7	35	worst case-see specific sites
3		Sanitary Sewers		6	5	30	Location specific		7	4	28	Location specific		4	7	28	worst case-see specific sites		5	7	35	worst case-see specific sites
4		Maintenance Covers		6	2	12	Location specific		7	2	14	Location specific		4	7	28	worst case-see specific sites		5	7	35	worst case-see specific sites
5		Pump Stations		6	5	30	Location specific		7	4	28	Location specific		4	7	28	worst case-see specific sites		5	7	35	worst case-see specific sites
		Lou Romano Water Reclamation Plant (LRWRP): *Inflow from Western Trunk line specifically* (<<100 year water levels for impacts)		6	6	36	Max 49 = <<100 yr HWL; comb events with high river		7	4	28			4	6	24			5	5	25	
6		Lou Romano Water Reclamation Plant (LRWRP)		6	7	42	Max 49 risk w<<100 yr HWL; Blockage main outfall, backflow into plant for treatment river water; loss capacity		7	4	28			4	7	28			5	7	35	
7	Stormwater System Assets	Open drainage channels		6	4	24	Location specific		7	2	14			4	7	28	worst case-see specific sites		5	7	35	worst case-see specific sites
		Russel Street - open channel drainage		6	6	36	36=Master @24 due xtrm rain		7	2	14			4	3	12	worst case-see specific sites		5	2	10	worst case-see specific sites
8		Storm Sewers		6	5	30	Location specific		7	2	14			4	7	28	worst case-see specific sites		5	7	35	worst case-see specific sites
9		Outfalls		6	4	24	Location specific		7	2	14			4	7	28	worst case-see specific sites		5	2	10	worst case-see specific sites
#		Maintenance holes		6	5	30	Location specific		7	2	14			4	7	28	worst case-see specific sites		5	7	35	worst case-see specific sites
#		Catch Basins		6	5	30	Location specific		7	2	14			4	7	28	worst case-see specific sites		5	7	35	worst case-see specific sites
#		Drains		6	5	30	Location specific		7	2	14			4	7	28	worst case-see specific sites		5	7	35	worst case-see specific sites
#		Culverts		6	5	30	Location specific		7	2	14			4	7	28	worst case-see specific sites		5	7	35	worst case-see specific sites
14	Transportation	Major Roadway - Felix Avenue		6	6	36	Fails 5 yr; 36=Master due xtrm rain; combination events		7	5	35			4	7	28			5	6	30	
#		Major Roadway - Huron Church Road		6	4	24			7	2	14			4	4	16			5	N/A		
#		Major Roadway - Mill Street		6	6	36	Excessive HGL		7	2	14			4	4	16			5	4	20	
#		Major Roadway - Ojibway Parkway		6	4	24			7	2	14			4	3	12			5	3	15	
#		Major Roadway - Prince Road		6	4	24			7	2	14			4	4	16			5	3	15	
#		Major Roadway - Riverside Drive		6	5	30	Excessive HGL		7	3	21			4	4	16			5	4	20	
20		Major Roadway - Sandwich Street		6	6	36	Max 36=100 yr rain; combination, high HGL, mdt ponding		7	4	28			4	5	20			5	4	20	
#		Major Roadway - University Avenue		6	4	24			7	2	14			4	4	16			5	4	20	
#		Major Roadway - Wyandotte Street W		6	4	24			7	2	14			4	4	16			5	4	20	
23		Ambassador Bridge/Canadian Border Services		6	6	36	Max 36= 100 yr rain; combination		7	4	28			4	4	16			5	4	20	
#		Rail Tracks		6	3	18	Max 42= combination events		7	2	14			4	6	24			5	5	25	
#	Institutional Buildings	St Michael's Adult Secondary School		6	3	18			7	2				4	5	20			5	5	25	
#		Duff - Baby House (museum)		6	3	18			7	2				4	5	20			5	5	25	
27		Canada South Science City - Tourist Attraction		6	6	36	Max 36=r due 100yr & 5yr rain		7	5	35			4	6	24			5	5	25	
28		West Windsor Musallah - Mosque		6	7	42	Max 42=r due 100 yr or 5 yr rain & combination; High HGL		7	6	42			4	5	20			5	4	20	
29		Windsor Essex Community Health - Community Centre		6	3	18			7	2				4	4	16			5	4	20	
30		Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre		6	7	42	Max 49= due 100 yr or 5yr rain & combination; sig bsmt flood - emerg response critical		7	7	49			4	6	24			5	6	30	
#		Mackenzie Hall Cultural Centre		6	3	18			7	2				4	4	16			5	4	20	
#		St John's Anglican Church - historic site		6	3	18			7	2				4	4	16			5	4	20	
33		Islamic Academy Windsor		6	6	36	Max 42= due 5 & 100yr & combination		7	6	42			4	5	20			5	4	20	
34		Society of St Vincent de Paul		6	6	36	Max 42= 5 & 100yr & combination		7	6	42			4	5	20			5	4	20	
35		General Brock Public School		6	5	30	Max 35= 5 & 100yr & combination		7	5	35			4	5	20			5	4	20	
36		Sandwich Teen Action Group		6	6	36	Max 42=due 5 & 100yr & combination		7	6	42			4	5	20			5	4	20	
#		Sandwich First Baptist Church		6	5	30	Max 30=due 100yr rain		7	3	21			4	2	8			5	2	10	
	Park Assets	Paterson Park		6	4	24			7	2	14			4	3	12			5	3	15	
		Bradley Park		6	4	24			7	2	14			4	2	8			5	2	10	
		Mackenzie Hall Park		6	4	24			7	2	14			4	2	8			5	2	10	
41	Energy and Communications Infrastructure	Overhead electrical distribution		6	3	18	Max 35= sensitive to wind, ice abv gnd; Also 100yr rain & HWL blo gnd;		7	2	14			4	2	8			5	1	5	
42		Sub-grade vaults and/or transformers		6	7	42	Max 42= due 100yr rain & HWL blo gnd; wind, ice abv gnd		7	2	14			4	5	20			5	2	10	
43		Telecommunication		6	4	24	Max 35=due wind, ice abv gnd; Alao 100yr rain & HWL below gnd;		7	2	14			4	3	12			5	2	10	
	Residential	See Part 4		6					7					4					5			
	Commercial Buildings	See Part 4		6					7					4					5			
	Industrial Assets	Sterling Fuels - Office and tank farm E of Russel St		6	4	24			7	2	14			4	4	16			5	3	15	
		Other Industrial Buildings - See Part 4																				

Infrastructure Components	5 Y/N	5 P	5 S	5 R	5 Rationale For Severity Score	6 Y/N	6 P	6 S	6 R	6 Rationale For Severity Score	7 Y/N	7 P	7 S	7 R	7 Rationale For Severity Score	8 Y/N	8 P	8 S	8 R	8 Rationale For Severity Score	9 Y/N	9 P	9 S	9 R	9 Rationale For Severity Score
Felix Avenue - Combined sewer		2	7	14			4	7	28			4	7	28			4	7	28			7	4		
Mill St - combined sewer		2	6	12			4	6	24			4	6	24			4	6	28			7	4	28	
Riverside Dr - combined sewer		2	6	12			4	4	16			4	5	20			4	4	16			7	4	28	
Interceptor Maintenance Holes (MH)		2	7	14	worst case- specific sites		4	7	28	worst case- specific sites		4	7	28	worst case- specific sites		4	7	28	worst case- specific sites		7	N/A		
Sanitary Sewers		2	7	14	worst case- specific sites		4	7	28	worst case- specific sites		4	7	28	worst case- specific sites		4	7	28	worst case- specific sites		7	N/A		
Maintenance Covers		2	7	14	worst case- specific sites		4	7	28	worst case- specific sites		4	7	28	worst case- specific sites		4	7	28	worst case- specific sites		7	N/A		
Pump Stations		2	7	14	worst case- specific sites		4	7	28	worst case- specific sites		4	7	28	worst case- specific sites		4	7	28	worst case- specific sites		7	N/A		
Lou Romano Water Reclamation Plant (LRWRP): Inflow from Western Trunk line specifically (<<100 year water levels for impacts)		2	7	14			4	7	28			4	7	28			4	7	28			7	7	49	
Lou Romano Water Reclamation Plant (LRWRP)		2	7	14			4	5	20			4	7	28			4	7	28			7	7	49	
Open drainage channels		2	7	14	worst case- specific sites		4	7	28	worst case- specific sites		4	6	24			4	7	28	worst case- specific sites		7	N/A		
Russel Street - open channel drainage		2	6	12	worst case- specific sites		4	3	12	worst case- specific sites		4	6	24			4	3	12			7	3	21	
Storm Sewers		2	7	14	worst case- specific sites		4	7	28	worst case- specific sites		4	6	24			4	7	28	worst case- specific sites		7	N/A		
Outfalls		2	6	12	worst case- specific sites		4	7	28	worst case- specific sites		4	6	24			4	7	28	worst case- specific sites		7	N/A		
Maintenance holes		2	7	14	worst case- specific sites		4	7	28	worst case- specific sites		4	6	24			4	7	28	worst case- specific sites		7	N/A		
Catch Basins		2	7	14	worst case- specific sites		4	7	28	worst case- specific sites		4	6	24			4	7	28			7	N/A		
Drains		2	7	14	worst case- specific sites		4	7	28	worst case- specific sites		4	6	24			4	7	28			7	N/A		
Culverts		2	7	14	worst case- specific sites		4	7	28	worst case- specific sites		4	6	24			4	7	28			7	N/A		
Major Roadway - Felix Avenue		2	7	14			4	6	24			4	7	28			4	7	28			7	5	35	
Major Roadway - Huron Church Road		2	5	10			4	3	12			4	5	20			4	4	16			7	N/A		
Major Roadway - Mill Street		2	7	14			4	3	12			4	6	24			4	4	16			7	5	35	
Major Roadway - Ojibway Parkway		2	4	8			4	3	12			4	4	16			4	3	12			7	3	21	
Major Roadway - Prince Road		2	5	10			4	3	12			4	5	20			4	4	16			7	3	21	
Major Roadway - Riverside Drive		2	5	10			4	4	16			4	5	20			4	4	16			7	5	35	
Major Roadway - Sandwich Street		2	7	14			4	5	20			4	7	28			4	6	24			7	4	28	
Major Roadway - University Avenue		2	5	10			4	4	16			4	5	20			4	4	16			7	N/A		
Major Roadway - Wyandotte Street W		2	5	10			4	4	16			4	5	20			4	4	16			7	N/A		
Ambassador Bridge/Canadian Border Services		2	7	14			4	6	24			4	7	28			4	5	20			7	5	35	
Rail Tracks		2	7	14			4	6	24			4	7	28			4	6	24			7	6	42	
St Michael's Adult Secondary School		2	6	12			4	5	20			4	6	24			4	5	20			7	N/A		
Duff - Baby House (museum)		2	5	10			4	5	20			4	5	20			4	5	20			7	N/A		
Canada South Science City - Tourist Attraction		2	7	14			4	6	24			4	7	28			4	7	28			7	5	35	
West Windsor Musallah - Mosque		2	7	14			4	6	24			4	7	28			4	7	28			7	4	28	
Windsor Essex Community Health - Community Centre		2	4	8			4	4	16			4	4	16			4	4	16			7	N/A		
Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre		2	7	14			4	7	28			4	7	28			4	7	28			7	N/A		
Mackenzie Hall Cultural Centre		2	4	8			4	4	16			4	4	16			4	4	16			7	N/A		
St John's Anglican Church - historic site		2	4	8			4	4	16			4	4	16			4	4	16			7	N/A		
Islamic Academy Windsor		2	7	14			4	6	24			4	7	28			4	6	24			7	4	28	
Society of St Vincent de Paul		2	7	14			4	6	24			4	7	28			4	6	24			7	4	28	
General Brock Public School		2	6	12			4	5	20			4	7	28			4	5	20			7	4	28	
Sandwich Teen Action Group		2	7	14			4	6	24			4	7	28			4	6	24			7	4	28	
Sandwich First Baptist Church		2	5	10			4	3	12			4	5	20			4	3	12			7	3	21	
Paterson Park		2	5	10			4	2	8			4	5	20			4	2	8			7	3	21	
Bradley Park		2	2	4			4	2	8			4	2	8			4	2	8			7	1	7	
Mackenzie Hall Park		2	2	4			4	2	8			4	2	8			4	2	8			7	1	7	
Overhead electrical distribution		2	3	6			4	2	8			4	2	8			4	2	8			7	1	7	
Sub-grade vaults and/or transformers		2	7	14			4	6	24			4	7	28			4	3	12			7	4	28	
Telecommunication		2	4	8			4	3	12			4	4	16			4	2	8			7	2	14	
See Part 4 (Residential)							4					4						N/A				7			
See Part 4 (Commercial Buildings)							4					4						N/A				7			
Sterling Fuels - Office and tank farm E of Russel St		2	5	10			4	4	16			4	6	24			4	5	20			7	3	21	
Other Industrial Buildings - See Part 4																									

Infrastructure Components	10 Y/N	10 P	10 S	10 R	10 Rationale For Severity Score	11 Y/N	11 P	11 S	11 R	11 Rationale For Severity Score	12 Y/N	12 P	12 S	12 R	12 Rationale For Severity Score	13 Y/N	13 P	13 S	13 R	13 Rationale For Severity Score	14 Y/N	14 P	14 S	14 R	14 Rationale For Severity Score
Felix Avenue - Combined sewer		4	3	12			6	3	18			2	5	10			7	3	21			7	3	21	
Mill St - combined sewer		4	3	12			6	3	18			2	5	10			7	3	21			7	3	21	
Riverside Dr - combined sewer		4	3	12			6	3	18			2	5	10			7	3	21			7	3	21	
Interceptor Maintenance Holes (MH)		4	3	12			7	3	21			2	5	10			7	1	7			7	1	7	
Sanitary Sewers		4	3	12			7	3	21			2	4	8			7	1	7			7	1	7	
Maintenance Covers		4	4	16			7	2	14			2	5	10			7	3	21			7	3	21	
Pump Stations		4	4	16			7	4	28			2	5	10			7	1	7			7	1	7	
Lou Romano Water Reclamation Plant (LRWRP): Inflow from Western Trunk line specifically (<<100 year water levels for impacts)		4	4	16			4	4	16			2	7	14			7	2	14			7	2	14	
Lou Romano Water Reclamation Plant (LRWRP)		4	4	16			7	4	28			2	7	14			7	2	14			7	2	14	
Open drainage channels		4	5	20			7	5	35			2	7	14			7	2	14			7	2	14	
Russel Street - open channel drainage		4	3	12			7	3	21			2	5	10			7	2	14			7	2	14	
Storm Sewers		4	3	12			7	3	21			2	5	10			7	2	14			7	2	14	
Outfalls		4	3	12			7	3	21			2	5	10			7	2	14			7	2	14	
Maintenance holes		4	4	16			7	3	21			2	6	12			7	2	14			7	2	14	
Catch Basins		4	5	20			7	5	35			2	7	14			7	2	14			7	2	14	
Drains		4	4	16			7	4	28			2	5	10			7	2	14			7	2	14	
Culverts		4	5	20			7	5	35			2	6	12			7	3	21			7	3	21	
Major Roadway - Felix Avenue		4	3	12			7	3	21			2	6	12			7	3	21			7	3	21	
Major Roadway - Huron Church Road		4	2	8			7	2	14			2	6	12			7	3	21			7	3	21	
Major Roadway - Mill Street		4	2	8			7	2	14			2	6	12			7	3	21			7	3	21	
Major Roadway - Ojibway Parkway		4	3	12			7	3	21			2	7	14			7	3	21			7	3	21	
Major Roadway - Prince Road		4	2	8			7	2	14			2	6	12			7	3	21			7	3	21	
Major Roadway - Riverside Drive		4	3	12			7	3	21			2	7	14			7	3	21			7	3	21	
Major Roadway - Sandwich Street		4	5	20			7	5	35			2	7	14			7	3	21			7	3	21	
Major Roadway - University Avenue		4	3	12			7	3	21			2	7	14			7	3	21			7	3	21	
Major Roadway - Wyandotte Street W		4	3	12			7	3	21			2	7	14			7	3	21			7	3	21	
Ambassador Bridge/Canadian Border Services		4	2	8			7	2	14			2	2	4			7	3	21			7	3	21	
Rail Tracks		4	3	12			7	3	21			2	3	6			7	2	14			7	2	14	
St Michael's Adult Secondary School		4	4	16			7	4	28			2	7	14			7	2	14			7	2	14	
Duff - Baby House (museum)		4	4	16			7	4	28			2	7	14			7	2	14			7	2	14	
Canada South Science City - Tourist Attraction		4	3	12			7	4	28			2	7	14			7	2	14			7	2	14	
West Windsor Musallah - Mosque		4	3	12			7	4	28			2	7	14			7	2	14			7	2	14	
Windsor Essex Community Health - Community Centre		4	5	20			7	5	35			2	7	14			7	2	14			7	2	14	
Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre		4	5	20			7	5	35			2	7	14			7	2	14			7	2	14	
Mackenzie Hall Cultural Centre		4	4	16			7	4	28			2	7	14			7	2	14			7	2	14	
St John's Anglican Church - historic site		4	4	16			7	4	28			2	7	14			7	2	14			7	2		
Islamic Academy Windsor		4	3	12			7	4	28			2	7	14			7	2	14			7	2	14	
Society of St Vincent de Paul		4	3	12			7	4	28			2	7	14			7	2	14			7	2	14	
General Brock Public School		4	4	16			7	4	28			2	7	14			7	2	14			7	2	14	
Sandwich Teen Action Group		4	3	12			7	4	28			2	7	14			7	2	14			7	2	14	
Sandwich First Baptist Church		4	3	12			7	3	21			2	7	14			7	2	14			7	2	14	
Paterson Park		4	3	12			7	4	28			2	6	12			7	2	14			7	2	14	
Bradley Park		4	3	12			7	4	28			2	6	12			7	2	14			7	2	14	
Mackenzie Hall Park		4	3	12			7	4	28			2	6	12			7	2	14			7	2	14	
Overhead electrical distribution		4	5	20			7	5	35			2	7	14			7	2	14			7	2	14	
Sub-grade vaults and/or transformers		4	5	20			7	4	28			2	5	10			7	2	14			7	2	14	
Telecommunication		4	5	20			7	5	35			2	7	14			7	2	14			7	2	14	
See Part 4 (Residential)		4	4	16			7	4	28			2	6	12											
See Part 4 (Commercial Buildings)		4					7	4	28			2	6	12											
Sterling Fuels - Office and tank farm E of Russel St		4	5	20			7	4	28			2	7	14			7	2	14			7	2	14	
Other Industrial Buildings - See Part 4																									

Part 2

Zone 2 - W of Russel St., N of Broadway St., W to shoreline

Infrastructure Class	Infrastructure Components	1 Y/N	1 P	1 S	1 R	1 Rationale For Severity Score	2 Y/N	2 P	2 S	2 R	2 Rationale For Severity Score	3 Y/N	3 P	3 S	3 R	3 Rationale For Severity Score	4 Y/N	4 P	4 S	4 R	4 Rationale For Severity Score
Wastewater System Assets	Ojibway Parkway - Combined Sewer		6	5	30	21=100 yr rainfall; sig HGLs		7	3	21			4	3	12			5	2	10	
	Riverside Dr - Combined Sewer		6	5	30	21=100 yr rainfall; sig HGLs		7	2	14			4	3	12			5	2	10	
	Sandwich Street - Combined Sewer		6	6	36	42=5 yr & 100 yr rainfall; mdt sfc flooding (0.5-1m)		7	6	42			4	4	16			5	3	15	
	Maintenance Covers		6	2	12			7	2	14			4	7	28			5	7	35	Location specific
	Interceptor Maintenance Holes (MH)		6	5	30			7	3	21			4	7	28			5	7	35	
	Pump Stations		6	5	30			7	4	28			4	7	28			5	7	35	Location specific
	Pump Station - Prospect Ave		6	6	36	36=Most high water levels (<< 100 year event), power from street light		7	2	14			4	7	28			5	6	30	35=Most high water levels (<< 100 year event), power from street light
	Pump Station - McKee Road		6	6	36	42=<100 yr HWL; extreme rain; backflow during HWL. Street flooding		7	3	21			4	7	28			5	6	30	
Stormwater System Assets	Open drainage channels		6	4	24			7	2	14			4	7	28			5	7	35	
	Storm Sewers		6	5	30			7	2	14			4	7	28			5	7	35	
	Brock Street Outfall		6	5	30	30=significant shoreline erosion		7	2	14			4	6	24			5	5	25	
	Maintenance holes		6	5	30			7	2	14			4	7	28			5	7	35	
	Catch Basins		6	5	30			7	2	14			4	7	28			5	7	35	
	McKee Creek catch basin		6	7	42	42 = <100 yr HWL & extreme rain; submerged HWK & surcharged extreme rain		7	3	21			4	7	28			5	6	30	
	Drains		6	5	30			7	2	14			4	7	28			5	7	35	
	Culverts		6	5	30			7	2	14			4	7	28			5	7	35	
Shoreline Stormwater/ Flood Protection Infrastructure	Outfall for Lou Romano Water Reclamation Plant (LRWRP)		6	6	36	42=<100 year HWL, combined river level+wave/freeboard		7	3	21			4	7	28			5	6	30	
	Mill St - Outfall, CS & catchment basin		6	6	36	36=<100 year HWL, combined river level or wave/freeboard		7	3	21			4	7	28			5	6	30	
Transportation	Major Roadway - Ojibway Parkway		6	6	36	36=100 year rain, outfall higher than ditch, floods right over		7	5	35			4	5	20			5	5	25	
	Road & Open Ditch - Prospect Ave		6	6	36	36=100 year rain possibly lower, outfall higher than ditch, floods right over		7	5	35			4	5	20			5	5	25	
	Major Roadway - Riverside Drive		6	5	30			7	2	14			4	3	12			5	2	10	
	Major Roadway - Sandwich Street		6	6	36			7	6	42			4	4	16			5	3	15	
	Ambassador Bridge/Huron-Church catch basin, outfall, weir		6	7	42	42=extreme rain with <<100 yr HWL; 100 yr rain; 5 yr rain		7	5	35			4	6	24			5	6	30	
	ETR Rail and Gore Creek		6	6	36	36=extreme rain and HWL; Gore Ck flooding across Sandwich St, ETR rail and siding		7	3	21			4	6	24			5	5	25	
	ETR Rail and McKee Creek		6	6	36	36=extreme rain and HWL; Road flooding, flagged by City		7	3	21			4	6	24			5	5	25	
	Rail Tracks		6	3	18	Max 35=combination events		7	2	14			4	6	24			5	5	25	
Institutional Buildings	St Michael's Adult Secondary School		6	3	18			7	2	14			4	5	20			4	5	20	
	Duff - Baby House (museum)		6	3	18			7	2	14			4	5	20			4	5	20	
	Canada South Science City - Tourist Attraction		6	6	36	Max 35=due 100yr & 5yr rain; high HGL		7	5	35			4	5	20			4	4	16	
	West Windsor Musallah - Mosque		6	7	42	Max 42= 100 yr or 5yr rain & combination; High HGL		7	6	42			4	5	20			4	4	16	
	Windsor Essex Community Health - Community Centre		6	3	18			7	2	14			4	4	16			4	4	16	
	Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre		6	7	42	Max 49=100 yr or 5yr rain & combination; sig bsmt flood - emerg response critical		7	7	49			4	6	24			4	6	24	
	Mackenzie Hall Cultural Centre		6	3	18			7	2	14			4	4	16			4	4	16	
	St John's Anglican Church - historic site		6	3	18			7	2	14			4	4	16			4	4	16	
	Islamic Academy Windsor		6	6	36	Max 42= 5 & 100yr & combination		7	6	42			4	5	20			4	4	16	
	Society of St Vincent de Paul		6	6	36	Max 42= 5 & 100yr & combination		7	6	42			4	5	20			4	4	16	
	General Brock Public School		6	5	30	Max 35=5 & 100yr & combination		7	5	35			4	5	20			4	4	16	
	Sandwich Teen Action Group		6	6	36	Max 42=5 & 100yr & combination		7	6	42			4	5	20			4	4	16	
	Sandwich First Baptist Church		6	5	30	Max 30= due 100yr rain		7	3	21			4	2	8			4	2	8	
	Chateau Park LTC Centre		6	5	30	35=100 year rain; wind damages, waves		7	3	21			4	5	20			5	5	25	

Infrastructure Components	5 Y/N	5 P	5 S	5 R	5 Rationale For Severity Score	6 Y/N	6 P	6 S	6 R	6 Rationale For Severity Score	7 Y/N	7 P	7 S	7 R	7 Rationale For Severity Score	8 Y/N	8 P	8 S	8 R	8 Rationale For Severity Score	9 Y/N	9 P	9 S	9 R	9 Rationale For Severity Score
Ojibway Parkway - Combined Sewer		2	7	14			4	3	12			4	5	20			4	3	12			7	2	14	
Riverside Dr - Combined Sewer		2	7	14			4	3	12			4	5	20			4	3	12			7	2	14	
Sandwich Street - Combined Sewer		2	7	14			4	6	24			4	7	28			4	6	24			7	2	14	
Maintenance Covers		2	7	14			4	7	28			4	7	28			4	7	28			7	N/A		Location specific
Interceptor Maintenance Holes (MH)		2	7	14			4	7	28			4	7	28			4	7	28			7	N/A		
Pump Stations		2	7	14			4	7	28			4	7	28			4	7	28			7	N/A		Location specific
Pump Station - Prospect Ave		2	7	14			4	6	24			4	7	28			4	7	28			7	6	42	
Pump Station - McKee Road		2	7	14			4	6	24			4	7	28			4	7	28			7	6	42	
Open drainage channels		2	6	12			4	7	28			4	7	28			4	7	28			7	N/A		Location specific
Storm Sewers		2	6	12			4	7	28			4	7	28			4	7	28			7	N/A		Location specific
Brock Street Outfall		2	7	14			4	6	24			4	7	28			4	6	24			7	4	28	
Maintenance holes		2	6	12			4	7	28			4	7	28			4	7	28			7	N/A		
Catch Basins		2	6	12			4	7	28			4	7	28			4	7	28			7	N/A		
McKee Creek catch basin		2	7	14			4	5	20			4	7	28			4	6	24			7	5	35	
Drains		2	6	12			4	7	28			4	7	28			4	7	28			7	N/A		
Culverts		2	6	12			4	7	28			4	7	28			4	7	28			7	N/A		
Outfall for Lou Romano Water Reclamation Plant (LRWRP)		2	6	12			4	6	24			4	7	28			4	7	28			7	5	35	
Mill St - Outfall, CS & catchment basin		2	6	12			4	6	24			4	7	28			4	7	28			7	5	35	
Major Roadway - Ojibway Parkway		2	7	14			4	5	20			4	7	28			4	5	20			7	4	28	
Road & Open Ditch - Prospect Ave		2	7	14			4	5	20			4	7	28			4	5	20			7	4	28	
Major Roadway - Riverside Drive		2	7	14			4	3	12			4	5	20			4	3	12			7	2	14	
Major Roadway - Sandwich Street		2	7	14			4	6	24			4	7	28			4	6	24			7	2	14	
Ambassador Bridge/Huron-Church catch basin, outfall, weir		2	7	14			4	6	24			4	6	24			4	6	24			7	5	35	
ETR Rail and Gore Creek		2	7	14			4	5	20			4	7	28			4	6	24			7	5	35	
ETR Rail and McKee Creek		2	6	12			4	5	20			4	7	28			4	6	24			7	5	35	
Rail Tracks		2	7	14			4	6	24			4	7	28			4	6	24			7	5	35	
St Michael's Adult Secondary School		2	6	12			4	5	20			4	6	24			4	5	20			7	N/A		
Duff - Baby House (museum)		2	5	10			4	5	20			4	5	20			4	5	20			7	N/A		
Canada South Science City - Tourist Attraction		2	7	14			4	6	24			4	7	28			4	7	28			7	5	35	
West Windsor Musallah - Mosque		2	7	14			4	6	24			4	7	28			4	7	28			7	4	28	
Windsor Essex Community Health - Community Centre		2	4	8			4	4	16			4	4	16			4	4	16			7	N/A		
Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre		2	7	14			4	7	28			4	7	28			4	7	28			7	N/A		
Mackenzie Hall Cultural Centre		2	4	8			4	4	16			4	4	16			4	4	16			7	N/A		
St John's Anglican Church - historic site		2	4	8			4	4	16			4	4	16			4	4	16			7	N/A		
Islamic Academy Windsor		2	7	14			4	6	24			4	7	28			4	6	24			7	4	28	
Society of St Vincent de Paul		2	7	14			4	6	24			4	7	28			4	6	24			7	4	28	
General Brock Public School		2	6	12			4	5	20			4	7	28			4	5	20			7	4	28	
Sandwich Teen Action Group		2	7	14			4	6	24			4	7	28			4	6	24			7	4	28	
Sandwich First Baptist Church		2	5	10			4	3	12			4	5	20			4	3	12			7	3	21	
Chateau Park LTC Centre		2	6	12			4	5	20			4	5	20			4	5	20			7	5	35	

Infrastructure Components	10 Y/N	10 P	10 S	10 R	10 Rationale For Severity Score	11 Y/N	11 P	11 S	11 R	11 Rationale For Severity Score	12 Y/N	12 P	12 S	12 R	12 Rationale For Severity Score	13 Y/N	13 P	13 S	13 R	13 Rationale For Severity Score	14 Y/N	14 P	14 S	14 R	14 Rationale For Severity Score
Ojibway Parkway - Combined Sewer		4	2	8			7	2	14			2	6	12			7	2	14			7	2	14	
Riverside Dr - Combined Sewer		4	2	8			7	2	14			2	6	12			7	2	14			7	2	14	
Sandwich Street - Combined Sewer		4	3	12	debris generation		7	4	28	debris generation; tree uprooting		2	5	10			7	2	14			7	2	14	
Maintenance Covers		4	4	16			7	2	14			2	5	10			7	3	21			7	3	21	
Interceptor Maintenance Holes (MH)		4	3	12			7	3	21			2	5	10			7	1	7			7	1	7	
Pump Stations		4	4	16			7	4	28			2	5	10			7	1	7			7	1	7	
Pump Station - Prospect Ave		4	5	20			7	5	35	S=4 or 5? 35=Most high water levels (<< 100 year event), power from street		2	7	14			7	2	14			7	2	14	
Pump Station - McKee Road		4	5	20	power		7	5	35	power		2	7	14			7	2	14			7	2	14	
Open drainage channels		4	5	20			7	5	35			2	7	14			7	3	21			7	3	21	
Storm Sewers		4	2	8			7	3	21			2	5	10			7	2	14			7	2	14	
Brock Street Outfall		4	2	8			7	2	14			2	6	12			7	3	21			7	3	21	
Maintenance holes		4	4	16			7	3	21			2	6	12			7	2	14			7	2	14	
Catch Basins		4	5	20			7	5	35			2	7	14			7	2	14			7	2	14	
McKee Creek catch basin		4	2	8			7	2	14			2	6	12			7	2	14			7	2	14	
Drains		4	4	16			7	4	28			2	5	10			7	2	14			7	2	14	
Culverts		4	5	20			7	5	35			2	6	12			7	3	21			7	3	21	
Outfall for Lou Romano Water Reclamation Plant (LRWRP)		4	3	12			7	3	21			2	6	12			7	2	14			7	2	14	
Mill St - Outfall, CS & catchment basin		4	3	12			7	3	21			2	6	12			7	2	14			7	2	14	
Major Roadway - Ojibway Parkway		4	4	16			7	3	21			2	6	12			7	2	14			7	2	14	
Road & Open Ditch - Prospect Ave		4	4	16			7	3	21			2	6	12			7	2	14			7	2	14	
Major Roadway - Riverside Drive		4	2	8			7	2	14			2	6	12			7	2	14			7	2	14	
Major Roadway - Sandwich Street		4	3	12	debris generation		7	4	28	debris generation; tree uprooting		2	5	10			7	2	14			7	2	14	
Ambassador Bridge/Huron-Church catch basin, outfall, weir		4	3	12			7	3	21			2	6	12			7	3	21			7	3	21	
ETR Rail and Gore Creek		4	2	8			7	3	21			2	6	12			7	3	21			7	3	21	
ETR Rail and McKee Creek		4	2	8			7	3	21			2	6	12			7	3	21			7	3	21	
Rail Tracks		4	3	12			6	3	18			2	3	6			7	2	14			7	2	14	
St Michael's Adult Secondary School		4	4	16			6	4	24			2	7	14			7	2	14			7	2	14	
Duff - Baby House (museum)		4	4	16			6	4	24			2	7	14			7	2	14			7	2	14	
Canada South Science City - Tourist Attraction		4	3	12			6	4	24			2	7	14			7	2	14			7	2	14	
West Windsor Musallah - Mosque		4	3	12			6	4	24			2	7	14			7	2	14			7	2	14	
Windsor Essex Community Health - Community Centre		4	5	20			6	5	30			2	7	14			7	2	14			7	2	14	
Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre		4	5	20			6	5	30			2	7	14			7	2	14			7	2	14	
Mackenzie Hall Cultural Centre		4	4	16			6	4	24			2	7	14			7	2	14			7	2	14	
St John's Anglican Church - historic site		4	4	16			6	4	24			2	7	14			7	2	14			7	2	14	
Islamic Academy Windsor		4	3	12			6	4	24			2	7	14			7	2	14			7	2	14	
Society of St Vincent de Paul		4	3	12			6	4	24			2	7	14			7	2	14			7	2	14	
General Brock Public School		4	4	16			6	4	24			2	7	14			7	2	14			7	2	14	
Sandwich Teen Action Group		4	3	12			6	4	24			2	7	14			7	2	14			7	2	14	
Sandwich First Baptist Church		4	3	12			6	3	18			2	7	14			7	2	14			7	2	14	
Chateau Park LTC Centre		4	5	20			7	5	35			2	7	14			7	3	21			7	3	21	

Infrastructure Class	Infrastructure Components	1 Extreme Rainfall				2 Extreme Rainfall				3 Extreme River Levels				4 Extreme River Levels				5 Combination Events				6 Combination Events				7 Combination Events				8 Combination Events				9 Combination Events				10 Secondary Impact Events				11 Secondary Impact Events				12 Secondary Impact Events				13 Secondary Impact Events				14 Secondary Impact Events			
		"Major" 100-yr Storm - 82mm in 4 hours (Peak rate of 145 mm/h)			Models storms 4-hour Chicago distribution based on peak rainfall rate	"Minor" 5-year Storm - 50mm in 4 hours (peak rate of 29.5 mm/hr)			Models storms 4-hour Chicago distribution based on peak rainfall rate	"Likely" CC HWL - 176.1 m			Adjusted HWL for our study - Based on HA's lit review and extensive group discussion	Current HWL - 175.9 m			Current 100 year level for Detroit River	Current 100 yr HWL + extreme rainfall (100 year storm)			Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check	Current 100 yr HWL + Moderate Rainfall (5-year storm)			Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check	Climate Chg HWL + extreme rainfall (100 year storm)			Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check	Climate Chg HWL + moderate rainfall (5 year storm)			Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check	HWL + wave action (freeboard)			Case Studies (from HRA): November 13, 15, 1972, March 31 & April 6, 1985, April 4, 1987, June 2015, Spring 2019	Major ice storm - 28mm or more			Multi-day loss of power - CSA Overhead Design 100 year event - between reliability 1 and 2	Extreme Wind Event - 120 km/h			debris generation, loss of site access, damage to above-ground infrastructure (plant, pump houses)	Tornado - (E)F2+			debris generation, loss of site access, severe damage to above-ground infrastructure (plant, pump houses)	Weathering (freeze thaw) - Concrete and masonry impacts - total cycles				Weathering (freeze thaw) - Concrete and masonry impacts - 30-cycle increments			
	Great Lakes Institute for Environmental Studies (U of Windsor)	6	5	30	35=100 year rain; basement flooding	7	3	21		4	5	20		5	5	25		2	6	12		4	3	12		4	6	24		4	3	12		7	5	**35**		4	3	12		7	4	28		2	7	14		7	2	14		7	2	14	
	HMCS Hunter Navy Facility	6	4	24		7	2	14		4	5	20		5	5	25		2	6	12		4	5	20		4	6	24		4	5	20		7	5	**35**		4	5	20		7	4	28		2	7	14		7	3	21		7	3	21	
Park Assets	McKee Park - Sandwich and Chewett Streets	6	3	18	35= < 100 year HWL; shoreline flooding	7	2	14		4	5	20		5	5	25		2	5	10		4	5	20		4	5	20		4	5	20		7	5	**35**		4	2	8		7	2	14		2	7	14		7	3	21		7	3	21	
	Brock Park	6	4	24		7	2	14		4	4	16		5	3	15		2	4	8		4	4	16		5	3	15		4	5	20		7	4	28		4	2	8		7	3	21		2	6	12		7	3	21		7	3	21	
	Mill Park	6	4	24		7	2	14		4	2	8		5	2	10		2	2	4		4	2	8		4	2	8		4	2	8		7	2	14		4	2	8		7	4	28		2	6	12		7	2	14		7	2	14	
	Queen's Park	6	4	24		7	2	14		4	2	8		5	2	10		2	2	4		4	2	8		4	2	8		4	2	8		7	2	14		4	2	8		7	4	28		2	6	12		7	2	14		7	2	14	
	Chateau Park - Ambassador Bridge area	6	4	24	35=<100 year HWL; retaining wall submerged	7	1	7		4	6	24		5	5	25		2	5	10		4	5	20		4	6	24		4	5	20		7	5	**35**		4	2	8		7	2	14		2	5	10		7	3	21		7	3	21	
Energy and Communications Infrastructure	JC Keith Transformer Station	6	5	**30**	30=flooding w high HGLS; critical 3rd party infrastructure, further study	7	3	21		4	4	16		5	3	15		2	6	12		4	4	16		4	5	20		4	4	16		7	3	21		4	5	20		7	3	21		2	6	12		7	2	14		7	2	14	
	Overhead electrical distribution	6	3	18	Max 35= sensitive to wind, ice abv grid; Also 100yr rain & HWL below grid	7	2	14		4	2	8		5	1	5		2	3	6		4	2	8		4	2	8		4	2	8		7	1	7		4	5	20		7	5	**35**		2	7	14		7	2	14		7	2	14	
	Sub-grade vaults	6	7	**42**	Max 42= due 100yr rain & HWL blo grid; wind, ice abv grid	7	2	14		4	5	20		5	2	10		2	7	14		4	6	24		4	7	28		4	3	12		7	4	28		4	5	20		7	4	28		2	5	10		7	2	14		7	2	14	
	Sub-grade transformers	6	4	24	Max 35=due wind, ice abv grid; Alao 100yr rain & HWL below grid	7	2	14		4	3	12		5	2	10		2	4	8		4	3	12		4	4	16		4	2	8		7	2	14		4	5	20		7	5	**35**		2	7	14		7	2	14		7	2	14	
	Atura Power Brighton Beach Gen Station	6	7	42	42=Combined events; 100 year rain, 5 year rain; subgrade flooding due HGL; flooding to 0.3m	7	3	21		4	7	28		5	7	35		2	7	14		4	7	28		4	7	28		4	7	28		7	7	**49**		4	6	24		7	5	35		2	6	12		7	2	14		7	2	14	
	Telecommunication	6	4	24	Max 35=due wind, ice abv grid; Alao 100yr rain & HWL below grid	7	2	14		4	3	12		5	2	10		2	4	8		4	3	12		4	4	16		4	2	8		7	2	14		4	5	20		7	5	**35**		2	7	14		7	2	14		7	2	14	
Residential	Buildings - See Part 4																																																				
Commercial Buildings	Buildings - See Part 4																																																				
Industrial Assets	Tranpo(Trucking/Logistics - Van De Hogan Group (VG; trucking); Cole-Carriers Inc.; Stantec Trailers	6	3	18		7	1	7		4	3	12		4	2	8		2	4	8		4	2	8		4	4	16		4	2	8		7	1	7		4	4	16		7	4	28		2	6	2		7	1	7		7	1	7	
	Windsor Biosolids Processing Plant	6	7	**42**	42=combined prob event; extremes rainfall; flooding >1m	7	3	21		4	5	20		5	4	20		2	7	14		4	4	16		4	7	28		4	5	20		7	5	35		4	3	12		7	3	21		2	7	14		7	2	14		7	2	14	
	Windsor Salt - end of Prospect Ave	6	7	**42**	42=Master; erosion 100 year rain; combined socs	7	3	21		4	5	20		5	5	25		2	7	14		4	6	24		4	7	28		4	5	20		7	6	**42**		4	3	12		7	4	28		2	7	14		7	2	14		7	2	14	
	Newmak Windsor Aluminum Plant	6	4	24		7	2	14		4	2	8		5	2	10		2	4	8		4	2	8		4	4	16		4	2	8		7	2	14		4	4	16		7	4	28		2	7	14		7	2	14		7	2	14	

Part 3

Zone 3 - W of Ojibway Pkwy., N of Morten Dr. to Broadway St.

Wastewater and Stormwater System Assets	Sanitary Sewers																																																				
	Sprucewood Ave - Combined Sewer	6	7	**42**	42=Combined event; 100 year and 5 year rain; ~1m flooding all rain events; Big HGL/surcharge.	7	6	**42**		4	5	20		5	4	20		2	7	14		4	6	24		4	7	28		4	6	24		7	5	35		4	3	12		7	3	21		2	6	12		7	2	14		7	2	14	
	Sprucewood Ave - Open ditches	7	6	**42**	42 = Extreme 5 & 100 year rain; workshop participants indicated landlein area	7	6	**42**		4	4	16		5	3	15		4	7	28		5	6	30		4	7	28		4	6	24		7	4	28		4	3	12		7	3	21		2	6	12		7	3	21		7	3	21	
	Maintenance Covers	6	2	12		7	2	14		4	7	28		5	7	35		2	7	14		4	7	28		4	7	28		4	7	28		7	N/A	Location specific		4	4	16		7	2	14		2	5	10		7	3	21		7	3	21	
	Pump Stations	6	5	30		7	4	28		4	7	28		5	7	35		2	7	14		4	7	28		4	7	28		4	7	28		7	N/A	Location specific		4	5	20	power outages	7	5	35	power outages, debris	2	5	10		7	1	7		7	1	7	
	Open drainage channels	6	4	24		7	2	14		4	7	28		5	7	35		2	6	12		4	7	28		4	7	28		4	7	28		7	N/A	Location specific		4	5	20		7	5	35		2	7	14		7	3	21		7	3	21	
	Storm Sewers	6	5	30		7	2	14		4	7	28		5	7	35		2	6	12		4	7	28		4	7	28		4	7	28		7	N/A	Location specific		4	2	8		7	3	21		2	5	10		7	2	14		7	2	14	
	Outfalls	6	4	24		7	2	14		4	7	28		5	7	35		2	6	12		4	7	28		4	7	28		4	7	28		7	N/A	Location specific		4	2	8		7	2	14		2	3	6		7	2	14		7	2	14	
	Maintenance holes	6	5	30		7	2	14		4	7	28		5	7	35		2	6	12		4	7	28		4	7	28		4	7	28		7	N/A	Location specific		4	4	16		7	3	21		2	6	12		7	2	14		7	2	14	
	Catch Basins	6	5	30		7	2	14		4	7	28		5	7	35		2	6	12		4	7	28		4	7	28		4	7	28		7	N/A	Location specific		4	5	20		7	5	35		2	7	14		7	3	21		7	3	21	
	Drains	6	5	30		7	2	14		4	7	28		5	7	35		2	6	12		4	7	28		4	7	28		4	7	28		7	N/A	Location specific		4	4	16		7	4	28		2	5	10		7	2	14		7	2	14	
	Culverts	6	5	30		7	2	14		4	7	28		5	7	35		2	6	12		4	7	28		4	7	28		4	7	28		7	N/A	Location specific		4	5	20		7	5	35		2	6	12		7	3	21		7	3	21	
Shoreline Stormwater/ Flood Protection Infrastructure	CSOs	6	5	30		7	4	28		4	6	24		5	5	25		2	7	14		4	5	20		4	7	28		4	6	24		7	N/A	Location specific		4	4	16		7	4	28		2	5	10		7	3	21		7	3	21	
Transportation	Major Roadway - Ojibway Parkway	6	7	**42**	42=Combined prob events;100 year rain, 5 year rain; LOS for 43% road	7	5	35		4	2	8		5	2	10		2	7	14		4	6	24		4	7	28		4	6	24		7	5	35		4	4	16		7	4	28		2	6	12		7	2	14		7	3	21	
	Major Roadway - Sprucewood Avenue	6	7	**42**	42=100 year & 5 year rain; adjacent to wetland; modelling	7	6	**42**		4	2	8		5	2	10		2	7	14		4	6	24		4	7	28		4	6	24		7	2	14		4	4	16		7	3	21		2	6	12		7	2	14		7	2	14	
	Detroit-Windsor Truck Ferry	6	7	**42**	42=100 year rain, 5 year rain, Combined prob event; 0.75-1m surface flooding, trade importance	7	6	**42**		4	3	12		5	2	10		2	7	14		4	6	24		4	7	28		4	6	24		7	5	35		4	5	20		7	5	35		2	6	12		7	2	14		7	2	14	
	Rail Tracks	6	7	**42**	42=100 year & 5 year rain;Combined events; mdt surface flooding for 100 year rain	7	5	35		4	2	8		5	2	10		2	6	12		4	5	20		4	6	24		4	5	20		7	2	14		4	4	16		7	3	21		2	6	12		7	2	14		7	2	14	
Park Assets	Black Oak Heritage Park	6	5	30	30=100 year rain & combined; Extreme wind, ice storms; sfc flooding >0.3m w 100 year rain	7	3	21		4	2	8		5	2	10		2	6	12		4	3	12		4	7	28		4	4	16		7	3	21		4	5	20		7	5	**35**		2	5	10		7	2	14		7	2	14	
Energy and Communications Infrastructure	Overhead electrical distribution	6	3	18	Max 30= sensitive to wind, ice abv grid; Also 100yr rain & HWL below ground	7	2	14		4	2	8		5	1	5		2	3	6		4	2	8		4	2	8		4	2	8		7	1	7		4	5	20		7	5	**35**		2	7	14		7	2	14		7	2	14	
	Sub-grade vaults	6	7	**42**	Max 28= due 100yr rain & HWL blo grid; wind, ice abv grid	7	2	14		4	5	20		5	2	10		2	7	14		4	6	24		4	7	**28**		4	3	12		7	4	28		4	5	20		7	4	28		2	5	10		7	2	14		7	2	14	
	Sub-grade transformers	6	4	24	Max 30=due wind, ice abv grid; Alao 100yr rain & HWL below grid	7	2	14		4	3	12		5	2	10		2	4	8		4	3	12		4	4	16		4	2	8		7	2	14		4	4	16		7	5	**35**		2	7	14		7	2	14		7	2	14	
	Telecommunication	6	4	24	Max 30=due wind, ice abv grid; Alao 100yr rain & HWL below grid	7	2	14		4	3	12		5	2	10		2	4	8		4	3	12		4	4	16		4	2	8		7	2	14		4	4	16		7	5	**35**		2	7	14		7	2	14		7	2	14	
	Shoreline Properties - Mortrem Ltd; ADM Windsor;	6	5	30		7	3	21		4	3	12		5	2	10		2	6	12		4	4	16		4	6	24		4	5	20		7	4	28		4	4	16		7	4	28		2	6	12		7	2	14		7	2	14	
	Windsor Salt Mine - ditch entrance	6	7	42	49=HWL +100 yr; Combined prob; 100 year rain 5 year rain	7	5	35		4	6	24		5	6	30		2	7	14		4	7	28		4	7	28		4	7	28		7	7	**49**		4	2	8		7	2	14		2	6	12		7	2	14		7	2	14	
	Windsor Salt Mine	6	7	42	49 = 5 & 100 year extreme rain; Combined probabilities; surface flooding 0.75->1m; extreme rain	7	5	35		4	6	24		5	6	30		2	7	14		4	6	24		4	7	28		4	7	28		7	7	**49**		4	2	8		7	4	28		2	6	12		7	2	14		7	2	14	
	Shoreline Protection - retaining walls, rip-rap	6	3	18		7	1	7		4	5	20		5	4	20		2	5	10		4	4	16		4	6	24		4	5	20		7	4	28		4	2	8		7	3	21		2	5	10		7	3	21		7	3	21	

Part 4

System-Wide Risks and Critical Third Party Services

System-Wide Assets	Zone 1 Residential Areas serviced by combined sewers	6	6	36	42=Combined prob: 5 & 100 year rain; Likely basement flooding; Surface flooding extreme rain	7	6	**42**		4	4	16		5	4	20		2	7	14		4	6	24		4	7	28		4	6	24		7	4	28		4	4	16		7	4	28		2	7	14		7	2	14		7	2	14	
	Zone 1 Commercial Areas serviced by combined sewers	6	7	**42**	42=Combined prob: 5 & 100 year rain-generaly; Likely basement flooding; Surface flooding extreme rain	7	6	**42**		4	4	16		5	4	20		2	7	14		4	6	24		4	7	28		4	6	24		7	4	28		4	4	16		7	4	28		2	7	14		7	2	14		7	2	14	
	Zone 1 Industrial Buildings serviced by combined sewers	6	6	36	42=100 & 5 year rain; Mainly surface & basement flooding	7	6	**42**		4	4	16		5	3	15		2	7	14		4	6	24		4	7	28		4	6	24		7	4	28		4	4	16		7	4	28		2	7	14		7	2	14		7	2	14	
	Zone 2 Combined Sewer Outfalls	6	5	30	42=Combined prob; 100 year rain; 5 year rain; high-river levels above 174.6m; blocked outfalls and back feeding into combined system; Lost sewer capacity for extreme rain	7	3	21		4	7	28		5	6	30		2	7	14		4	6	24		4	7	28		4	6	24		7	5	**35**		4	2	8		7	3	21		2	5	10		7	3	21		7	3	21	
	Zone 2 Residential Areas serviced by combined sewers	6	7	**42**	49 = Heavy rainfalls; Surface flooding >1m; Potential basement flooding	7	7	**49**		4	4	16		5	3	15		2	7	14		4	4	16		4	7	28		4	4	16		7	3	21		4	5	20		7	5	35		2	6	12		7	2	14		7	2	14	
	Zone 2 Commercial Areas serviced by combined sewers	6	7	**42**	42 = Heavy rainfall; Surface flooding >1m	7	6	**42**		4	2	8		5	2	10		2	7	14		4	6	24		4	7	28		4	6	24		7	3	21		4	2	8		7	3	21		2	6	12		7	2	14		7	2	14	
	Loss of Electrical power delivery - Pumps	6	4	24	30=Only entities damaging power delivery; Any assets below-grade (water intrusion); Power assets in Zone 2 flagged for further study	7	2	14		4	2	8		5	2	10		2	5	10		4	3	12		4	6	24		4	3	12		7	3	21		4	6	24		7	5	**35**		2	7	14		7	2	14		7	2	14	
	Loss of Communications - equipment monitoring	6	4	24	30=Events giving damage to telephone lines; Below grade assets	7	3	21		4	2	8		5	2	10		2	5	10		4	3	12		4	6	24		4	3	12		7	3	21		4	5	20		7	5	**35**		2	7	14		7	2	14		7	2	14	
	Surface drainage and surface transportation (emergency response)	6	5	30	Max 35 = any wind >102 kph gusts or other damaging event affecting emergency response; Debris generation	7	3	21		4	2	8		5	2	10		2	5	10		4	3	12		4	5	20		4	3	12		7	3	21		4	6	24		7	5	**35**		2	7	14		7	1	7		7	1	7	
	Pad mounted electrical	6	7	**42**	42= 100 year rainfall event; Extremely sensitive to surface flooding < 1m or more in depth; potential public safety risk	7	1	7		4	1	4		5	1	5		2	7	14		4	2	8		4	7	28		4	2	8		7	2	14		4	4	16		7	2	14		2	7	14		7	2	14		7	2	14	

Climate change risk assessment of the City of Windsor's West Windsor public, private and institutional assets and third party risks, focussing on flooding risks

This PIEVC risk assessment is divided into 4 parts. Parts 1, 2 and 3 reference Zones 1, 2 and 3 respectively, and refer to assets with medium to high climate change risks. These higher risks were identified via City of Windsor guidance, interviews, forensic analysis of past impacts, other reports and informed by modelling of the City's sewer, surface and river level flows. Part 4 refers to system-wide risks and third party services.

Highlighted Infrastructure components indicate Medium to High site risks

Future Condition - 2080

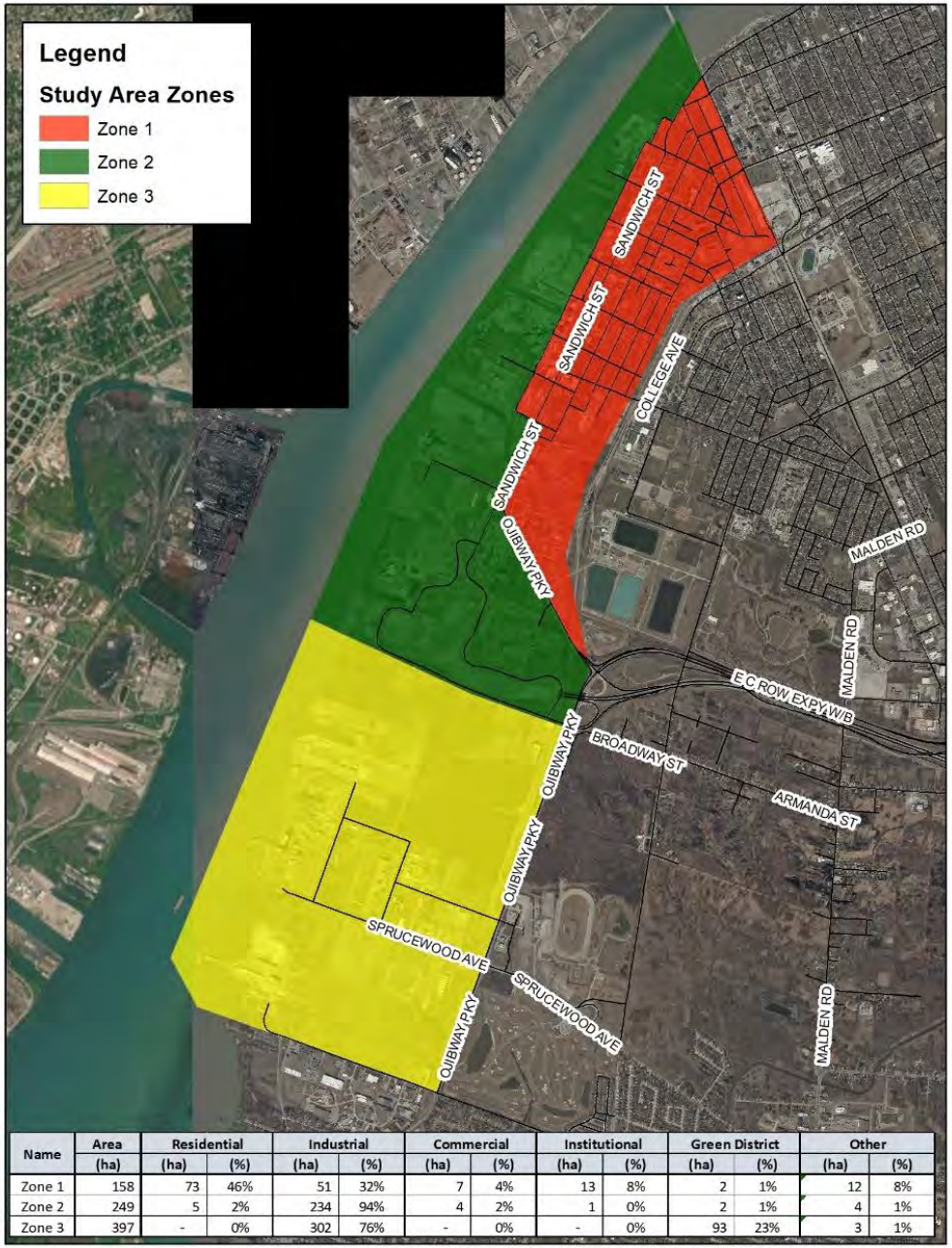
No.	Infrastructure Class	Infrastructure Components	1 Extreme Rainfall					2 Extreme Rainfall					3 Extreme River Levels					4 Extreme River Levels					5 Combination Events				
			"Major" 100-yr Storm - 82mm in 4 hours (Peak rate of 145 mm/h)				Models storms 4-hour Chicago distribution based on peak rainfall rate	"Minor" 5-year Storm - 50mm in 4 hours (peak rate of 29.5 mm/hr)				Models storms 4-hour Chicago distribution based on peak rainfall rate	"Likely" CC HWL - 176.1 m				Adjusted HWL for our study - Based on HA's lit review and extensive group discussion	Current HWL - 175.9 m				Current 100 year level for Detroit River	Current 100 yr HWL + extreme rainfall (100 year storm)				Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check
			Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score
	Part 1																										
	Zone 1 - E of Russel St., N of Ojibway Pkwy to Huron Church Rd.																										
	Wastewater System Assets	**Felix Avenue - Combined sewer**		7	6	**42**	Max risk 42= Combined prob event; fails 5 year design storm criteria		7	5	35			4	7	28			5	5	25			4	7	28	
		Mill St - combined sewer		7	6	**42**	42=Excess HGL-abv sfc for 100yr rain ..Inconsistent? Combine with Trans or separate?		7	3	21			4	5	20			5	6	30			2	6	12	
		Riverside Dr - combined sewer		7	5	**35**	35=Master @100 yr rain... Same w trans?		7	3	21			4	4	16			4	4	16			2	6	12	
2		Interceptor Maintenance Holes (MH)		7	5	**35**	See Part 4		7	3	21			4	7	28			5	7	35			4	7	28	
3		Sanitary Sewers		7	5	**35**	See Part 5		7	4	28			4	7	28			5	7	35			4	7	28	
4		Maintenance Covers		7	2	14	See Part 6		7	2	14			4	7	28			5	7	35			4	7	28	
5		Pump Stations		7	5	35	See Part 7		7	4	28			4	7	28			5	7	35			4	7	28	
		Lou Romano Water Reclamation Plant (LRWRP): *Inflow from Western Trunk line specifically* (for much less than 100 year year river level)		7	6	42	Max 49 risk = <<100 yr HWL; comb extreme river and rainfall events; Excess inflow throttle or close gates; potential basement flooding		7	4	28			4	6	24			5	5	25			4	7	28	
6		**Lou Romano Water Reclamation Plant (LRWRP) - Note for much less than 100 year river levels**		7	6	42	Max 49 risk w<<100 yr HWL; Blockage main outfall, backflow into plant for treatment river water; loss capacity		7	4	28			4	6	24			5	5	25			4	7	28	
7	Stormwater System Assets	Open drainage channels		7	4	28			7	2	14			4	7	28	worst case- specific sites		5	7	35	worst case- specific sites		4	7	28	worst case- specific sites
		Russel Street - open channel drainage		7	6	**42**	Max 42=extrm rain; ditches completely fill		7	2	14			4	3	12	worst case- specific sites		5	2	10	worst case- specific sites		4	6	24	worst case- specific sites
8		Storm Sewers		7	5	35			7	2	14			4	7	28	worst case- specific sites		5	7	35	worst case- specific sites		4	7	28	worst case- specific sites
9		Outfalls		7	4	28			7	2	14			4	7	28	worst case- specific sites		5		0	worst case- specific sites		4	6	24	worst case- specific sites
#		Maintenance holes		7	5	35			7	2	14			4	7	28	worst case- specific sites		5	7	35	worst case- specific sites		4	7	28	worst case- specific sites
#		Catch Basins		7	5	35			7	2	14			4	7	28	worst case- specific sites		5	7	35	worst case- specific sites		4	7	28	worst case- specific sites
#		Drains		7	5	35			7	2	14			4	7	28	worst case- specific sites		5	7	35	worst case- specific sites		4	7	28	worst case- specific sites
#		Culverts		7	5	35			7	2	14			4	7	28	worst case- specific sites		5	7	35	worst case- specific sites		4	7	28	worst case- specific sites
#	Transportation	**Major Roadway - Felix Avenue**		7	6	**42**	Excessive HGL		7	5	35			4	7	28			5	6	30			4	7	28	
#		Major Roadway - Huron Church Road		7	4	28			7	2	14			4	4	16			5	N/A				4	5	20	
#		**Major Roadway - Mill Street**		7	6	**42**	Excessive HGL		7	2	14			4	4	16			5	4	20			4	7	28	
#		Major Roadway - Ojibway Parkway		7	4	28			7	2	14			4	3	12			5	3	15			4	4	16	
#		Major Roadway - Prince Road		7	4	28			7	2	14			4	4	16			5	3	15			4	5	20	
#		**Major Roadway - Riverside Drive**		7	5	**35**	Excessive HGL		7	3	21			4	4	16			5	4	20			4	5	20	
20		**Major Roadway - Sandwich Street**		7	6	**42**	Max 42=combined & 100 yr Xtrm rain		7	4	28			4	5	20			5	4	20			4	7	28	
#		Major Roadway - University Avenue		7	4	28			7	2	14			4	4	16			5	4	20			4	5	20	
#		Major Roadway - Wyandotte Street W		7	4	28			7	2	14			4	4	16			5	4	20			4	5	20	
23		**Ambassador Bridge/Canadian Border Services**		7	6	**42**	Max 42=100 yr rain; combination		7	4	28			4	4	16			5	4	20			4	7	28	
#		**Rail Tracks**		7	3	21	Max 49=combination events		7	2	14			4	6	24			5	5	25			4	7	28	
#	Institutional Buildings	St Michael's Adult Secondary School		7	3	21			7	2	14			4	5	20			5	5	25			4	6	24	
#		Duff - Baby House (museum)		7	3	21			7	2	14			4	5	20			5	5	25			4	5	20	
27		**Canada South Science City - Tourist Attraction**		7	6	**42**	Max 42 = xtrm rain and 5 yr. Combined.		7	5	35			4	6	24			5	5	25			4	7	28	
28		**West Windsor Musallah - Mosque**		7	7	**49**	Max **49**= due 100 yr or 5yr rain & combination; High HGL		7	6	**42**			4	5	20			5	4	20			4	7	28	
29		Windsor Essex Community Health - Community Centre		7	3	21			7	2	14			4	4	16			5	4	20			4	4	16	
30		**Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre**		7	7	**49**	Max **49**= due 100 yr or 5yr rain & combination; emerg response critical		7	7	**49**			4	6	24			5	6	30			4	7	28	
#		Mackenzie Hall Cultural Centre		7	3	21			7	2	14			4	4	16			5	4	20			4	4	16	
#		St John's Anglican Church - historic site		7	3	21			7	2	14			4	4	16			5	4	20			4	4	16	
33		**Islamic Academy Windsor**		7	6	**42**	Max 42= due 5 & 100yr & combination		7	6	**42**			4	5	20			5	4	20			4	7	28	
34		**Society of St Vincent de Paul**		7	6	**42**	Max 42= due 5 & 100yr & combination		7	6	**42**			4	5	20			5	4	20			4	7	28	
35		**General Brock Public School**		7	5	**35**	Max 35= due 5 & 100yr & combination		7	5	**35**			4	5	20			5	4	20			4	6	24	
36		**Sandwich Teen Action Group**		7	6	**42**	Max 42=r due 5 & 100yr & combination		7	6	**42**			4	5	20			5	4	20			4	7	28	
#		**Sandwich First Baptist Church**		7	5	**35**	Max 35=due 100yr rain		7	3	**21**			4	N/A				5	N/A				4	5	20	
		Great Lakes Institute for Environmental Studies (U of Windsor)		7	5	**35**	35=100 year rain; basement flooding		7	3	21			4	5	20			5	5	25			4	6	24	
		HMCS Hunter Navy Facility		7	4	28			7	2	14			4	5	20			5	5	25			4	6	24	
	Park Assets	Paterson Park		7	4	28			7	2	14			4	3	12			5	3	15			4	5	20	
		Bradley Park		7	4	28			7	2	14			4	2	8			5	2	10			4	2	8	
		Mackenzie Hall Park		7	4	28			7	2	14			4	2	8			5	2	10			4	2	8	
41	Energy and Communications Infrastructure	**Overhead electrical distribution**		7	3	21	Max 35= sensitive to wind, ice abv gnd; Also 100yr rain & HWL blo gnd;		7	2	14			4	2	8			5	1	5			4	3	12	
42		**Sub-grade vaults and/or transformers**		7	7	**49**	Max 49= due 100yr rain & HWL blo gnd; wind, ice abv gnd		7	2	14			4	5	20			5	2	10			4	7	28	
43		**Telecommunication**		7	4	28	Max 35=due wind, ice abv gnd; Also 100yr rain & HWL below gnd;		7	2	14			4	3	12			5	2	10			4	4	16	
		See Part 4																						4	7	28	
	Commercial Buildings	**See Part 4**																						4	N/A		
	Industrial Assets	Sterling Fuels - Office and tank farm E of Russel St		7	4	28			7	2	14			4	4	16			5	3	15			4	5	20	
		Other Industrial Buildings - **See Part 4**																									
	Part 2																										
	Zone 2 - W of Russel St., N of Broadway St., W to shoreline																										
		Ojibway Parkway - Combined Sewer		7	5	**35**	35=Master for 100 yr rain		7	3	21			4	3	12			5	2	10			4	5	20	
		Riverside Dr - Combined Sewer		7	5	**35**	35=Master for 100 yr rain		7	2	14			4	3	12			5	2	10			4	5	20	
		Sandwich Street - Combined Sewer		7	6	**42**	42=5 yr & 100 yr rainfall; mdt sfc flooding		7	6	**42**			4	4	16			5	3	15			4	6	24	
		Interceptor Maintenance Holes (MH)		7	5	35			7	3	21			4	7	28			5	7	35			4	7	28	
		Sanitary Sewers		7	5	35			7	4	28			4	7	28			5	7	35	Location specific		4	7	28	
		Maintenance Covers		7	2	14			7	2	14			4	7	28			5	7	35	Location specific		4	7	28	
		Pump Stations		7	5	35			7	4	28			4	7	28			5	7	35	Location specific		4	7	28	
		Pump station - Prospect Ave		7	6	**42**	42=Most high water levels (<< 100 year event), power from street light, outfall higher than ditch		7	2	14			4	7	28			5	6	30			4	7	28	
		Pump Station - McKee Road		7	6	**42**	42=<100 yr HWL; extreme rain; backflow during HWL. Street flooding		7	3	21			4	7	28			5	6	30			4	7	28	
	Stormwater System Assets	Open drainage channels		7	4	28			7	2	14			4	7	28			5	7	35			4	6	24	
		Storm Sewers		7	5	35			7	2	14			4	7	28			5	7	35			4	6	24	
		Brock Street Outfall		7	5	**35**	35_=significant shoreline erosion		7	2	14			4	6	24			5	5	25			4	7	28	
		Maintenance holes		7	5	35			7	2	14			4	7	28			5	7	35			4	6	24	
		Catch Basins		7	5	35			7	2	14			4	7	28			5	7	35			4	6	24	
		McKee Creek catch basin		7	7	**49**	42 = <100 yr HWL & extreme rain; submerged HWK & surcharged extreme rain		7	3	21			4	7	28			5	6	30			4	7	28	
		Drains		7	5	35			7	2	14			4	7	28			5	7	35			4	6	24	
		Culverts		7	5	35			7	2	14			4	7	28			5	7	35			4	6	24	
		Outfall for Lou Romano Water Reclamation Plant (LRWRP)		7	6	**42**	42=<100 year HWL, combined river level+wave/freeboard		7	3	21			4	7	28			5	6	30			4	6	24	
		Mill St - Outfall, CS & catchment basin		7	6	**42**	42=<100 year HWL, combined river level or wave/freeboard		7	3	21			4	7	28			5	6	30			4	6	24	
	Transportation	**Major Roadway - Ojibway Parkway**		7	6	**42**	42=100 year rain, outfall higher than ditch, floods right over		7	5	35			4	5	20			5	5	25			4	7	28	
		Road & Open Ditch - Prospect Ave		7	6	**42**	42=100 year rain, outfall higher than ditch, floods right over		7	5	35			4	5	20			5	5	25			4	7	28	
		Major Roadway - Riverside Drive		7	5	**35**			7	2	14			4	3	12			5	2	10			4	7	28	
		Major Roadway - Sandwich Street		7	6	**42**			7	6	**42**			4	4	16			5	3	15			4	7	28	
		Ambassador Bridge/Huron-Church catch basin, outfall, weir		7	7	**49**	42=extreme rain with <<100 yr HWL; 100 yr rain; 5 yr rain		7	5	35			4	6	24			5	6	30			4	6	24	
		ETR rail and Gore Creek		7	6	**42**	42 =extreme rain and HWL; Gore Ck flooding across Sandwich St, ETR rail and siding		7	3	21			4	6	24			5	5	25			4	6	24	
		ETR rail and McKee Creek		7	6	**42**	49=extreme rain and HWL; Road flooding, flagged by City		7	3	21			4	6	24			5	5	25			4	6	24	
		Rail Tracks		7	3	21	Max 35=combination events		7	2	14			4	6	24			5	5	25			4	7	28	
	Institutional Buildings	St Michael's Adult Secondary School		7	3	21			7	2	14			4	5	20			5	5	25			4	6	24	
		Duff - Baby House (museum)		7	3	21			7	2	14			4	5	20			5	5	25			4	5	20	
		Canada South Science City - Tourist Attraction		7	6	42	Max 35=due 100yr & 5yr rain; high HGL		7	5	**35**			4	5	20			5	4	20			4	7	28	
		West Windsor Musallah - Mosque		7	7	49	Max 42= 100 yr or 5yr rain & combination; High HGL		7	6	**42**			4	5	20			5	4	20			4	7	28	
		Windsor Essex Community Health - Community Centre		7	3	21			7	2	14			4	4	16			5	4	20			4	4	16	
		Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre		7	7	49	Max **49**=100 yr or 5yr rain & combination; sig bsmt flood -		7	7	**49**			4	6	24			5	6	30			4	7	28	

Infrastructure Components	6 Combination Events					7 Combination Events					8 Combination Events					9 Combination Events					10 Secondary Impact Events				
	Current 100 yr HWL + Moderate Rainfall (5-year storm)				Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check	Climate Chg HWL + extreme rainfall (100 year storm)				Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check	Climate Chg HWL + moderate rainfall (5 year storm)				Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check	HWL + wave action (freeboard)				Case Studies (from HIRA): November 13-15, 1972, March 31 & April 6, 1985, April 4, 1987, June 2015, Spring 2019	Major ice storm - 28mm or more				Multi-day loss of power - CSA Overhead Design 100 year event - between reliability 1 and 2
	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score
Part 1 – Zone 1																									
Felix Avenue - Combined sewer		5	7	35			4	7	28			4	7	28			7	4	28			4	3	12	
Mill St - combined sewer		5	6	30			4	6	24			4	6	24			7	4	28			4	3	12	
Riverside Dr - combined sewer		5	4	20			4	5	20			4	4	16			7	4	28			4	3	12	
Interceptor Maintenance Holes (MH)		5	7	35			4	7	28			4	7	28			7	N/A				4	3	12	
Sanitary Sewers		5	7	35			4	7	28			4	7	28			7	N/A				4	3		
Maintenance Covers		5	7	35			4	7	28			4	7	28			7	N/A				4	4	16	
Pump Stations		5	7	35			4	7	28			4	7	28			7	N/A				4	4	16	
LRWRP: Inflow from Western Trunk line specifically		5	7	35			4	7	28			4	7	28			7	7	**49**			4	4	16	
LRWRP - Note for much less than 100 year river levels		5	7	35			4	7	28			4	7	28			7	7	**49**			4	4	16	
Open drainage channels		5	7	35	worst case- specific sites		4	7	28	worst case- specific sites		4	7	28	worst case- specific sites		7	N/A				4	5	20	
Russel Street - open channel drainage		5	3	15	worst case- specific sites		4	6	24	worst case- specific sites		4	3	12	worst case- specific sites		7	3	21			4	2	8	
Storm Sewers		5	7	35	worst case- specific sites		4	7	28	worst case- specific sites		4	7	28	worst case- specific sites		7	N/A				4	2	8	
Outfalls		5	7	35	worst case- specific sites		4	6	24	worst case- specific sites		4	7	28	worst case- specific sites		7	N/A				4	2	8	
Maintenance holes		5	7	35	worst case- specific sites		4	7	28	worst case- specific sites		4	7	28	worst case- specific sites		7	N/A				4	4	16	
Catch Basins		5	7	35	worst case- specific sites		4	7	28	worst case- specific sites		4	7	28	worst case- specific sites		7	N/A				4	5	20	
Drains		5	7	35	worst case- specific sites		4	7	28	worst case- specific sites		4	7	28	worst case- specific sites		7	N/A				4	4	16	
Culverts		5	7	35	worst case- specific sites		4	7	28	worst case- specific sites		4	7	28	worst case- specific sites		7	N/A				4	5	20	
Major Roadway - Felix Avenue		5	6	30			4	7	28			4	7	28			7	5	35			4	3	12	
Major Roadway - Huron Church Road		5	3	15			4	5	20			4	4	16			7	N/A				4	2	8	
Major Roadway - Mill Street		5	3	15			4	6	24			4	4	16			7	5	35			4	2	8	
Major Roadway - Ojibway Parkway		5	3	15			4	4	16			4	3	12			7	3	21			4	3	12	
Major Roadway - Prince Road		5	3	15			4	5	20			4	4	16			7	3	21			4	2	8	
Major Roadway - Riverside Drive		5	4	20			4	5	20			4	4	16			7	5	35			4	3	12	
Major Roadway - Sandwich Street		5	5	25			4	7	28			4	6	24			7	4	28			4	3	12	
Major Roadway - University Avenue		5	4	20			4	5	20			4	4	16			7	N/A				4	3	12	
Major Roadway - Wyandotte Street W		5	4	20			4	5	20			4	4	16			7	N/A				4	3	12	
Ambassador Bridge/Canadian Border Services		5	6	30			4	7	28			4	5	20			7	5	35			4	5	20	
Rail Tracks		5	6	30			4	7	28			4	6	24			7	7	**49**			4	3	12	
St Michael's Adult Secondary School		5	5	25			4	6	24			4	6	24			7	N/A				4	4	16	
Duff - Baby House (museum)		5	5	25			4	5	20			4	5	20			7	N/A				4	4	16	
Canada South Science City - Tourist Attraction		5	6	30			4	7	28	severity = 6 vs 5 for xtrm rain alone		4	7	28			7	5	35			4	3	12	
West Windsor Musallah - Mosque		5	6	30			4	7	28			4	7	28			7	4	28			4	3	12	
Windsor Essex Community Health - Community Centre		5	4	20			4	4	16			4	4	16			7	N/A				4	5	20	
Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre		5	7	35			4	7	28			4	7	28			7	N/A				4	5	20	
Mackenzie Hall Cultural Centre		5	4	20			4	4	16			4	4	16			7	N/A				4	4	16	
St John's Anglican Church - historic site		5	4	20			4	4	16			4	4	16			7	N/A				4	4	16	
Islamic Academy Windsor		5	6	30			4	7	28			4	7	28			7	4	28			4	3	12	
Society of St Vincent de Paul		5	6	30			4	7	28			4	7	28			7	4	28			4	3	12	
General Brock Public School		5	5	25			4	6	24			4	7	28			7	4	28			4	4	16	
Sandwich Teen Action Group		5	6	30			4	7	28			4	7	28			7	4	28			4	3	12	
Sandwich First Baptist Church		5	5	25			4	5	20			4	5				7	3	21			4	3	12	
Great Lakes Institute for Environmental Studies (U of Windsor)		5	3	15			4	6	24			4	3	12			7	5	**35**			4	3	12	
HMCS Hunter Navy Facility		5	5	25			4	6	24			4	5	20			7	5	**35**			4	5	20	
Paterson Park		5	2	10			4	5	20			4	2	8			7	3	21			4	3	12	
Bradley Park		5	2	10			4	2	8			4	2	8			7	1	7			4	3	12	
Mackenzie Hall Park		5	2	10			4	2	8			4	2	8			7	1	7			4	3	12	
Overhead electrical distribution		5	2	10			4	2	8			4	2	8			7	1	7			4	5	20	
Sub-grade vaults and/or transformers		5	6	30			4	7	28			4	3	12			7	4	28			4	5	20	
Telecommunication		5	3	15			4	4	16			4	2	8			7	2	14			4	5	20	
See Part 4		5	6	30			4	7	28			4	6	24											
See Part 4 (Commercial Buildings)			N/A				4	N/A					N/A												
Sterling Fuels - Office and tank farm E of Russel St		5	4	20			4	6	24			4	5	20			7	3	21			4	5	20	
Other Industrial Buildings - See Part 4																									
Part 2 – Zone 2																									
Ojibway Parkway - Combined Sewer		5	3	15			4	5	20			4	3	12			7	1	7			4	2	8	
Riverside Dr - Combined Sewer		5	3	15			4	5	20			4	3	12			7	1	7			4	2	8	
Sandwich Street - Combined Sewer		5	6	30			4	7	28			4	6	24			7	2	14			4	3	12	
Interceptor Maintenance Holes (MH)		5	7	35			4	7	28			4	7	28			7	N/A				4	3	12	
Sanitary Sewers		5	7	35			4	7	28			4	7	28			7	N/A		Location specific		4	3	12	
Maintenance Covers		5	7	35			4	7	28			4	7	28			7	N/A		Location specific		4	4	16	
Pump Stations		5	7	35			4	7	28			4	7	28			7	N/A		Location specific		4	4	16	
Pump station - Prospect Ave		5	7	35			4	7	28			4	7	28			7	5	35			4	5	20	
Pump Station - McKee Road		5	6	30			4	7	28			4	7	28			7	5	35			4	5	20	
Open drainage channels		5	7	35			4	7	28			4	7	28			7	N/A		Location specific		4	5	20	
Storm Sewers		5	7	35			4	7	28			4	7	28			7	N/A		Location specific		4	2	8	
Brock Street Outfall		5	6	30			4	7	28			4	6	24			7	4	28			4	2	8	
Maintenance holes		5	7	35			4	7	28			4	7	28			7	N/A				4	4	16	
Catch Basins		5	7	35			4	7	28			4	7	28			7	N/A				4	5	20	
McKee Creek catch basin		5	5	25			4	7	28			4	6	24			7	5	**35**			4	2	8	
Drains		5	7	35			4	7	28			4	7	28			7	**N/A**				4	**4**	16	
Culverts		5	7	35			4	7	28			4	7	28			7	N/A				4	5	20	
Outfall for Lou Romano Water Reclamation Plant (LRWRP)		5	6	30			4	7	28			4	7	28			7	5	35			4	3	12	
Mill St - Outfall, CS & catchment basin		5	6	30			4	7	28			4	7	28			7	6	**42**			4	3	12	
Major Roadway - Ojibway Parkway		5	5	25			4	7	28			4	5	20			7	4	28			4	4	16	
Road & Open Ditch - Prospect Ave		5	5	25			4	7	28			4	5	20			7	4	28			4	4	16	
Major Roadway - Riverside Drive		5	3	15			4	5	**20**			4	3	12			7	2	14			4	2	8	
Major Roadway - Sandwich Street		5	6	30			4	7	28			4	6	24			7	2	14			4	3	12	debris generation
Ambassador Bridge/Huron-Church catch basin, outfall, weir		5	6	30			4	7	28			4	6	24			7	6	**42**			4	4	16	
ETR rail and Gore Creek		5	5	25			4	7	28			4	6	24			7	6	**42**			4	3	12	
ETR rail and McKee Creek		5	5	25			4	7	28			4	6	24			7	5	35			4	2	8	
Rail Tracks		5	6	30			4	7	28			4	6	24			7	5	**35**			4	3	12	
St Michael's Adult Secondary School		5	5	25			4	6	24			4	5	20			7	N/A				4	4	16	
Duff - Baby House (museum)		5	5	25			4	5	20			4	5	20			7	N/A				4	4	16	
Canada South Science City - Tourist Attraction		5	6	30			4	7	28			4	7	28			7	5	**35**			4	3	12	
West Windsor Musallah - Mosque		5	6	30			4	7	28			4	7	28			7	4	28			4	3	12	
Windsor Essex Community Health - Community Centre		5	4	20			4	4	16			4	4	16			7	N/A				4	5	20	
Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre		5	7	35			4	7	28			4	7	28			7	N/A				4	5	20	

Infrastructure Components	11 Secondary Impact Events					12 Secondary Impact Events					13 Secondary Impact Events					14 Secondary Impact Events				
	Extreme Wind Event - 120 km/h				debris generation, loss of site access, damage to above-ground infrastructure (plant, pump houses)	Tornado - (E)F2+				debris generation, loss of site access, severe damage to above-ground infrastructure (plant, pump houses)	Weathering (freeze thaw) - Concrete and masonry impacts - total cycles					Weathering (freeze thaw) - Concrete and masonry impacts - 30-cycle increments				
	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score	Y/N	P	S	R	Rationale For Severity Score
Part 1 – Zone 1																				
Felix Avenue - Combined sewer		7	3	21			2	5	10			7	3	21			7	3	21	
Mill St - combined sewer		7	3	21			2	5	10			7	3	21			7	3	21	
Riverside Dr - combined sewer		7	3	21			2	5	10			7	3	21			7	3	21	
Interceptor Maintenance Holes (MH)		7	3	21			2	5	10			7	1	7			7	1	7	
Sanitary Sewers		7	3	21			2	4	8			7	1	7			7	1	7	
Maintenance Covers		7	2	14			2	5	10			7	3	21			7	3	21	
Pump Stations		7	4	28			2	5	10			7	1	7			7	1	7	
LRWRP: Inflow from Western Trunk line specifically		7	4	28			2	7	14			7	2	14			7	2	14	
LRWRP - Note for much less than 100 year river levels		7	4	28			2	7	14			7	2	14			7	2	14	
Open drainage channels		7	5	35			2	7	14			7	2	14			7	2	14	
Russel Street - open channel drainage		7	3	21			2	5	10			7	2	14			7	2	14	
Storm Sewers		7	3	21			2	5	10			7	2	14			7	2	14	
Outfalls		7	3	21			2	5	10			7	2	14			7	2	14	
Maintenance holes		7	4	28			2	6	12			7	2	14			7	2	14	
Catch Basins		7	5	35			2	7	14			7	2	14			7	2	14	
Drains		7	4	28			2	5	10			7	2	14			7	2	14	
Culverts		7	5	35			2	6	12			7	3	21			7	3	21	
Major Roadway - Felix Avenue		7	3	21			2	6	12			7	2	14			7	2	14	
Major Roadway - Huron Church Road		7	2	14			2	6	12			7	2	14			7	2	14	
Major Roadway - Mill Street		7	2	14			2	6	12			7	2	14			7	2	14	
Major Roadway - Ojibway Parkway		7	3	21			2	7	14			7	2	14			7	2	14	
Major Roadway - Prince Road		7	2	14			2	6	12			7	2	14			7	2	14	
Major Roadway - Riverside Drive		7	3	21			2	7	14			7	2	14			7	2	14	
Major Roadway - Sandwich Street		7	4	28			2	7	14			7	2	14			7	2	14	
Major Roadway - University Avenue		7	3	21			2	7	14			7					7			
Major Roadway - Wyandotte Street W		7	3	21			2	7	14			7					7			
Ambassador Bridge/Canadian Border Services		7	5	35			2	7	14			7	2	14			7	2	14	
Rail Tracks		7	3	21			2	3	6			7	2	14			7	2	14	
St Michael's Adult Secondary School		7	4	28			2	7	14			7	2	14			7	2	14	
Duff - Baby House (museum)		7	4	28			2	7	14			7	2	14			7	2	14	
Canada South Science City - Tourist Attraction		7	4	28			2	7	14			7	2	14			7	2	14	
West Windsor Musallah - Mosque		7	4	28			2	7	14			7	2	14			7	2	14	
Windsor Essex Community Health - Community Centre		7	5	35			2	7	14			7	2	14			7	2	14	
Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre		7	5	35			2	7	14			7	2	14			7	2	14	
Mackenzie Hall Cultural Centre		7	4	28			2	7	14			7	2	14			7	2	14	
St John's Anglican Church - historic site		7	4	28			2	7	14			7	2	14			7	2	14	
Islamic Academy Windsor		7	4	28			2	7	14			7	2	14			7	2	14	
Society of St Vincent de Paul		7	4	28			2	7	14			7	2	14			7	2	14	
General Brock Public School		7	4	28			2	7	14			7	2	14			7	2	14	
Sandwich Teen Action Group		7	4	28			2	7	14			7	2	14			7	2	14	
Sandwich First Baptist Church		7	3	21			2	7	14			7	2	14			7	2	14	
Great Lakes Institute for Environmental Studies (U of Windsor)		7	4	28			2	7	14			7	2	14			7	2	14	
HMCS Hunter Navy Facility		7	4	28			2	7	14			7	3	21			7	3	21	
Paterson Park		7	4	28			2	6	12			7	2	14			7	2	14	
Bradley Park		7	4	28			2	6	12			7	2	14			7	2	14	
Mackenzie Hall Park		7	4	28			2	6	12			7	2	14			7	2	14	
Overhead electrical distribution		7	5	**35**			2	7	14			7	2	14			7	2	14	
Sub-grade vaults and/or transformers		7	4	28			2	5	10			7	2	14			7	2	14	
Telecommunication		7	5	**35**			2	7	14			7	2	14			7	2	14	
See Part 4																				
See Part 4 (Commercial Buildings)		7	4	28			2	6	12											
Sterling Fuels - Office and tank farm E of Russel St		7	4	28			2	7	14			7	2	14			7	2	14	
Other Industrial Buildings - See Part 4																				
Part 2 – Zone 2																				
Ojibway Parkway - Combined Sewer		7	2	14			2	6	12			7	2	14			7	2	14	
Riverside Dr - Combined Sewer		7	2	14			2	6	12			7	2	14			7	2	14	
Sandwich Street - Combined Sewer		7	4	28			2	5	10			7	2	14			7	2	14	
Interceptor Maintenance Holes (MH)		7	3	21			2	5	10			7	1	7			7	1	7	
Sanitary Sewers		7	3	21			2	4	8			7	1	7			7	1	7	
Maintenance Covers		7	2	14			2	5	10			7	3	21			7	3	21	
Pump Stations		7	4	28			2	5	10			7	1	7			7	1	7	
Pump station - Prospect Ave		7	5	35			2	7	14			7	2	14			7	2	14	
Pump Station - McKee Road		7	5	35			2	7	14			7	2	14			7	2	14	
Open drainage channels		7	5	35			2	7	14			7	3	21			7	3	21	
Storm Sewers		7	3	21			2	7	14			7	2	14			7	2	14	
Brock Street Outfall		7	2	14			2	6	12			7	3	21			7	3	21	
Maintenance holes		7	3	21			2	6	12			7	2	14			7	2	14	
Catch Basins		7	5	35			2	7	14			7	2	14			7	2	14	
McKee Creek catch basin		7	2	14			2	6	12			7	2	14			7	2	14	
Drains		7	4	28			2	5	10			**7**	2	14			**7**	2	14	
Culverts		7	5	35			2	6	12			7	3	21			7	3	21	
Outfall for Lou Romano Water Reclamation Plant (LRWRP)		7	3	21			2	6	12			7	2	14			7	2	14	
Mill St - Outfall, CS & catchment basin		7	3	21			2	6	12			7	2	14			7	2	14	
Major Roadway - Ojibway Parkway		7	3	21			2	6	12			7	2	14			7	2	14	
Road & Open Ditch - Prospect Ave		7	3	21			2	6	12			7	2	14			7	2	14	
Major Roadway - Riverside Drive		7	2	14			2	6	12			7	2	14			7	2	14	
Major Roadway - Sandwich Street		7	4	28	debris generation; tree uprooting		2	5	10			7	2	14			7	2	14	
Ambassador Bridge/Huron-Church catch basin, outfall, weir		7	3	21			2	6	12			7	2	14			7	2	14	
ETR rail and Gore Creek		7	3	21			2	6	12			7	2	14			7	2	14	
ETR rail and McKee Creek		7	3	21			2	6	12			7	3	21			7	3	21	
Rail Tracks		7	3	21			2	3	6			7	2	14			7	2	14	
St Michael's Adult Secondary School		7	4	28			2	7	14			7	2	14			7	2	14	
Duff - Baby House (museum)		7	4	28			2	7	14			7	2	14			7	2	14	
Canada South Science City - Tourist Attraction		7	4	28			2	7	14			7	2	14			7	2	14	
West Windsor Musallah - Mosque		7	4	28			2	7	14			7	2	14			7	2	14	
Windsor Essex Community Health - Community Centre		7	5	35			2	7	14			7	2	14			7	2	14	
Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre		7	5	35			2	7	14			7	2	14			7	2	14	

Infrastructure Class	Infrastructure Components	1 Extreme Rainfall: "Major" 100-yr Storm - 82mm in 4 hours (Peak rate of 145 mm/h)	1 Extreme Rainfall: Models storms 4-hour Chicago distribution based on peak rainfall rate	2 Extreme Rainfall: "Minor" 5-year Storm - 50mm in 4 hours (peak rate of 29.5 mm/hr)	2 Extreme Rainfall: Models storms 4-hour Chicago distribution based on peak rainfall rate	3 Extreme River Levels: "Likely" CC HWL - 176.1 m	3 Extreme River Levels: Adjusted HWL for our study - Based on HA's lit review and extensive group discussion	4 Extreme River Levels: Current HWL - 175.9 m	4 Extreme River Levels: Current 100 year level for Detroit River	5 Combination Events: Current 100 yr HWL + extreme rainfall (100 year storm)	5 Combination Events: Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check	6 Combination Events: Current 100 yr HWL + Moderate Rainfall (5-year storm)	6 Combination Events: Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check	7 Combination Events: Climate Chg HWL + extreme rainfall (100 year storm)	7 Combination Events: Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check	8 Combination Events: Climate Chg HWL + moderate rainfall (5 year storm)	8 Combination Events: Combined probability event modeling results. Currently based on stat independent mult. - Need stat dependence check	9 Combination Events: HWL + wave action (freeboard)	9 Combination Events: Case Studies (from HIRA): November 13-15, 1972, March 31 & April 6, 1985, April 4, 1987, June 2015, Spring 2019	10 Secondary Impact Events: Major ice storm - 28mm or more	10 Secondary Impact Events: Multi-day loss of power - CSA Overhead Design 100 year event - between reliability 1 and 2	11 Secondary Impact Events: Extreme Wind Event - 120 km/h	11 Secondary Impact Events: debris generation, loss of site access, damage to above-ground infrastructure (plant, pump houses)	12 Secondary Impact Events: Tornado - (E)F2+	12 Secondary Impact Events: debris generation, loss of site access, severe damage to above-ground infrastructure (plant, pump houses)	13 Secondary Impact Events: Weathering (freeze thaw) - Concrete and masonry impacts - total cycles	14 Secondary Impact Events: Weathering (freeze thaw) - Concrete and masonry impacts - 30-cycle increments
	Mackenzie Hall Cultural Centre	7 3 21		7 2 14		4 4 16		5 4 20		4 4 16		5 4 20		4 4 16		4 4 16		7 N/A		4 4 16		7 4 28		2 7 14		7 2 14	7 2 14
	St John's Anglican Church - historic site	7 3 21		7 2 14		4 4 16		5 4 20		4 4 16		5 4 20		4 4 16		4 4 16		7 N/A		4 4 16		7 4 28		2 7 14		7 2 14	7 2 14
	Islamic Academy Windsor	7 6 **42**	Max 42= 5 & 100yr & combination	7 6 **42**		4 5 20		5 4 20		4 7 28		5 6 30		4 7 28		4 6 24		7 4 28		4 3 12		7 4 28		2 7 14		7 2 14	7 2 14
	Society of St Vincent de Paul	7 6 **42**	Max 42= 5 & 100yr & combination	7 6 **42**		4 5 20		5 4 20		4 7 28		5 6 30		4 7 28		4 6 24		7 4 28		4 3 12		7 4 28		2 7 14		7 2 14	7 2 14
	General Brock Public School	7 5 **35**	Max 35=5 & 100yr & combination	7 5 **35**		4 5 20		5 4 20		4 6 24		5 5 25		4 5 20		4 5 20		7 4 28		4 4 16		7 4 28		2 7 14		7 2 14	7 2 14
	Sandwich Teen Action Group	7 6 **42**	Max 42=5 & 100yr & combination	7 6 **42**		4 5 20		5 4 20		4 7 28		5 6 30		4 7 28		4 6 24		7 4 28		4 3 12		7 4 28		2 7 14		7 2 14	7 2 14
	Sandwich First Baptist Church	7 5 **35**	Max 30= due 100yr rain	7 3 21		4 2 8		5 2 10		4 5 20		5 3 15		4 5 20		4 3 12		7 3 21		4 3 12		7 3 21		2 7 14		7 2 14	7 2 14
	Chateau Park LTC Centre	7 5 **35**	35=100 year rain; wind, waves	7 3 21		4 5 20		5 5 25		4 6 24		5 5 25		4 5 20		4 5 20		7 3 21		4 5 20		7 5 **35**		2 7 14		7 3 21	7 3 21
	Great Lakes Institute for Environmental Studies (U of Windsor)	7 5 **35**	35=100 year rain; basement flooding; wind, waves	7 3 21		4 5 20		5 5 25		4 6 24		5 3 15		4 6 24		4 3 12		7 5 **35**		4 3 12		7 4 28		2 7 14		7 2 14	7 2 14
	HMCS Hunter Navy Facility	7 4 28	42=>100 year HWL;erosion; WPA shoreline property, high occup building	7 2 14		4 7 28		5 6 30		4 6 24		5 6 30		4 7 28		4 7 28		7 5 **35**		4 3 12		7 5 **35**		2 7 14		7 3 21	7 3 21
Park Assets	**McKee Park - Sandwich and Chewett Streets**	7 3 21	35= < 100 year HWL; shoreline flooding	7 2 14		4 5 20		5 5 25		4 5 20		5 5 25		4 5 20		4 5 20		7 5 **35**		4 2 8		7 2 14		2 7 14		7 3 21	7 3 21
	Brock Park	7 4 28		7 2 14		4 4 16		5 3 15		4 4 16		5 4 20		4 5 20		4 5 20		7 4 28		4 2 8		7 3 21		2 6 12		7 3 21	7 3 21
	Mill Park	7 4 28		7 2 14		4 2 8		5 2 10		4 2 8		5 2 10		4 2 8		4 2 8		7 2 14		4 2 8		7 4 28		2 6 12		7 2 14	7 2 14
	Queen's Park	7 4 28		7 2 14		4 2 8		5 2 10		4 2 8		5 2 10		4 2 8		4 2 8		7 2 14		4 2 8		7 4 28		2 6 12		7 2 14	7 2 14
	Chateau Park - Ambassador Bridge area	7 3 21	35=<100 year HWL; retaining wall submerged	7 1 7		4 6 24		5 5 25		4 6 24		5 5 25		4 6 24		4 6 24		7 5 **35**		4 2 8		7 2 14		2 5 10		7 3 21	7 3 21
Energy and Communications Infrastructure	**JC Keith Transformer Station**	7 5 **35**	35=flooding w high HGLs; critical 3rd party infrastructure, further study	7 3 21		4 4 16		5 3 15		4 6 24		5 4 20		4 5 20		4 4 16		7 3 21		4 5 20		7 3 21		2 6 12		7 2 14	7 2 14
	Overhead electrical distribution	7 3 21	Max 35= sensitive to wind, ice abv grnd; Also: 100yr rain & HWL	7 2 14		4 2 8		5 1 5		4 3 12		5 2 10		4 2 8		4 2 8		7 1 7		4 5 20		7 5 **35**		2 7 14		7 2 14	7 2 14
	Sub-grade vaults	7 7 **49**	Max 42= due 100yr rain & HWL blo grd; wind, ice abv grnd	7 2 14		4 5 20		5 2 10		4 7 28		5 6 30		4 7 28		4 3 12		7 4 28		4 5 20		7 4 28		2 5 10		7 2 14	7 2 14
	Sub-grade transformers	7 4 28	Max 35=due wind, ice abv grnd; Also: 100yr rain & HWL below grnd	7 2 14		4 3 12		5 2 10		4 4 16		5 3 15		4 4 16		4 2 8		7 2 14		4 5 20		7 5 **35**		2 7 14		7 2 14	7 2 14
	Telecommunication	7 4 28	Max 35=due wind, ice abv grnd; Also: 100yr rain & HWL below grnd	7 2 14		4 3 12		5 2 10		4 4 16		5 3 15		4 4 16		4 2 8		7 2 14		4 5 20		7 5 **35**		2 7 14		7 2 14	7 2 14
	Atura Power Brighton Beach Gen Station	7 7 **49**	49=Combined events, 100 year rain, 5 year rain; subgrade flooding due HGL, flooding to 8.3m	7 3 21		4 7 28		5 7 35		4 7 28		5 7 35		4 7 28		4 7 28		7 7 **49**		4 6 24		7 5 35		2 6 12		7 2 14	7 2 14
Residential Buildings	**Buildings - See Part 4**																										
Commercial Buildings	**Building - See Part 4**																										
Industrial Assets	Transpo/Trucking/Logistics - Van De Hogan Group (VG; trucking); Cole-Carriers Inc.; Stantec Trailers	7 3 21		7 1 7		4 3 12		5 2 10		4 4 16		5 2 10		4 4 16		4 2 8		7 1 7		4 4 16		7 4 28		2 6 12		7 1 7	7 1 7
	Windsor Biosolids Processing Plant	7 7 **49**	42=combined prob event, extremes rainfall; flooding > 1m	7 3 21		4 5 20		5 4 20		4 7 28		5 4 20		4 7 28		4 5 20		7 8 35		4 3 12		7 3 21		2 7 14		7 2 14	7 2 14
	Windsor Salt - end of Prospect Ave	7 7 **49**	49=Master; erosion 100 year rain; combined prob	7 3 21		4 5 20		5 5 25		4 7 28		5 6 30		4 7 28		4 5 20		7 6 42		4 3 12		7 4 28		2 7 14		7 2 14	7 2 14
	Newmak Windsor Aluminum Plant	7 4 28		7 2 14		4 2 8		5 2 10		4 4 16		5 2 10		4 4 16		4 2 8		7 2 14		4 4 16		7 4 28		2 7 14		7 2 14	7 2 14
Part 3																											
Zone 3 - W of Ojibway Pkwy., N of Morten Dr. to Broadway St.																											
	Sprucewood Ave - Combined Sewer	7 7 **49**	49=Combined event; 100 year and 5 year rain; ~ 1m flooding all rain events; Sig HGL/surcharge	7 6 **42**		4 5 20		5 4 20		4 7 28		5 6 30		4 7 28		4 6 24		7 5 35		4 4 16		7 3 21		2 6 12		7 2 14	7 2 14
	Sprucewood Ave - Open ditches	7 7 **49**	49 = Extreme 5 & 100 year rain; workshop participants indicated problem area	7 6 **42**		4 4 16		5 3 15		4 7 28		5 6 30		4 7 28		4 6 24		7 4 28		4 3 12		7 3 21		2 6 12		7 3 21	7 3 21
	Maintenance Covers	7 2 14				4 7 28		5 7 35		4 7 28		5 7 35		4 7 28		4 7 28		7 N/A	Location specific	4 4 16		7 2 14		2 5 10		7 3 21	7 3 21
	Pump Stations	7 5 35		7 4 28		4 7 28		5 7 35		4 7 28		5 7 35		4 7 28		4 7 28		7 N/A	Location specific	4 5 20	power outages	7 5 35	power outages, debris	2 5 10		7 1 7	7 1 7
	Open drainage channels	7 4 28		7 2 14		4 7 28		5 7 35		4 6 24		5 7 35		4 7 28		4 7 28		7 N/A	Location specific	4 5 20		7 5 35		2 7 14		7 3 21	7 3 21
	Storm Sewers	7 5 35		7 2 14		4 7 28		5 7 35		4 6 24		5 7 35		4 7 28		4 7 28		7 N/A	Location specific	4 2 8		7 3 21		2 5 10		7 2 14	7 2 14
	Outfalls	7 4 28		7 2 14		4 7 28		5 7 35		4 6 24		5 7 35		4 7 28		4 7 28		7 N/A	Location specific	4 2 8		7 3 14		2 3 6		7 2 14	7 2 14
	Maintenance holes	7 5 35		7 2 14		4 7 28		5 7 35		4 6 24		5 7 36		4 7 28		4 7 28		7 N/A	Location specific	4 4 16		7 3 21		2 6 12		7 2 14	7 2 14
	Catch Basins	7 5 35		7 2 14		4 7 28		5 7 35		4 6 24		5 7 36		4 7 28		4 7 28		7 N/A	Location specific	4 5 20		7 4 28		2 7 14		7 2 14	7 2 14
	Drains	7 5 35		7 2 14		4 7 28		5 7 35		4 6 24		5 7 36		4 7 28		4 7 28		7 N/A	Location specific	4 4 16		7 4 28		2 5 10		7 2 14	7 2 14
	Culverts	7 5 35		7 2 14		4 7 28		5 7 35		4 6 24		5 7 36		4 7 28		4 7 28		7 N/A	Location specific	4 5 20		7 5 35		2 6 12		7 3 21	7 3 21
Shoreline Stormwater/ Flood Protection Infrastructure	**CSOs**	7 5 35		7 4 28		4 6 24		5 5 25		4 7 28		5 5 25		4 7 28		4 6 24		7 N/A	Location specific	4 4 16		7 4 28		2 5 10		7 3 21	7 3 21
Transportation	**Major Roadway - Ojibway Parkway**	7 7 49	49=Combined prob events; 100 year rain, 5 year rain; LOS for 63% road	7 5 35		4 2 8		5 2 10		4 4 16		5 2 10		4 4 16		4 2 8		7 2 14		4 4 16		7 4 28		2 7 14		7 2 14	7 2 14
	Major Roadway - Sprucewood Avenue - open ditches	7 7 **49**	49=100 year & 5 year rain; adjacent to wetland; modelling	7 6 **42**		4 2 8		5 2 10		4 7 28		5 6 30		4 7 28		4 6 24		7 2 14		4 4 16		7 3 21		2 6 12		7 2 14	7 2 14
	Detroit-Windsor Truck Ferry	7 7 **49**	49=100 year rain, 5 year rain, Combined prob event; 0.75-1m surface flooding, trade importance	7 6 **42**		4 3 12		5 2 10		4 7 28		5 6 30		4 7 28		4 6 24		7 5 35		4 5 20		7 5 35		2 6 12		7 2 14	7 2 14
	Rail Tracks	7 7 **49**	49=100 year & 5 year rain;Combined events; mdt surface flooding for 100 year rain	7 5 35		4 2 8		5 2 10		4 6 24		5 5 25		4 6 24		4 5 20		7 2 14		4 4 16		7 3 21		2 6 12		7 2 14	7 2 14
Park Assets	**Black Oak Heritage Park**	7 5 **35**	35=100 year rain & combined; Extreme wind, ice storm; sfc flooding >0.3m w/ 100 year rain	7 3 21		4 2 8		5 2 10		4 6 24		5 3 15		4 7 28		4 4 16		7 3 21		4 4 16		7 5 **35**		2 5 10		7 2 14	7 2 14
Energy and Communications Infrastructure	**Overhead electrical distribution**	7 3 21	Max 30= sensitive to wind, ice abv grd; Also 100yr rain & HWL below ground	7 2 14		4 2 8		5 1 5		4 3 12		5 2 10		4 2 8		4 2 8		7 1 7		4 5 20		7 5 **35**		2 7 14		7 2 14	7 2 14
	Sub-grade vaults	7 7 **49**	Max 28= due 100yr rain & HWL blo grd; wind, ice abv grnd	7 2 14		4 5 20		5 2 10		4 7 28		5 6 30		4 7 **28**		4 3 12		7 4 28		4 5 20		7 4 28		2 5 10		7 2 14	7 2 14
	Sub-grade transformers	7 4 28	Max 30=due wind, ice abv grnd; Also: 100yr rain & HWL below grnd	7 2 14		4 3 12		5 2 10		4 4 16		5 3 15		4 4 16		4 2 8		7 2 14		4 4 16		7 5 **35**		2 7 14		7 2 14	7 2 14
	Telecommunication	7 4 28	Max 30=due wind, ice abv grnd; Also: 100yr rain & HWL below grnd	7 2 14		4 3 12		5 2 10		4 4 16		5 3 15		4 4 16		4 2 8		7 2 14		4 4 16		7 5 **35**		2 7 14		7 2 14	7 2 14
Industrial Assets	**Shoreline Properties - Mortrem Ltd; ADM Windsor:**	7 5 35		7 3 21		4 3 12		5 2 10		4 6 24		5 4 20		4 6 24		4 5 20		7 4 28		4 4 16		7 4 28		2 6 12		7 2 14	7 2 14
	Windsor Salt Mine - ditch entrance	7 7 **49**	49=HWL <100 yr; Combined prob; 100 year rain; 5 year rain	7 5 35		4 6 24		5 6 30		4 7 28		5 7 35		4 7 28		4 7 28		7 7 **49**		4 2 8		7 2 14		2 6 12		7 2 14	7 2 14
	Windsor Salt Mine	6 7 42	49 = 5 & 100 year extreme rain; Combined probabilities; surface flooding 0.75-1m; extreme HGLs	5 7 35		4 6 24		5 6 30		2 7 14		4 6 24		4 7 28		4 7 28		7 7 **49**		4 2 8		7 4 28		2 6 12		7 2 14	7 2 14
	Shoreline Protection - retaining walls, rip-rap	7 3 21		7 1 7		4 5 20		5 4 20		4 5 20		5 4 20		4 6 24		4 5 20		7 4 28		4 2 8		7 3 21		2 5 10		7 3 21	7 3 21
Part 4																											
System-Wide Risks and Critical Third Party Services																											
System-Wide Assets	*Zone 1* Residential Areas serviced by combined sewers	7 7 **49**	42=Master for combined prob; 5 & 100 year rain (??)	7 6 **42**		4 5 20		5 4 20		4 7 28		5 6 30		4 7 28		4 6 24		7 4 28		4 4 16		7 4 28		2 7 14		7 2 14	7 2 14
	Zone 1 Commercial Areas serviced by combined sewers	7 7 **49**	42=Combined prob; 5 & 100 year rain generally; Likely basement flooding; Surface flooding extreme rain	7 6 **42**		4 4 16		5 4 20		4 7 28		5 6 30		4 7 28		4 6 24		7 4 28		4 4 16		7 4 28		2 7 14		7 2 14	7 2 14
	Zone 1 Industrial Buildings serviced by combined sewers	7 6 **42**	42=100 & 5 year rain; Mainly surface & basement flooding	7 6 **42**		4 4 16		5 3 15		4 7 28		5 6 30		4 7 28		4 6 24		7 4 28		4 4 16		7 4 28		2 7 14		7 2 14	7 2 14
	Zone 2 Combined Sewer Outfalls	7 5 **35**	High river levels above 174.6m; blocked outfalls and back feeding into combined system; Lost sewer capacity for extreme rain	7 3 21		4 7 28		5 6 30		4 7 28		5 6 30		4 7 28		4 6 24		7 5 **35**		4 2 8		7 3 21		2 5 10		7 3 21	7 3 21
	Zone 2 Residential Areas serviced by combined sewers	7 7 **49**	49 = Heavy rainfalls; Surface flooding > 1m; Potential basement flooding	7 7 **49**		4 4 16		5 3 15		4 7 28		5 4 20		4 7 28		4 7 28		7 3 21		4 5 20		7 5 35		2 6 12		7 2 14	7 2 14
	Zone 2 Commercial Areas serviced by combined sewers	7 7 **49**	49 = Heavy rainfall; Surface flooding > 1m	7 6 **42**		4 2 8		5 2 10		4 7 28		5 6 30		4 7 28		4 6 24		7 3 21		4 2 8		7 3 21		2 6 12		7 2 14	7 2 14
	Loss of Electrical Power Delivery - Pumps	7 4 28	delivery; Any assets below-grade (water intrusion); Power assets in Zone 2 flagged for further study	7 2 14		4 2 8		5 2 10		4 5 20		5 3 15		4 6 24		4 3 12		7 3 21		4 6 24		7 5 **35**		2 7 14		7 2 14	7 2 14
	Loss of Communications - equipment monitoring	7 4 28	35=Events giving damage to telephone lines; Below grade assets; Loss of pump monitoring	7 3 21		4 2 8		5 2 10		4 5 20		5 3 15		4 6 24		4 3 12		7 3 21		4 5 20		7 5 **35**		2 7 14		7 2 14	7 2 14
	Surface drainage and surface transportation (emergency response)	7 5 35	Max 35 = any wind >102 kph gusts or other damaging event affecting emergency response; Debris generation	7 3 21		4 2 8		5 2 10		4 5 20		5 3 15		4 5 20		4 3 12		7 3 21		4 6 24		7 5 **35**		2 7 14		7 1 7	7 1 7
	Pad mounted electrical	7 7 **49**	49= 100 year rainfall event; Extremely sensitive to surface flooding < 1m or more in depth; potential public safety risk	7 1 7		4 1 4		5 1 5		4 7 28		5 2 10		4 7 28		4 2 8		7 2 14		4 4 16		7 2 14		2 7 14		7 2 14	7 2 14

Zones 1, 2 and 3 for the West Windsor Study Region



Name	Area	Residential		Industrial		Commercial		Institutional		Green District		Other	
	(ha)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)
Zone 1	158	73	46%	51	32%	7	4%	13	8%	2	1%	12	8%
Zone 2	249	5	2%	234	94%	4	2%	1	0%	2	1%	4	1%
Zone 3	397	-	0%	302	76%	-	0%	-	0%	93	23%	3	1%

ZONE 1: Priority Assets at Risk and Proposed Short-Term and Long-Term Solutions.

Climate risks are identified as due to surface flooding, high Detroit River Levels, basement flooding (combined sewers) and/or erosion.

Short-term solutions (to 5 years) and longer-term solutions are proposed for each high risk issue linked to flooding.

ZONE 2: Priority Assets at Risk and Proposed Short-Term and Long-Term Solutions.

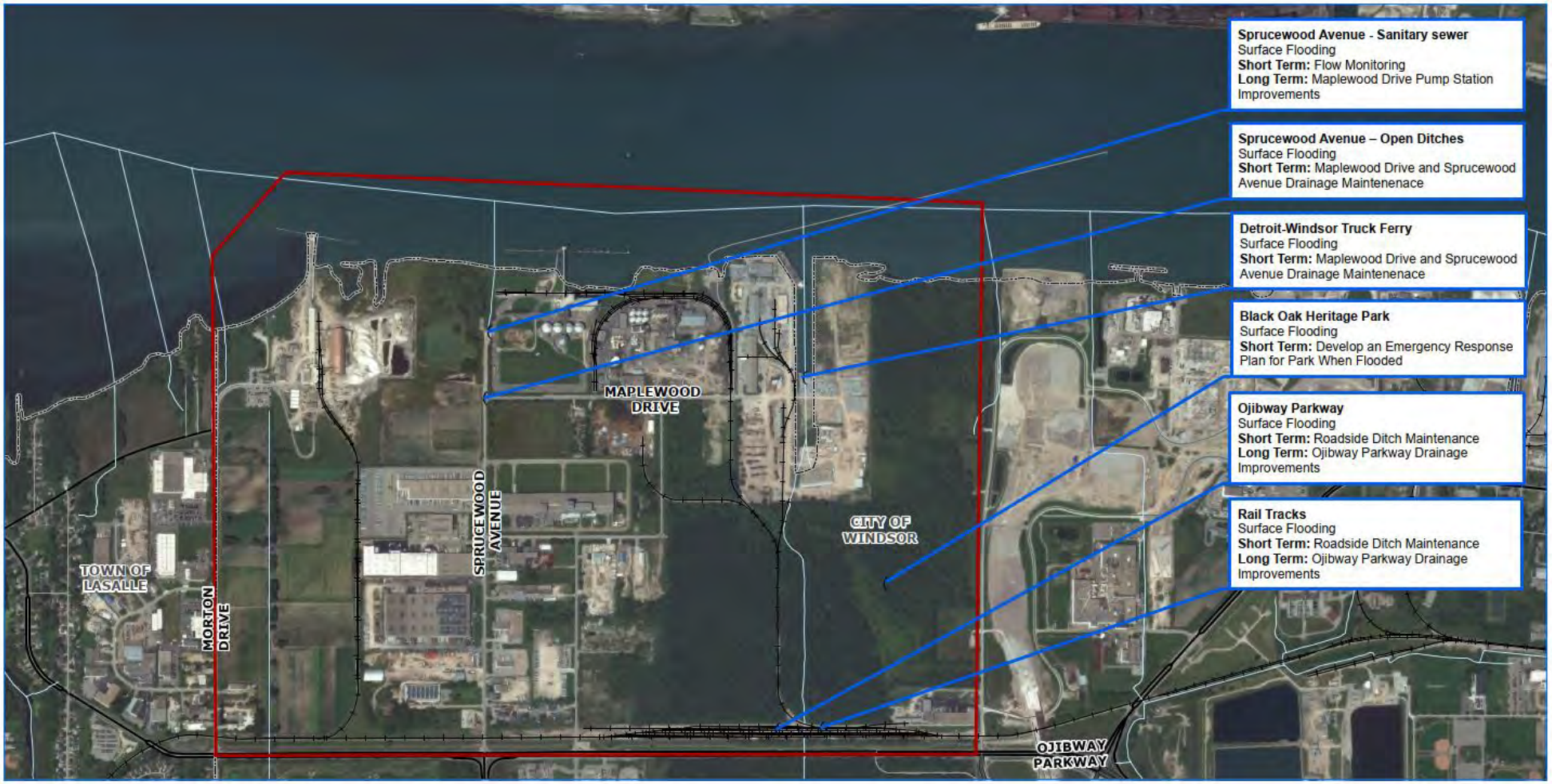
Climate risks are identified as due to surface flooding, high Detroit River Levels, basement flooding (combined sewers) and/or erosion.

Short-term solutions (to 5 years) and longer-term solutions are proposed for each high risk issue linked to flooding.

ZONE 3: Priority Assets at Risk and Proposed Short-Term and Long-Term Solutions.

Climate risks are identified as due to surface flooding, high Detroit River Levels, basement flooding (combined sewers) and/or erosion.

Short-term solutions (to 5 years) and longer-term solutions are proposed for each high risk issue linked to flooding.



West Windsor Study Area:

Summary of Medium and High Risks for Sites and Infrastructure Components

Risk Level (and corresponding scores)	
Low (<21)	
Medium (21-30)	
High (31-42)	
Extremely High or Potentially Life Threatening (>42)	

Infrastructure Component	Climate Hazard	Potential Impact	Current	2050s	2080s
Zone 1					
Lou Romano Water Reclamation Plant – Inflow from Western Trunk line specifically	Combined probability events << 100 year river level	*Excess inflow results in need to throttle gates; complete closure of gates rapidly results in extensive 3rd party (res./commercial) basement flooding (Ed Valdez); main sources of excessive flow, with LaSalle and Riverside considered 2nd and 3rd (Phong Nguy, City of Windsor); "our issue is... Western Trunk" (Roberta Harrison, City of Windsor)*	**49**	**49**	**49**
Lou Romano Water Reclamation Plant	High River Levels - << 100 year river level	*Blockage of main outfall, backflow into plant (incl. fish) resulting in treatment of river water; loss of outflow capacity for high flow events*	**49**	**49**	**49**
Russell Street - open channel drainage	Extreme rainfall	*Ditches filled completely during heavy rainfall*	24	**36**	**42**
Sandwich Street	Combined probability event; Extreme rainfall- "100 year" storm	*high HGL, moderate (0.3-0.5 m) surface ponding*	**35**	**36**	**42**
Ambassador Bridge - Entrance/onramp	Combined probability event; Extreme rainfall- "100 year" storm	*surface flooding and excess HGL - note this is just outside of Zone 1 but is included due to criticality of asset*	**35**	**36**	**42**
Felix Ave. - combined sewer	Combined probability event	*Excessive HGL - fails 5-year design storm criteria*	**35**	**36**	**42**

Mills St. – Combined sewer	Extreme Rainfall – "100 year" event	*Excessive HGLs (above surface for 100 year event), failure of LOS requirements*	**24**	**36**	**42**
Riverside Dr. – Combined sewer	Extreme Rainfall – "100 year" event	*Excessive HGLs (above surface for 100 year event), failure of LOS requirements*	**21**	**30**	**35**
Canada South Science City	Extreme Rainfall – "100 year" and "5 year" events	*potential basement flooding (High HGL)*	**35**	**36**	**42**
West Windsor Mosque	Combined probability event; Extreme Rainfall "100 year" event; Heavy rainfall "5 year" event	*potential basement flooding (High HGL)*	**42**	**42**	**49**
Islamic Academy/St Vincent de Paul Society/Sandwich Teen Action Group	Combined probability event; Extreme Rainfall "100 year" event; Heavy rainfall "5 year" event	*All 3 adjacent buildings - potential basement flooding (High HGL)*	**42**	**42**	**42**
Major F.A. Tilston, VC, Armoury and Windsor Police Training Centre	Extreme Rainfall – "100 year" event; Heavy rainfall "5 year" event	*Significant potential for basement flooding (high HGLs), moderate surface flooding 0.5-1.0 meter; Flooding slightly less severe but facility considered critical to emergency response.*	**49**	**49**	**49**
General Brock Public School	Extreme Rainfall – "100 year" event; Heavy rainfall "5 year" event	*Potential basement flooding (High HGL)*	**35**	**35**	**35**
Sandwich First Baptist Church	Extreme Rainfall – "100 year" event;	*Potential basement flooding (High HGL)*	**21**	**30**	**35**
Rail Tracks	Combined probability event	*Excess inflow results in need to throttle gates; complete closure of gates rapidly results in extensive 3rd party (res./commercial) basement flooding; main sources of excessive flow*	**35**	**42**	**49**
Zone 2					
Prospect Ave. - Pump station (incl. power connections) and outfall	High river levels - <<100 year HWL	*Blockage of outfall preventing drainage; outfall is higher than ditch, replaced diesel pump to low voltage feed from street light (Phong Nguy, City of Windsor)*	**35**	**36**	**42**

Prospect Ave. - Road and open drainage	Extreme rainfall - "100 year" storm, poss. lower	*Road and ditch flooding; outfall is higher than ditch (Phong Nguy, City of Windsor); Prospect "floods right over" (Ed Valdez, City of Windsor)*	**35**	**36**	**42**
Windsor Salt (end of Prospect Ave.)	Erosion; Extreme rainfall "100 Year" event; Combined probability event	*Modeling indicates dangerous ponding (>1 m) with 100 year and combined prob events; also potential for slump events resulting in salt entering Detroit River (one event 1954)*	**42**	**42**	**49**
Ojibway Parkway – Combined sewer	Extreme rainfall - "100 year" storm	*Significant HGLs*	**21**	**30**	**35**
Riverside Drive- Combined sewer	Extreme rainfall - "100 year" storm	*Significant HGLs*	**21**	**30**	**35**
Sandwich Street - Combined sewer	Extreme rainfall - "100 year" storm; Heavy rainfall "5 year" event	*Moderate surface flooding (0.5 to 1.0 meter) and significant HGLs*	**42**	**42**	**42**
Mill St. - Outfall and catchment basin	High river levels - < 100 year HWL; combined river level and freeboard/wave action	*blockage of outfall from high river levels preventing drainage, secondary street flooding*	**35**	**36**	**42**
Huron-Church (Ambassador Bridge) - catch basin, outfall and overflow weir wall	High river levels - <100 year HWL; extreme rainfall "100 year" event; Heavy rainfall "5 Year" event	*submersion during high river levels with 2nd ary road flooding and road base erosion; some sfc flooding reported with heavy rainfall; weir wall either has or is planned to increase in height (Roberta Harrison, City of Windsor); report to council with details is available (Karina Richters, Sustainability and CC, City of Windsor)*	**35**	**42**	**49**
McKee Rd. - Pumping station	High river levels - <100 year HWL; extreme rainfall	*Backflow during high water levels, also street flooding/surface ponding*	**35**	**42**	**42**
McKee Creek - catch basin	High river levels - <100 year HWL, extreme rainfall	*Submerged at < 100 year high water level; surcharged during extreme rainfall events*	**35**	**42**	**42**
Brighton Beach Generation Station	Combined probability events; Extreme rainfall "100 Year" event; Heavy rainfall "5-year" event	*Potential for sub-grade infrastructure flooding (extreme HGL), also minor to moderate (up to 0.3 m) flooding*	**49**	**49**	**49**
Keith Transmission Station - Hydro One	Potential sub-grade flooding (high	*Critical 3rd Party infrastructure - significant amt of sub-grade*	**21**	**30**	**42**

	HGLs, adjacent significant ponding)	*infrastructure, surface flooding adjacent properties – **Recommend further study***			
Chateau Park LTC	Extreme rainfall "100 year" event	*High HGLs - potential basement flooding*	**35**	**35**	**35**
Great Lakes Institute for Environmental Studies	Extreme rainfall "100 year" event	*High HGLs - potential basement flooding*	**35**	**35**	**35**
Chateau Park (Ambassador Bridge area)	<100 year HWL	*Retaining wall submerged*	**35**	**35**	**35**
McKee Park - Sandwich and Chewett Streets	<100 year HWL	*Shoreline flooding resulting in erosion damage and boat launch closure*	**35**	**35**	**35**
Gore Creek and ETR Rail	surface flooding - extreme rainfall and high water levels	*"Gore Creek flooding across Sandwich Street, ETR rail line and siding resulting in traffic diversion and rail line closure" Peter Barry, WPA*	**35**	**36**	**42**
McKee Creek and ETR Rail	surface flooding - extreme rainfall and high water levels	*Road flooding, already flagged by city (Roberta Harrison, City of Windsor; Peter Barry, WPA)*	**35**	**36**	**49**
Windsor Biosolids Processing Plant	combined probability event, extreme rainfall	*Significant surface flooding (> 1 m) form model, reports of surface flooding during real events (Ed Valdez)*	**35**	**42**	**49**
Brock Street - Outfall	**Erosion**	*"Brock Street outfall, significant shoreline erosion, infrastructure in decaying condition. In early planning stages of restoration and renaturalization of land within 5 years - PB Port Authority"; No significant impacts (as at lower elevation ones) but "should be looked at (Roberta Harrison)*	**28**	**30**	**35**
Goose Bay Park - Riverside Drive	High river levels - <100 year HWL	*Boat ramp and walking path underwater for several months*	**35**	**35**	**42**
HMCS Hunter	High river levels - <100 year HWL; **Erosion**	*High occupancy building (3rd Party) - Impacts to shoreline, WPA shoreline property*	**35**	**35**	**42**
Zone 3					
Ojibway Parkway	Combined probability events; Extreme rainfall "100 year" event;	*Extremely high HGLs for all rainfall events, failure of LOS requirements for 63% of road*	**35**	**42**	**49**

	Heavy rainfall "5-Year" event				
Windsor Salt Mine - Ditch entrance	High river levels - < 100 year HWL; Combined probability events; Extreme rainfall "100 year" event; Heavy rainfall "5-Year" event	*Loss of drainage capacity*	**49**	**49**	**49**
Windsor Salt Mine	Extreme rainfall "100 year" event; Heavy rainfall "5-Year" event Combined probability events;	*Moderate to significant surface flooding (~0.75 to >1 m); extreme HGLs*	**49**	**49**	**49**
Detroit-Windsor Truck Ferry	Extreme rainfall "100 year" event; Heavy rainfall "5-Year" event Combined probability event	*Moderate to significant surface flooding (~0.75 to 1 m); extreme HGLs; international trade importance, high impact when affected (as with Ambassador Bridge)*	**42**	**42**	**49**
Sprucewood Ave. - Combined sewer	Combined probability event; Extreme rainfall "100 year" event; Heavy rainfall "5-Year" event	*Moderate to significant surface flooding (~1 m) for all rainfall events; Significant HGL/surcharge during combined probability event*	**42**	**42**	**49**
Sprucewood Ave. – open ditches	Extreme rainfall "100 year" event; Heavy rainfall "5-Year" event	*Workshop attendees indicated problem area, adjacent to wetland, coincides with modeling data for avenue*	**42**	**42**	**49**
Black Oak Heritage Park	Extreme rainfall "100 year" event; Combined probability events w/ 100-year rainfall	*Surface flooding >0.3 meters for 100 year rainfall event*	**30**	**35**	**35**
Rail Tracks	Extreme rainfall "100 Year" Event; Heavy Rainfall "5 Year" event; Combined probability events	*High HGLs, moderate surface flooding for 100 year event*	**35**	**42**	**49**

General/System-Wide Risks and Critical 3rd Party Services					
Infrastructure Component	**Climate Hazard**	**Potential Impact**	**Current**	**2050s**	**2080s**
Loss of electrical power delivery - pumps	Any events resulting in damage to electrical power delivery (e.g., wind storms); Any below-grade assets sensitive to water intrusion	*Loss of power to critical pumps can result in rapid increase in sewer back-up risk.* *Keith TS, Altura Power Station, Gordi Howe Bridge sub-grade vault all potentially sensitive to flooding.* ***Flagged for further study.***	**30**	**35**	**35**
Loss of communications – equipment monitoring	Any events resulting in damage to telephone lines (e.g., wind storms); Any below-grade assets sensitive to water intrusion	*Disruption of monitoring to pumps and other equipment. Will be converted to internet-based monitoring. When monitoring disrupted, requires deployment of staff to equipment site.*	**30**	**35**	**35**
Surface drainage and surface transportation	Any wind (i.e., 120 km/hr gusts; tornado) or other damaging event (e.g., ice storm, heavy snowfall) to adjacent trees, foliage and industrial site storage yards	*Downing of trees and utility poles during wind events can block surface access routes to infrastructure, affecting emergency event response and access to equipment and assets.* *Debris generation during high winds can result in blockage of surface drainage, including open channels, culverts and catch basins.*	**30**	**35**	**35**
Zone 1 – Residential Areas serviced by combined sewers	Combined probability event; "100 year" event; Heavy rainfall "5 year" event	*Basement flooding risk - high HGL; Surface flooding from extreme rainfall*	**42**	**42**	**49**
Zone 1 - Commercial Areas - Combined sewer	Combined probability event; "100 year" event; Heavy rainfall "5 year" event	*Likely basement flooding (high HGL); Surface flooding from extreme rainfall*	**42**	**42**	**49**
Zone 1 – Industrial Buildings - Combined sewer	"100 year" event; Heavy rainfall "5 year" event	*Surface flooding from extreme rainfall*	**42**	**42**	**42**
Zone 2 – Combined Sewer Outfalls	Combined probability events; High river levels	*Lake levels above 174.6 m will result in blocked outfalls and back feeding of Detroit River water into combined*	**35**	**35**	**35+**

		system; Also significant reduction in combined sewer capacity during extreme rainfall events			
Zone 2 - Residential Areas - Combined sewer	Heavy rainfall	*Significant surface flooding (> 1 m); Potential basement flooding extreme HLGs (i.e., above surface)*	**49**	**49**	**49**
Zone 2 - Commercial Areas - Combined sewer	Heavy rainfall	*Significant surface flooding (> 1 m)*	**42**	**42**	**49**
Pad-mounted Electrical distribution equipment	Extreme rainfall "100 year" event; Combined probability event	*Extremely sensitive to surface flooding < 1.0 m in depth, can result in electrification of flood waters posing fatal hazard to public;* ***Flagged for further study***	**28**	**42**	**49**

PIEVC Engineering Protocol

For

Infrastructure Vulnerability Assessment and Adaptation to a Changing Climate

Worksheet Step 4

Engineering Analysis

Revision 1.1

Effective March 30, 2020, the PIEVC Program is operated jointly by the Institute for Catastrophic Loss Reduction (ICLR), the Climate Risk Institute (CRI), and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

For further information about this ***Engineering Protocol*** or the ***PIEVC Program*** please contact ICLR.

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Instructions

This worksheet is designed to allow practitioners to document that they have actively considered and evaluated each step of the Protocol. The worksheet also provides a document were practitioner considerations regarding each task of the Protocol are recorded.

Complete Every Field

To ensure complete coverage of the Protocol steps, when completed, the practitioner should have entered a response in every field of this worksheet.

Document Tasks That Do Not Apply

Where a particular task is not relevant to the current assessment:

- Enter **N/A** in the relevant field of this worksheet and
- Provide rational for the decision in the comments field of the task.

Document Tasks That Are Omitted

Where a practitioner has chosen to omit a particular step of the Protocol:

- Enter **OMITTED** in the relevant field; and
- Provide rational for the decision in the comments field of the task.

Companion Excel Workbook Supports This Step of the Protocol

Practitioners may use the accompanying ***Excel Worksheet 4*** to formally document the results of their analysis.

Protocol for Changing Climate Infrastructure Vulnerability Assessment

Practitioners are strongly cautioned to avoid the following common pitfalls in executing a vulnerability assessment based on the Protocol.

i. ***Skipping Protocol tasks***.

Although it is acceptable to select to not execute a particular task, the practitioner should nonetheless evaluate the question posed by that task and document the basis for the decision.

ii. Using previous case study reports as a template for the analysis.

Although previous studies provide an excellent reference, the application of the Protocol is highly specific to infrastructure. Applying previous case studies as a template can often lead the practitioner to miss key factors that contribute to the overall risk profile of the infrastructure.

iii. Using the worksheets without reference to the Protocol.

Although the worksheets parallel the Protocol, they do not provide supplementary context that may be necessary to correctly address the specified Protocol task.

4 Step 4 – Engineering Analysis

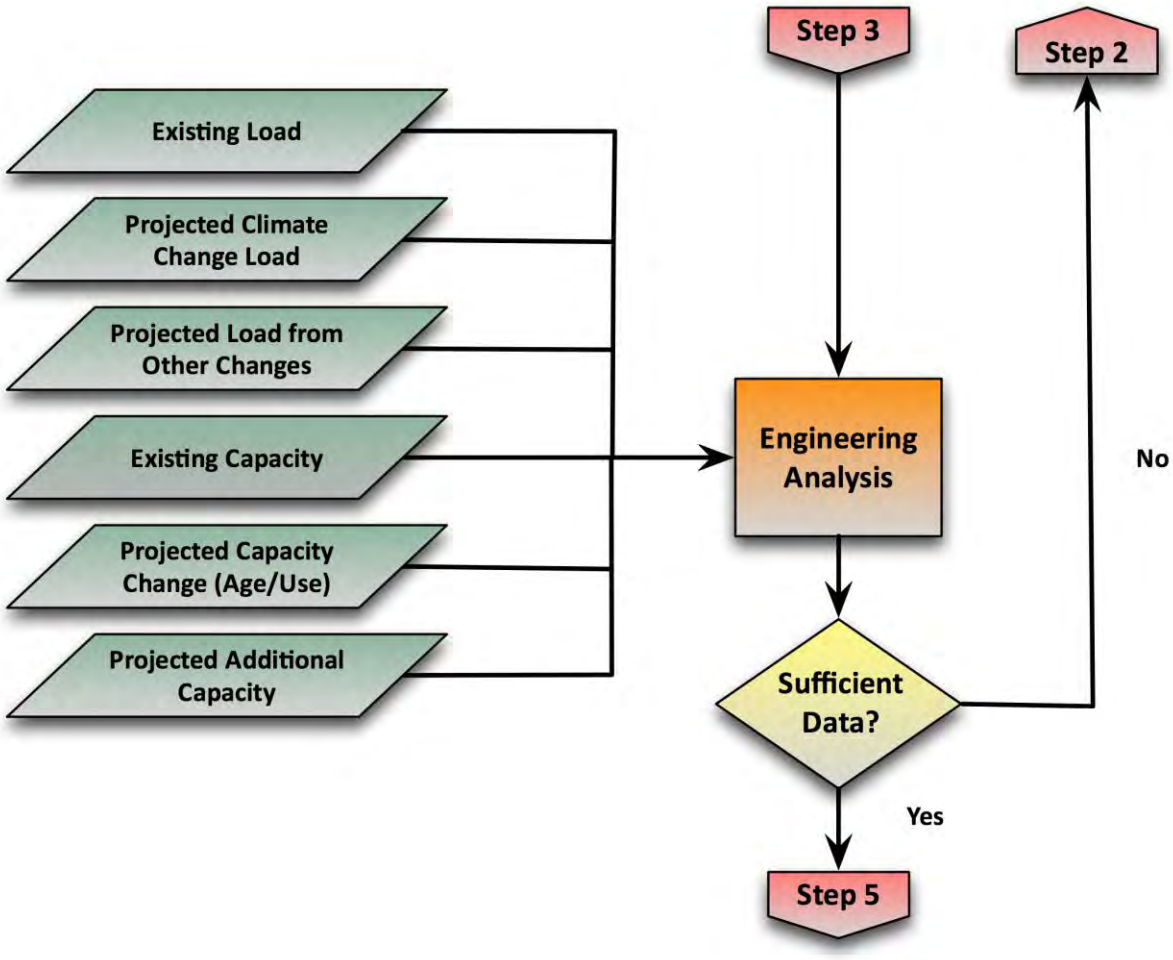
In this step the practitioner will assess the impact of projected changing climate loads placed on the infrastructure and its capacity. Vulnerability exists when infrastructure has insufficient capacity to withstand the projected or anticipated loads that may be placed on it. Resiliency exists when the infrastructure has sufficient capacity to withstand increasing loads resulting from changing climate.

Engineering Analysis requires the assessment of the various factors that affect load and capacity of the infrastructure. Based on this assessment, indicators or factors are determined in order to relatively rank the potential vulnerability of the infrastructure components to various climate effects.

Much of the data required for Engineering Analysis may not exist or may be very difficult to acquire. Engineering Analysis requires the application of multi-disciplinary professional judgement. Thus, even though numerical analysis is applied, the practitioner is cautioned to avoid the perception that the analysis is definitively quantitative or based on measured parameters. The results of the analysis yield a set of parameters that can be ranked relative to each other, based on the professional judgement of the practitioner. This can be used to rank the relative vulnerability or resiliency of the infrastructure.

The process flowchart for Step 4 of the Protocol is presented in **Figure 7**.

Figure 7: Step 4– Engineering Analysis Process Flowchart



4.1 Prepare Step 4 Worksheet

	Enter *Yes* or *No*	
a. Use this ***Worksheet***; or		No
b. Prepare practitioner specific documentation. i. Practitioner specific documentation ***MUST*** detail each task outlined in this step of the Protocol.		No
Comments and Observations *A detailed asset and engineering risk assessment was completed for this study, including a relatively comprehensive Triple Bottom Line (TBL) assessment of costs of potential solutions and the relative impacts reduced by the proposed solutions including their social and environmental implications. Potential opportunities for synergistic benefits with other ongoing projects also were explored briefly and scored in the TBL.*		

In the following steps, the Practitioner may either record results in Excel Worksheet 4 or in their own working papers. In any event, the information stipulated by this Protocol should be duly recorded.

4.2 Calculate the Existing Load (L_E)

Calculate the existing load on the infrastructure components that the practitioner selected for Engineering Analysis.

	Check Complete
a. Determine the existing load on the infrastructure based on: ▪ Definitions; ▪ Direct measurements; ▪ Engineering calculations; or	

▪ Assumptions based on professional judgement. *The aim of Step 4 was to develop a flood risk profile for the three Zones of the West Windsor area and to identify short-term (within 5 years) and longer-term recommended flood protection solutions. Detailed H&H modelling results were calibrated to identify the potential benefits or reduced flooding risks for each of the proposed solutions.*	
b. Substantiate the rationale for the methodology used. The proposed solutions build on the detailed PIEVC risk assessment Step 3 and earlier studies for flooding risks within the City of Windsor. These past studies spanning the past decade indicate the highest risk areas and their resilience options and have been considered in detail by the City. For example, while the 2020 City of Windsor Sewer and Coastal Flood Master Plan Report (prepared by Dillon) generally highlighted solutions and costs/benefits for priority flooding regions across the City, this study examined these risks and options in greater granularity and with detailed extreme weather and climate analyses for the West Windsor region, including shorelines along the Detroit River.	
Comments and Observations N/A	

4.3 Calculate Changing Climate Load (L_C)

Calculate the projected changing climate load placed on the infrastructure components that the practitioner selected for engineering analysis.

	Check Complete
a. Determine the projected Changing Climate load on the infrastructure based on: ▪ Definitions; ▪ Direct measurements; ▪ Engineering calculations; or ▪ Assumptions based on professional judgement.	

b. Substantiate the rationale for the methodology used. As described in PIEVC worksheet #2, a combination of sources were used to project future loads for the system. To project future climatic loads, outputs from an ensemble of all IPCC AR5 models were downscaled to the regional scale using Delta methods where appropriate, while peer-reviewed climate change studies based on different climate change models were used for other variables (e.g. Detroit River water levels, ice and wind storm extremes). Extreme rainfall variables were projected using the Clausius-Clapeyron and climate change modelling approaches, as outlined in the 2019 updated CSA PLUS 4013 Technical guide: Development, interpretation and use of rainfall intensity-duration-frequency (IDF) information: Guideline for Canadian water resources practitioners. Population densities and projections are incorporated into the H&H modelling. Detailed climate analyses was used to "drive" the hydraulic and surface flow or hydrology (H&H) modelling of the City of Windsor's sanitary, storm and combined sewer system and its overland drainage and storage network. The modelling has been calibrated against recent extreme storm rainfall events as detected by a network of 14 City-maintained rain gauges and recent high water levels (2019), as well as basement and flooding incident reports. The modelling includes details of the sewer system including interceptor maintenance holes, overflow sewers, overland stormwater conveyance and storage systems and incorporates land uses and topographical LiDAR information. The modelling has been designed to highlight the sewer system nodes that don't meet LOS criteria as well as surface flooding depths and surface flooding extents (i.e. % of area > 0). Other climate hazard load thresholds were identified from applicable codes and standards, design criteria, LOS statements and forensic analyses of past failures. The Tailored Severity Scale associated with with PIEVC worksheet #2 provides the background and limits on the various load thresholds.	
Comments and Observations N/A	

4.4 Calculate Other Change Loads (L_O)

Calculate the projected Other Change load placed on the infrastructure components that the practitioner selected for engineering analysis.

	Check Complete
a. Determine the other projected loads on the infrastructure based on: ▪ Definitions; ▪ Direct measurements; ▪ Engineering calculations; or ▪ Assumptions based on professional judgement.	
b. Substantiate the rationale for the methodology used. See Section 4.3 (above)	
Comments and Observations N/A	

4.5 Calculate Total Load (L_T)

	Check Complete
Calculate the total projected load on the infrastructure components that the practitioner selected for engineering analysis, using the equation: $\mathbf{L_T = L_E + L_C + L_O}$ Where: L_T = Total projected load on the infrastructure L_E = Existing load on the infrastructure L_C = Projected load on the infrastructure resulting from changing climate L_O = Projected load on the infrastructure resulting from other changes	

See earlier section 4.3 (above). Loads are provided for current conditions and projected for the 2050s and 2080s using RCP8.5 or high greenhouse gas emission assumptions.	
Comments and Observations N/A	

4.6 Calculate the Existing Capacity (C_E)

Calculate the existing capacity of the infrastructure components that the practitioner selected for engineering analysis.

	Check Complete
a. Determine the existing capacity of the infrastructure based on: ▪ Definitions; ▪ Direct measurements; ▪ Engineering calculations; or ▪ Assumptions based on professional judgement.	
b. Substantiate the rationale for the methodology used. Detailed calibrated overland flow and sewer system modelling were used to evaluate capacities for different locations and assets. The calibration of the modelling was based on past extreme events where extreme rainfall and high river levels brought more water to the City sewers, overland conveyance and storage systems, roadways and open drains than there was capacity to manage. Overall, many of the West Windsor assets and locations are sensitive to small future increases in rainfall events and high water levels.	
Comments and Observations N/A	

4.7 Calculate the Projected Change in Existing Capacity ($C_{\Delta E}$)

Calculate the projected change (loss) in capacity arising from aging and normal wear and tear of the infrastructure components that the practitioner selected for engineering analysis.

	Check Complete
a. Determine the projected change, if any, to the capacity of the infrastructure over the time horizon of the evaluation; based on: ▪ Definitions; ▪ Direct measurements; ▪ Engineering calculations; or ▪ Assumptions based on professional judgement.	
b. Substantiate the rationale for the methodology used. Various assets are beyond their expected service lifespans and are planned for replacement in the near future or are in the process of being replaced or upgraded. Many of these near-term changes have not been incorporated into the modelling, meaning that the overall system should have greater resilience when completed than indicated in this study i.e. results should reflect worst case risks. For example, drainage improvements from the construction of the Gordie Howe International Bridge and related upgrading of Sandwich Street may add improved resilience for a portion of Zones 1 and 2. Any improvements to separate combined sewer systems or add storage retention capacity for the Lou Romano RTB will increase capacity and resilience beyond the snapshot provided in this study.	
Comments and Observations N/A	

4.8 Calculate Additional Capacity (C_A)

Calculate other projected additional capacity of the infrastructure components that the practitioner selected for engineering analysis.

	Check Complete
a. Determine the projected additional capacity of the infrastructure over the time horizon of the evaluation; based on: ▪ Definitions; ▪ Direct measurements; ▪ Engineering calculations; or ▪ Assumptions based on professional judgement.	
b. Substantiate the rationale for the methodology used. As discussed in earlier sections, the capacity and resilience added to vulnerable assets as a result of the proposed short-term and longer-term solutions were evaluated using the H&H modelling results and other considerations. The increased future loading to the sewer and drainage systems under climate change was incorporated directly into the modelling results and evaluated through systems engineering considerations.	
Comments and Observations N/A	

4.9 Calculate the Projected Total Capacity (C_T)

	Check Complete
Calculate projected total capacity of the infrastructure components that the practitioner selected for engineering analysis, using the equation: $\mathbf{C_T = C_E - C_{\Delta E} + C_A}$ Where: C_T = Total projected capacity of the infrastructure C_E = Existing capacity of the infrastructure $C_{\Delta E}$ = Projected change in capacity of the infrastructure resulting from	

aging and normal wear and tear C_A = Projected additional capacity of the infrastructure	
Completed, as discussed in the main report and in the Triple Bottom Line assessments for each resilience measure (by specific asset and location). Modelling of the sewer and overland flow and storage systems reflected the variable and potentially exceeded capacities for different assets under critical climate hazards, whether extreme rainfall, extreme high water levels or their various combination events.	
Comments and Observations N/A	

4.10 Calculate Vulnerability Ratio

	Check Complete
Evaluate the vulnerability of the infrastructure components that the practitioner selected for engineering analysis, using the ratio: $V_R = \frac{L_T}{C_T}$ Where: V_R = Vulnerability Ratio L_T = Projected total load on the infrastructure C_T = Projected total capacity of the infrastructure	

When $V_R > 1$, the infrastructure component is vulnerable **When $V_R < 1$, the infrastructure component has adaptive capacity** Completed, as discussed in the main report and in the Triple Bottom Line assessments for each resilience measure by asset and location.	
Comments and Observations N/A	

4.11 Calculate Capacity Deficit

	Check Complete
Where vulnerability has been identified for the infrastructure components that the practitioner selected for engineering analysis, calculate the projected capacity deficit using the following equation: $\mathbf{C_D = L_T - C_T}$ $\mathbf{= L_T - (C_E + C_{\Delta E} + C_A)}$ Where: C_D = Projected capacity deficit of the infrastructure component L_T = Projected total load on the infrastructure component C_E = Existing capacity of the infrastructure component $C_{\Delta E}$ = Projected change in capacity of the infrastructure component resulting from aging and normal wear and tear C_A = Projected additional capacity of the infrastructure component	
Comments and Observations	

Handled for capacity through calibrated system H&H modelling. Note that many parts of the West Windsor sewer and drainage system have minimal capacity for increased rainfall and high water level events.	

4.12 Assess Data Sufficiency

Add rows as necessary.

a. Document where there is insufficient information currently available to proceed with an element of the assessment.		
Insufficient Information	i. Where there is insufficient information currently available, identify a process to develop or infill that data.	ii. Where data cannot be developed, identify the data gap as a finding in Step 5 of the Protocol – Recommendations.
Reasonably complete datasets, with relatively good quality modelling calibrated against recent high impact extreme events	It would be advantageous to include 2020 record high Detroit River was levels in the H&H model, although the high impact extreme water levels of 2019 were included in the calibration and modelling of system performance.	Not needed at this point, but for consideration in a future update of the modelling.

4.13 *Evaluate Need for Additional Work*

Add rows as necessary.

a. Identify matters that require additional study or evaluation outside of the current vulnerability assessment. These would normally include: i. Interactions requiring additional data that cannot be acquired within the schedule of the current risk assessment. ii. Evaluating climatic events that specifically contribute to heightened infrastructure risk where the practitioner and/or infrastructure owner determine that a better understanding of the factors that contribute to the event can help resolve identified risks. iii. Areas where identified patterns of risk could be resolved through the development or amendment of codes, standards, guidelines, procedures, etc. iv. Other issues deemed appropriate by the practitioner.
A long-standing need is for improved modelling of Great Lakes water levels under climate change conditions. In particular, improvements to the modelling of Great Lakes runoff and land evaporation processes since 2011 have changed the consensus on future water level projections from decreasing levels to highly variable levels in future, with levels dependent on GHG emission assumptions. Further improvements will be added in the near future with the latest climate change models e.g. IPCC AR6 climate change models released in 2021 and with higher resolution and improved 3-dimensional Great Lakes hydrodynamic (atmosphere-lake-land) models. Since Great Lakes levels respond to small differences in hydrodynamic processes i.e. temperature and precipitation, there is potential for the water level projections used in this study to differ with the next generation of water level projections. Higher water levels that exceed the 2020 extremes would be problematic for many assets in this West Windsor region. This study added a climate change “buffer” or safety margin to the 2020 extreme high water levels.
Ice cover conditions on the Great Lakes are dependent on air and water temperatures and wind conditions and have a significant influence on evaporation rates. Ice cover conditions can also impact flows and water levels when ice jam conditions occur, but the influence is short-lived compared to multi-year fluctuating river and lake levels.
The H&H modelling used for this study could improve with additional calibration and better capture of the details of the sewer and overland flow systems.
All of the above improvements require significant efforts by others but can be expected to evolve slowly.
Comments and Observations

N/A

	Check Complete
b. Document the additional work identified above as recommendations in Step 5. Included.	
Comments and Observations N/A	

4.14 Identify Conclusions and Recommendations

	Check Complete
a. Where the practitioner deems that they have sufficient, reliable, data to draw conclusions and make recommendations, proceed to Step 5. • See the Mapped Medium and High Risks and the Summary of Medium and High Risks documents from PIEVC worksheet#3 indicating the at-risk assets, their locations and proposed short-term and long-term solutions. • See the main report for a more complete discussion of risks and recommended solutions as well as the Triple Bottom Line discussion on the costing-benefits-environmental considerations of the proposed solutions	
Comments and Observations N/A	

Date:	November 28, 2022
Prepared by:	Heather Auld & Simon Eng Dillon Consulting Limited

PIEVC Engineering Protocol

For

Infrastructure Vulnerability Assessment and Adaptation to a Changing Climate

Worksheet Step 5

Recommendations and Conclusions

Revision 1.1

For further information about this ***Engineering Protocol*** or the ***National Engineering Vulnerability Assessment*** **Project** please contact Engineers Canada.

David Lapp, P.Eng.
Practice Lead, Engineering and Public Policy
Engineers Canada

300 – 55 Metcalfe Street
Ottawa, Ontario, K1P 6L5 Canada

Instructions

This worksheet is designed to allow practitioners to document that they have actively considered and evaluated each step of the Protocol. The worksheet also provides a document were practitioner considerations regarding each task of the Protocol are recorded.

Complete Every Field

To ensure complete coverage of the Protocol steps, when completed, the practitioner should have entered a response in every field of this worksheet.

Document Tasks That Do Not Apply

Where a particular task is not relevant to the current assessment:

- Enter **N/A** in the relevant field of this worksheet and
- Provide rational for the decision in the comments field of the task.

Document Tasks That Are Omitted

Where a practitioner has chosen to omit a particular step of the Protocol:

- Enter **OMITTED** in the relevant field; and
- Provide rational for the decision in the comments field of the task.

Protocol for Changing Climate Infrastructure Vulnerability Assessment

Practitioners are strongly cautioned to avoid the following common pitfalls in executing a vulnerability assessment based on the Protocol.

i. ***Skipping Protocol tasks***.

Although it is acceptable to select to not execute a particular task, the practitioner should nonetheless evaluate the question posed by that task and document the basis for the decision.

ii. Using previous case study reports as a template for the analysis.

Although previous studies provide an excellent reference, the application of the Protocol is highly specific to infrastructure. Applying previous case studies as a template can often lead the practitioner to miss key factors that contribute to the overall risk profile of the infrastructure.

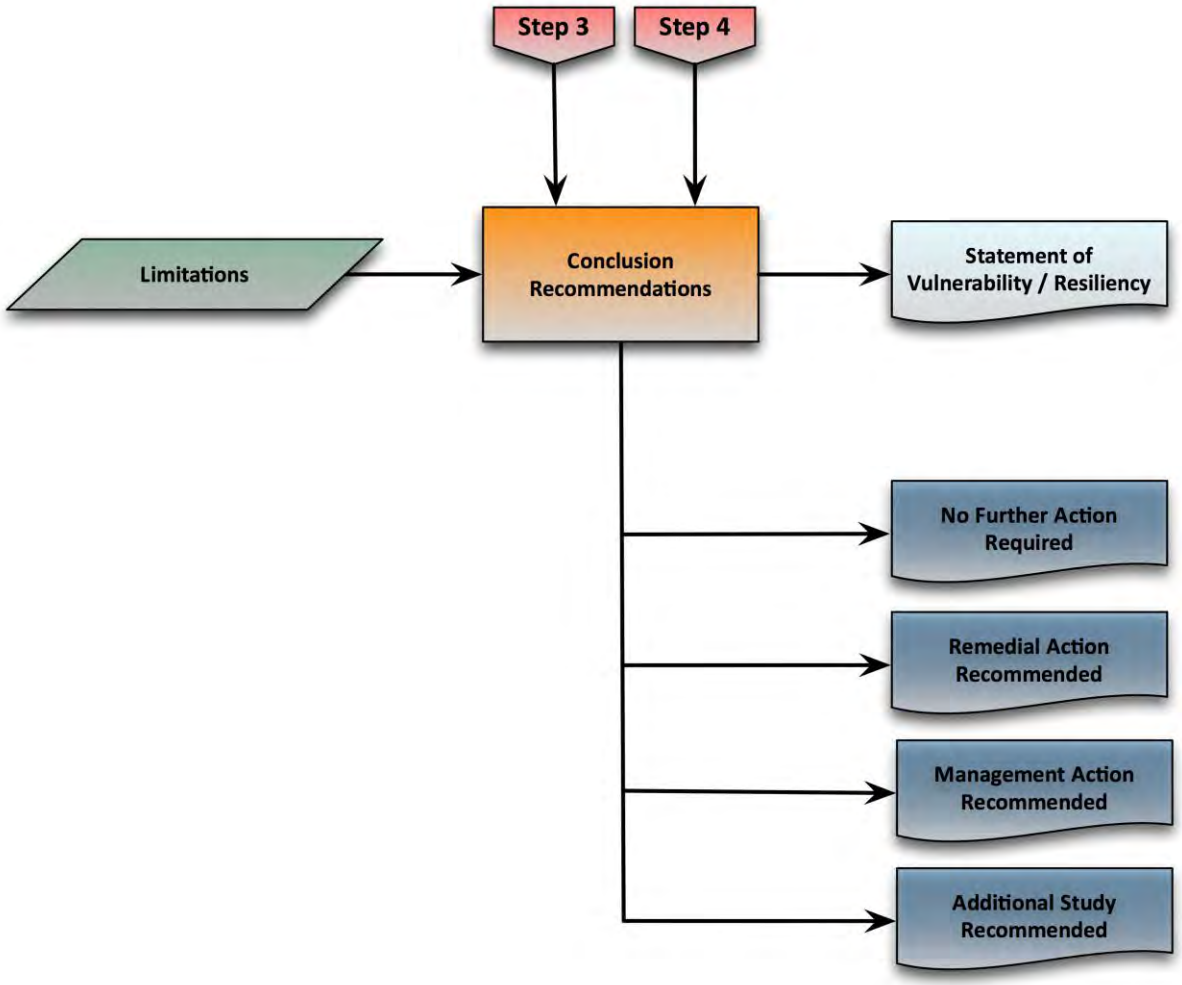
iii. Using the worksheets without reference to the Protocol.

Although the worksheets parallel the Protocol, they do not provide supplementary context that may be necessary to correctly address the specified Protocol task.

5 Step 5 – Recommendations and Conclusions

The process flowchart for Step 5 of the Protocol is presented in **Figure 8**.

Figure 8: Step 5 – Recommendations Process Flowchart



5.1 Prepare Step 5 Worksheet

	Enter *Yes* or *No*	
a. Use this ***Worksheet***; or	Yes	
b. Prepare practitioner specific documentation. i. Practitioner specific documentation ***MUST*** detail each task outlined in this step of the Protocol.		No
Documentation on Tasks is also provided in the main report and its Appendices.		
Comments and Observations N/A		

5.2 Declare Assumptions Regarding Available Information, Data Sources, Uncertainties and Relevant Limitations

Add rows as necessary.

a. Comment on the limitations of the vulnerability assessment. These include limitations associated with: i. Major assumptions. ii. Available infrastructure information and sources. iii. Available changing climate information and sources. iv. Available other change information and sources. v. The use of generic or specific examples to represent populations. vi. Uncertainty and related concepts. vii. Other relevant limitations, if they exist.
Data coverage and modelling: Overall, rainfall and river water level coverage for the assessment was relatively good (compared to many other PIEVC studies) and the detailed modelling of the flooding and infrastructure system risks was extremely helpful in assessing the impacts of climate events and the costs and benefits (TBL) of different resilience

solutions.

Great Lakes Water Levels: A risk assessment provides a snapshot in time of the overall system vulnerability and resiliency. It is based on the information available to the team at the time of the assessment, including future projections of Great Lakes water levels. Many sewer and drainage assets in West Windsor were found to be highly sensitive to high lake levels (and some to low lake levels). However, the studies and projections of future extreme high and low water levels on the Great Lakes and their connecting rivers (Detroit River) remain uncertain under a changing climate. As noted in PIEVC worksheet #4, the earlier "consensus" on projections of lake levels had indicated lowering lake levels but these projections changed after 2011 due to improved hydrodynamic-climate processes in the Great Lakes flow models. The results after 2011 all indicated greater uncertainty in water levels, with potential for either increasing or decreasing near extreme levels. These future lake levels were found to be highly sensitive to the different climate change projections and especially to future global GHG emission trends.

Fluctuations in multi-year water levels have been record-breaking over the past decade, with record breaking low levels observed in 2013 transitioning to record breaking high levels in 2020. While multi-year water levels have fluctuated since they were first recorded in 1860, the variability over the past decade has been unprecedented historically and continuing high variability is expected into the future.

Multi-year high or low Great Lakes water levels can be very difficult to predict in the near term and even more difficult to project under climate change influences due to their strong dependence on relatively small differences in climate, hydrological and hydraulic processes. These small differences include the net flow of water in and out of the lake system driven by incoming precipitation over the lakes and runoff from the surrounding watersheds, outgoing evaporation from the lakes as a result of warmer air and lake waters and reduced ice cover as well as smaller influences from net flows and diversions between the lakes and consumptive removals. It is not surprising that future water levels will depend on small differences between the projections of rate of temperature warming and rates of precipitation increase, which is turn will depend on future rates of increases in global greenhouse gas emissions.

With the release of the latest generation of climate change models (IPCC AR6), improvements to climate change downscaling approaches for the Great Lakes region, as well as improvements to the modelling of Great Lakes hydrodynamic-climate processes, it is likely that upcoming lake level projections will differ from those used in this study. The efforts to generate new lake level projections is highly complex and requires contributions from many Canadian and U.S. centres of expertise.

Climate Change Projection Uncertainties: The future climate change hazards were derived from several sources, with each source sometimes using different climate change projection methods and often, different driving climate change models and uncertainties. For example,

some of the study's projected climate variables were derived from an ensemble of the 2013 released IPCC AR5 climate models, which were compared to the 2021 released AR6 climate models whenever possible. For some extreme climate variables that were based on peer-reviewed studies, the results will be based on the earlier 2007 released AR4 generation of climate change models.

Generally, the uncertainties in the climate change projections were due to:

1. Natural climate variability (i.e., the natural fluctuations of the current and future climate);
2. Climate Model and Downscaling uncertainty (i.e., different parameterizations and sensitivities in models; different spatial and temporal resolutions); and,
3. Future greenhouse-gas (GHG) emissions (i.e., accumulated GHG emissions globally and the uncertainty on the magnitude of future GHG forcing and its impact on climate).

Uncertainties (1) and (2) were addressed through the use of multi-model ensembles or climate models from various global climate modelling centres. Uncertainty (3) was addressed through use of a "conservative" or high future emissions GHG scenario driving greater or faster changes in climate (i.e., RCP8.5).

Modelling of river water level and overland flow and storage processes: As discussed in worksheet #4, the H&H modelling would improve with additional calibration with capture of the 2020 extreme high water levels and extreme rainfall events after 2017 and better depiction of the details of the sewer and overland flow systems. However, these improvements require significant efforts and investments and may not be immediately justified given other uncertainties. Nonetheless, improvements can be expected to evolve slowly over time.

Comments and Observations

N/A

5.3 State Conclusions

Add rows as necessary.

a. Present specific conclusions arising from Steps 1 through 4.

   i. Report on infrastructure components that have been assessed to be vulnerable.
   ii. Summarize infrastructure components that have been assessed to have adaptive capacity.

***Medium to High Risk Infrastructure Components*:** Many West Windsor infrastructure components were found to be at medium to high risk from climate events currently and/or into the future. Note that Zone 1 or "inland" represents infrastructure in residential, institutional and industrial areas; Zone 2 represents a shoreline industrial area; while Zone 3 represents an industrial and parkland area. Flooding from either extreme rainfalls or high water levels or their combinations represent the primary hazards resulting in medium to high risk vulnerabilities.

Of the medium to high risks noted currently or into the future, the assessment identified at least 15 City infrastructure vulnerabilities in Zone 1, while some 22 vulnerabilities were noted in Zone 2 and 8 vulnerabilities in Zone 3. Some 10 medium to high risks were assessed for third party infrastructure types.

The Summary of Medium and High Risks provided with PIEVC worksheet #3 summarizes the vulnerable infrastructure components and their associated hazards for Zones 1, 2 and 3 in the West Windsor study region. The Summary indicates the main climate hazards contributing to the risks, comments on the potential impacts and highlights the resulting risk scores for the current, 2050s and 2080s periods.

Similarly, the Mapped Medium and High Risks provided with PIEVC worksheet#3 highlights the main vulnerabilities by mapped locations and infrastructure system components and indicates the primary hazards contributing to the vulnerabilities with their recommended short-term (within 5 years) and long-term resilience solutions.

Comments and Observations

See the main project report for further description of potentially vulnerable infrastructure-climate interactions which were scored as medium or high (i.e., overall risk scores of 36-49).

5.4 State Recommendations

Add rows as necessary.

a. Present specific recommendations arising from Steps 1 through 4. As appropriate, classify recommendations into the following categories:

i. Remedial engineering actions;
ii. Monitoring activities; or
iii. Management actions.

Recommended Short and Longer-term Resilience Solutions for Flooding: Generally, the recommended short and longer-term flooding resilience solutions can be summarized as:

- *Reduction of excess flows to Lou Romano Reclamation Plant including:*
  - Backflow prevention at CSOs
    i. Weirs to reduce river water inflows during high water levels
    ii. Flapgates to reduce inflows
  - Lou Romano Retention Treatment Basin (RTB)
  - Combined Sewer Separation

(Note: The Lou Romano Water Reclamation Plant services a larger total area of the City of Windsor with generally older sewers. The City recently has completed construction of the RTB, which will provide capacity to retain a significant amount of the combined sewer overflows from the sewer systems. Priority sections of the City currently are under mandatory downspout disconnection requirements, which will increase capacity in the sewer system.)

- *Reduction of Potential Surface Flooding through:*
  - Raising Ground Elevations (Grading Improvements)
  - Dewatering Pumping
  - Conveyance Improvements. For example, through upgrades to:
    - Prince Road Trunk Storm Sewer Outfall and Pumping Station
    - Detroit Street Trunk Storm Sewer and Outfall
    - Combined Sewer Separation
    - Roadside Drainage Improvements

- *Reduction of Basement Flooding through:*
  - Basement Flood Protection Measures
    - Backflow Prevention
    - Downspout Disconnection
  - Combined Sewer Separation
    - PDC Separation
    - Foundation Drain Disconnection

- *Shoreline Erosion Protection and Response through:*
  - Monitoring and Local Repair Plans
  - Improved understanding and mapping of high risk erosion locations

Monitoring Activities

- Monitoring of high impact shoreline erosion localities to evaluation of causes of higher risks and potential longer term solutions
- Monitoring of river ice conditions, including ice jams, for impacts on short duration higher (or lower) river levels and on shoreline erosion rates
- Monitoring of Detroit River levels and any changes to their variability (i.e. rates of fluctuation from high to low levels for needed response times and options)
- Monitoring and awareness of the most recent Great Lakes and climate change water level projection studies and their implications for updates to the flood resilience actions
- Maintain and/or increase ongoing site rainfall monitoring by the City
- Ongoing monitoring of medium risk climate-infrastructure interactions to detect trends towards higher impacts and risks
- Monitor effectiveness of resilience actions through tracking and documentation on measures implemented and note over time whether these measures have proven effective in reducing or responding to identified risks

Resilience and Management Activities

- Ongoing implementation of the City of Windsor Sewer Master Plan for the medium to high vulnerability West Windsor infrastructure components
- Further assessment of the costs, benefits, implementation challenges and maintenance requirements and costing for the solutions at each vulnerability and location (e.g. different backflow prevention options)
- Ongoing implementation of basement flood protection measures through City's downspout disconnect requirements and incentives
- Ongoing implementation of combined sewer separation measures - as existing and any new funding opportunities allow
- Ongoing localized grading improvements in areas most vulnerable to flooding
- Priority area installation and use of weirs and flap gates to reduce river water inflows for periods of high river water levels (and their low water level implications)
- Installation of rain catchers within existing maintenance holes (MHs) to reduce stormwater inflow to the sanitary MHs during a storm event. An assessment was completed to determine where the potential for inflow was highest and where MH

sealing should be prioritized
- Investigate the contributions and opportunities from additional resilience actions by third parties to the overall West Windsor region flood risk sensitivities e.g. Gordie Howe Bridge drainage improvements, rebuilding of Sandwich Street, etc
- Actively monitor severe weather watches and warnings for significant rainfall and/or rain plus snowmelt events (levels of monitoring will be dependent on sensitivities to critical return period rainfall events)
- Actively monitor Canada-U.S. seasonal predictions of lake and river high water level conditions for needed shorter-term resilience responses, which could include overland flow reduction measures among others
- Monitor and consider revisions to the long-term Resilience Plans should new future projections of Great Lakes and Detroit River water levels indicate further increases

Comments and Observations

Note that remedial engineering actions are already planned under the Sewer Master Plan (plus potential for third parties resilience actions). See the main report for further details.

b. Report on data gaps and availability; requiring additional work or studies.

See earlier Section 5.2 and main report. Note that data coverage and modelling guidance was good relative to many PIEVC assessments.
It is expected that work to increase resilience to the West Windsor drainage and sewer challenges by the City will likely continue for the highest priority risks and as infrastructure is replaced.

Comments and Observations

N/A

c. Identify matters that require further action.

Along with the implementation of the short-term and long-term resilience measures, it is important for locations and assets with vulnerabilities to high river and lake water levels to monitor the coordinated Canada and U.S. measurements and seasonal predictions (*not* projections) of potential high water levels on the Detroit River system to support very short-term or emergency responses.

While predictions of seasonal lake and Detroit River water levels are difficult, efforts to *project*

future water levels long into the future under different GHG assumptions is multiple times more challenging while being subject to high uncertainties. New and improved climate change models with more realistic assumptions on future global GHG emissions, as well as improvements to linked 3-dimensional Great Lakes hydrodynamic and climate models could change the projections of future levels significantly. As a result, it is important that changes to studies and modelling of Great Lakes water levels under climate change be monitored carefully since it is likely that the understanding and projections of future lake levels may change from the summary provided in this assessment. Funding for the various flooding resilience measures and any enforcement actions will continue to be challenging, but progress is ongoing and steady. As well, some of the third party impacts such as those impacting electricity generation and distribution infrastructure will have implications for the region and for other components of this PIEVC assessment. Other changes to drainage and sewer systems from ongoing third party projects, such as completion of the Gordie Howe International Bridge, will also have implications for West Windsor infrastructure components. Due to the multiple interactions of the climate and lake/river hazards i.e. the cascading nature of the hazards and risks, it also is important that the hydraulic and hydrological modelling and studies of the drainage and sewer system be continuously improved. The updating of the systems modelling also needs to account for the potential benefits of the added resilience responses.
Comments and Observations N/A

5.5 Prepare Statement of Vulnerability / Resiliency

	Check Complete
a. Based on the limitations, conclusions and recommendations outlined above, prepare a Statement of Vulnerability / Resiliency.	
Comments and Observations Due to the generally low lying terrain within the City of Windsor, its proximity to the Great Lakes and connecting rivers and location in one of Canada's	✓

southernmost climate/weather zones, it is not surprising that the West Windsor area is prone to various types of climate hazards and flooding risks. Windsor's relatively higher exposure to flooding hazards of all types results in overland drainage and sewer capacity challenges in many localities. Overall, the West Windsor PIEVC assessment identified many medium to high climate change risks, mainly from high lake/river levels and from extreme rainfall events. For some of the highest risk sewer and drainage systems, even a 5 year return level rainfall event was noted to produce notable impacts. But, for infrastructure components near the shorelines of the Detroit River, it is the combinations of high lake/river levels combined with a heavy rainfall event that pose significant challenges and will require significant resilience actions.	

	Identify Vulnerability or Resiliency **Mark Yes or No**
b. For infrastructure that is deemed to be generally resilient the statement should include: i. A declaration that the infrastructure is generally resilient. ii. A declaration of the global limitations of the assessment. iii. A declaration of the time horizon of the assessment. iv. A declaration of climate trends or interactions that may contribute to the vulnerability of the infrastructure.	Yes
c. For infrastructure that is deemed to be generally vulnerable the statement should include: i. A declaration that the infrastructure is generally vulnerable. ii. A declaration of the global limitations of the assessment.	Yes

iii. A declaration of the time horizon of the assessment. iv. A declaration of climate trends or interactions that significantly contribute to the vulnerability of the infrastructure	
Many infrastructure components of the West Windsor region are moderately to highly vulnerable to the current and future climate, as discussed in earlier section.	
Comments and Observations N/A	

	Check Complete
d. The practitioner may use a format of their own choosing to prepare the Statement but, as a minimum, it must: i. Make a declaration regarding the degree of vulnerability or resiliency of the infrastructure. ii. Make a declaration of the global limitations of the assessment. iii. Make a declaration of the time horizon of the assessment. iv. Make a declaration of climate trends or interactions that contribute, or may contribute, to the vulnerability of the infrastructure.	✓
Comments and Observations See earlier sections (especially 5.5a) and main report.	

Date:	December 1, 2022
Prepared by:	Simon Eng and Heather Auld Dillon Consulting Ltd

Worksheet Step 5 – Recommendations and Conclusions

Appendix B

Risk Assessment Workshop

Appendix B – Risk Assessment Workshops

1. Internal Workshop, October 20, 2021
2. Internal Workshop, October 26, 2021
3. External PIEVC Assessment Workshop, January 7, 2022
4. Review of Solutions and Initial Recommendations, May 19, 2022

West Windsor Flood/PIEVC Assessment

Internal Workshop
October 20, 2021

DILLON CONSULTING

75 YEARS

Agenda

1. Intro/Agenda
    1. Review of Climate Hazards List
2. Interactions Matrix – Y/N Analysis

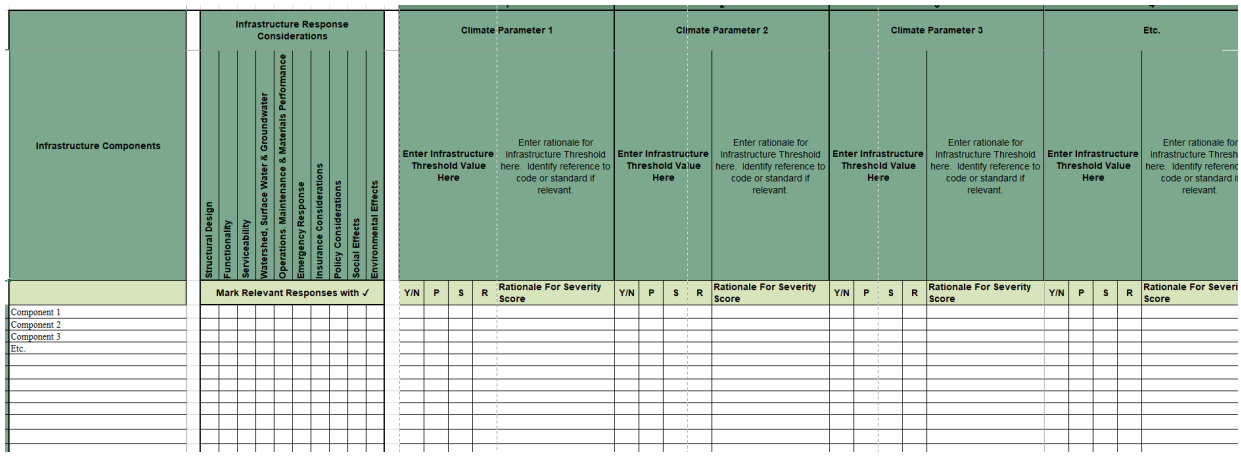
10:30 AM – 10 min Break

3. Impact Severity Ranking Discussion
    1. Review of Methodology/Ranking Method
    2. Review of Preliminary Ratings
4. Preliminary Design Solutions Discussion

Hazards List

Hazard/Element	Threshold	Comments
Extreme rainfall	82 mm in 4 hrs, peak rate of 145 mm/h	"Basic" model storm, 15 min intervals
	114 mm in 4 hrs, peak rate 203 mm/hr	"Climate Change Enhanced" model storm
	3rd extreme rainfall event?	Recent historical basement flooding events
Riverine and Creek Flooding	Multi-day rainfall	Case study - **June 2017**
	Ice jam events	No historical database of events, flagged for further study
Snow	Rapid snowmelt - **SWE value**	Frozen ground, ice and snow blocked drainage, snowmelt
	Snow accumulations - 250 cm	**Winter 2013-2014 case study** - mobility impacts, drainage
Extreme River Levels	Extreme HWL - 176.3 m	Combined probability event modeling
	"Likely" HWL - 176.1 m	Combined probability event modeling
	All time low water level	
Combination Events	HWL + extreme rainfall	Combined probability event modeling
	Rainfall + hail and wind	Debris blockage of drainage infrastructure
	HWL + wave action (freeboard)	*Case Studies (from HIRA):* November 13-15, 1972, March 31 & April 6, 1985, April 4, 1987, June 2015, Spring 2019
Secondary Impact Events	Major ice storm	*Multi-day loss of power*
	Extreme wind event - 120 km/h	debris generation, loss of site access, damage to above-ground
	Tornado - (E)F2+	debris generation, loss of site access, severe damage to above-
	Extreme Temperatures - heat and cold	Brownouts due to excessive loading - ***poss. not needed if sufficient power back-up***
	Shoreline and creek erosion	Impacts to CSOs, any other adjacent infrastructure
	River ice	Shoreline erosion and infrastructure impacts potential
	Weathering (freeze thaw)	Concrete and masonry impacts

Executing in Pieces – PIEVC Worksheet 3



Severity Rating Process

1) Rating impact severity of given hazard, at a given intensity/threshold, for *existing* assets.
2) When considering if impacts are important (Y/N Analysis) how to rate impacts:
    i) Does the interaction contribute to the risk being assessed (i.e., city drainage and flood protection infrastructure and results of failure/underperformance)?
    ii) Does the interaction result in impacts to response measures/actions?

Severity Scale	Method D	Method E
0	No effect	Negligible; Not applicable
1	Measurable	Very Low; Some measurable change
2	Minor	Low; Slight loss of serviceability
3	Moderate	Moderate loss of serviceability
4	Major	Major loss of serviceability; Some loss of capacity
5	Serious	Loss of capacity; Some loss of function
6	Hazardous	Major; Loss of function
7	Catastrophic	Extreme; Loss of Asset

Yes/No Analysis

- See Excel Spreadsheet – Will be executed in table "sections"

			Extreme rainfall			Riverine and Creek Flooding		
Asset Class	Infrastructure Class	Component	82 mm in 4 hrs, peak rate of 145 mm/h	114 mm in 4 hrs, peak rate 203 mm/hr	*3rd extreme rainfall event?*	Multi-day rainfall	Ice jam events	Rapid snowmelt - SWE value
Main Project Assets	Combined Waste and Storm Water	Combined Sewers - Low Elevation	✓	✓	✓	✓		✓
		Combined Sewers - High Elevation	✓	✓	✓	✓	?	✓
		Interceptor Maintenance Holes (MH)	✓	✓	✓	✓	?	✓
	Wastewater System Assets - Higher Elevation	Sanitary Sewers	?	?	?	✓		✓
		Storm Drains	✓	✓	✓			✓
		Pump Stations	?	?	?	✓		✓
		Lou Romano Water Reclamation Plant (LRWRP)	?	?	?	✓	?	✓
	Wastewater System Assets - Lower Elevation	Sanitary Sewers	?	?	?	✓		✓
		Storm Drains	✓	✓	✓			✓
		Pump Stations	?	?	?	✓		✓
		Lou Romano Water Reclamation Plant (LRWRP)	?	?	?	✓	?	✓
	Stormwater System Assets - Higher Elevation	Open drainage channels	✓	✓	✓	✓		✓
		Storm Sewers	✓	✓	✓	✓		✓
		Maintenance holes	✓	✓	✓	?		✓
		Culverts	✓	✓	✓	✓		✓
	Stormwater System Assets - Lower Elevation	Open drainage channels	✓	✓	✓	✓		✓
		Storm Sewers	✓	✓	✓	✓	?	✓
		Maintenance holes	✓	✓	✓	?		✓

Severity Ranking

Severity Scale	Method E
0	Negligible; Not applicable
1	Very Low; Some measurable change
2	Low; Slight loss of serviceability
3	Moderate loss of serviceability
4	Major loss of serviceability; Some loss of capacity
5	Loss of capacity; Some loss of function
6	Major; Loss of function
7	Extreme; Loss of Asset

Design Solutions Development

- Immediately obvious responses based on modeling?
- Potential responses that require additional analysis/data/information to define?
- Potential responses which require additional feedback from the client to determine if appropriate?

Comments:

- ...

Thanks for Your Time and Attention!

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West Windsor Flood/PIEVC Assessment

Second Internal Workshop
October 26, 2021

DILLON CONSULTING

75 YEARS

Agenda

1. Intro/Agenda – *2:00 PM Start*
2. Impact Severity Ranking Discussion
    1. Intro to methodology
    2. Completion of "?"s for Y/N Analysis

        3:00 PM – 5 min Break
    3. Review of flagged impact ratings
3. Next Steps Discussion – *3:50 PM to End*
    1. External Workshop Timing
    2. Key Staff Interviews and Site Visits

Severity Rating Process

1) Rating impact severity of given hazard, at a given intensity/threshold, for *existing* assets.
2) When considering if impacts are important (Y/N Analysis) how to rate impacts:
    i) Does the interaction contribute to the risk being assessed (i.e., city drainage and flood protection infrastructure and results of failure/underperformance)?
    ii) Does the interaction result in impacts to response measures/actions?

Instructions: Please have *Slide 4* open on your desktop for rating exercise.

- Completing Y/N + Rating Simultaneously – Start w/ Question Marks (H33)
- Review of flagged (yellow highlights) severity ratings

Severity Ranking

Severity Scale	Method E
0	Negligible; Not applicable
1	Very Low; Some measurable change
2	Low; Slight loss of serviceability
3	Moderate loss of serviceability
4	Major loss of serviceability; Some loss of capacity
5	Loss of capacity; Some loss of function
6	Major; Loss of function
7	Extreme; Loss of Asset

Next Steps - Discussion

- Timing of External Workshop
- Additional Refinement Tasks:
  - Key Staff Interviews
  - Site Visits – Targeted Locations?

Thanks for Your Time and Attention!

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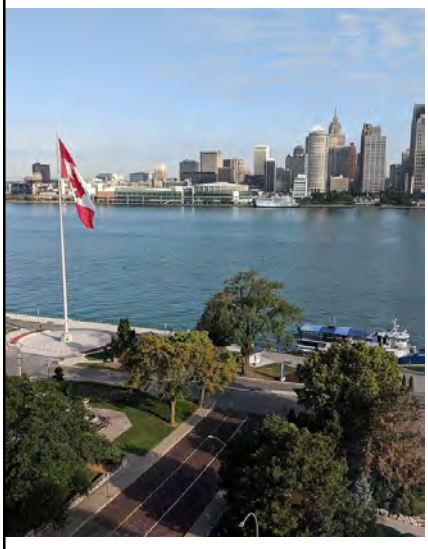
West Windsor Flood Assessment Study

External PIEVC Assessment Workshop

January 7, 2022

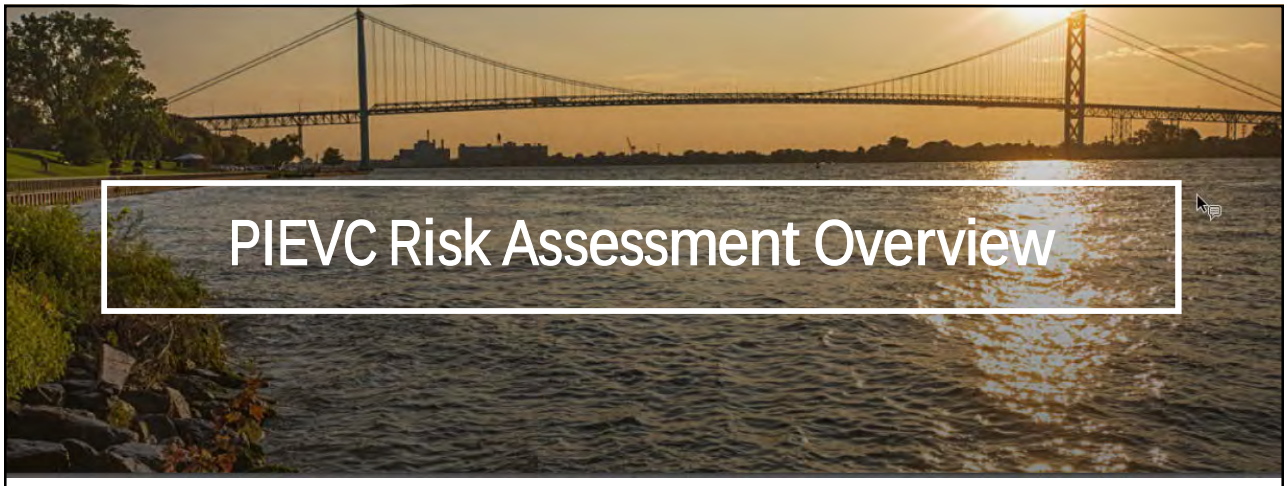
DILLON CONSULTING

Welcome and Introductions



- Welcome – Project Managers for City of Windsor, Dillon Consulting Limited
- Attendee List Review – Name and Position

- Purpose of Today's Workshop
  - *Validation* of methods and assumptions
  - Modified workshop format from "standard" PIEVC
  - Opportunities for further feedback: site visits, bilateral meetings



PIEVC Risk Assessment Overview

Overall Project Goals and Intended Outputs

Project Goals: Develop a flood risk profile for the West Windsor area and identify alternative and recommended flood protection solutions.

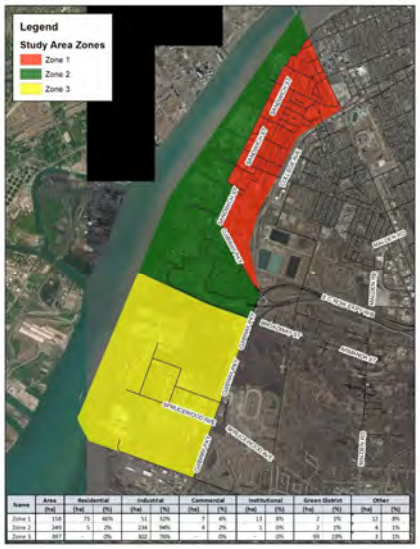
Flood protection solutions will:

- Reduce susceptibility of coastal flooding within the study area, reduce impact of increased inflow and infiltration (I&I) into the municipal system from high Detroit River water levels;
- Improve the performance of the existing infrastructure during high water levels and reduce peak flows at the Lou Romano WRP;
- Provide more sustainable municipal infrastructure; and,
- Reduce risk of surface and basement flooding.

Next Steps following risk assessment:

- Alternate solutions development
- Public consultation

Scope and Boundaries



- Boundaries: Ojibway Pky and College St.; LaSalle border; Huron-Church/Ambassador Bridge
  - Zone 1 "inland" residential, institutional and industrial;
  - Zone 2 shoreline industrial; and
  - Zone 3 industrial and parkland.
- Assets: Drainage, sanitary, combined sewers, including Lou Romano* plant, and key adjacent city and 3rd party assets (schools, parks, arterial roads, etc.)
- Impacts: drainage/sanitary system overloading and failures, immediate effects on surrounding critical assets, 3rd party assets critical to operations of drainage/sanitary

* Note: *Internal treatment plant operations not in scope*

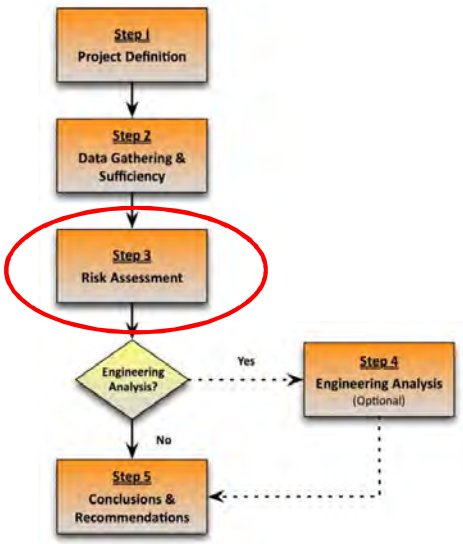
Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol & Outputs

PIEVC Protocol

- Based on standard risk assessment methodology
- 5-steps
  - #4 usually omitted
- Although presented as linear, generally *iterative* in practice
- Effectiveness relies on tailoring and expertise of practitioners

Outputs

- *Prioritized list* of risks



PIEVC Protocol and Outputs – Triple Bottom Line Module

- PIEVC (Step 5) usually ends with "technical" response considerations *only*
- *"Triple Bottom Line" Multi-Factor Analysis* considers weighting based on economic, social and environmental considerations
  - Includes "do nothing" as an option

PIEVC Step 3 - The Risk Equation

At its essence, risk is the product of two components:

$$R = P \times S$$

Severity of resulting impact on your asset

Climate hazard occurrence data

Where those components are:
P= Probability – how *likely* is this to occur; and,
S= Severity of the consequence of an event, *should it occur*.

Additional Notes:
- "Exposure" taken into account in "P" where needed
- "Severity" rating needs to be tailored to a given system

Actions Linked to Risk Level

Severity								
7	0	7	14	21	28	35	42	49
6	0	6	12	18	24	30	36	42
5	0	5	10	15	20	25	30	35
4	0	4	8	12	16	20	24	28
3	0	3	6	9	12	15	18	21
2	0	2	4	6	8	10	12	14
1	0	1	2	3	4	5	6	7
0	0	0	0	0	0	0	0	0
	0	1	2	3	4	5	6	7

Probability

Special Case | Low Risk | Medium Risk | High Risk

- *High Risk* = unacceptable, immediate response
- *Medium Risk* = requires monitoring, possible engineering analysis needed
- *Low Risk* = acceptable risk
- *Special Case* = operational, planning and/or management response

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Frequently Asked Questions

- "If we have drainage modeling (depth and hydraulic gradient) information, why use categorical scales for risk ranking?"
  - Severity ratings provide tailored context – e.g., what do these depths *mean* in terms of impacts?
  - Need to define *when* response is needed.
- "How can you rate probability without detailed statistical information?"
  - Climate data is not available for every important hazard
  - Key hazards subject to significant uncertainty
    - Great Lakes/Detroit River Levels
    - Likelihood of joint probability scenarios

  ...*professional judgement* based on all available guidance information ("ingredient" parameters, scientific literature)

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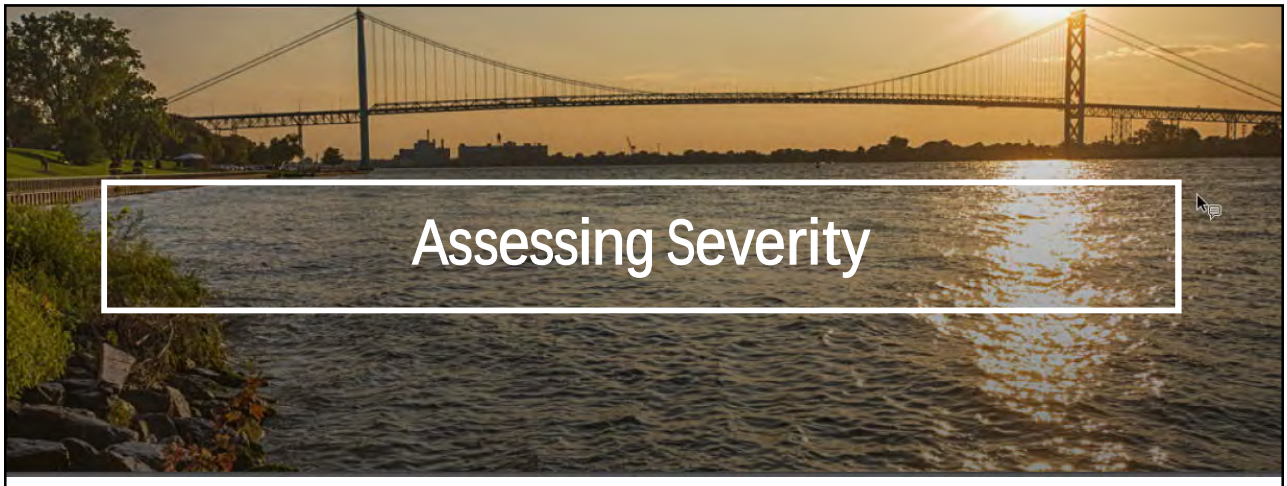
Workshop – Requested Inputs

- Validate methods and preliminary results
  - Do these tiers sound right?
  - Are there missing considerations?
  - Do the results sound right? If not, why not?
- Workshopping Activities
  - Review and validation of "S" scoring method
  - Review of "P" scoring method and prelim results
  - Review of Draft Risk results (MURAL Map Exercise)



Simplified Severity Rating Scale – Quantitative Ratings – Exercise 1

Question – Do these reflect how you would rank impacts based on hazard posed by these values?

- Based on literature regarding impacts from varying flood depths
- Differentiates between serviceability requirements for 5- vs 100-year storms

Severity	PIEVC Definition	Surface Flooding and Hydraulic Grade Line Thresholds
1	Very Low; Some measurable change	Sufficient rainfall for ground saturation
2	Low; Slight loss of serviceability	Sufficient surface flow transporting leaf litter, etc., partial drainage block
3	Moderate loss of serviceability	Temporary ponding in low lying areas (e.g., immediately surrounding drains) < 0.1 m
4	Major loss of serviceability; Some loss of capacity	Standing water < 0.3 m (for 100 yr storm) *or* HGL < 0.3 m BGS (5 yr storm)
5	Loss of capacity; Some loss of function	Standing water 0.3 to 0.5 m AGL (100 yr storm) - vehicles may be stranded; partial erosion of roadbeds, embankments; *Any* ponding/standing water from 5 year storm
6	Major; Loss of function	> 0.5 m AGL depth - vehicles may become buoyant; Any washouts resulting in loss of 1 or more lanes of traffic
7	Extreme; Loss of Asset	≥ 1.0 m AGL depth OR depth X velocity ≥ 0.4 m^2/s; Total loss of multiple transportation corridors

Simplified Severity Rating Scale – Qualitative Ratings – Plant and Shoreline – Exercise 1 Continued

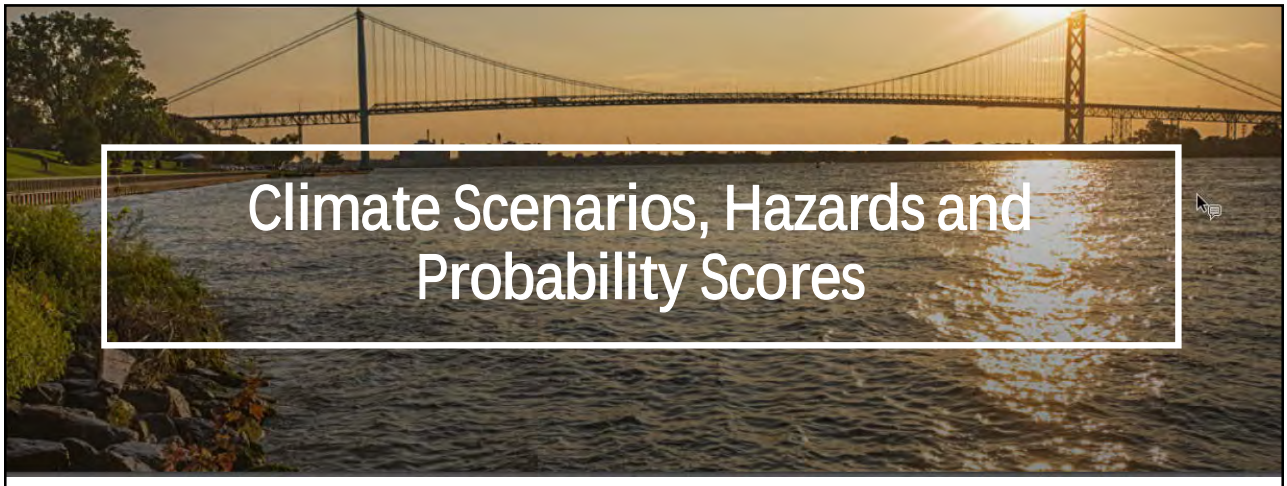
Question – Do these reflect how you would rank impacts based on hazard posed by these impacts?

Severity	PIEVC Definition	Treatment Plant	Shoreline Infrastructure
1	Very Low; Some measurable change	Flow/water volume greater than average annual maximum	Excessive seasonal erosion, noticeable mass loss
2	Low; Slight loss of serviceability	Maint. access covers and drains partially blocked	Excessive seasonal erosion, greater than normal maintenance
3	Moderate loss of serviceability	Maint. access covers and drains fully blocked	Spray begins to overtop unprotected shoreline
4	Major loss of serviceability; Some loss of capacity	Flow at plant approaching max capacity; Some pump stations no longer functioning, may require repair	Spray begins to overtop protected shoreline; Erosion of unprotected shoreline requires repairs
5	Loss of capacity; Some loss of function	Treatment Plant Shut-Off - sewer back-up 10s of properties	Shoreline protection dmg requiring significant repairs; levees or other riverine flood protection overtopped by wave action
6	Major; Loss of function	Treatment Plant Shut-Off - sewer back-up 100s properties	Shoreline protection destroyed; levees or other riverine flood protection overtopped, standing water 0.5 to 1.0 m
7	Extreme; Loss of Asset	Treatment Plant Shut-Off - sewer back-up 1000s properties; Destruction and/or removal of water control infrastructure	Flooding event results in destruction and/or removal of flood control infrastructure; movement/destruction of vehicles, structures and people (> 1.0 m AGL water levels)

Simplified Severity Rating Scale – 3rd Party Private Assets – Exercise 1 Continued

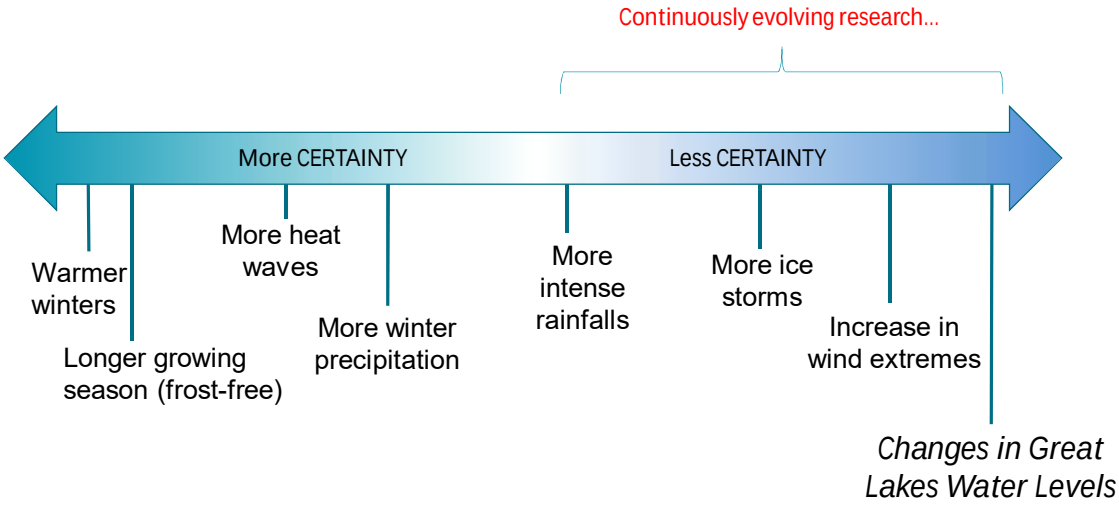
Question – Do these reflect how you would rank impacts based on hazard posed by these impacts?

Severity	PIEVC Definition	3rd Party Private
1	Very Low; Some measurable change	Sufficient rainfall for ground saturation
2	Low; Slight loss of serviceability	Sufficient surface flow transporting leaf litter, branches, etc. from properties, partially blocking drainage
3	Moderate loss of serviceability	Debris generation (e.g., siding, roof gravel) may result in blockage of surface drainage
4	Major loss of serviceability; Some loss of capacity	Ground water levels approach basement level but still > 1.8 m HGL, sump pumps activated; Isolated cases of water damage may occur due to failure of sump pumps, other protective systems
5	Loss of capacity; Some loss of function	Any basement flooding, water level < 1.8 m HGL; Minor to moderate industrial containment breach non-hazardous materials
6	Major; Loss of function	Basement flooding, HGL < 1.3; Surface flooding 0.5 m to 1.0 m AGL; Industrial hazardous materials containment breach into water bodies
7	Extreme; Loss of Asset	Basement flooding, HGL above sfc; Surface flooding > 1.0 m AGL; Major industrial containment spill of hazardous materials onto adjacent private and public properties



West Windsor Flood Risk Assessment PIEVC - January 7, 2022

Not All Climate Hazards are the Same...



Climate Change within PIEVC Assessment Context

"P" Defined by *climate parameter*:

$$R = P \times S$$

Held constant

"Detects" or "sees" climate change

Climate *parameter* needed

- Statistical information used in risk assessment
- i.e., element, value and duration

e.g., heavy rainfall? 25 mm in 1 hour, 15 mm in 15 min?

- "P" based on likelihood over *30-year time period*

Climate Parameters Review – Exercise 2

Precipitation/Drainage/Flooding Events

- Combined probability event modeling
  - Design rainfall events: 5-year and 100-year 4-hour "Chicago" storm
  - Detroit River Levels – Current 100 year, "Future" 100 year and extreme low
  - High-water-level + freeboard
- Multi-day rainfall (June 2010 case)
- Snow accumulations/melt (2014 case)

Secondary and Long-Term Impacts

- Major ice storm - 28 mm or more
- Extreme wind event – gusts ≥120 km/h
- Tornado - (E)F2+
- Rainfall + hail and wind
- Shoreline and creek erosion
- Weathering (freeze thaw)
- River ice

Discussion Questions

- Include extreme temperatures?
  - electrical power delivery impacts
- Others event types not covered here?

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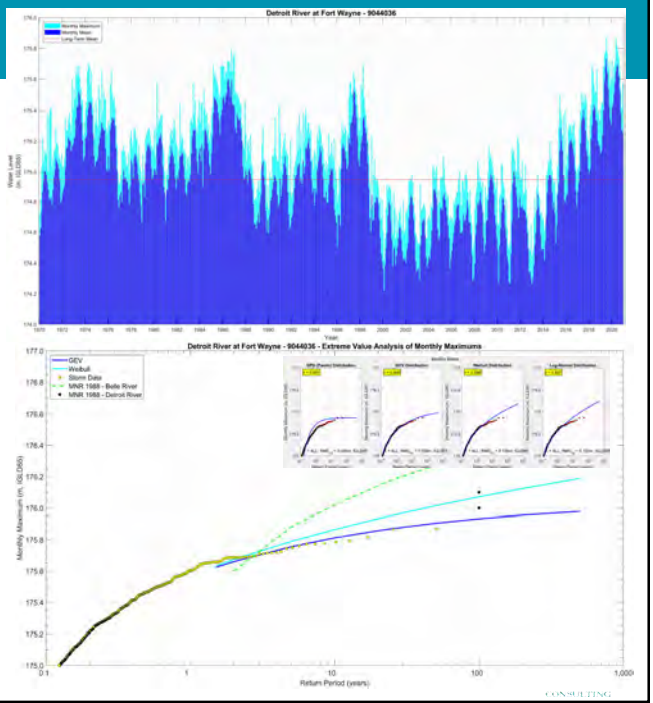
Detroit River Level - Historical Analysis

- Located Near Project Site
- Hourly Data – 1970 – Present
- Peaks: Max = 175.9, Min = 173.8

- Extreme Value Analysis (EVA)
  - Storm Listing - Monthly Maxima
  - Weibull EVA - Good Match with Low Frequency (High Return Periods)
- 100-Year Weibull Prediction Has Best Agreement with 100-Year (MNR 1989, DR2 and DR3)
  - Weibull most Likely Distribution used in MNR 1989



Great Lake Levels and Climate Change

- Great Lakes water level system is *highly* complex
- Earlier Windsor study referenced a 2011 study and one model projection of +30cm in 100 year high levels by 2100
- Added 5 climate change and lake level studies (2013-19)
- All studies project huge uncertainties on future lake levels; Expect *rapid* transitions between high & low levels

Projections of lake levels under climate change:

- Median of all model projections: *Decreasing* over time i.e. more climate models indicate decreases than increases
- 75th percentile highest increase: *~20cm by mid-century,* kept similar to 2100 (conservative recommendation)
- But, projections depend on GHGs – lower future levels with higher GHG emissions

Results agree with 2019 Canada-U.S. Assessment of Impacts on the Great Lakes

"*Newer model-based projections of lake level foresee a central tendency toward small drops in lake levels to the end of the 21st century, with appreciable probability of small rises in lake levels, in contrast to the large drops projected using the older, now-defunct methodology.*"

Climate Analytics – Methods and Key Findings - Joint Probability Events

"It is difficult to determine the joint probability of both extreme rainfall and high lake levels (i.e. it is unknown what the probability of occurrence would be for both a 100-year storm event and concurrent 100-year lake level)."

- Windsor/Essex SWM Standards Manual

…we're gonna try anyway.

- $P_1 \times P_2$ …*only* if statistically independent.
- Determining "P" value challenging
  - Currently using stat independent assumption
  - Statistical dependence investigation ongoing

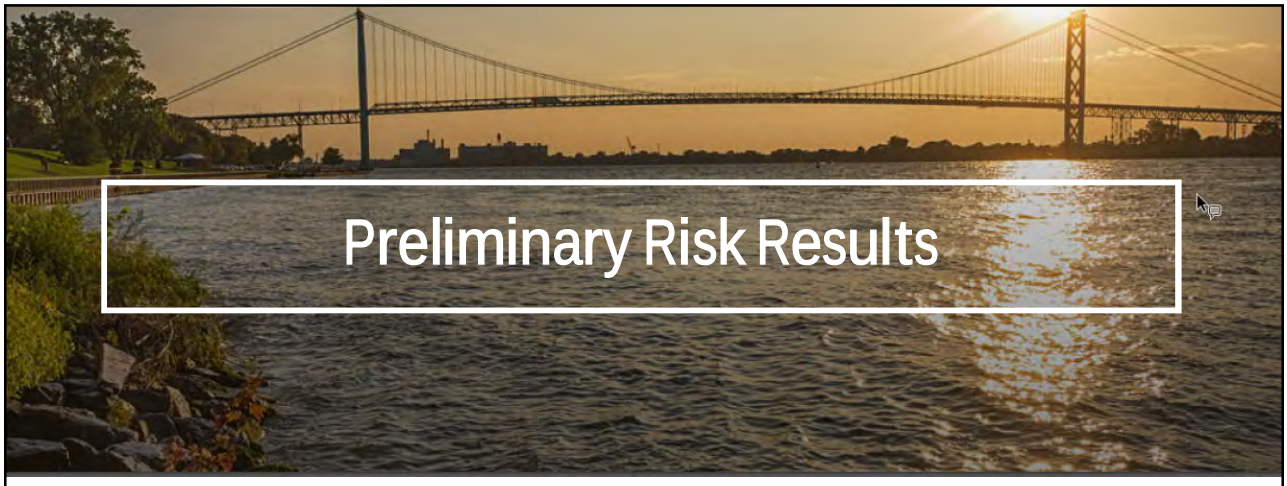
Climate Analytical Results & Discussion

Findings

- Detroit River Levels
  - Review of additional literature (research is ongoing) suggests slightly lower future peak river levels
- Event Probability Changes
  - Extreme rainfall very sensitive to warming, main driver of future changes in risk
  - Current 100-year rainfall reduced to 33-year by 2050s, 15-year by 2080s
    - Consistent with other studies and agreement among methods (e.g., climate analogues)
      - Equivalent to ~40% climate change safety factor currently in use
  - No significant changes in other parameters, including cool season/winter hazards

Discussion Questions

- Are there important events that are not covered in this list of hazards?



West Windsor Flood Risk Assessment PIEVC - January 7, 2022

Interactive Review of Risk Results – Exercise 3

- Group will be redirected to the MURAL virtual whiteboard
  - Annotated map of the study area with highest risks indicated
  - 5-minutes allotted to allow attendees to get familiar with the tool
    - If more than one user present at computer, elect data input person
  - 20-minutes allotted for review and information input
  - 15-minutes for discussion of results and input
- A link to the workspace can be found here: https://app.mural.co/t/dillonconsulting7627/m/dillonconsulting7627/1640109666555/dde48c0c2fd41376e10cdaed9b179bb4027b5354?sender=u0b47aeec169a0431b8606900

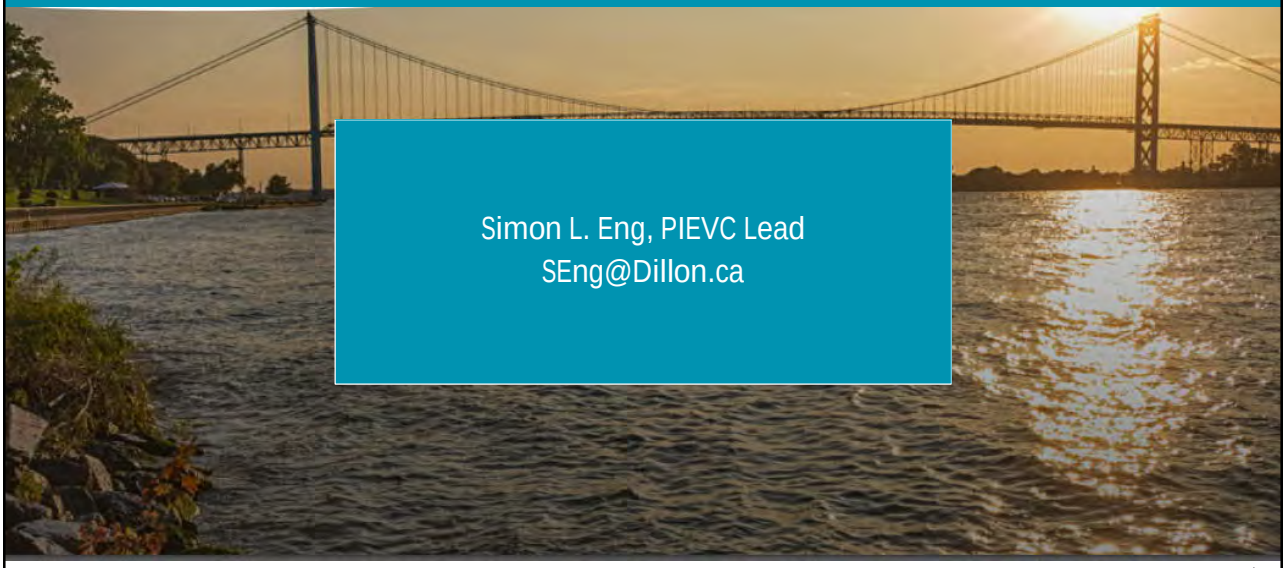
Next Steps

Solutions Development

- Development of list of solutions for problem areas
  - Triple-Bottom-Line (TBL) Module
  - Stakeholder Consultation Meeting to review proposed solutions and TBL outcomes
  - External Public Consultation Meeting to review refined list of proposed solutions

Final Project Reporting

Final Discussion/Questions



Simon L. Eng, PIEVC Lead
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West Windsor Flood Assessment Study

Review of Solutions and Initial Recommendations

May 19, 2022

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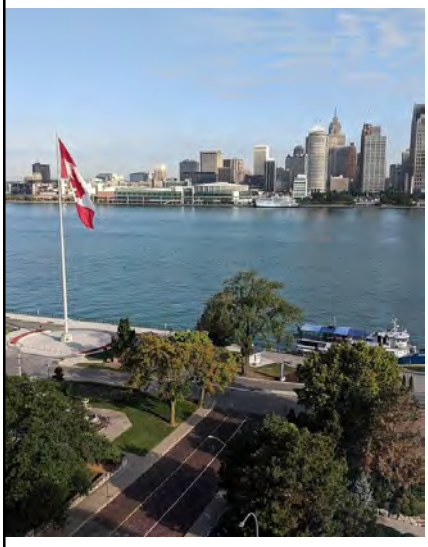
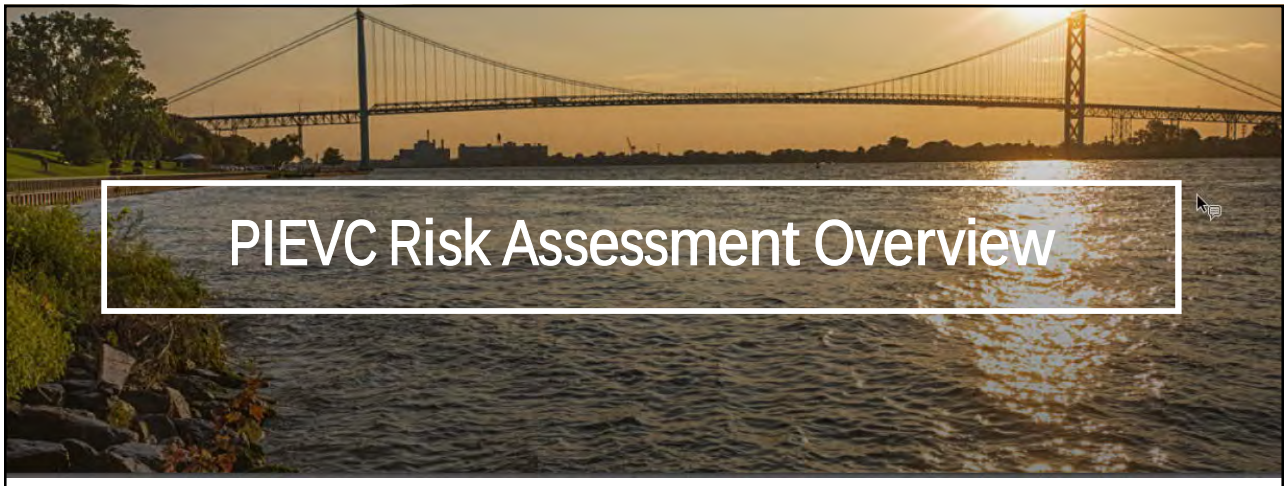
Welcome and Introductions



- Welcome – Project Managers for City of Windsor, Dillon Consulting Limited
- Purpose of Today's Workshop
  - Review results of PIEVC STEP 3
  - Review solutions and initial recommendations
  - Opportunities for further feedback



PIEVC Risk Assessment Overview

Overall Project Goals and Intended Outputs

Project Goals: Develop a flood risk profile for the West Windsor area and identify recommended flood protection solutions.

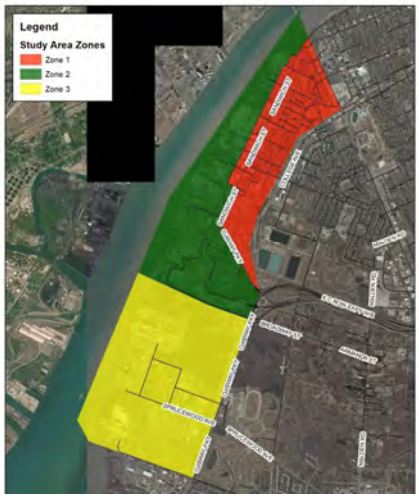
Flood protection solutions have been developed to:

- Reduce susceptibility of coastal flooding within the study area, reduce impact of increased inflow and infiltration (I&I) into the municipal system from high Detroit River water levels;
- Improve the performance of the existing infrastructure during high water levels and reduce peak flows at the Lou Romano WRP;
- Provide more sustainable municipal infrastructure; and,
- Reduce risk of surface and basement flooding.

Next Steps following solution finalization:

- Public consultation; and
- Final reporting.

Project Area



Boundaries: Ojibway Pky and College St.; LaSalle border; Huron-Church/Ambassador Bridge

- Zone 1 "inland" residential, institutional and industrial;
- Zone 2 shoreline industrial; and
- Zone 3 industrial and parkland.

Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol & Outputs

PIEVC Protocol

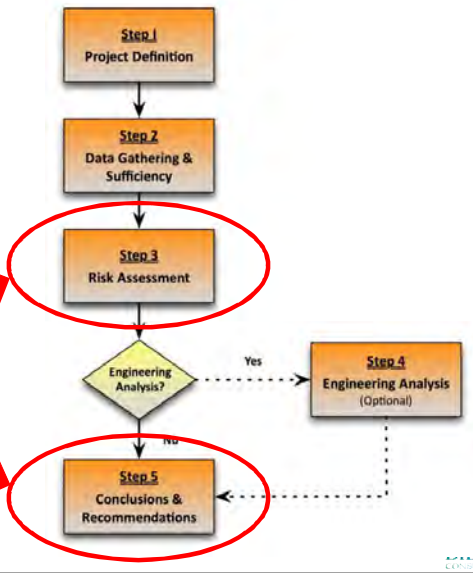
- Based on standard risk assessment methodology

Outputs

- *Prioritized list* of risks

January Workshop

Where we are now



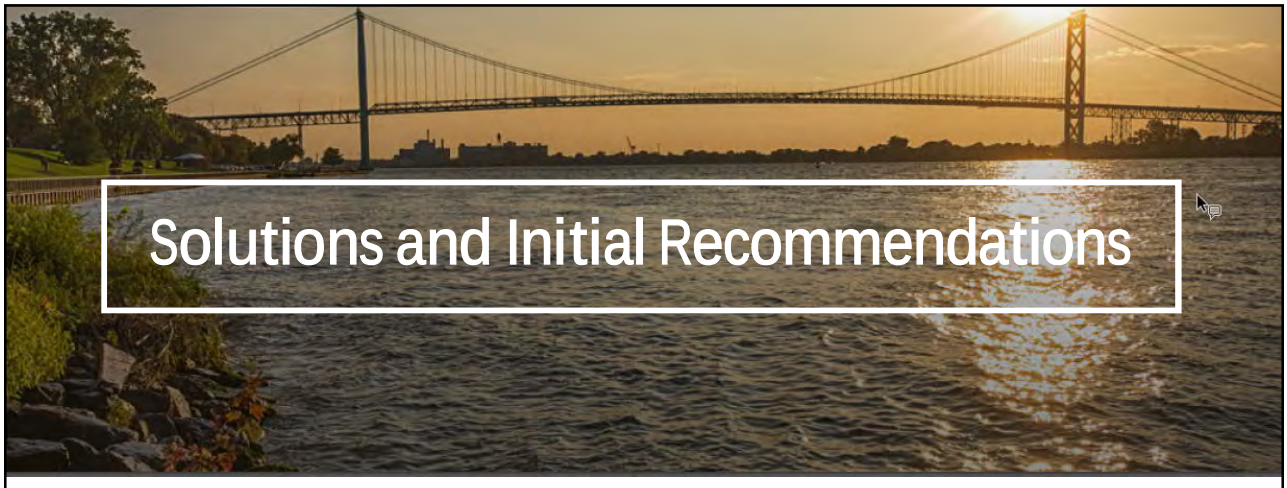
West Windsor Flood Study PIEVC Overview

1. Identified Assets: Drainage, sanitary, combined sewers, including Lou Romano* plant, and key adjacent city and 3rd party assets (schools, parks, arterial roads, etc.)
2. Assessed Impacts due to Climate Change Events: Drainage/sanitary system overloading and failures, immediate effects on surrounding critical assets, 3rd party assets critical to operations of drainage/sanitary system
3. Developed Risk Scores:

Risk = Probability x Severity

4. Identified Solutions: Recommendations to address risks at assets with the highest scores

* Note: *Internal treatment plant operations not in scope*



General Solutions

Excess Flows to Lou Romano Water Reclamation Plant
- Backflow Prevention at CSOs
  - Weirs
  - Flapgates
- Lou Romano RTB
- Combined Sewer Separation

Surface Flooding
- Raise Ground Elevations (Grading Improvements)
- Dewatering Pumping
- Conveyance Improvements
  - Prince Road Trunk Storm Sewer Outfall and Pumping Station
  - Detroit Street Trunk Storm Sewer and Outfall
  - Combined Sewer Separation
  - Roadside Drainage Improvements

General Solutions - Continued

Basement Flooding
- Basement Flood Protection Measures
  - Backflow Prevention
  - Downspout Disconnection
- Combined Sewer Separation
  - PDC Separation
  - Foundation Drain Disconnection

Shoreline Erosion
- Monitoring and Local Repair Plans

Zone 1

Zone Characterization
- Inland, mainly residential, institutional and commercial
- Includes Lou Romano Water Reclamation Plant
- Ground elevations mostly higher than Detroit River HWL

Flood Hazard Characterization
- Basement Flooding – surcharging of combined systems
- High Flows to Lou Romano – high river levels, wet weather I/I
- Surface Flooding
  - High Detroit River levels – Russell Street, Sandwich Street
  - Severe rainfall – localized, combined sewer surcharging

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Zone 1

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Zone 2

Zone Characterization

- Detroit River shoreline, mainly industrial
- Includes WPA lands, WDBA lands, Brighton Beach Generation Station, Keith Transmission Station
- Ground elevations close to Detroit River HWL

Flood Hazard Characterization

- Surface Flooding
  - High Detroit River levels – Prospect Avenue, Sandwich Street, McKee Park
  - Severe rainfall – localized, conveyance system surcharging
- Shoreline Erosion Concerns

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Zone 2

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Zone 3

Zone Characterization

- Detroit River shoreline, mainly industrial
- Includes Black Oak Heritage Park, Truck Ferry
- Ground elevations generally 1-2 m above Detroit River HWL

Flood Hazard Characterization

- Surface Flooding
  - Roadside Drainage Capacity – Ojibway Parkway, Sprucewood Avenue
  - Sanitary Surcharging – localized, severe rainfall

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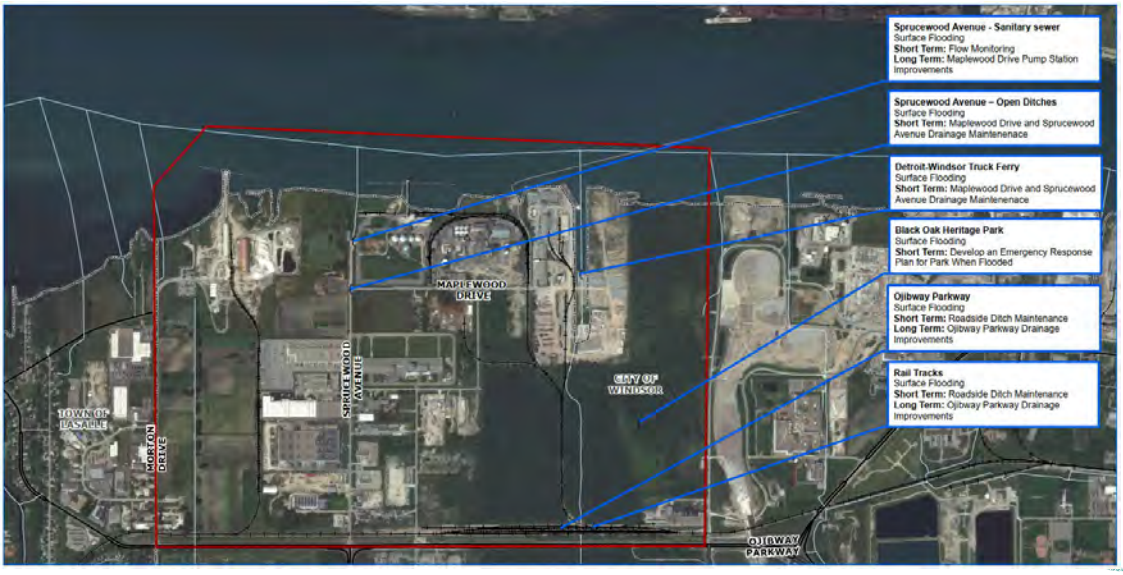
Zone 3



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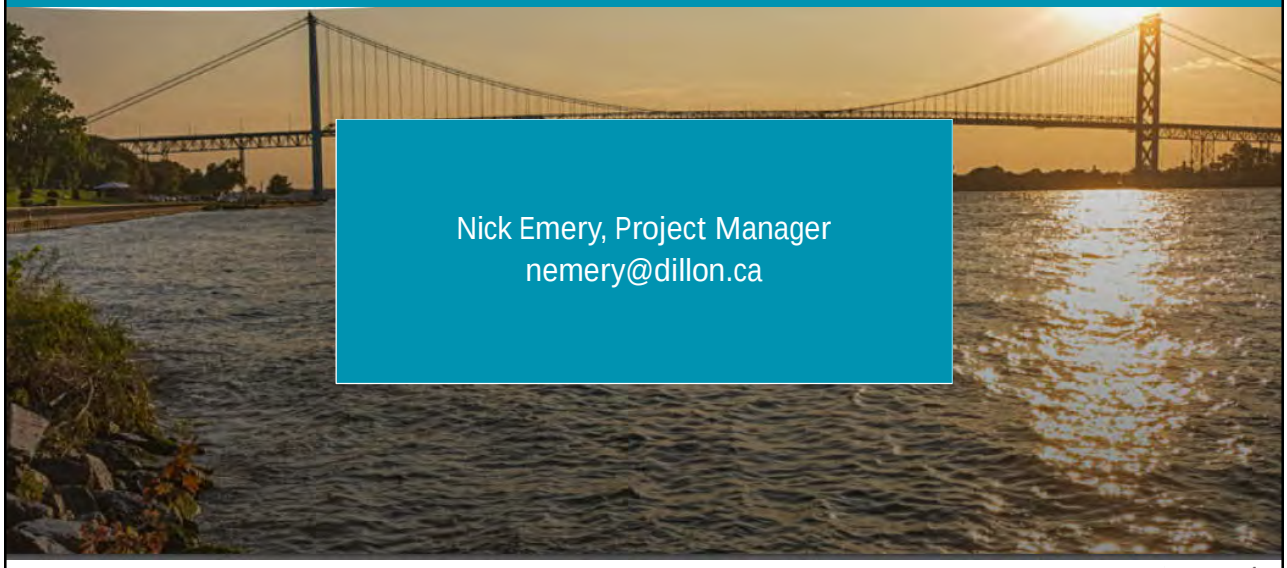
Next Steps

- Refine Proposed Solutions
  - Triple-Bottom-Line (TBL) Module
- External Public Consultation Meeting to review refined list of proposed solutions
- Final Project Reporting

Final Discussion/Questions



Nick Emery, Project Manager
nemery@dillon.ca

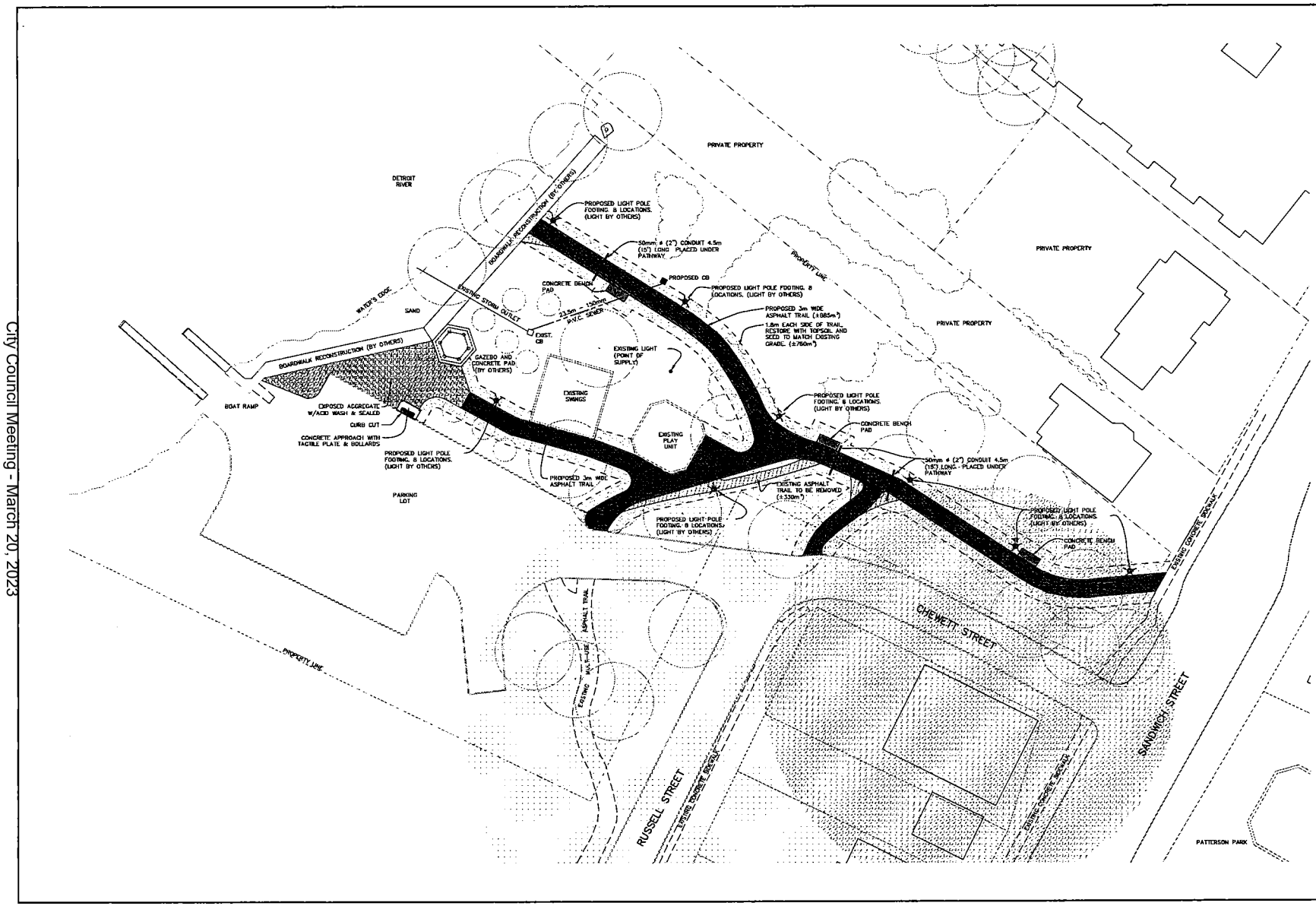
Appendix C

Background Information

Appendix C – Background Information

1. McKee Park Improvements Site Plan, March 2022

5. Sandwich Street ETR Crossing Pavement Rehabilitation and Culvert Extension, Proposed Pavement Upgrades, February 2022



GENERAL NOTES:

1. CONTRACTOR TO CALL FOR LOCATES PRIOR TO COMMENCEMENT OF ANY WORK ON SITE. CONTRACTOR TO DETERMINE AND VERIFY THE LOCATION AND DEPTHS OF UNDERGROUND UTILITIES PRIOR TO COMMENCING ALL CONSTRUCTION ADVISE THE PROJECT MANAGER FOR ANY CONFLICT BETWEEN EXISTING UTILITIES AND NEW WORK.
2. THE LOCATION OF UTILITIES IF INDICATED ON THE DRAWING IS NOT GUARANTEED TO BE ACCURATE. THE ONUS LIES ON THE CONTRACTOR AFTER ACCEPTANCE OF ANY CONTRACT AWARD TO OBTAIN AT THEIR OWN EXPENSE THE EXACT LOCATION OF EACH UTILITY. NO EXTRAS TO THE CONTRACT OR CLAIM FOR COMPENSATION WILL BE ALLOWED IF IT SHOULD BE DISCOVERED THAT ANY UTILITY IS ACTUALLY LOCATED IN THE SITE LINE OR GRADE THAT IS IN VARIANCE WITH THE SITE, LINE OF GRADE SHOWN ON THIS DRAWING.
3. CONTRACTOR TO INFORM CITY PROJECT MANAGER OF COMMENCEMENT OF WORK DATE OF WORK START UP. ENC PRIOR TO ANY ONSITE OPERATIONS TAKING PLACE. THE CITY WILL MEET CONTRACTOR ON SITE TO REVIEW ALL WORK PRIOR TO COMMENCEMENT. A MINIMUM OF 48HOURS NOTICE SHALL BE GIVEN TO THE CITY PRIOR TO STARTING WORK.
4. THE CONTRACTOR TO VERIFY ENC GRADES OF ALL PROPOSED MANHOLES, CATCH BASINS AND MANHOLE TOP ELEVATIONS AND ADJUST TO SUIT EXISTING GRADES. ALL DRAINAGE INSTALLED AS A RESULT OF THIS WORK SHALL HAVE POSITIVE DRAINAGE TO EXISTING CATCH BASINS, MANHOLES, CONSTRUCTION TO MAINTAIN EXISTING GRADES OR AS FILED WITH CITY PROJECT MANAGER. THE CONTRACTOR IS TO OBTAIN ALL PERMITS REQUIRED FOR ANY DRAINAGE WORK IF NECESSARY.
5. REPAIR ANY DAMAGE DONE AS A RESULT OF CONSTRUCTION. VERIFY THAT ALL EXISTING SITE CONDITIONS ARE AS SHOWN ON THE PLANS. THE CONTRACTOR IS RESPONSIBLE TO THE CITY FOR ANY DAMAGE DONE TO A UTILITY THROUGH ANY ACT OF NEGLECT BY THE CONTRACTOR OR ANYONE ACTING UNDER THE AUTHORITY OF THE CONTRACTOR.
6. ALL WORK TO BE PERFORMED IN COMPLIANCE WITH THE HEALTH AND SAFETY ACT LATEST REVISIONS AS WELL AS THE CITY OF WINDSOR HEALTH AND SAFETY REGULATIONS.
7. RESTORATION OF ANY AREAS DISTURBED AS A RESULT OF CONSTRUCTION WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RESTORE TO EXISTING CONDITIONS OR BETTER INCLUDING DAMAGED ASPHALT, CONCRETE, CURBS OR ANY OTHER SITE FEATURE DAMAGED AS A RESULT OF CONSTRUCTION OPERATIONS. GRADING WILL BE RESTORED AS ROUGH FINISHED GRADE AND THE CITY WILL PERFORM ALL FINISHED SITE GRADING AFTER WORK HAS BEEN COMPLETED. ROUGH GRADING INCLUDES ELIMINATING ANY TRIP HAZARDS UNEVEN AREAS TO ALLOW FOR POSITIVE DRAINAGE.
8. ANY GRADES AND DIMENSIONS ARE PROVIDED FOR CONVENIENCE TO BIDDERS AND ARE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE OR VERIFY WITH THE CITY PROJECT MANAGER.
9. CONTRACTOR TO PROVIDE SITE LAYOUT SERVICES BY CERTIFIED SURVEYOR TO CONFORM WITH DRAWINGS AND CAD FILES PROVIDED BY CITY. LAYOUT, GRADES AND DEPTHS MUST BE CONFIRMED BY CITY PROJECT MANAGER PRIOR TO FINALIZING PATHWAY LAYOUT, DEPTHS OF STONE AND FINISHED GRADES OF CATCH BASINS, ASPHALT, CONCRETE, SITE FEATURES, AND GENERAL SITE GRADING.

EXISTING TREE PROTECTION:

1. THE FOLLOWING NOTES TAKE PERTAIN TO ANY AND ALL EXISTING TREES ON ENC SITE, LOCATED WITHIN THE CONSTRUCTION AREA OR ADJACENT TO ANY CONSTRUCTION OPERATIONS AS A RESULT OF WORK BEING PERFORMED.
2. PRIOR TO ANY DEMOLITION OR CONSTRUCTION, PROTECT ALL TREES TO REMAIN AS DIRECTED BY THE PROJECT MANAGER OR BY ERECTING SNOW FENCE BEYOND THE DRIP LINE OR AS CLOSE AS POSSIBLE TO THE DRIP LINE TO THE SATISFACTION OF THE PROJECT MANAGER. DO NOT STORE OR STOCKPILE ANY BUILDING MATERIALS OR EQUIPMENT INSIDE THE DRIP LINE OF EXISTING TREES.
3. IF RE-GRADING IS REQUIRED BETWEEN THE DRIP LINE OF AN EXISTING TREE, DO NOT REMOVE OR ADD MORE THAN 150mm (+/-) OF SOIL. IF THE SITUATION REQUIRES A CHANGE IN GRADE OF MORE THAN150mm (+/-) NOTIFY THE CITY PROJECT MANAGER FOR FURTHER INSTRUCTION.
4. ANY TREES DAMAGED AS A RESULT OF CONSTRUCTION REVISED REPAIR MUST BE REPLACED TO THE SATISFACTION OF THE CITY OF WINDSOR WITH NEW TREE, CALIPER NO LESS THAN 100mm. THE CONTRACTOR TO NOTIFY THE CITY PROJECT MANAGER AS SOON AS ANY DAMAGE HAS OCCURRED TO ANY EXISTING TREE.

03/2022	TENDER
Date	Issued for
Revisions	

THE CITY OF WINDSOR ONTARIO, CANADA

City of Windsor
Parks and Recreation
3430 McDougall St. Windsor, Ontario, N8X 3N8 (519) 253 - 2300

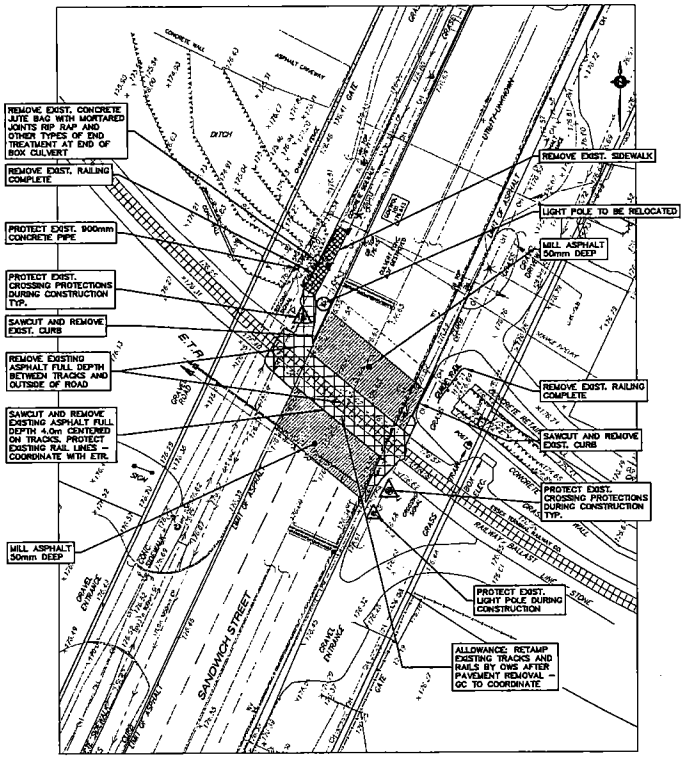
McKEE PARK IMPROVEMENTS
ASPHALT TRAIL REDEVELOPMENT

Project

SITE PLAN

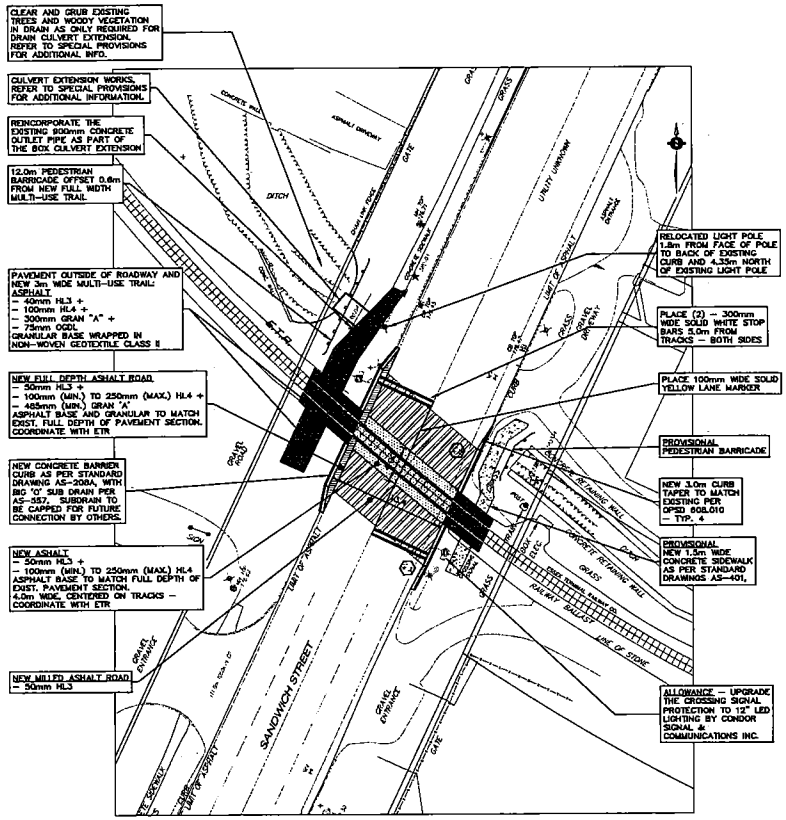
Sheet title

Date: MARCH 2022	Approved
Design: D. A.	Tender No.
Drawn: S. H.	Project No.
North	Scale: 1 : 250
	1 of 2
	Sheet No.



EXISTING CONDITIONS & REMOVALS

SCALE 1:250



PROPOSED NEW CONSTRUCTION

SCALE 1:250

NOTES

1. PROVIDE SILT FENCE FOR SEDIMENT AND EROSION CONTROL ALONG EXISTING ROADSIDE DITCHES AND MUNICIPAL DRAIN DURING CONSTRUCTION. CONTRACTOR TO MONITOR DAILY.
2. CONTRACTOR SHALL PROTECT EXISTING CATCH BASINS AND PIPE END SECTIONS FROM SEDIMENT WITH FILTER CLOTH OR OTHER APPROVED METHOD. ALL SUMP TO BE KEPT CLEAN DURING CONSTRUCTION.
3. NO WORKS TO BE UNDERTAKEN WITHIN THE MUNICIPAL DRAIN UNLESS OTHERWISE SHOWN ON THE CONTRACT DOCUMENTS OR AS PER PRIOR APPROVAL BY OWNER.
4. ALL DISTURBED AREAS SHALL BE FINE GRADED WITH TOPSOIL, HYDRO SEED AND EROSION CONTROL BLANKETS
5. ALL DIMENSIONS SHOWN ON PLANS ARE MINIMUM REQUIREMENTS FOR TENDER.
6. REFER TO ALL CONTRACT DOCUMENTS FOR ADDITIONAL INFORMATION.
7. CONTRACTOR TO COORDINATE ALL WORKS WITH ETR WHEN WORKING WITHIN 4.6m OF THE RAIL LINES. REFER TO ALLOWANCE – ESSEX TERMINAL RAILWAY FLAGMEN FOR ALL WORK WITHIN THE ETR RIGHT OF WAY
8. CONTRACTOR TO COORDINATE UPGRADES TO CROSSING PROTECTION "BY OTHERS" DURING CONSTRUCTION.
9. CONTRACTOR TO CONFIRM LAYOUTS WITH THE CITY BEFORE NEW WORKS COMMENCE.

PAVING NOTES:

- CONTRACTOR TO REMOVE EXISTING CATCHBASIN/ LIGHTING POLE AND REMOVE OR ABANDON EXISTING CB LEAD
- CONTRACTOR TO PROTECT/ADJUST EXISTING APPURTENANCE DURING CONSTRUCTION
- CONTRACTOR TO PROTECT/SUPPORT EXISTING HYDRO/LIGHT/BELL FACILITIES DURING CONSTRUCTION
- EXISTING ETR CROSSING PROTECTION
- REMOVE EXISTING CURB AND GUTTER
- REMOVE EXISTING ASPHALT (FULL DEPTH)
- REMOVE EXISTING CONCRETE SIDEWALK
- MILL 50mm OF EXISTING ASPHALT
- NEW ASPHALT AND MULTI USE TRAIL (40mm HL3 SURFACE, 60mm HL4 BASE, 300mm GRANULAR "A")
- NEW ASPHALT (50mm HL3 SURFACE, 100mm MIN. HL4 BASE)
- NEW FULL DEPTH ASPHALT ROAD (50mm HL3 SURFACE, 100mm MIN. HL4 BASE + 485mm MIN. GRAN "A")
- NEW 50mm HL3 SURFACE COURSE ASPHALT FOR COLD MILLING
- NEW CONCRETE SIDEWALK (AS-401) (LIMITS TO BE APPROVED BY THE CITY ENGINEER) (PROVISIONAL)

LEGEND

DESCRIPTION	EXISTING	PROPOSED
UNDERGROUND BELL	BELL	
UNDERGROUND HYDRO	HYD	
UNDERGROUND TRAFFIC	T	
STORM SEWER		
SANITARY SEWER		
DUAL SEWER		
WATERMAIN	W	
GASMAIN	G	
SEWER MANHOLE		
WATER VALVE		
FIRE HYDRANT		
GAS VALVE		
LIGHT STANDARD		
TRAFFIC LIGHT		
HYDRO POLE		
BELL POLE		
ROAD SIGN		
CATCH BASIN		
SURVEY BAR		

ATTENTION:

CONTRACTOR IS RESPONSIBLE FOR THE EXACT LOCATION AND PROTECTION OF EXISTING UTILITIES DURING CONSTRUCTION.

No.	REVISIONS	DATE	INIT.
	ISSUED FOR PREQUALIFICATION/ TENDER DATE: FEBRUARY 4, 2022		
	ISSUED FOR CONSTRUCTION DATE:		
	AS CONSTRUCTED DATE:		

SCALES

10m 5 0 10 20 30 40m

HORIZONTAL 1 : 500

LICENSED PROFESSIONAL ENGINEER J.R. DATTILO 100018065 PROVINCE OF ONTARIO

DATE DRAWN: JAN. 2021
DRAWN BY: J. MUEGGE/D. BAUGHAN
CHECKED: P. USENE
DESIGN: J. DATTILO
CHECKED: C. MIDDAUGH

CHRIS NEPSZY, P.Eng.
COMMISSIONER OF INFRASTRUCTURE SERVICES

THE CORPORATION OF THE CITY OF WINDSOR
ENGINEERING DEPARTMENT

SANDWICH STREET ETR CROSSING
PAVEMENT REHABILITATION AND CULVERT EXTENSION
SANDWICH STREET AT ETR
PROPOSED PAVEMENT UPGRADES
EXISTING CONDITIONS AND REMOVALS AND PROPOSED NEW CONSTRUCTION

PREQUALIFICATION/ TENDER No. 16-22
ACCOUNT No. 7141048
DRAWING No. P-2009
SHEET 1 OF 6

Appendix D

Climate Data and Analysis Summary

To: Project File

From: Heather Auld

Date: February 16, 2022

Subject: West Windsor Flood Risk Assessment
Climate Data and Analysis Summary

Our File: 21-2409

Purpose and Scope

This report serves as a technical summary for climate data, information and analyses executed within the context of the Public Infrastructure and Engineering Vulnerability Committee (PIEVC) Protocol risk assessment. It provides detailed technical information on the data sources, analytical methods, analytical results and final application and contextualization of those results within the context of the PIEVC assessment.

Climate Analytical Methodology – Historical Data and Future Projections

The risk assessment necessitates the analysis of both historical and future climate information. Historical climate information serves two key purposes:

1. It provides a baseline for historical operating conditions for the assets under study; and,
2. It provides a reference point to establish necessary context for climate change projections; i.e., how far will changes in climate deviate from current conditions?

A historical background is critical to providing a point of reference for climate change information, since it can indicate the type of operating environment which has already interacted with the assets under study. Climate projections are of little value unless the projected changes are provided within the context of these current conditions.

Historical Data

The majority of the historical climate baseline information used in this project was derived from climate observations from the most representative climate stations

available near the assets being evaluated. A meteorological record of 30 years (1981 to 2010), a so-called "climate normals" period, was used for historical baseline data calculations. Historical climate data were obtained from the Environment and Climate Change Canada (ECCC) Windsor International Airport station. Additionally, Detroit River level data were obtained from the US Army Corps of Engineers for the Fort Wayne stream gauge station.

Climate Change Projections

Having established a historical baseline, the analysis then required guidance to assess potential changes in key hazards and climate parameters under a changing climate. The methodology employed here uses the "Delta" or *change factor* method to both downscale Global Climate Model (GCM) projections to the local scale needed for decision making, and to account for climate model biases. This method assumes that future changes to the West Windsor study area climate will be directly correlated to changes to the regional climate and that relationships between variables at the local scale are assumed to remain relatively constant in the future period. Not surprising, most studies indicate that credible climate change projections at the local to regional scale are highly contingent upon GCMs being able to faithfully represent the large-scale processes and relevant features of the climate system (IPCC 2013).

This method of model bias correction and downscaling is able to make use of many models – called a "multi-model" ensemble – with the reliability of the outputs being much improved over the use of any single, higher resolution model. The selection of a single model or a small subset of climate models could lead to costly maladaptive decisions, particularly since the use of ensembles helps to moderate the effects of differing assumptions inherent in each model.

This study used an ensemble of all AR5 global climate models initially released by the Intergovernmental Panel on Climate Change (IPCC) in 2013, with outputs for the climate parameters of interest and representative of the Windsor region. Dillon first obtained the average climate conditions for the baseline normals period (1981-2010, the official and most recent available), and then projected the average change in climate conditions for the future periods (i.e., 2050s and 2080s) from the multi-model ensemble. The *change* from baseline to future produced by the model ensemble was then added to the actual historical station observations. This method avoids any inherent model biases by

only considering the change – or "delta" – of the projections and adding this to the analyses of the historically observed climate.

From an ensemble of 37 GCMs, the grid point value corresponding to the Windsor location was selected. Grid point size differs between models, but is approximately 150 km x 150 km when all models are re-gridded to a common scale prior to averaging. The use of an ensemble of models is approved by the Intergovernmental Panel on Climate Change (IPCC, 2013). In effect, this method applies a climate change factor to a baseline high resolution observation (i.e. station corresponding to the Windsor study area) to estimate future climate conditions.

Climate Projections for Complex Hazards

Complex hazards, meaning those that are characterized as being highly localised (with respect to model grid scales described above), short duration, extremes, and/or combined or concurrent (synergistic) events, require specialized studies and are not directly available as raw outputs from GCMs. In these cases, future climate conditions for the Windsor area were either derived from specialised studies available in the peer-reviewed published literature (e.g. Cheng et al., 2012, 2014 for high winds and ice storms; Diffenbaugh et al. 2013 for changes in severe thunderstorm activity).

Where projection guidance was not available in any form, professional judgement was applied based on an integration and assessment of all available guidance (e.g., trends in parameters contributing to a given hazard) and the climate expertise of the Dillon team.

In particular, a comprehensive review of all climate change and Great Lakes level studies undertaken by Canada or the United States since 2011 was used to assess and update the future lake level projections developed for the earlier Riverside East and Windsor Port Authority PIEVC risk assessments. Several new water level studies were reviewed that included more recent climate change models, a greater number of climate change models, added regional scale climate modelling results, more GHG emission assumptions and improved lake dynamics modelling.

Selection of Representative Concentration Pathways (RCPs)

In the currently valid IPCC AR5 assessment, greenhouse gas emission assumptions or representative concentration pathways, or simply "RCPs", were developed to describe alternate possible future climates based on the amounts of greenhouse-gas (GHG)

emissions that may be emitted and accumulated long into the future. RCPs refer to a consistent set of internationally agreed upon assumptions on GHG emissions activities that are used by climate modellers to explore plausible future emission scenarios and their implications for the globe's climate responses.

The future pathways for GHG emissions are largely unknown, but historically the trends in emissions have been most closely following the RCP8.5 or *high* emission trajectory (**Figure 1**). This trajectory represents an additional 8.5 W/m^2 of energy to the atmosphere by the year 2100 and approximates a mostly "business as usual" carbon emissions situation. In the absence of any truly enforceable global GHG reduction program, this would seem to be the most likely (and extreme) path. This RCP 8.5 emission pathway is also useful as a risk averse lens to climate change assessments, since it represents the "worst case" emissions path which can be used to avoid under-adaptation.

A second often considered pathway is RCP4.5, which represents notable reduction in GHG emission undertaken globally through multiple means (e.g., reduction of the use of coal, increased reliance on renewables). Contrasting the two scenarios, projections using RCP8.5 generate a global average temperature increase of between 4 and 6 °C degrees by the year 2100, whereas the RCP4.5 scenario projects an increase of 2 to 3 °C by the end of the century (Peters et al. 2012).

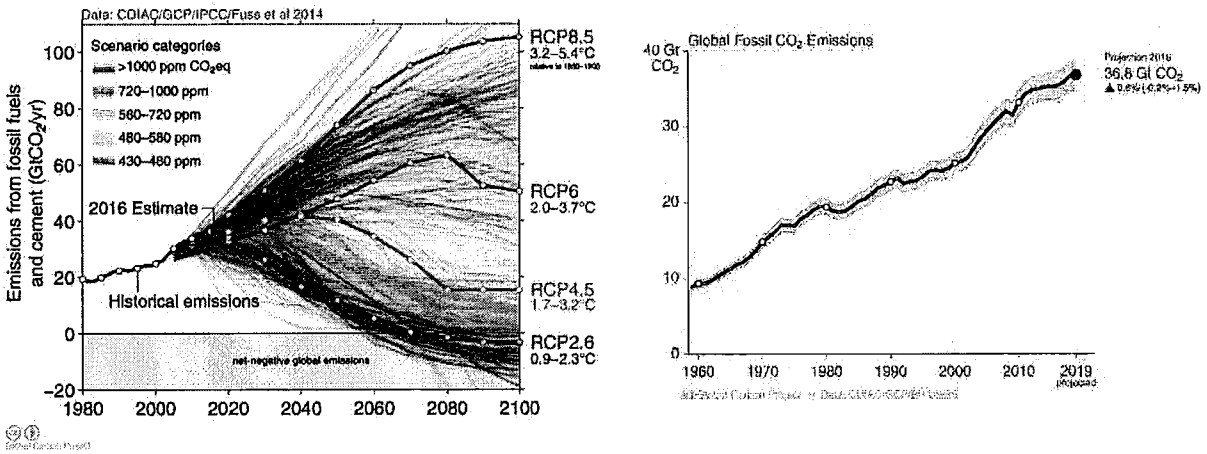


Figure 1 - RCPs and associated emissions compared to historical values. Left figure (a) shows GHG emissions up to 2016, right figure (b) shows carbon emissions up to 2019.[1]

[1] The IPCC 6th Assessment Report (AR6) will feature a change from RCPs to so-called "Shared Socioeconomic Pathways," or SSPs, and therefore graphics comparing recent historical GHG emissions to RCPs are not available.

For this study, RCP8.5 was used as the basis for future projections and the risk assessment calculations. Climate change projections were compiled for the time period 2041 - 2070 (i.e., the 2050s), and 2071 - 2100 (i.e., 2080s) using the full Coupled Model Intercomparison Project 5 (CMIP5) ensemble of 37 Global Climate Models (GCM) associated with the IPCC 5th global assessment released in 2013. As noted above, the emission scenario RCP8.5 is used for its consistency with "business as usual" conditions resulting from continued global growth in GHG emissions. In many cases, the RCP8.5 emission assumption represents a global temperature increase likely to exacerbate the intensity and frequency of extreme climatic and weather events (Climate Nexus, 2021). The emission scenario of RCP8.5 was selected as a conservative, risk averse assumption for most extreme climate variables to best inform the vulnerability assessment and its risk management planning.

Global GHG emissions continue to grow. Selecting a less conservative RCP would assume global GHG reductions that have yet to occur, possibly underestimating impacts. Selecting an RCP that aligns with recent and current global GHG emissions trends is preferable for applications intended to inform risk management planning.

Threshold Selection and Probability Scoring

As statistical information for both historical and projected hazard event frequencies was available for most of the climate parameters identified in the study, the more quantitative PIEVC Protocol Method B was used to develop the probability scores for each parameter. Where such statistical information is available, the probabilities for each climate parameter are converted from numerical probabilities into PIEVC score categories. The PIEVC Protocol makes use of standardized climate probability scores ranging from 0 to 7, employed in parallel with the 0 to 7 impact scoring scale used for severity assessment, as summarized in Table 1. A score of 0 refers to a climate event that likely will not occur, while a score of 7 refers to an event that is "highly probable" to occur over the service life of the structure (i.e., a probability approaching 100%). However, because the original scale only provides individual values for each category, ranges (far-right column) were derived to better define each probability score value.

Table 1 – General Climate Parameter Probability Scoring

Probability Scale	PIEVC Value (%)	Range (%)
0	<0.1%	<0.1%
1	1%	0.1 to 2.5 %
2	5%	2.5 to 12.5 %
3	10%	12.5% to 15%
4	20%	15% to 30%
5	40%	30% to 55%
6	70%	55% to 85%
7	99%	85% to 100%

Furthermore, probabilities calculated for this study are based on the probability of event occurrence within a 30-year period (i.e., an event with a 1% annual probability of occurrence has an approximate probability of 26% within any given 30-year time period). This 30-year time frame was used as a compromise between expected service life of individual components, and is also the standard averaging period for climate data (i.e., the "climate normals" described above).

Climate Parameter Threshold Selection

Climate parameters used in the risk assessment are based on asset-relevant "thresholds". These thresholds are defined by the intensity and duration of key hazards directly relevant to the design capacity and/or risk characteristics relevant to assets under assessment. In this case, heavy and extreme rainfall values and Detroit River levels were defined based on the drainage model values used to assess the performance of the infrastructure. These specifically included the 4-Hour 5-Year and 100-Year return period design storms using a Chicago synthetic rainfall distribution, as well as the 100-Year and "Climate Change" high river levels.

Secondary impact events, those which may occur in tandem with or in rapid succession with extreme rainfall events, were defined based on thresholds relevant to critical *adjacent* and interconnected infrastructure (i.e., surface transportation, electrical power and communications). These events were included in the analysis to determine if they

could result in significant, additional exacerbation of impacts on the drainage and sanitary systems (e.g., what are the impacts of power loss on pumping stations and treatment plant operations).

Key Climate Hazards – Historical and Future Conditions

Table 2 below provides a summary of the statistical information and PIEVC probability scores assigned to each climate parameter for which statistical information was available. The annual frequency, 30-year probability and associated PIEVC 0-7 probability score are provided for each of the three time horizons (i.e., current, 2050s and 2080s).

Additional climate parameters and related were initially included in the analysis, namely extreme air temperatures, heavy snowfall events and seasonal snow accumulations, as well as combined rainfall and hail events. Staff interviews, historical events research and stakeholder workshop discussions subsequently indicated that these event types were not important to the overall impacts to the drainage and sanitary systems, and as such were removed from the analysis. Finally, some important hazards (i.e., shoreline erosion, river ice, and ice jam floods events) are included in the risk assessment and discussions, but reliable data were not available for statistical analysis.

Detailed discussion of each climate parameter is provided in the following sections.

Table 2 – Climate Parameter Thresholds and Probabilities

Hazard/ Element	Threshold	Annual Frequency	30-Year Probability and Score		Annual Frequency	30-Year Probability and Score		Annual Frequency	30-Year Probability and Score	
		Current			2050s			2080s		
Extreme rainfall	"Major" 100-yr Storm - 82 mm in 4 hrs, peak rate of 145 mm/h	0.0068966	~20%	4	0.03125	>60%	6	0.0666667	>85%	7
	"Minor" 5-year Storm - 50 mm in 4 hrs, peak rate 29.5 mm/hr	0.1724138	>99%	7	0.3703704	>99%	7	0.5263158	100%	7
Extreme River Levels	"Likely" CC HWL - 176.1 m	0.0066667	~20%	4	0.01	~25%	4	0.01	~25%	4
	Current HWL - 175.9 m	0.01	~25%	4	0.012	30%	5	>0.012	> 30%	5
Combination Events	Current 100 yr HWL + extreme rainfall (100 year storm)	N/A	7%	2	N/A	12%	2	N/A	26%	4
	Current 100 yr HWL + Moderate Rainfall (5-year storm)	N/A	26%	4	N/A	30%	4	N/A	> 30%	5
	Climate Chg HWL + extreme rainfall (100 year storm)	N/A	5%	2	N/A	16%	4	N/A	23%	4
	Climate Chg HWL + moderate rainfall (5 year storm)	N/A	26%	4	N/A	26%	4	N/A	30%	4
	HWL + wave action (freeboard)	0.1	>95%	7	**N/A - Steady or increasing**	N/A	7	**N/A - Steady or increasing**	N/A	7
Secondary Impact Events	Major ice storm - 28 mm or more	0.01	~25%	4	0.0108	~30%	4	0.01004	~25%	4
	Extreme wind event - 120 km/h	0.05	~80%	6	0.062	85%	7	0.063	85%	7
	Tornado - (E)F2+	0.002	~5%	2	0.0025	~7%	2	0.003	9%	2
	Weathering (freeze thaw)	14.1	100%	7	10.5	100%	7	7.8	100%	7
		0.47	>99%	7	0.35	>99%	7	0.26	>99%	7

Detroit River Water Levels

Although Great Lakes water levels have fluctuated considerably over the past century, the fluctuations from the extreme low to extreme high levels from 2011 to 2021 have been among the most extreme seen in the observations. Levels typically fluctuate on multi-decadal time scales, but the recent fluctuations have been more rapid, dropping to record lows on the Great Lakes from 1999 to 2013 and then rising to record highs, particularly for the 2019 to 2021 period.

Water levels on the Great Lakes are determined by the net flow of water in and out of the lake system. The processes that drive the changes in water levels and their connecting channels are complex and vary over time periods from seasons to years to multi-decades. In general, the annual fluctuations in water levels can be attributed to the seasons, the longer-term or multi-year fluctuations can be attributed to climate and the short-term fluctuations in levels can be associated with weather.

The annual and climate fluctuations result from three main factors:

1. Changes in rainfall and snowfall over the lakes,
2. Evaporation from the lakes, and
3. Inflow or runoff from tributaries and rivers that enters each lake from the surrounding land and any diversions or management changes, as shown in **Figure 2**.

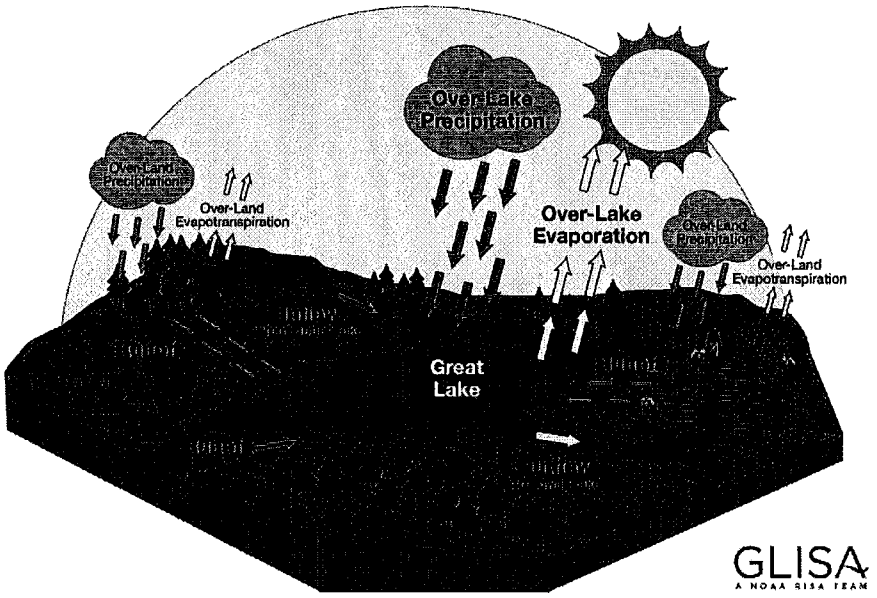


Figure 2 Climate, hydrologic and hydraulic processes affecting Great Lakes water levels. From GLISA (Great Lakes Integrated Sciences and Assessments, NOAA). Accessed from: https://glisa.umich.edu/sustained-assessment/lake-levels/

Seasonally, water levels rise through the spring and summer with snowmelt and spring rainfall, peak around July, then decline through the fall and winter, with a low point around February. The winter ice cover timing and ice amount have a significant influence in controlling evaporation and shoreline erosion and on spring water levels. This seasonal rise and fall varies from approximately 40 to 60 cm on average. Water levels also can fluctuate on very short-term scales along the shorelines during wind-driven, localized weather events, e.g. the southern shoreline of Lake St Clair.

Historical Data and Extreme Value Analysis

A statistical analysis was completed to calculate the Detroit River 100-year water level based on historical water level measurements.

Vertical Datum

The International Great Lakes Datum 1985 (IGLD'85) is often used with respect to water levels and bathymetry, and the Canadian Geodetic Datum (CGVD) is often used with respect to topographic survey and LiDAR data. It is important to recognize that there is a

slight difference between IGLD'85 and CGVD at the project location. At Tecumseh, the closest site where this datum difference is defined, IGLD'85 is 0.01 m lower than Geodetic. Any survey data can therefore be adjusted using the equation below:

IGLD'85 – CGVD = 0.01 m

Observational Data

Hourly water level measurements were obtained from the National Oceanic and Atmospheric Administration (NOAA, 2006) for the Fort Wayne Gauge on the Detroit River (Station # 9044036). The period of record of the measurements used for this analysis is from 1970 to August 2021.

A time series of the water level measurements is provided in **Figure 3** and a probability of exceedance curve of the measurement data is provided in **Figure 4.** The long-term average of the recorded water level measurements is 174.94 m, IGLD'85. The maximum measured water level was 175.87, recorded in July of 2019. The probability of exceedance curve shows that the recorded water exceeds 175.6 m just under 1% of the period of record, and 175.7 m approximately 0.1 % of the time.

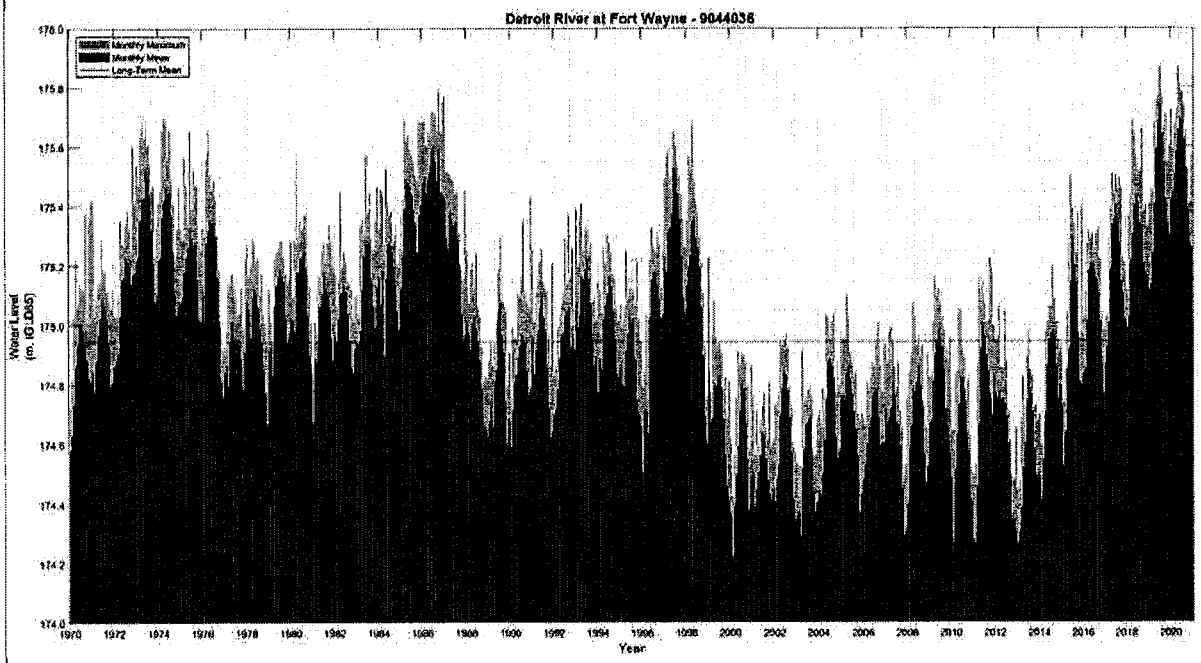


Figure 3 – Water Level Measurements at Fort Wayne (NOAA Gauge 9044036)

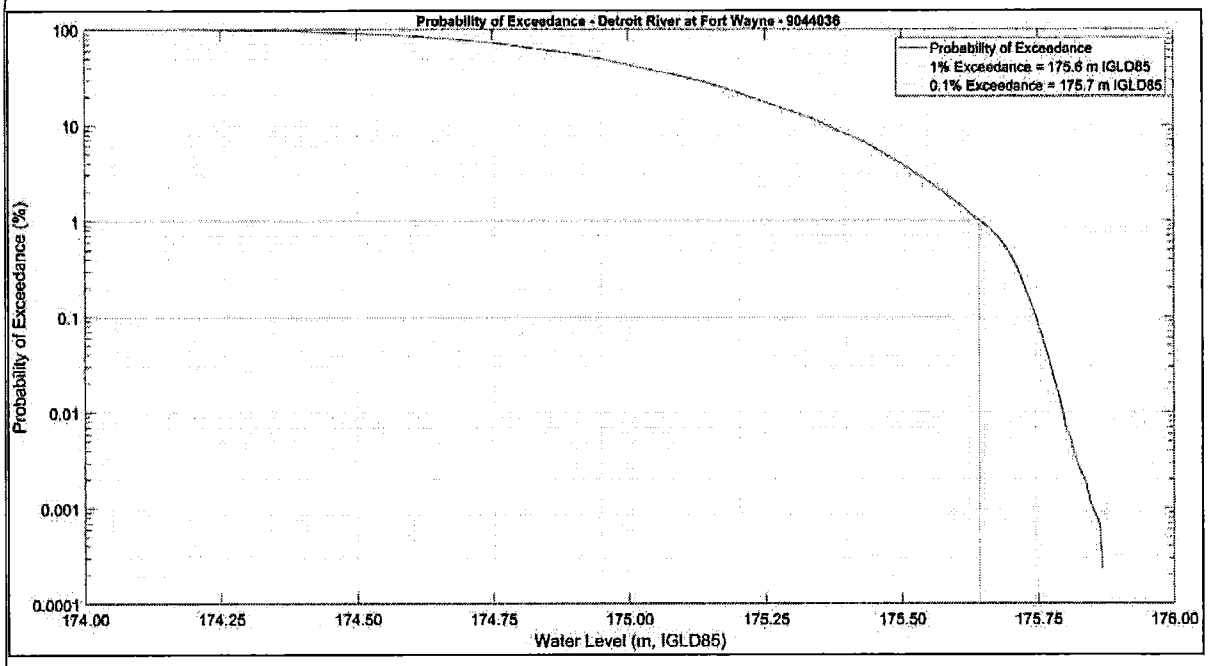


Figure 4 – Probability of Exceedance on Water Level Measurements (NOAA Gauge 9044036, Fort Wayne)

Extreme Value Analysis

An extreme value analysis (EVA) was completed on the gauge data to identify peak water level data for the study area. The EVA defines the cumulative probability distribution using several statistical distributions. In other words, the results of the EVA can be used to define extreme values for a variety of defined return periods.

In order to reduce the dataset, the maximum monthly water levels were used as the inputs for the EVA. The cumulative probability distribution was estimated using four statistical distributions (General Pareto Distribution, Generalized Extreme Value Analysis, Weibull, and Log-Normal) are summarized in **Table 3** and plotted on **Figure 5.** The actual peak values are plotted as points, and the fits are plotted as lines. Each distribution shows a strong correlation (r-squared value) with the peak gauge data; however, the Weibull and GEV distributions appear to have the best fit with the lower frequency (higher return period) events.

Table 3 - Summary of Extreme Value Analysis of Fort Wayne Gauge Data

Return Period (years)	Water Level (m, IGLD'85)			
	General Pareto Distribution	Generalized Extreme Value	Weibull	Log-Normal
1	175.76	175.62	175.63	175.63
2	175.79	175.66	175.67	175.67
5	175.83	175.76	175.79	175.79
10	175.85	175.81	175.86	175.88
20	175.86	175.86	175.93	175.95
25	175.86	175.87	175.95	175.97
50	175.86	175.90	176.01	176.04
100	175.87	175.93	176.07	176.11

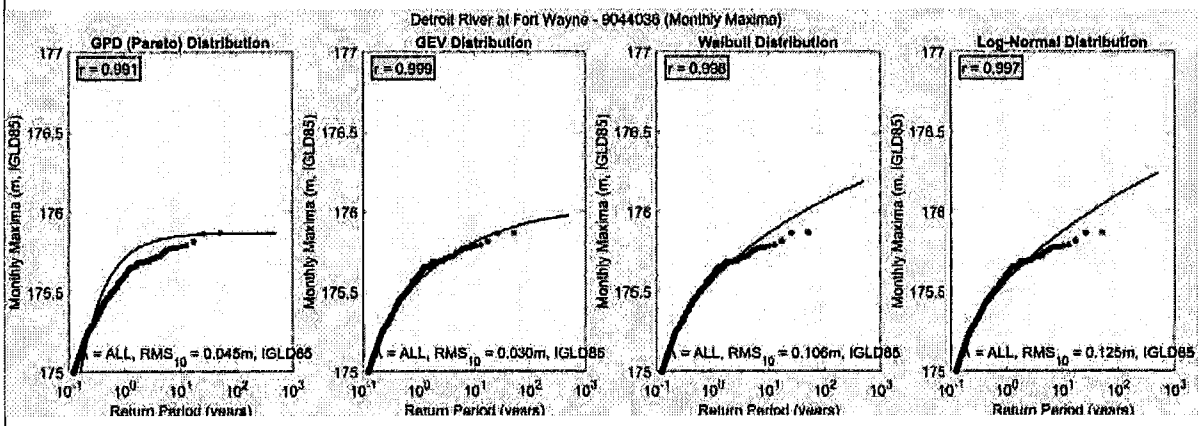


Figure 5 – Extreme Value Analysis Results for Various Statistical Distributions

Previous Studies

The 100-year flood level is the sum of the mean lake level and storm surge with a combined probability of a 100-year return period (i.e., on average, has a 1 percent probability of occurring in any given year or on average once in 100 years). The Great Lakes System Flood Levels and Water Related Hazards report (MNR 1989) provides estimates of the 100-year flood level for several locations on the Detroit River. The

study area falls between two of these locations; DR2 and DR3. The 100-year flood level for DR2 is 176.1 m, IGLD'85. The 100-year flood level for DR3 is 176.0 m, IGLD'85. The MNR study specifically mentions that there are no climate change considerations included in the estimate of the 100-year flood levels.

Summary of EVA of Historical River Levels

A comparison of the EVA and the peak values from the 1989 MNR study are provided in **Figure 6**. The GEV distribution has a better fit with the peak data, and the Weibull distribution has better agreement with the previous study by MNR. Both distributions are well correlated with the monthly maxima.

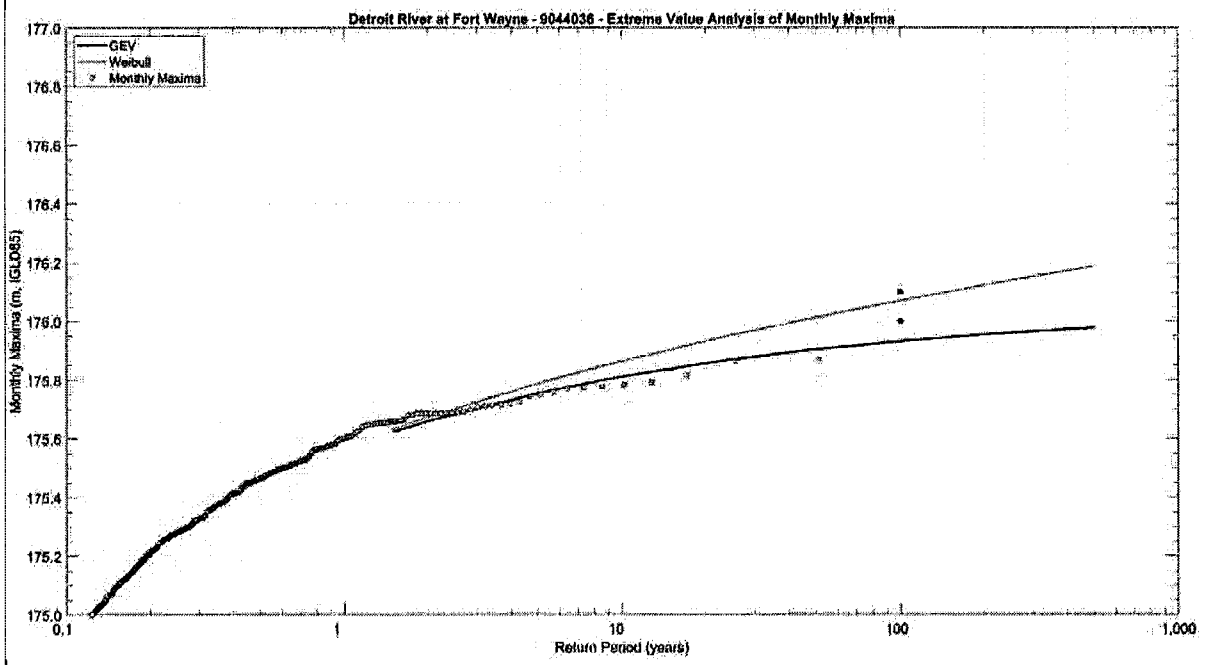


Figure 6 –Extreme Value Analysis Comparison with MNR 1989

Although the MNR study does not mention which cumulative probability distribution was used to estimate the peak water levels, it is likely that the Weibull distribution was used. As such, the EVA estimates using the Weibull distribution should be used for the coastal flooding study.

Consequently, the 100-year Detroit River water level for the West Windsor area is 176.1 m, IGLD'85.

Prediction and Projection of Near and Long-term Water Levels

Multi-year periods of high or low Great Lakes water levels can be very difficult to predict in the near term and even more difficult to project for longer periods into the future due to the strong dependence on small relative differences between the climate, hydrological and hydraulic processes. For example, the low water levels shown in **Figure 7** covering the period from the late 1990s to around 2013 resulted largely from warming air temperatures with surface water temperatures on Lakes Michigan-Huron and the other lakes rising by roughly 2 degrees C. This resulted in evaporation rates that were nearly 30% above annual average levels and reduced the ice cover that further extended the evaporation seasons. As a result, many Great Lakes water levels dropped to their lowest levels ever recorded. The strong El Niño event in 1997 may also have played a role in the lower levels during the period and reduced precipitation. Impacts from these low water levels included reduced shipping and cargo tonnage, increased shipping costs, challenges in using docks and piers, a need to extend the reach of water intake pipes, increased algal growth and impacts on shoreline ecosystems. Climate change and warming temperatures are likely to bring repeated low water levels and disruptions in future decades.

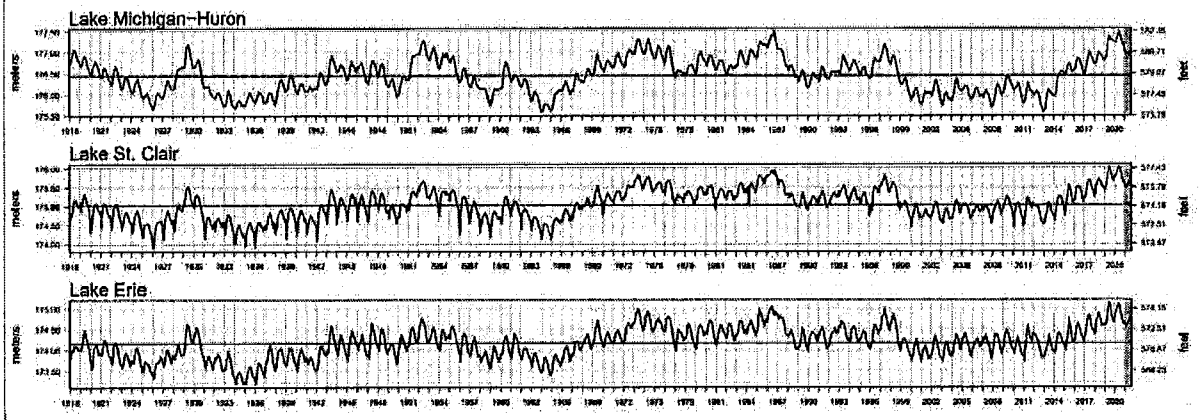


Figure 7 – Great Lakes Monthly Average Water Levels

Recovery from these record low water levels began in 2013 with a particularly cold polar vortex winter of 2013-14 that brought heavier ice cover and less lake evaporation. This change was accompanied by several increased precipitation seasons, particularly for winter and spring (e.g., 2017, 2019), and some notable extreme precipitation events. For example, high water levels in spring 2019 were accompanied by a heavy snow

winter, early snowmelt and a wet spring. In the near future, periods of increased precipitation along with the occasional cold polar vortex winters could drive water levels to at least the highs seen in recent years. Impacts from the high water levels have included extreme shoreline flooding, property inundation, contamination of the Detroit River waters from land inundation, severe coastal erosion, surcharged sewer systems, unusable docks, beaches and parks, flooded roads and buildings, shipping challenges in clearing bridges and overhead cables, and health impacts from mold, sewer surcharging, fast river currents, contamination of wells, etc.

To put the impacts of the different lake level processes into perspective, the typical annual and seasonal variability of the Great Lakes is approximately 40 to 60 cm, while the longer term climate fluctuations due to persistent low and high water levels accounts for approximately 60 to 90 cm of variation. Fluctuations from decisions on water diversions and regulation of the lakes accounts for only 5 to 10 cm. Glacial isostatic adjustment or GIA, which refers to the ongoing movement of the earth's crust as it rebounds following the retreat of the glaciers at the end of the last ice age, has a very small impact but is effectively tilting the basin southward over time. The result is a very slow tendency for lowering of water levels in the upper Great Lakes and very slow rising levels more predominant for the lower lakes.

The combined Lakes Michigan and Huron fluctuate the most of the Great Lakes over the longer climate period and impact Windsor's water levels both along Lake St Clair shoreline and along the Detroit River. Water levels on Lake Erie, downstream of Windsor, generally experience similar fluctuations to those of Lake Michigan-Huron and Lake St Clair but typically with a smaller amplitude. The net result is that there sometimes can be a backwater influence on the slope of the connecting Detroit River. More often than not, these large fluctuations and their extremes have been associated with the fluctuating climate.

Projections of Future Great Lakes Water Levels and their Extremes

Historical trends and future climate change projections indicate increasing precipitation, warming air and water temperatures, potential for recurring periods of high evaporation, and the occasional polar vortex winter. In future, this combination of both gradual climate trends and extreme climate events is expected to force more rapid transitions between the extreme high and low water levels in the Great Lakes.

While the changing climate is turning up the dials on the factors that both increase and decrease water levels, the projections on potential water levels remain highly uncertain. Prior to about 2011, most climate change and lake level modelling studies pointed to lowering lake levels as the new "Normal" for the future. These earlier projections assumed that atmospheric temperatures could be used as a proxy when modelling lake and runoff evaporation rates. Lofgren et al (2011) introduced energy budget-based methods for estimating land and runoff based evaporation and evapotranspiration instead of the more common use of air temperatures as a proxy. The land evapotranspiration, which is part of the calculation of runoff, was depicted as being extremely sensitive to climate warming, likely resulting in overestimated reductions in runoff and overestimated lake level declines (Hayhoe et al., 2010, Lofgren et al., 2011, Lofgren and Rouhana, 2016).

The first study to indicate the potential for both lake level rises and declines this century was undertaken by Lofgren et al (2011) and was based on improved methods to estimate runoff evaporation and evapotranspiration. The new methods were driven by two older or third generation climate change models. Today, the most recent set of climate change models are known as the sixth generation climate models from the 6th Intergovernmental Climate Change Panel Assessment Report 6 (IPCC AR6). The outputs from this Lofgren et al (2011) climate study were used for the 2019 East Windsor study (Landmark/RWDI, 2019), as presented in Table 4, and for the Windsor Port Climate Change Risk Assessment.

Table 4 – 1:100 year Instantaneous Water Levels, Lake St Clair in Windsor, historical data (Instantaneous) and future climate projections (monthly). *From Landmark/RWDI, 2019 with future projections of levels based on Lofgren et al. 2019.*

Station and Dataset	1:100 Year Instantaneous Water Level (m, IGLD)
Historical Data	
Windmill Point, 6 Minute	176.1
Windmill Point, Hourly	176.4
Windmill Point, Monthly	176.5
St Clair Shores, 6 Minute	176.3
St Clair Shores, Hourly	176.4
St Clair Shores, Monthly	176.5
Belle River, Daily	176.4
Tecumseh, Daily	176.5
Future Climate Projections	
Lake St Clair, Monthly, CGCM3, AE	176.8
Lake St Clair, Monthly, CGCM3, Delta	176.0
Lake St Clair, Monthly, GFDL, AE	175.6
Lake St Clair, Monthly, GFDL, Delta	175.4

A total of four future results were derived from use of two climate models with different greenhouse gas emission assumptions (high A1, moderate A1B) and two different runoff models. Of the four results, three indicated decreases in future extreme high lake levels ranging from 50-110 cm, while one result indicated increases of 30 cm in average lake levels (based on the Canadian climate change model and one runoff model). These future differences in average lake levels to the end of the century were used to adjust the historical 100-year return period high water level estimate for the mid and end century.

Based on the highest result, a recommended 30 cm increase to the historical 100-year high water level was provided for the East Riverside flood assessment. The Landmark/RWDI study interpolated instantaneous water levels of 176.6 m and 176.8 m for 2030 and 2050, respectively for southern Lake St Clair.

Updated Climate Change and Lake Level Projections

While the Lofgren et al. (2011) study initiated a "revolution" in Great Lakes water level projections for the future, several other studies followed that further improved runoff

estimates while also incorporating a greater number of newer, improved and higher resolution climate change models. Overall, more of these more recent climate change studies projected a central tendency towards small drops in lake levels by the end of the 21st century, with some probability of small rises in lake levels (e.g., MacKay and Seglenieks, 2012; Notaro et al., 2015; Lofgren et al., 2016).

Lofgren and Rouhana (2016) updated the original Lofgren et al. (2011) study for the Great Lakes using eight sets of the newer fifth generation climate change models (IPCC AR5 climate models) and three different greenhouse gas emission scenarios, while also considering future time periods representing the 2050s and 2100s. These combinations resulted in 32 climate model projections over two future time periods. The updated study also improved land evapotranspiration and river and tributary runoff processes. For mid-century, the median of these 32 climate model projections indicated decreasing lake levels, with fewer climate change model combinations showing increases than decreases, as shown in Figure 8.

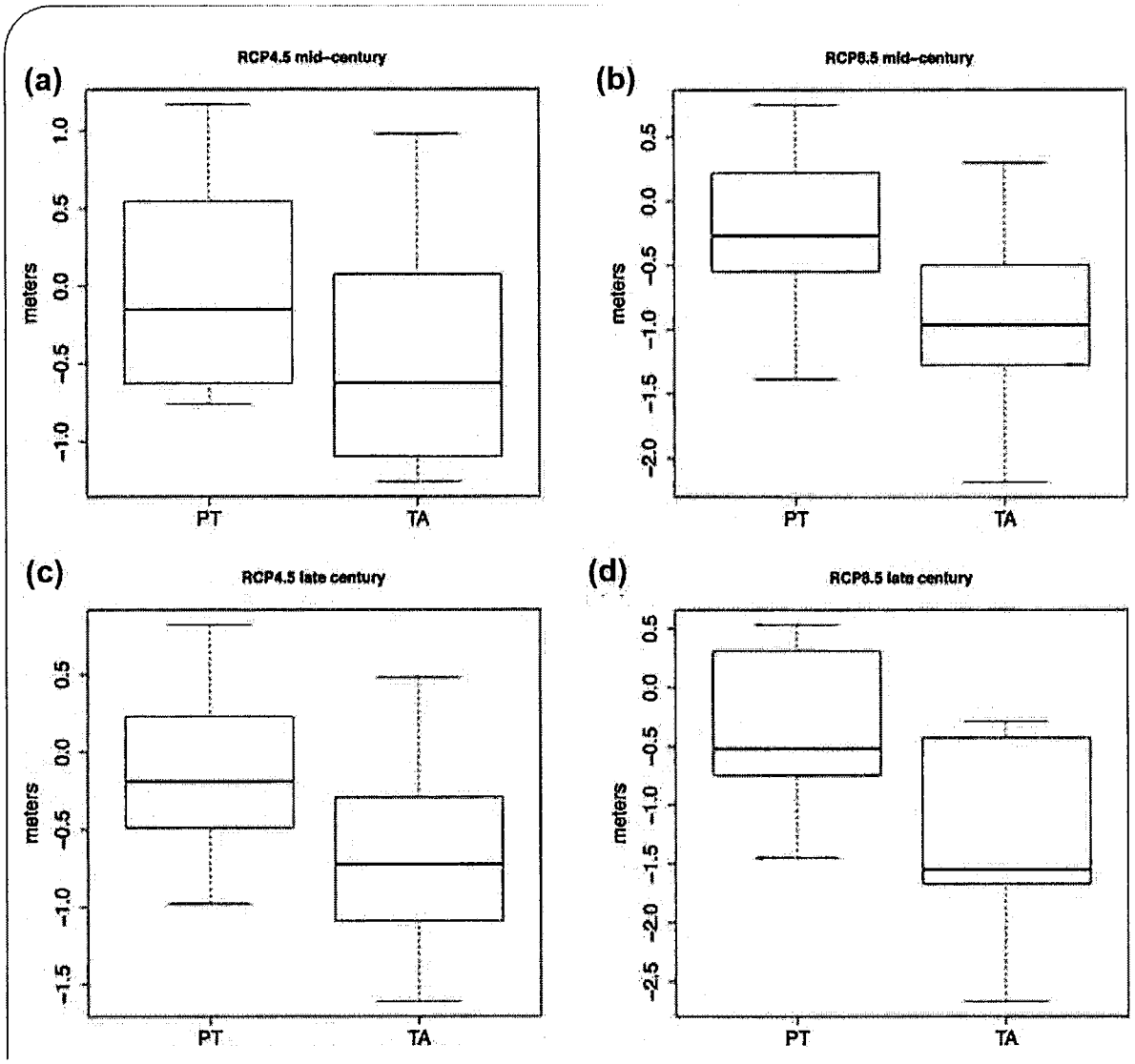


Figure 8 – Lake Michigan–Huron future water levels using two runoff estimation methods, namely the TA or temperature adjusted method with greater evapotranspiration, and the Priestly-Taylor or PT energy adjusted methods for subsets of the Global Climate Model projections. Note that the scale can differ significantly among the panels. (a) Mid-twenty-first century for low global GHG emissions, RCP 4.5, (b) Mid-twenty-first century for high or almost "business as usual" global GHG emissions, RCP 8.5, (c) Late twenty-first century for lower GHG emissions, RCP 4.5, (d) Late twenty-first century for high GHG emissions, RCP 8.5. The box plots indicate the 25th to 75th percentile of the different climate model results, while the bottom and top horizontal lines represent the extreme (outlier) low and high results. The Priestly-Taylor or PT runoff method is considered to be more realistic than the TA method. *From: Journal of Hydrometeorology 17, 8; 10.1175/JHM-D-15-0220.1*

Note that Figure 8 depicts future conditions for the combined Lakes Michigan-Huron rather than water levels for Lake St Clair. As noted earlier, the combined Lake Michigan

and Huron experience the highest fluctuations of the Great Lakes, although variability for Lake St Clair is similar. The use of the Lakes Michigan and Huron water levels probably adds conservatism to the results. Note as well that two different runoff methods are shown in Figure 8, with the Priestly-Taylor (PT) evapotranspiration and runoff method considered to more closely represent reality for the Great Lakes (Lofgren and Rouhana, 2016).

Given the uncertainties, an approach with added safety margins for the mid-century period would consider the 75th percentile high of all the projections rather than the median. By mid-century, the largest increases in lake levels are projected for significantly reduced global GHG emissions or RCP4.5 assumptions, although higher global GHG assumptions are more likely for this mid-century period. The combination of the 75th percentile high water level projection risks, the more realistic PT runoff model, and a more realistic RCP8.5 high GHG assumptions, indicates a potential for roughly a 20 cm increase in future high water levels. This set of assumptions *represents an almost* ***"worst case"*** *projection of mid- century lake level rises,* keeping in mind that more of the future projections call for declining levels. The late-century results indicate potential for a similar high lake level, although an even greater majority of the projections indicate decreases in water levels.

Given that these future lake level projections are highly uncertain, it is recommended that high lake level resilience actions address the current 100-year historical high water level risks plus any needed freeboards that could include margins for climate change. Depending on the guidance from a Triple Bottom Line analysis and the timing required to fund, design and implement resilience options, there may be advantages for some risks in awaiting outputs from improved lake level studies based on the newly released 6th generation climate change models. Given that the water level projections are highly dependent on the quality of the climate models, any new projections of water levels could be driven by better climate models and better runoff formulations. The new set of 6th generation climate models is currently being released by the IPCC, although it will take some time before the models can be screened for their ability to better depict Great Lakes dynamics and combined to drive the various Great Lakes water level models. The new climate models include better climate physics (e.g., improved treatment of climate and weather systems, clouds, biogeochemical cycles, permafrost, wetlands, aerosols), higher spatial resolutions, increased GHG emissions scenarios that

are more realistic and policy relevant, better carbon cycling, a greater number of contributing climate modelling groups, etc.

Additional Climate Change and Water Level Studies and their Caveats

The conclusions from the updated Lofgren and Rouhana (2016) are supported by other lake level studies. For example, a study by Notaro et al. (2015) evaluated all available 5th generation climate change models including fine resolution climate models for their ability to capture the locations and dynamics of the Great Lakes climate and lake levels. Only two sets of climate change models – one set from France and another from Japan - were able to meet the rigorous screening requirements set by the U.S. NOAA/GLERL group undertaking the study. Although both sets of models were rigorous in depicting current Great Lake dynamics, their future climate projections and lake levels differed greatly. One set of models indicated a tendency towards increasing lake levels, depending on GHG emission assumptions, while the other set indicated significant decreases in levels. The differences between the models in their projections of future rates of warming versus rates of precipitation increases were critical in determining future trends.

Overall, climate models with higher GHG assumptions and greater rates of warming tend to project lower water levels. This was seen in the Lofgren and Rouhana (2016) results and in the various other studies. Climate models with relatively higher rates of temperature increases tend to project lower water levels, while models with greater rates of precipitation increases and relatively modest warming tend to project the highest water levels. The greatest risks for higher lake levels are associated with climate models showing a slower rate of warming, such as might result under reduced GHG emissions or climate models with relatively lower sensitivities to GHG emissions, and with significantly greater precipitation increases. All climate models indicate warming in future but significant differences are noted seasonally in their future precipitation projections.

Table 5 summarizes the results from a number of water level studies that have been released since the Lofgren et al (2011) study. These later studies are driven by either 3rd or 5th generation global climate models released by the IPCC, which can add to challenges of comparing results. The studies represent a range of climate model resolutions from less than 25 km to roughly 200 km, depending on whether downscaling or regional climate models were added. More study results indicated future decreases

in water levels and the potential for smaller increases. All of the studies highlighted the huge uncertainties in the future lake level projections. Most of the studies in **Table 5** incorporated the higher GHG emission assumptions, either RCP8.5 or A2, while some also included lower GHG assumptions such as RCP4.5 that can only be reached through aggressive global GHG reduction actions.

Table 5 - Great Lakes Water Level or Net Basin Supply and Climate Change Studies from 2011

Climate and Lake Level Studies	Climate Models used	Great Lakes	Resolution	Projection Period, *(GHGs)*	Study Outcomes
Landmark/RWDI 2019 study using Lofgren et al (2011)	2@ IPCC 3rd generation climate models – CGCM3 and GFDL2.0 plus two runoff models (4 results)	All except Lake Ontario	~200 km	2081-2100 *(high A2 & mod A1B)*	Lake St Clair by end century: (3 results) dropping by 50-1100 cm and (1 result) rising by 30cm
Lofgren and Rouhana (2016)	8@ IPCC 5th generation climate models with 3 sets of GHG assumptions 32 model combinations divided over mid to late century periods	All	Estimated 60-200 km	2056-2075 and 2081-2100 *(RCP4.5 & RCP8.5)*	Median: Decreases under high GHG assumptions (RCP8.5); more decreases Lake Michigan-Huron (25-75%tiles): 2060s: -50cm to +20cm 2090s: -75 to +30cm
Mackay and Segenicks (2013)	1@ 3rd generation GCM; Canadian Regional Climate Model (RCM)	Lake Erie	~22.5 km	2021-2050 *(high A2)*	Lake Erie ~6 cm lower
Notaro et al (2015)	32@ IPCC 5th generation climate models. Screened to 2 models based on ability to depict Great Lakes locations and dynamics. Both downscaled using 25Km regional climate model.	All	~ 25 km	2050s and 2080s *(RCP8.5)*	Contrasting climate projections. By late century, one by -30cm, other by +42 cm. Depends on climate model projections, relative rate of temperature and precipitation changes, GHG assumptions
Music et al (2015)	3@ 3rd generation RCMs	Mich-Huron	45-50 km	2041-70 *(high A2)*	Lakes Michigan-Huron NBS: ~1% increase
Mailhot et al (2019)	S@ 5th generation RCMs with 2 GHG assumptions (total of 28 simulations covering 2 time periods) Analysis of extremes and variability	All Great Lakes; Basin NBS each	15-30 km	2041-2070 and 2071-2100 *(RCP4.5 & RCP8.5)*	Average NBS: 2 to 9% increase in NBS (not lake levels) Extreme highs: NBS increases of 1-9% Extreme lows: NBS decreases of 18-29%

Notes:

RCM: Regional scale climate model that is driven by a larger scale model or global climate model (GCM)

GHG: Greenhouse gas assumptions; 5th generation models, assume low = RCP4.5, high = RCP8.5; 3rd generation models, assume high = A2

2050s: Usually period from 2041-2070; 2080s: Usually period from 2071-2100

NBS: Net Basin Supply (differences between inflow and outflow) is the primary driver of lake level changes

All of the climate models indicate future increases in both temperature and precipitation across the Great Lakes Basin, with warming temperatures contributing to declining levels while increasing precipitation contributed to rising levels. It is not surprising that the future projections of water levels can be highly uncertain and variable since different climate models indicate different rates of future warming and precipitation increases. Adding to the uncertainty, many of the climate change models used to drive the lake level processes either don't represent the Great Lakes or place them in the wrong locations, miss or configure the lakes incorrectly while also poorly depicting the lake-land-atmosphere dynamics.

Summary of the Lake Level Projections

Historical records of lake levels over several decades show that trends are small but the variability in lake levels is high (Wuebbles, 2019). Under a changing climate, it is likely that lake water levels will continue to fluctuate and that the time span for their variability between highs and lows may become shorter. The model-based projections of lake levels completed since 2011 indicate central tendencies towards smaller drops in lake levels to the end of the 21st century, with an appreciable probability of small rises in lake levels, in contrast to the large drops that were projected using the older and, now-defunct runoff methods (Wuebbles et al, 2019).

Overall, lowering lake level projections appear more probable under the more realistic higher emissions greenhouse gas assumptions, while projected increases are more probable in the near term and if global GHG emissions are significantly reduced (i.e., the climate is expected to respond more strongly to global GHG emissions after mid-century). Regardless of the studies referenced, it is recommended that any projected lake level recommendations be based on work from 2011 and preferably, using a greater number of recent climate change models with better depictions of Great Lakes and climate dynamics. The latest 6th generation climate models may be able to better depict the Great Lakes and their climate and hydrology-hydraulics dynamics for many of the reasons discussed earlier.

This report's documentation of studies (Table 5) and recommendations for future lake levels include a number of conservative (safety margin) assumptions. These include the recommended use of the 75th percentile highest climate change projection rather than the median or average lake level change and the use of Lake Michigan-Huron lake level changes, which can be similar or higher than those of Lake St Clair.

It is plausible that recent extreme high water levels could be reached again in the near decades or exceeded, although more of the existing lake level models and studies indicate that overall levels may decrease during this century. As a result, an additional 20 cm of water level rise is recommended for the study's coastal areas, with these high water levels more likely until mid-century. Increasingly, researchers are concluding that the rapid transitions between extreme high and low water levels in the Great Lakes may represent the "new normal" (Gronwald and Hood, 2019).

Extreme Rainfall – Historical Investigation

The trends and impacts of extreme precipitation were based on the long-term record of precipitation from Windsor Airport. The trend in mean annual precipitation at Windsor Airport has been trending upwards over the most recent 80 year period, increasing from near 800 mm/year in the 1940s to 1000 mm/year more recently, as shown in Figure 9.

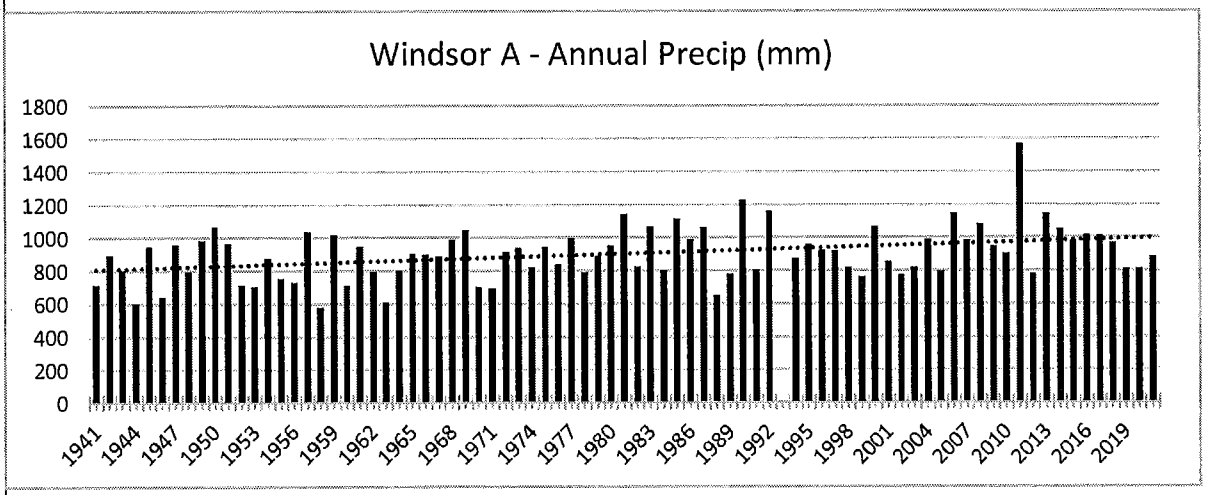


Figure 9 – Trends in Windsor Airport's annual total precipitation since 1941

The vertical bars indicate the annual precipitation totals while the dotted line represents a linear trend-line based on the data.

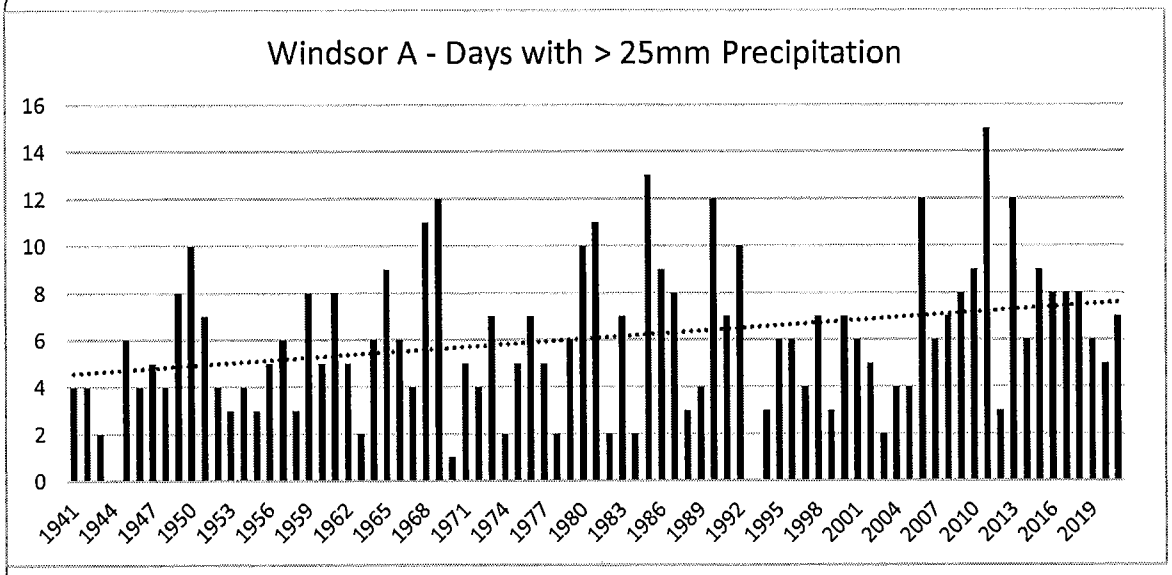
An investigation was undertaken to assess whether extreme daily precipitation events might be contributing more over time to this increasing annual precipitation total. Two thresholds were considered:

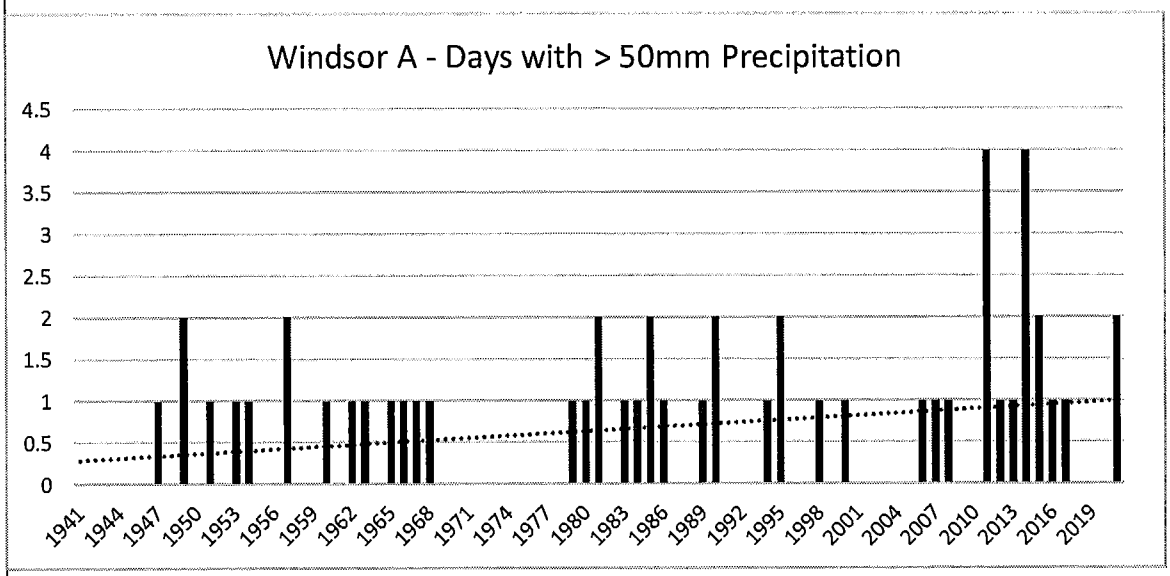
1. The days where greater than 25mm of precipitation occurred; and
2. The days where greater than 50mm of precipitation occurred.

Summing the annual precipitation totals attributed to just these heavier precipitation days, it was possible to determine the contribution of these extreme daily amounts to the annual total precipitation using the following relationship:

(SUM of >XX days precipitation / SUM of ALL precipitation) x 100 = Percent contribution of heavier events

The historical occurrence of days with greater than 25 mm of precipitation (solid and liquid) has increased since 1941 from on average about 5 days to 8 days per year. The number of days per year with greater than 50 mm per day has also increased from 0.2 days/year (or once every 5 years), to 1 day per year on average. **Figures 10a** and **10b** highlight these trends in heavier precipitation events.





Figures 10a (top) and 10b (bottom) depict the frequency of days per year with: (10a) 25 mm or more and (10b) 50 mm or more of precipitation. The upward trend is particularly notable for days per year with 25 mm or more of precipitation.

There were many more daily events with 25 mm or more of precipitation than for the more extreme daily threshold of 50mm or more over the period. The percent contribution of these heavier precipitation days to the annual precipitation totals also show increasing trends over the period. As shown in Figure 11, the contribution of the greater than 25mm/day events has increased from about 20% on average in the 1940s to about 27% in recent years (so, on average contributing from one-fifth to now over

one-quarter of the annual precipitation total). Most recently, the year 2021 stands out where 37% of the annual precipitation total was contributed by the sum of daily events measuring at least 25 mm of precipitation.

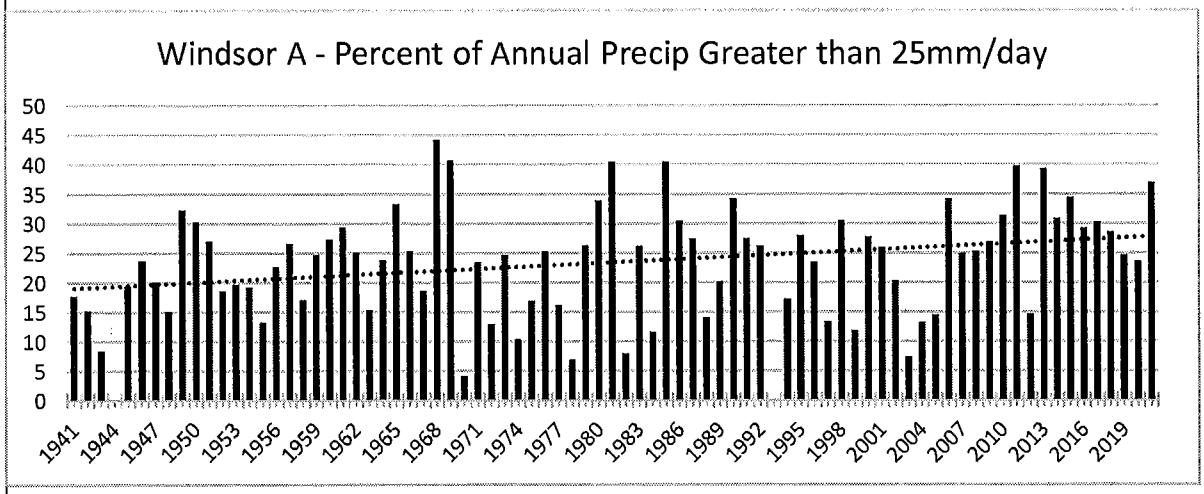


Figure 11 – Annual Contribution of Precipitation Events Greater than 25 mm

Considering the higher threshold of days with greater than 50 mm of precipitation, an increasing trend is also noted in their contributions to the annual total since 1941. These heavy precipitation events are far fewer in number and contribute much less to the annual precipitation total, increasing from nearly 2% to a more recent 6% of the annual precipitation amount. The two highest contribution years occurred relatively recently in 2014 (24% of the annual total contributed by days with at least 50 mm) and in 2021 (16% contribution). The year 2014 was particularly notable, with May 27 measuring a 58.2 mm rainfall, June 18 with 56.4 mm, August 11 with 73.6 mm, and September 10 noted a 64.8 mm event.

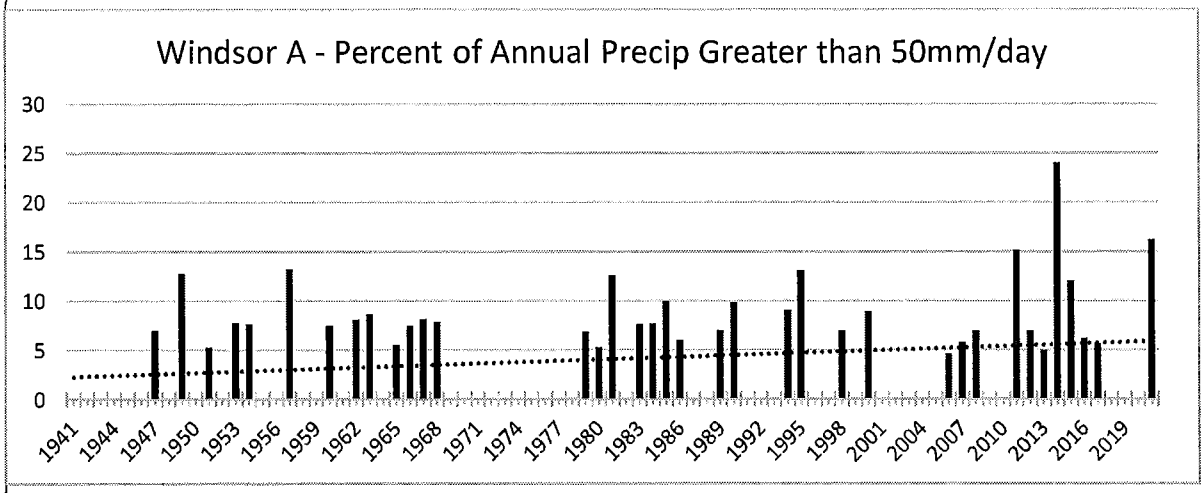


Figure 12 – Annual Contribution of Precipitation Events Greater than 50 mm

A 2014 study on "Extreme Storms in Michigan" (Saunders et al, 2014) found that extreme 50 mm (2 inch) rain storms had more than doubled over the period from 1964 to 2013 for southern Michigan. This study used different analysis approaches that incorporated all long-term rainfall measurements. Since precipitation and particularly, extreme heavy precipitation amounts, can vary greatly over very short distances and result in a principal climate station missing significant events, it can be challenging to capture trends and potential risks using a single station unless it has a very long and consistent data record or unless continuous precipitation records in space and time are used. The Windsor Airport's climate record is considered to be relatively long.

Extreme Precipitation Projections

Two design rainfall events (5-year and 100-year 4-hour storms, corresponding to 50 mm and 82 mm, respectively) were used to model and evaluate the performance of the West Windsor infrastructure system. However, the PIEVC assessment process also requires that potential future changes in the likelihood of these events be assessed to evaluate whether any important changes in future risks may occur.

Projections indicated that both events showed significant increases in likelihood under climate warming. In particular, the 82 mm event, currently considered the "100-year" storm, was projected by mid-century to increase in frequency by over *3 times*, reducing to ~30-year return period. This event likelihood was projected to increase further by late-century, roughly equivalent to a *15-year return period* by the 2080s.

These rainfall projections were based on the Clausius-Clapeyron (C-Clap) temperature scaling method (Ball et al., 2016), which is a theoretical relationship between air temperature and the amount of water the air could potentially hold and release. While there is an expanding body of research on the development of future climate change driven extreme intensity-duration-frequency (IDF) rainfall design values derived from downscaled climate models, many of these approaches are still experimental and there is a lack of consensus on the most appropriate ones to use (Coulibaly et al., 2016; CSA, 2019). However, when climate change "adjustment factors" or augmentation factors for the future climate are needed, climate research increasingly supports some defensible and simple future climate approaches for extremes. These approaches are founded on the C-Clap relation.

The method is explained in detail in the CSA PLUS 4013 IDF Guide (CSA, 2019), but can be simply described as the use of projected changes in air temperature as the basis for scaling changes in precipitation intensity (i.e., extreme rainfall for multi-year to multi-decadal return period events). For every degree increase in air temperature, the C-Clap relation indicates that the atmosphere can carry approximately 7% more moisture. Observational regional studies (Panthou et al., 2014) as well as state-of-science fine-scale climate change modelling studies indicate that this is a good approximation for observed changes in rainfall intensity, depending on air temperature. Because the assessment required a measure of the change in event *probabilities* under warming conditions – as opposed to a change in *intensity* for the same event frequency – an additional step was needed to interpolate the new event frequency. A key caveat is that this method assumes the same statistical distribution for the future as assumed within the historical rainfall data, an assumption that does not take into account potential changes in the variability of the extreme rainfall intensities.

Correlation Investigation - Extreme Precipitation and Extreme Great Lakes Water Levels

Great Lakes Basin wet and dry periods are influenced by storm tracks, which can often be linked to global-scale processes such as El Niño or Atlantic Multi-decadal Oscillation, while cold air outbreaks that influence ice cover and evaporation rates can often be related to the Arctic Oscillation and other shifts in the polar jet stream. In spite of these persistent storm track influences, the interactions of these global patterns with lake levels are complex and unclear. The variety of climate and hydrological/hydraulic processes operating at different time scales and influencing Great Lake levels suggest

that it is difficult and maybe impossible to determine whether patterns influencing heavy precipitation events can be linked to other conditions that influenced high to extreme lake levels. It is also uncertain how these relationships will change with climate change.

For completeness, a local study was undertaken to determine whether any relationship existed between such extreme precipitation events and extremes of water levels and flood contributions. The extreme precipitation events were compared against water level observations at two locations: St. Clair Shores and Ft. Wayne. Level data was obtained from the US Army Corps of Engineers website:

https://tidesandcurrents.noaa.gov/waterlevels.html?id=9034052&units=metric&bdate=20210101&edate=20211231&timezone=LST&datum=IGLD&interval=d&action=

An initial review of total annual precipitation and mean annual water levels at the St. Clair Shores and stations revealed no correlation at the coarse scale. A more refined daily precipitation comparison was undertaken for the last year of full data in 2021 to daily total precipitation for events equal to or above 10 mm and daily average water levels. As shown in **Figures 13** and **14**, the results indicate that there is very little daily correlation between the amount of daily precipitation received at Windsor Airport above 10mm and the daily average water levels at both of these stations as shown below since lake levels reflect a complex and long set of interactions influenced by many climate, hydrologic and hydraulic processes rather than sudden extreme daily events.

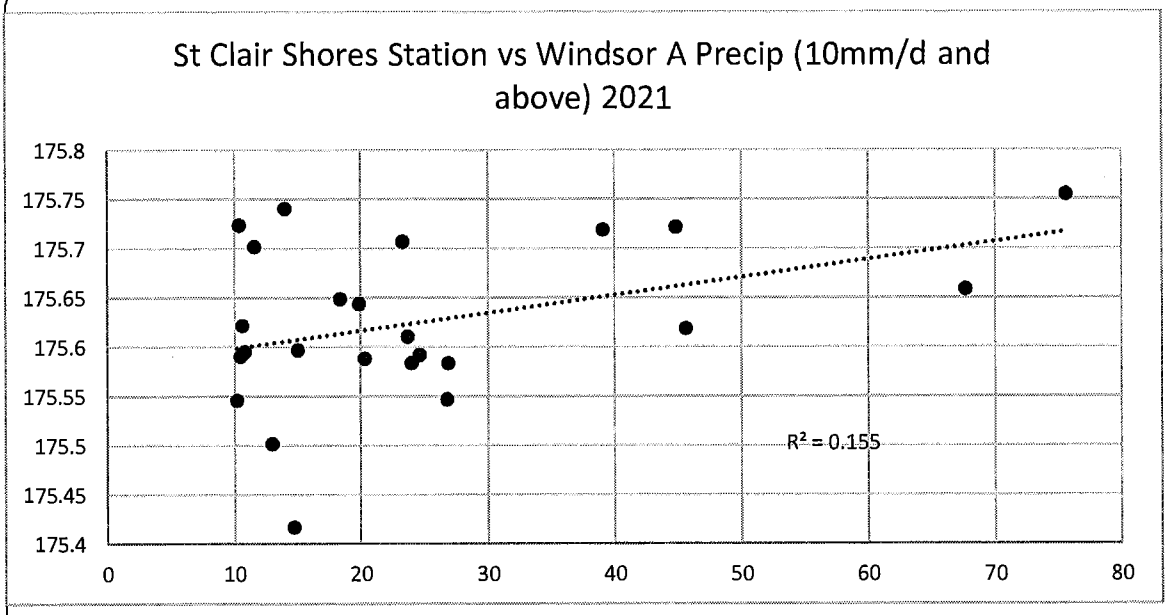


Figure 13 – Comparison of Precipitation and Water Level at St. Clair Shores

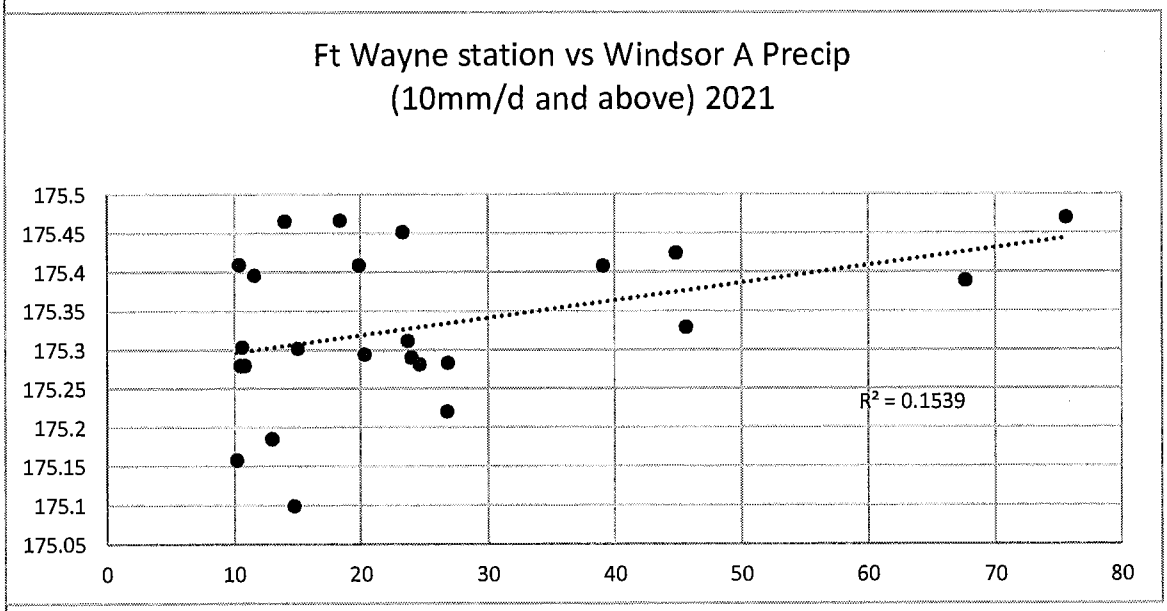


Figure 14 – Comparison of Precipitation and Water Level at Fort Wayne

Based on this correlation analysis, it was determined that the combined event probabilities for design rainfall and extreme lake levels (i.e., those used to evaluate drainage system performance using the drainage model) can defensibly be treated as statistically independent events. Since extreme rainfall and high Detroit river levels can

be treated as statistically independent, their individual likelihoods are simply *multiplied* to arrive at an overall likelihood of simultaneous occurrence for both events.

Secondary and Long-Term Impact Events

Additional hazards were investigated for the potential to generate either long-term (gradual) damage and impacts to drainage and shoreline protection infrastructure and/or secondary climatic events that can result in exacerbating impacts to drainage and sanitary systems (e.g., through reduced or blocked surface transportation access, loss of power to treatment plants and pumps, etc.).

Shoreline Erosion

No historical database of shoreline erosion for the Detroit River was identified, and so impacts and rate of change could not be statistically evaluated. However, City staff interviews, stakeholder consultation as well as the County of Essex Hazard Identification and Risk Assessment (HIRA; County of Essex, 2019) all indicated significant concerns regarding shoreline erosion, and it was therefore included as a key hazard consideration within the findings of the flood assessment.

Weathering

Many municipalities and other infrastructure and asset owners across Canada have suggested that weathering related deterioration of assets may have accelerated in recent years. Assignment of cause in these cases is difficult given other potential contributing factors (e.g., under-investment in long-term asset maintenance) but these observations do highlight the importance of slow, creeping processes on degradation of important assets.

The freeze-thaw cycles used here are based on laboratory tests of reinforced concrete samples, indicating that visible damage can begin after approximately 30 cycles (Sun et al. 1999; Ruedrich et al, 2011). While the total number of freeze-thaw cycles is anticipated to decrease over the project time horizon, this decrease is not substantial, and weathering from this process is expected to continue through the rest of the century.

Ice storms

Because there exists no national database of ice storm events for Canada, the research here required the identification of historical events through literature review and media searches (Klaassen et al., 2003; Mclachlan and Smith, 1976). Statistics were then calculated based on this table and compared for consistency against ice accretion design data in infrastructure standards (i.e., CSA 2010). Finally, downscaled climate projections of ice storm activity from the literature (Cheng et al. 2011) were then applied to future time periods. Two thresholds were used, 15 mm for when power outages tend to occur due to tree contacts from large branches, and 25 mm, which is the minimum design threshold for overhead systems.

Cheng et al. (2011) produced downscaled projections based on weather patterns obtained for major historical ice storm events, suggesting a slight increase in event frequency under warming climate conditions. A more recent study by Jeong et al. (2019) is consistent with Cheng et al.'s (2011) earlier findings, indicating an increase in 50-year return period ice loads for a global average warming of 3°C or less. However, results from Jeong et al. (2019) were not presented in a format allowing derivation of the numerical event frequency values and changes. These findings are also in general agreement with earlier research from Klaassen et al. (2003). The earlier study noted that higher ice accretion values had occurred in recent decades for ice storm events occurring immediately south of the Canada-U.S. border in the states of Michigan and New York. The same storm events tended to generate lower ice accretion values or heavy snowfall in adjacent areas of Ontario and Quebec. The study proposed that a poleward shift in storm tracks could result in a potential increase in more significant ice storm events in adjacent portions of southern Canada. However, we note these changes in event frequencies result in little future change for ice impacts compared to the baseline. For example, the approximate 10% projected increase in event frequency for 25 mm ice storms still results in a low overall event frequency, increasing from 8% per year to 9% per year annual probability.

High winds – Severe Thunderstorms, Tornadoes

The consideration of high winds used two different thresholds. Gusts in excess of 120 km/hr (year round) were analysed, as were localised severe thunderstorm driven winds, and tornadoes of EF2 and higher intensity.

Gusts from All Event Types

A threshold of 120 km/h was used to help identify potentially high impact wind cases that may result in significant secondary impacts to critical services such as electrical power and surface transportation. Statistics were calculated directly from wind observations at Windsor Airport and checked against Detroit Wayne County Airport.

Wind gusts are not directly available as outputs from global or regional climate models. We therefore needed to again employ guidance from specialized downscaling studies available within the literature. Cheng et al. (2012) and Cheng et al. (2014) conducted statistical downscaling climate projections studies using approaches similar to the work referenced earlier on ice storm events. Their findings indicate potential increases in the number of days with wind gusts exceeding damaging thresholds. More recent research using a small set of regional climate models by Jeong and Sushama (2019) also supports the potential for increases in wind gust frequency and more year-to-year variability in extreme wind gusts, particularly for scenarios under the RCP8.5 emissions pathway by the end of the century. The indicated 24% increase in daily wind gust frequency is taken directly from Cheng et al. (2014) projected changes in wind gust frequency for the study region.

Tornado and other Localized Severe Thunderstorm Winds

Severe thunderstorm winds were evaluated using a review of ECCC storm spotter damage reports (Chadwick, 2005), media searches and case study reviews of high impact historical events. The frequency of their occurrence, specifically how often severe thunderstorm wind damage is reported but not detected at Windsor Airport, was then used to estimate the true prevalence and frequency of these events.

Tornado frequency was evaluated using the National Tornado Database (Cheng et al. 2013) and counting all tornadoes above the defined thresholds which occurred anywhere within the City of Windsor. Most large tornadoes affecting Windsor have crossed the Detroit River (in one case twice), when entering/exiting the City, and so the total frequency is representative of events which could impact shoreline assets and properties directly.

Due to the extremely complex nature of tornadoes and other severe thunderstorm related hazards, understanding the effects of climate change on their behaviour has been challenging. Unlike other hazards, tornadoes are the result of a combination and balance of a set of meteorological conditions, which at least partly explains their rarity

compared to other atmospheric hazards. Only relatively recently have detailed studies of climate change effects on severe thunderstorm activity been able to provide some indication of the potential impacts of climate change on tornado hazards over the North American continent.

Recent studies of historical tornado activity trends in the United States indicate no discernable changes in total frequency of tornadoes over recent decades, but a decreasing trend in the total number of days experiencing tornadic activity (Brooks et al., 2014). However, several climate change projection studies using both previous AR4 and AR5 era global climate models (Trapp et al. 2007; Diffenbaugh et al. 2013) indicates the potential for significant increases in the number of days with favourable conditions for severe thunderstorm outbreaks (including tornadoes), suggesting that the frequency of these events may increase in some regions. More recent research on trends in tornado activity in the United State (Strader et al., 2017; Gensini & Brooks, 2018) also indicate both historically recent and future projected shifts in conditions conducive to tornado occurrence, which are of potential relevance to the City of Windsor and surrounding areas. Gensini and Brooks (2018) also report an observed increase in days with potential for significant (i.e., EF2 or stronger) tornado development in northeastern North America over the past approximately 40 years.

Conclusions

Having completed the climate data analysis and scoring, key findings are the following:

- Analyses of both historical and projected Great Lakes levels resulted in updated 100-Year and projected "Climate Change" Detroit River levels.
- Extreme value analysis indicated no significant changes in estimated 100-year return period events, even when including the most recent years of high water levels.
- Review of updated climate projection literature suggests a lower future potential Great Lakes basin elevation than was indicated in previous studies.
- The greatest changes in risk across time are associated with changes in extreme rainfall frequency, with significant increases in the likelihood what are currently considered the 5-year and 100-year 4-hour storms, increasing future scores for both combined event modeling cases (i.e., rainfall and high river levels) as well as "rainfall only" hazard events.

- Several important parameters, particularly shoreline erosion and river ice related hazards, were flagged for the need for increased quantitative monitoring. These hazards were considered important but no quantitate monitoring database is currently available to assess the frequency, severity, etc., of these events.

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Appendix E

Hydraulic Assessment

DILLON CONSULTING

Memo

To: Project File

From: Aakash Bagchi, P.Eng., Aryn Cain, EIT

Date: December 2, 2022

Subject: West Windsor Flood Risk Study
Existing Condition Model Review and Flood Risk Assessment

Our File: 21-2409

Dillon Consulting (Dillon) was retained by the City of Windsor (City) to complete a flood risk study to identify and quantify flood risk for West Windsor. The study area is generally bounded by the Detroit River to the North and West, Huron Church Road and the Essex Terminal Railway to the East and the municipal boundary with the Town of LaSalle to the South. The West Windsor region has been impacted by record high water levels in the Detroit River in the recent past. High water levels have resulted in surface flooding, backing up of gravity storm sewer outlets in to the Detroit River, and have affected operations at the Lou Romano Water Reclamation Plant (LRWRP). The LRWRP, located within the study area, is a critical piece of municipal infrastructure that services the central and southern parts of the City of Windsor.

This memo summarises the hydrologic/hydraulic modelling analysis undertaken to identify infrastructure at risk due to joint probability events, which include high water levels in the Detroit River occurring concurrently with rainfall events.

1 West Windsor Study Area

Figure 1 shows the extents of the West Windsor study area and lists major land uses. The study area was divided into three zones based on the dominant land uses, topography, and type of sewer infrastructure:

Zone 1 – includes the developments along Sandwich Street West, also known as Sandwich Towne. The land use within this zone is primarily a mix of residential and industrial land uses. Residential forms approximately 46% of the total area while industrial comprises of 32% of the total area. This zone also has some institutional and commercial land use. This area is serviced primarily by a combined sewer system. Sewer separation has been achieved in some areas south of Brock St.

Zone 2 – includes areas along the Detroit River, west of Russell St. The land use in this zone is primarily industrial. The Riverside Drive interceptor trunk sewer lies in this zone, along Russell Street. It conveys sewage during dry weather conditions to the LRWRP from the combined sewers in the central Windsor area. The LRWRP is located along Ojibway Parkway in this zone.

Zone 3 – forms the southern portion of the study area. Industrial land use forms a majority of area within this zone. Green spaces form the next major land use in this zone. Industrial

developments along Sprucewood Avene are serviced by a sanitary sewer system that drains to the LRWRP. Stormwater runoff from this area drains to the Detroit River through a local storm sewer system and the Sprucewood Avenue Drain.

Figure 2 shows the existing topography within the study area. The areas along the banks of the Detroit River are generally at a lower elevation than inland areas. The general slope of the ground surface is towards the Detroit River.

The soil types within the study area include Burford Loam, Berrein Sand and Granby Sand. The soil type along the bank of Detroit River is primarily Burford Loam, which is considered to be a well drained soil with high infiltration rates. Soil types in areas further inland are Berrein Sand and Granby Sand. These soils are poorly drained and have lower infiltration rates.

2 Background Investigation

2.1 Review of Background Reports and Studies

Background reports and studies relevant to the study area were reviewed by the Project Team. The following reports and data were reviewed as part of this study:

- Prince Road Sewer Study (Stantec, 2001)
- Functional Design Report - Sanitary Sewerage and Stormwater Drainage - Malden/Prairie Grass (Dillon, 1993)
- Ojibway Sanitary Sewer Infrastructure Rehabilitation Needs Study (La Fontaine, 1992)
- Proposed Sewer and Sanitary Sewer Prince Road (Golder, 1986)
- Prince Road Trunk Storm Sewer Study (MacLAREN, 1978)
- Interim Report on Investigations of the Ojibway Sanitary Sewerage Area (MacLAREN, 1978)

2.2 Review of City of Windsor Sewer and Coastal Flood Protection Master Plan

The City recently completed the Sewer and Coastal Flood Protection Master Plan (SCFPMP) (Dillon, 2020). The SCFPMP identified problem areas, which are at risk of flooding due to sewer surcharging and coastal flooding under different return period rainfall events. Impacts of coastal flooding were analysed for the East Windsor Area. The SCFPMP also recommended short and long term solutions to mitigate the risk of residential basement flooding, surface flooding and coastal flooding (East Windsor area).

The following solutions were recommended for the West Windsor study area through the Windsor SCFPMP:

- 2700 mm diameter storm sewer outlet from the Prince Road sewer, at Chappell Avenue, to McKee Creek, along with a dewatering pump of 0.085 m^3/s capacity;
- Separation of combined sewer systems; and
- Improvements to the Detroit Street storm sewer system including a 1200 mm diameter storm sewer and an improved outlet to the Detroit River.

3 Hydrologic/Hydraulic Assessment

The hydrologic/hydraulic model completed as part of the Windsor SCFPMP was used to evaluate the performance of the existing drainage infrastructure in West Windsor. The modelling analysis was completed using the Infoworks-ICM modelling package, distributed by Innovyze. Infoworks-ICM is a modelling software for stormwater, wastewater, and watershed systems.

The hydraulic model used for the Windsor SCFPMP included all major storm, sanitary and combined sewers in the City of Windsor. The model was calibrated using observed sewer flow data. Details about the model setup and calibration are provided in the Windsor SCFPMP Report (Dillon, 2020). The model also includes a 2D mesh that represents the existing ground surface. Flooding in the 2D mesh represents surface flooding due to sewer surcharging or limited sewer inlet capacity.

While the model simulates high water levels as downstream boundary conditions to the sewer system, it does not simulate overland flooding along the shore due to high water levels. As such, the model is not setup to simulate effects of wave action in addition to high Detroit River water levels.

The existing conditions calibrated Windsor SCFPMP hydrologic/hydraulic model was used to complete this analysis. Boundary conditions, in the form of fixed water levels at sewer outfall locations in the Detroit River, were updated for the current analysis, as summarised below.

3.1 Detroit River Water Levels and Model Boundary Condition

Dillon undertook an analysis of historic water levels in the Detroit River to determine the 1:100 year return period water levels in the Detroit River near the study area. Details about this analysis are provided in **Climate Data and Analysis Summary**. The 1:100 year return period water level of 176.1 m in the Detroit River was used as the downstream boundary condition for the existing conditions analysis.

In addition to an analysis of historic water levels, Dillon completed an analysis of the impacts of climate change on water levels in the Detroit River, and recommended a Climate Change water level of 176.3 m. Details about this analysis are provided in the **Climate Data and Analysis Summary**. This water level was used as the boundary condition to estimate flood risk for the future climate change scenarios.

In addition to analysing impacts on the study area due to high water levels, an additional low water level scenario was evaluated to estimate flood risk due to rainfall events. This modelling scenario evaluated the flood risk when high water levels in the Detroit River would not be a causing a tailwater condition on underground sewer systems. For this analysis, the Average Annual Minimum Monthly Mean water level in the Detroit River near the study area was used.

The following water levels were used as boundary conditions for the hydraulic modelling analysis:

- 1:100 year return period – 176.10 m
- 1:100 year return period (considering impacts of climate change) – 176.30 m
- Low water level – 174.22 m

3.2 Modeling Approach

The calibrated Infoworks-ICM model set up for the Windsor SCFPMP was used for the hydrologic/hydraulic assessment. Updates were made to the boundary conditions applied to sewer outfalls along the Detroit River to reflect recommendations from the water level analysis completed as part of this study.

To remain consistent with the modelling approach used for the SCFPMP, design storm events used for the SCFPMP were used for the current modelling analysis. The objective of the modelling analysis was to evaluate flood risk during a number of joint probability events. These scenarios evaluated flood risk occurring due to high water levels in the Detroit River and concurrent rainfall on the watershed.

Results from the model simulations were analysed to estimate flood risk for the West Windsor study area, in general, and specific public and private infrastructure within the study area.

3.3 Design Scenarios

For the current analysis, the following modelling scenarios were evaluated:

- 1:100 year return period water levels in Detroit River concurrent with:
    - 1:5 year return period design storm event; and
    - 1:100 year return period design storm event.
- 1:100 year return period climate change water levels in Detroit River concurrent with:
    - 1:5 year return period design storm event; and
    - 1:100 year return period design storm event.
- Low water levels in Detroit River concurrent with:
    - 1:5 year return period design storm event; and
    - 1:100 year return period design storm event.

The design storm events used for this analysis were 4-hour rainfall events with 10-min time intensity intervals, using the Chicago distribution.

3.4 Evaluation Criteria

For the current analysis, the Level of Service (LOS) criteria developed through the SCFPMP were used. The flood risk due to joint probability events were analysed using the Hydraulic Grade Line (HGL) elevations in the sewer systems, and reported surface flooding due to sewer surcharging. Sewers are typically considered to be surcharged when the HGL elevation is above the obvert of the sewer pipes.

The SCFPMP recommends HGL in sanitary and combined sewers to remain 1.8 m below the existing ground elevation. 1.8 m is the assumed basement floor depth from ground. HGLs in sanitary and combined sewer system above this elevation represent a high risk of basement flooding due to sewer surcharging. The SCFPMP recommends surface flooding depth on roadways during a 1:100 year rainfall event to not exceed 0.30 m.

Additionally, the SCFPMP recommends surface flooding depths on major roadways (arterial and collector streets) during a climate change rainfall event to not exceed 0.30 m. This criteria was adapted for the current analysis to identify roadway flooding during joint probability simulations with a 1:100 year return period water level in Detroit River with consideration to climate change impacts.

4 Modeling Results

4.1 1:100 Year Return Period Water Levels (Historic)

Two modelling scenarios representing two joint probability events were simulated using the 1:100 year return period water levels in the Detroit River as downstream boundary conditions. Results from these simulations are represented in **Figures 3** and **4**.

The model results suggest that most combined sewers in Zone 1 are surcharged during the 1:5 year return period rainfall event simulation. Storm sewers conveying stormwater runoff to gravity outfalls are surcharged due to high water levels in the River backing up through the sewers. The Riverside Drive Interceptor sewer conveying sewage from central Windsor to the LRWRP is also surcharged during the 1:5 year simulation. The sanitary sewer system servicing industrial development in Zone 3 is also surcharged, and HGL elevations in the system are above the assumed basement floor elevation. No significant surface flooding is observed along municipal right-of-ways (ROWs) during the 1:5 year rainfall event simulation.

The outlet sewer from the LRWRP is surcharged during these simulations due to high water levels in the Detroit River, potentially affecting operations at the plant.

During the 1:100 year rainfall event simulation, a larger number of combined sewer MHs in Zone 1 report a higher risk of basement flooding, with HGLs above the assumed basement floor elevation. In addition, a number of sanitary and storm MHs in areas that are serviced by separated sewers report high HGLs. Surface flooding of depths greater than 0.30 m is observed along Russell Street and Sandwich Street.

4.2 1:100 Year Return Period Water Levels (Climate Change)

Results from joint probability events considering higher water levels in the Detroit River due to impacts of climate change show higher HGLs in the sewer systems, due to a higher tailwater effect caused by higher water levels. Results for these simulations are represented in **Figures 5** and **6**.

Correspondingly, the surface flooding extents along municipal ROWs representing flooding with depths greater than 0.30 m are higher during the joint probability event using 1:100 year rainfall event.

5 Identification of Flood Risk Areas

Figures 7 represents land parcels that are at risk of flooding due to either sewer surcharging or surface flooding, while **Figure 8** represents critical infrastructure at risk of flooding during the joint probability

event simulation with 1:100 year return period water levels in the Detroit River and 1:100 year rainfall event.

Similarly, **Figures 9** and **10** represent land parcels and critical infrastructure at risk of flooding during joint probability simulation with 1:100 year return period water levels considering effects of climate change, concurrent with a 1:100 year rainfall event.

To identify land parcels at risk of flooding, proximity to MHs reporting high HGLs and surface flooding locations was investigated.

A number of residential land parcels in Zone 1 were identified to be under risk of basement flooding due to sewer surcharging. A number of land parcels with industrial land uses were identified in Zone 2. It must be noted here that these parcels are at risk of flooding from high River water levels since they are located along the River bank.

A number of land parcels identified as critical infrastructure are also at risk of flooding. These include schools/childcare centres, nursing homes, armoury and the LRWRP.

Appendix F

Public Information Centre

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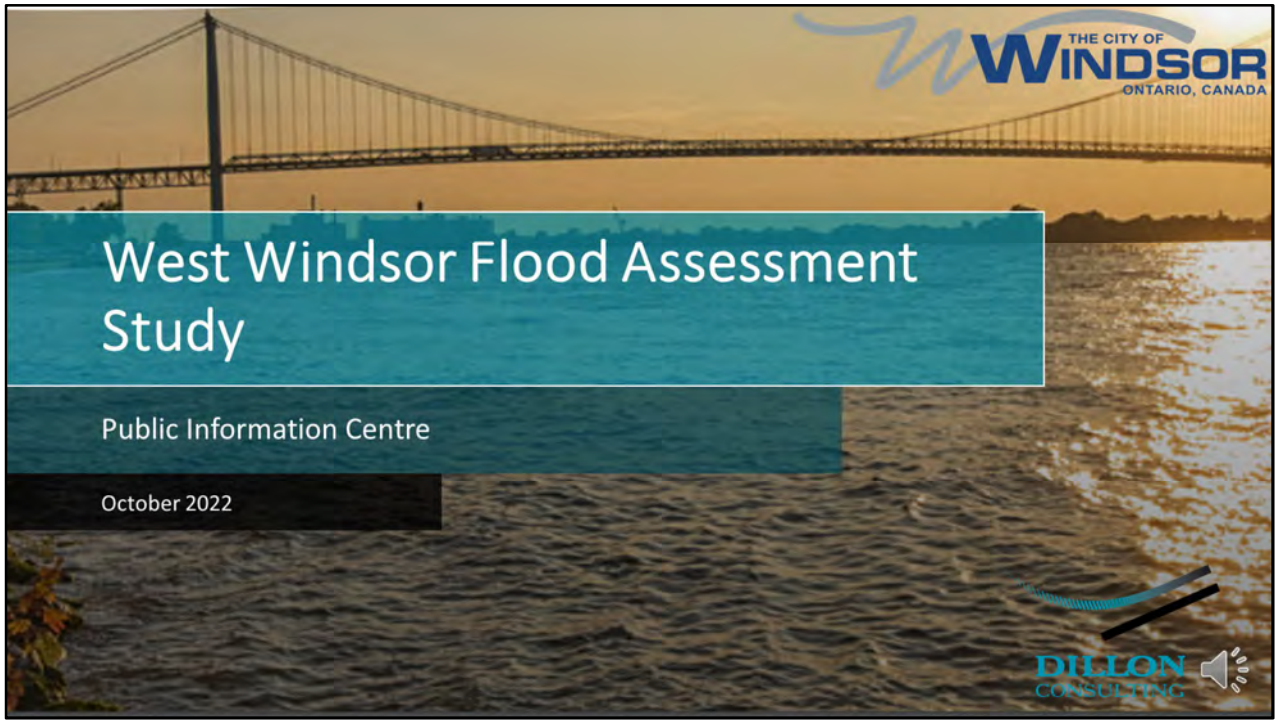
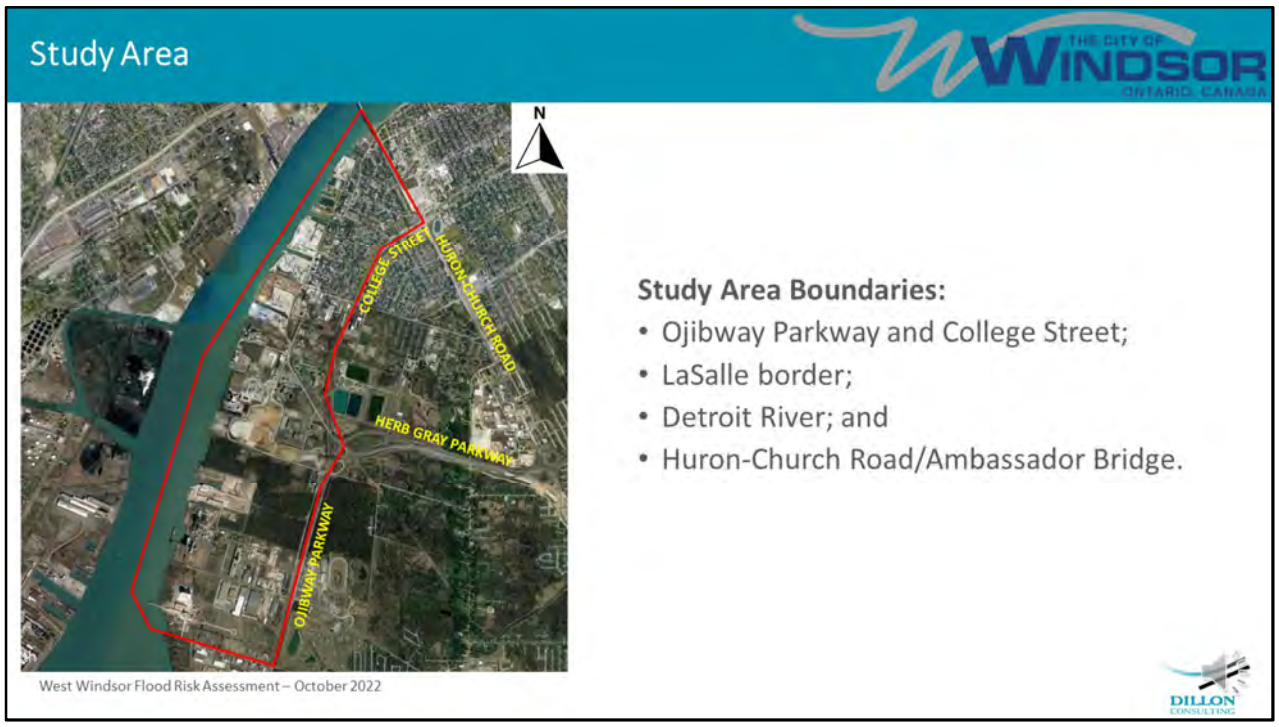
Appendix F – Public Information Centre

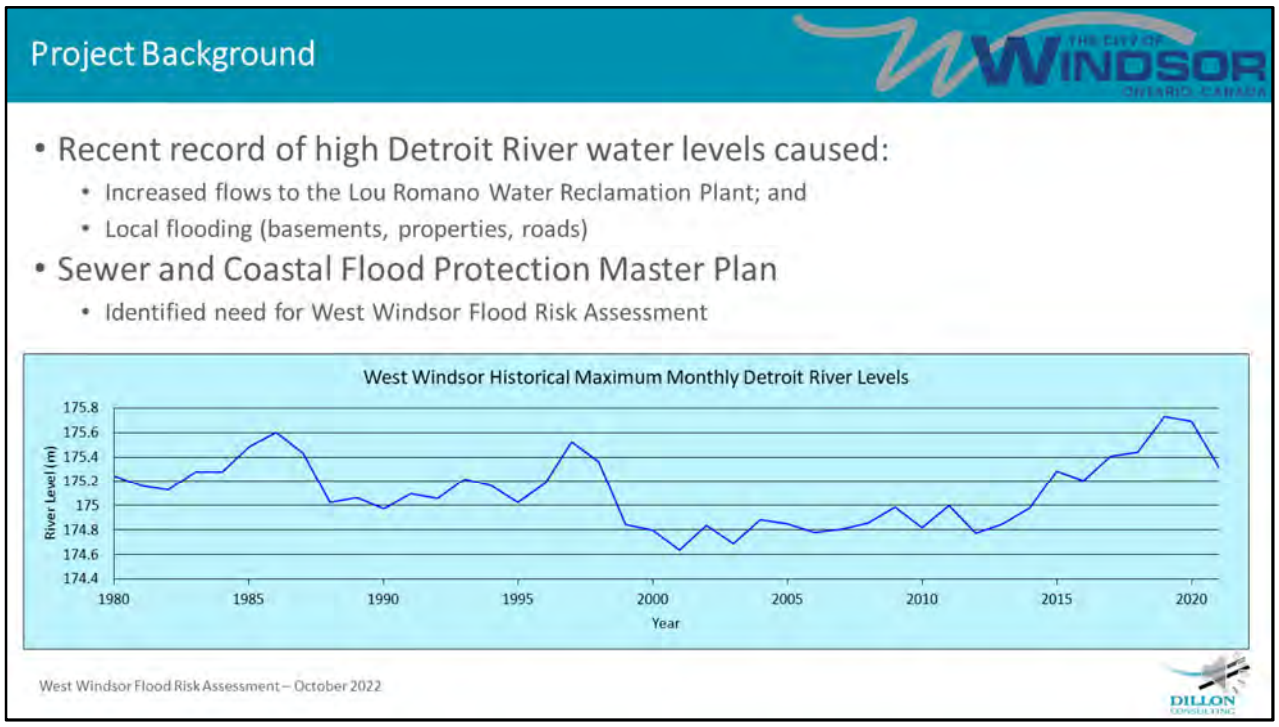
1. Presentation Slideshow
2. Stakeholder Contact List
3. Public Information Centre Stakeholder Email
4. Public Consultation Record



Hello! And thank you for joining the Virtual Public Information Centre for the West Windsor Flood Assessment Study. My name is Nick Emery and I am the project manager with Dillon Consulting Limited. Dillon was retained by the City of Windsor, Ontario to complete this project.



I'd like to begin by outlining the portion of the City of Windsor that we studied for this project. Our study area is generally bounded by Ojibway Parkway, the Essex Terminal Railway and College Street to the east, the Town of LaSalle municipal boundary to the south, the Detroit River to the west, and Huron Church Road and the Ambassador Bridge to the north. From here forward we will refer to this area as West Windsor.



I'd now like to provide a little bit of background information to explain why this project was undertaken.

Water levels on the Detroit River vary from year to year. However, in recent years, river levels were especially high, peaking in May 2020.

As some of you listening to this presentation may remember, these increased water levels caused several impacts across the City of Windsor. Some of the most visible impacts were at marinas, boat launches, and shoreline parks.

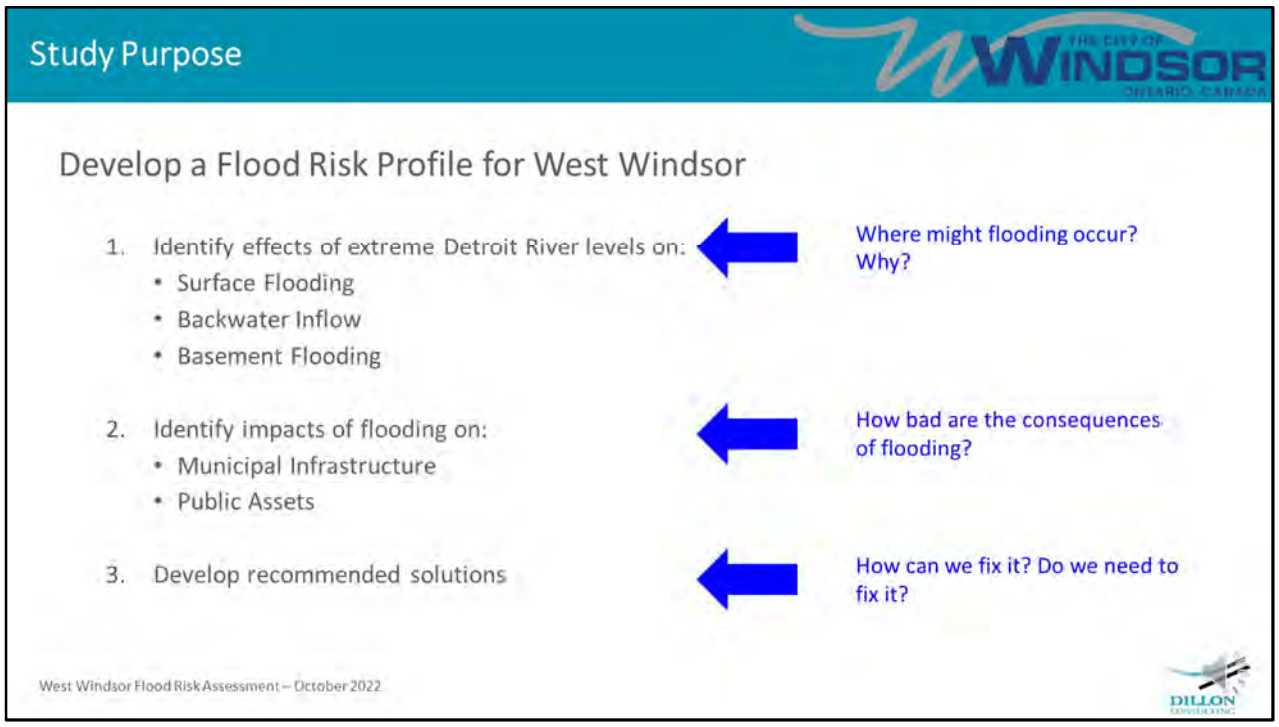
Similarly, in West Windsor, these high river levels caused local flooding along shoreline properties and municipal roadways near the riverfront. This also exacerbated the risk of basement flooding further inland within the West Windsor area.

Another, less visible, effect was that the high river levels increased the sewer flows sent to the Lou Romano Water Reclamation Plant. This plant is responsible for treating wastewater from most of the City of Windsor. These additional flows resulted in higher operating costs and reduced capacity to accommodate peak flows.

While these recent high river levels were occurring, the City of Windsor was in the process

of completing its city-wide “Sewer and Coastal Flood Protection Master Plan” which recognized the shoreline within West Windsor as being vulnerable to high river levels. Due to this increased vulnerability, the Masterplan recommended the completion of an additional Flood Risk Assessment for the West Windsor Area.

The City of Windsor secured funding for this project from the Government of Canada through the National Disaster Mitigation Program. This program was established to reduce the impacts of natural disasters, including flooding, on Canadians.



The purpose of this project is to develop a flood risk profile for the West Windsor area.

There are 3 main objectives that this study will accomplish.

The first is to identify the impacts of extreme Detroit River levels on the West Windsor Area. Particularly focusing on how the increased levels impact:
Surface flooding on properties and streets;
Inflow to the local sewer system; and
Local basement flooding.

The questions we are trying to answer with this first objective are:

Where in West Windsor do high river levels cause flooding or other impacts? and
Why does it happen at these locations?

The next objective is to identify the effects of high river levels in West Windsor on municipal infrastructure and public assets

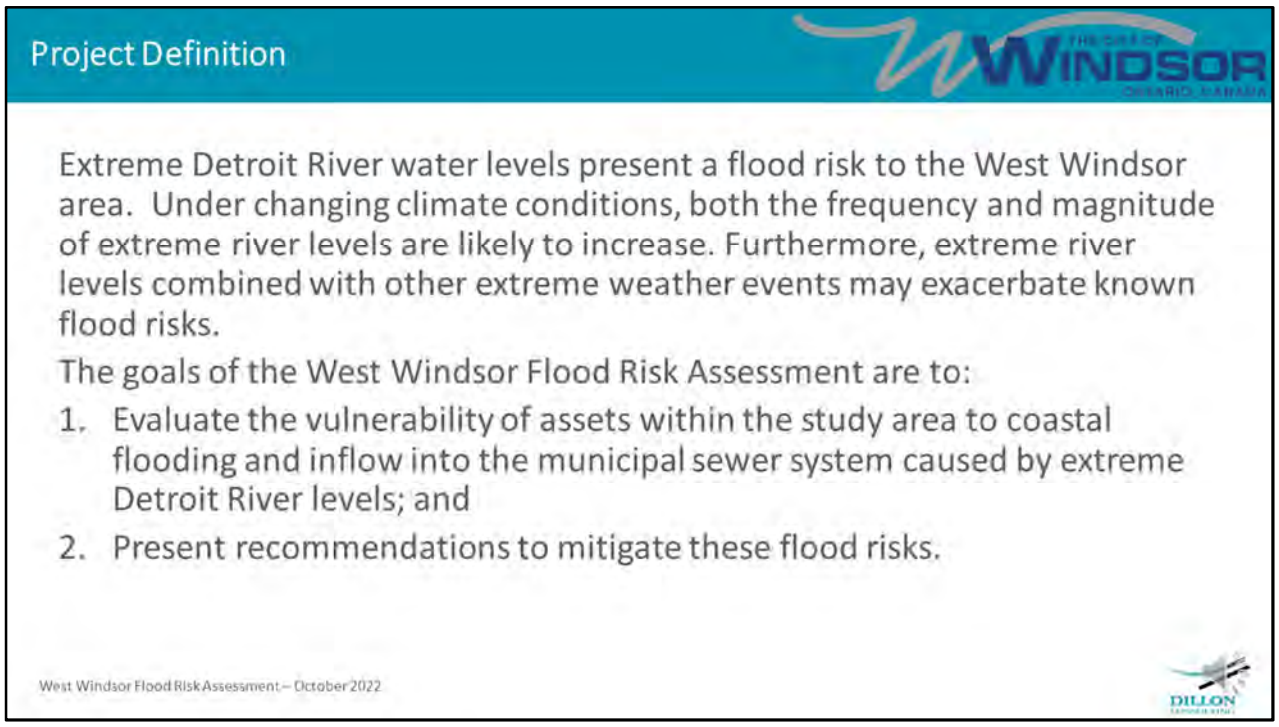
For instance if a road is flooded, how much of a hazard does that present?

Is it still passable to traffic?
Does it prevent access to properties and public facilities? OR
Is it so severe that it prevents emergency vehicles from responding?

To put it another way, what are the consequences of flooding in West Windsor? By understanding these consequences, we can prioritize where we need to develop solutions.

Which brings me to our final objective, which is to identify and evaluate possible solutions to address the impacts of high river levels.

How do we fix the problem? Are the consequences severe enough that we need to develop a solution

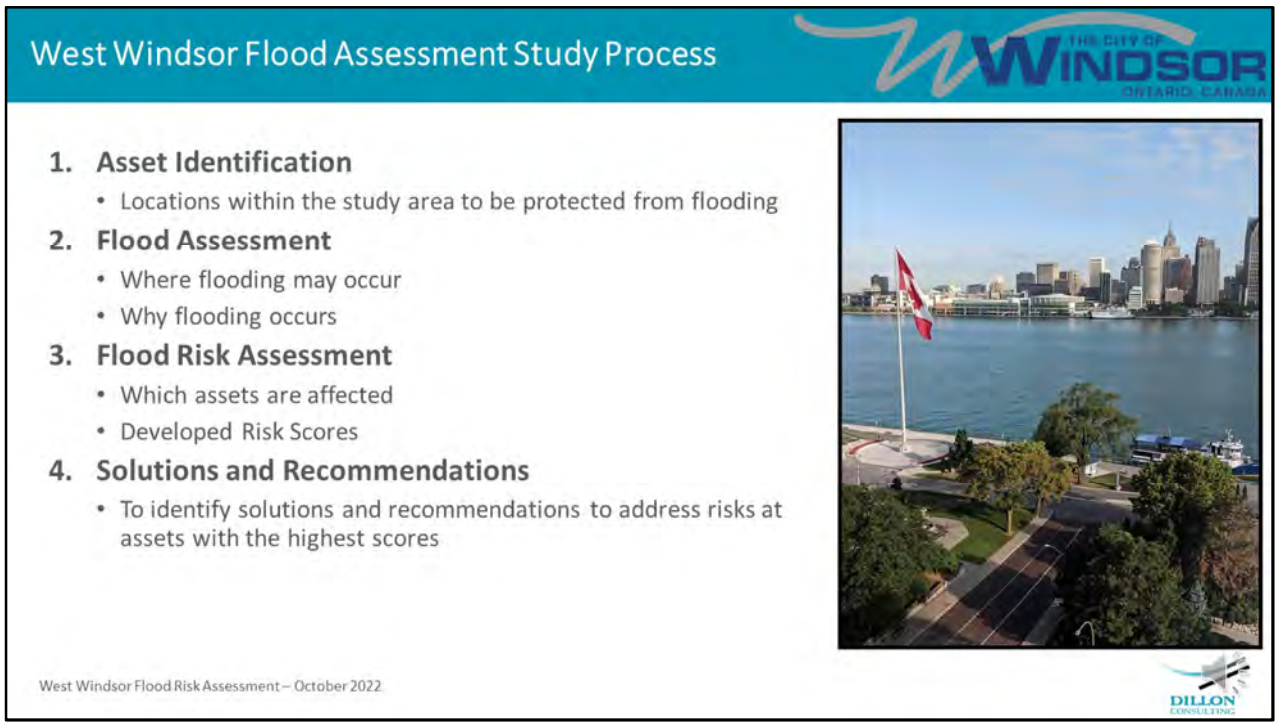


Based on the background information and the objectives that we've just outlined, this project definition was developed to help guide the completion of the West Windsor Flood Risk Assessment:

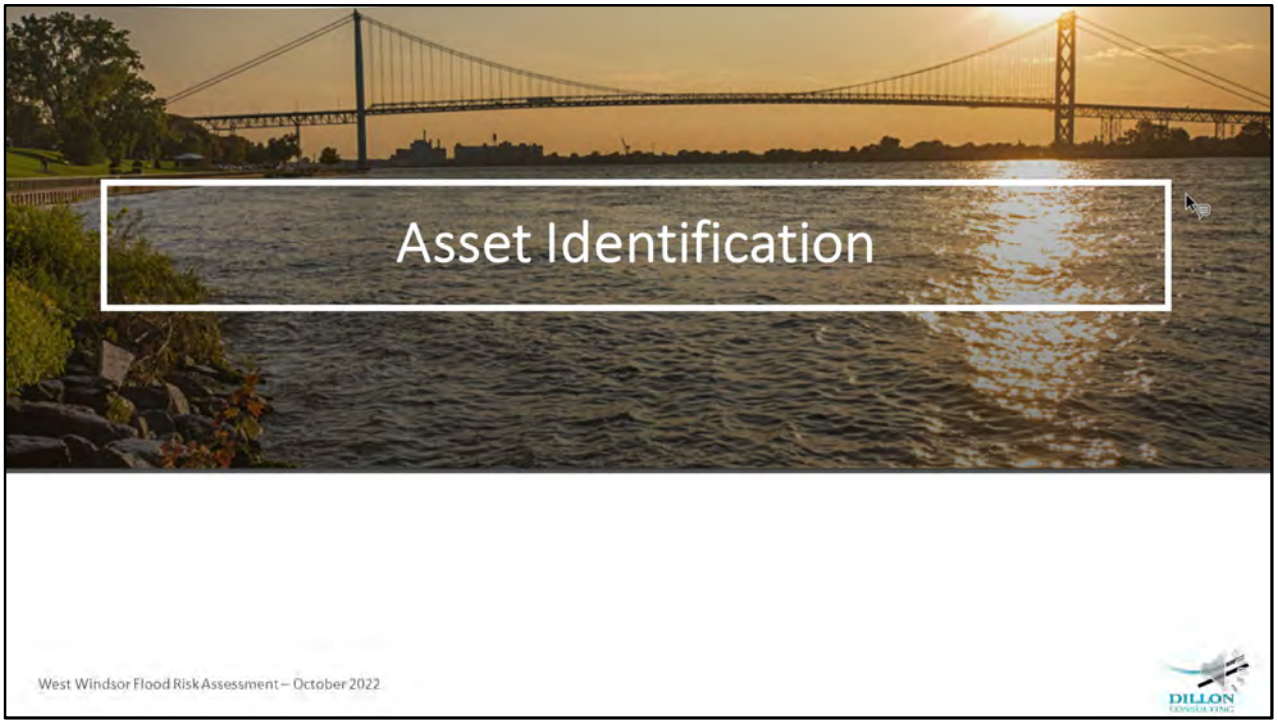
Extreme Detroit River water levels present a flood risk to the West Windsor area. Under changing climate conditions, both the frequency and magnitude of extreme river levels are likely to increase. Furthermore, extreme river levels combined with other extreme weather events may exacerbate known flood risks.

The goals of the West Windsor Flood Risk Assessment are to:

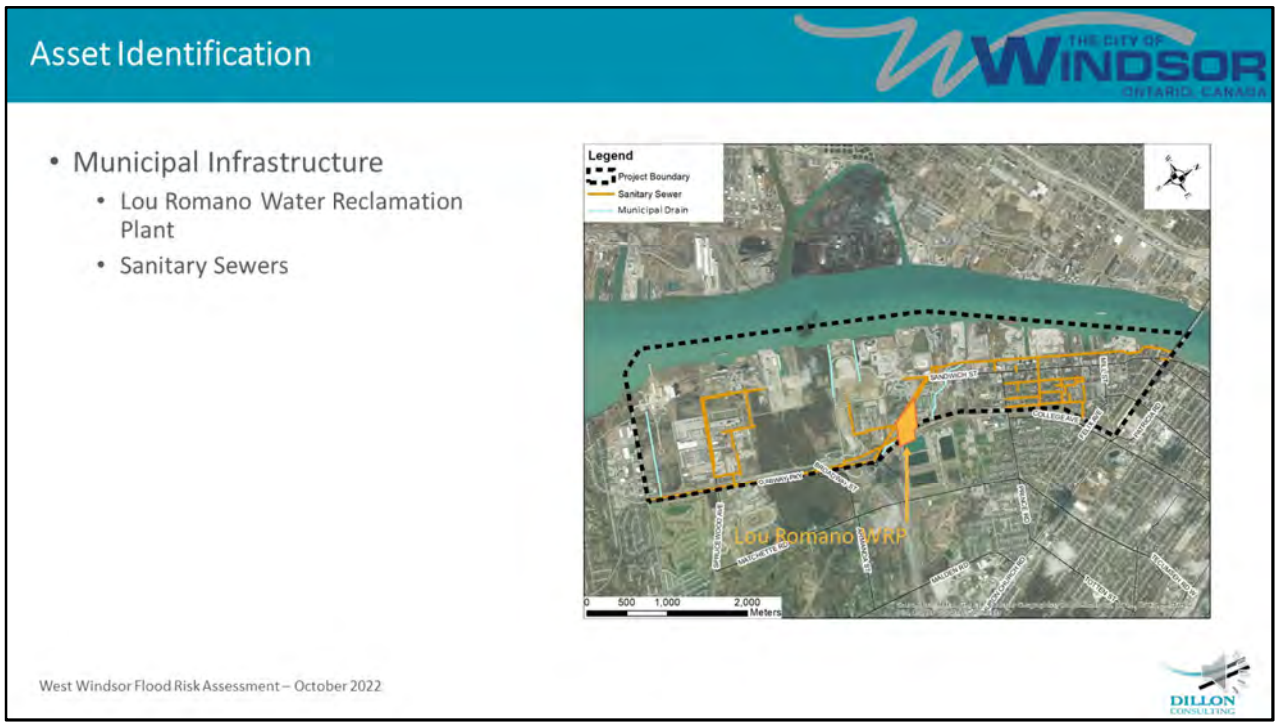
1. Evaluate the vulnerability of assets within the study area to coastal flooding and inflow into the municipal sewer system caused by extreme Detroit River levels; and
2. Present recommendations to mitigate these flood risks.



Equipped with that project definition to guide us, the project team then set out to complete the West Windsor Flood Assessment using the following process:
Our first step was to identify the critical assets within West Windsor that need to be protected from flooding.
Next, we completed a flood assessment to identify flooding locations and to examine the role that high river levels have in contributing to this flooding.
Then, we completed a flood risk assessment using the PIEVC protocol to identify which assets in West Windsor are susceptible to flooding under high river levels, and to develop risk scores for each of the affected assets
Finally, guided by the risk scoring in the previous step, we developed solutions and recommendations to address flooding at assets where unacceptable impacts are likely to occur.
I'll be explaining each of these steps in further detail as we work through the rest of this presentation.



Our first step was to understand the types and locations of assets within the West Windsor area that need to be protected during periods when the Detroit River water levels are extremely high



The first category of assets that we identified was municipal infrastructure.

This includes the Lou Romano Water Reclamation Plant, which treats wastewater from the City of Windsor to that it can be safely released to the Detroit River; and
The upstream sanitary sewers that convey wastewater to the Lou Romano Plant. When I talk about sanitary sewers, these are the pipes that take the wastewater away from your home whenever you take a shower, run your tap, or flush your toilet.

Asset Identification

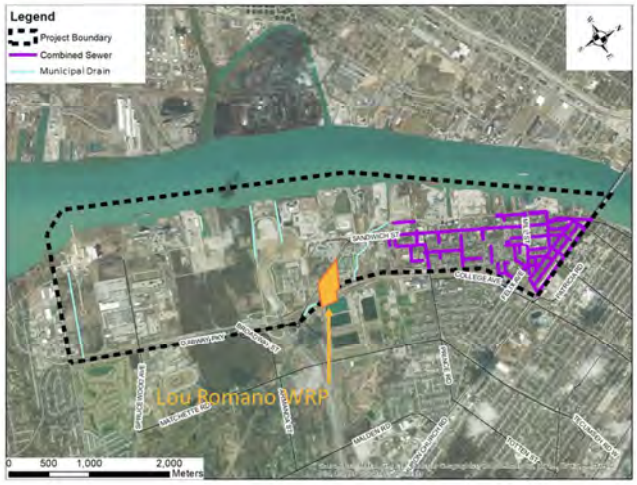
- Municipal Infrastructure
  - Lou Romano Water Reclamation Plant
  - Sanitary Sewers
  - Storm Sewers

West Windsor Flood Risk Assessment – October 2022

The next municipal infrastructure items are storm sewers. These pipes collect surface runoff from rain storms and snowmelt and convey that water to either an open channel, a roadside ditch, or directly to the Detroit River.

Asset Identification

- Municipal Infrastructure
  - Lou Romano Water Reclamation Plant
  - Sanitary Sewers
  - Storm Sewers
  - Combined Sewers
  - Roadways



West Windsor Flood Risk Assessment – October 2022

A combined sewer system services much of the residential area within West Windsor. These are typically older systems that collect both sanitary and storm flows and convey them to the Lou Romano Water Reclamation Plant. These systems also have overflows that spill directly into the Detroit River during severe storm events. We call these CSOs, which stands for combined sewer overflows. I'll be talking about these in further detail later on in this presentation.

The final pieces of municipal infrastructure that we considered are the public roadways within West Windsor.

Asset Identification

- Municipal Infrastructure
  - Lou Romano Water Reclamation Plant
  - Sanitary Sewers
  - Storm Sewers
  - Combined Sewers
  - Roadways
- Parks

West Windsor Flood Risk Assessment – October 2022

The next assets we identified are municipal parks and green spaces, including McKee Park, Mill Park, Brock Park, and Black Oak Heritage Park.

Asset Identification

- Municipal Infrastructure
  - Lou Romano Water Reclamation Plant
  - Sanitary Sewers
  - Storm Sewers
  - Combined Sewers
  - Roadways
- Parks
- Emergency Services

West Windsor Flood Risk Assessment – October 2022

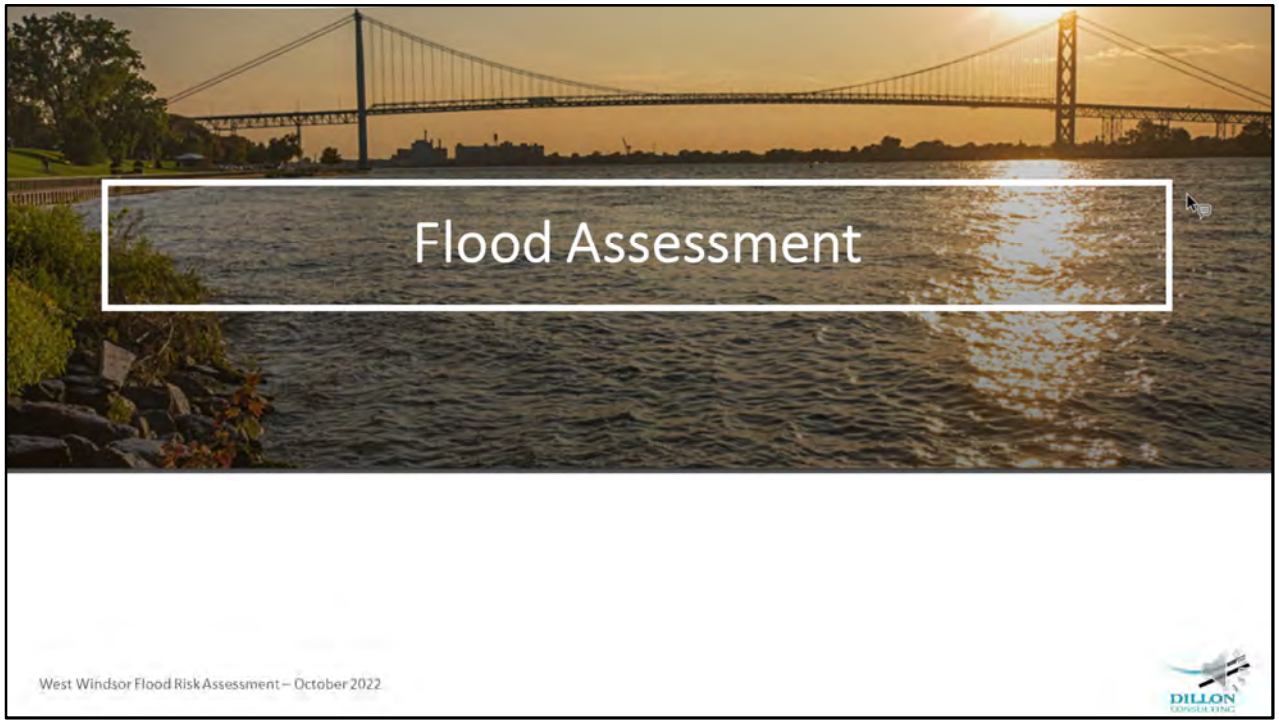
We also identified emergency services which include both health care facilities and police stations. Fire stations were also included in our search, but there aren't any located within our study area

Asset Identification

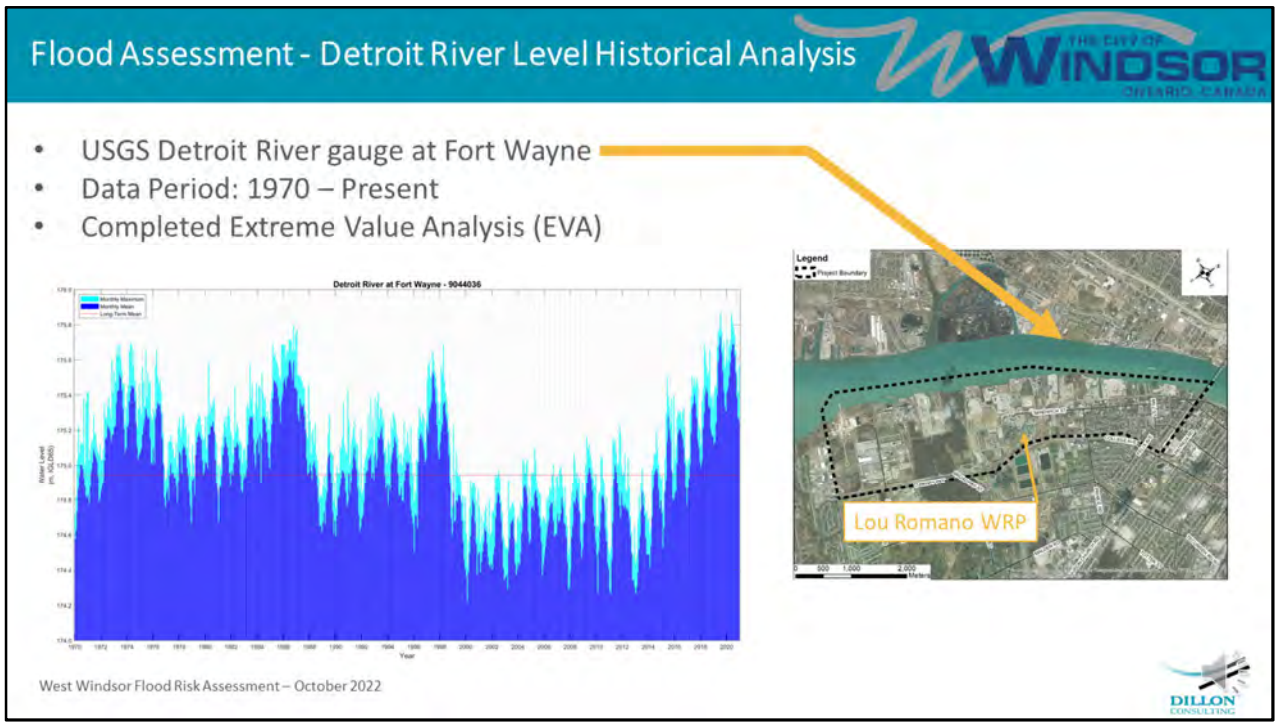
- Municipal Infrastructure
  - Lou Romano Water Reclamation Plant
  - Sanitary Sewers
  - Storm Sewers
  - Combined Sewers
  - Roadways
- Parks
- Emergency Services
- Critical 3rd Party Assets
  - Utilities
  - Long Term Care Homes
  - Schools
  - Community Centres

West Windsor Flood Risk Assessment – October 2022

Lastly, we identified all the Critical third Party Assets which include utilities, long term care homes, schools and community centers.
So the list that you see on this slide summarizes all of the assets that we investigated in this study



Our next step was to complete the flood risk assessment to identify locations where extreme Detroit River levels are likely to contribute to flooding and to understand why that flooding occurs.

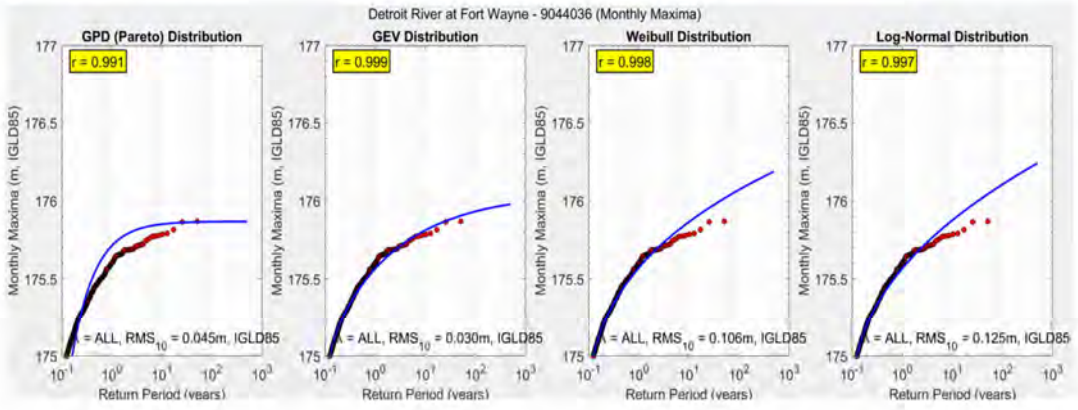


We all understand that water levels on the Detroit River fluctuate, so there must be a range of water levels that we can reasonably expect to see. But What does it mean when we talk about extreme water levels? For the purposes of this study we're interested in the 100-year water level. This is the maximum water level that we can anticipate during a 100-year time period. We can also think of this as the maximum water level that has a 1% chance of occurring in any given year.

So, what is that water level for the West Windsor study area?

Fortunately, we had access to some really great historical data to help us answer that question. Just across the river from West Windsor, there's a United States Geological Service stream gauge which records the Detroit River level every hour – the graph on this shows those recorded water levels. We gathered the over 50 years of available data and used it to complete an extreme value analysis.

Flood Assessment - Detroit River Level Historical Analysis



Based on historical data, the peak 100-year Detroit River water level is 176.1 m

West Windsor Flood Risk Assessment – October 2022

The historical data were plotted and compared with standard probability distributions to identify a curve that best fits the measured peak water levels. The curve with the best fit was then used to estimate the Detroit River 100-year water level.

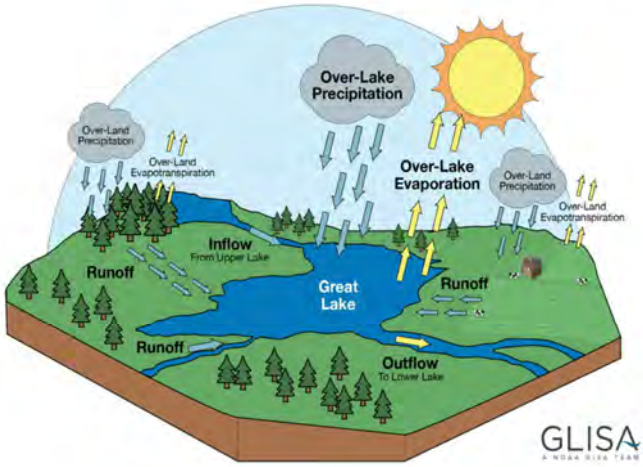
Based on our extreme value analysis results, a 1:100-year water level of 176.1 m was calculated for the West Windsor Area.

We need to keep in mind that this value is based on historical data. We also need to know if future climate change is likely to affect this number.

Flood Assessment - Detroit River Level Climate Change

Changes in water levels within the Great Lakes system are primarily caused by the following factors:

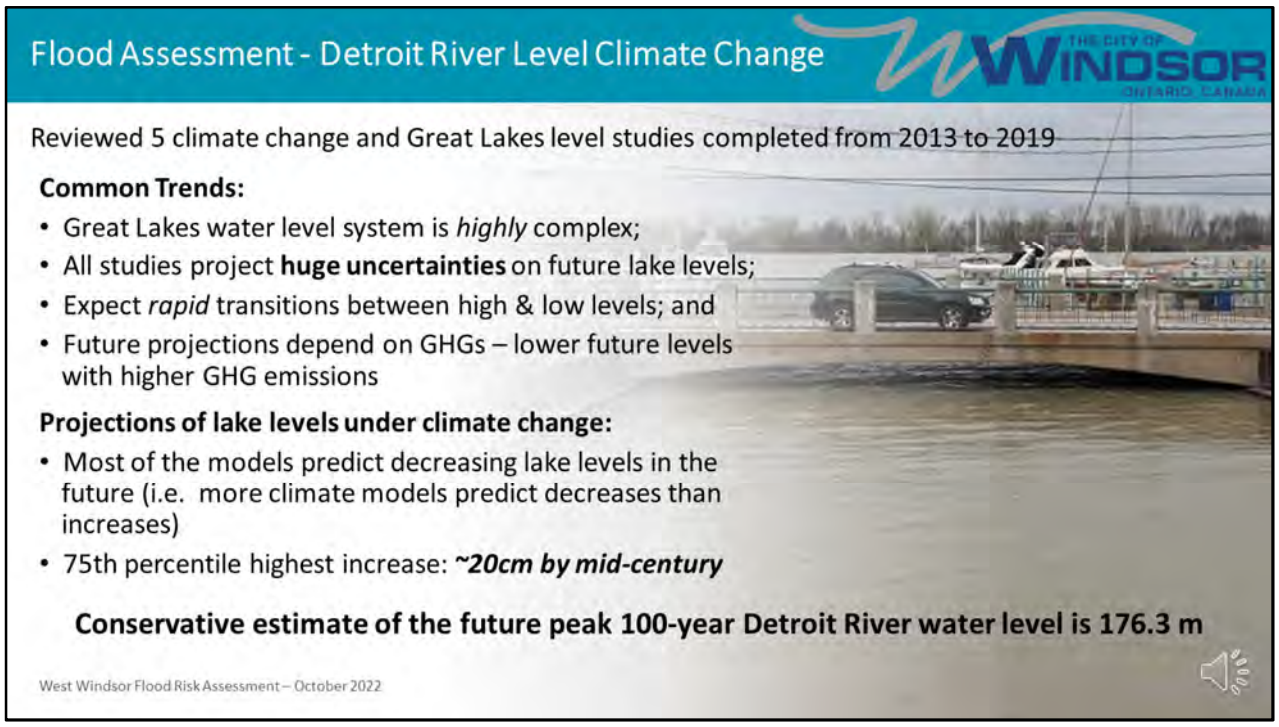
- Changes in precipitation
- Changes in evaporation from the lakes
- Changes in the inflow and outflow from the systems



West Windsor Flood Risk Assessment – October 2022

As you know, the Detroit River is part of the Great Lakes system, connecting Lake St. Clair to Lake Erie. Each of the Great Lakes' water levels fluctuates annually due to three main factors:

1. changes in rainfall and snowfall over the lakes,
2. changes in evaporation from the lakes, and
3. changes in the flows from tributaries and rivers that enter the Great Lakes from the surrounding lands and any diversions or management changes



To answer the question of how peak water levels on the Detroit River may change in the future, we completed a review of 5 recently published studies that predict the effects of climate change on the Great Lakes.

Now, as you may guess, five different studies with five different analysis methodologies are going to draw five different sets of conclusions. However, based on our review we identified 4 common trends:
All of the studies that we reviewed acknowledge that the interactions of the factors that influence the Great Lakes water levels are very complex;
All of the studies recognize that there is uncertainty associated with predicting future lake levels and, just like our local weather forecasts, these uncertainties increase the further into the future we're trying to predict;
More definitively, we can expect quicker changes from low lake levels to high lake levels and vice versa;
And finally, all of the studies predict an inverse correlation between future greenhouse gas emissions and lake levels. Increasing GHG emissions are linked to lower future lake levels.

Each of the Great Lakes studies that we reviewed relied on the results of different climate models and considered different scenarios to predict future lake levels. As a result, each study provides a range of future water level predictions based on different assumptions. In

general, most of the climate models predict that lake levels will likely decrease in the future.

However, we wanted to look at the worst case scenario because first of all, we know that there's considerable uncertainty associated with these predictions and secondly, because we wanted to have a conservative high water level to use to predict future flooding and develop flood protection solutions. Based on the climate change studies that we reviewed, the highest predicted increase in peak water levels is about 20 cm.

Adding this increase to the water level calculated from our extreme value analysis gives us a future condition 100-year Detroit River water level of 176.3 m. Again, this is a conservative estimate of the peak water level that we can expect, considering climate change impacts.

Flood Assessment – Extreme Water Level Comparison

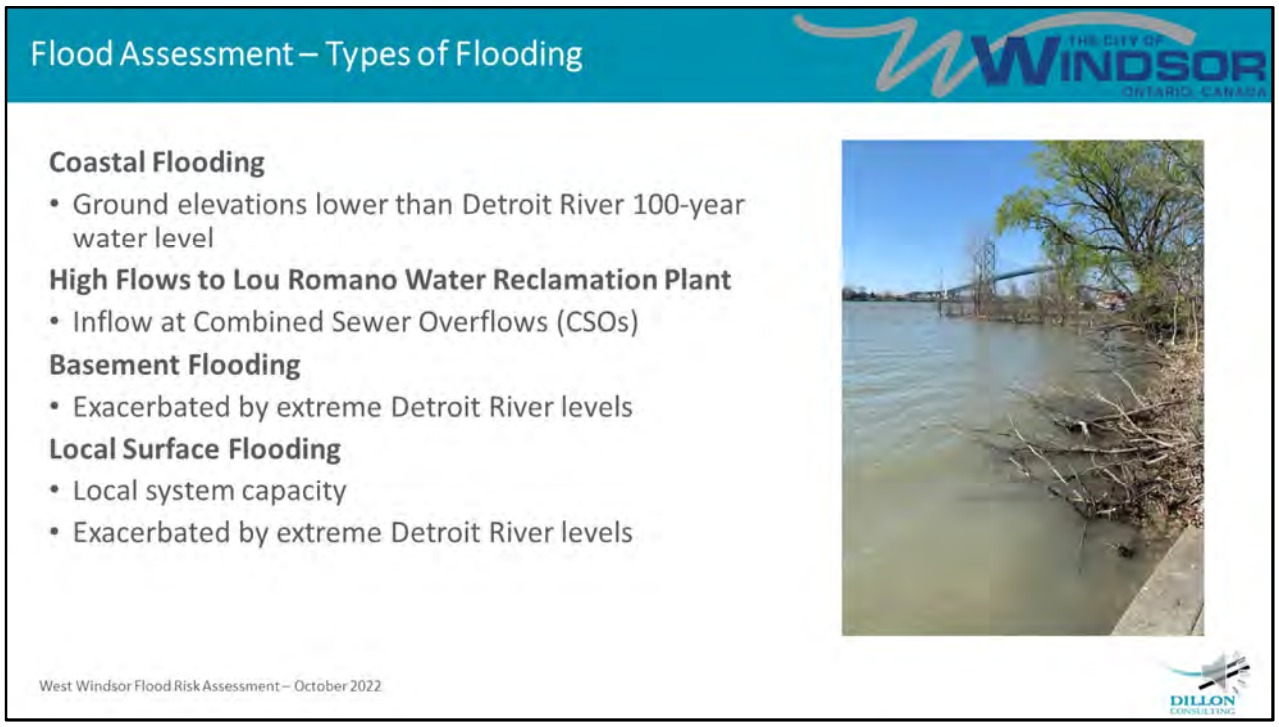
Generally:

- Properties east of Russell Street are more than 1 m above the extreme river level;
- Lands near the McKee Creek Drain are less than 1 m above the extreme river level; and
- Shoreline industrial properties are less than 1 m above the extreme river level.

West Windsor Flood Risk Assessment – October 2022

So, now that we've defined our extreme Detroit River level, how does it compare in relation to the West Windsor area? To get a sense of this, we've show the 177.3 m contour as the red line on this slide. This contour is 1 m higher than our 100-year water level to help highlight the portions of West Windsor that may be affected by high river levels either by direct surface flooding or by backups of the local storm drainage system.

From this slide, we can draw three significant conclusions:
Overall the majority of residential properties in West Windsor, which are located east of Russell Street are more than 1 m above the extreme river level;
Lands located near the McKee Creek Drain are generally less than 1 m above the extreme water level; and
Many shoreline industrial properties are less than 1 m above the extreme river level.



The next step in the project was to identify where and why flooding caused by high river levels could occur in West Windsor. We used a few different methods to examine this including:

- A topographic mapping assessment to identify areas below the Detroit River 100-year water level;
- Computer modelling of the City's sewer and drainage networks; and
- Gathered observations of previous flooding from City operations staff and stakeholders.

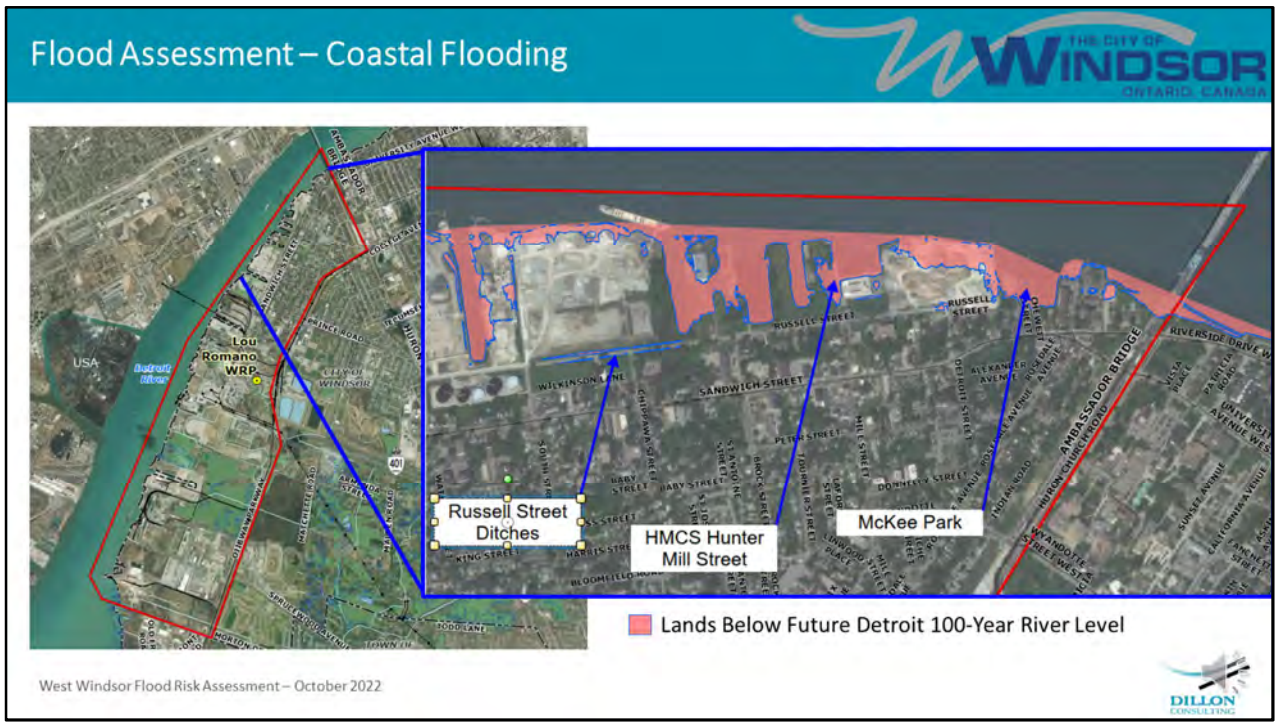
From this, we identified 4 main types of flooding in West Windsor linked to high Detroit River levels:

1. The first is coastal flooding which affects lands that are lower than the 1:100 year Detroit River Level. What we're talking about here is shoreline properties that are directly flooded when the river levels are high.
2. The next impact that we identified is increased flows to the Lou Romano Water Reclamation Plant caused by river water flowing directly into the combined system through Combined Sewer Overflows (CSOs) that are lower than the 100-year Detroit River level. During the recent period of high river levels, the plant saw a substantial increase in flows because river water was making its way into the City of Windsor's sewer network and getting mixed with wastewater.
3. Basement flooding is also a concern under high river level conditions. Now, basement

flooding usually occurs due to severe storm events. While high river levels don't directly cause basement flooding in West Windsor, they can increase the extent and severity of basement flooding by reducing the available capacity in the sewer network during storm events.

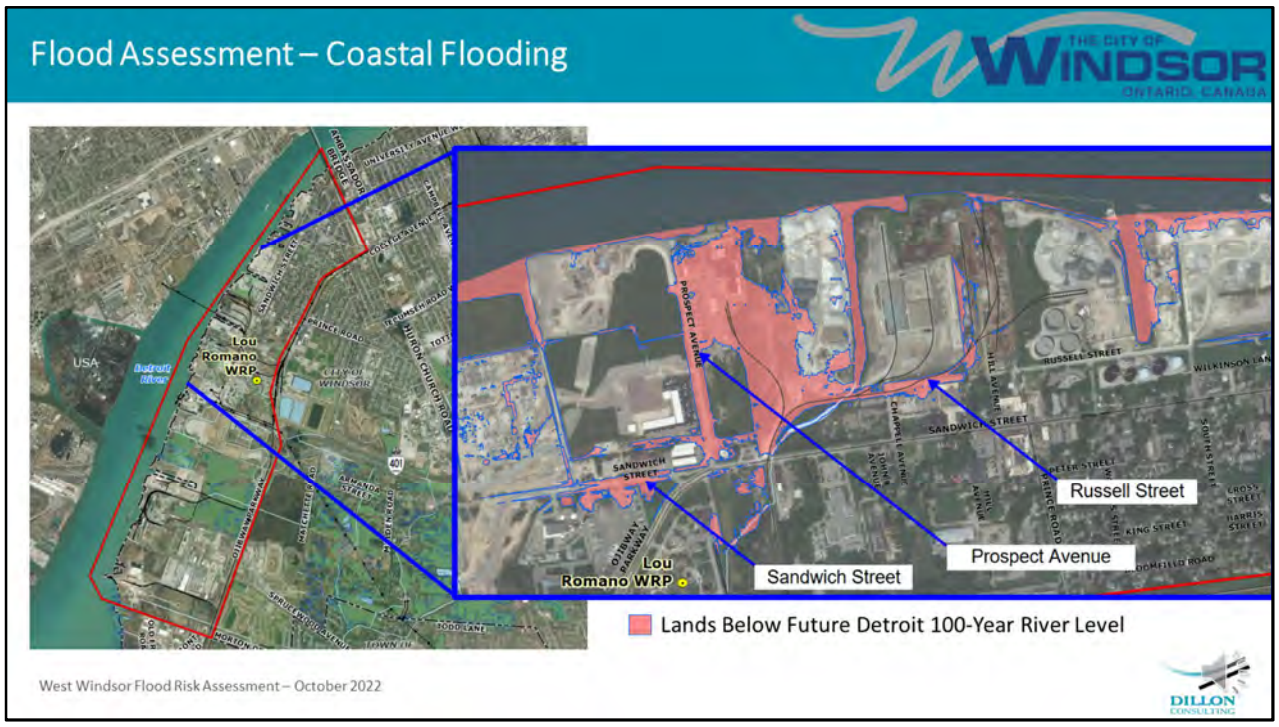
4. The final type of flooding that we identified in West Windsor is local surface flooding. This is inland flooding caused by storm events due to limited available capacity in the local storm drainage systems. Similar to basement flooding, this isn't caused directly by high river levels, but they can exacerbate it by reducing the available capacity in the storm drainage system.

Over the next few slides, we're going to take a look at where each of these types of flooding occurs in West Windsor.



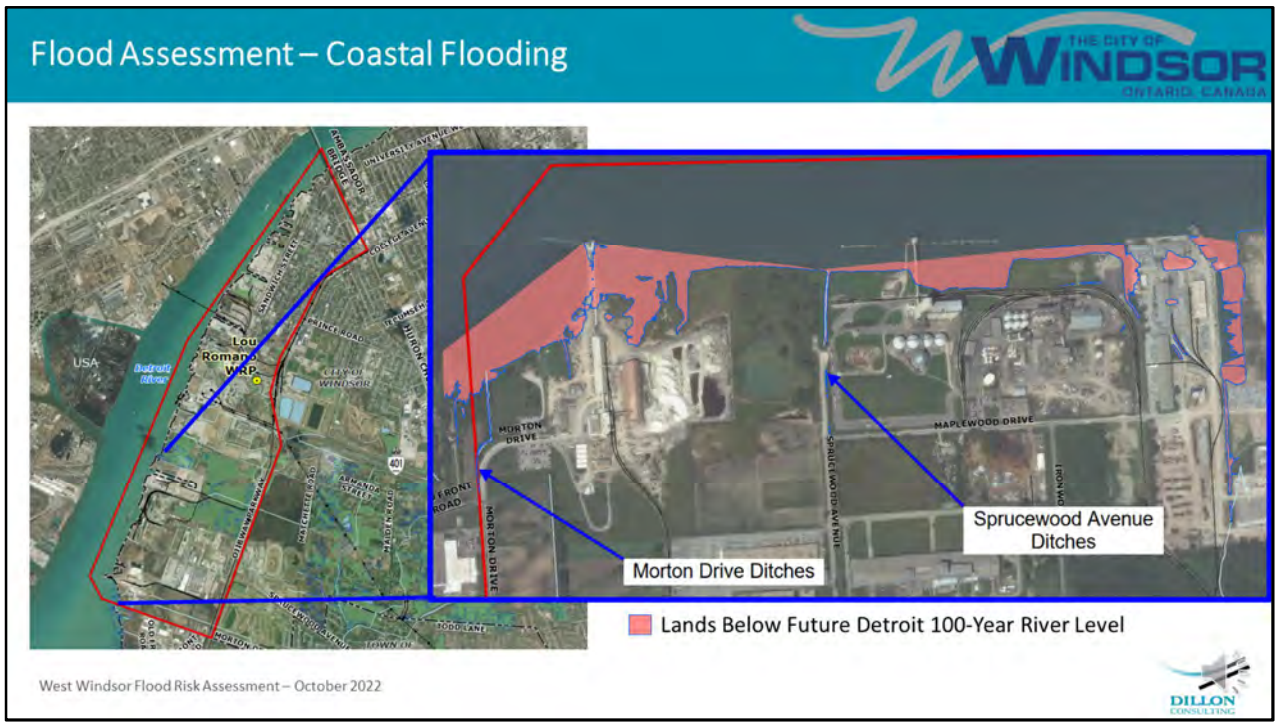
First off is coastal flooding. These are the areas shown in pink on the inset, where the ground elevation is lower than the 100 year Detroit river level.

Working our way along the shoreline from north to south, the assets that are directly affected by coastal flooding include:
McKee Park, which is important because the City of Windsor is in the process of planning park improvements;
The westernmost portion of Mill Street and HMCS Hunter; and
Portions of the Russell Street ditches.

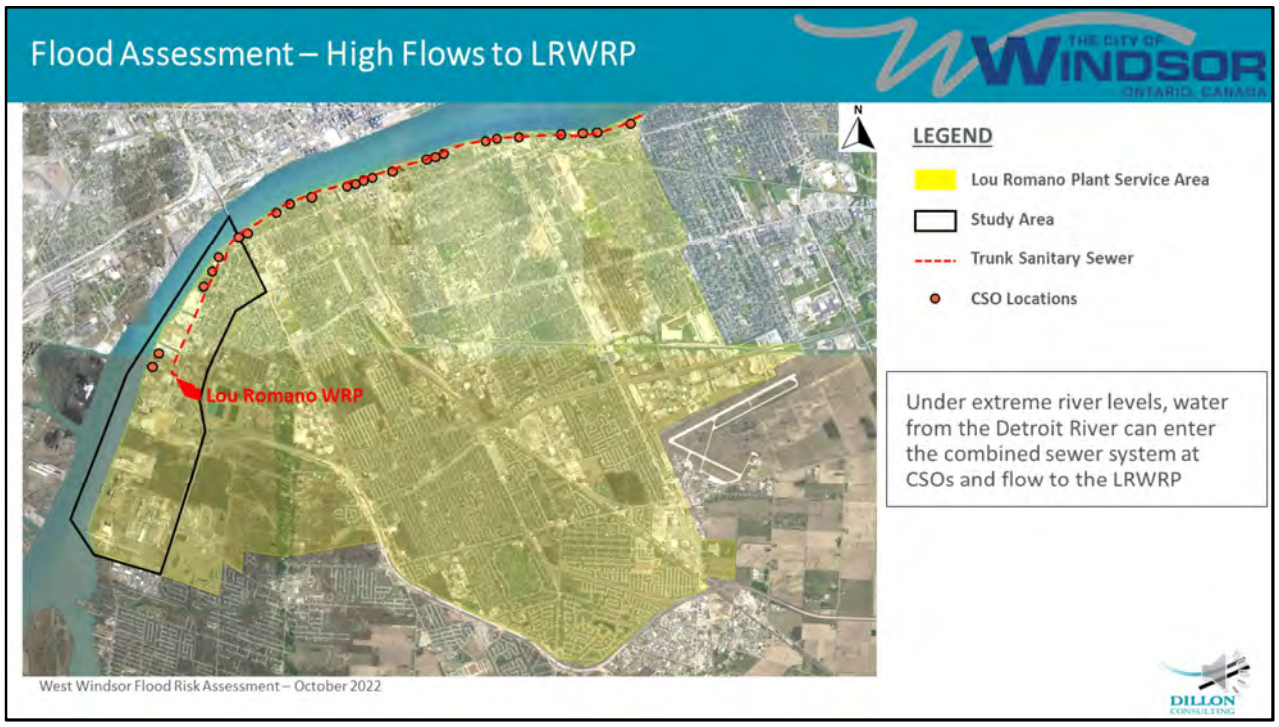


Further south, portions of Russell Street, Prospect Avenue, and Sandwich Street are all lower than the Detroit River 100-year water level. This is a problem because roadway flooding creates a hazard to traffic, it may limit access to properties, and prolonged flooding can damage the road structure. It's also important to note that the roadway flooding that we're talking about here can persist for weeks of months, depending on river levels. Creating a potentially long-term hazard.

Another asset that's expected to experience coastal flooding under high river level conditions is Black Oak Heritage Park. The available topography suggests that shoreline flooding will occur and may encroach inland.



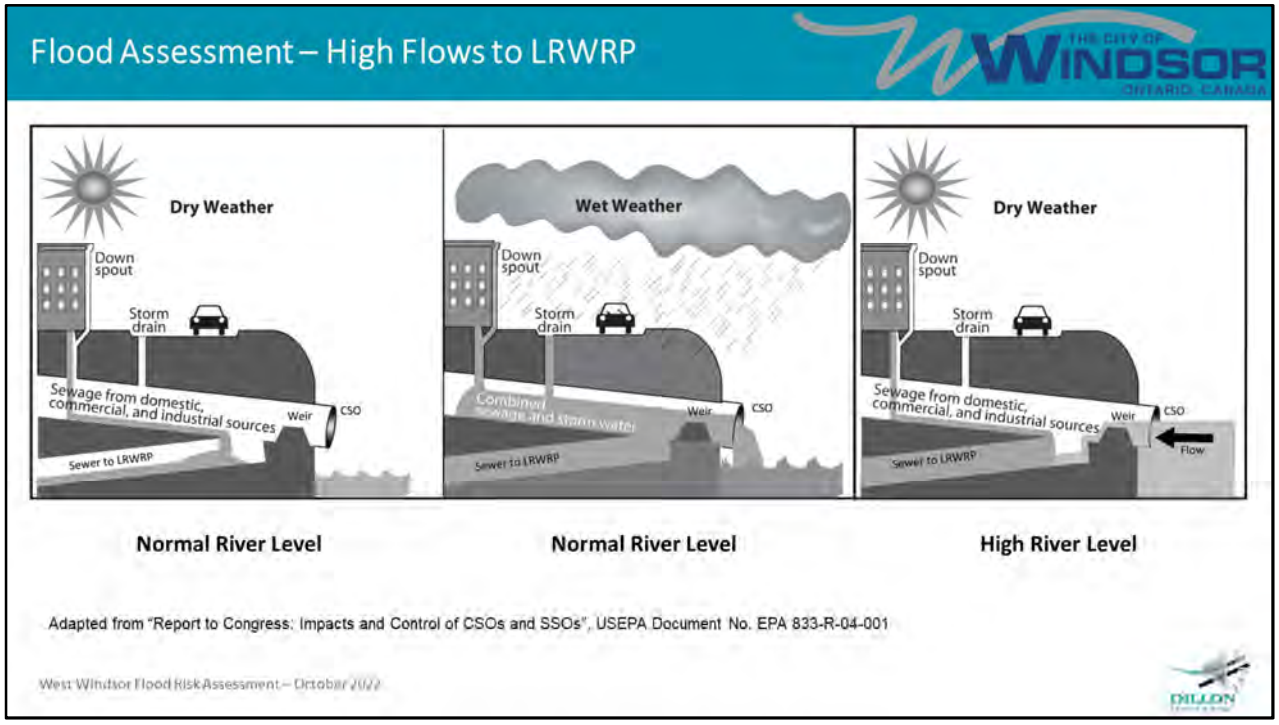
Lastly, the bottoms of the Morton Drive and Sprucewood Avenue roadside ditches are lower than the Detroit River 100-year water levels. We can expect this to reduce the available capacity of the drainage system during severe storm events.



The next impact of high river levels that we'll go over is their effect on the flows entering the Lou Romano Water Reclamation Plant. The area shown in yellow on this slide is the Lou Romano plant's service area. Wastewater from all of the homes and businesses in this area is collected by sanitary and combined sewers and sent to the treatment plant through a huge trunk sanitary sewer located parallel to the Detroit River shoreline. This trunk sewer is shown as the red dashed line on this slide.

However, when the Detroit River water levels are high, river water can enter the trunk sanitary sewer at each of the combined sewer overflows. And as you can see, there are quite a number of CSOs located both within and upstream of our study area that contribute to this problem.

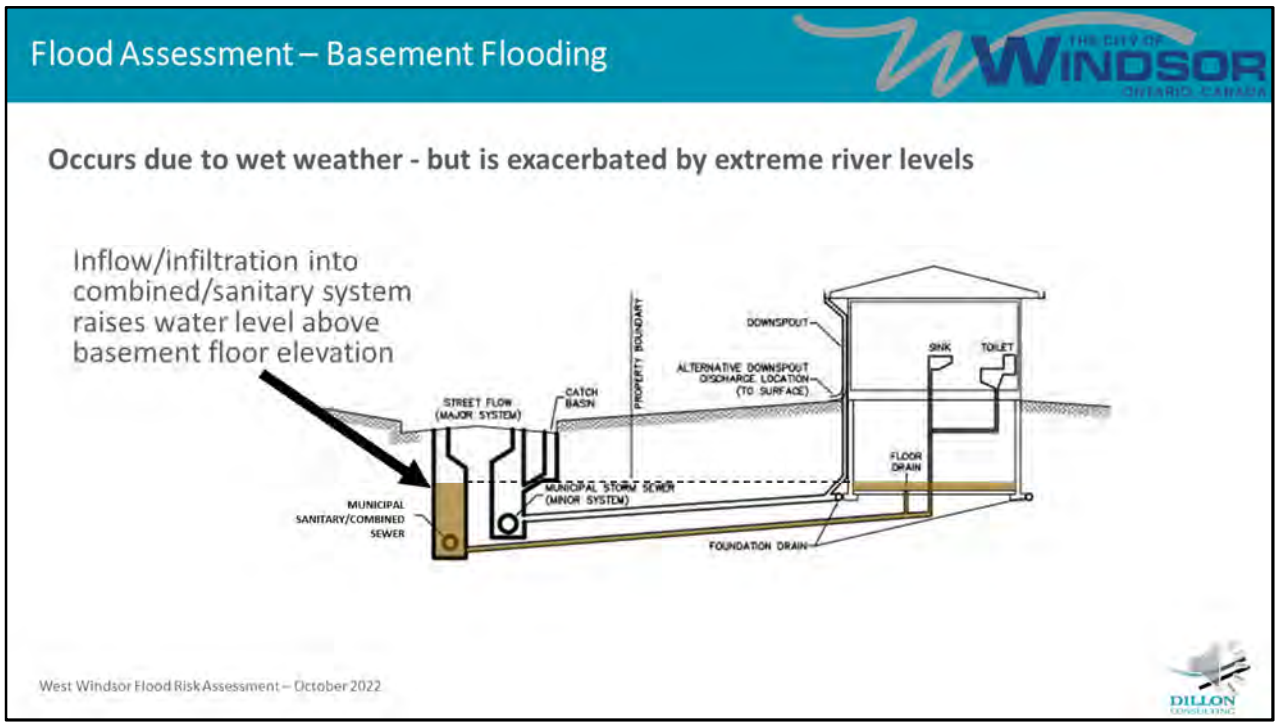
Our next slide illustrates how CSOs allow river water to enter the City of Windsor sewer system in a bit more detail.



The graphic on the left shows how CSOs operate during dry weather conditions under normal river levels. Wastewater from our upstream homes and businesses is all collected by sanitary and combined sewer systems and sent to the Lou Romano plant to be treated before flowing into the Detroit River.

The middle graphic shows how CSOs operate during severe storm events under normal river level conditions. During these severe storms, a portion of the wastewater flows directly to the Detroit River through the CSOs. The reason why this is allowed to happen is to reduce the possibility of basement flooding and to reduce the risk of overwhelming the treatment plant. This only happens during severe storms and the City of Windsor is actively working to reduce the number of overflow occurrences through a number of ongoing projects.

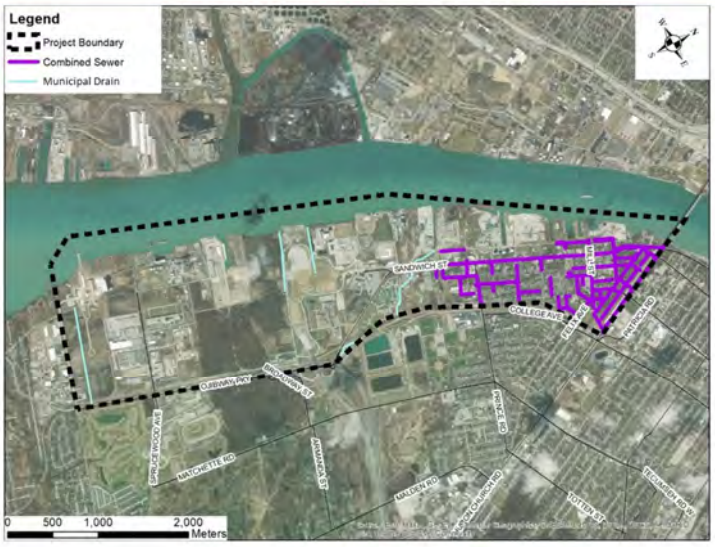
These first two graphics show how CSOs operate under normal river level conditions. The graphic on the right shows us what happens when the Detroit River water levels rise above the CSOs. As you can see in this case, river water is now entering the sewer system and being sent to the Lou Romano plant for treatment.



Basement flooding occurs during wet weather when the water level in the municipal sanitary or combined sewer is higher than the elevation of the basement. When we talk about wet weather, we typically mean rain storms or sudden snowmelt events. When these happen, runoff enters the wastewater system both through direct connections and through inflow and infiltration pathways such as pipe joints and maintenance hole lids.

These inflows flood the wastewater system and can back up through the floor drain and into the home. The risk of basement flooding is increased by extreme river levels because as we showed on the last slide, a portion of the capacity of the wastewater system is being used up by river water.

Flood Assessment – Basement Flooding



West Windsor Flood Risk Assessment – October 2022

The portions of West Windsor that may be most at risk of basement flooding are the areas serviced by combined sewers, shown in purple on this slide.

Flood Assessment – Local Flooding

Surface ponding when drainage systems surcharge – exacerbated by extreme river levels

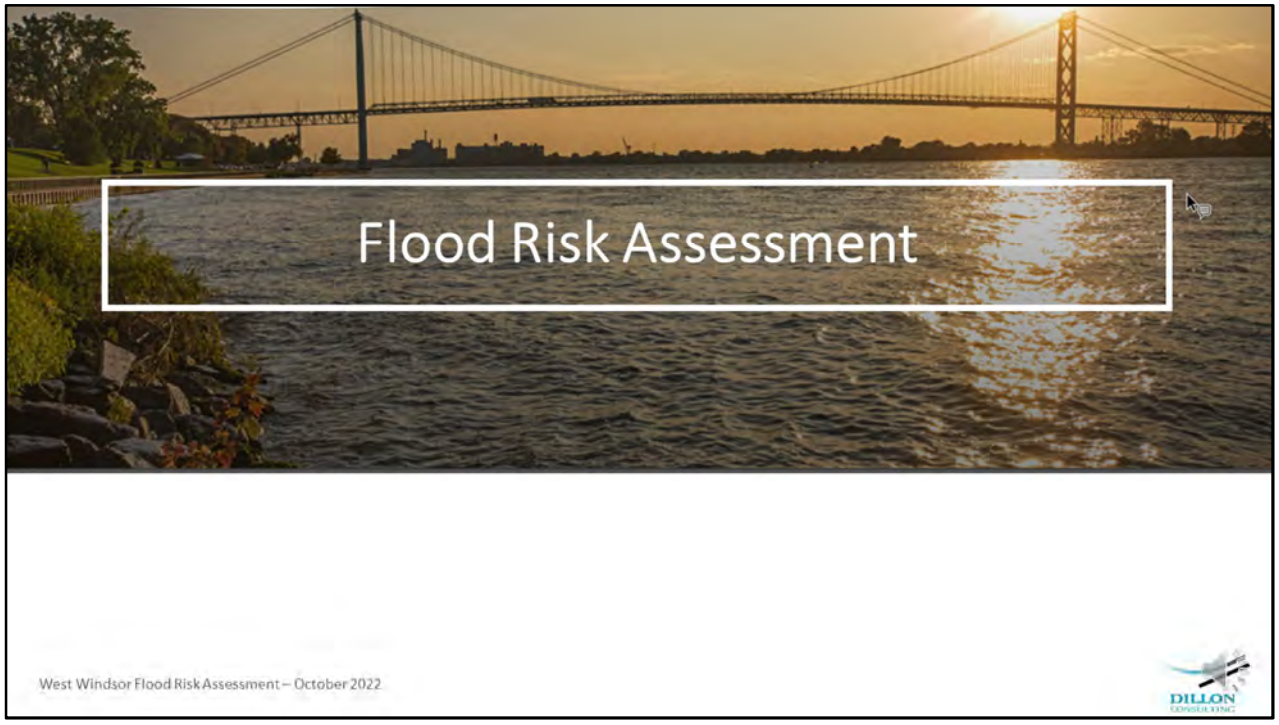
- Morton Avenue
- Sprucewood Avenue/Maplewood Drive
- Ojibway Parkway
- Sandwich Street at McKee Creek
- Russell Street
- Riverside Drive

West Windsor Flood Risk Assessment – October 2022

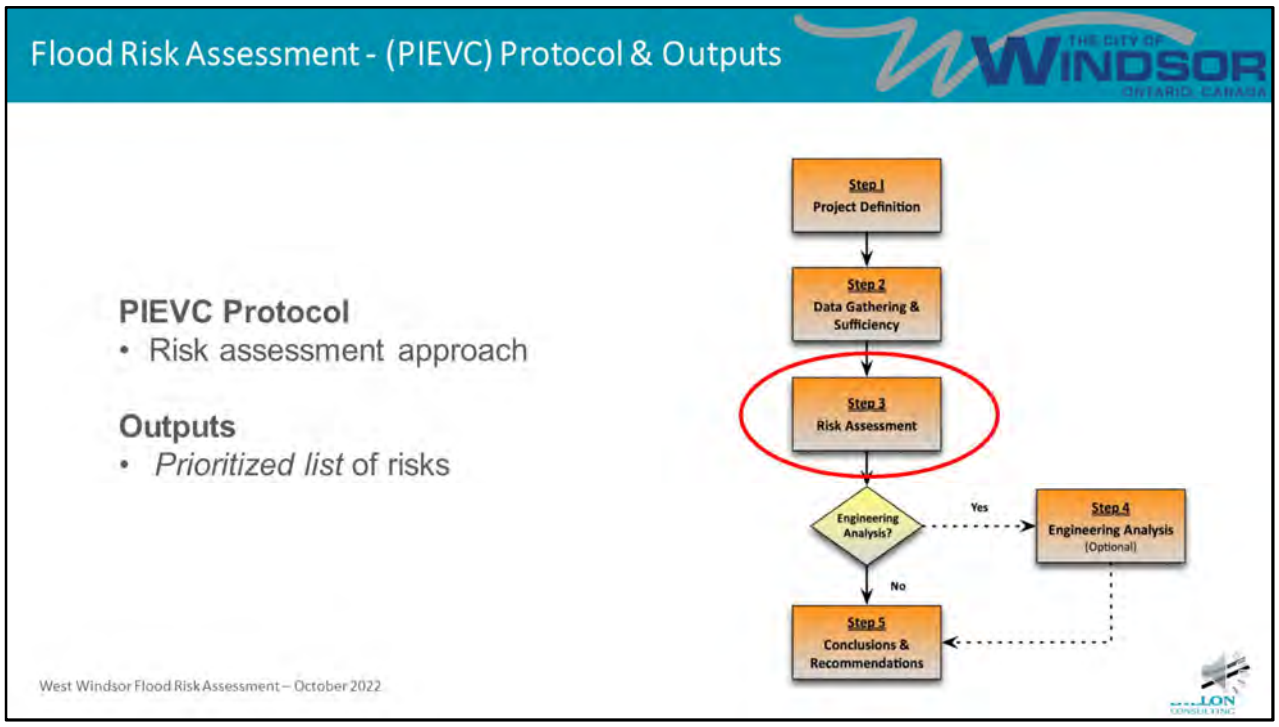
Local surface flooding occurs during storms when the local drainage system surcharges because it simply isn't big enough to handle the incoming flows. When we use the word surcharge in these cases, what we mean is the peak water level rises above the maximum design level in the drainage system. For a storm sewer, this is when maintenance holes begin to flood, and for a ditch system, this is when the water level rises above the top of bank. High river levels can exacerbate these local flooding conditions by reducing the available capacity of the local storm drainage system.

Based on our flood assessment of the West Windsor area, Morton Avenue, Sprucewood Avenue, Maple Wood Drive, Ojibway Parkway, Sandwich Street near McKee Creek, Russell Street and Riverside Drive may all experience surface ponding during wet weather events.

Now that we've talked about the impacts of high river levels in West Windsor and where they happen, in the next section of the presentation we'll talk about the severity of those impacts.



The Flood Risk Assessment was completed to develop flood risk scores for each asset affected by high Detroit River levels.



To accomplish this, the study team used the PIEVC protocol. PIEVC stands for Public Infrastructure Engineering Vulnerability Committee and the protocol was developed by Engineers Canada in partnership with Natural Resources Canada. PIEVC is a structured, rigorous quantitative process to assess the risks and vulnerabilities of infrastructure to current and future extreme weather events and climatic changes.

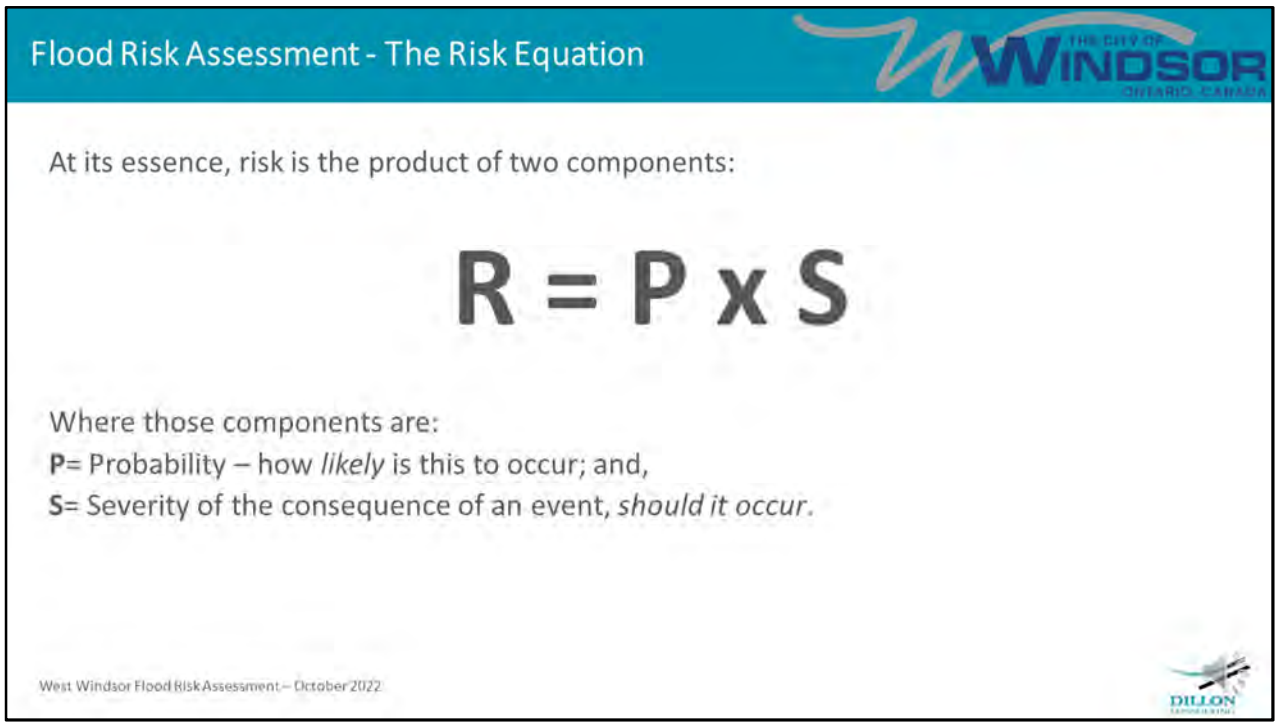
The PIEVC protocol follows the framework shown by the flow chart on this slide:

1. First a project definition is developed which requires an assessment and finalization of project parameters including the identification of infrastructure for assessment, and determination of assessment scope. We touched on these points earlier in this presentation.
2. Data is gathered which includes working with stakeholders to identify all assets that should be considered, defining climate parameters and thresholds for both existing and future conditions, and identifying where flooding occurs and the main drivers causing flooding. We discussed these items in the flood assessment portion of this presentation.
3. In Step 3, a risk assessment is completed determine what assets are impacted by flooding and assigning a risk score to each asset. We'll be talking about this over the next two slides.
4. Following the risk assessment, an engineering analysis was completed to develop and

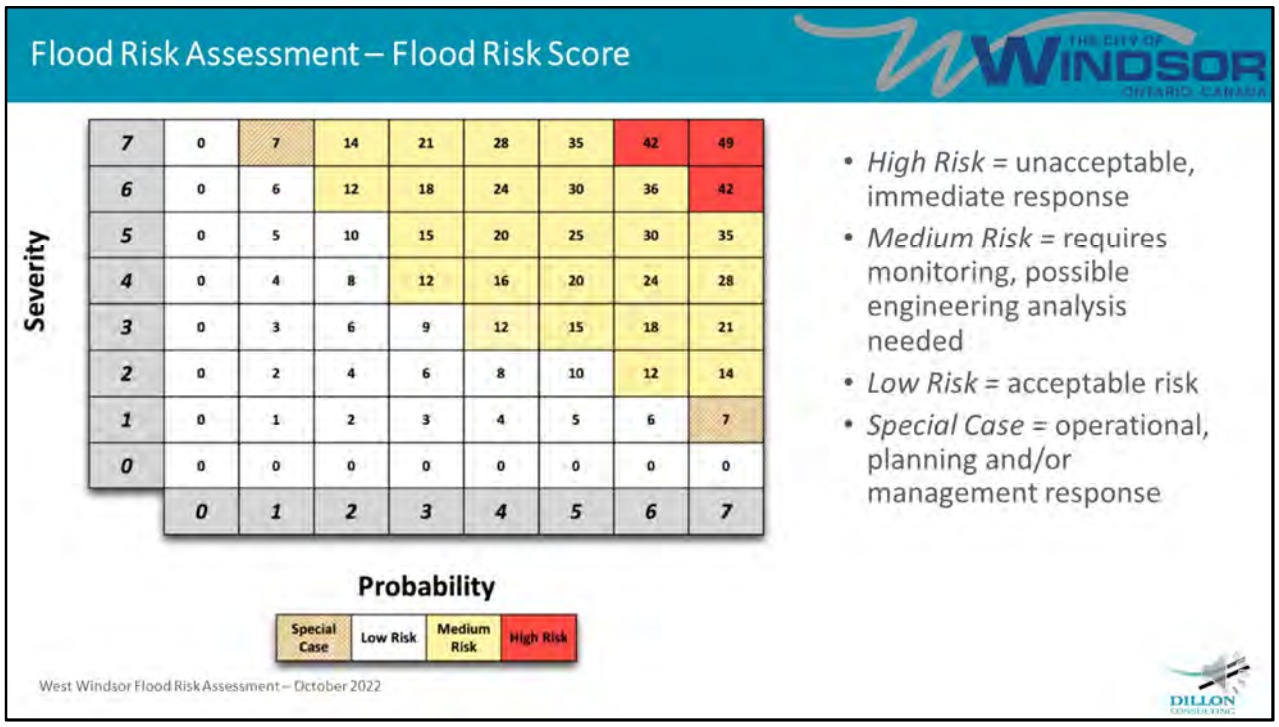
evaluate solutions. We'll be talking about these a little bit later in this presentation.

5. And finally, Conclusions and Recommendations are developed.

Our next two slides will be focusing on Step 3.



Using the PIEVC protocol, we calculated a risk score for every asset that we identified in the West Windsor area. As this equation shows, the risk score is the product of two components. The first is the probability of flooding occurring at the asset. The second is the severity of the consequences of flooding on that asset. Those consequences may range from a minor temporary nuisance, to the need for repairs, or - most extreme – the complete loss of the asset.



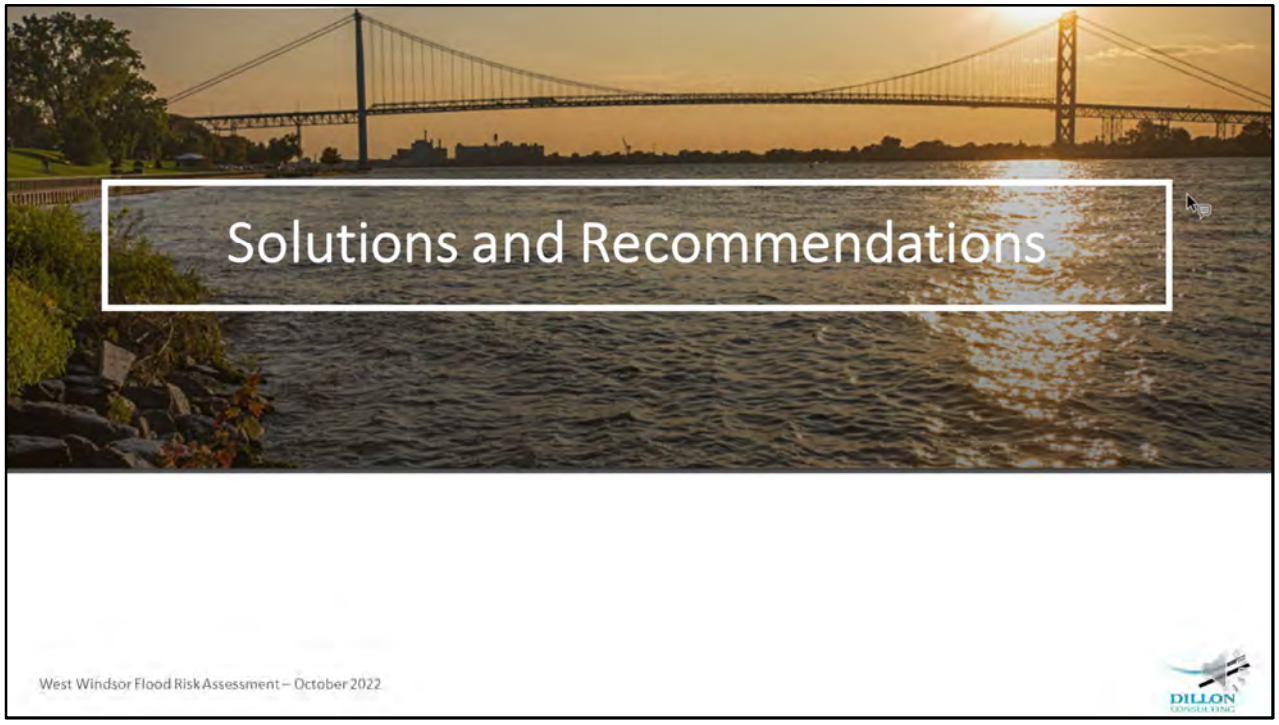
The range of resulting flood risk scores is summarized in the following table. Each asset was assigned a level of risk based on its flood risk score.

High risk scores were assigned where the consequences of flooding on an asset are unacceptable and a mitigation solution is required.

Medium Risk scores require monitoring and possible solutions.

Low Risks are acceptable.

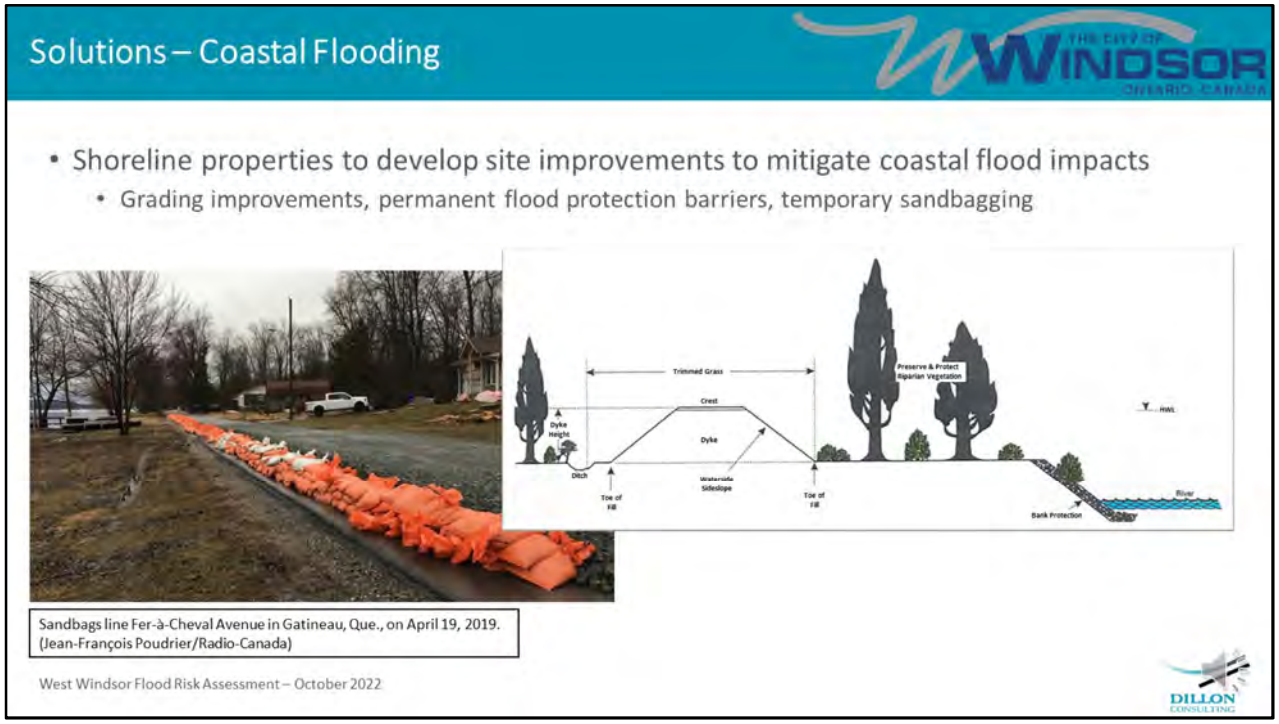
Lastly, special cases were identified where operational changes, planning considerations, or management response are required.



So, to recap what we've discussed so far:

- We've characterized the impacts of extreme river levels on West Windsor;
- We've identified which assets in West Windsor will likely be affected; and
- We've assessed the risk to each asset to help us identify where we need to develop responses.

We're now going to go over the solutions and recommendations that have been prepared to address each type of flooding that we identified earlier in the presentation.

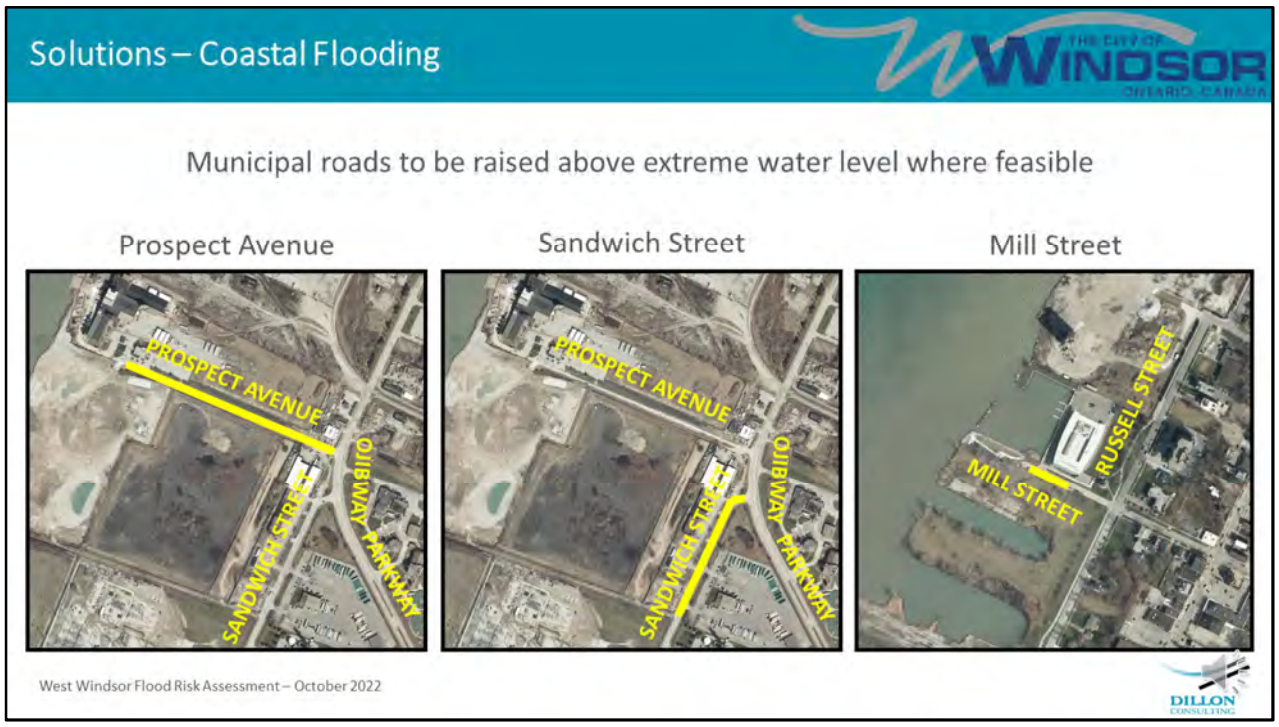


We'll begin by talking about solutions to address coastal flooding.

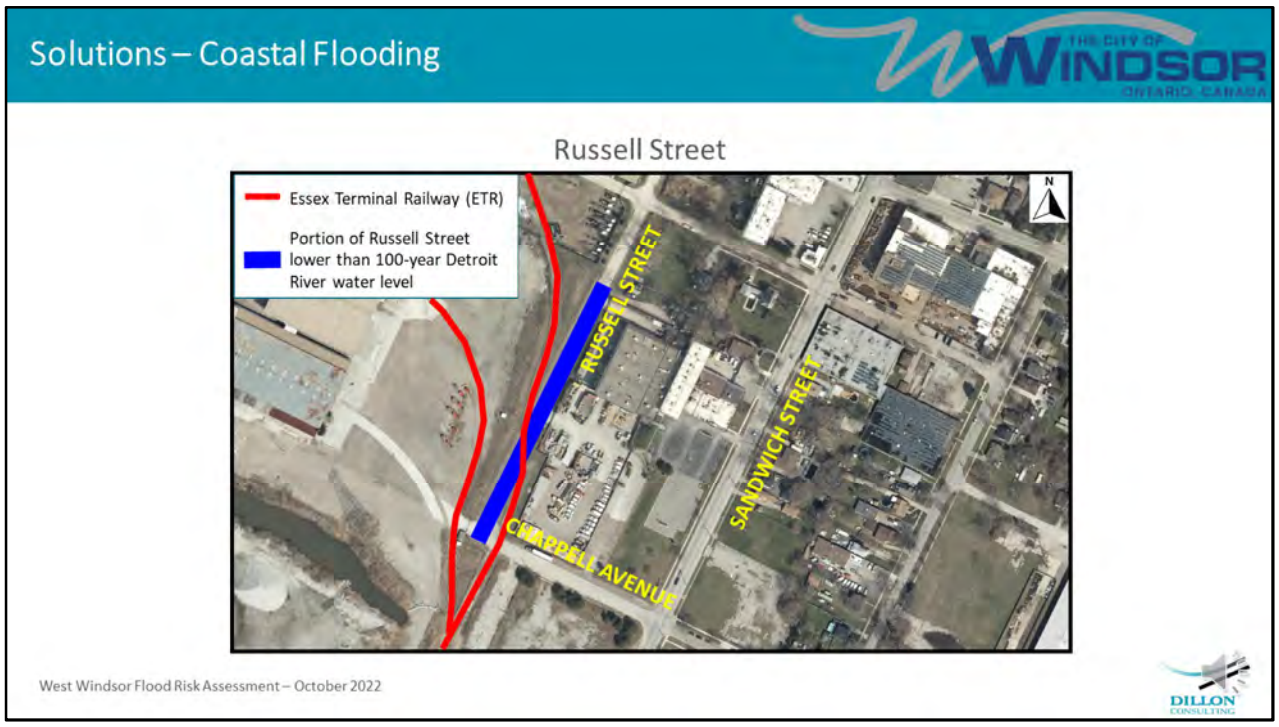
You'll remember that this is flooding of low lying shoreline properties caused directly by extreme river levels. Since these are mostly privately owned industrial lands, and since coastal flooding generally doesn't encroach inland beyond these properties, we recommend that these properties implement their own site improvements to protect themselves from coastal flooding. This will give individual shoreline property owners the flexibility to select measures that meet the specific needs of their operations.

Site owners can consider both temporary and permanent coastal flood protection measures during periods of extreme water levels.

- Temporary measures could include sandbag barriers or moving site operations to locations outside of the flooded areas;
- While permanent measures may include site grading improvements to raise critical portions of the site above the high water level, or constructing permanent flood protection barriers such as berms.



The other assets affected by coastal flooding are municipal roads. Portions of Prospect Avenue, Sandwich Street, and Mill Street are lower than the 100-year Detroit river water level. Where feasible, the profiles of Prospect Avenue, the portion of Sandwich Street immediately south of Ojibway Parkway, and the west limit of Mill Street will be raised to mitigate flooding during periods of high river levels.

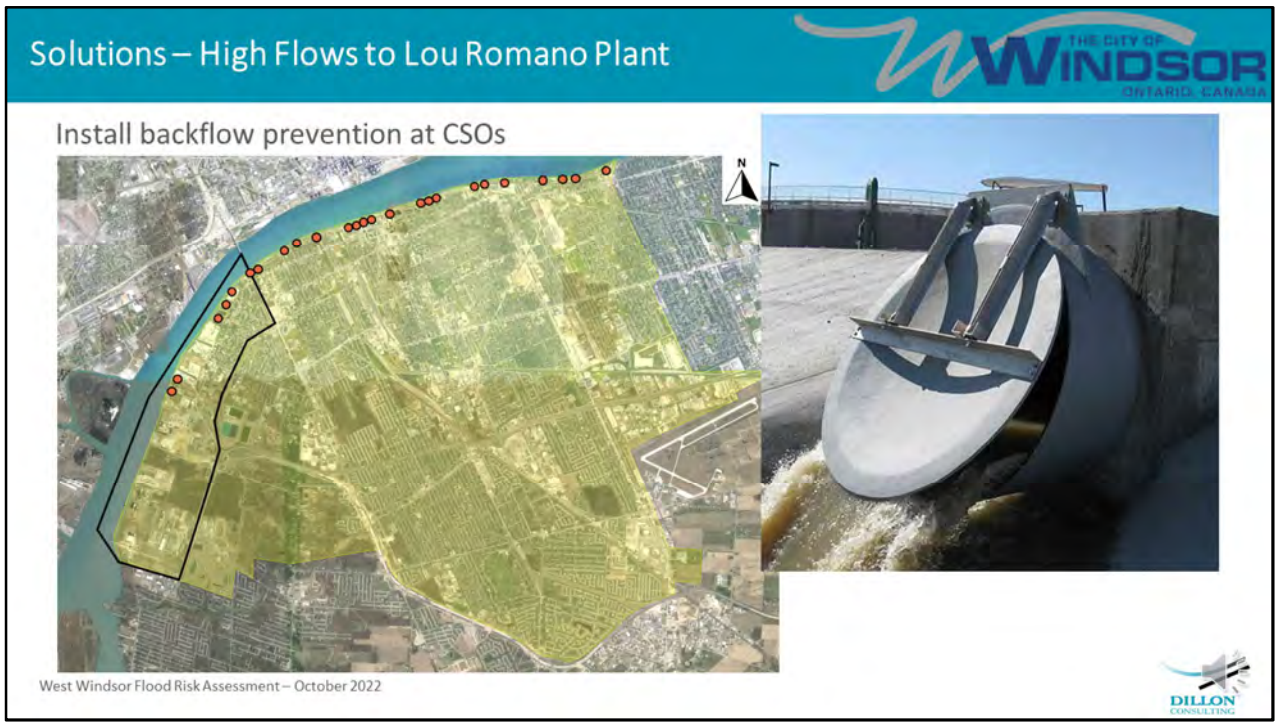


The southernmost portion of Russell Street near its intersection with Chappell Street is also lower than the Detroit River 100-year water level. However, in this case, simply raising the Chappell Street road profile isn't feasible because the Essex Terminal Railroad crosses the right-of-way at two locations. Any changes to the road profile would also require changes to the railway line and would have significant impacts on neighboring properties.

In this case, an adaptive solution is proposed. This portion of Russell Street serves to provide local property access and is not an arterial road. If this area becomes flooded, there are alternate routes for through traffic. Furthermore, the estimated flood depths are not sufficient to prevent traffic access to the fronting properties.

For this area, a flood response plan should be developed to:

- Warn of the flood hazard;
- Block through traffic; and
- Confirm that property access is maintained.



Our next set of solutions addresses the additional flows to the Lou Romano Water Reclamation Plant.

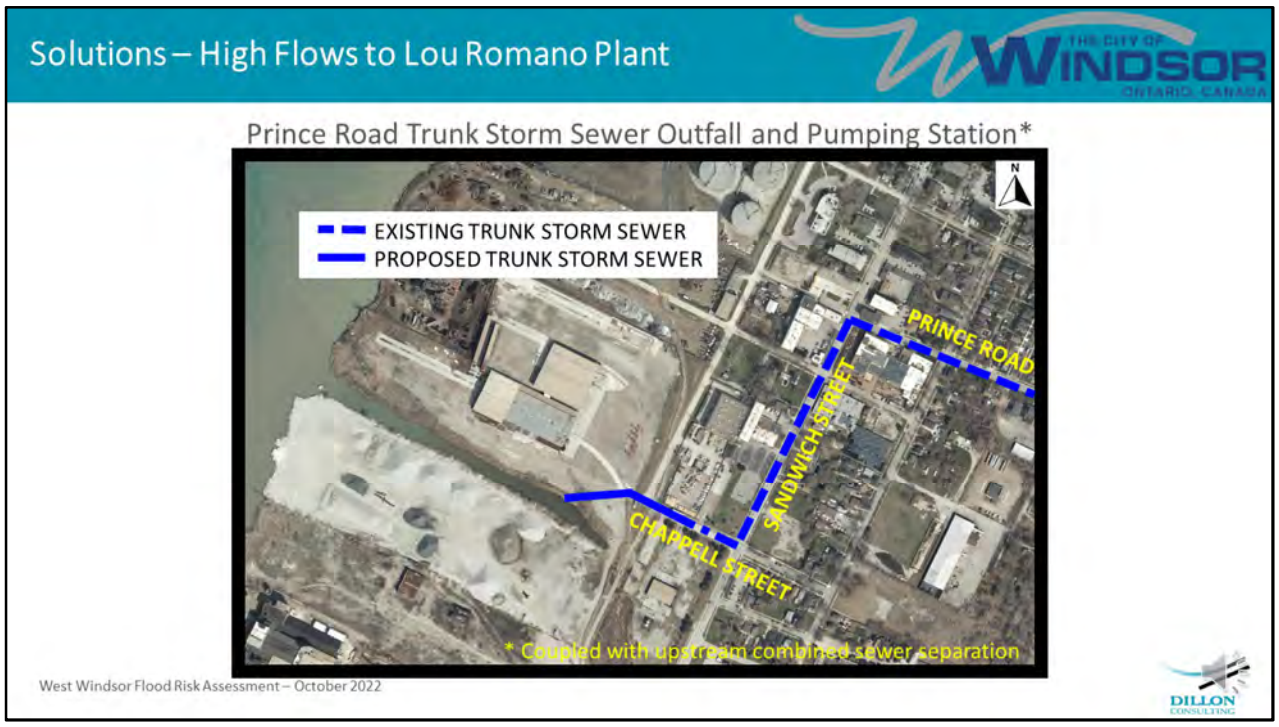
The first component of the recommended solution is to install backflow prevention at all CSOs that are below the projected Detroit River 100-year water level. This includes the CSOs located in the West Windsor area, as well as those located upstream.

Backflow preventers are devices that allow water to flow in only one direction – examples include flap gates such as the one shown in the image on the righthand side of this slide, check valves, and weirs. Whatever devices are chosen, they will be oriented to prevent Detroit River water from entering the combined storm sewer, while allowing overflows to enter the Detroit River during periods of severe rainfall, thereby protecting upstream homes and businesses from basement flooding.

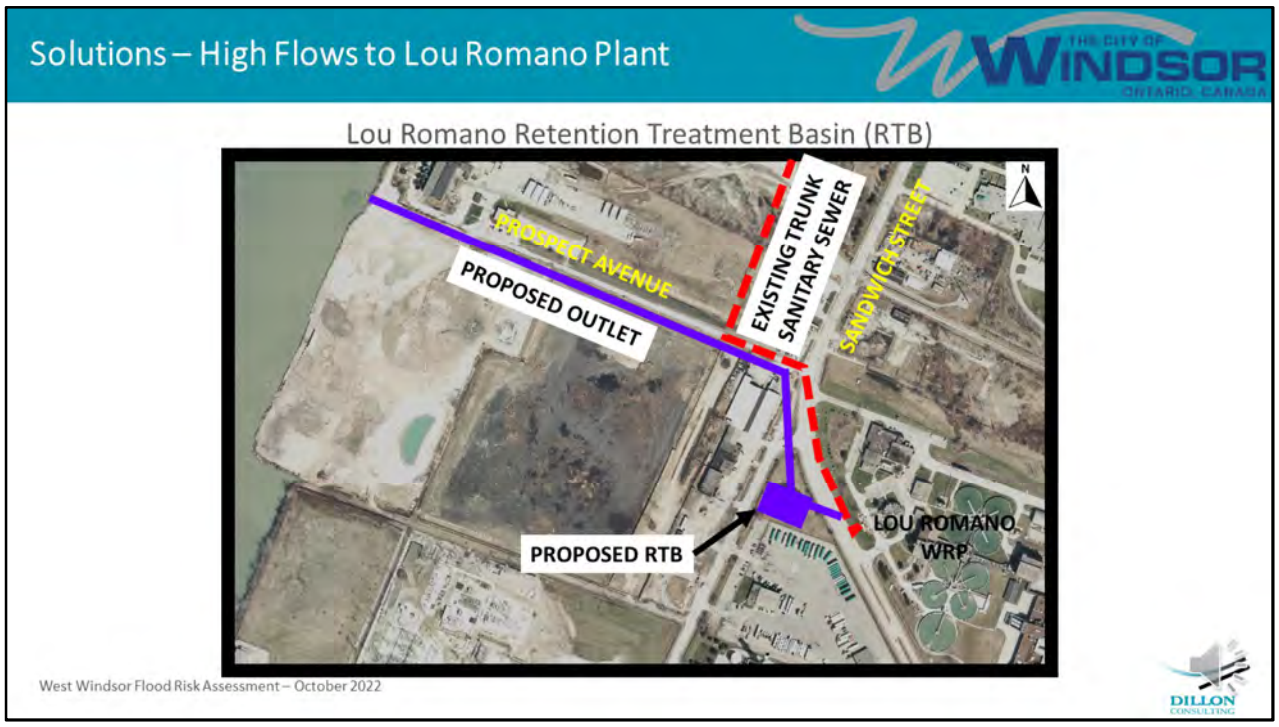
Backflow preventers can be implemented in the near term but there are other solutions located in the West Windsor area that have been recommended through previous studies that will also help to reduce the flows to the Lou Romano plant. I'll be covering those in the next four slides.

The City of Windsor Sewer and Coastal Flood Protection Master Plan completed in 2020 identified the need to separate the combined sewers, which means replacing the existing combined sewers with separate storm and sanitary systems.

One of the projects recommended in the Master Plan to support this goal is the construction of a new trunk storm sewer and outfall from Detroit Street in the northern portion of the West Windsor study area. This new outfall will provide a stormwater outlet to allow upstream combined sewer separation to proceed, and direct stormwater that would otherwise go to the Lou Romano plant to the Detroit River.

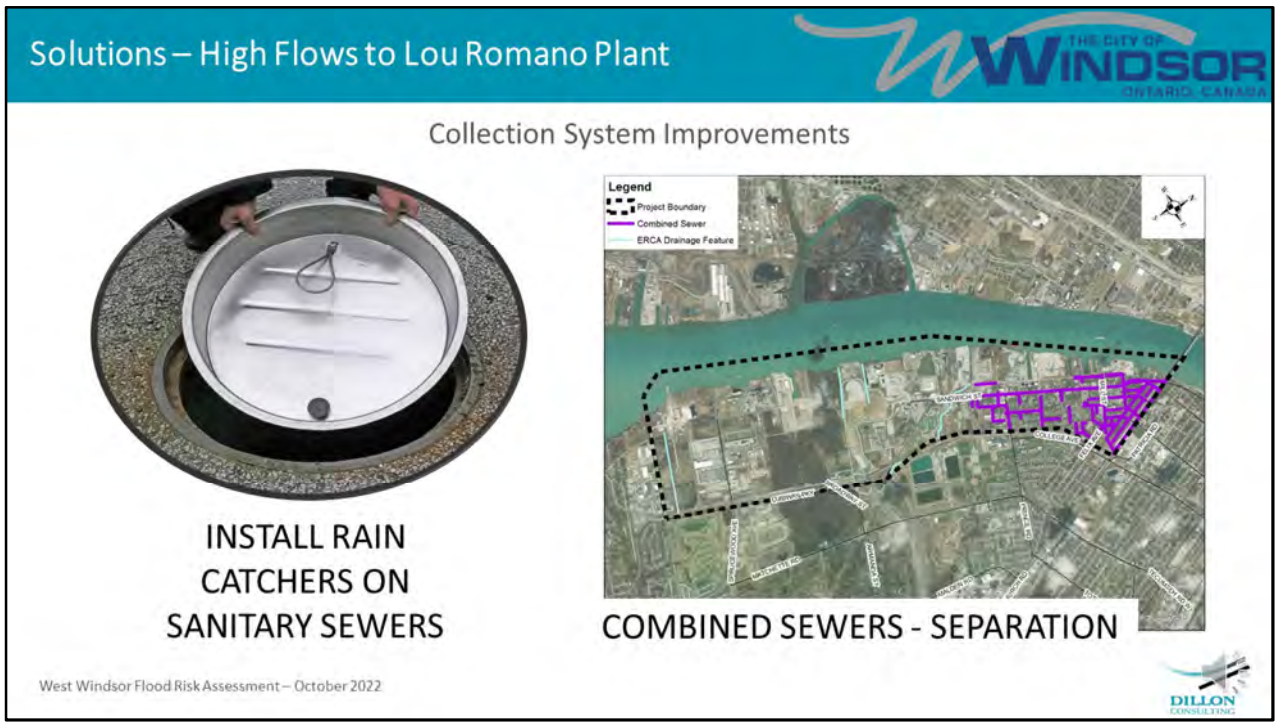


Another proposed storm sewer outfall recommended through the Sewer and Coastal Flood Protection Master Plan is the Prince Road Trunk Storm Sewer Outfall and Pumping Station. Similar to the proposed Detroit Street Outfall, the project will direct stormwater away from the flows entering the Lou Romano plant. The City of Windsor is in the process of completing an Environmental Assessment to establish the location of the proposed outfall works. That process is expected to be completed in 2022.



In 2019, the City of Windsor completed an environmental assessment for a proposed retention treatment basin, or RTB, at the Lou Romano Treatment Plant. The RTB will provide primary treatment of wastewater during wet weather events when the flows to the plant are greater than the plant capacity. Wet weather flows include both wastewater from our homes and businesses, and storm runoff that enters the sewer network either intentionally through combined systems or unintentionally through inflow and infiltration sources. Additionally, the RTB will provide primary treatment of wastewater in an emergency situation, such as a catastrophic failure at the plant.

Construction for the Lou Romano RTB is expected to begin in 2023.

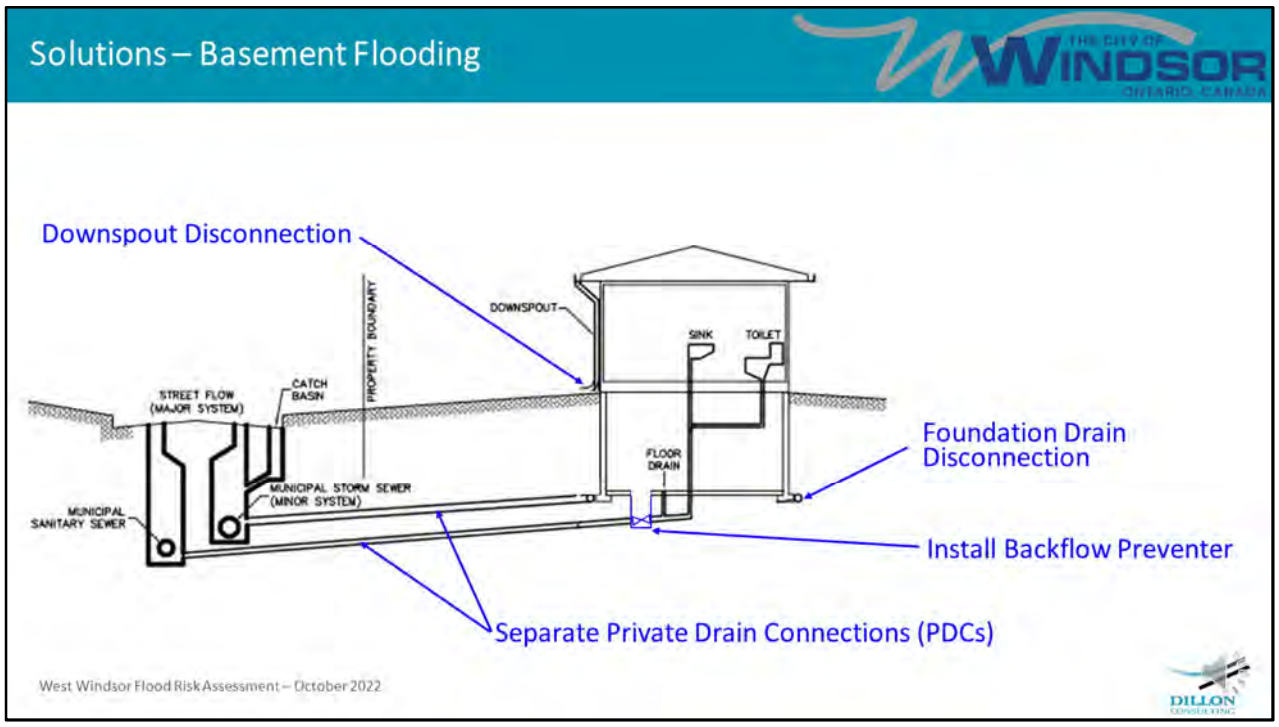


The final solutions to reduce wet weather flows to the Lou Romano treatment plant involve improvements to the upstream wastewater collection system.

During wet weather events, rainwater can enter the sanitary sewer through pick holes and ill-fitting maintenance hole covers. Flow through a pick hole alone can be on the order of 3 L/s. While this may not sound like much, when you consider the hundreds of sanitary maintenance holes in West Windsor, it adds up to a significant volume during a single storm event.

Rain catchers, which are essentially removable pans that fit directly beneath the maintenance hole lid are recommended at all locations where surface ponding is expected to occur. These are an easily implemented way of reducing flows to the Lou Romano plant.

The other collection system improvement that will reduce flows to the Lou Romano plant is combined sewer separation. The City of Windsor has a number of ongoing projects to eliminate stormwater flows to its combined sewers. However, given the many kilometers of existing combined sewers it will take many years to separate all of these systems.



Each of the solutions that we've discussed so far that reduce the flows entering the sanitary and combined sewer systems will also help to reduce basement flooding. However, these programs will take time to implement.

Homeowners also have a role to play in protecting their residences from basement flooding. These solutions can be implemented readily and provide immediate protection to individual properties while programs to improve the municipal drainage systems are implemented. Examples of home improvements that can provide flood mitigation include:

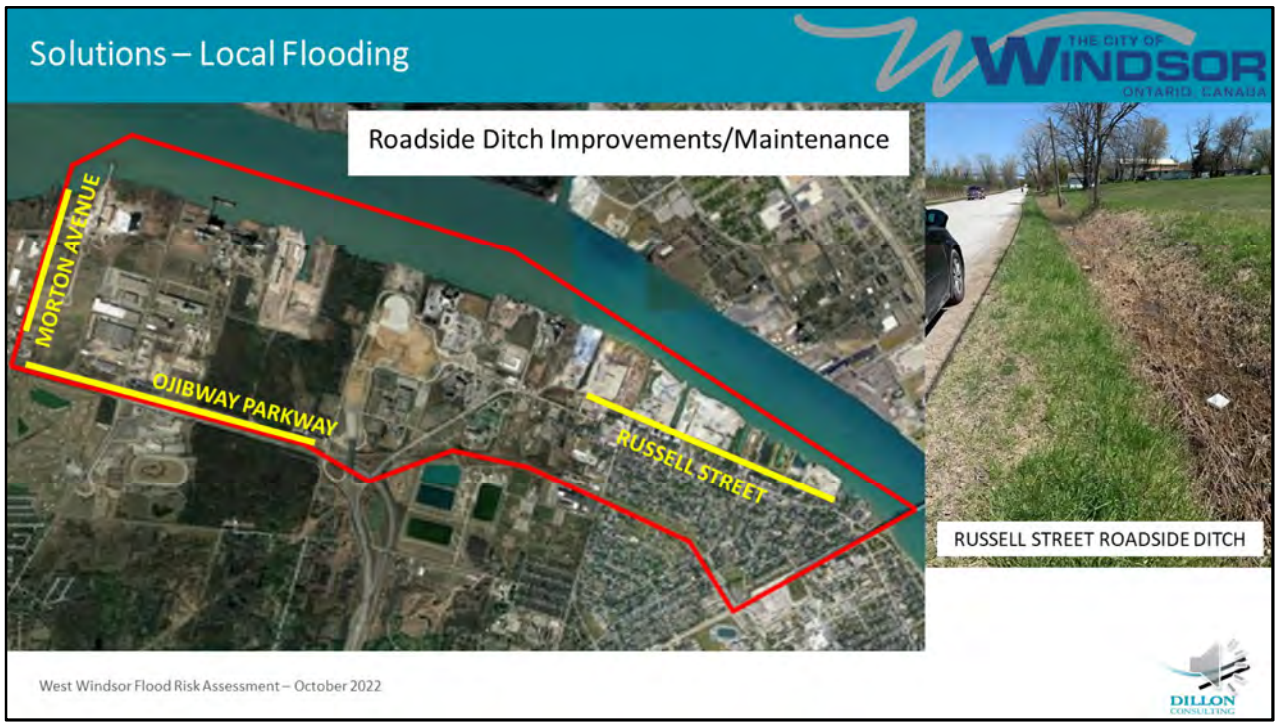
- Disconnecting downspouts from foundation drains and directing them instead to the ground surface;
- Disconnecting foundation drains from the private drain connection and directing them instead to a sump pump;
- Installing a backflow preventer to prevent wastewater backups into the come; and
- Providing separate private drain connections, one for sanitary flows and one for storm flows.

The City of Windsor currently has two programs to help homeowners protect their homes from basement flooding.

The Downspout Disconnection Program provides free assistance to help property owners safely redirect the flows from their eaves troughs to the ground surface.

The Basement Flood Protection Subsidy Program provides homeowners with up to $2,800 per property towards the costs of installing eligible flood protection measures such as backflow preventers, new sump pump installations, and foundation drain disconnections.

More information on both of these programs can be found on the City of Windsor at the links provided here, or by telephoning the City of Windsor.



To address local flooding, improvements and maintenance to roadside ditches are recommended on:

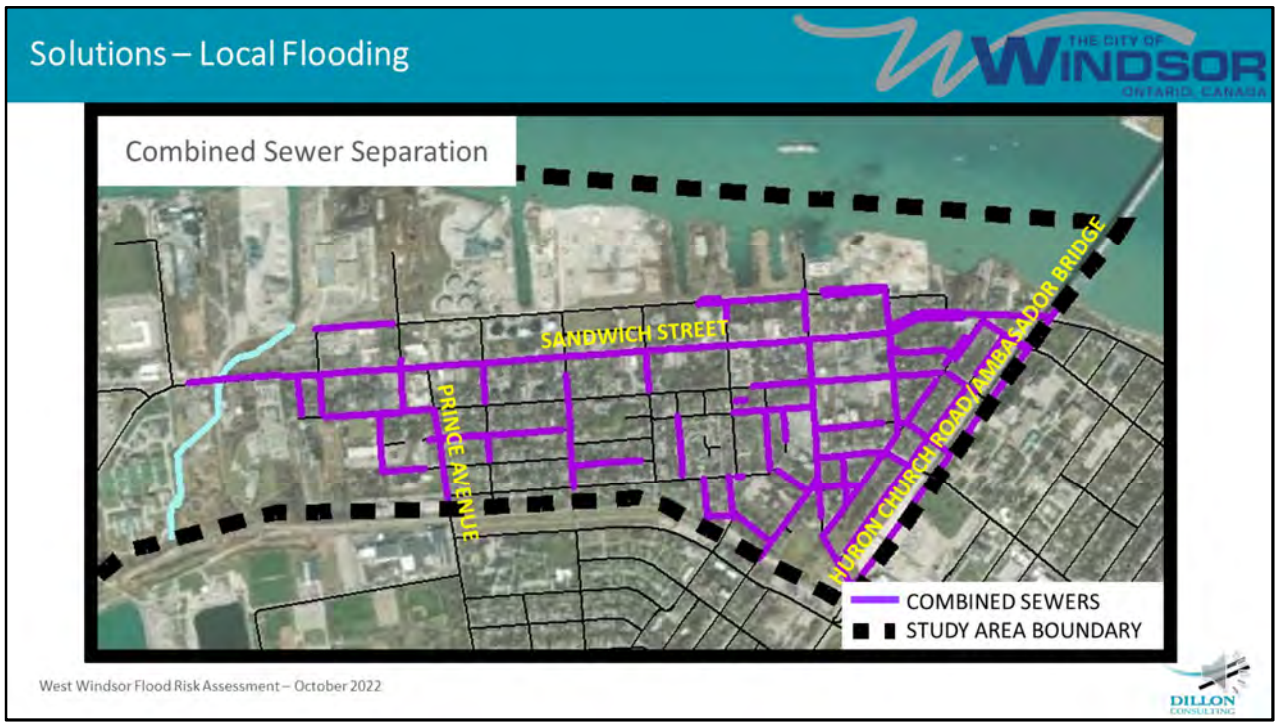
- Morton Avenue;
- Ojibway Parkway; and
- Russell Street.

This work will likely involve vegetation removal, minor regrading, and could also include ditch widening at some locations.

Similar improvements are recommended to the roadside ditches on Maplewood Drive and Sprucewood Avenue. Since there is some information to suggest that these ditches may be part of a municipal drain system, any improvements or maintenance will need to be completed in accordance with the Drainage Act.

Another area where this a significant risk of local flooding is McKee Creek, which is a municipal drain. Similar to the recommendations for the roadside ditches that we discussed on the previous slide, the proposed solution for McKee Creek is to perform drain maintenance and assess the need for drain improvements.

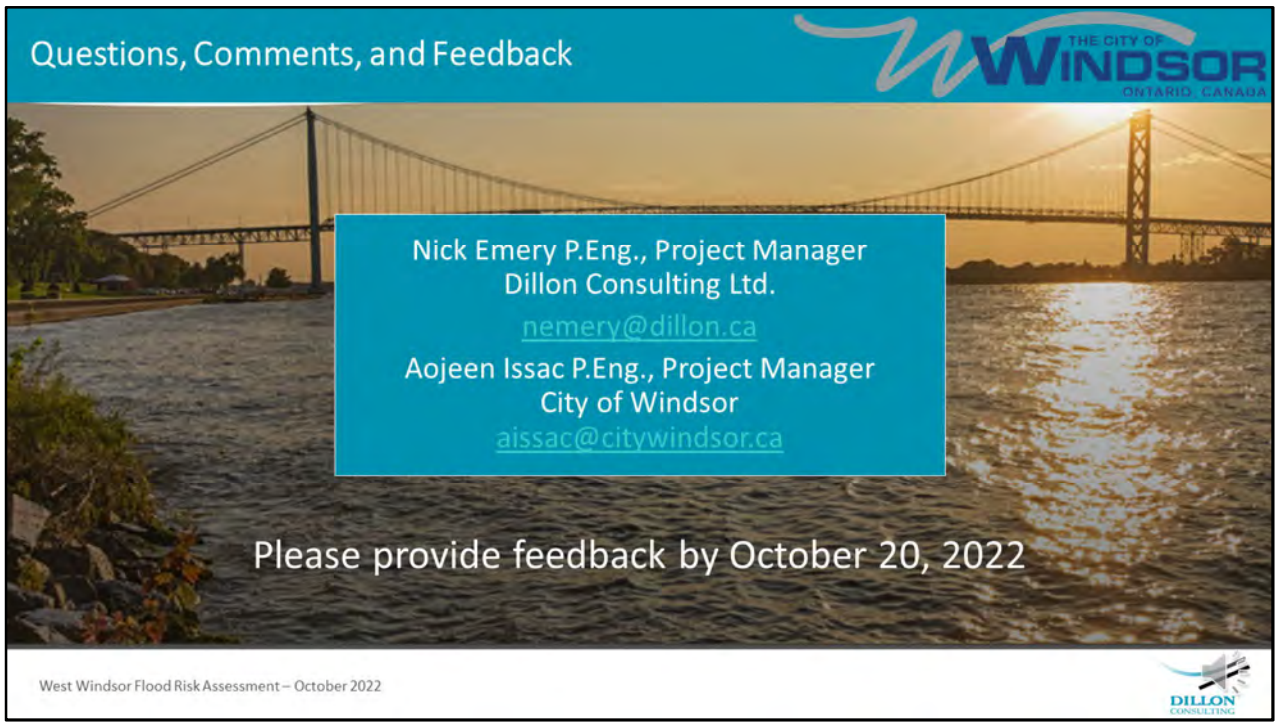
Since McKee Creek is a municipal drain, all of these works will need to be completed in accordance with the Drainage Act. Drain maintenance is recommended in the short term to improve the existing drain capacity. This includes removing vegetation and accumulated sediment from the channel. Over the long term, the need for drain improvements should be assessed. Drain improvements may include widening the channel and replacing existing culvert crossings.



As we've already mentioned, combined sewer separation has a significant role to play to address flooding in West Windsor. By providing storm sewers in areas currently serviced by combined systems, the depth and frequency of roadway ponding during severe storm events will be reduced.

I'd just like to remind you that this is a long-term solution that will take time to implement in West Windsor.

The final solution to address local flooding is private site improvements. These are measures that property owners can implement to reduce the risk of surface flooding. Typically this involves modifying the site grading to direct water away from homes and businesses and reduce maximum ponding depths.



This brings us to the end of our virtual Public Information Centre for the West Windsor Flood Assessment Study. The next step in the project is for the study team to prepare its final report to document the study findings and recommendations. If you have any questions, comments, or feedback on the information provided in this presentation or the project in general, please feel free to contact the project managers at the email addresses shown on this slide. Thank you very much for taking the time to listen to this presentation.

West Windsor Flood Risk Study - Stakeholder List

Date Added	Organization	Title	First Name2	Last Name	Email 1	Phone Number	Address 1	City	Provinc	Postal Code
Mayor, Council, and Municipal Staff - Windsor										
08/05/2021	City of Windsor	Mayor	Drew	Dilkens	mayorsoffice@citywindsor.ca	519-255-7796	350 City Hall Square West	Windsor	ON	N9A 6S1
08/05/2021	City of Windsor	Ward 1 Councillor	Fred	Francis	ffrancis@citywindsor.ca	519-250-4607	350 City Hall Square West, Suite 220	Windsor	ON	N9A 6S1
08/05/2021	City of Windsor	Ward 2 Councillor	Fabio	Costante	fcostante@citywindsor.ca	519-252-1005	350 City Hall Square West, Suite 220	Windsor	ON	N9A 6S1
08/05/2021	City of Windsor	Senior Economic Development Officer	Milan	Vujanovic	mvujanovic@citywindsor.ca	519-255-6100 x6608	350 City Hall Square West	Windsor	ON	N9A 6S1
09/20/2021	City of Windsor	Commissioner of Infrastructure Services	Chris	Nepszy	cnepszy@citywindsor.ca	(519) 255-6247x6356 / mobile: (519) 791-5564	1266 McDougall Ave	Windsor	ON	N8X 3M7
08/05/2021	City of Windsor	Senior Manager, Infrastructure & Transportation	France	Isabelle-Tunks	ftunks@citywindsor.ca	519-255-6100 ext 6402	350 City Hall Square West, Room 302	Windsor	ON	N9A 6S1
08/05/2021	City of Windsor	Manager, Design and Development	Fahd	Mikhael	fmikhael@citywindsor.ca		350 City Hall Square West	Windsor	ON	N9A 6S1
08/05/2021	City of Windsor	Deputy City Solicitor	Wira	Vendrasco	wvendrasco@citywindsor.ca		350 City Hall Square West	Windsor	ON	N9A 6S1
08/05/2021	City of Windsor	Manager, Real Estate Services	Frank	Scarfone	fscarfone@citywindsor.ca		350 City Hall Square West	Windsor	ON	N9A 6S1
08/05/2021	City of Windsor	Supervisor, Environmental Sustainabilty and Climate Cl	Karina	Richters	krichters@citywindsor.ca		350 City Hall Square West	Windsor	ON	N9A 6S1
09/20/2021	City of Windsor	Manager of Parks Development	Wadah	Al-Yassiri	walyassiri@citywindsor.ca	519-253-2300 ext 2740	2450 McDougall Street	Windsor	ON	N8X 3N6
08/05/2021	City of Windsor	Manager of Contracts, Field Services & Maintenance	Phong	Nguy	pnguy@citywindsor.ca	519-255-6560 ext 4253	1266 McDougall Avenue	Windsor	ON	N8X 3M7
08/05/2021	City of Windsor		Stephen	Habrun	shabrun@citywindsor.ca	519-944-4111	3700 North Service Road East	Windsor	ON	N8W 5X2
08/05/2021	City of Windsor	City Planner/Executive Director	Thom	Hunt	thunt@citywindsor.ca	519-255-6543	350 City Hall Square West	Windsor	ON	N9A 6S1
09/20/2021	City of Windsor	Engineer II	Aojeen	Issac	aissac@citywindsor.ca	519-255-6257 ext 6368	351 City Hall Square West	Windsor	ON	N9A 6S2
05/10/2022	City of Windsor	Manager of Process Engineering & Maintenance	Ed	Valdez	evaldez@citywindsor.ca	(519) 253-7111 ext. 3366	4155 Ojibway Parkway	Windsor	ON	N9C 4A5
05/10/2022	City of Windsor	Plant Manager	Kevin	Cabana	kcabana@citywindsor.ca	(519) 253-7111 ext. 3383	4156 Ojibway Parkway	Windsor	ON	N9C 4A6
05/10/2022	City of Windsor	Maintenance Coordinator	Roberta	Harrison	roharrison@citywindsor.ca					
05/10/2022	City of Windsor	Manager Parks Development	Wadah	Al-Yassiri	walyassiri@citywindsor.ca	(519) 255-6100 ext. 6494	350 City Hall Square West	Windsor	ON	N9A 6S1
06/10/2022	City of Windsor	Engineer II	Ian	Wilson	IWilson@citywindsor.ca					
06/10/2022	City of Windsor	Water & Wastewater Engineer	Ryan	Langlois	RLanglois@citywindsor.ca					
06/10/2022	City of Windsor	Manager, Development	Stacey	McGuire	smcguire@citywindsor.ca					
09/20/2021	City of Windsor	Senior Manager of Pollution Control	Jake	Renaud	jrenaud@citywindsor.ca	519-253-7111 ext 3229	4155 Ojibway Parkway	Windsor	ON	N9C 4A4
Municipal Staff - Town of Tecumseh										
06/10/2022	Town of Tecumseh	Deputy Clerk & Manager Legislative Services	Jennifer	Alexander	jalexander@tecumseh.ca	519-735-2184 ext 139	917 Lesperance Road	Tecumseh	ON	N8N 1W9
08/05/2021	Town of Tecumseh	Drainage Superintendent/ Engineering Technologist	Sam	Paglia	spaglia@tecumseh.ca	519-735-2184 ext 105	917 Lesperance Road	Tecumseh	ON	N8N 1W9
08/05/2021	Town of Tecumseh	Director Planning & Building Services	Brian	Hillman	bhillman@tecumseh.ca	519-735-2184 ext 131	917 Lesperance Road	Tecumseh	ON	N8N 1W9
08/05/2021	Town of Tecumseh	Manager Engineering	John	Henderson	jhenderson@tecumseh.ca	519-735-2184 ext 166	917 Lesperance Road	Tecumseh	ON	N8N 1W9
	Town of Tecumseh	Director Public Works & Environmental Services	Phil	Bartnik	pbartnik@tecumseh.ca	519-735-2184 ext 148	917 Lesperance Road	Tecumseh	ON	N8N 1W9
Municipal Staff - Town of LaSalle										
09/20/2021	Town of LaSalle	Director of Council Services/Clerk	Jennifer	Astrologo		519-969-7770 ext 1223	5950 Malden Road	LaSalle	ON	N9H 1S4
08/05/2021	Town of LaSalle	Manager of Engineering	Jonathan	Osborne	josborne@lasalle.ca	519-969-7770 ext 1255	5950 Malden Road	LaSalle	ON	N9H 1S4
08/05/2021	Town of LaSalle	Director of Public Works	Peter	Marra	pmarra@lasalle.ca	519-969-7770 ext 1475	5950 Malden Road	LaSalle	ON	N9H 1S4
08/05/2021	Town of LaSalle	Chief Administrative Officer	Joe	Milicia		519-969-7770 ext 1224	5950 Malden Road	LaSalle	ON	N9H 1S4
Provincial Agencies										
08/05/2021	Indigineous Relations and Reconciliation	(Acting) Manager, Ministry Partnerships Unit	Rachel	Manson-Smith	MAA.EA.Review@ontario.ca	416-325-7032	160 Bloor Street East, 9th Floor	Toronto	ON	M7A 2E6
08/05/2021	Ministry of the Environment, Conservation and Parks	Supervisor	Crystal	Lafrance	crystal.lafrance@ontario.ca	226-919-7304	733 Exeter Rd	London	ON	N6E 1L3
08/05/2021	Ministry of Natural Resources and Forestry	District Planner	Karina	Cerniavskaia	MNRF.Ayl.Planners@ontario.ca	519-773-4757	615 John Street	Aylmer	ON	N5H 2S8
Federal Agencies										
08/05/2021	Nav Canada	No Contact - Send to General Email			service@navcanada.ca	1-613-563-5588	77 Metcalfe Street	Ottawa	ON	K1P 5L6
08/05/2021	CP Rail	Manager	Jennifer	Benedict	Jennifer_Benedict@cpr.ca	905-803-5989	1290 Central Parkway West	Mississauga	ON	L5C 4R3
08/05/2021	CN Rail	Senior Manager	Stefan	Linder	stefan.linder@cn.ca	905-669-3133	1 Administration Rd	Concord	ON	L4K 1B9
08/05/2021	CN Rail	Manager	Michael	Vallins	michael.vallins@cn.ca	905-669-3264	1 Administration Rd	Concord	ON	L4K 1B9
06/10/2022	CN Rail				ER-Public-Works@cn.ca					
Community Organizations										
08/05/2021	Windsor Essex Community Housing Corporation	No Contact - Send to General Email			info@wechc.com	519-254-1681	P.O. Box 1330	Windsor	ON	N9A 6R3
Emergency Service Providers										
08/05/2021	Central Ambulance Communications Centre		Robin	Souchuk	robin.souchuk@ontario.ca	519-256-2373	4510 Rhodes Drive, Suite 320	Windsor	ON	N8W 5K5
08/05/2021	City of Windsor	Director of Planning and Physical Resources	Barry	Horrobin	bhorrobin@police.windsor.on.ca	519-255-6700 ext 4471	150 Goyeau Street	Windsor	ON	N9A 6J5
08/05/2021	Ontario Provincial Police					519 723-2491	1219 Hicks Rd., P.O. Box 910	Essex	ON	N8M 2Y2
08/05/2021	City of Windsor	Fire Chief	Stephen	Laforet	slaforet@citywindsor.ca	519-253-3016 ext 253	815 Goyeau Street	Windsor	ON	N9A 1H7
08/05/2021	Essex-Windsor EMS		Bruce	Krauter	bkrauter@countyofessex.on.ca	519-776-6441 ext 2654	360 Fairview Avenue West, Suite 115	Essex	ON	N8M 1Y6
08/05/2021	Town of LaSalle	Fire Chief	Dave	Sutton	dsutton@lasalle.ca	519-966-0744	1900 Normandy Street	LaSalle	ON	N9H 1P8
08/05/2021	Town of Tecumseh	Director Fire Services & Fire Chief	Doug	Pitre	dpitre@tecumseh.ca	519-979-4041 ext 210	985 Lesperance Rd.	Tecumseh	ON	N8N 1W9
Environmental Organizations										
08/05/2021	Essex Region Conservation Authority (ERCA)	Director, Watershed Management Services	James	Bryant	JBryant@erca.org	519-776-5209 ext 246	360 Fairview Avenue West, Suite 311	Essex	ON	N8M 1Y6
08/05/2021	Essex Region Conservation Authority (ERCA)	Water Resources Engineer	Tian	Martin	tmartin@erca.org	519-776-5209 ext 304	360 Fairview Avenue West, Suite 311	Essex	ON	N8M 1Y6
08/05/2021	Essex Region Conservation Authority (ERCA)	Planning Department			planning@erca.org	519-776-5209	360 Fairview Avenue West, Suite 311	Essex	ON	N8M 1Y6
09/29/2022	Essex Region Conservation Authority (ERCA)	Watershed Engineer	Lina	Florian	lflorian@erca.org	519-776-5209 ext 314	361 Fairview Avenue West, Suite 311	Essex	ON	N8M 1Y7
08/05/2021	Great Lakes Institute for Environmental Research	Director	Trevor	Pitcher	glierdir@uwindsor.ca	1-519-253-3000 ext 2710	2601 Union Street	Windsor	ON	N9B 3P4
08/05/2021	Windsor Essex County Environment Committee	Environment and Sustainability Coordinator	Averil	Parent	aparent@citywindsor.ca	519-253-7111	Council Services Department 350 City Hall	Windsor	ON	N9A 6S1
08/05/2021	Detroit River Canadian Cleanup	RAP Coordinator	Claire	Sanders	sanders@detroitriver.ca	519-776-5209 ext 356	311-360 Fairview Ave West	Essex	ON	N8M 1Y6
08/05/2021	International Joint Commission	Director	Trish	Morris	morrisp@windsor.ijc.org	519-257-6715	100 Ouellette Ave., 8th Floor	Windsor	ON	N9A 6T3

West Windsor Flood Risk Study - Stakeholder List

Indigenous Communities and Organizations										
08/05/2021	Can-Am Indian Friendship Centre	No Contact - Send to General Email			admin@caifc.ca	519-253-3243	2929 Howard Ave	Windsor	ON	N8X 4W4
03-10-2022	Chippewas of the Thames First Nation	Chief	Jacqueline	French	jfrench@cottfn.com	519-289-5555	320 Chippewa Road R.R. #1	Muncey	ON	N0L 1Y0
08/05/2021	Chippewas of the Thames First Nation	Consultation Coordinator	Fallon	Burch	consultation@cottfn.com	519-264-0776	320 Chippewa Road R.R. #1	Muncey	ON	N0L 1Y0
03-10-2022	Chippewas of Kettle & Stony Point First Nation	Chief	Jason	Henry	KPAssistant@kettlepoint.org Jason.Henry@kettlepoint.org	519-786-2125	6247 Indian Lane	Lambton Shores	ON	N0N 1J1
08/05/2021	Chippewas of Kettle & Stony Point First Nation	Consultation Coordinator	Valerie	George	fdesk@kettlepoint.org	519-786-2125	6247 Indian Lane	Lambton Shores	ON	N0N 1J1
03-10-2022	Aamjiwnaang First Nation	Chief	Christopher	Plain	chief.plain@aamjiwnaang.ca	519-336-8410	978 Tashmoo Avenue	Sarnia	ON	N7T 7H5
05-10-2022	Aamjiwnaang First Nation	Environmental Coordinator	Cathleen	O'Brien	cobrien@aamjiwnaang.ca	519-336-8410 Ext. 245	978 Tashmoo Avenue	Sarnia	ON	N7T 7H5
03-10-2022	Bkejwanong Territory (Walpole Island First Nation)	Chief	Charles	Sampson	Charles.sampson@wifn.org	519-627-1481	117 Tahgahoning Rd.	Walpole Island	ON	N8A 4K9
03-10-2022	Caldwell First Nation	Chief	Mary	Duckworth	ChiefMaryDuckworth@caldwellfirstnation.ca	519-358-6922	14 Orange Street	Leamington	ON	N8H 1P5
03-10-2022	Caldwell First Nation	Consultation Coordinator	Michelle	McCormack	ecc@caldwellfirstnation.ca	519-322-1766	14 Orange Street	Leamington	ON	N8H 1P5
03-10-2022	Caldwell First Nation	Consultation Coordinator	Zack	Hamm	ecc2@caldwellfirstnation.ca	519-322-1766	14 Orange Street	Leamington	ON	N8H 1P5
03-10-2022	Oneida Nation of the Thames	Chief	J. Todd	Cornelius	todd.cornelius@oneida.on.ca	519-318-4605	2210 Elm Avenue	Southwold	ON	N0L 2G0
03-10-2022	Metis Nation of Ontario	Manager, Lands, Resources and Consultations			consultations@metisnation.org	416-977-9881	75 Sherbourne Street	Toronto	ON	M5A 2P9
03-10-2022	Metis Nation of Ontario	Director of Lands, Resources and Consultations	Lina	Norheim	LindaN@metisnation.org	(416) 433-1315				
03-10-2022	Union of Ontario Indians	Grand Council Chief	Reg	Niganobe	info@anishinabek.ca	705-497-9135	1 Migizii Miikan, P.O Box 711	North Bay	ON	P1B 8J8
03-10-2022	Chiefs of Ontario	Director of Environment	Kathleen	Padulo	Kathleen.Padulo@coo.org	416-597-1266	468 Queen St. E, Suite 400	Toronto	ON	M5A 1T7
03-10-2022	Chiefs of Ontario	Ontario Regional Chief	Glen	Hare	ORCEA@coo.org	416-597-1266	468 Queen St. E, Suite 400	Toronto	ON	M5A 1T7
03-10-2022	Southern First Nations Secretariat	Executive Director	Jennifer	Whiteye	jenwhiteye@sfns.on.ca	519-692-5868 ext. 242	22361 Austin Line	Bothwell	ON	N0P 1C0
03-10-2022	Windsor Essex Kent Metis Council	Communications Officer	Kayla	Martin	communications@sfns.on.ca		22361 Austin Line	Bothwell	ON	N0P 1C0
08/05/2021	Windsor Essex Kent Metis Council	Executive Assistant	Lori	Fisher	exec.assistant@sfns.on.ca	519-974-0860	145-600 Tecumseh Road East	Windsor	ON	N8X 4X9
08/05/2021	Windsor Essex Kent Metis Council	President	Sharlene	Lance	windsoressexmetiscouncil@outlook.com	519-974-0860	145-600 Tecumseh Road East	Windsor	ON	N8X 4X9
Utility Providers										
08/05/2021	Bell Canada	Access Network Coordinator	Dave	Cowing	david.cowing@bell.ca	519-973-6702	1149 Goyeau Street, Floor 1	Windsor	ON	N9A 1H9
08/05/2021	Bell Canada	Implementation Specialist	Clifford	Trepanier	clifford.trepanier@bell.ca	519-973-6761	1149 Goyeau Street, Floor 1	Windsor	ON	N9A 1H9
08/05/2021	Cogeco Cable Solutions	Planning Leadhand - West Region	Bill	Sorrell	bill.sorrell@cogeco.com	519-972-4013	2525 Dougall Ave.	Windsor	ON	N8X 5A7
08/05/2021	MNSI	Network Planner	Dave	Hartleib	hartleib@mnsi.net	519-985-8435	3363 Tecumseh Road East	Windsor	ON	N8W 1H4
08/05/2021	Enbridge		Mary Jane	Patrick	ontuqllandsinq@enbridge.com	519-436-4600	50 Keil Drive North	Chatham	ON	N7M 5M1
08/05/2021	Enbridge	Construction Project Manager	Will	Ceccacci	wceccacci@enbridge.com	519-251-6810	3840 Rhodes Drive	Windsor	ON	N9A 6N7
08/05/2021	Ontario Power Generation Inc.	Director of Environmental Services	Susan	Rapin	susan.rapin@opg.com	416-592-6399	700 University Avenue	Toronto	ON	M5G 1X6
08/05/2021	ENWIN Utilities Ltd.	Director, Water Engineering	Norbert	Poggio	npoggio@enwin.com	519-251-7300	787 Ouellette Avenue, P.O. Box 1625, Station A	Windsor	ON	N9A 5T7
08/05/2021	Enwin Utilities Ltd.	Director, Hydro Engineering	Marvio	Vinhaes	mvinhaes@enwin.com	519-251-7300	787 Ouellette Avenue, P.O. Box 1625, Station A	Windsor	ON	N9A 5T7
Stakeholders										
03-10-2022	Windsor Essex Catholic District School Board (477 Detroit Street)	Manager of Construction & Engineering	Greg	Koppeser	greg_koppeser@wecdsb.on.ca	519 253 2481 Ext. 1211	1325 California Avenue	Windsor	ON	N9B 3L5
03-10-2022	University of Windsor	President	Dr. Rob	Gordon	Robert.Gordon@uwindsor.ca	(519) 253-3000 Ext: 2000	Room 126 Assumption Hall 400 Huron Church Rd	Windsor	ON	N9C 2J9
03-10-2022	Essex Terminal Railway Co.	Superintendent	Ivan	Pratt	ipratt@etr.ca	519 973-8222 EXT. 227	1601 Lincoln Road	Windsor	ON	N8Y 2J3
05-10-2022	Windsor Port Authority	Harbour Master	Peter	Berry	pberry@portwindsor.com		3190 Sandwich Street	Windsor	ON	N9C 1A6
06-10-2022	Windsor Port Authority	President & CEO	Steve	Salmons	ssalmons@portwindsor.com		3190 Sandwich Street	Windsor	ON	N9C 1A6
03-10-2022	Hand In Hand Support (3020 Sandwich St, Windsor, ON)	No Contact - Send to General Email			Info@handinhand-support.org	519-419-5500	3020 Sandwich Street	Windsor	ON	N9C 1A3
03-10-2022	Coco Group General Email				info@cocogroup.com					
03-10-2022	Coco Paving Inc. (on 3800 Russel Street)	Director, Land Development & Government Relations	Anthony	Rossi	ARossi@cocogroup.com		949 Wilson Avenue	Toronto	ON	M3K 1G2
03-10-2022	Coco Group - Coco Homes Office	After Sales Contact	Rebecca	Danial	labouzeeni@cocogroup.co	519-948-7133	RR 2 6725 South Service Road E	Windsor	ON	N8N 2M1
03-10-2022	Green Infrastructure Partners		David	Colle	dcolle@gipi.com	(519) 256-8633	4016 Sandwich Street	Windsor	ON	N9C 1C4
	Green Infrastructure Partners	Windsor Aggregate Dock Manager	Ernie	Scerbo	escerbo@gipi.com					
03-10-2022	K S Windsor Salt Ltd. (Ojibway Mine)	General Manager -Ojibway Mine	Pierre	Girard	pgirard@windsorsalt.com	(519) 972-2209	200 Morton Drive	Windsor	ON	N9C 3W9
03-10-2022	Nemak of Canada Corporation	No Contact - Send to General Email			contact@nemak.com	519-251-4400	4600 GN Booth Drive	Windsor	ON	N9C 4G8
03-10-2022	Transport Canada	No Contact - Send to General Email			questions@tc.gc.ca		4900 Yonge Street	Toronto	ON	M2N 6A6
03-10-2022	Ontario Power Generation (on 40 Broadway Street)	Director of Environmental Services	Susan	Rapin	susan.rapin@opg.com	416-592-6399	700 University Avenue HLC D16 1	Toronto	ON	M5G 1X6
05-10-2022	Southwestern Sales Corporation Limited (on 210 Detroit Street)	No Contact - Send to General Email			info@southwesternsales.ca	(519) 254-1811	210 Detroit Street	Windsor	ON	N9C 2P1
03-10-2022	Canadian Transit Company	No Contact - Send to General Email			commandcenter@ambassadorbridge.com	519-977-0700	PO Box 869	Warren	MI	48090
03-10-2022	K Scrap Resources Ltd.	General Manager	Tom	Meloche	admin@kscrap.com	519.254.5188 ext 204	110 Hill Avenue	Windsor	ON	N9C 3B8
03-10-2022	Hydro One Networks Inc. (on 20 Broadway Street)	Regulatory Affairs General Email Address			Regulatory@HydroOne.com	416-345-5000	483 Bay St. (South Tower), 8th Floor Reception	Toronto	ON	M5G 2P5
03-10-2022	ADM Agri-Industries Ltd.	Plant Manager	Trevor	Durrant	trevor.durrant@ADM.com	(519) 972-8100	5550 Maplewood Drive	Windsor	ON	N9C 0B9
05-10-2022	Greater Essex County District School Board	Coordinator of Engineering	Guiliana	Hinchliffe	giuliana.hinchliffe@publicboard.ca		451 Park St W	Windsor	ON	N9A 6K1

Emery, Nick <nemery@dillon.ca>

West Windsor Flood Assessment Study - Notice of Virtual Public Information Centre

1 message

Emery, Nick <nemery@dillon.ca> Thu, Oct 6, 2022 at 10:59 AM

Good morning,

On behalf of the West Windsor Flood Assessment Study project team, we invite you to review the public information centre material available at the project page on the CIty of Windsor website here: https://www.citywindsor.ca/residents/Construction/Environmental-Assessments-Master-Plans/Pages/West-Windsor-Flood-Assessment-Study.aspx

Additional information is provided in the attached project notice.

Have a great day!

Nick Emery
Associate
Dillon Consulting Limited
130 Dufferin Avenue, Suite 1400
London, Ontario, N6A 5R2
T - 519.438.1288 ext. 1234
F - 519.672.8209
M - 226.559.7057
nemery@dillon.ca
www.dillon.ca

NOTICE OF VIRTUAL PUBLIC INFORMATION CENTRE.pdf
560K

West Windsor Flood Risk Study - Public Consultation Record

Source	Contact	Date	Comment Summary	Addressed in Report Section
Chippewas of the Thames First Nation	Fallon Burch	November 4, 2022	After reviewing the West Windsor Flood Assessment Study, we have identified no concerns with your project or the information that you have presented to us at this time. We ask that if there are any changes to your project that are of a substantive nature that you keep us informed. If there is an Archaeology Assessment conducted, we require notification and the opportunity to actively participate by sending First Nation Field Liaisons on behalf of this First Nation.	
Windsor Port Authority	Peter Berry	October 18, 2022	Supports raising Mill Street and notes concerns with condition of existing outlet. Notes concerns with raised road profile causing flow into HMCS Hunter driveway.	
Windsor Port Authority	Peter Berry	October 18, 2022	Concerns regarding proposed Detroit Street trunk sewer onstructability, including weight of aggregate stockpiles and potential construction impacts on site operations.	
Windsor Port Authority	Peter Berry	October 18, 2022	Concerns with existing drainage on Russell Street and effects on port operations.	
Resident	Carl Maiolani	October 25, 2022	A quick question re high river levels and the connection between same and green-house gas levels… as shown in the video.. “lower future levels with higher GHG emissions”.. please elaborate on the relationship between these two things..	
Survey	Anonymous	-	6 surveys completed.	
City of Windsor	Ryan Langlois	October 19, 2022	How does the level of 176.3 m (conservative estimate of future peak 100 year) relate to other studies completed upstream (ex. Landmark/RWDI Study) for East Riverside? Is the increase from the previous 100yr level to the new predicted in that area of Windsor similar to the increase identified through this study?	
City of Windsor	Ryan Langlois	October 19, 2022	Can you confirm if the shoreline property improvements proposed (ex. Grading improvements, permanent flood protection barriers and temporary sandbagging) will be the responsibility of the owner, or will the City be taking on this task? As a land owner, why should I have to pay the full cost for a solution which also protects others?	
City of Windsor	Ryan Langlois	October 19, 2022	“Municipal Roads to be raised above extreme water levels where feasible” If the roadways are raised up, does that mean that my adjacent property will now be lower. Under a current condition, the lakewater would be getting into the municipal storm sewer system and away from my home, or stored along the roadways. Will this solution make flooding worse on my property?	

West Windsor Flood Risk Study - Public Consultation Record

Source	Contact	Date	Comment Summary	Addressed in Report Section
City of Windsor	Ryan Langlois	October 19, 2022	Wouldn't a more logical and feasible solution to have a barrier landform along the coastline to stop water from getting onto the roadway in the first place, or is there a gravity outlet sewer connected to the river which propagates water inland? In this case, would a backflow preventer solve this problem instead of raising the roadways?	
City of Windsor	Ryan Langlois	October 19, 2022	Will ERCA approve a solution to raise the roadways above the 100 year Detroit Level Water Level?	
City of Windsor	Ryan Langlois	October 19, 2022	What is the ponding depth along these roadways? Greater than 0.30 m?	
City of Windsor	Ryan Langlois	October 19, 2022	So through the installation of backflow preventers at CSO outfalls, during high water levels, CSO's will be unable to function as designed and during larger storm events, the area will now be susceptible to basement flooding due to combined sewer surcharging?	
City of Windsor	Ryan Langlois	October 19, 2022	I was under the assumption that the MECP were no longer supporting RTB's. Are there any other solutions proposed in the instance where this solution is not approved by the ministry?	
City of Windsor	Ryan Langlois	October 19, 2022	AIM development property is in the process of an expansion with additional hard surface. As part of this work, a council report went out (Item No. 8.1, Council report 136/2021 – October 4, 2021) and it was identified that the drain is currently servicing at below a 2 year level of service, but the improvements would not increase the level of service to the 1:2 year (typical municipal drainage standard). A relocation of the culvert crossing Maplewood Avenue within the Sprucewood drain is also proposed. This Municipal Drainage Report should take into consideration any improvements necessary to reduce local flooding (does it require just drain cleaning, or a full enhancement to a typical level of service?).	

West Windsor Flood Risk Study - Public Consultation Record

Source	Contact	Date	Comment Summary	Addressed in Report Section
Hydro One	Secondary Land Use Asset Optimization Strategy & Integrated Planning Hydro One Networks Inc.	October 31, 2022	At this time we do not have sufficient information to comment on the potential resulting impacts that your project may have on our infrastructure. As such, we must stay informed as more information becomes available so that we can advise if any of the alternative solutions present actual conflicts with our assets, and if so; what resulting measures and costs could be incurred by the proponent. Note that this response does not constitute approval for your plans and is being sent to you as a courtesy to inform you that we must continue to be consulted on your project.	

Appendix G

Backflow Preventers

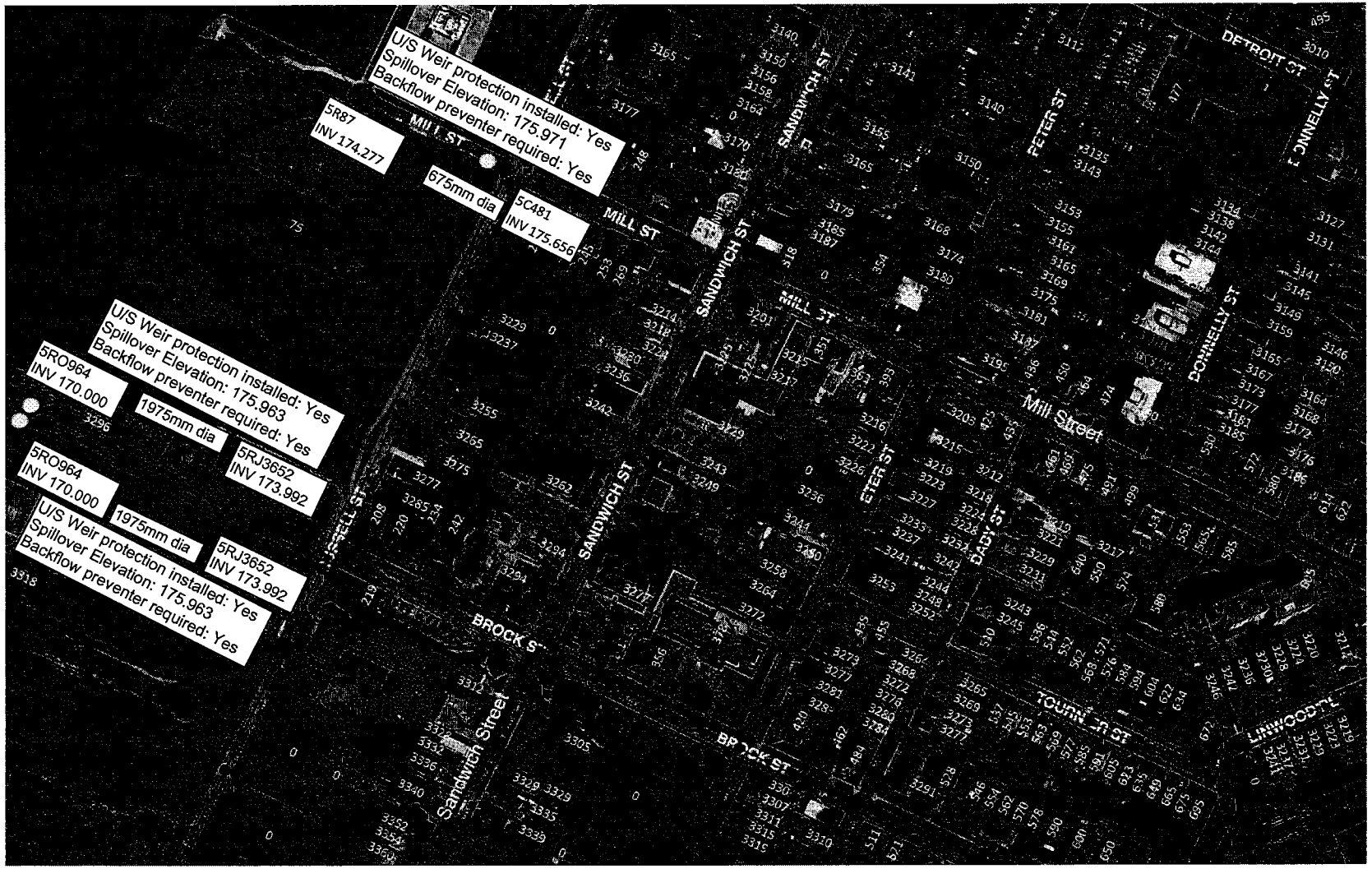
DILLON CONSULTING

WEST WINDSOR FLOOD PROTECTION STUDY
CSO BACKFLOW PREVENTION DEVICES

Backflow Preventer #	Street Name	U/S Structure ID	D/S Structure ID	D/S Invert Elevation (m)	Sewer Size (m)	Sewer Type	Existing Weir Protection Installed? (Yes/No)	Existing Weir Spillover Elevation (m)	Backflow Preventer Required (Yes/No)	Proposed Backflow Prevention Device	Construction Location	Maintenance Access	Proposed Maintenance Structure Required? (Yes/No)
1	Brock Street	5RJ3652	5RO964	170.000	1.975	Circular	Yes	175.963	Yes	Mueller HydroGate - Model 50C Round Opening	Flap gate installed at opening of downstream end of outlet	Assuming there is no access to the outlet opening, an access chamber will need to be installed upstream of the CSO Outlet	Yes
2	Brock Street	5RJ3652	5RO964	170.000	1.975	Circular	Yes	175.963	Yes	Mueller HydroGate - Model 50C Round Opening	Flap gate installed at opening of downstream end of outlet	Assuming there is no access to the outlet opening, an access chamber will need to be installed upstream of the CSO Outlet	Yes
3	Mill Street	5C481	5R87	174.277	0.675	Circular	Yes	175.971	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No
4	Prospect Avenue	5R991	5RO958	171.298	2.125	Circular	No	-	Yes	Mueller HydroGate - Model 50C Round Opening	Flap gate installed at opening of downstream end of outlet	Assuming there is no access to the outlet opening, an access chamber will need to be installed upstream of the CSO Outlet	Yes
5	Hill Ave	5R104	5RO465	173.000	1.350	Circular	No	-	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No
6	Detroit Street	5R3084	5RO955	172.640	0.900	Circular	Yes	175.196	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No
7	Huron Church Road	5RJ1006	5RO962	170.500	2.725	Circular	Yes	174.600	Yes	Mueller HydroGate - Model 50C Round Opening	Flap gate installed at opening of downstream end of outlet	Assuming there is no access to the outlet opening, an access chamber will need to be installed upstream of the CSO Outlet	Yes
8	Patricia Road	5R706	5RO704	175.521	1.050	Circular	No	-	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No
9	Askin Avenue	5C249	5R951	175.006	1.800	Circular	Yes	176.566	No	-	-	-	-
10	Bridge Avenue	5CPS10000	5RO960	174.040	1.500	Circular	No	-	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	Yes
11	Curry Avenue	5R993	5RO959	175.137	0.600	Circular	Yes	175.936	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No
12	Elm Avenue	4C948	4RO907	174.000	1.200	Circular	Yes	174.850	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No
13	Crawford Avenue	4R3350	4RO908	175.000	0.600	Circular	Yes	176.471	No	-	-	-	-

14	Bruce Avenue	4R35	4RO1	174.000	0.700	Circular	Yes	175.810	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No
15	Church Street	4R277	4RO901	174.000	0.750	Circular	Yes	178.930	No	-	-	-	-
16	Church Street	4RJ3313	4RO469	171.789	2.725	Circular	No	-	Yes	Mueller HydroGate - Model 50C Round Opening	Flap gate installed at opening of downstream end of outlet	Assuming there is no access to the outlet opening, an access chamber will need to be installed upstream of the CSO Outlet	Yes
17	Church Street	4RJ914	4RO443	172.500	1.200	Circular	Yes	175.044	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No
18	Ferry Street	4R38	4RO900	173.000	1.375	Circular	Yes	176.211	No	-	-	-	-
19	Oullette Avenue	4R3008	4RO903	173.000	1.825	Circular	Yes	175.730	Yes	Mueller HydroGate - Model 50C Round Opening	Flap gate installed at opening of downstream end of outlet	Assuming there is no access to the outlet opening, an access chamber will need to be installed upstream of the CSO Outlet	No
20	Goyeau Street	4RJ916	4RO455	173.250	1.450	Circular	No	-	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No
21	McDougall Street	4R3235	4RO906	174.085	1.200	Circular	Yes	176.080	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No
22	McDougall Street	4RJ3133	4RO3052	170.574	2.100	Circular	No	-	Yes	Mueller HydroGate - Model 50C Round Opening	Flap gate installed at opening of downstream end of outlet	Assuming there is no access to the outlet opening, an access chamber will need to be installed upstream of the CSO Outlet	Yes
23	Glengarry Avenue	3RJ3410	3RO3411	171.000	2.250	Circular	Yes	176.800	No	-	-	-	-
24	Marantette Ave	3R18	3RO703	174.255	1.050	Circular	Yes	176.095	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No
25	Parent Ave	3C3413	3RO704	174.769	1.500	Circular	Yes	175.280	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	Yes
26	Langlois Avenue	3RJ903	3RO702	171.765	1.825	Circular	Yes	175.682	Yes	Mueller HydroGate - Model 50C Round Opening	Flap gate installed at opening of downstream end of outlet	Assuming there is no access to the outlet opening, an access chamber will need to be installed upstream of the CSO Outlet	Yes
27	Lincoln Road	2RJ3107	2RO910	171.000	3.350	Circular	Yes	176.539	No	-	-	-	-
28	Chilver Road	2R555	2RO914	175.000	1.050	Circular	Yes	177.000	No	-	-	-	-
29	Chilver Road	2R555	2RO913	175.000	1.200	Circular	Yes	176.268	No	-	-	-	-

30	Argyle Road	2R379	2RO916	173.500	1.500	Circular	Yes	175.140	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No
31	Walker Road	2R3313	2RO915	173.500	0.650	Circular	No	-	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No
32	Albert Road	1RJ136	1RO136	173.448	1.650	Circular	Yes	175.914	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No
33	Belleview Avenue	1RJ937	1RO137	174.637	1.050	Circular	Yes	178.904	No	-	-	-	-
34	Strabane Avenue	1R375	1RO134	174.015	1.200	Circular	Yes	174.960	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No
35	George Avenue	1R1450	1RO1	173.000	2.125	Circular	No	-	Yes	Mueller HydroGate - Model 50C Round Opening	Flap gate installed at opening of downstream end of outlet	Assuming there is no access to the outlet opening, an access chamber will need to be installed upstream of the CSO Outlet	Yes
36	Rossini Boulevard	1RJ930	1RO199	173.000	1.200	Circular	Yes	175.288	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No
37	Riverside Drive East	1R330	1RO330	175.000	0.600	Circular	No	-	Yes	WaPro WaStop - Inline Check Valve	Inline check valve inserted directly into sewer at downstream end of existing MH	Dewatering of the downstream sewer is required prior to installation of the backflow prevention device	No


City of Windsor
U/S Weir protection installed: Yes
Spillover Elevation: 175.971
Backflow preventer required: Yes
5R87
INV 174.277
675mm dia
5C481
INV 175.656
U/S Weir protection installed: Yes
Spillover Elevation: 175.963
Backflow preventer required: Yes
5RO964
INV 170.000
1975mm dia
5RJ3652
INV 173.992
5RO964
INV 170.000
1975mm dia
5RJ3652
INV 173.992
U/S Weir protection installed: Yes
Spillover Elevation: 175.963
Backflow preventer required: Yes
MILL ST
Mill Street
SANDWICH ST
Sandwich Street
PETER ST
DONNELLY ST
DETROIT CT
BROCK ST
DABY ST
TOURNAIR ST
LINWOOD PL
Legend
Storm Sewer Manholes
Storm Sewers
Dual Manholes
Sanitary Sewer Manholes
Sanitary Sewers
Combined Sewer Manholes
Combined Sewers
Dual Manholes
Municipal Address
Street Centreline
Major Roads
Backflow Preventers
Proposed Manholes
1:2,500
127.0
0
63.50
127.0Meters
NAD_1983_UTM_Zone_17N
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Notes

City of Windsor

Legend

- Storm Sewer Manholes
- Storm Sewers
- Dual Manholes
- Sanitary Sewer Manholes
- Sanitary Sewers
- Combined Sewer Manholes
- Combined Sewers
- Dual Manholes
- Municipal Address
- Street Centreline
- Major Roads
- # Backflow Preventers
- Proposed Manholes

1: 2,500

127.0 0 63.50 127.0 Meters

NAD_1983_UTM_Zone_17N

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Notes


City of Windsor
5RO465
INV 173.000
1350mm dia
5R104
INV 173.500
U/S Weir protection installed: No
Spillover Elevation: -
Backflow preventer required: Yes
HILL AVE - PRIVATE
HILL AVE - PRIVATE
Sandwich Street
SANDWICH ST
WATKINS ST
PRINCE RD
HILL AVE
HILL AVE
CHAPPELL AVE
UNIT 1
Legend
Storm Sewer Manholes
Storm Sewers
Dual Manholes
Sanitary Sewer Manholes
Sanitary Sewers
Combined Sewer Manholes
Combined Sewers
Dual Manholes
Municipal Address
Street Centreline
Major Roads
Backflow Preventers
Proposed Manholes
1:2,500
127.0
0
63.50
127.0 Meters
NAD_1983_UTM_Zone_17N
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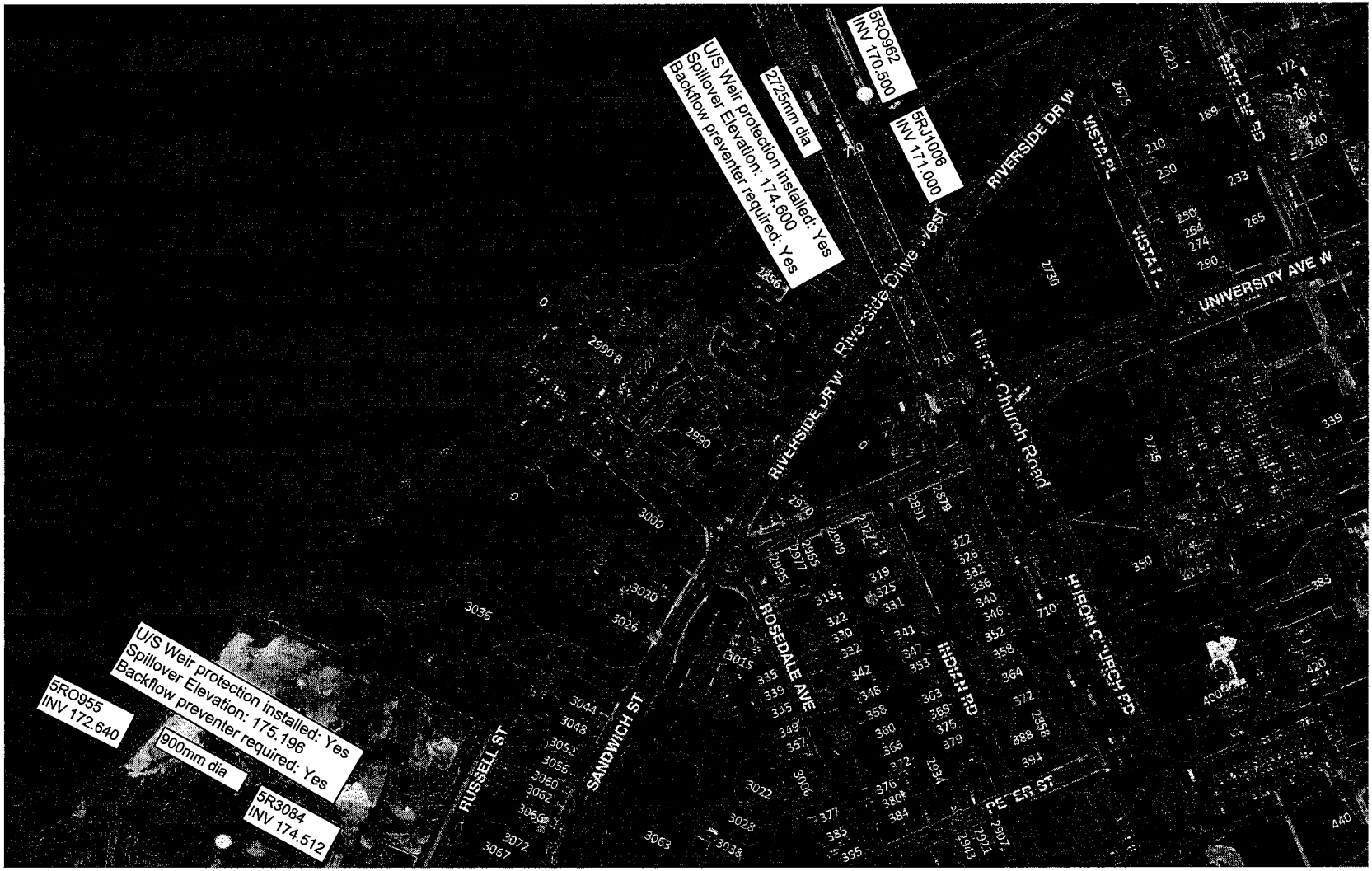
City of Windsor
5RO962
INV 170.500
U/S Weir protection installed: Yes
Spillover Elevation: 174.600
Backflow preventer required: Yes
2725mm dia
5RJ1006
INV 171.000
RIVERSIDE DR W
VISTA PL
UNIVERSITY AVE W
Riverside Drive West
Huron Church Road
ROSEDALE AVE
INDIAN RD
HURON CHURCH RD
PETER ST
SANDWICH ST
RUSSELL ST
U/S Weir protection installed: Yes
Spillover Elevation: 175.196
Backflow preventer required: Yes
5RO955
INV 172.640
900mm dia
5R3084
INV 174.512
Legend
Storm Sewer Manholes
Storm Sewers
Dual Manholes
Sanitary Sewer Manholes
Sanitary Sewers
Combined Sewer Manholes
Combined Sewers
Dual Manholes
Municipal Address
Street Centreline
Major Roads
Backflow Preventers
Proposed Manholes
1: 2,500
127.0 0 63.50 127.0 Meters
NAD_1983_UTM_Zone_17N
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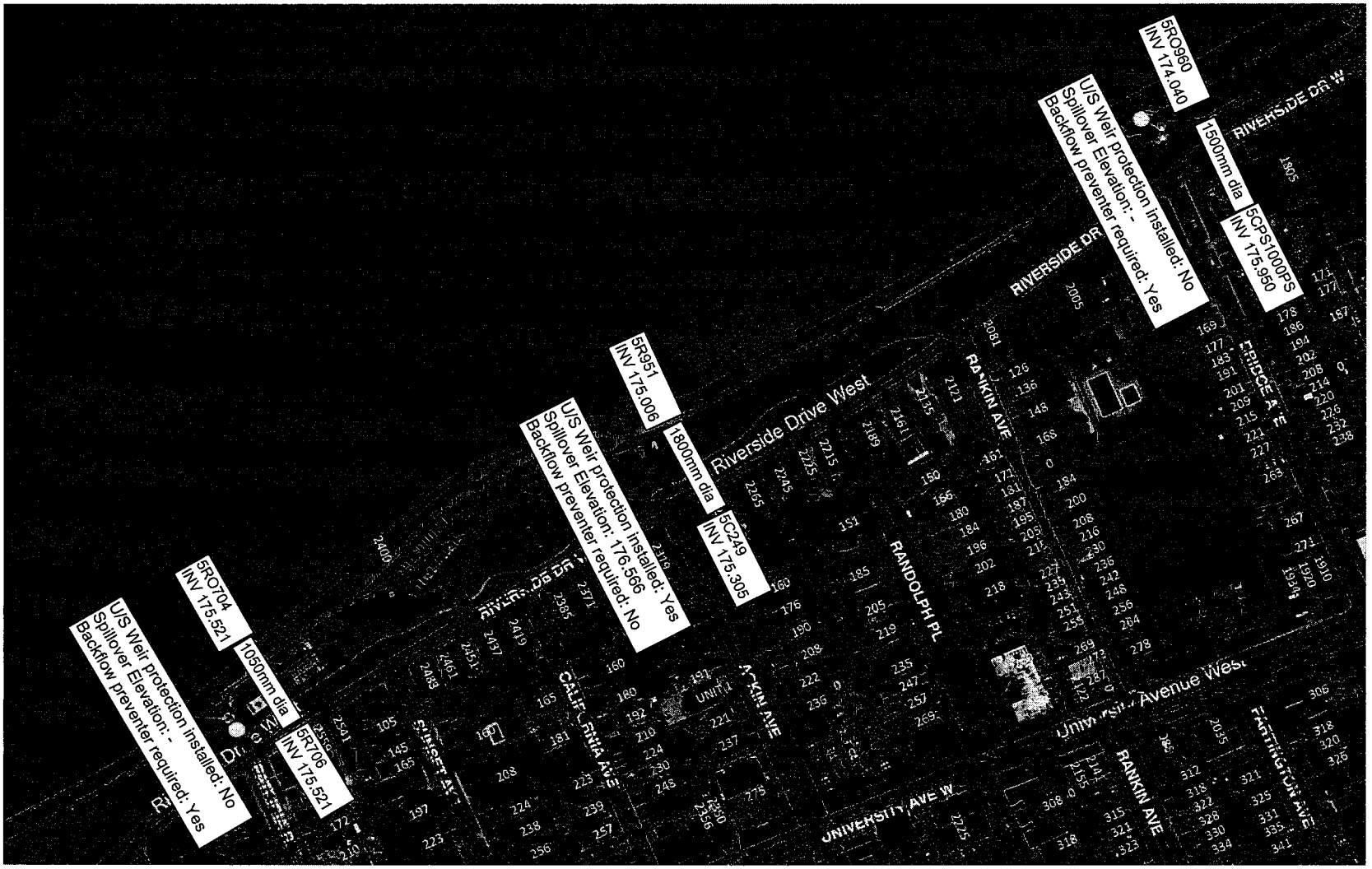
City of Windsor
5RO960
INV 174.040
U/S Weir protection installed: No
Spillover Elevation: -
Backflow preventer required: Yes
1500mm dia
5CPS1000PS
INV 175.950
RIVERSIDE DR W
RIVERSIDE DR
5R951
INV 175.006
U/S Weir protection installed: Yes
Spillover Elevation: 176.566
Backflow preventer required: No
1800mm dia
5C249
INV 175.305
Riverside Drive West
RANKIN AVE
RANDOLPH PL
5RO704
INV 175.521
1050mm dia
5R706
INV 175.521
U/S Weir protection installed: No
Spillover Elevation: -
Backflow preventer required: Yes
CALIFORNIA AVE
SUNSET AVE
UNIVERSITY AVE W
University Avenue West
FAIRINGTON AVE
Legend
Storm Sewer Manholes
Storm Sewers
Dual Manholes
Sanitary Sewer Manholes
Sanitary Sewers
Combined Sewer Manholes
Combined Sewers
Dual Manholes
Municipal Address
Street Centreline
Major Roads
Backflow Preventers
Proposed Manholes
1: 2,500
127.0
0
63.50
127.0 Meters
NAD_1983_UTM_Zone_17N
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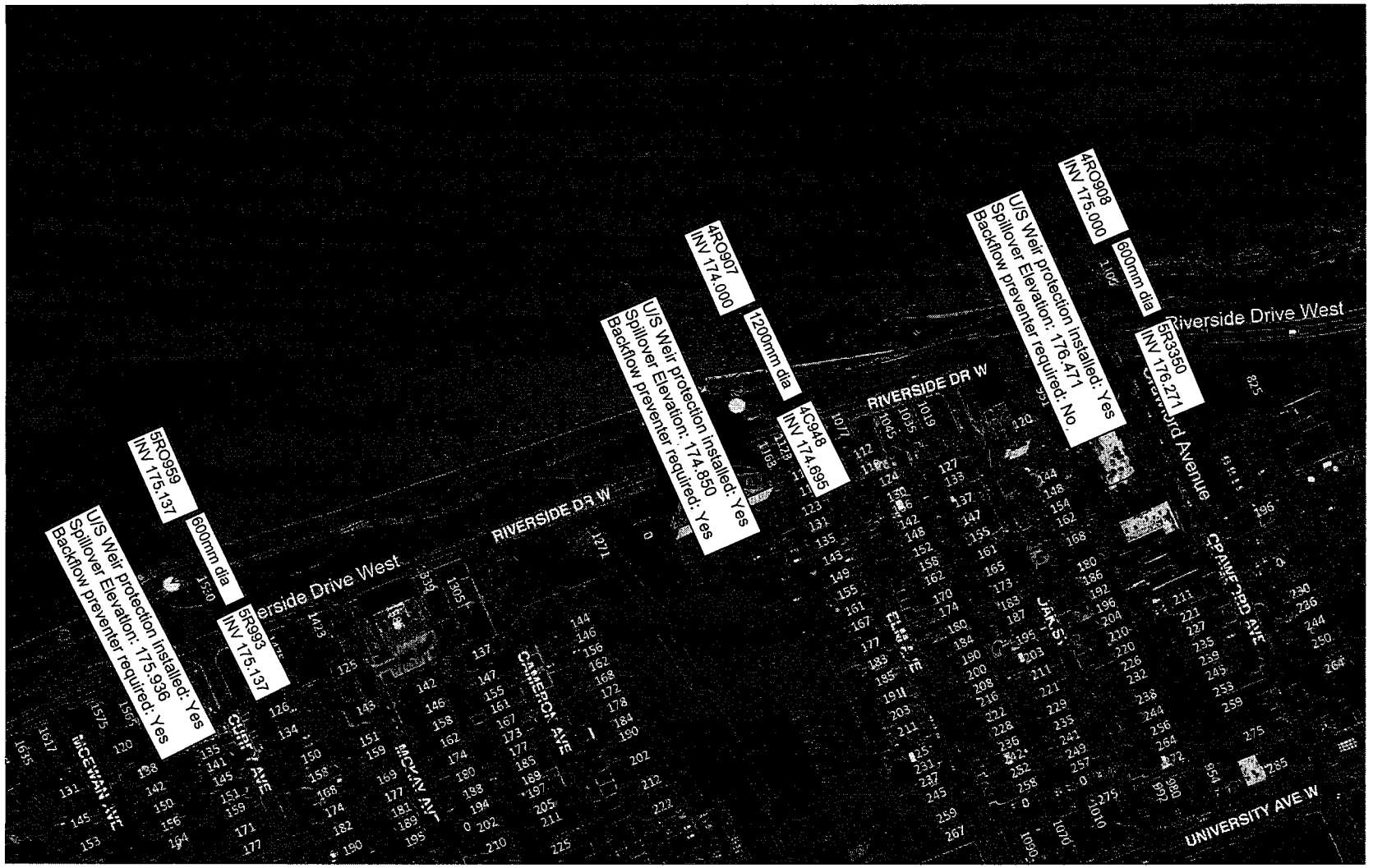
City of Windsor
Legend
Storm Sewer Manholes
Storm Sewers
Dual Manholes
Sanitary Sewer Manholes
Sanitary Sewers
Combined Sewer Manholes
Combined Sewers
Dual Manholes
Municipal Address
Street Centreline
Major Roads
Backflow Preventers
Proposed Manholes
1:2,500
Notes
5RO959 INV 175.137
600mm dia
5R993 INV 175.137
U/S Weir protection Installed: Yes Spillover Elevation: 175.936 Backflow preventer required: Yes
U/S Weir protection installed: Yes Spillover Elevation: 174.850 Backflow preventer required: Yes
4RO907 INV 174.000
1200mm dia
4C948 INV 174.695
U/S Weir protection installed: Yes Spillover Elevation: 176.471 Backflow preventer required: No
4RO908 INV 175.000
600mm dia
5R8350 INV 176.271
Riverside Drive West
RIVERSIDE DR W
CAMERON AVE
MCKAY AVE
CRAWFORD AVE
UNIVERSITY AVE W
127.0 0 63.50 127.0 Meters
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City of Windsor
4RO1
INV 174.000
700mm dia
U/S Weir protection installed: Yes
Spillover Elevation: 175.810
Backflow preventer required: Yes
4R35
INV 174.723
U/S Weir protection installed: Yes
Spillover Elevation: 178.930
Backflow preventer required: No
4RO901
INV 174.000
750mm dia
4R277
INV 175.457
4RO469
INV 171.789
2725mm dia
4RJ3313
INV 172.469
U/S Weir protection installed: No
Spillover Elevation: -
Backflow preventer required: Yes
RIVERSIDE DR W
RIVERSIDE DR E
PITT ST W
PITT ST E
CHATHAM ST W
CHATHAM ST E
UNIVERSITY AVE W
UNIVERSITY AVE E
University Avenue West
Ouellette Avenue
PARK ST E
127.0
0
63.50
127.0 Meters
NAD_1983_UTM_Zone_17N
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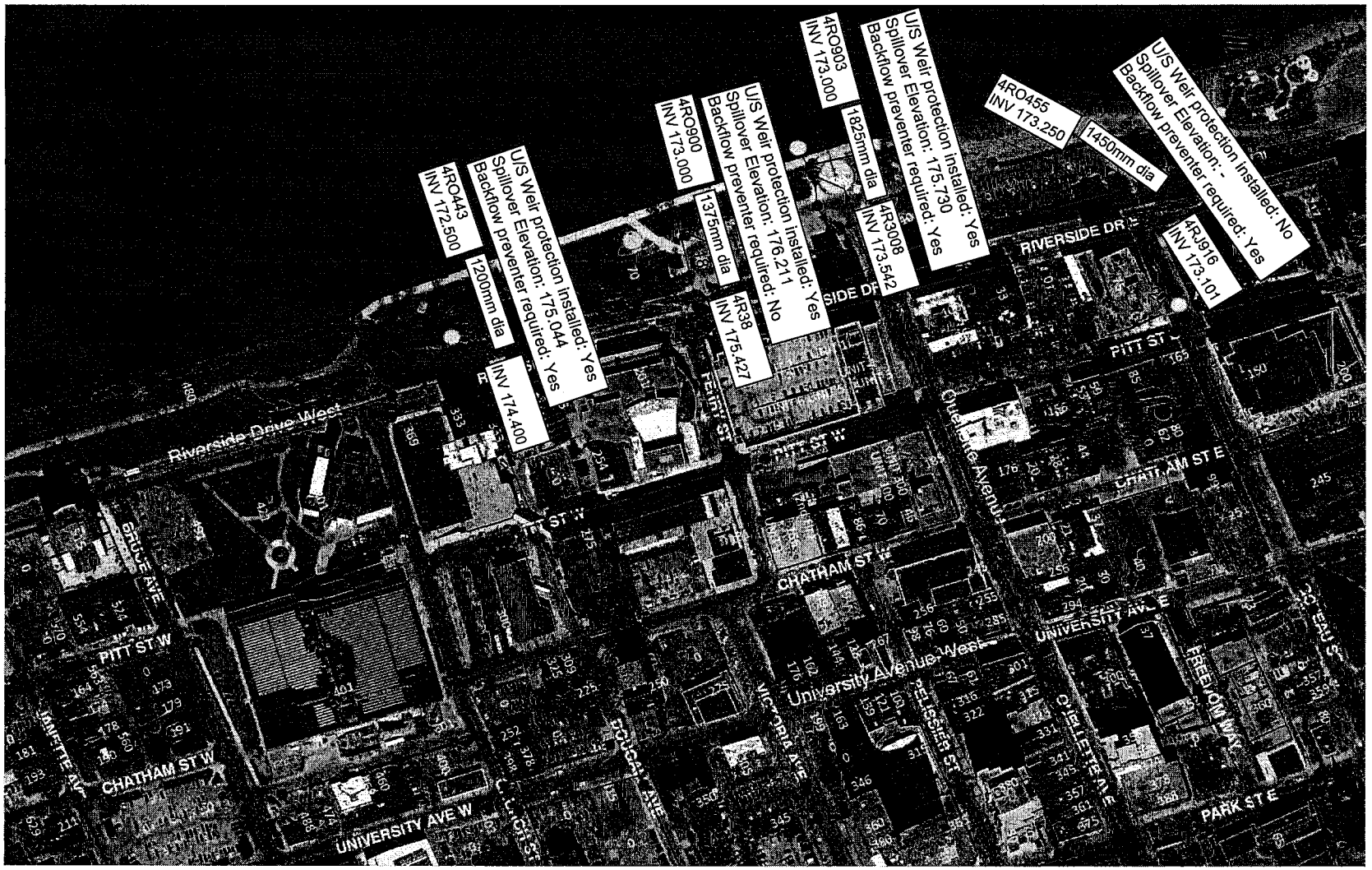
Legend
Storm Sewer Manholes
Storm Sewers
Dual Manholes
Sanitary Sewer Manholes
Sanitary Sewers
Combined Sewer Manholes
Combined Sewers
Dual Manholes
Municipal Address
Street Centreline
Major Roads
Backflow Preventers
Proposed Manholes
1:2,500
Notes


City of Windsor
4RO903 INV 173.000
1825mm dia
U/S Weir protection installed: Yes Spillover Elevation: 175.730 Backflow preventer required: Yes
4RO455 INV 173.250
1450mm dia
U/S Weir protection installed: No Spillover Elevation: - Backflow preventer required: Yes
4RO900 INV 173.000
U/S Weir protection installed: Yes Spillover Elevation: 176.211 Backflow preventer required: No
1375mm dia
4R3008 INV 173.542
4RO443 INV 172.500
U/S Weir protection installed: Yes Spillover Elevation: 175.044 Backflow preventer required: Yes
1200mm dia
INV 174.400
4R38 INV 175.427
4RJ916 INV 173.101
RIVERSIDE DR
Riverside Drive West
PITT ST W
PITT ST
CHATHAM ST W
CHATHAM ST
CHATHAM ST E
UNIVERSITY AVE W
University Avenue West
UNIVERSITY AVE E
PARK ST E
Chilver Avenue
Ferry St
Bruce Ave
Victoria Ave
Freedom Way
Legend
Storm Sewer Manholes
Storm Sewers
Dual Manholes
Sanitary Sewer Manholes
Sanitary Sewers
Combined Sewer Manholes
Combined Sewers
Dual Manholes
Municipal Address
Street Centreline
Major Roads
Backflow Preventers
Proposed Manholes
1: 2,500
127.0 0 63.50 127.0 Meters
NAD_1983_UTM_Zone_17N
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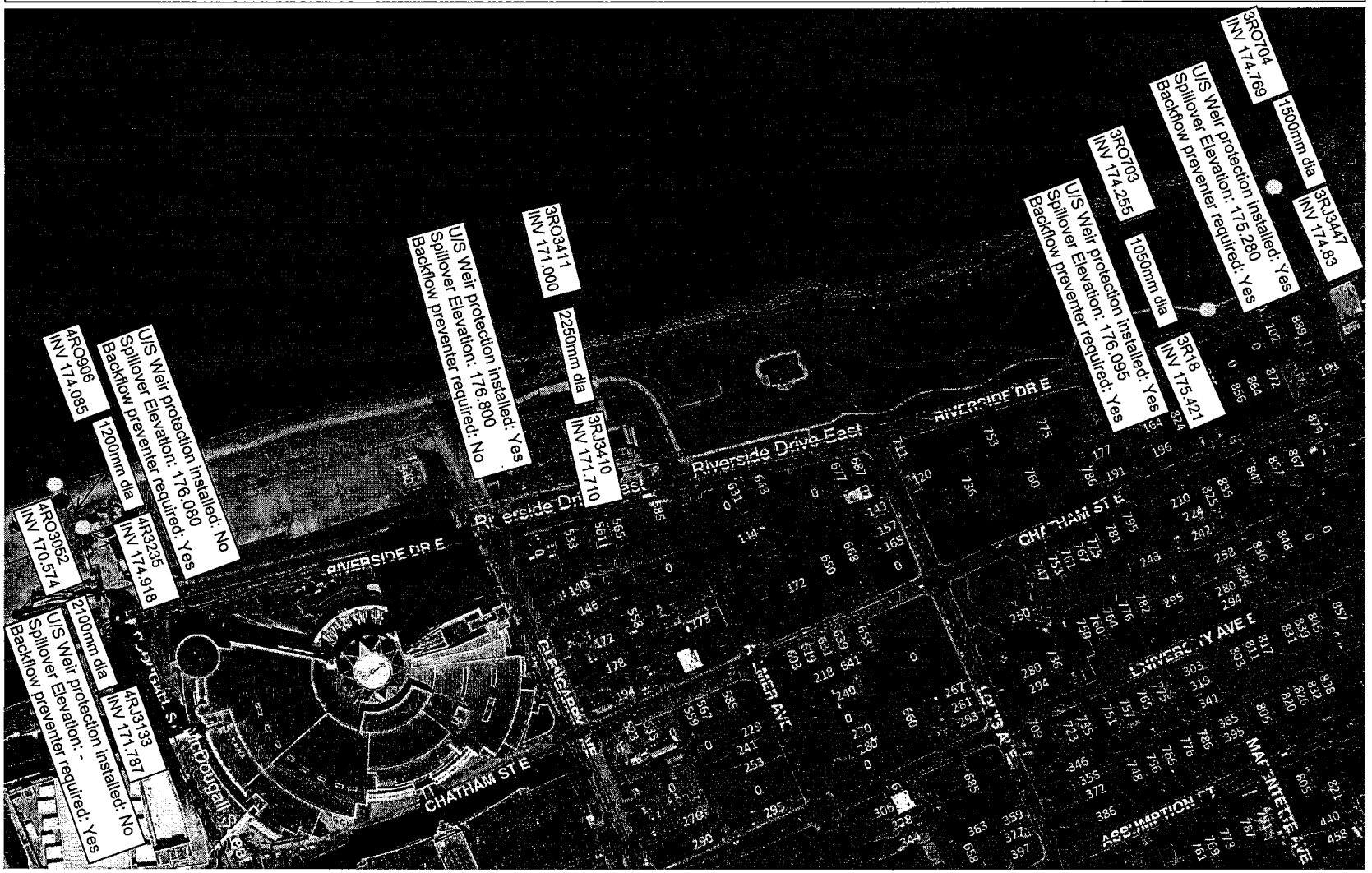
City of Windsor
4RO906
INV 174.085
1200mm dia
U/S Weir protection Installed: No
Spillover Elevation: 176.080
Backflow preventer required: Yes
4R3235
INV 174.918
4RO3052
INV 170.574
2100mm dia
U/S Weir protection Installed: -
Spillover Elevation: -
Backflow preventer required: Yes
4RJ3133
INV 171.787
3RO3411
INV 171.000
2250mm dia
U/S Weir protection Installed: Yes
Spillover Elevation: 176.800
Backflow preventer required: No
3RJ3410
INV 171.710
3RO704
INV 174.769
1500mm dia
3RJ3447
INV 174.83
U/S Weir protection Installed: Yes
Spillover Elevation: 175.280
Backflow preventer required: Yes
3RO703
INV 174.255
1050mm dia
U/S Weir protection Installed: Yes
Spillover Elevation: 176.095
Backflow preventer required: Yes
3R18
INV 175.421
Riverside Drive East
RIVERSIDE DR E
CHATHAM ST E
CHATHAM ST E
UNIVERSITY AVE E
ASSUMPTION PL
McDougall St
Glasgow Ave
Lincoln Ave
127.0
0
63.50
127.0 Meters
NAD_1983_UTM_Zone_17N
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Legend
Storm Sewer Manholes
Storm Sewers
Dual Manholes
Sanitary Sewer Manholes
Sanitary Sewers
Combined Sewer Manholes
Combined Sewers
Dual Manholes
Municipal Address
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Major Roads
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1: 2,500
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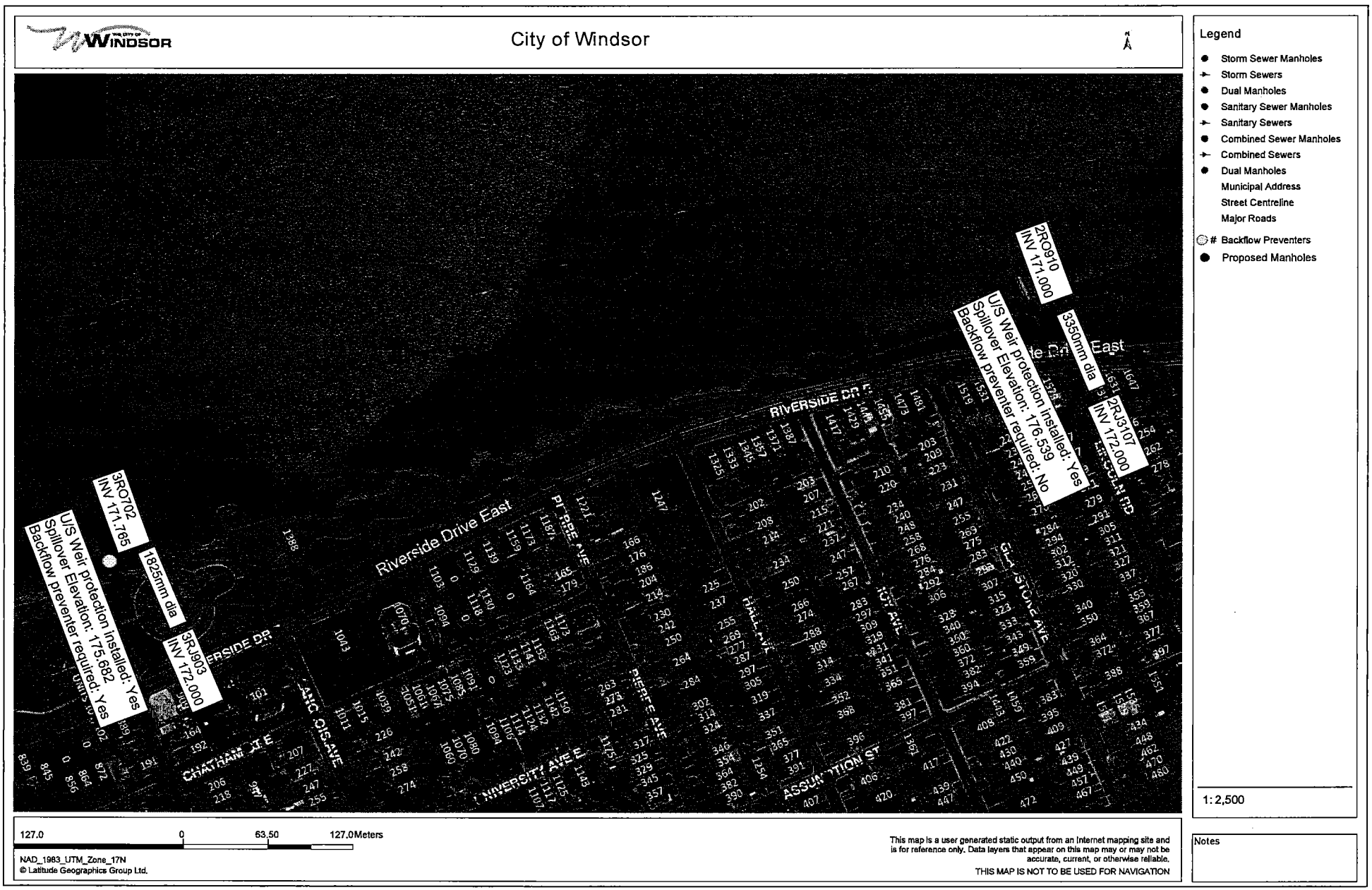
City of Windsor
Legend
Storm Sewer Manholes
Storm Sewers
Dual Manholes
Sanitary Sewer Manholes
Sanitary Sewers
Combined Sewer Manholes
Combined Sewers
Dual Manholes
Municipal Address
Street Centreline
Major Roads
Backflow Preventers
Proposed Manholes
3RO702
INV 171.765
U/S Weir protection Installed: Yes
Spillover Elevation: 175.682
Backflow preventer required: Yes
1825mm dia
3RJ903
INV 172.000
2RO910
INV 171.000
U/S Weir protection Installed: Yes
Spillover Elevation: 176.539
Backflow preventer required: No
3350mm dia
2RJ3107
INV 172.000
Riverside Drive East
1:2,500
127.0
0
63.50
127.0Meters
NAD_1983_UTM_Zone_17N
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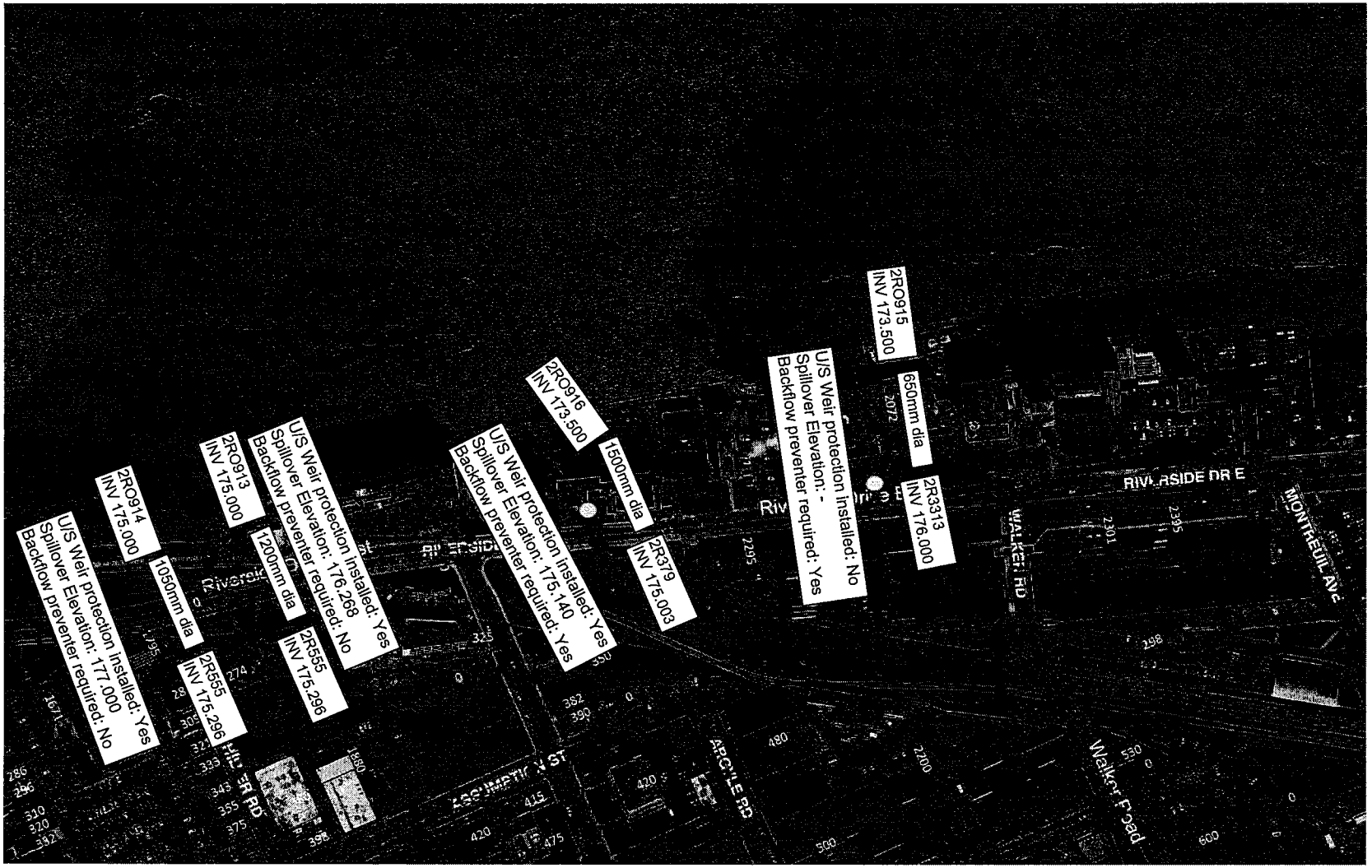
City of Windsor
2RO914
INV 175.000
2RO913
INV 175.000
1200mm dia
1050mm dia
U/S Weir protection Installed: Yes
Spillover Elevation: 177.000
Backflow preventer required: No
U/S Weir protection Installed: Yes
Spillover Elevation: 176.268
Backflow preventer required: No
2R555
INV 175.296
2R555
INV 176.296
2RO916
INV 173.500
1500mm dia
U/S Weir protection Installed: Yes
Spillover Elevation: 175.140
Backflow preventer required: Yes
2R379
INV 175.003
2RO915
INV 173.500
650mm dia
U/S Weir protection Installed: No
Spillover Elevation: -
Backflow preventer required: Yes
2R3313
INV 176.000
RIVERSIDE DR E
WALKER RD
MONTREUIL AVE
ASSUMPTION ST
ARGYLE RD
Walker Road
Legend
Storm Sewer Manholes
Storm Sewers
Dual Manholes
Sanitary Sewer Manholes
Sanitary Sewers
Combined Sewer Manholes
Combined Sewers
Dual Manholes
Municipal Address
Street Centreline
Major Roads
Backflow Preventers
Proposed Manholes
1: 2,500
127.0
0
63.50
127.0 Meters
NAD_1983_UTM_Zone_17N
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Notes


City of Windsor
1RO136
INV 173.448
1650mm dia
1RJ136
INV 174.000
U/S Weir protection Installed: Yes
Spillover Elevation: 175.914
Backflow preventer required: Yes
RIVERSIDE DR E
Drouillard Road
ALBERT PD
DROUILLARD RD
CADILLAC ST
1RO137
INV 174.637
1050mm dia
U/S Weir protection Installed: Yes
Spillover Elevation: 178.904
Backflow preventer required: No
1RJ937
INV 175.500
BRUCE AVE
PRATT CL
Legend
Storm Sewer Manholes
Storm Sewers
Dual Manholes
Sanitary Sewer Manholes
Sanitary Sewers
Combined Sewer Manholes
Combined Sewers
Dual Manholes
Municipal Address
Street Centreline
Major Roads
Backflow Preventers
Proposed Manholes
1:2,500
127.0 0 63.50 127.0 Meters
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Notes

City of Windsor

Legend

- Storm Sewer Manholes
- Storm Sewers
- Dual Manholes
- Sanitary Sewer Manholes
- Sanitary Sewers
- Combined Sewer Manholes
- Combined Sewers
- Dual Manholes
- Municipal Address
- Street Centreline
- Major Roads
- # Backflow Preventers
- Proposed Manholes

1:2,500

127.0 0 63.50 127.0 Meters

NAD_1983_UTM_Zone_17N

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Notes

City of Windsor

Legend

- Storm Sewer Manholes
- Storm Sewers
- Dual Manholes
- Sanitary Sewer Manholes
- Sanitary Sewers
- Combined Sewer Manholes
- Combined Sewers
- Dual Manholes
- Municipal Address
- Street Centreline
- Major Roads
- # Backflow Preventers
- Proposed Manholes

1: 2,500

127.0 0 63.50 127.0 Meters

NAD_1983_UTM_Zone_17N

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Appendix H

Cost Estimate and TBL Assessment Matrix

West Windsor Flood Protection Study
Appendix H - Table H.1 Solution Summary and Budgetary Cost Estimates

Date 2022-11-22

No.	Solution	Local/ Regional	Applicable Zones	Description	Construction Cost	Engineering Cost (20%)	Contingency Cost (30%)	Total Solution Cost
1	Install Backflow Prevention at CSOs along Detroit River	Local	1&2	See West Windsor Flood Protection Study - CSO Backflow Prevention Devices in Appendix G of the West Windsor Flood Risk Study Report for proposed locations, sizes, and additional details.	$ 1,795,000	$ 359,000	$ 538,500	$ 2,692,500
2	Lou Romano RTB	Regional	1	Solution detailed in the Sewer and Coastal Flood Protection Master Plan for additional details on the proposed retention treatment basin (RTB) at Lou Romano Water Reclamation Plant and Windsor Riverfront West CSO Control "Schedule C" Class EA Environmental Study Report. A portion of this project will be funded through the Federal Goverment via the DMAF funding.	$ 50,000,000	$ 10,000,000	$ 15,000,000	$ 75,000,000
3	Combined Sewer Separation	Regional	1&2	Long term solution to separate all combined sewers in the West Windsor Flood Study area into separate saniitary sewage and storm water systems.	$ 497,776,000	$ 99,555,200	$ 149,332,800	$ 746,664,000
4	Install Basement Flood Protection Measures	Regional	1&2	Solution to provide flood relief to private residences that are at risk for basement flooding in the study area. All homes that are older than 1980 would be subject to these improvements. Solutions include installation of backflow preventors, sump pump, power backup, foundation drain disconnection, lot grading etc.	Cost per home. $25,000.	-	-	-
5	Prince Road Trunk Storm Sewer Outfall and Pump Station	Local	1&2	Solution detailed in the Sewer and Coastal Flood Protection Master Plan for additional details on the proposed outfall and pump station see Prince Road Storm Sewer Outlet - Envrionmental Study Report Schedule C Municipal Class EA.	$ 5,510,000	$ 1,102,000	$ 1,653,000	$ 8,265,000
6	Detroit Street Trunk Storm Sewer and Outfall	Local	1&2	See the Sewer and Coastal Flood Protection Master Plan for additional details on the proposed Detroit Street trunk storm sewer and outfall improvements.	$ 2,162,400	$ 432,480	$ 648,720	$ 3,243,600
7	Russell Street - Private Site Improvements	Local	1	Seed West Windsor Flood Risk Study Report for further details	$ 127,000	$ 25,400	$ 38,100	$ 190,500
8	Sandwich Street Drainage Improvements	Local	1	Sandwich Street improvements between Ojibway Parkway and McKee Road.	$ 1,200,000	$ 240,000	$ 360,000	$ 1,800,000

West Windsor Flood Protection Study
Appendix H - Table H.1 Solution Summary and Budgetary Cost Estimates

Date 2022-11-22

No.	Solution	Local/ Regional	Applicable Zones	Description	Construction Cost	Engineering Cost (20%)	Contingency Cost (30%)	Total Solution Cost
9	Private Solutions to Prevent Surface Flooding from High Water Levels	Local	2	Solutions from the Sewer and Coastal Flood Protection Master Plan - private property.	N/A	N/A	N/A	N/A
10	Private Flood Protection Solutions	Local	2	Solutions from the Sewer and Coastal Flood Protection Master Plan - private property.	N/A	N/A	N/A	N/A
11	Windsor Biosolids Plant - Site Drainage and Grading Improvements	Local	2	Solutions from the Sewer and Coastal Flood Protection Master Plan - private property.	N/A	N/A	N/A	N/A
12	Recalibrate Sanitary Service Area	Local	2	Updating the City of Windsor Master Plan modelling to recalibrate sanitary service areas based on current conditions.	-	$ 100,000	-	$ 100,000
13	McKee Creek Drain Maintenance from Detroit River to Sandwich Street	Local	2	Maintain the McKee Creek Drain from the Detroit River to Sandwich Street. Including: cleaning and grubbing and cleanout. See Landmark Drainage Report (Feb. 2022)	$ 119,000	$ 23,800	$ 35,700	$ 178,500
14	McKee Creek Drain Improvements	Local	2	Replace existing ETR Crossing. See Landmark Drainage Report (Feb. 2022)	$ 224,000	$ 44,800	$ 67,200	$ 336,000
15	Monitoring River Levels	Local	2	Ongoing observation of water levels within the Great Lakes system to ensure that the recommended infrastructure and protection measures are implemented in advance of rising levels and climate change impacts. This may involve updated future climate/river level assessments in the future.	N/A	N/A	N/A	N/A
16	Dewatering Pump Station	Local	2	City of Windsor to monitor and maintain the pump station after maintenance period is complete. This is currently being monitored and maintained by the Windsor Detroit Bridge Authority.	N/A	N/A	N/A	N/A
17	Prospect Avenue Improvements	Local	2	See Figure 3 - Grade Protection Plan - Prospect Avenue in the ***Figures*** section of the West Windsor Flood Risk Study Report along with ***Section 6.2.2*** of the West Windsor Flood Risk Study Report for additional details.	$ 1,800,000	$ 360,000	$ 540,000	$ 2,700,000

Date 2022-11-22

No.	Solution	Local/ Regional	Applicable Zones	Description	Construction Cost	Engineering Cost (20%)	Contingency Cost (30%)	Total Solution Cost
18	Brock St - Inspect Shoreline and Outfall Condition and Develop Local Repair Plan	Local	2	Provide inspection of the shoreline and outfall condidtions for Brock Street, assess conditions and prepare a report.	-	-	-	$ 40,000
19	Reprofile Mill Street	Local	2	Existing Mill Street road grades to be raised to a minimum grade of 176.10 to protect against costal flooding.	$ 200,000	$ 40,000	$ 60,000	$ 300,000
20	Private Flood Protection and Erosion Solutions	Local	2	Solutions from the Sewer and Coastal Flood Protection Master Plan - private property.				
21	McKee Park Improvements	Local	2	See Figure 5 - Grade Protection Plan - McKee Park in the ***Figures*** section of the West Windsor Flood Risk Study Report along with ***Section 6.2.2*** of the West Windsor Flood Risk Study Report for additional details.	$ 440,000	$ 88,000	$ 132,000	$ 660,000
22	Maplewood Drive Pump Station Improvements	Local	3	Improve the condition and capacity of the Maplewood Drive Pump Station including a proposed 1 CMS pump to handle additional flows from rising water levels	$ 200,000	$ 40,000	$ 60,000	$ 300,000
23	Maplewood Drive and Sprucewood Avenue Drainage Maintenenace	Local	3	Maintain the Maplewood Drive and Sprucewood Avenue drainage including: clearing and grubbing, excavation and disposal of material off site	$ 1,040,400	$ 208,080	$ 312,120	$ 1,560,600
24	Black Oak Heritage Park - Develop an Emergency Response Plan for Park When Flooded	Local	3	Solutions from the Sewer and Coastal Flood Protection Master Plan - private property.	N/A	N/A	N/A	N/A
25	Ojibway Parkway - Roadside Ditch Maintenance	Local	3	Maintain the Ojibway Parkway roadside ditch including: cleaning, flushing, repairs, and intermittent inspection	$ 1,125,000	$ 225,000	$ 337,500	$ 1,687,500
26	Ojibway Parkway Drainage Improvements	Local	3	Improve the condition and capacity of the Ojibway Parkway drainage including roadside ditches, underground storm system, and outlet capacity	$ 2,500,000	$ 500,000	$ 750,000	$ 3,750,000

West Windsor Flood Protection Study
Appendix H - Table H.1 Solution Summary and Budgetary Cost Estimates

Date 2022-11-22

No.	Solution	Local/ Regional	Applicable Zones	Description	Construction Cost	Engineering Cost (20%)	Contingency Cost (30%)	Total Solution Cost
27	Install Rain Catchers	Regional	1 & 2	Install rain catchers at sanitary MHs located in low lying areas	$ 70,000	N/A	$ 21,000	$ 91,000
28	Russell Street Local Drainage Improvements	Local	2	Improve the condition and capacity of the Russell Street drainage including roadside ditches and outlet capacity	$ 1,560,000	$ 312,000	$ 468,000	$ 2,340,000
29	Morton Avenue Roadside Ditch Improvements	Local	3	Improve and maintain the condition and capacity of the Morton Avenue roadside ditches including: excavation, cleaning, widening, and intermittent inspection and maintenance	$ 531,000	$ 106,200	$ 159,300	$ 796,500

West Windsor Flood Protection Study -
Table H-2 - Triple Bottom Line Criteria, Evaluation and Scoring

TBL Ranking Criteria	Methodology and Indicator	Weighting	Comparison Score: 0/5/10			Source of Comparison Data and Comments	1	2	3	4	5	6	8	15	16	18
			0	5	10		Install Backflow Prevention at CSOs along Detroit River	Lou Romano RTB	Combined Sewer Separation	Install Basement Flood Protection Measures	Prince Road Trunk Storm Sewer Outfall and Pump Station	Detroit Street Trunk Storm Sewer and Outfall	Sandwich Street Drainage Improvements	McKee Creek Drain Maintenance from Detroit River to Sandwich Street	McKee Creek Drain Improvements	Prospect Outlet Dewatering Pump Station
ECONOMIC																
Cost effectiveness	Projects with lower capital costs impacts taxpayers the least and will require less budget allocation.	2	Cost > $4M	Cost Between $1-4M	Cost/< $1M or Private Property Costs.	Based on 2022 Estimated Project Construction Costs and does not factor inflation.	Assume all completed as on comprehensive project.	Cost > $4M	Several kilometers of combined sewer including restoration will have significant costs.	Assume City will contribute to residential property protection costs via subsidy program.	Cost Between $1-4M	Cost Between $1-4M	Cost/< $1M	Cost/< $1M or Private Property Costs.	Cost Between $1-4M	Cost Between $1-4M
						Score	10	0	0	10	10	10	20	20	10	10
Asset Risk Rating	Higher priority if asset condition indicates need for refurbishment or replacement.	1	<10% rated as poor condition, acceptable condition or new infrastructure.	10-30% Rated as poor condition	>30% Rated as poor condition	Condition ratings were obtained via the City's Information System as of 2017.	Various conditions however most are older structures.	New infrastructure.	Various conditions however most are older structures.	New infrastructure.	New infrastructure.	Sewer in acceptable condition. Constructed in 2001.	Drainage swales and road should be maintained.	Drainage swales and road should be maintained.	Drainage swales and road should be maintained.	New infrastructure.
						Score	10	0	10	0	0	0	10	10	10	0
Synergistic implementation, timing with other projects or opportunities *e.g. Gordie Howe Bridge, Sandwich St reconstruction, Great Lakes WQA*	Higher priority and advantages for earlier action if synergistic opportunities support co-funding or achieve similar goals *e.g. Intl Bridge; GLWQA*	2	Likely no synergies or opportunities for overlapping funding or receiving support from other projects	Potential for synergies with one other project or potential funding opportunity	Potential for synergy with MORE than one other project or funding is available.	Survey of potential opportunities for synergistic projects.	Works to be done independent from other projects.	Received DMAF contribution from federal government.	Opportunity to separate sewer during road reconstruction projects.	Works to be done independent from other projects.	Opportunity to complete this work in conjunction with the McKee Creek Improvements (Solution 15).	Works to be done independent from other projects.	Works to be done independent from other projects.	Opportunity to complete this work in conjunction with the Prince Road Trunk Storm Sewer Outfall and Pump Station (Solution 5).	Works to be done independent from other projects.	Opportunity to complete this work in conjunction with the Prospect Road Reprofiling.
						Score	0	20	10	0	10	0	0	20	0	10
If solution fails or is not implemented, high replacement costs or extreme challenges if catastrophic failure occurs (e.g. high costs to replace, time without services)	Higher priority for action if high costs or long disruptions could be incurred from catastrophic failure of critical asset *e.g. Lou Romano WWTP, pumping stations*	1	Low Reduction	Median Reduction	High Reduction	If solutions are not implemented what is the extent of property damage or failure of 3rd party assets during high river level events.	Median Reduction	High Reduction	Low Reduction	Low Reduction	High Reduction	Low Reduction	Low Reduction	Low Reduction	Median Reduction	Median Reduction
						Score	5	10	0	0	10	0	0	0	5	5
Ease, cost and complexity of measure's ongoing operations and maintenance.	Higher acceptance for action if ongoing O&M efforts are relatively lower.	2	Poor acceptance of measure, unknown technology and significant number of manhours for maintenance and operation.	Some training needed. Mid-level number of manhours for maintenance and operation.	Known technology and minimal labour hours are acceptable.		O&M shall be completed per the City's typical sewer system practices.	Complex and increased O&M for an additional pump station and large scale storage unit.	Significant length of sewer to be added to City Asset.	No ongoing O&M needs.	Increased O&M for an additional pump station.	O&M shall be completed per the City's typical sewer system practices.	O&M shall be completed per the City's typical sewer system practices.	O&M shall be completed per the City's typical sewer system practices.	O&M shall be completed per the City's typical sewer system practices.	Increased O&M for an additional pump station.
						Score	20	0	0	20	0	20	20	20	20	0
						Total Score (Economic)	45	30	20	30	30	30	50	70	45	25

West Windsor Flood Protection Study -
Table H-2 - Triple Bottom Line Criteria, Evaluation ar

TBL Ranking Criteria	Methodology and Indicator	19	20	21	23	24	25	27	28	29	30	31
		Reprofile Prospect Avenue	Brock St - Inspect Shoreline and Outfall Condition and Develop Local Repair Plan	Reprofile Mill Street	McKee Park Improvements to be constructed above Detroit River high water level	Maplewood Drive Sanitary Pump Station Improvements	Maplewood Drive and Sprucewood Avenue Drainage Maintenance	Ojibway Parkway - Roadside Ditch Maintenance	Ojibway Parkway Drainage Improvements	Install Rain Catchers	Russell Street Local Drainage Improvements	Morton Ave. Drainage Improvements
ECONOMIC												
Cost effectiveness	Projects with lower capital costs impacts taxpayers the least and will require less budget allocation.	Cost Between $1-4M	Cost/< $1M or Private Property Costs.	Cost/< $1M or Private Property Costs.	Cost/< $1M or Private Property Costs.	Cost/< $1M or Private Property Costs.	Cost > $4M	Cost > $4M	Cost/< $1M or Private Property Costs.	Cost/< $1M or Private Property Costs.	Cost/< $1M or Private Property Costs.	Cost/< $1M or Private Property Costs.
		10	20	20	20	20	0	0	20	20	20	20
Asset Risk Rating	Higher priority if asset condition indicates need for refurbishment or replacement.	Drainage swales and road in poor condition.	Infrastructure in poor condition.	Road and drainage acceptable condition.	Park facilities acceptable condition.	New infrastructure.	Drainage swales and road should be maintained.	Drainage swales and road should be maintained.	Drainage swales and road should be maintained.	New infrastructure.	Drainage swales and road should be maintained.	Drainage swales and road should be maintained.
		10	10	0	0	0	10	10	10	0	10	10
Synergistic implementation, timing with other projects or opportunities *e.g. Gordie Howe Bridge, Sandwich St reconstruction, Great Lakes WQA*	Higher priority and advantages for earlier action if synergistic opportunities support co-funding or achieve similar goals *e.g. Intl Bridge; GLWQA*	Opportunity to complete this work in conjunction with the new RTB's outlet to the Detroit River.	Works to be done independent from other projects.	Works to be done independent from other projects.	Funding opportunities available in conjunction with the Gordie Howe Bridge.	Works to be done independent from other projects.	Works to be done independent from other projects.	Works to be done independent from other projects.	Works to be done independent from other projects.	Works to be done independent from other projects.	Works to be done independent from other projects.	Works to be done independent from other projects.
		20	0	0	20	0	0	0	0	0	0	0
If solution fails or is not implemented, high replacement costs or extreme challenges if catastrophic failure occurs (e.g. high costs to replace, time without services)	Higher priority for action if high costs or long disruptions could be incurred from catastrophic failure of critical asset *e.g. Lou Romano WWTP, pumping stations*	High Reduction	Median Reduction	High Reduction	Low Reduction	Low Reduction	Low Reduction	Low Reduction	Low Reduction	Low Reduction	Low Reduction	Low Reduction
		10	5	10	0	0	0	0	0	0	0	0
Ease, cost and complexity of measure's ongoing operations and maintenance.	Higher acceptance for action if ongoing O&M efforts are relatively lower.	O&M shall be completed per the City's typical sewer system practices.	O&M shall be completed per the City's typical sewer system practices.	O&M shall be completed per the City's typical sewer system practices.	O&M shall be completed per the City's typical sewer system practices.	Increased O&M for an additional pump station.	O&M shall be completed per the City's typical sewer system practices.	O&M shall be completed per the City's typical sewer system practices.	O&M shall be completed per the City's typical sewer system practices.	O&M shall be completed per the City's typical sewer system practices.	O&M shall be completed per the City's typical sewer system practices.	O&M shall be completed per the City's typical sewer system practices.
		20	20	20	20	0	20	20	20	20	20	20
		70	55	50	60	20	30	30	50	40	50	50

West Windsor Flood Protection Study -
Table H-2 - Triple Bottom Line Criteria, Evaluation and Scoring

TBL Ranking Criteria	Methodology and Indicator	Weighting	Comparison Score: 0/5/10			Source of Comparison Data and Comments	1	2	3	4	5	6	8
			0	5	10		Install Backflow Prevention at CSOs along Detroit River	Lou Romano RTB	Combined Sewer Separation	Install Basement Flood Protection Measures	Prince Road Trunk Storm Sewer Outfall and Pump Station	Detroit Street Trunk Storm Sewer and Outfall	Sandwich Street Drainage Improvements
SOCIAL													
Level of Basement Flooding	Higher priority and need for action in areas with greatest basement flooding risks and for solutions that mitigate basement flood risk.	2	Lowest amount of basement flooding risk mitigation by the solution.		Highest amount of basement flooding risk mitigation by the solution.	Solutions that will reduce extraneous flows entering the system or will reduce sanitary sewer system hydraulic gradeline levels.	Reduces backflow of river water into the sanitary system.	Reduces risk of backup of wastewater within the sanitary system.	Reduces inflow of rainwater into the into the sanitary system.	Direct protection of individual basement flood risk is most effective.	Supports combined sewer separation which reduces basement flood risk.	Marginal impact to basement flood risk.	Solution will not directly reduce basement flood risk.
						Score	20	20	20	20	10	0	0
Level of Extent of Surface and Coastal Flooding	Higher priority and need for action in areas with greatest flooding risks associated with high water levels and for solutions that mitigate surface flood risk.	2	Lowest amount of flooding risk mitigated by the solution.		Highest amount of flooding risk mitigated by the solution.	Total Area of 1:100 year flood risk being removed.	Median level of surface flood risk reduction.	Low level of surface flood risk reduction.	Low level of surface flood risk reduction.	Low level of surface flood risk reduction.	High level of surface flood risk reduction.	Mid level improvement for surface and coastal flood risk reduction. Up	High level of surface flood risk reduction.
						Score	10	0	0	0	20	10	20
Access Risk - Level of Risk to Roadways or Railway Crossing	Higher priority and need for action if surface flooding along major arterial roadways impacts for emergency access and continue critical transportation connections.	2	Solution mitigates flooding along Collector roadways.	Solution mitigates flooding along Arterial Roadways - do NOT provide critical connections.	Solution mitigates flooding along Arterial roadways and Railway Corridors -- DO provide critical connections (hospital routes, border access).	Road classifications from the City's Data System (2021).	No impact to surface flooding.	No impact to surface flooding.	Reduction of surface flooding throughout study area.	No impact to surface flooding.	Direct benefit on Prince Road which provide access to Hôtel-Dieu Grace Healthcare.	Collector Roadways.	Collector Roadway.
						Score	0	0	0	0	20	0	0
Public Confidence & City Reputation	Higher priority and need for action if greater population density in area (reflecting potentially displeased citizens)	1	Low Density of homes/businesses within area impacted by potential service disruptions.	Mid Level Density of homes/businesses within area impacted by potential service disruptions.	High Density of homes/businesses within area impacted by potential service disruptions.	High Density = Residential/Urban Areas Mid Level Density = Commercial Developments, Industrial Sites Low Level Density = Vacant and Industrial Sites	High Density	Regional Solution impacts all development areas.	Regional Solution Benefital all development areas.	High Density	High Density	High Density	Low Density
						Score	10	10	10	10	10	10	0
Level of Disruption to Archaeological and Cultural Heritage Resources	Higher priority and need for action in areas with greatest flooding risks associated with high water levels and for solutions that mitigate surface flood risk.	2	Significant impact to Archaeological and Cultural Heritage Resources due to construction excavations and new infrastructure.		Minimal impact to Archaeological and Cultural Heritage Resources due to construction excavations and new infrastructure.	Any excavation works along the waterfront areas (high archaeological risks) or construction impacts to private property areas that may contain built heritage features and/or cultural landscapes such as parks, naturalized areas.	Mid Level Impact. May require some excavation to construct CSO Chambers.	Mid Level Impact. May require some excavation to construct RTB chamber and sanitary trunk sewers.	Significant level of distruption throughout the study area to separate combined sewer.	Minimal Impact, Assume areas are already disturbed.	High level of impact due to location of works.	High level of impact due to location of works.	Minimal Impact, Assume areas are already disturbed.
						Score	10	10	0	20	0	0	20
						Total Score (Social)	50	40	30	50	60	20	40

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Table H-2 - Triple Bottom Line Criteria, Evaluation and Scoring

TBL Ranking Criteria	Methodology and Indicator	Weighting	Comparison Score: 0/5/10			Source of Comparison Data and Comments	15	16	18	19	20	21	23
			0	5	10		McKee Creek Drain Maintenance from Detroit River to Sandwich Street	McKee Creek Drain Improvements	Prospect Outlet Dewatering Pump Station	Reprofile Prospect Avenue	Brock St - Inspect Shoreline and Outfall Condition and Develop Local Repair Plan	Reprofile Mill Street	McKee Park Improvements to be constructed above Detroit River high water level
SOCIAL													
Level of Basement Flooding	Higher priority and need for action in areas with greatest basement flooding risks and for solutions that mitigate basement flood risk.	2	Lowest amount of basement flooding risk mitigation by the solution.		Highest amount of basement flooding risk mitigation by the solution.	Solutions that will reduce extraneous flows entering the system or will reduce sanitary sewer system hydraulic gradeline levels.	Solution will not directly reduce basement flood risk.	Solution will not directly reduce basement flood risk.	Solution will not directly reduce basement flood risk.	Solution will not directly reduce basement flood risk.	Solution will not directly reduce basement flood risk.	Solution will not directly reduce basement flood risk.	Solution will not directly reduce basement flood risk.
						Score	0	0	0	0	0	0	0
Level of Extent of Surface and Coastal Flooding	Higher priority and need for action in areas with greatest flooding risks associated with high water levels and for solutions that mitigate surface flood risk.	2	Lowest amount of flooding risk mitigated by the solution.		Highest amount of flooding risk mitigated by the solution.	Total Area of 1:100 year flood risk being removed.	Median level of surface flood risk reduction.	High level of surface flood risk reduction.	High level of surface flood risk reduction.	High level of surface flood risk reduction.	Median level of surface flood risk reduction.	High level of surface flood risk reduction.	Median level of surface flood risk reduction.
						Score	10	20	20	20	10	20	10
Access Risk - Level of Risk to Roadways or Railway Crossing	Higher priority and need for action if surface flooding along major arterial roadways impacts for emergency access and continue critical transportation connections.	2	Solution mitigates flooding along Collector roadways.	Solution mitigates flooding along Arterial Roadways - do NOT provide critical connections.	Solution mitigates flooding along Arterial roadways and Railway Corridors – DO provide critical connections (hospital routes, border access).	Road classifications from the City's Data System (2021).	Proximity to Essex Terminal Railway (ETR)	Proximity to Essex Terminal Railway (ETR)	Collector Road however no other egress/ingress.	Collector Road however no other egress/ingress.	Collector Road	Arterial Roadway	Collector Road
						Score	20	20	20	20	0	10	0
Public Confidence & City Reputation	Higher priority and need for action if greater population density in area (reflecting potentially displeased citizens)	1	Low Density of homes/businesses within area impacted by potential service disruptions.	Mid Level Density of homes/businesses within area impacted by potential service disruptions.	High Density of homes/businesses within area impacted by potential service disruptions.	High Density = Residential/Urban Areas Mid Level Density = Commercial Developments, Industrial Sites Low Level Density = Vacant and Industrial Sites	Low Density	Low Density	Low Density	Low Density	High Density	High Density	High Density
						Score	0	0	0	0	10	10	10
Level of Disruption to Archaeological and Cultural Heritage Resources	Higher priority and need for action in areas with greatest flooding risks associated with high water levels and for solutions that mitigate surface flood risk.	2	Significant impact to Archaeological and Cultural Heritage Resources due to construction excavations and new infrastructure.		Minimal impact to Archaeological and Cultural Heritage Resources due to construction excavations and new infrastructure.	Any excavation works along the waterfront areas (high archaeological risks) or construction impacts to private property areas that may contain built heritage features and/or cultural landscapes such as parks, naturalized areas.	High level of impact due to location of works along River waterline.	High level of impact due to location of works along River waterline.	Mid Level Impact. Excavation for pump station required.	Mid Level Impact. Regarding of existing roadway.	High level of impact due to location of works along River waterline.	Mid Level Impact. Regarding of existing roadway.	High level of impact due to location of works along River waterline.
						Score	0	0	10	10	0	10	0
						Total Score (Social)	30	40	50	50	20	50	20

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Table H-2 - Triple Bottom Line Criteria, Evaluation and Scoring

TBL Ranking Criteria	Methodology and Indicator	Weighting	Comparison Score: 0/5/10			Source of Comparison Data and Comments	24	25	27	28	29	30	31
			0	5	10		Maplewood Drive Sanitary Pump Station Improvements	Maplewood Drive and Sprucewood Avenue Drainage Maintenance	Ojibway Parkway - Roadside Ditch Maintenance	Ojibway Parkway Drainage Improvements	Install Rain Catchers	Russell Street Local Drainage Improvements	Morton Ave. Drainage Improvements
SOCIAL													
Level of Basement Flooding	Higher priority and need for action in areas with greatest basement flooding risks and for solutions that mitigate basement flood risk.	2	Lowest amount of basement flooding risk mitigation by the solution.		Highest amount of basement flooding risk mitigation by the solution.	Solutions that will reduce extraneous flows entering the system or will reduce sanitary sewer system hydraulic gradeline levels.	Solution will not directly reduce basement flood risk.	Solution will not directly reduce basement flood risk.	Solution will not directly reduce basement flood risk.	Solution will not directly reduce basement flood risk.	Reduces quantity of stormwater entering the sanitary sewer system.	Solution will not directly reduce basement flood risk.	Solution will not directly reduce basement flood risk.
						Score	0	0	0	0	10	0	0
Level of Extent of Surface and Coastal Flooding	Higher priority and need for action in areas with greatest flooding risks associated with high water levels and for solutions that mitigate surface flood risk.	2	Lowest amount of flooding risk mitigated by the solution.		Highest amount of flooding risk mitigated by the solution.	Total Area of 1:100 year flood risk being removed.	High level of surface flood risk reduction.	High level of surface flood risk reduction.	Median level of surface flood risk reduction.	High level of surface flood risk reduction.	Low level of surface flood risk reduction.	High level of surface flood risk reduction.	Median level of surface flood risk reduction.
						Score	20	20	10	20	10	20	10
Access Risk - Level of Risk to Roadways or Railway Crossing	Higher priority and need for action if surface flooding along major arterial roadways impacts for emergency access and continue critical transportation connections.	2	Solution mitigates flooding along Collector roadways.	Solution mitigates flooding along Arterial Roadways - do NOT provide critical connections.	Solution mitigates flooding along Arterial roadways and Railway Corridors – DO provide critical connections (hospital routes, border access).	Road classifications from the City's Data System (2021).	Collector Road	Collector Road	Arterial Roadway (Emergency Route)	Arterial Roadway (Emergency Route)	No road surface impact.	Collector Road	Collector Road
						Score	0	0	20	20	0	0	0
Public Confidence & City Reputation	Higher priority and need for action if greater population density in area (reflecting potentially displeased citizens)	1	Low Density of homes/businesses within area impacted by potential service disruptions.	Mid Level Density of homes/businesses within area impacted by potential service disruptions.	High Density of homes/businesses within area impacted by potential service disruptions.	High Density = Residential/Urban Areas Mid Level Density = Commercial Developments, Industrial Sites Low Level Density = Vacant and Industrial Sites	Low Density	Low Density	Low Density	Low Density	Retrofit of manholes is proposed within high density areas.	Low Density	Low Density
						Score	0	0	0	0	10	0	0
Level of Disruption to Archaeological and Cultural Heritage Resources	Higher priority and need for action in areas with greatest flooding risks associated with high water levels and for solutions that mitigate surface flood risk.	2	Significant impact to Archaeological and Cultural Heritage Resources due to construction excavations and new infrastructure.		Minimal impact to Archaeological and Cultural Heritage Resources due to construction excavations and new infrastructure.	Any excavation works along the waterfront areas (high archaeological risks) or construction impacts to private property areas that may contain built heritage features and/or cultural landscapes such as parks, naturalized areas.	High level of impact due to location of works along River waterline.	Low level of impact.	Low level of impact.	Low level of impact.	Low level of impact.	Low level of impact.	Mid Level impact. Regarding of existing roadway.
						Score	0	20	20	20	20	20	10
						Total Score (Social)	20	40	50	60	50	40	20

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Table H-2 - Triple Bottom Line Criteria, Evaluation and Scoring

TBL Ranking Criteria	Methodology and Indicator	Weighting	Comparison Score: 0/5/10			Source of Comparison Data and Comments	1	2	3
			0	5	10		Install Backflow Prevention at CSOs along Detroit River	Lou Romano RTB	Combined Sewer Separation
ENVIRONMENTAL									
CSO overflows	Higher priority and need for action if solution reduces CSO overflow risks.	2	Lowest reduction of CSO Frequency.		Highest reduction of CSO Frequency.	High reduction of CSO events may be attributed to solutions that reduce stormwater inflow or reduces the HGL in the into the sanitary system.	Minimal reduction in number of CSO events.	Will measurably reduce the frequency of CSOs.	Removing stormwater from wastewater system will reduce the number of CSO events.
						Score	0	20	20
Risk of contaminants reaching Detroit River or other sensitive habitat.	Higher priority and support for action if solution reduces land contamination risks for sensitive habitat and the Great Lakes Area of Concern	2	Does NOT notably reduce contaminant risks.	**Reduces** amount of contaminants from reaching Detroit River or sensitive habitat.	**Prevents** or contains land contaminants from reaching Detroit River or sensitive habitat.	Contaminate risk associated with sewage backup from combined sewer on surface.	Reduces number of combined/sanitary sewer system back up events.	Reduces number of combined/sanitary sewer system back up events.	Reduces number of combined/sanitary sewer system back up events.
						Score	20	20	20
Reduces GHG and/or air quality emissions.	Higher priority and support for action if solution offers emission or GHG reductions (e.g. reduces loads on LRWRP, reduced electricity for pumping)	2	May add to GHG emissions (e.g. increased electricity, fossil fuel needs).		Potential for emission reductions.	Qualitative evaluation (e.g. additional electricity, additional LRWRP treatment, etc.)	No electricity required for long term solution implementation.	New/bigger pump station will have higher electrical needs.	No electricity required for long term solution implementation.
						Score	10	0	10
Human Health and/or Well-Being	Higher priority and support for action if the public can be warned and can take action to reduce their health and safety risks, encourage inclusion and well-being (e.g. shading, parks, recreation).	2	Does not increase public response times to reduce of health and safety risks (e.g. sewer backup, escape from heavy flooding hazards). Does not improve well-being or human health.	Improves at <u>least one of</u>: Increases public response times to reduce health and safety risks; Improves well-being or human health.	Improves <u>two or more</u> of: Increases public response times to reduce health and safety risks; Improves well-being or human health.	Human health is associated with reduction in basement flood risk or reduction of surface flooding. Well being is associated odour nuisance, aesthetics, beneficial uses, well-being and associated human health.	Reduces basement flood risk including health risks associated with sewage backup.	Reduces basement flood risk including health risks associated with sewage backup.	Reduces basement flood risk including health risks associated with sewage backup.
						Score	10	20	20
						Total Score (Environmental)	40	60	70

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Table H-2 - Triple Bottom Line Criteria, Evaluation and Scoring

TBL Ranking Criteria	Methodology and Indicator	Weighting	Comparison Score: 0/5/10			Source of Comparison Data and Comments	4	5	6	8
			0	5	10		Install Basement Flood Protection Measures	Prince Road Trunk Storm Sewer Outfall and Pump Station	Detroit Street Trunk Storm Sewer and Outfall	Sandwich Street Drainage Improvements
ENVIRONMENTAL										
CSO overflows	Higher priority and need for action if solution reduces CSO overflow risks.	2	Lowest reduction of CSO Frequency.		Highest reduction of CSO Frequency.	High reduction of CSO events may be attributed to solutions that reduce stormwater inflow or reduces the HGL in the into the sanitary system.	Does not reduce risk of CSOs.	Improving stormwater drainage will reduce CSO frequency.	Does not significantly reduce risk of CSOs.	Improving stormwater drainage will reduce CSO frequency.
						Score	0	10	0	10
Risk of contaminants reaching Detroit River or other sensitive habitat.	Higher priority and support for action if solution reduces land contamination risks for sensitive habitat and the Great Lakes Area of Concern	2	Does NOT notably reduce contaminant risks.	**Reduces** amount of contaminants from reaching Detroit River or sensitive habitat.	**Prevents** or contains land contaminants from reaching Detroit River or sensitive habitat.	Contaminate risk associated with sewage backup from combined sewer on surface.	Does not reduce number of combined/sanitary sewer system back up events.	Reduces number of combined/sanitary sewer system back up events.	Reduces number of combined/sanitary sewer system back up events.	Does not reduce number of combined/sanitary sewer system back up events.
						Score	0	20	20	0
Reduces GHG and/or air quality emissions.	Higher priority and support for action if solution offers emission or GHG reductions (e.g. reduces loads on LRWRP, reduced electricity for pumping)	2	May add to GHG emissions (e.g. increased electricity, fossil fuel needs).		Potential for emission reductions.	Qualitative evaluation (e.g. additional electricity, additional LRWRP treatment, etc.)	No electricity required for long term solution implementation.	New/bigger pump station will have higher electrical needs.	No electricity required for long term solution implementation.	No electricity required for long term solution implementation.
						Score	10	0	10	10
Human Health and/or Well-Being	Higher priority and support for action if the public can be warned and can take action to reduce their health and safety risks, encourage inclusion and well-being (e.g. shading, parks, recreation).	2	Does not increase public response times to reduce of health and safety risks (e.g. sewer backup, escape from heavy flooding hazards). Does not improve well-being or human health.	Improves at <u>least one of</u>: Increases public response times to reduce health and safety risks; Improves well-being or human health.	Improves <u>two or more</u> of: Increases public response times to reduce health and safety risks; Improves well-being or human health.	Human health is associated with reduction in basement flood risk or reduction of surface flooding. Well being is associated odour nuisance, aesthetics, beneficial uses, well-being and associated human health.	Reduces basement flood risk including health risks associated with sewage backup.	Reduces basement flood risk including health risks associated with sewage backup.	Reduces basement flood risk including health risks associated with sewage backup.	Minimal health or well being benefits.
						Score	20	20	20	0
						Total Score (Environmental)	30	50	50	20

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Table H-2 - Triple Bottom Line Criteria, Evaluation and Scoring

TBL Ranking Criteria	Methodology and Indicator	Weighting	Comparison Score: 0/5/10			Source of Comparison Data and Comments	15	16	18	19
			0	5	10		McKee Creek Drain Maintenance from Detroit River to Sandwich Street	McKee Creek Drain Improvements	Prospect Outlet Dewatering Pump Station	Reprofile Prospect Avenue
ENVIRONMENTAL										
CSO overflows	Higher priority and need for action if solution reduces CSO overflow risks.	2	Lowest reduction of CSO Frequency.		Highest reduction of CSO Frequency.	High reduction of CSO events may be attributed to solutions that reduce stormwater inflow or reduces the HGL in the into the sanitary system.	Improving stormwater drainage will reduce CSO frequency.	Does not reduce risk of CSOs.	Does not reduce risk of CSOs.	Does not reduce risk of CSOs.
						Score	10	0	0	0
Risk of contaminants reaching Detroit River or other sensitive habitat.	Higher priority and support for action if solution reduces land contamination risks for sensitive habitat and the Great Lakes Area of Concern	2	Does NOT notably reduce contaminant risks.	**Reduces** amount of contaminants from reaching Detroit River or sensitive habitat.	**Prevents** or contains land contaminants from reaching Detroit River or sensitive habitat.	Contaminate risk associated with sewage backup from combined sewer on surface.	Does not reduce number of combined/sanitary sewer system back up events.	Does not reduce number of combined/sanitary sewer system back up events.	Does not reduce number of combined/sanitary sewer system back up events.	Does not reduce number of combined/sanitary sewer system back up events.
						Score	0	0	0	0
Reduces GHG and/or air quality emissions.	Higher priority and support for action if solution offers emission or GHG reductions (e.g. reduces loads on LRWRP, reduced electricity for pumping)	2	May add to GHG emissions (e.g. increased electricity, fossil fuel needs).		Potential for emission reductions.	Qualitative evaluation (e.g. additional electricity, additional LRWRP treatment, etc.)	No electricity required for long term solution implementation.	New/bigger pump station will have higher electrical needs.	New/bigger pump station will have higher electrical needs.	
						Score	10		0	
Human Health and/or Well-Being	Higher priority and support for action if the public can be warned and can take action to reduce their health and safety risks, encourage inclusion and well-being (e.g. shading, parks, recreation).	2	Does not increase public response times to reduce of health and safety risks (e.g. sewer backup, escape from heavy flooding hazards). Does not improve well-being or human health.	Improves at <u>least one of</u>: Increases public response times to reduce health and safety risks; Improves well-being or human health.	Improves <u>two or more</u> of: Increases public response times to reduce health and safety risks; Improves well-being or human health.	Human health is associated with reduction in basement flood risk or reduction of surface flooding. Well being is associated odour nuisance, aesthetics, beneficial uses, well-being and associated human health.	Minimal health or well being benefits.	Minimal health or well being benefits.	Minimal health or well being benefits.	Minimal health or well being benefits.
						Score	0	0	0	0
						Total Score (Environmental)	20	0	0	0

West Windsor Flood Protection Study -
Table H-2 - Triple Bottom Line Criteria, Evaluation and Scoring

TBL Ranking Criteria	Methodology and Indicator	Weighting	Comparison Score: 0/5/10			Source of Comparison Data and Comments	20	21	23	24
			0	5	10		Brock St - Inspect Shoreline and Outfall Condition and Develop Local Repair Plan	Reprofile Mill Street	McKee Park Improvements to be constructed above Detroit River high water level	Maplewood Drive Sanitary Pump Station Improvements
ENVIRONMENTAL										
CSO overflows	Higher priority and need for action if solution reduces CSO overflow risks.	2	Lowest reduction of CSO Frequency.		Highest reduction of CSO Frequency.	High reduction of CSO events may be attributed to solutions that reduce stormwater inflow or reduces the HGL in the into the sanitary system.	Does not reduce risk of CSOs.	Does not reduce risk of CSOs.	Does not reduce risk of CSOs.	Does not reduce risk of CSOs.
						Score	0	0	0	0
Risk of contaminants reaching Detroit River or other sensitive habitat.	Higher priority and support for action if solution reduces land contamination risks for sensitive habitat and the Great Lakes Area of Concern	2	Does NOT notably reduce contaminant risks.	**Reduces** amount of contaminants from reaching Detroit River or sensitive habitat.	**Prevents** or contains land contaminants from reaching Detroit River or sensitive habitat.	Contaminate risk associated with sewage backup from combined sewer on surface.	Does not reduce number of combined/sanitary sewer system back up events.	Does not reduce number of combined/sanitary sewer system back up events.	Does not reduce number of combined/sanitary sewer system back up events.	Does not reduce number of combined/sanitary sewer system back up events.
						Score	0	0	0	0
Reduces GHG and/or air quality emissions.	Higher priority and support for action if solution offers emission or GHG reductions (e.g. reduces loads on LRWRP, reduced electricity for pumping)	2	May add to GHG emissions (e.g. increased electricity, fossil fuel needs).		Potential for emission reductions.	Qualitative evaluation (e.g. additional electricity, additional LRWRP treatment, etc.)	No electricity required for long term solution implementation.	No electricity required for long term solution implementation.	No electricity required for long term solution implementation.	New/bigger pump station will have higher electrical needs.
						Score	10	10	10	0
Human Health and/or Well-Being	Higher priority and support for action if the public can be warned and can take action to reduce their health and safety risks, encourage inclusion and well-being (e.g. shading, parks, recreation).	2	Does not increase public response times to reduce of health and safety risks (e.g. sewer backup, escape from heavy flooding hazards). Does not improve well-being or human health.	Improves at <u>least one of</u>: Increases public response times to reduce health and safety risks; Improves well-being or human health.	Improves <u>two or more</u> of: Increases public response times to reduce health and safety risks; Improves well-being or human health.	Human health is associated with reduction in basement flood risk or reduction of surface flooding. Well being is associated odour nuisance, aesthetics, beneficial uses, well-being and associated human health.	Minimal health or well being benefits.	Minimal health or well being benefits.	Benefit related to the maintenance of public park access.	Minimal health or well being benefits.
						Score	0	0	20	0
						Total Score (Environmental)	10	10	30	0

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Table H-2 - Triple Bottom Line Criteria, Evaluation and Scoring

TBL Ranking Criteria	Methodology and Indicator	Weighting	Comparison Score: 0/5/10			Source of Comparison Data and Comments	25	27	28	29
			0	5	10		Maplewood Drive and Sprucewood Avenue Drainage Maintenance	Ojibway Parkway - Roadside Ditch Maintenance	Ojibway Parkway Drainage Improvements	Install Rain Catchers
ENVIRONMENTAL										
CSO overflows	Higher priority and need for action if solution reduces CSO overflow risks.	2	Lowest reduction of CSO Frequency.		Highest reduction of CSO Frequency.	High reduction of CSO events may be attributed to solutions that reduce stormwater inflow or reduces the HGL in the into the sanitary system.	Does not reduce risk of CSOs.	Does not reduce risk of CSOs.	Does not reduce risk of CSOs.	Reducing stormwater entering the wastewater system have some benefit.
						Score	0	0	0	20
Risk of contaminants reaching Detroit River or other sensitive habitat.	Higher priority and support for action if solution reduces land contamination risks for sensitive habitat and the Great Lakes Area of Concern	2	Does NOT notably reduce contaminant risks.	**Reduces** amount of contaminants from reaching Detroit River or sensitive habitat.	**Prevents** or contains land contaminants from reaching Detroit River or sensitive habitat.	Contaminate risk associated with sewage backup from combined sewer on surface.	Does not reduce number of combined/sanitary sewer system back up events.	Does not reduce number of combined/sanitary sewer system back up events.	Does not reduce number of combined/sanitary sewer system back up events.	Reduce number of combined/sanitary sewer system back up events.
						Score	0	0	0	20
Reduces GHG and/or air quality emissions.	Higher priority and support for action if solution offers emission or GHG reductions (e.g. reduces loads on LRWRP, reduced electricity for pumping)	2	May add to GHG emissions (e.g. increased electricity, fossil fuel needs).		Potential for emission reductions.	Qualitative evaluation (e.g. additional electricity, additional LRWRP treatment, etc.)	No electricity required for long term solution implementation.	No electricity required for long term solution implementation.	No electricity required for long term solution implementation.	No electricity required for long term solution implementation.
						Score	10	10	10	10
Human Health and/or Well-Being	Higher priority and support for action if the public can be warned and can take action to reduce their health and safety risks, encourage inclusion and well-being (e.g. shading, parks, recreation).	2	Does not increase public response times to reduce of health and safety risks (e.g. sewer backup, escape from heavy flooding hazards). Does not improve well-being or human health.	Improves at <u>least one of</u>: Increases public response times to reduce health and safety risks; Improves well-being or human health.	Improves <u>two or more</u> of: Increases public response times to reduce health and safety risks; Improves well-being or human health.	Human health is associated with reduction in basement flood risk or reduction of surface flooding. Well being is associated odour nuisance, aesthetics, beneficial uses, well-being and associated human health.	Minimal health or well being benefits.	Minimal health or well being benefits.	Minimal health or well being benefits.	Minimal health or well being benefits.
						Score	0	0	0	0
						Total Score (Environmental)	10	10	10	50

West Windsor Flood Protection Study -
Table H-2 - Triple Bottom Line Criteria, Evaluation and Scoring

TBL Ranking Criteria	Methodology and Indicator	Weighting	Comparison Score: 0/5/10			Source of Comparison Data and Comments	30	31
			0	5	10		Russell Street Local Drainage Improvements	Morton Ave. Drainage Improvements
ENVIRONMENTAL								
CSO overflows	Higher priority and need for action if solution reduces CSO overflow risks.	2	Lowest reduction of CSO Frequency.		Highest reduction of CSO Frequency.	High reduction of CSO events may be attributed to solutions that reduce stormwater inflow or reduces the HGL in the into the sanitary system.	Does not reduce risk of CSOs.	Does not reduce risk of CSOs.
						Score	0	0
Risk of contaminants reaching Detroit River or other sensitive habitat.	Higher priority and support for action if solution reduces land contamination risks for sensitive habitat and the Great Lakes Area of Concern	2	Does NOT notably reduce contaminant risks.	**Reduces** amount of contaminants from reaching Detroit River or sensitive habitat.	**Prevents** or contains land contaminants from reaching Detroit River or sensitive habitat.	Contaminate risk associated with sewage backup from combined sewer on surface.	Does not reduce number of combined/sanitary sewer system back up events.	Does not reduce number of combined/sanitary sewer system back up events.
						Score	0	0
Reduces GHG and/or air quality emissions.	Higher priority and support for action if solution offers emission or GHG reductions (e.g. reduces loads on LRWRP, reduced electricity for pumping)	2	May add to GHG emissions (e.g. increased electricity, fossil fuel needs).		Potential for emission reductions.	Qualitative evaluation (e.g. additional electricity, additional LRWRP treatment, etc.)	No electricity required for long term solution implementation.	No electricity required for long term solution implementation.
						Score	10	10
Human Health and/or Well-Being	Higher priority and support for action if the public can be warned and can take action to reduce their health and safety risks, encourage inclusion and well-being (e.g. shading, parks, recreation).	2	Does not increase public response times to reduce of health and safety risks (e.g. sewer backup, escape from heavy flooding hazards). Does not improve well-being or human health.	Improves at <u>least one of</u>: Increases public response times to reduce health and safety risks; Improves well-being or human health.	Improves <u>two or more</u> of: Increases public response times to reduce health and safety risks; Improves well-being or human health.	Human health is associated with reduction in basement flood risk or reduction of surface flooding. Well being is associated odour nuisance, aesthetics, beneficial uses, well-being and associated human health.	Minimal health or well being benefits.	Minimal health or well being benefits.
						Score	0	0
						Total Score (Environmental)	10	10

Appendix H

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Committee Matters: SCM 69/2023

Subject: E-Scooter Update - City-wide

Moved by: Councillor Kieran McKenzie
Seconded by: Councillor Mark McKenzie

Decision Number: ETPS 929
That the report of the Active Transportation Coordinator dated January 10, 2023 regarding E-Scooter Update – City-wide **BE RECEIVED** for information.
Carried.

Report Number: C 7/2023
Clerk's File: SW/13715

Clerk's Note:

1. The recommendation of the Environment, Transportation & Public Safety Standing Committee and Administration are the same.

2. Please refer to Item 8.1 from the Environment, Transportation & Public Safety Standing Committee Meeting held on February 22, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: http://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230222/-1/9386

Subject: E-Scooter Update - City-wide

Reference:

Date to Council: February 22, 2023
Author: Kathy Quenneville
Active Transportation Coordinator
519-255-6100 ext. 6287
kquenneville@citywindsor.ca
Public Works - Operations
Report Date: January 10, 2023
Clerk's File #: SW/13715

To: Mayor and Members of City Council

Recommendation:

THAT report C 7/2023, "E-Scooter Update – City-wide" **BE RECEIVED** for information.

Executive Summary:

N/A

Background:

E-scooters are becoming an increasingly popular form of micro-mobility. In November 2019, the Ontario government announced a 5-year e-scooter pilot program, running from January 1, 2020 to January 1, 2025. Under this pilot program, municipalities have the ability to allow electric kick-scooters to operate on streets and in rights-of-way under their jurisdiction.

The City of Windsor Active Transportation Master Plan recommends pursuing a partnership with private operators to provide a public bike sharing program and consider the feasibility of an electric scooter sharing program (Walk Wheel Windsor Action 3.1).

Similarly, the Windsor Works Report cited improving urban mobility as a key ingredient of downtown revival. The E-Scooter pilot program approved by Council in 2020 aligned with the Windsor Works recommendations and progress toward the goals of investment in infrastructure and economic development and innovation. The most recent implementation report from Windsor Works explains that "the City needs to improve its downtown district, complete riverfront developments and provide new and enhanced mobility options" and supports the implementation of e-scooters and e-bikes.

In report S 7/2020 on April 29, 2020, administration put forth a recommendation to the Environment, Transportation and Public Safety Standing Committee for issuance of a Request for Proposal for Bike share and E-scooter operations. Council endorsed this recommendation on May 25th 2020 and an RFP was issued which identified that the successful proponent(s) would be responsible for supplying, operating, maintaining, managing, marketing, financing and reporting on the bike/e-scooter share system under the guidelines of a service agreement with the City for a one-year pilot project to operate on City property. A Request for Proposal (RFP) was issued on January 15, 2021 and closed on February 8, 2021. Bird Canada was the successful proponent and began running their e-scooter program on May 1st 2021.

At the April 19, 2021 meeting of Council, Council directed administration to report back on the results of the trial period whereby e-scooters would be permitted on the Central Riverfront Trail from the Ambassador Bridge to Hiram Walker, subsequent to an amendment to the Parks By-law 131-2019 (CR165/2021 and CR83/2020). The trial period expired on December 1, 2021.

The total service area of the e-scooters equals approximately 22.6 km^2 (15% of the City) and includes approximately 65,000 residents (30% of Windsor's population). **Figure 1** demonstrates the service area under which Bird operated for the 2021 term. A minimum fleet size of 450 devices and maximum of 600 devices between all Proponents (including impounded devices) was specified, with potential to increase upon request and review.

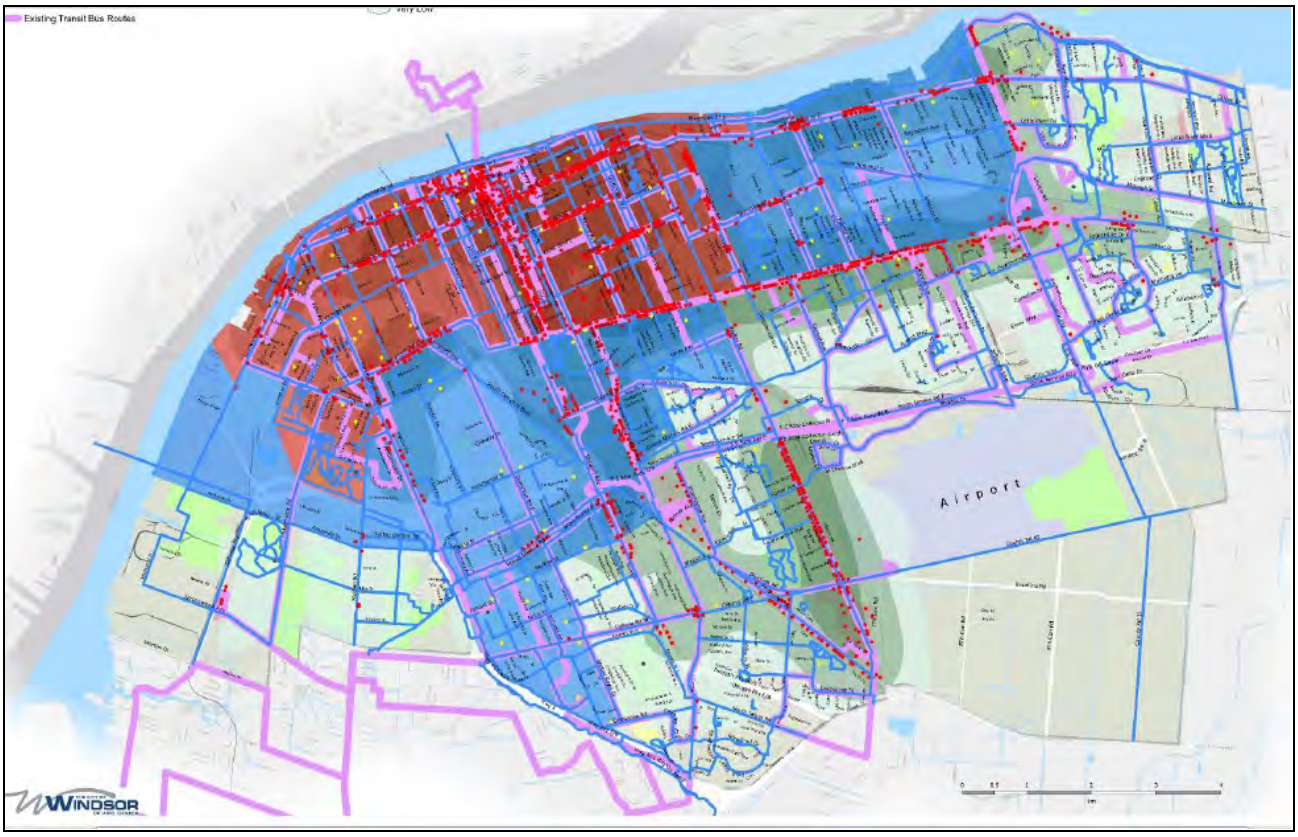


Figure 1 – Phase 1 Service Area
Generally bound by the Riverfront Pathway to the north, Tecumseh Road to the south, Prince Road to the west and Drouillard Road to the east

For the 2021 trial period, Bird Canada (Bird) was required to provide a fleet of e-bicycles as part of the pilot, however there were a number of supply issues and delays due to Covid-19 that did not make it possible for Windsor to receive the equipment.

Bird does not operate their e-scooters during the winter months and therefore they stopped services for the year on October 31st, 2021.

In the January 24, 2022 report C 10/2022, Administration put forth a recommendation to Council that the micro-mobility program be extended and that the Bird contract be renewed for the 2022 year. Council endorsed this recommendation on February 28, 2022, and Bird's contract was renewed for 2022. In 2022, e-bicycles had become available and were included in their 2022 fleet of devices. The extended contract will end on March 29th, 2023.

Discussion:

Program Data for the 2021 and 2022 E_Scooter/E-Bike Pilot

During the course of the program, the number of vehicles deployed varied at any given time, due to removals for service and repairs. **Table 1** below, represents the average number of vehicle available per day. Note that e-bikes are also included in the 2022 total.

Table 1 – Vehicles Deployed

Year	Avg. Available Vehicles/Day
2021	401
2022	637

Rider data and feedback was collected and reviewed on a monthly basis by the operator and City Administration. **Table 2** below contains Windsor ridership data, where 2022 represents combined e-scooter and e-bike data.

Table 2 – Rider Data for Bird Canada Pilot

Year	Total Number of Rides	Unique Users	Average distance travelled (km)
2021	137,298	22,520	4.11
2022	104,293	17,040	2.92

In 2021, the longest ride taken in Windsor was 43 kilometers.

In September of 2021, Bird expanded their services for University of Windsor student travel needs. Designated parking areas were provided for students as well as slowdown zones to ensure safe riding.

Equity and Ride Pass Programs

Bird provided an Equity Pricing Program which comprises of discounted rides to a number of groups to increase equity. An application form is available through the Bird app for program qualification. Proof of documentation is required by Bird to verify eligibility.

Rides are discounted by 50% for the following:

- Low-income residents
- Veterans
- Seniors
- Employees of pre-approved community-based organizations and non-profits in Windsor like Bike Windsor-Essex, Windsor Goodfellows and the Downtown Mission of Windsor

Bird also has a ride pass program available, allowing riders to purchase daily, 3 day, weekly and monthly passes and providing users with unlimited rides of up to 30 minutes.

Program Fees and Revenue

A $1 per day administrative fee and $10,000 per annum licensing fee were charged to the operator of the program, to cover capital and operations costs associated with the pilot program.

Regular Bird user fees in 2021 were a flat-rate trip fee of $1.15 and an additional $0.35 per minute. To cover the cost of inflation, these fees increased in 2022 to an initial trip fee of $2.50 and a $0.42 per minute charge.

During the e-scooter 2021 pilot operational months of May to November, the City received a total revenue of $123,750 (HST incl.) and in 2022, which had a slightly longer operation period from March to November, revenue was $140,088.53 (HST incl.). This revenue reflects the $1 per device per day administration fee, as well the annual $10,000 licensing fee and was captured in the Transportation Planning Operating budget. There were no reported capital or operating costs incurred by the City in 2022; revenue (excluding HST) was transferred to the Bikeways Development capital project at the end of the year.

Public Safety with Bird Micro-Mobility

A number of actions have been taken by Bird to promote the safe operation of e-scooters, including:

- the creation of a safety video which is included in the Bird riding app;
- a “Beginner Mode” feature is available, allowing for gentle acceleration for any new riders;
- the presence of Safe Street Patrols at the waterfront trail to educate riders on local rules, parking and etiquette;
- 15 km/h slow down zones to increase safety, where vehicles slow down safely down to 15km/h compared to the maximum mandated speed of 20km/h;
- a demonstration of their services and proper scooter use at various events, also providing free helmets and free rides to passersby;
- a collaboration with the Windsor Police Service to ensure public safety and education regarding e-scooters;
- the implementation of license plate stickers to help identify individual scooters to assist with reporting and resolving theft issues, and
- the use of an escalating warning, penalty and suspension framework to further enforce adherence to local rules.

Currently, there is limited data on reported injuries as a result of the Bird e-scooters in Windsor for the 2021 Pilot. Through consultation it has been determined that data will need to be collected and compiled with Windsor Regional Hospital services and through the Research Ethics Board.

MTO Survey

The Ministry of Transportation acquired the assistance of WSP and Stuckless Consulting to gather information and collect feedback on the second year of the Ontario e-scooter pilot, on common transportation modes used and to evaluate the safety of the

program. Two Ontario cities were chosen as sample municipalities, Windsor and Ottawa, as well as Kelowna and Calgary outside of Ontario. The method of collection was through a survey, which in Windsor ran from November 19th to December 19th on SurveyMonkey, with the link to the survey advertised by the City's communications team. While the consultants are still analyzing the survey data, with a final report anticipated to be complete in April 2023, the raw survey data of the Windsor respondents indicates that:

- 89% of those who responded would likely ride an e-scooter again.
- The introduction of e-scooters did not change the mode of transportation of the majority of respondents.
- The most common reasons for using an e-scooter were for sightseeing & leisure, to get to/from social activities/dining and to try out the service.
- 52 people reported that they involved in a crash or collision while riding an e-scooter, and 19 reported injuries that required medical attention as a result.

The completed report will help inform any future program service improvements and public education needs.

In addition to the MTO survey, the City also received monthly user feedback collected through Bird's in-app customer survey.

2023 Micro-Mobility for Windsor

The contract between the City of Windsor and Bird will end on March 29, 2023. A new micro-mobility Request For Proposal was issued on January 11th and will close on January 30th, 2022. The RFP outlines similar service requirements as the 2021 pilot RFP, additionally the program is now open to the possibility of multiple vendors, providing any combination of e-scooters, e-bikes and bicycles. The service area has also expanded to allow for device operation within City municipal boundaries, with the exception of areas prohibited by the Traffic By-Law, Parks By-Law and the majority of the Sandwich South planning district.

Program Service

In 2021, there were 71 Service Requests submitted through Municipal 311 relating to e-scooter concerns or issues, and this number was significantly reduced to only 17 complaints in 2022, which could be attributed to Bird's ongoing public safety awareness measures. The majority of complaints reflected safety issues relating to abandoned or poorly parked devices left on the sidewalk and users riding on the sidewalk, with a few complaints regarding payment issues.

Risk Analysis:

There are no risks associated with the recommendations of this informational report.

Climate Change Risks

Climate Change Mitigation:

Micro-mobility programs have the potential to mitigate greenhouse gas emissions as people may opt to use emission-free e-bikes or e-scooters to travel to their destinations instead of a fuel burning vehicle. Adopting a micro-mobility program can help the City reach its sustainability and greenhouse gas reduction goals, as well as promote alternative modes of travel.

Climate Change Adaptation:

As climate change presents more global and local threats, a shift to active transportation will become more sustainable and necessary. Including a micro-mobility program within the City of Windsor is a right step towards climate change adaptation.

Financial Matters:

There are no expenditures associated with the recommendations of this informational report.

Consultations:

James Chacko, Executive Director, Parks & Facilities

Conclusion:

The micro-mobility program through Bird Canada helped increase the goals outlined in the Active Transportation Master Plan and Windsor Works Report by providing new and enhanced mobility options to the downtown core in Windsor. The second year of the micro-mobility program, continued to demonstrate a large ridership and positive feedback from the public.

Planning Act Matters:

N/A

Approvals:

Name	Title
Jeff Hagan	Transportation Planning Senior Engineer
Shawna Boakes	Executive Director of Operations
Chris Nepszy	Commissioner of Infrastructure Services
Onorio Colucci	Chief Administrative Officer

Notifications:

Name	Address	Email
Windsor Bicycling Committee		

Appendices:

N/A

THE CITY OF WINDSOR ONTARIO, CANADA

Committee Matters: SCM 70/2023

Subject: Response to CQ 9-22 – Driveway Culvert Rehabilitation & Backyard Drainage Implementation Programs

Moved by: Councillor Kieran McKenzie
Seconded by: Councillor Mark McKenzie

Decision Number: ETPS 930
That the report of the Right of Way & Field Services Coordinator dated January 4, 2023 regarding the Response to CQ 9-22 – Driveway Culvert Rehabilitation & Backyard Drainage Implementation Programs **BE RECEIVED** by Council for information; and

That Administration **BE REQUESTED** to create a program for Private Culvert rehabilitation for Council's consideration.
Carried.

Report Number: C 2/2023
Clerk's File: SW2023

Clerk's Note:

1. The recommendation of the Environment, Transportation & Public Safety Standing Committee and Administration are **not** the same.

2. Please refer to Item 8.2 from the Environment, Transportation & Public Safety Standing Committee Meeting held on February 22, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: http://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230222/-1/9386

Subject: Response to CQ 9-22 – Driveway Culvert Rehabilitation & Backyard Drainage Implementation Programs

Reference:

Date to Council: February 22, 2023
Author: Andrew Lewis
Right of Way & Field Services Coordinator
(519) 255-6560x4229
alewis@citywindsor.ca

Public Works - Operations
Report Date: January 4, 2023
Clerk's File #: SW2023

To: Mayor and Members of City Council

Recommendation:

THAT the report on CQ 9-22 **BE RECEIVED** by Council for information.

Executive Summary:

N/A

Background:

The following Council Question was raised at the June 13, 2022 meeting of City Council by Councillor McKenzie:

CQ 9-2022:

Assigned to Commissioner, Infrastructure Services:

Asks that Administration report back on the potential benefits of the City of Windsor offering a Private Culvert Rehabilitation Subsidy program to residents similar to other programs currently offered through the Flood Mitigation program framework such as the Basement Flooding Protection Program and the Downspout Disconnection Program. The analysis should include reference to impacts to both individual homeowners and the community as a whole from a flood mitigation standpoint as well as estimated financial impacts, storm water management benefits and a potential funding source. The report to also include a subsidy program for backyard drains on private property.

Discussion:

Private Driveway Culvert Rehabilitation:

The City of Windsor currently receives approximately a dozen 311 phone calls a year from residents looking to have their driveway culvert within the Right of Way over a ditch/drain rehabilitated at the expense of the City of Windsor. While the Municipality maintains roadside ditches/drains to ensure a proper channel for storm water, all costs associated with driveway/culvert rehabilitation is exclusively borne upon the property owner, due to the fact that it serves as the access to their property from the Right of Way and is the sole responsibility of the property owner to maintain.

Upon receipt of a complaint and confirmation by the Maintenance Department, the property owner is required to obtain a Right of Way permit prior to commencing any work on the dilapidated culvert/structure. It is important to comply with City of Windsor Standard Specifications when rehabilitating the culvert/structure, which is verified through the inspection process included within the permit.

Below is a list of relevant terms and definitions.

Culvert	A structure that forms an opening through soil whose primary function is to convey surface water through an embankment.
Driveway Culvert	A pipe under a driveway constructed to provide vehicular private property access over a ditch or a drain. Driveway culvert pipes are commonly made of PVC, HDPE or concrete materials. Replacement Pipe - Materials shall meet the requirements of OPSS 1820 for concrete pipe products, OPSS 1841 for polyvinyl chloride (PVC) pipe products, OPSS 1840 for polyethylene (PE) plastic pipe products and OPSS 1843 for polypropylene (PP) plastic pipe products. Pipe sizes – Shall conform to City of Windsor Standard Drawing AS-209A – Backfill of ditch/swale/trench and match upstream/downstream sizes.
Lawn Culvert	A pipe providing an enclosure of a ditch or a drain, generally intended to provide non-vehicular access.
Municipal Drain	A Municipal Drain is created pursuant to the local municipality passing a By-law under the Drainage Act. The municipality is responsible for Municipal Drain management, maintenance and

repair, whether they are within the Right of Way or not.

Most Municipal Drains are either ditches or enclosed systems, such as pipes or tiles buried underground and can include structures such as dykes or berms, pumping stations, buffer strips, grassed waterways, storm water detention ponds, culverts and bridges.

Roadside Ditch The open channel adjacent to a rural road cross section within the municipal Right of Way, installed for the purpose of collecting road and adjacent storm water surface runoff.

Pipe Culvert A pipe placed in a drain or roadside ditch through a soil embankment, which allows for the conveyance of water from one side of the other.

Box Culvert Box culverts are commonly made up of reinforced concrete and may be used as a pipe culvert on more substantial ditches and drains, with the smallest box culvert span generally being 1.20 m.

Bridge A structure that provides a roadway or walkway for the passage of vehicles across an obstruction, gap or facility and that is greater than 3.00 m in span.

Headwalls A headwall is a small retaining wall built at the inlet/outlet of a culvert. The City of Windsor requires headwalls to reduce erosion caused by the flow of water and shall be installed as per City of Windsor Standard Specifications.

Note:

Private driveway culverts located over a Municipal Drain will not qualify for an incentive from this subsidy program. The cost of Municipal Drain infrastructure is assessed to benefiting landowners, following the individualized Drainage Report prepared under the Drainage Act. In general, these results in benefiting (upstream) landowners including the City of Windsor, being assessed a portion of driveway culvert costs with the property receiving the driveway paying the balance, which is already discounted.

Flood Mitigation

The main benefit of implementing the Private Driveway Culvert Rehabilitation subsidy program is to help prevent flooding due to a collapsed driveway culvert. The replacement of damaged culverts could reduce the likelihood of flooding to surrounding parcels of land, as well as the right of way, and improve the conveyance of the ditch/drain.

Below are three of the most common scenarios, which contribute to ditch and culvert related flood damage in the City of Windsor:

1. Storm connections could encounter backflow if the ditch they outlet to is surcharged due to a collapsed culvert. This can potentially flood the basements of any connected properties.

2. Overland flooding could occur if a private culvert collapses and obstructs the flow of storm water downstream, thus surcharging the ditch and flooding the surrounding road and upstream properties.

3. Infiltration of the neighbouring sanitary system can happen when ditches/drains overflow and seep into the adjacent sanitary sewers causing basement flooding through the private sanitary connection, due to a surcharged sanitary system.

Administration has identified three incentive options based on the culvert type. These incentives would provide assistance in the form of monetary grants/payment to property owners who require culvert rehabilitation, as a means of preventing future flood damage.

Incentives provided by the City of Windsor would be dependent on the type of culvert to be installed, with the eligible amounts outlined below:

Culvert Type	**Subsidy Amount**
Pipe Culvert (diameter less than 1.20 m)	100 % of cost ($500.00 maximum)
Large Culvert (diameter greater than 1.20 m)	100% of cost ($2,000.00 maximum)
Bridge Culvert	100% of cost ($5,000 maximum)

The incentive values identified are based on high-level industry estimates for different types of culvert replacements and are estimated with consideration given to the variation in cost for each type of work, as well as determining what would make a reasonable and manageable subsidy for the City of Windsor to provide to property owners. The rebate incentive is intended to cover a portion of the total cost of a lawn or driveway culvert installation and would not be applicable for new culvert installations.

Application & Rebate Process

Similar to the Basement Flooding Protection Subsidy Program (Appendix A), if Council were to approve the Private Driveway Culvert Rehabilitation Program, a similar process would be proposed subject to any further internal review and amendments by various stakeholders such as Finance and Legal that may be required relative to administrating the program.

Backyard Drains on Private Property

The solutions recommended in the City's Sewer and Coastal Flood Protection Master Plan (SMP) included flood risk reduction measures for both surface and basement flooding. The SMP solutions were comprehensive with recommended improvements to the conveyance systems, downstream outlets and source control measures within the Right of Way and on private property. A fundamental component of the flood risk reduction measures included source controls to reduce the volume and magnitude of inflows into the sewer system. As such, it is not recommended to implement a program that encourages residents to connect to an existing sewer system that may not be designed to handle the increase in flow.

The following is a summary of the key South Windsor Sewer shed recommended source control improvements per the SMP.

- Disconnection of existing foundation drainage from the sanitary sewer system, which are generally anticipated to be residential homes older than 1980;

- Through pilot projects assessing the benefits and challenges of low impact development (LID) measures to reduce the volume of storm water entering the sewer system;

- Disconnection of all directly connected residential roof drains from the storm sewer system with safe discharges directed to the ground surface; and

- Reduction of inflow into the sanitary sewer system following sealing of manhole lids with rain catchers and continued repair and sealing of existing leaky sewer pipes and manholes structures.

The City of Windsor's flood mitigation strategy is a multifaceted approach with a key element being to reduce excess water entering into the sewer systems. Implementing a rear yard drainage program with additional direct connections to the storm sewer system would contradict the SMP recommended measures and the City's goal to reduce flooding risks.

Risk Analysis:

Risks inherent by not proceeding with the recommendation to incorporate a Private Driveway Culvert Rehabilitation Program is considered low due to the volume of phone calls (Approximately 12/Year) requesting to have a driveway culvert rehabilitated.

The associated risks encountered by proceeding with the request for the Implementation of Backyard Drains on Private Property program could result in additional property damage as a result of flooding. Adding storm water to the existing sewer systems would contribute to a greater potential for the sewer to surcharge, as many sewers are not designed to accommodate the increased flow.

Climate Change Risks

Climate Change Mitigation:

Future construction projects will result in Greenhouse Gas (GHG) emissions that are accounted for within the annual Community GHG emissions inventory.

Climate Change Adaptation:

Future significant storms are likely to occur again and could lead to further instances of overland flooding within the City. While there will always be the risk of overland flooding, this can be mitigated by conveying storm water to the Municipal storm sewer system thus reducing the level of ponding on private property.

Allocating additional resources to investigate the causes of infiltration into our sanitary sewer system could help lead to a reduction in the instances of basement flooding via the sanitary connection and would reduce the costs of excess storm water entering our water reclamation plants for further treatment.

Timing Risk:

The rehabilitation of private driveway culverts will take time to implement. There is a risk that another significant rain event may occur causing damage to private and City property due to flooding.

Financial Matters:

Private Culvert Replacements

If Council were to approve a private culvert rehabilitation program, the total annual subsidy payments expected could range anywhere between $500 and $60,000 per application depending on the type of applications received. Based on research of adjacent municipalities with a similar subsidy program, Administration estimates approximately 12 applications per year, or between $6,000 and $60,000 in annual payments. There is a possibility that the application quantities for Windsor could exceed 12 should the subsidy program be approved, which would result in increased subsidy payments greater than the estimate above. Administration cannot project what the actual quantity of applications would be as a result of the introduction of a subsidy program.

Should City Council approve a subsidy program the cost of the subsidy payments could be funded by the Flood Abatement Measures Project 7169001. Reprioritization of the annual funding for Project 7169001 would be required to include funding for this subsidy program in the ongoing rolling 10-year plan for all existing flood abatement measure programs. This would result in less funding for other programs funded by the Flood Abatement Measures Program such as sewer repairs and lining, storm sewer outfall rehabilitation, CCTV and zoom inspections, smoke and dye testing, and trunk sewer inspections. Should high uptake result from the introduction of a new driveway culvert rehabilitation subsidy program, this would reduce the available funding for the existing flood abatement measures initiatives.

Consultations:

Adam Pillon, Manager of Right of Way – Engineering

Amy Olsen, Technologist III – Engineering

Juan Florian, Engineer I – Operations

Ian Wilson, Engineer II – Engineering

Tom Graziano, Drainage Superintendent – Engineering

Phong Nguy, Manager of Contracts, Field Services and Maintenance – Operations

Shawna Boakes, Executive Director Operations/ Deputy City Engineer – Operations

Cindy Becker, Financial Planning Administrator – Public Works

Conclusion:

Administration has reviewed and provided Council with pertinent information related to Council Question 9-22 on the potential creation of two new subsidy programs; Private Driveway Culvert Rehabilitation and Implementation of Backyard Drains on Private Property.

Planning Act Matters:

N/A

Approvals:

Name	Title
Cindy Becker	Financial Planning Administrator- Public Works Operations
Shawna Boakes	Executive Director, Operations/Deputy City Engineer
France Isabelle-Tunks	Executive Director, Engineering/Deputy City Engineer

Name	Title
Chris Nepszy	Commissioner, Infrastructure Services
Shelby Askin Hager	Commissioner, Legal & Legislative Services
Joe Mancina	Commissioner, Corporate Services CFO / City Treasurer
Onorio Colucci	Chief Administrative Officer

Notifications:

Name	Address	Email

Appendices:

1 Appendix A - Basement Flooding Protection Subsidy Program Brochure

THE CITY OF WINDSOR
ONTARIO, CANADA

Basement Flooding Protection Subsidy Program

2020

To assist homeowners, on May 3, 2011 Windsor City Council approved a Basement Flooding Protection Subsidy Program (BFPSP). The BFPSP is a program to assist homeowners by way of a financial subsidy to install a sump pump and/or back-water valve (flood protection devices). For further information about this program and how to apply, please read the enclosed information.

Program Information and Application

The City of Windsor makes improvements annually to the complex system of underground pipes, sewers and catch basins. These improvements alone cannot completely protect a home from basement flooding. With increasingly frequent and severe weather events related to climate change, it is essential that residents take the appropriate action to reduce the risk of basement flooding on their own private property.

What is it?

The City is offering residents a financial subsidy to install a sump pump, sump pump overflow, a back-water valve and/or disconnect foundation drains from the floor drain. The amount of subsidy that may be available to residents is described below:

Basement Flooding Protection Subsidy – Eligible Amounts

- Install Backwater Valve(s) (Licensed plumber required)
  100% of cost ($1,000 maximum)
- Install sump pump with sump pump overflow and disconnect foundation drains from floor drain 100% of cost ($1,750 maximum)
- Install only sump pump overflow to discharge outside to surface (applies to existing sump pumps only) 100% of cost ($300 maximum)
- Install backwater valve and sump pump with sump pump overflow 100% of cost ($2,800 maximum)
- Disconnect foundation drains from floor drain and/or dye testing and Camera work as required 100% of cost ($400 maximum)

Disputes with respect to qualifying work will be resolved by the City Engineer and/or the Chief Building Official or their designate.

****THE MAXIMUM LIFETIME ELIGIBLE SUBSIDY LIMIT IS $2,800 PER PROPERTY****

What the program does not cover:

1. Replacement of existing sump pump
2. Upgrade of sump pump
3. Addition of another sump pump
4. Installation of a sump pump when foundation drains are already separated from floor drain or sanitary sewer
5. Work performed for which a permit cannot be obtained.
6. Supply and installation of an electro-pneumatic backwater valve

Subsidy Requirements:

1. **ALL** eligible basement flooding protection work **MUST** be performed by a contractor/licensed plumber or master plumber. If a backwater valve is installed by a contractor, a licensed plumber must certify its installation.

Any work performed by a homeowner themselves DOES NOT qualify for subsidy

Who is eligible for this program?

This program is available to owners of existing residential dwellings (single family and duplex homes) located in the City of Windsor.

How do I take advantage of this subsidy program and what is the process?

1. Start by submitting your application on-line (prior to any work commencing) at:
   https://publicforms.citywindsor.ca/basementfloodingprotection/create
2. Your application will be screened initially to determine if the property is located in the City of Windsor and whether it qualifies for the program.
3. If this condition is met, an Administrative Inspector will contact you to arrange to visit your residence and determine the eligible work for subsidy under this Program. This is called a 'Courtesy Inspection' and is completed prior to work commencing.
4. Applicants can then proceed to obtain quotes to perform the eligible work.
   a. A master plumber or licensed plumbing contractor (should be able to present a current City of Windsor license) must certify the backwater valve installation. If you have any concerns about whether or not the plumber is licensed, please contact 311. Please note that the City's Licensing Department cannot recommend specific plumbing contractors or provide a list of licensed plumbing contractors.
   b. The plumbing contractor must use material or fittings that are approved by the Ontario Building Code.
   c. A building plumbing permit and an approved final inspection must be obtained for backwater valve and sump pump installations.
   d. If a sump pump is installed, please ensure the disconnection or capping of leads to the floor drain.
5. Have the work performed. (We recommend that you do not pay the plumbing contractor in full until the building permit has an approved final inspection.)

How do I receive the subsidy?

Once the Building/Plumbing Permit has an approved final inspection, please remit the following information in order to have the paperwork processed and a cheque issued for the eligible subsidy amount:

1. Original or pdf invoice(s) showing a cost breakdown of all charges; with the total amount paid, clearly marked as "Paid in Full."
2. Acknowledgement of Responsibility and Liability Waiver document signed by an owner of the property having authority to bind all owners of the property to the conditions in the Waiver (attached in this package).

In Person or By Mail:

Basement Flooding Protection Subsidy Program
Engineering Department – Right-of-Way Division
350 City Hall Square West, Suite 210
Windsor, Ontario N9A 6S1

Via Email (pdf format):

Basement Flooding Protection Subsidy Program
engineeringdept@citywindsor.ca

Please Note:

- Subsidies for eligible work are subject to available funding and provided on a first- come, first-served basis.
- Subsidies are provided one time only for each eligible installation, per property, and on a no-fault basis.
- The Ontario Building Code does not allow backwater valves to be installed on buildings having more than one dwelling unit.
- The subsidy is available only to existing residential dwellings (single family, duplex and freehold townhomes), not residential dwellings in the planning stages or currently under construction.
- The property must have its downspouts already properly disconnected (or the owner agrees to have them disconnected in the future) from the City sewer system, where possible.

SUBSIDY PROGRAM STEPS

1	**SUBMIT ONLINE APPLICATION** https://publicforms.citywindsor.ca/basementfloodingprotection/create
2	**COURTESY INSPECTION** City Inspector will call to schedule inspection prior to any work commencing with Property Owner
3	**OBTAIN QUOTES & HIRE PLUMBER** Plumber or Home Owner can take out the Permit (City does not need to see quotes)
4	**PLUMBER COMPLETES THE WORK** Final inspection occurs during installation
5	**PAY THE PLUMBER** ***Confirm the following prior to payment*** a) PERMIT was obtained b) Work PASSED Final Inspection
6	**SUBMIT DOCUMENTATION TO CITY FOR ASSESSMENT AND REBATE** a) Acknowledgement of Responsibility & Liability Waiver b) Itemized Original or PDF Invoice (marked PAID IN FULL)

C. Release:

ACKNOWLEDGEMENT OF RESPONSIBILITY AND LIABILITY WAIVER

TO BE COMPLETED BY PROPERTY OWNER

ATTENTION: SIGNING THIS DOCUMENT IS A PRE-CONDITION TO PARTICIPATION IN THE BASEMENT FLOODING PROTECTION SUBSIDY PROGRAM. BY SIGNING THIS LEGAL DOCUMENT YOU GIVE UP CERTAIN LEGAL RIGHTS. PLEASE READ CAREFULLY.

You are entitled to obtain independent legal advice before signing.

Property address where work was performed:_____, Windsor, ON _____

Mailing address (if differs from above address):_____

In consideration for participation in the Basement Flooding Protection Subsidy Program [the "Program"], I/we, an Applicant(s), understand, acknowledge, and agree that:

a) I/we am/are the owner(s) of the property stated herein;

b) The Applicant(s) are fully and solely responsible for any and all work as carried out through the Program, including but not limited to, the choice of eligible contractors, the selection and/or installation of materials, the work, improvements, and/or modifications conducted, and any and all other work procedures [collectively the "Work"], regardless of whether said Work was carried out as part of, or in association with, the Program;

c) The Corporation of the City of Windsor [the "Corporation"] assumes no responsibility for the methods, workmanship, or any action or inaction, by the contractor, which the Applicant(s) may find to be unacceptable;

d) Any issues the Applicant(s) may have arising from the Work will be addressed by the Applicant(s) directly with the contractor, and the Corporation is not responsible for doing so;

e) Should any of the Work be removed within 5 years of the completion date, the total amount of the subsidy provided through the program shall be repaid by the Applicant(s) to the Corporation;

f) The Corporation is entitled to disconnect the property's downspout, at the Corporation's cost.

g) The Corporation assumes no responsibility or liability for any loss, damage, injury, expense, or any other matter that may arise, or that may be incurred, as a result of the Applicant(s)'s participation in Program, as a consequence of any cause, including the negligence of the contractor, the Corporation, and/or their employees and/or agents.

h) Participation in the Program is not a guarantee by the Corporation that future flooding will not occur;

i) The Applicant(s) hereby release and hold harmless the Corporation, its employees and/or agents, from any and all Claims associated with participating in Program, including losses from future sewer backups resulting from the failure of any of the Work carried out under this Program, howsoever arising;

j) The Applicant(s) are responsible to ensure that a building permit is obtained within 1year of receiving Building Inspector approval to proceed with eligible work under the program

I/we understand and agree that I/we have been given the opportunity to seek independent legal advice prior to signing this document, and hereby accept full responsibility for complying with all of the terms set forth therein.

I/we represent and warrant that I/we are authorized to bind all owners on title to this Property. The City is entitled to rely on this Acknowledgement and Waiver as evidence that all owners on title to the Property consent and agree to the execution of this Acknowledgement and Waiver and the assumptions and risks herein, and I/we hereby indemnify the City for any damage and other claims that may be made by any other owner or other interest in the Property as a result of the execution of this Acknowledgement and Waiver, which shall be binding on all property owners, their heirs, next of kin, executors, administrators, and successors and assigns.

I/we hereby direct payment of the Program grant to be made to_____.
(Owner Name as it appears on Title)

I HAVE READ THIS DOCUMENT CAREFULLY AND I ACKNOWLEDGE MY RESPONSIBILITIES AND THE EFFECT OF THIS LIABILITY WAIVER ON MY LEGAL RIGHTS AND RESPONSIBILITIES.

SIGNED THIS_____DAY OF_____, 20____

_____

Applicant's Name

_____ _____

Applicant's Signature Witness

Item No. 8.11

THE CITY OF WINDSOR ONTARIO, CANADA

Committee Matters: SCM 71/2023

Subject: Effectiveness of Salting Residential Streets During Winter Control Incident Response to Prevent Ice Formation

Moved by: Councillor Kieran McKenzie
Seconded by: Councillor Gary Kaschak

Decision Number: ETPS 931
That the report of the Maintenance Coordintaor dated December 21, 2022 regarding Effectiveness of Salting Residential Streets during Winter Control Incident Response to Prevent Ice Formation, **BE RECEIVED** for information; and

That Administration **BE REQUESTED** to report back to Council with a high-level cost estimate to implement the service as envisioned in the administrative report; and

That the information **BE PROVIDED** to Council when this report is considered at a future Council meeting.
Carried.

Report Number: C 227/2022
Clerk's File: SW2022

Clerk's Note:

1. The recommendation of the Environment, Transportation & Public Safety Standing Committee and Administration are **not** the same.

2. Please refer to Item 8.3 from the Environment, Transportation & Public Safety Standing Committee Meeting held on February 22, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: http://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230222/-1/9386

Subject: Effectiveness of Salting Residential Streets During Winter Control Incident Response to Prevent Ice Formation

Reference:

Date to Council: February 22, 2023
Author: Roberta Harrison
Maintenance Coordinator
519-255-6560 Ext. 4241
roharrison@citywindsor.ca

Public Works - Operations
Report Date: December 21, 2022
Clerk's File #: SW2022

To: Mayor and Members of City Council

Recommendation:

THAT report S 227/2022, "*Effectiveness of Salting Residential Streets during Winter Control Incident Response to Prevent Ice Formation*", **BE RECEIVED** for information.

Executive Summary:

N/A

Background:

At the meeting of City Council on January 17, 2022, Councillor Gignac asked CQ 1-2022 as follows:

> **CQ 1-2022**
>
> *"Asks Public Works if adjustment to snow incident response would be more effective if salting of residential streets at least once to prevent ice forming. Intention is not to increase budget to include additional salting but perhaps redirecting multiple salting of arterials to direct 1 to residential streets."*

This report is provided in response to CQ 1-2022.

Discussion:

The City of Windsor provides Winter Maintenance to the Expressway, arterial roads, collector roads, and Transit Windsor routes for snowfall or freezing winter storm events.

Winter Maintenance is provided in accordance with the Winter Control Service Level Policy. During a winter weather event, the goal of Winter Maintenance efforts is to get residents and visitors safely moving again, as soon as possible in accordance to the level of service set by Council. Recognizing that each winter event is unique, the Winter Control Service Level Policy allows for the use of discretion in determining the optimal course of action given the prevailing circumstances.

The current level of service has proven to be efficient with respect to maximizing the available tax dollars and minimizing environmental damage as it reduces equipment costs and salt usage while considering the roadway classification and traffic volumes.

Currently, there are twenty-one (21) main salting/plow routes that cover the Expressway, arterial roads, collector roads and transit routes. Each salting/plow route takes approximately two to four hours to complete depending on traffic and weather conditions. Once the route has been completed, ongoing weather dictates that the truck continues until the snowfall/freezing weather has subsided. Due to the unpredictability and uneven snowfall in different parts of the routes during an active winter storm, trucks must maintain the route to ensure the level of service is met.

Residential streets, totalling 1,325 lane kilometers, are divided into thirty-six (36) zones. Applying salt (only) to one of the thirty-six residential streets takes approximately four to six hours – depending on traffic and weather conditions. Directing all twenty-one trucks on from the main routes to salt the thirty-six residential zones would take eight to twelve hours to complete. The time spent off the higher priority main routes would cause snow and ice to build up and may result in collisions and traffic backups throughout the City.

Due to many factors including current temperature, forecasted temperatures, type and duration of precipitation, wind speed and cloud cover, salting as contemplated in the Council Question may not be effective. For example, salting too early during extreme cold and falling temperatures may wet the pavement and cause icy conditions as when the temperature gets close to -12 degrees Celsius, the salt will stop working and the snow that melted earlier will freeze again. Melting of ice and snow is the combined effect of applying the salt and the friction from the traffic. In residential areas, traffic is not heavy enough to trigger this effect and once it is buried under a layer of snow it no longer will react.

In addition, while effective at melting ice on roadways, rock salt has a lasting, negative impact on the environment and can damage infrastructure. As such, the City takes care to ensure the effective Winter Maintenance for the safety of all roadway users in the City of Windsor while striving to minimize the amount of salt entering the environment.

Risk Analysis:

Redirecting trucks to residential roads instead of maintaining the current level of service on the Expressway, Arterial roads, Collector roads and transit routes would mean that ice and snow would build up on these higher priority roads. Maintaining the current

level of service would mitigate the risk of ice and snow build up on the Expressway, Arterial roads, Collector roads and transit routes.

Climate Change Mitigation:

The equipment required to salt 1,325 land kilometers of residential streets during a winter control incident response would result in increased green house gas emissions.

Climate Change Adaptation:

N/A

Financial Matters:

Although the intention of the Council Question is not to increase the budget, salting the 1,325 lane kilometers of residential roads is not feasible using existing forces and would require additional winter control funding to implement. Should Council wish to provide direction to have Administration change the level of service provided for residential, a detailed cost analysis would be required in order to determine the incremental budget required.

Consultations:

Phong Nguy, Manager, Contracts, Field Services, Maintenance

Conclusion:

The current service level of Winter Maintenance has proven to be efficient. The route design ensures that roads that are the highest priority are complete prior to lower priority roads thus optimizing mobility under adverse weather conditions. The current level of service maximizes the use of available tax dollars while minimizing environmental damage and equipment costs.

Redirecting equipment to salt residential streets would require additional salt and result in additional equipment costs and would lead to snow and ice build up on the Expressway, arterial and collector roads as well as on transit routes, which could cause traffic back-ups and collisions.

In addition, due to many factors including current temperature, air temperature forecast, type and duration of precipitation, wind speed and cloud cover, salting as contemplated in the Council Question may not be effective.

Therefore, Administration does not recommend treating residential roadways instead of treating the Expressway, arterial and collector roads and transit routes.

Planning Act Matters:

N/A

Approvals:

Name	Title

Name	Title
Cindy Becker	Financial Planning Administrator – Public Works Operations
Shawna Boakes	Executive Director of Operations
Chris Nepszy	Commissioner, Infrastructure Services, City Engineer, Corporate Leader
Joe Mancina	Commissioner, Corporate Services CFO/City Treasurer
Onorio Colucci	Chief Administrative Officer

Notifications:

Name	Address	Email

Appendices:

THE CITY OF WINDSOR ONTARIO, CANADA

Committee Matters: SCM 72/2023

Subject: Response to CQ 15-2021 – July 16, 2021 Rain Event (City Wide)

Moved by: Councillor Renaldo Agostino
Seconded by: Councillor Mark McKenzie

Decision Number: ETPS 932
That the report of the Executive Initative Coordinator, Infrastructure Services dated January 11, 2023 regarding Response to CQ 15-2021 – July 16, 2021 Rain Event (City Wide) **BE RECEIVED.**
Carried.

Report Number: C 8/2023
Clerk's File: SW2023

Clerk's Note:

1. The recommendation of the Environment, Transportation & Public Safety Standing Committee and Administration are the same.

2. Please refer to Item 8.4 from the Environment, Transportation & Public Safety Standing Committee Meeting held on February 22, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: http://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230222/-1/9386

Subject: Response to CQ 15-2021 – July 16, 2021 Rain Event-City Wide

Reference:

Date to Council: February 22, 2023
Author: Rob Slater
Executive Initiative Coordinator, Infrastructure Services
(519) 255-6247 ext. 6029
rslater@citywindsor.ca

Communication and Customer Service
Report Date: January 11,2023
Clerk's File #: SW2023

To: Mayor and Members of City Council

Recommendation:

That Council **RECEIVE** this report in response to CQ 15-2021.

Executive Summary:

N/A

Background:

At its July 19th meeting of Council, Councillor Costante asked the following question:

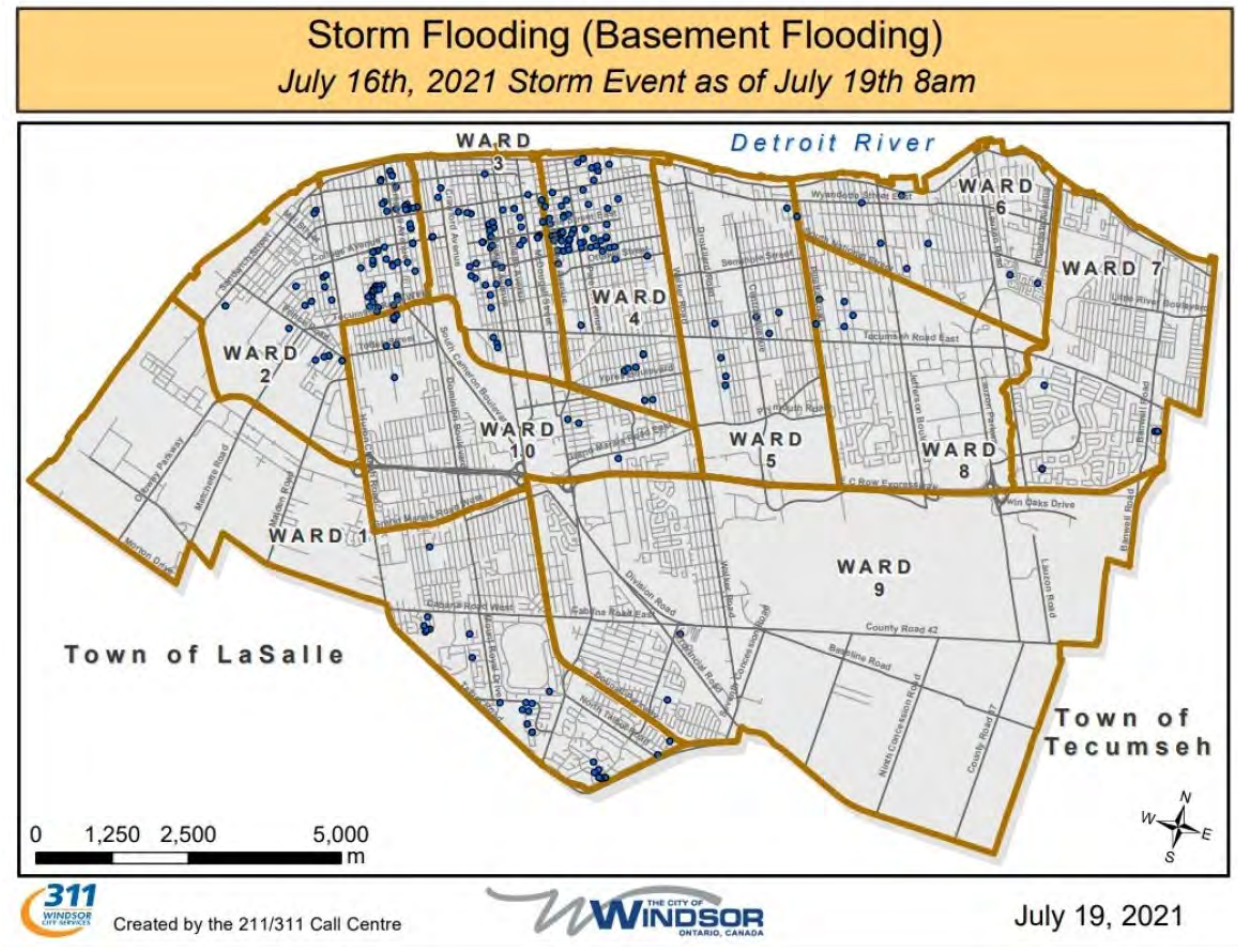
> **CQ 15-2021**
>
> *"Asks that Administration report back on the possible causes of flooding on July 16th based on data collected, and that administration further provide any potential solutions moving forward".*

This report is provided in response to CQ 1-2021.

Discussion:

On July 16, 2021, the City of Windsor experienced a significant rainfall event. The weather forecast for that day called for total rainfall amounts of 40mm to 60mm. Some areas of the City experienced up to 76mm. The rainfall was intense. In some areas, more than 38.1mm of rain fell in one hour.

While the City's system functioned as designed, some street flooding and basement flooding occurred – mainly in the downtown area. The map below illustrates where the 444 instances of basement flooding were reported to 311.



Similar to other extreme weather events that the City has experienced, the underlying cause of flooding in this case was as a result of more water entering the system than the system was designed to handle. Unfortunately, as a result of climate change, these types of extreme weather events are expected to continue.

Integration of public infrastructure upgrades and private property measures are required to reduce the risk and impacts of flooding.

The City manages storm water by:

- Undertaking flood protection projects
- Maintaining, repairing and restoring existing infrastructure
- Carrying out street sweeping
- Enforcing by-laws to protect the environment and prevent interference with the operation of the storm water management system.

Since 2018, the City of Windsor has spent allocated approximately $211 million in its Capital Budget to improving its sewer infrastructure.

Year	Sewer Infrastructure Projects
2018	$29.21 M
2019	$36.050 M
2020	$43.763 M
2021	$51.252 M
2022	$51.041 M
Total	**$211.316 M**

Further, The City of Windsor's current 10-year capital budget (2022 - 2031) contains **$454** million in Sewer Infrastructure projects.

The City has also applied and was successful in obtaining government funding for flood mitigation projects. In 2019, the City of Windsor was approved to receive **$32.1** Million in Federal funding under the Disaster Mitigation and Adaptation Fund (DMAF) Program towards $89.3 Million in various flood mitigation projects.

Completed DMAF projects include:

- Greenhouse Gas Mitigation Assessment & Climate Change Study
- Matthew Brady Boulevard, Phase 2
- Belle Isle View Boulevard, Phase 1
- Belle Isle View Boulevard, Phase 2
- Tranby Avenue Reconstruction
- Tranby Park Storm Water Management

Active and Future DMAF Projects include:

- Eastlawn Boulevard,
- Matthew Brady Boulevard, Phase 3
- Belleperche Trunk Sewer, Phases 1 through 3
- St. Paul Pumping Station Expansion
- East Marsh Pumping Station Improvements
- East Marsh Drainage Redirection (Public Information Update Slides)
- Riverside / Vista Relief Storage, Phase 2A
- Flow Monitoring Program

On August 31, 2022, the Federal government announced that it is investing **$33** million in DMAF funding to support the construction of a new retention treatment basin (RTB) as well as a new pumping station and outfall sewer in West Windsor. The RTB will enhance the treatment abilities and reduce the impact of major storm events for homes serviced by the Plant. The City will contribute $55.8 million to the project, which is currently targeted for completion in 2032.

Sewer and Coastal Master Plan

Completion of the City's *Sewer and Coastal Master Plan* was an important facet of the Mayor's 8 -point plan to address flooding. Work began on the plan in the spring of 2018 and was formally adopted by Council on January 25, 2021. The **$4.9 billion dollar** plan provides an achievable blueprint that identifies and prioritizes improvements to City infrastructure. The recommendations contained in the plan provide a roadmap to follow over the next 50 years or more. The plan consists of a mix of short-term and long-term solutions that will serve to reduce the impact and risk of flooding.

The *Sewer and Coastal Master Plan* also identifies actions that homeowners can take to reduce their risk of flooding.

Each component of the plan – once completed – will further reduce the risk of flooding within the City of Windsor.

In addition to infrastructure projects, the Contracts, Field Services & Maintenance Division has a preventative maintenance cleaning program where they routinely:

- Maintain sanitary sewers
- Clean storm sewers
- Clean catch basins

The preventative maintenance-cleaning program also includes the cleaning and grading of municipal drains and roadside ditches.

Environmental Services has four vacuum street sweepers. They are in use throughout the year except when temperatures are below freezing. The street sweeping program helps keep storm drains clear and runs from April to November – depending on the weather.

Efforts to Reduce Inflow and Infiltration

Inflow and Infiltration (I & I) happens when water from the environment that does not need to be treated enters the sanitary system. Infiltration refers to groundwater entering the system. Inflow refers to rainwater (storm water) entering the system. Sources of I & I include:

- Manhole covers, sewer system leaks, improper storm connections (Public Right of Way)
- Connected foundation drains, improper plumbing connections, leaks in private drain pipes (Private Property)

Public right of way sources account for 30% of I & I into the sanitary system while private property sources account for 70%.

Efforts to reduce I & I of public right of way sources include:

- Smoke and Dye Testing;
- Camera Inspections; and
- Installing Rain Catchers on Manholes in High Priority Areas.

Private Property Measures to Reduce Instances of Flooding:

In addition to sewer infrastructure projects and programs and ongoing efforts to reduce I & I, the City has several private property initiatives that private property owners are encouraged to take advantage of in order to reduce instances of flooding. Some measures that private property owners can undertake are described below:

Home Flood Protection Pilot Program

The Home Flood Protection Program is a pilot program that will educate homeowners on dealing with water in the house, their foundation, their windows, eaves troughs, grading, and backwater valves. It also provides an assessment of the flood probability of the home. The goal of the assessments is to help homeowners reduce their risk of basement flooding and to reduce damage in the event of a flood.

The program's initial pilot phase will cover 100 homes on a first come, first served basis, and will cost the city $100,000. A refundable inspection security deposit ($200) be assessed to each household. Release of the security deposit would take place following implementation of some of the works described.

For homeowners benefitting from the program, the company operating the program, AET, will make the following resources accessible:

- Flood protection resource information
- Phone and Online Registration
- Booking and Management of Home Flood Assessors
- Homeowner Reminders of their Home Flood Assessments
- Home Flood Assessment Reports
- Quality assurance of the Home Flood Assessment Report
- Email notification for downloading of the report
- 15 minute consultation with Home Flood Assessor

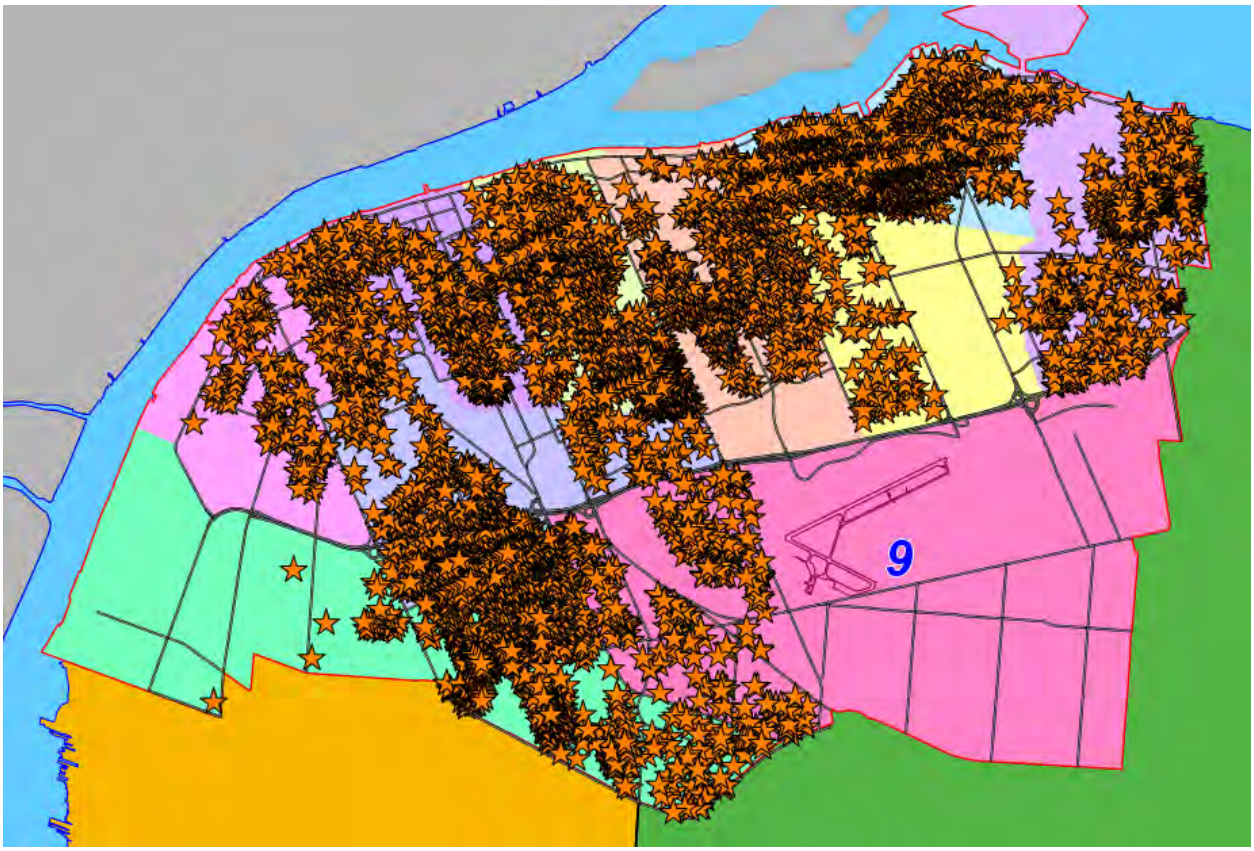
Basement Flooding Protection Subsidy Program (BFP)

Although the City's sewer systems are being continuously improved, under severe rainfall events, often the most effective measures a resident can take to prevent flooding, is at their property.

The City offers owners of residential dwellings (single family and duplex homes) a financial subsidy to install a sump pump with sump pump overflow and/or backwater valve(s) and/or disconnect foundation drains from the floor drain and/or dye testing and camera work as required. The maximum eligible subsidy limit is $2,800 per property.

The benefits of the BFP include both reducing total water entering the sewer system and installation of a reactive mechanical barrier (back flow preventer) to stop sanitary sewage from entering basements.

Since its inception in 2011, the Basement Flooding Protection Subsidy Program has paid $18,157,380 to 8,455 applicants. The stars on the map below indicate the locations of those residential dwellings that have taken advantage of the program (as of July 5, 2022).



Downspout Disconnection

Connected downspouts provide a direct connection to the City's sewer system, allowing rainwater to flow fast into the system. The rainwater from a disconnected downspout should discharge onto a pervious surface, allowing infiltration.

The City of Windsor currently offers a free Downspout Disconnection program. Downspout Disconnection is the process of separating roof downspouts from the sewer system and redirecting roof runoff onto pervious surfaces, most commonly a lawn or garden.

Benefits of downspout disconnection include:

- Reduced neighbourhood basement flooding
- Reduced sewage treatment expenditures
- Added sewer capacity
- Reduced need for costly trunk sewer projects

The Sewer and Coastal Master Plan also includes a Downspout Disconnection Pilot Project. This pilot program is reviewing the benefits of mandatory downspout disconnection in reducing the total volume of water entering the storm sewer system.

The anticipated benefit of downspout disconnection for flood risk reduction is 2% to 5% in the volume of water entering the sewer.

Risk Analysis:

As this report to Council is for information, there are no risks associated with receiving the report.

Climate Change Risks

Climate Change Mitigation:

N/A

Climate Change Adaptation:

N/A

Financial Matters:

There are no financial impacts associated with the receipt of this report.

Consultations:

Phong Nguy, Manager, Contracts, Field Services & Maintenance

Fahd Mikhael, Manager, Design

Linda Mancina – Financial Planning Administrator, Engineering

Conclusion:

The flood event that occurred on July 16, 2021 was the result of more water entering the system than the system was designed to handle.

Due to climate change, extreme weather events such as the one that occurred on July 16, 2021 are expected to continue. As such, continued integration of public infrastructure upgrades and private property measures are required to reduce the risk and impacts of flooding.

The Sewer and Coastal Master Plan takes a system-wide approach to identify specific improvement projects that can be undertaken by the City to improve sewer efficiency and reduce the risk of flooding caused by wet weather. The City of Windsor has completed numerous sewer infrastructure improvement projects and has others planned or initiated that will serve to reduce the impact and risk of flooding.

Homeowners are encouraged to take advantage of the various programs the City offers to help proactively reduce the risk and impact of flooding on their property and also to reduce the amount of water entering the city's storm water system. These programs include the Home Flood Protection Pilot Program, the Basement Flooding Protection Subsidy Program, and the Downspout Disconnection Program. More information about these programs and others can be found on the City's website.

Planning Act Matters:

N/A

Approvals:

Name	Title
France Isabelle-Tunks	Executive Director, Engineering/Deputy City Engineer
Shawna Boakes	Executive Director, Operations/Deputy City Engineer
Chris Nepszy	Commissioner, Infrastructure Services
Onorio Colucci	Acting Chief Administrative Officer

Notifications:

Name	Address	Email

Appendices:

Committee Matters: SCM 73/2023

Subject: CQ5-2022 Non-BIA Commercial Areas as Community Safety Zones - City-wide

Moved by: Councillor Kieran McKenzie
Seconded by: Councillor Renaldo Agostino

Decision Number: ETPS 933
That the report of the Transportation Planning Senior Engineer dated January 16, 2023 regarding CQ5-2022 Non-BIA Commercial Areas as Community Safety Zones **BE RECEIVED** for information.
Carried.

Report Number: C 4/2023
Clerk's File: ST2023

Clerk's Note:

1. The recommendation of the Environment, Transportation & Public Safety Standing Committee and Administration are the same.

2. Please refer to Item 8.6 from the Environment, Transportation & Public Safety Standing Committee Meeting held on February 22, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: http://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230222/-1/9386

Subject: CQ5-2022 Non-BIA Commercial Areas as Community Safety Zones - City-wide

Reference:

Date to Council: February 22, 2023
Author: Jeff Hagan
Transportation Planning Senior Engineer
519-255-6100 ext 6003
jhagan@citywindsor.ca
Public Works - Operations
Report Date: January 16, 2023
Clerk's File #: ST2023

To: Mayor and Members of City Council

Recommendation:

THAT report C 4/2023, "CQ5-2022 Non-BIA Commercial Areas as Community Safety Zones" **BE RECEIVED** for information.

Executive Summary:

N/A

Background:

At the April 11, 2022 Council meeting, Councillor Kaschak asked the following Council Question:

> ***CQ5-2022***
>
> *Asks Administration to report back to Council on the appropriateness of adding non-BIA commercial districts as Community Safety Zones in commercial shopping districts that generate similar levels of pedestrian and active transportation activity.*

This report provides the requested information.

Community Safety Zones

The Highway Traffic Act allows municipalities to designate portions of roadways where public safety is of special concern as community safety zones. In a community safety

zone, fines are doubled for a range of driving offenses including speeding and careless driving.

Community safety zones must be established by by-law and signed to be enforceable.

Community Safety Zone Policy & Previous Reports

Report S 9/2021 *Community Safety Zone Policy* came before Council at its April 19, 2021 meeting. This report included a proposed Community Safety Zone Policy to provide guidance and consistency for community safety zones in Windsor. The report also included recommended amendments to Traffic By-law 9148 that would adjust existing community safety zones to be in compliance with the policy and introduce new community safety zones at specific locations.

In response to this report, Council adopted the Community Safety Zone Policy and the proposed Traffic By-law amendments, and directed Administration to report back on the cost of providing community safety zones in the nine Business Improvement Areas (CR161/2021).

Report C 20/2022 *Cost of Adding the BIAs as Community Safety Zones* was brought before Council at its April 11, 2022 meeting. In response, Council approved the recommended community safety zones in Business Improvement Areas and referred ongoing maintenance costs for the added signage to the 2023 operating budget (CR139/2022).

Discussion:

The Community Safety Zone Policy identifies factors that should be considered when determining whether a community safety zone is appropriate for a street segment:

- The presence of community buildings, including schools, parks, or hospitals
- The presence of other facilities that attract and/or generate high volumes of pedestrian or cyclist traffic
- The presence of School Areas or School Zones
- The frequency of collisions and/or injuries on a given section of roadway

Schedule A-1 of the Official Plan, attached as Appendix A, identifies Traditional Commercial Streets. Traditional Commercial Streets are pedestrian-oriented commercial areas where, generally, the building facade is located at the property line adjacent to the sidewalk. These streets are especially walkable areas with a high density of shops, restaurants, and other service-oriented businesses. Customers in these areas typically arrive at businesses on foot, whether walking directly or from nearby transit stops or off-site parking (e.g. on-street parking or municipal lots).

Most Traditional Commercial Streets are located in Business Improvement Areas (BIAs); the Traditional Commercial Streets not located in a BIA are shown in Figure 1 and listed in Table 1.

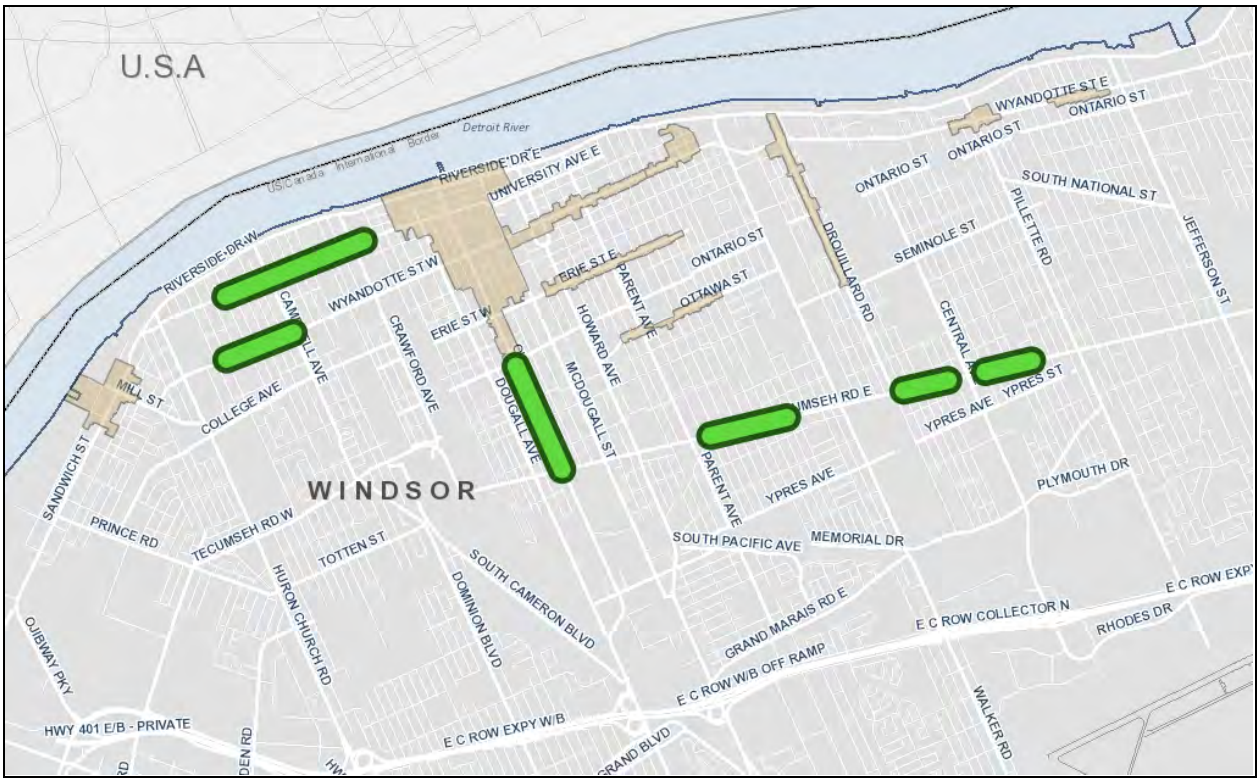


Figure 1: Business Improvement Areas (beige) and Traditional Commercial Streets Outside BIAs (green)

Table 1: Traditional Commercial Streets Outside Business Improvement Areas

Street	From	To	Length
University Avenue West	Randolph Avenue	Salter Avenue	1.38 km
Wyandotte Street West	California Avenue	Campbell Avenue	0.66 km
Ouellette Avenue	Giles Boulevard	Tecumseh Road	1.10 km
Tecumseh Road East	Forest Avenue	Chilver Road	0.73 km
Tecumseh Road East	Cadillac Street	Larkin Road	0.43 km
Tecumseh Road East	Westcott Road	Rossini Boulevard	0.45 km

At all the locations in Table 1, installing community safety zones would be compliant with the Community Safety Zone Policy, but have not been identified as priority locations for installation of community safety zones.

Risk Analysis:

No critical or significant risks have been identified with the recommendations of this report.

Implementing community safety zones without corresponding enforcement would be associated with a moderate reputational risk, either to the City or to Windsor Police Service. Windsor Police Service personnel have indicated that their ability to provide enforcement in community safety zones is contingent on resources as well as other demands on those resources. Because of this, any specific level of enforcement of community safety is not guaranteed.

Climate Change Risks

Climate Change Mitigation:

Indirect greenhouse gas emission reductions may come from decreased car travel speeds due to potentially higher enforcement priority and speed control measures through the implementation of a community safety zone. Furthermore, the implementation of community safety zones may increase cycling and shifts to active transportation due to decreased road speeds and increased safety.

Climate Change Adaptation:

The gradual increase in annual mean temperatures, along with the decreasing frequency of days below -10^{O}C due to climate change may lead to an increase in cycling/pedestrian traffic during traditionally colder months. Because of this modal shift, demand for community safety zones may gradually increase over time.

Financial Matters:

The cost to implement community safety zones for the six Traditional Commercial Streets located outside Business Improvement Areas is $22,800, due to the required signage. Ongoing maintenance costs are estimated to be $380 per year. Cost estimates by street segment are provided in Table 2.

Table 2: Cost Estimate

Street	Length	Signs Required	Initial Installation Cost	Ongoing Annual Maintenance Cost
University Avenue West (Randolph to Salter)	1.38 km	12	$7,200.00	$120.00
Wyandotte Street West (California to Campbell)	0.66 km	4	$2,400.00	$40.00
Ouellette Avenue (Giles to Tecumseh)	1.10 km	10	$6,000.00	$100.00
Tecumseh Road East (Forest to Chilver)	0.73 km	4	$2,400.00	$40.00
Tecumseh Road East (Cadillac to Larkin)	0.43 km	4	$2,400.00	$40.00
Tecumseh Road East (Westcott to Rossini)	0.45 km	4	$2,400.00	$40.00
Total		**38**	**$22,800.00**	**$380.00**

Currently, no funds are allocated for this work. Should Council direct that these community safety zones be installed, a source of funds for the initial installation cost will need to be identified and an operating budget increase for maintenance cost will be brought forward as part of the 2024 operating budget submission.

Consultations:

Ian Day & Roberto Peticca, Traffic Operations

Insp. Jennifer Crosby & Barry Horrobin, Windsor Police Service

Conclusion:

Information on installing community safety zones in commercial districts outside Business Improvement Areas has been provided as directed by Council Question CQ5-2022.

Planning Act Matters:

N/A

Approvals:

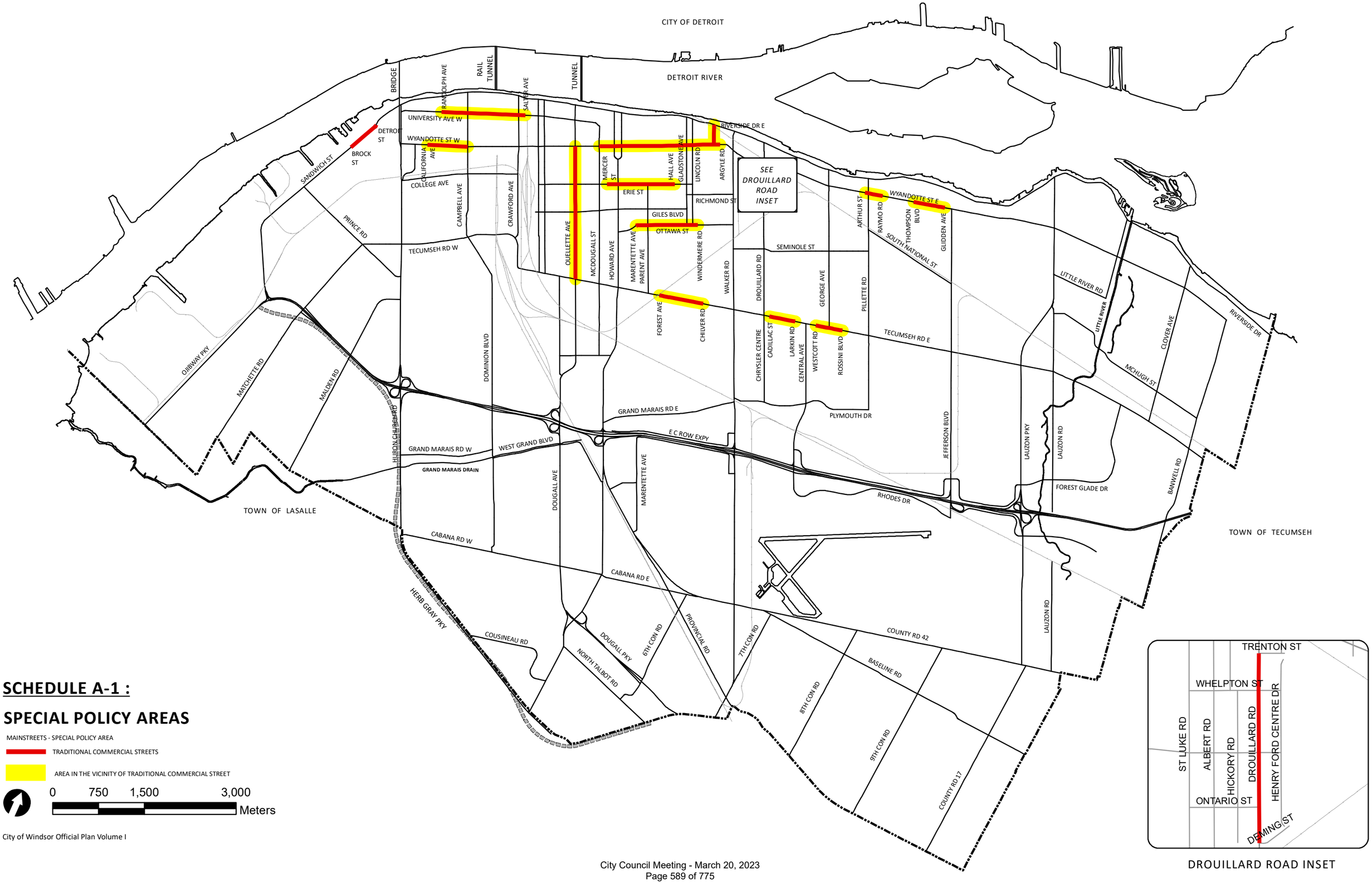
Name	Title
Cindy Becker	Financial Planning Administrator
Shawna Boakes	Executive Director of Operations & Deputy City Engineer
Chris Nepszy	Commissioner of Infrastructure Services and City Engineer
Joe Mancina	Commissioner of Corporate Services and Chief Financial Officer
Onorio Colucci	Chief Administrative Officer

Notifications:

Name	Address	Email
Councillor Kaschak		

Appendices:

1 Appendix A - Traditional Commercial Streets (Official Plan Schedule A-1)


CITY OF DETROIT
DETROIT RIVER
BRIDGE
RANDOLPH AVE
RAIL TUNNEL
SALTER AVE
TUNNEL
UNIVERSITY AVE W
WYANDOTTE ST W
DETROIT ST
BROCK ST
SANDWICH ST
CALIFORNIA AVE
COLLEGE AVE
CAMPBELL AVE
CRAWFORD AVE
PRINCE RD
TECUMSEH RD W
OUELLETTE AVE
MCDOUGALL ST
HOWARD AVE
MARENTETTE AVE
PARENT AVE
MERCER ST
ERIE ST
HALL AVE
GLADSTONE AVE
LINCOLN RD
ARGYLE RD
RIVERSIDE DR E
RICHMOND ST
GILES BLVD
OTTAWA ST
WINDERMERE RD
WALKER RD
FOREST AVE
CHILVER RD
SEE DROUILLARD ROAD INSET
SEMINOLE ST
DROUILLARD RD
CHRYSLER CENTRE
CADILLAC ST
LARKIN RD
CENTRAL AVE
GEORGE AVE
WESTCOTT RD
ROSSINI BLVD
PILLETTE RD
PLYMOUTH DR
ARTHUR ST
RAYMO RD
WYANDOTTE ST E
THOMPSON BLVD
SOUTH NATIONAL ST
GLIDDEN AVE
JEFFERSON BLVD
LITTLE RIVER RD
LITTLE RIVER
CLOVER AVE
RIVERSIDE DR
MCHUGH ST
LAUZON PKY
LAUZON RD
FOREST GLADE DR
BANWELL RD
TECUMSEH RD E
OJIBWAY PKY
MATCHETTE RD
MALDEN RD
HURON CHURCH RD
DOMINION BLVD
GRAND MARAIS RD E
E C ROW EXPY
GRAND MARAIS RD W
WEST GRAND BLVD
GRAND MARAIS DRAIN
DOUGALL AVE
MARENTETTE AVE
RHODES DR
TOWN OF LASALLE
TOWN OF TECUMSEH
CABANA RD W
CABANA RD E
HERB GRAY PKY
COUSINEAU RD
DOUGALL PKY
NORTH TALBOT RD
6TH CON RD
PROVINCIAL RD
7TH CON RD
8TH CON RD
9TH CON RD
BASELINE RD
COUNTY RD 42
COUNTY RD 17
LAUZON RD
SCHEDULE A-1 :
SPECIAL POLICY AREAS
MAINSTREETS - SPECIAL POLICY AREA
TRADITIONAL COMMERCIAL STREETS
AREA IN THE VICINITY OF TRADITIONAL COMMERCIAL STREET
0 750 1,500 3,000
Meters
City of Windsor Official Plan Volume I
TRENTON ST
WHELPTON ST
ST LUKE RD
ALBERT RD
HICKORY RD
DROUILLARD RD
HENRY FORD CENTRE DR
ONTARIO ST
DEMING ST
DROUILLARD ROAD INSET

Item No. 8.14

Committee Matters: SCM 76/2023

Subject: Update to Transit Windsor Signing Authorities - City Wide

Moved by: Councillor Gary Kaschak
Seconded by: Councillor Mark McKenzie

Decision Number: ETPS 936
That the Environment, Transportation & Public Safety Standing Committee, sitting as the Transit Windsor Board of Directors and City Council **AUTHORIZE** the following positions at Transit Windsor to be signing authorities for the Transit Windsor Imprest Account:

- The Executive Director, Transit Windsor and the Director, Fleet and Facility Development, Transit Windsor as the primary signing authorities; and
- The Director, Operations and Planning, Transit Windsor and the Maintenance Manager-Fleet, Transit Windsor as the secondary signing authorities; and further,

That the secondary signing authorities **BE UTILIZED** only in the event that one of the primary signatories be unavailable; and further,

That the CAO **BE AUTHORIZED** to approve future amendments in signing authorities for the Transit Windsor Imprest Account where such changes are deemed administrative or housekeeping in nature.
Carried.

Report Number: S 18/2023
Clerk's File: MT/13708

Clerk's Note:

1. The recommendation of the Environment, Transportation & Public Safety Standing Committee and Administration are the same.

2. Please refer to Item 9.3 from the Environment, Transportation & Public Safety Standing Meeting held on February 22, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: http://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230222/-1/9386

Subject: Update to Transit Windsor Signing Authorities - City Wide

Reference:

Date to Council: February 22, 2023
Author: Tyson Cragg
Executive Director, Transit Windsor
519-944-4141 ext 2232
tcragg@citywindsor.ca
Transit Windsor
Report Date: February 3, 2023
Clerk's File #: MT/13708

To: Mayor and Members of City Council

Recommendation:

THAT the Environment, Transportation & Public Safety Standing Committee, sitting as the Transit Windsor Board of Directors and City Council **AUTHORIZE** the following positions at Transit Windsor to be signing authorities for the Transit Windsor Imprest Account:

- The Executive Director, Transit Windsor and the Director, Fleet and Facility Development, Transit Windsor as the primary signing authorities; and
- The Director, Operations and Planning, Transit Windsor and the Maintenance Manager-Fleet, Transit Windsor as the secondary signing authorities; and further

THAT The secondary signing authorities **BE UTILIZED** only in the event that one of the primary signatories be unavailable; and further

THAT the **CAO BE AUTHORIZED** to approve future amendments in signing authorities for the Transit Windsor Imprest Account where such changes are deemed administrative or housekeeping in nature.

Executive Summary:

N/A.

Background:

Historically, wherever and whenever possible and appropriate Administration has established and maintained the City's bank accounts with the signing authority of both the Mayor and City Treasurer. When required administratively and where appropriate, secondary signing authority, such as any one of the three Deputy Treasurers are able to sign in lieu of the City Treasurer.

From time to time, it has been determined that signing authorities are not that of the Mayor and City Treasurer. In those situations, City Council is advised of the reasons and approval is required prior to any changes being made.

Discussion:

The Imprest account is used for employees that go off on Short-term Disability (STD) or WSIB and are issued pay advance cheques until their claim is approved. The existence of this Imprest account is used to satisfy the timely disbursement of employee-related payments in accordance with the Collective Agreement. In 2001, a report seeking changes in signing authorities was presented to City Council S125/2021. Since that time Transit Administration has undergone restructuring whereby previous position titles have been changed to better reflect and align with the organizational needs of each department. Following past practice, the two primary signing authorities will be the Executive Director, Transit Windsor and the Director, Fleet and Facility Development, Transit Windsor. To facilitate day to day operational support both the Director, Operations and Planning, Transit Windsor and the Maintenance Manager-Fleet, Transit Windsor are being recommended as secondary signing authorities. However it is noted that only one of the secondary authorities can sign on behalf of a primary authority. In other words, a cheque must carry two authorized signatures being either both primary signers or one primary with one secondary signer. As such, this report seeks the necessary approvals that will allow for the continued use of the Imprest Bank account on a regular basis.

Further to the above noted recommendations, City Council is also being requested to authorize the CAO to approve any future changes in signing authorities for the Transit Windsor Imprest account where such changes are deemed to be administrative or housekeeping in nature. Allowing for the CAO to review such changes will assist in timely maintenance of banking agreements and documents.

Risk Analysis:

Transit Administration has determined that there is no risk to updating the position titles of the designated signing authorities as detailed within the recommendations. There is however, an identified risk with not approving the recommendations, that will present a challenge when obtaining signatures and would delay the process of getting the cheques to the employees in a timely-manner; therefore, risking a violation to the Collective Agreement. The establishment of signing authorities which are not the Mayor and City Treasurer in no way diminish other financial controls which are in place to ensure proper use of funds such as regular account reconciliations.

Climate Change Risks

Climate Change Mitigation:

N/A.

Climate Change Adaptation:

N/A.

Financial Matters:

There are no financial costs associated with a change in account signatories.

Consultations:

Janice Guthrie – Deputy Treasurer Taxation, Treasury & Financial Projects, City of Windsor

Conclusion:

Transit Administration recommends the approval of the recommendations as detailed within this report.

Planning Act Matters:

N/A.

Approvals:

Name	Title
Tyson Cragg	Executive Director, Transit Windsor
Chris Nepszy	Commissioner, Infrastructure Services
Janice Guthrie	On behalf of Commissioner, Corporate Services /Chief Financial Officer
Onorio Colucci	Chief Administrative Officer (A)

Notifications:

Name	Address	Email

Appendices:

THE CITY OF WINDSOR ONTARIO, CANADA

Committee Matters: SCM 84/2023

Subject: Zoning By-law Amendment Application for property known as 478 Janette Avenue; Applicant: 1413600 Ontario Ltd.; File No. Z-029/22, ZNG/6847; Ward 3.

Moved by: Councillor Angelo Marignani
Seconded by: Councillor Kieran McKenzie

Decision Number: **DHSC 481**

I. That Zoning By-law 8600 **BE AMENDED** for the lands located on the east side of Janette Avenue, between Wyandotte Street West and Park Street West, described as Lot 68 and Pt Lot 67, Plan 274, [PIN 01195-0191 LT], by adding a site specific holding provision to permit "One Multiple Dwelling with a maximum of six dwelling units" as an additional permitted use, subject to additional regulations;

"467. EAST SIDE OF JANETTE AVENUE, BETWEEN WYANDOTTE STREET WEST AND PARK STREET WEST

For the lands comprising Lot 68 and Pt Lot 67, Plan 274, PIN 01195-0191 LT, "One *Multiple Dwelling* with a maximum of six *dwelling units"* shall be an additional permitted use and the following shall apply:

1. The provisions in Section 11.2.5.4, save and except for section 11.2.5.4.4
2. Main Building Height - maximum 10.0 m

[ZDM 3; ZNG/6847]"

II. That the holding (H) symbol **BE REMOVED** when the applicant/owner submits an application to remove the holding (H) symbol and the following conditions are satisfied:

a) Official approval of the storm water management calculations;
b) Street Opening Permit; and
c) Alley Maintenance Contribution of $5,750.00 paid to the Corporation of the City of Windsor.

Carried.

Report Number: S 26/2023
Clerk's File: Z/14512

Clerk's Note:

1. The recommendation of the Development & Heritage Standing Committee and Administration are the same.

2. Please refer to Item 7.1 from the Development & Heritage Standing Committee held on March 6, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: https://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230306/-1/9395

Subject: Zoning By-law Amendment Application for property known as 478 Janette Avenue; Applicant: 1413600 Ontario Ltd.; File No. Z-029/22, ZNG/6847; Ward 3.

Reference:

Date to Council: March 6, 2023
Author: Justina Nwaesei, MCIP, RPP
Senior Planner - Subdivisions
519-255-6543, ext. 6165
jnwaesei@citywindsor.ca

Planning & Building Services
Report Date: February 16, 2023
Clerk's File #: Z/14512

To: Mayor and Members of City Council

Recommendation:

I. That Zoning By-law 8600 **BE AMENDED** for the lands located on the east side of Janette Avenue, between Wyandotte Street West and Park Street West, described as Lot 68 and Pt Lot 67, Plan 274, [PIN 01195-0191 LT], by adding a site specific holding provision to permit "One *Multiple Dwelling* with a maximum of six *dwelling units"* as an additional permitted use, subject to additional regulations;

"467. EAST SIDE OF JANETTE AVENUE, BETWEEN WYANDOTTE STREET WEST AND PARK STREET WEST

For the lands comprising Lot 68 and Pt Lot 67, Plan 274, PIN 01195-0191 LT, "One *Multiple Dwelling* with a maximum of six *dwelling units"* shall be an additional permitted use and the following shall apply:

1. The provisions in Section 11.2.5.4, save and except for section 11.2.5.4.4
2. Main Building Height - maximum 10.0 m

[ZDM 3; ZNG/6847]"

II. THAT the holding (H) symbol **BE REMOVED** when the applicant/owner submits an application to remove the holding (H) symbol and the following conditions are satisfied:

a) Official approval of the storm water management calculations;

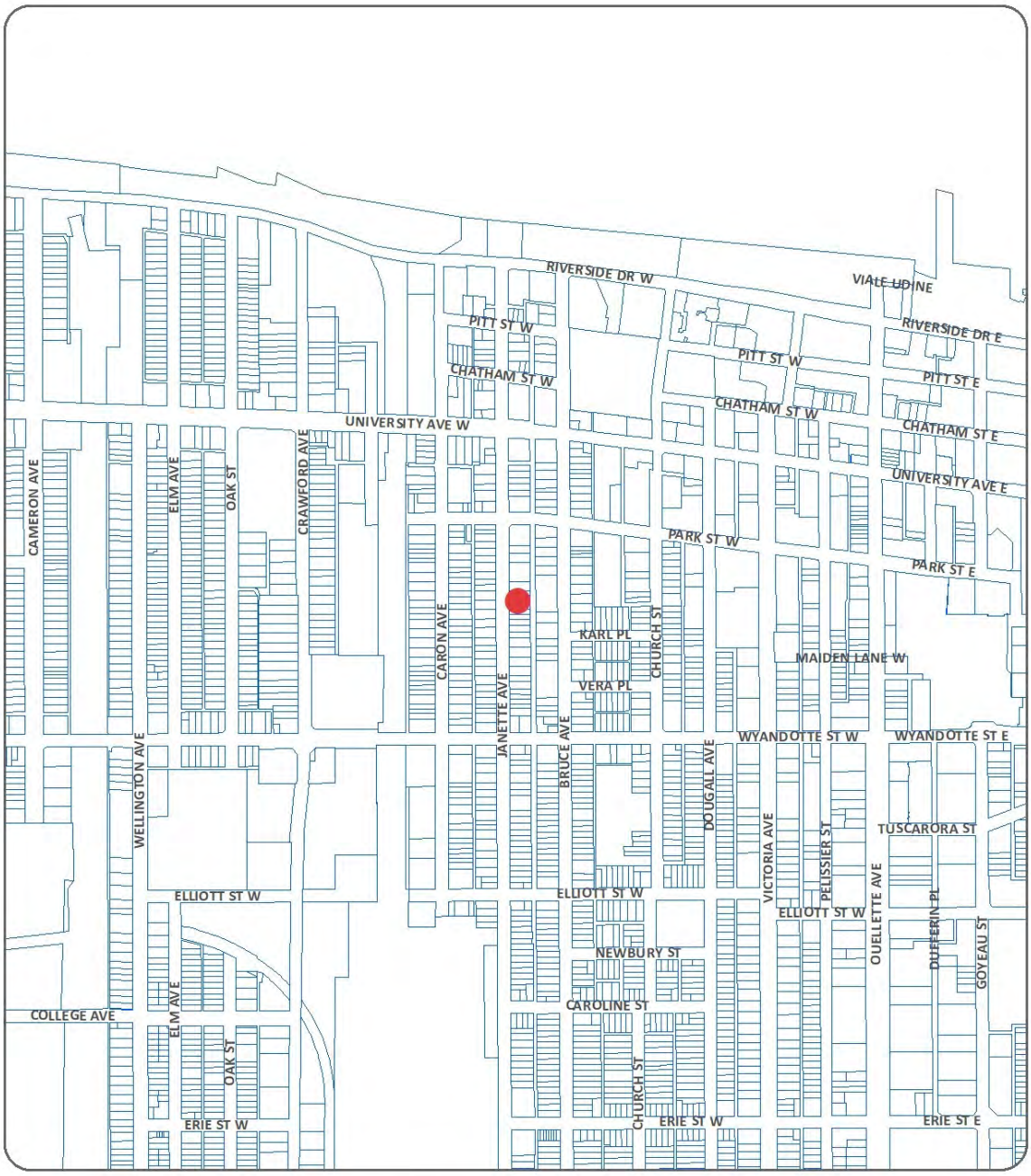
b) Street Opening Permit; and

c) Alley Maintenance Contribution of $5,750.00 paid to the Corporation of the City of Windsor.

Executive Summary: N/A.

Background:

1. KEY MAP



KEY MAP - Z-029/22, ZNG-6847

SUBJECT LANDS

2. APPLICATION INFORMATION

LOCATION: 478 Janette Ave., East side of Janette Ave., between Wyandotte Street W. and Park Street W.

APPLICANT: 1413600 ONTARIO LTD.; c/o Zak Habib.

AGENT: N/A

REGISTERED OWNER: SAME AS APPLICANT

PROPOSAL: The applicant is requesting a site-specific amendment to By-Law 8600 to permit one *multiple dwelling* with a maximum of six (6) *dwelling units* on land zoned Residential District 2.2 zoning (RD2.2).

[NOTE: The RD2.2 zoning permits one multiple dwelling containing a maximum of four dwelling units. Building Permit was recently issued for construction of a multiple dwelling with 4-dwelling units on the subject land. The construction of the 4-unit dwelling is nearing completion.]

The applicant is proposing 2 additional units in the basement of the 4-unit dwelling; thereby, converting the building to a 6-unit *multiple dwelling.* Seven (7) on-site parking spaces are proposed. The applicant is requesting relief from the following zoning by-law provision:

- Section 11.2.5.4.4 – Main Building Height – maximum - 9.0m (approved by B/L101-2022); proposed - 10m *in accordance with approved permit drawings for the 4-unit dwelling.)*

[NOTE: The applicant has requested deletion of the following two zoning by-law relief mentioned in the application form and Planning Rationale Report]: Relief from

- *Section 24.24.1.1 – Required number of accessible parking - minimum -1 Type A; proposed – 0 Type A.*
- *Section 25.5.20.1.6 - Parking area separation from a habitable room window – minimum – 4.50m; proposed 4.02m.]*

SUBMISSIONS BY APPLICANT:

- Zoning By-law Amendment Application form;
- Property Deed;
- Development Concept plan;
- Planning Justification Report dated November 10, 2022, prepared by Pillon Abbs Inc.
- Lot Grading Plan dated April 27, 2021, prepared by Clarke Surveyors, and
- StormWater Management Report dated October 4, 2022, prepared by Haddad Morgan & Associates Ltd.

3. SITE INFORMATION

OFFICIAL PLAN	**ZONING & ZDM**	**CURRENT USE(S)**	***PREVIOUS USE(S)***
RESIDENTIAL - Low Profile Area, Schedule E, Land Use, City Centre Planning District, OP Vol. 1	RESIDENTIAL DISTRICT 2.2 (RD2.2); ZDM3	4-unit multiple dwelling under construction	Vacant
FRONTAGE	**DEPTH**	**AREA**	**SHAPE**
22.86 m	34.21 m	782.13 m2	rectangle
Note: All measurements are approximate			

4. REZONING MAP

PART OF ZONING DISTRICT MAP 3

N.T.S.

REQUESTED ZONING AMENDMENT

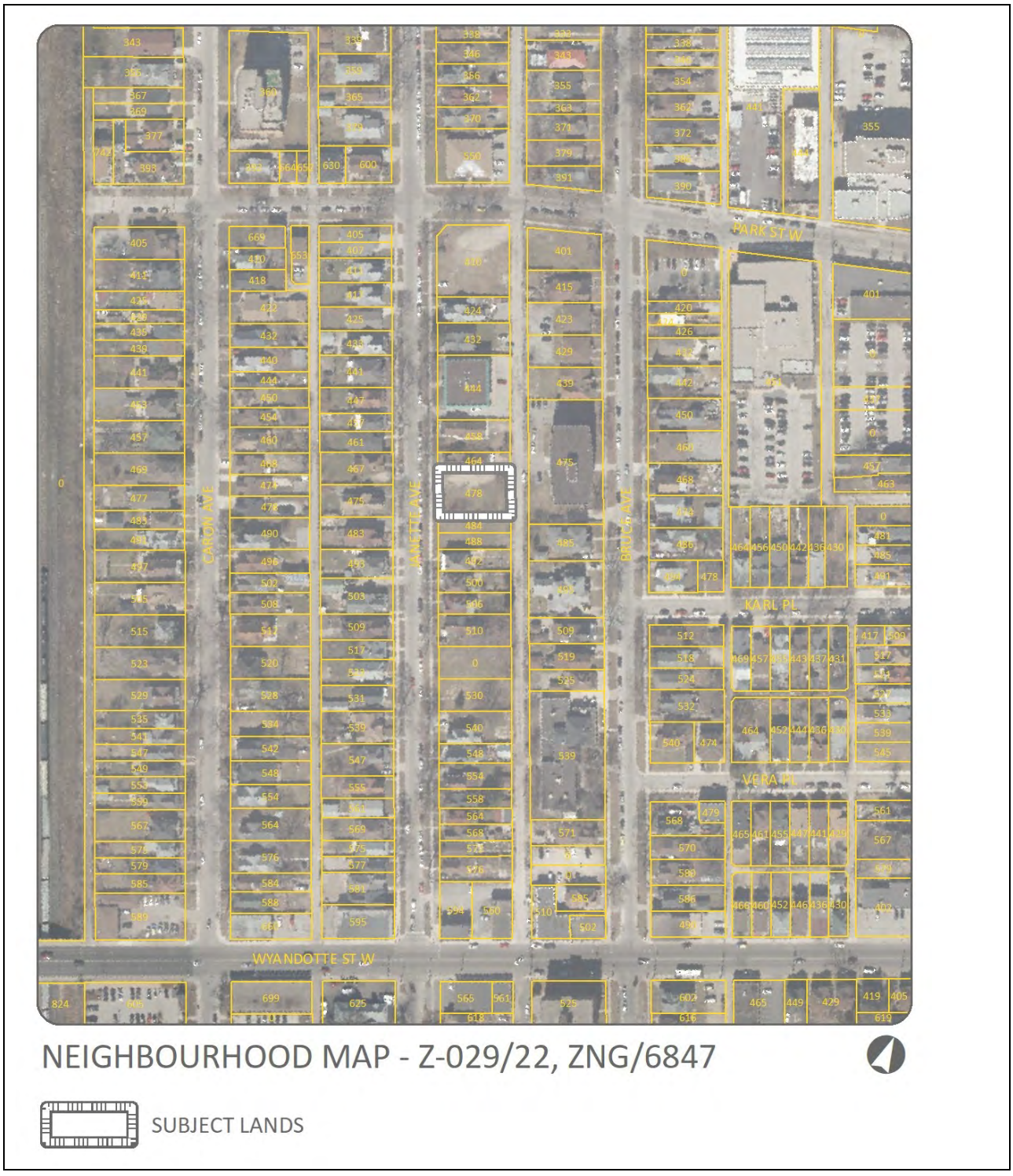
Applicant: 1413600 Ontario Ltd.

SUBJECT LANDS

PLANNING & BUILDING DEPARTMENT

DATE : JANUARY, 2023
FILE NO. : Z-029/22, ZNG/6847

5. NEIGHBOURHOOD CHARACTERISTICS



2017 EIS (Executive Information System) AERIAL Photo

New Building (under construction) at 478 Janette Avenue, on Google Earth Photo, Jun 2022

NEIGHBOURHOOD CHARACTERISTICS & SURROUNDING LAND USE

The surrounding area is an established residential neighbourhood characterised by its low density, low profile residential uses, predominantly two storeys tall with 4 or less dwelling units. Attached as **Appendix B** to this report, are Site Photos taken February 15, 2023.

The following additional housing types/options exist in the immediate neighbourhood:

- 3-storey, 11-unit Apartment building at 444 Janette Avenue.
- 6-storey, 45-unit Apartment Building - First Place Apartments, at 475 Bruce Avenue, and
- 3-storey, Residential Care facility - Bruce Villa, at 539 Bruce Avenue.

Mixed use developments (residential and commercial uses) are mainly located along Wyandotte Street Corridor, further south of the subject land.

North, West, and East: **Residential uses**

South: (i) ***Residential uses,*** **and** (ii) **Mixed Use developments** (along Wyandotte St.)

MUNICIPAL INFRASTRUCTURE

- The City's records show that there is a 375mm diameter brick pipe combined sewer along Janette Avenue available to service the subject land.
- Municipal watermains, fire hydrants and LED streetlights are available on Janette Avenue and in the subject area.
- There are concrete bike lanes, sidewalks, curbs and gutter along both sides of Janette Avenue right-of-way and along some nearby roadway rights-of-way.

- Transit Windsor Bus routes (Dougall 6, Crosstown 2, and Central 3) are available to service the subject land and area. Central 3 and Crosstown 2 run along Wyandotte Street West while Dougall 6 runs along Janette Avenue in front of the subject land. The closest existing bus stop is located at the northwest corner of Janette and Park, approximately 160m from the subject land.
- Janette Avenue and Park Street West are classified as Class I Collector Roads in the Official Plan, while Wyandotte Street West is classified as a Class II Arterial Road. Janette Avenue is a one-way southbound R.O.W.
- The neighbourhood is serviced by north/south alleys.

Discussion:

PLANNING ANALYSIS:

1. PROVINCIAL POLICY STATEMENT (PPS) 2020

Provincial Policy Statement (PPS) 2020 was issued under section 3 of the Planning Act and came into effect May 1, 2020. PPS 2020 replaces the Provincial Policy Statement issued April 30, 2014 and provides policy direction on matters of provincial interest related to land use planning and development. PPS 2020 sets the policy foundation for regulating the development and use of land in Ontario.

The following policies of PPS 2020 are considered relevant in discussing provincial interests related to this amendment:

> *1 .1.1 Healthy, liveable and safe communities are sustained by:*
>
> *a) promoting efficient development and land use patterns which sustain the financial well-being of the Province and municipalities over the long term;*
>
> *b) accommodating an appropriate affordable and market-based range and mix of residential types (including single-detached, additional residential units, multi-unit housing, affordable housing and housing for older persons), employment (including industrial and commercial), institutional (including places of worship, cemeteries and long-term care homes), recreation, park and open space, and other uses to meet long-term needs;*

This amendment will permit the conversion of a four-plex (under construction) to a six-plex. The recommended amendment will maintain the existing development pattern and profile in the subject area, while accommodating two additional residential units on the subject land. Thereby, resulting in a more efficient use of land, municipal services and infrastructure.

As noted already in this report, the predominant residential type in the subject neighbourhood is the low profile, 1 to 4-units residential developments. The recommended amendment will bring about the accommodation of a 6-unit dwelling, which will constitute an appropriate market-based range and mix of residential types. The subject amendment is consistent with the above policies (1.1.1.a and 1.1.1.b) of the PPS.

> *1.1.3.3 Planning authorities shall identify appropriate locations and promote opportunities for transit-supportive development, accommodating a significant supply and range of housing options through intensification and redevelopment where this can be accommodated taking into account existing building stock or areas, including brownfield sites, and the availability of suitable existing or planned infrastructure and public service facilities required to accommodate projected needs.*

This amendment will facilitate the development of a low profile housing option, which is similar to the predominant existing building stock in the subject area. The recommended amendment

promotes residential intensification by increasing the number of residential units from 4 to 6 on the subject land. The amendment will support the use of existing sidewalks and bike lanes, and facilitate the use of available public transit in the area. The proposed 6-unit dwelling will efficiently use land, resources, and existing infrastructure, including existing and planned active transportation options such as sidewalks and bike lanes. The subject amendment is consistent with policy 1.1.3.3 of the PPS.

1.4 Housing

1.4.3 Planning authorities shall provide for an appropriate range and mix of housing options and densities to meet projected market-based and affordable housing needs of current and future residents of the regional market area by:

b) permitting and facilitating:
1. all housing options required to meet the social, health, economic and well-being requirements of current and future residents, ...; and
2. all types of residential intensification, including additional residential units, and redevelopment in accordance with policy 1.1.3.3;

c) directing the development of new housing towards locations where appropriate levels of infrastructure and public service facilities are or will be available to support current and projected needs;
d) promoting densities for new housing which efficiently use land, resources, infrastructure and public service facilities, and support the use of active transportation and transit in areas where it exists or is to be developed;

This amendment will

- promote the a slightly higher density than recently approved on the subject land;
- create an opportunity for a more compact development in an established residential area containing mostly lower-density developments;
- facilitate a net increase in residential units or accommodation;
- result in the minor intensification of the subject site and area;
- facilitate the municipality's ability to accommodate residential growth through intensification;
- provide a form of housing that is appropriate in terms of range and mix, and
- meet the social, health and well-being of current and future residents.

Appropriate level of infrastructure, active transportation and transit services are available or will be available in the subject area. This amendment is consistent with policy 1.4 of the PPS.

1.6 Infrastructure and Public Service Facilities

1.6.6.2 Municipal sewage services and municipal water services are the preferred form of servicing for settlement areas to support protection of the environment and minimize potential risks to human health and safety. Within settlement areas with existing municipal sewage services and municipal water services, intensification and redevelopment shall be promoted wherever feasible to optimize the use of the services.

The subject land is within an area that is serviced by municipal sewage services and municipal water services. The recommended zoning by-law amendment is consistent with policy 1.6.6.2 of the PPS.

1.6.6.7 Planning for stormwater management shall:
f) promote stormwater management best practices, including stormwater attenuation and re-use, water conservation and efficiency, and low impact development.

The applicant submitted a Stormwater Management (SWM) Report dated October 4, 2022. The SWM report indicates that the proposed development will discharge to the existing 375mm

diameter brick pipe combine sewer (municipal sewer) on Janette Avenue. The SWM report also states as follows:

- The site would require a minimum storage capacity of 12.3cubic metres for the 1:2-year storm and 36.3 cubic metres for the 1:100 –year storm;
- The storage for the 2-year storm shall be accommodated in an Advanced Drainage Systems (ADS) Stormtech stormwater chamber system, as well as underground in pipes, manhole and catch basin. The high-water level shall be no greater than 0.30 m below the parking lot catch basin elevation.
- The necessary stormwater storage associated with the 100-year storm event shall be accommodated by means of underground structures (pipes, manholes, catch basins, storage units). The high-water level will be 184.7 m (rear catch basin elevation), with underground storage unit capacity of 33.6 cubic metres.
- Tempest Inlet Control Devices shall be introduced to control the overflow to a maximum release rate of 1.5l/s.
- Water quality treatment will be provided in the Stormtech Isolator Row PLUS (IR+) from Advanced Drainage Systems.

Stormwater management calculations are typically addressed at Site Plan Control; however, the City's Site Plan Approval team have stated that this application does not require Site Plan Control Approval. Therefore, to ensure implementation of the SWM recommendations outlined in the afore mentioned SWM Report, a Street Opening Permit is included as a condition of H-removal in this report. Consequently, the recommended amendment is deemed consistent with policy 1.6.6.7 (f) of the PPS.

In summary, the above planning analysis demonstrates that the recommended zoning by-law amendment is consistent with the relevant Policies of PPS 2020.

2. OFFICIAL PLAN (OP)

Land Use Designation: The site is designated "RESIDENTIAL - Low Profile Area", Schedule E, Land Use, City Centre Planning District, City of Windsor Official Plan Volume 1.

The Development Profile Areas (s.6.11.3.1) establish the maximum height for buildings within distinct sub-areas of the City Centre. Accordingly, the following apply in the City Centre Planning District:

- Low Profile Area where development is generally no greater than three (3) storeys in height (s.6.11.3.1(a)).
- Medium Profile Area where development is generally no greater than six (6) storeys in height (s.6.11.3.1(b)).

This amendment is for the accommodation of a 6-plex within a low profile development containing 2 storeys above ground and a possible third storey in the basement floor.

Permitted Uses: "*in areas also designated as Low Profile Area single detached, semi-detached, duplex, and row and multiplex dwelling units with up to 8 units,"* s. 6.11.5.1 (a), OP Vol. 1; "*in areas also designated as Medium or High Profile Area dwelling units, preferably over 8 units,*" s.6.11.5.1(b), OP. Vol. 1. The subject land is designated as Residential – Low Profile Area. Therefore, the proposed 6-plex is a permitted use.

Section 6.11.5.3 requires residential development proposals in areas designated as "Residential" on Schedule E: City Centre Planning District to be evaluated according to policy 6.3.2.5, OP. Vol. 1.

Evaluation criteria for neighbourhood development pattern, s.6.3.2.5 of OP Vol. 1. With respect to the proposed development on the subject land, the following evaluation criteria are applicable:

s.6.3.2.5 (c) compatible with the surrounding area in terms of scale, massing, height, siting, orientation, setbacks, parking and amenity areas;
(d) provided with adequate off street parking;
(e) capable of being provided with full municipal physical services and emergency services;

The desired outcome of this amendment is to accommodate a 6-plex within the existing (newly constructed 4-plex) building on the subject land. Therefore, the amendment maintains the same massing, height, siting, orientation, and setbacks as the existing permitted use (4-plex) on the subject land. The scale of development, parking and amenity areas being proposed are compatible with the surrounding area. The Concept plan, hereto attached as **Appendix A**, shows adequate off-street parking for the proposed development.

As noted already in this report, the subject land is within an established (built-up) residential neighbourhood and municipal infrastructure and services are available in the area; therefore, the proposed development is capable of being provided with full municipal physical services and emergency services per s.6.3.2.5 (e).

3. ZONING

The subject land is zoned Residential District 2.2 (RD2.2) in the City of Windsor Zoning By-law 8600. PERMITTED USES in the RD2.2 zoning district are:

- *One Double Duplex Dwelling*
- *One Duplex Dwelling*
- *One Multiple Dwelling containing a maximum of four dwelling units*
- *One Semi-Detached Dwelling*
- *One Single Unit Dwelling*
- *Townhome Dwelling*
- *Any use accessory to any of the preceding uses.*

The proposed 6-unit multiple dwelling is <u>not</u> permitted in the R2.2 zoning. Therefore, the applicant submitted this rezoning application.

The applicant's request for zoning by-law amendment has been considered and supported in this report. As noted already, the following two requests were originally submitted, but have been deleted at the request of the applicant:

a) reduction in the required number of Type A accessible parking spaces. The attached Appendix A (concept plan) shows compliance with the requirement of 1 (one) Type A accessible parking.
b) reduction in parking area separation from 4.5m to 4.02m; the concept plan shows compliance with the 4.5m minimum required parking area separation.

A 10m maximum building height was permitted in the RD2.2 zoning district until July 11, 2022, when Council passed By-law 101-2022. Building Permit for the 4-plex was issued July 22, 2021. The proposed 6-plex will be created within the approved building containing the 4-plex; therefore, the applicant's request for a 10m maximum building height is supported.

The 6 dwelling units require a minimum of 7 parking spaces. The applicant proposes 7 parking spaces (one of which is Type A accessible parking) with rear alley access.

A **HOLDING SYMBOL** is recommended for approval of the special provision s.20(1)467. The purpose of the holding symbol is to address stormwater management implementation and Alley maintenance contribution. An application for removal of the holding prefix would be required prior to the issuance of a building permit for the proposed 6-plex development.

A **DRAFT BY-LAW** is attached as **Appendix D** to this report.

4. SITE PLAN

Site Plan Control is not applicable to the proposed development, in accordance with the Planning Act and the City of Windsor By-law. Consequently, some conditions, which could have been incorporated in a site plan agreement, have been recommended for the removal of the holding provision in this report. However, the Canadian Pacific Rail Warning Clause and some agency requirements in **Appendix C** attached cannot be enforced by way of a holding provision.

The applicant is still required to comply with CP rail requirements and other municipal and agency requirements found in the attached **Appendix C** to this report.

5. BUILDING PERMIT

A building permit resubmission to the previously issued building permit (2021 303210 000 00 RW) will be required prior to commencing any construction or scope of work changes relating to a 6 unit building on the subject land. See Building Department comment in Appendix C attached to this report.

6. STREET OPENING PERMIT (SOP)

Through internal discussions, staff has confirmed that SOP is required for the installation of the proposed parking area at the rear of the property. It has also been confirmed that the requirements for Stormwater Management and Alley Contribution would be addressed through the SOP process.

Risk Analysis:

Mitigation: The proposed development will promote active transportation by utilizing existing/planned sidewalks in the area; thereby, reducing carbon footprint.

Adaptation: Implementation of the approved stormwater management measures and lot-grading plan for this proposed development would help mitigate adverse impacts on climate change.

Financial Matters: N/A

Consultations:

1. DEPARTMENT AND AGENCIES

Appendix C, attached to this report, contains comments from municipal departments and external agencies that were consulted. There are no objections to the requested amendment. However, take note that some municipal departments and external agencies have conditions/requirements for approval of the zoning amendment. Detailed comments can be found in **Appendix C** hereto attached.

2. PUBLIC NOTICE

The City advertised the official notice in the local Newspaper (the Windsor Star Newspaper) in accordance with the Planning Act.

The City will also mail courtesy notice to all properties within 120m (400 feet) of the subject parcel, prior to the Development & Heritage Standing Committee (DHSC) meeting.

Conclusion:

Based on my evaluation of the (i) materials submitted by the applicant, (ii) relevant policies of the Provincial Policy Statement 2020 and the City of Windsor Official Plan, and (iii) comments from municipal departments and external agencies, it is my opinion that the recommended zoning by-law amendment is consistent with the Provincial Policy Statement 2020 and maintains conformity with the Official Plan.

This amendment constitutes good planning. Staff recommends approval of the recommended zoning by-law amendment.

Planning Act Matters:

I concur with the above comments and opinion of the Registered Professional Planner.

Michael Cooke, MCIP, RPP
Manager, Planning Policy

Thom Hunt, MCIP, RPP
City Planner

I am not a registered Planner and have reviewed as a Corporate Team Leader

JP, Commissioner of Economic Development & Innovation

OC, Chief Administrative Officer

Approvals:

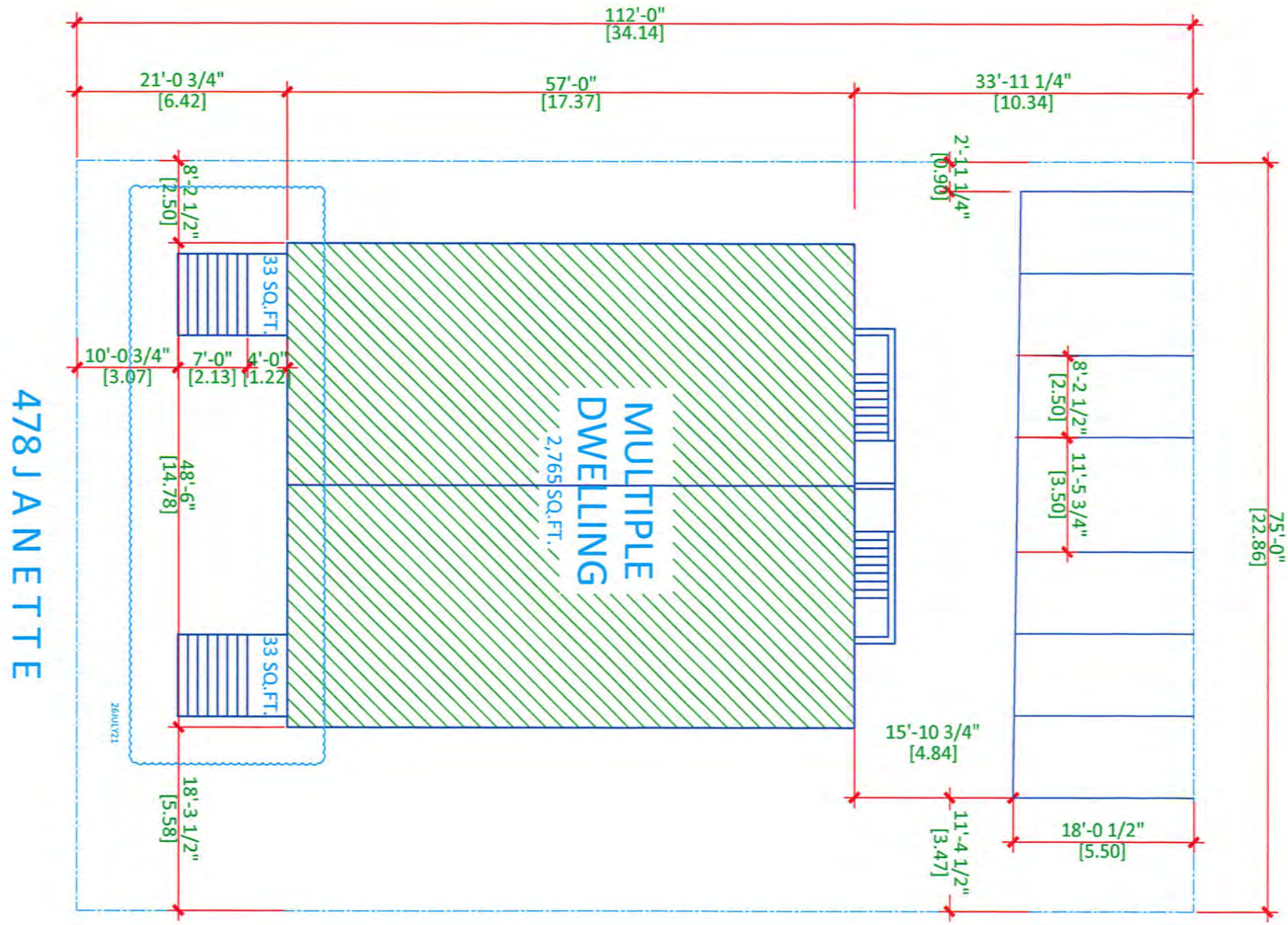
Name	Title
Michael Cooke, MCIP, RPP	Manager of Planning Policy / Deputy City Planner
Thom Hunt, MCIP, RPP	City Planner
Wira Vendrasco	Deputy City Solicitor
Jelena Payne	Commissioner of Economic Development & Innovation
Onorio Colucci	Chief Administrative Officer

Notifications:

Name	Address	Email
Abutting property owners, tenants/ occupants within 120 meter (400 feet) radius of the subject		
Applicant & Owner: 1413600 Ontario Ltd., c/o Zak Habib	4521 Southwood Lakes Blvd., Windsor ON N9G 2M6	zak@royaltyhomes.ca
Councillor Renaldo Agostino	350 City Hall Square W., Suite 510, Windsor, ON, N9A 6S1	ragostino@citywindsor.ca

Appendices:

1 Appendix A - Concept plan
2 Appendix B - Site Photos
3 Appendix C - Consultations
4 Appendix D - Draft By-law for Z-029-22


112'-0"
[34.14]
21'-0 3/4"
[6.42]
57'-0"
[17.37]
33'-11 1/4"
[10.34]
2'-11 1/4"
[0.90]
8'-2 1/2"
[2.50]
33 SQ.FT.
10'-0 3/4"
[3.07]
7'-0"
[2.13]
4'-0"
[1.22]
48'-6"
[14.78]
33 SQ.FT.
18'-3 1/2"
[5.58]
MULTIPLE
DWELLING
2,765 SQ.FT.
478 JANETTE
26UUY21
8'-2 1/2"
[2.50]
11'-5 3/4"
[3.50]
75'-0"
[22.86]
15'-10 3/4"
[4.84]
11'-4 1/2"
[3.47]
18'-0 1/2"
[5.50]

View of Janette Avenue from Park Street heading south towards Wyandotte Street

View of existing buildings on the E/S of Janette Ave. N/S of subject 4-plex at 478 Janette Ave.

View of the subject 4-plex at 478 Janette Avenue and abutting uses

View of rear n/s alley from Park St.

View of rear n/s alley from Wyandotte St.

View of subject 4-plex from abutting rear alley.

APPENDIX C – CONSULTATIONS

Assessment Management Officer – Jose Mejalli

No objection.

Parks Design & Development – Sherif Barsom

No objection.

Environmental Services – Anne-Marie Albidone

No concerns from Environmental Services on the application, however applicants should be aware that all waste is collected in the alley at this address. Plans should account for this.

Transit Windsor – Jason Scott

Transit Windsor has no objections to this development. The closest existing transit route to this property is with the Dougall 6. The closest existing bus stop to this property is located on Janette at Park Northwest Corner. This bus stop is approximately 160 metres from this property falling well within our 400 metre walking distance guideline to a bus stop. This will remain unchanged with our Council approved Transit Master Plan.

Frank Garardo – Policy & Special Studies

Plan Schedules:

Schedule 'A' Planning Districts & Policy Areas - "City Centre"

Schedule 'A-1' – Special Policy Areas - N/A

Schedule 'B' – Greenway System – "N/A"

Schedule 'C' – Development Constraint Areas – N/A

Schedule 'C-1' – Development Constraint Areas: Archaeological Potential – Designated within "High Archaeological Potential"

Schedule 'D' – Land Use – refer to schedule "E"

Schedule 'E' - City Centre Planning District – "Low Profile Residential"

OP Policies for Low Profile Residential:

6.11.5 Residential Policies
PERMITTED USES 6.11.5.1 Uses permitted in the Residential land use designation identified on Schedule E: City Centre Planning District include:
(a) in areas also designated as Low Profile Area single detached, semi-detached, duplex, and row and multiplex dwelling units with up to 8 units; and
(b) in areas also designated as Medium or High Profile Area dwelling units, preferably over 8 units.

Schedule 'F' - Roads & Bikeways - Janette Avenue – Class I Collector

Schedule 'F-1' – Railways/Rail Corridors and Railyards – N/A

Schedule 'G' - Civic Image – N/A

Schedule 'H' - Baseplan Development Phasing – N/A

Schedule 'J' - Urban Structure Plan – N/A

Canadian Pacific Railway

RE: Comments on Z-029/22 [ZNG/6847] - 1413600 ONTARIO LTD. - 478 JANETTE AVE., within 500m of CP Rail Yard

Thank you for the recent notice respecting the captioned development proposal in the vicinity of Canadian Pacific Railway Company. The safety and welfare of residents can be adversely affected by rail operations and CP is not in favour of residential uses that are not compatible with rail operations. CP freight trains operate 24/7 and schedules/volumes are subject to change. CP's approach to development in the vicinity of rail operations is encapsulated by the recommended guidelines developed through collaboration between the Railway Association of Canada and the Federation of Canadian Municipalities. The 2013 Proximity Guidelines can be found at the following website address: http://www.proximityissues.ca/.

CP recommends that the below condition be inserted in all property and tenancy agreements and offers of purchase and sale for all dwelling units in the proposed building(s):

"Canadian Pacific Railway and/or its assigns or successors in interest has or have a railway right-of-way and/or yard located adjacent to the subject land hereof with operations conducted 24 hours a day, 7 days a week, including the shunting of trains and the idling of locomotives. There may be alterations to, or expansions of, the railway facilities and/or operations in the future, which alterations or expansions may affect the living environment of the residents in the vicinity. Notwithstanding the inclusion of any noise and/or vibration attenuating measures in the design of the development and individual dwellings, Canadian Pacific Railway will not be responsible for complaints or claims arising from the use of its facilities and/or its operations on, over, or under the aforesaid right-of-way and/or yard."

Should the captioned development proposal receive approval, CP respectfully requests that the recommended guidelines be followed.

ENWIN

HYDRO ENGINEERING:
No objection to Re-zoning

Please note that ENWIN has the following infrastructure near the development property:
- Existing 2 x 27.6kV overhead primary hydro distribution on the east side of the N/S alley behind the property
- Existing 120/240V overhead secondary hydro distribution on the east side of the N/S alley behind the property

We recommend referring to the Occupational Health & Safety Act for minimum safe limits of approach during construction and also the Ontario Building Code for adequate clearance requirements for New Buildings.

WATER ENGINEERING:
Water Engineering has no objections. There is 2 existing 25mm water services for this property that were approved to be used back when this was only supposed to be a 4 plex. Verification is required to make sure 2 – 25mm water services is sufficient for the updated development. Also, the water meters need to be placed in a common space or outside in pits. Water service shall not come into the building from under the basement floor until it reaches the common space unless the meters are outside in pits.

ENBRIDGE

After reviewing the provided drawing at 478 Janette Ave, and consulting our mapping system, please note that Enbridge Gas has active infrastructure in the proposed area. A PDF drawing has been attached for reference.

Please Note:
1. The shown piping locations are approximate and for information purposes only
2. The drawings are not to scale
3. This drawing does not replace field locates. Please contact Ontario One Call for onsite locates prior to excavating, digging, etc

Enbridge Gas requires a minimum separation of 0.6m horizontal and 0.3m vertical from all of our plant less than NPS 16 and a minimum separation 1.0m horizontal and 0.6m vertical between any CER-regulated and vital pipelines. For all pipelines (including vital pipelines), when drilling parallel to the pipeline, a minimum horizontal clearance measured from the edge of the pipeline to the edge of the final bore hole of 1 m (3.3 ft) is required. Please ensure that this minimum separation requirement is maintained, and that the contractor obtains locates prior to performing any work and utilizes safe excavation practices while performing any work in the vicinity.

Also, please note the following should you find any abandoned infrastructure in the area:
- Any pipe that is excavated, please assume that it is live

- If during the course of any job, any pipe is found that is not on the locate sheet and is in conflict with your work, please call our emergency number (1-877-969-0999), and one of our Union Gas representatives will respond to determine if that plant is in fact live or dead
- Please note that our Enbridge Gas representative will respond to the live or dead call within 1-4 hours, so please plan your work accordingly

Barbara Rusan – Building Department

IMPORTANT NOTE . Building permit (2021 303210 000 00 RW) for a 4 unit multiple dwelling at 478 Janette Avenue, Windsor, Ontario was previously issued by the Building Department in July 2021. The noted building permit is currently active and under construction. Any construction that falls outside of the scope of work outlined in the issued building permit will be subject to legal action.

The proposed 6 unit building in this zoning by-law amendment application will alter the scope of construction for the issued permit.

As such, *a building permit resubmission to the previously issued building permit (2021 303210 000 00 RW) will be required prior to commencing any construction or scope of work changes relating to a 6 unit building*.

The Building Code Act, Section 8.(1) requires that a building permit be issued by the Chief Building Official for construction or demolition of a building.

The building permit review process occurs after a development application receives approval and once a building permit application has been submitted to the Building Department and deemed a complete application.

Due to the limited Ontario Building Code related information received, review of the proposed project for compliance to the Ontario Building Code has not yet been conducted. It is strongly recommended that the owner and/or applicant contact the Building Department to determine building permit needs for the proposed project prior to building permit submission.

The City of Windsor Building Department can be reach by phoning 519-255-6267 or, through email at buildingdept@citywindsor.ca

The above *building permit resubmission requirement* is pending the outcome of Zoning By-law Amendment application Z-029/22 [ZNG/6847] - 1413600 ONTARIO LTD. - 478 JANETTE AVE.

Site Plan Control – Jacqueline Cabral

Site Plan is not applicable for this proposed development pursuant to the Planning Act and City of Windsor By-law 1-2004.

Stefan Fediuk – Landscape

Pursuant to the application for a zoning amendment (Z 029/22) to permit six residential dwelling units in an existing structure and seven on-site parking spaces on the subject, please note no objections.

Shannon Deehan – Transportation Planning

- Janette Avenue is classified as a Class I Collector per the Official Plan with a required right-of-way width of 21.3 meters per Schedule X. The current right-of-way width is sufficient and therefore no conveyance is required.
- All vehicle and bicycle parking must comply with zoning by-law 8600, otherwise a parking study may be required.
- All new accesses shall conform to the TAC Geometric Design Guide for Canadian Roads and the City of Windsor Standard Engineering Drawings.
- All exterior paths of travel must meet the requirements of the Accessibility for Ontarians with Disabilities Act (AODA).

Tracy Tang – Heritage Planning

No supporting information required.

The subject lands is in an area of high archaeological potential. However, portions of the lands has previously been built upon and the proposed development footprint is limited. Therefore an archaeological

assessment is not required at this time. Nevertheless, the Applicant should be notified of the following archaeological precaution.

1. Should archaeological resources be found during grading, construction or soil removal activities, all work in the area must stop immediately and the City's Planning & Building Department, the City's Manager of Culture and Events, and the Ontario Ministry of Citizenship and Multiculturalism must be notified and confirm satisfaction of any archaeological requirements before work can recommence.
2. In the event that human remains are encountered during grading, construction or soil removal activities, all work in that area must be stopped immediately and the site secured. The local police or coroner must be contacted to determine whether or not the skeletal remains are human, and whether the remains constitute a part of a crime scene. The Local police or coroner will then notify the Ontario Ministry of Citizenship and Multiculturalism and the Registrar at the Ministry of Government and Consumer Services if needed, and notification and satisfactory confirmation be given by the Ministry of Citizenship and Multiculturalism.

Rob Perissinotti – Right-Of-Way

We have reviewed the subject rezoning application and have the following comments:

The site may be serviced by a 375mm combined brick sewer fronting the property on Janette Ave. Best Practice 1.1.1 is to be followed for connections to combined sewers. Any redundant connections shall be abandoned in accordance with the City of Windsor Engineering Best Practice B.P 1.3.3. The submitted storm water management calculations have been reviewed and deemed completed as per the Windsor/Essex Region Stormwater Standards Manual. It should be noted that prior to the official approval of these calculations, minor additional information will be requested.

Janette Ave is classified as a Collector Road requiring a right-of-way width of 21.3 meters according to Schedule 'X' of the Official Plan. The current right-of-way width is sufficient therefore no conveyance is required. The proposed parking off the alley will require continuous paving up to the current paved alley, to City of Windsor standards. The parking area should be shifted as close as possible to the building to allow for vehicles to maneuver prior to entering the paved portion of the alley. Water runoff is to be contained within private property. Permits are required for any work in the right-of-way. An alley maintenance contribution in the amount of $5,750.00 ($250.00 per linear meter $250 x 23m = $5,750.00) is to be paid to the City prior to the issuance of permits.

In summary, we have no objections to the proposed Rezoning application subject to the following:

Building and Right-of-way permits will not be issues prior to:

- Official approval of the storm water management calculations, and
- The alley maintenance contribution of $5,750.00 has been paid to the City of Windsor

APPENDIX D – DRAFT BY-LAW AMENDMENT

B Y - L A W N U M B E R -2023
A BY-LAW TO FURTHER AMEND BY-LAW NUMBER 8600
CITED AS THE "CITY OF WINDSOR ZONING BY-LAW"

Passed the day of , 2023.

WHEREAS it is deemed expedient to further amend By-law Number 8600 of the Council of The Corporation of the City of Windsor, cited as the "City of Windsor Zoning By-law" passed the 31st day of March, 1986, as heretofore amended:

THEREFORE the Council of The Corporation of the City of Windsor enacts as follows:

1. That subsection 1 of Section 20, of said by-law, is amended by adding the following paragraph:

"467. EAST SIDE OF JANETTE AVENUE, BETWEEN WYANDOTTE STREET WEST AND PARK STREET WEST

For the lands comprising Lot 68 and Pt Lot 67, Plan 274, PIN 01195-0191 LT, "One *Multiple Dwelling* with a maximum of six *dwelling units"* shall be an additional permitted use and the following shall apply:

1. The provisions in Section 11.2.5.4, save and except for section 11.2.5.4.4
2. Main Building Height - maximum 10.0 m

[ZDM 3; ZNG/6847]"

2. The said by-law is further amended by changing the Zoning District Maps or parts thereof referred to in Column 2, of said by-law and made part thereof, so that the lands described in Column 3 are delineated by a broken line and further identified by the zoning symbol shown in Column 5:

1. Item Number	2. Zoning District Map Part	3. Lands Affected	4. Official Plan Amendment Number	5. Zoning Symbol
1	3	Lot 68 and Pt Lot 67, Plan 274, PIN 01195-0191 LT (located on the east side of Janette Avenue, between Wyandotte Street West and Park Street West).	-	S.20(1)H467

3. That the holding THAT the holding (H) symbol BE REMOVED when the applicant/owner submits an application to remove the holding (H) symbol and the following conditions are satisfied:

a) Official approval of the storm water management calculations;

b) Street Opening Permit; and

c) Alley Maintenance Contribution of $5,750.00 paid to the Corporation of the City of Windsor.

DREW DILKENS, MAYOR

CLERK

First Reading - , 2023
Second Reading - , 2023
Third Reading - , 2023

SCHEDULE 2

1. By-law _____ has the following purpose and effect:

   To amend the zoning of the land located on the east side of Janette Avenue, between Wyandotte Street West and Park Street West, described as Lot 68 and Pt Lot 67, Plan 274, [PIN 01195-0191 LT], so as to permit the development of a multiple dwelling with a maximum of 6 dwelling units on the subject land.

   The amending by-law maintains the RD2.2 zoning on the subject land and adds a special zoning provision permitting a 6-plex. This amendment will result in the conversion of the newly constructed 4-plex to a 6-plex.

2. Key map showing the location of the lands to which By-law _____applies.

Committee Matters: SCM 85/2023

Subject: Approval of a Plan of Condominium with Exemption under Section 9(3) of the Condominium Act, 4755, 4775 & 4785 Walker Road; Applicant: 5042667 Ontario Ltd.; File# CDM 002-22 [CDM-6829]; Ward 9

Moved by: Councillor Kieran McKenzie
Seconded by: Councillor Angelo Marignani

Decision Number: **DHSC 482**
That the application of 5042667 Ontario Ltd. for an exemption under Section 9(3) of *The Condominium Act* for approval of a plan of condominium (Standard Condominium), comprised of a total of 224 dwelling units and 7 commercial units within three (3) new Multiple Dwelling structures under construction or planned to be constructed, as shown on the attached MAP Nos. CDM-002/22-1, CDM-002/22-2, and CDM-002/22-3A,3B,3C, on parcels legally described as Pt Lot 13, Concession 6, PART 3 and Pt of PART 2 on Plan 12R-17667, and PARTS 6 to 9 on Plan 12R-24241, City of Windsor; located at 4755, 4775 and 4785 Walker Road, **BE APPROVED** for a period of three (3) years.
Carried.

Report Number: C 25/2023
Clerk's File:Z/14505

Clerk's Note:

1. The recommendation of the Development & Heritage Standing Committee and Administration are the same.

2. Please refer to Item 7.2 from the Development & Heritage Standing Committee held on March 6, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: https://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230306/-1/9395

Subject: Approval of a Plan of Condominium with Exemption under Section 9(3) of the Condominium Act, 4755, 4775 & 4785 Walker Road; Applicant: 5042667 Ontario Ltd.; File# CDM 002-22 [CDM-6829]; Ward 9

Reference:

Date to Council: March 6, 2023
Author: Justina Nwaesei, MCIP, RPP
Senior Planner - Subdivisions
519-255-6543, ext. 6165
jnwaesei@citywindsor.ca

Planning & Building Services
Report Date: February 13, 2023
Clerk's File #: Z/14505

To: Mayor and Members of City Council

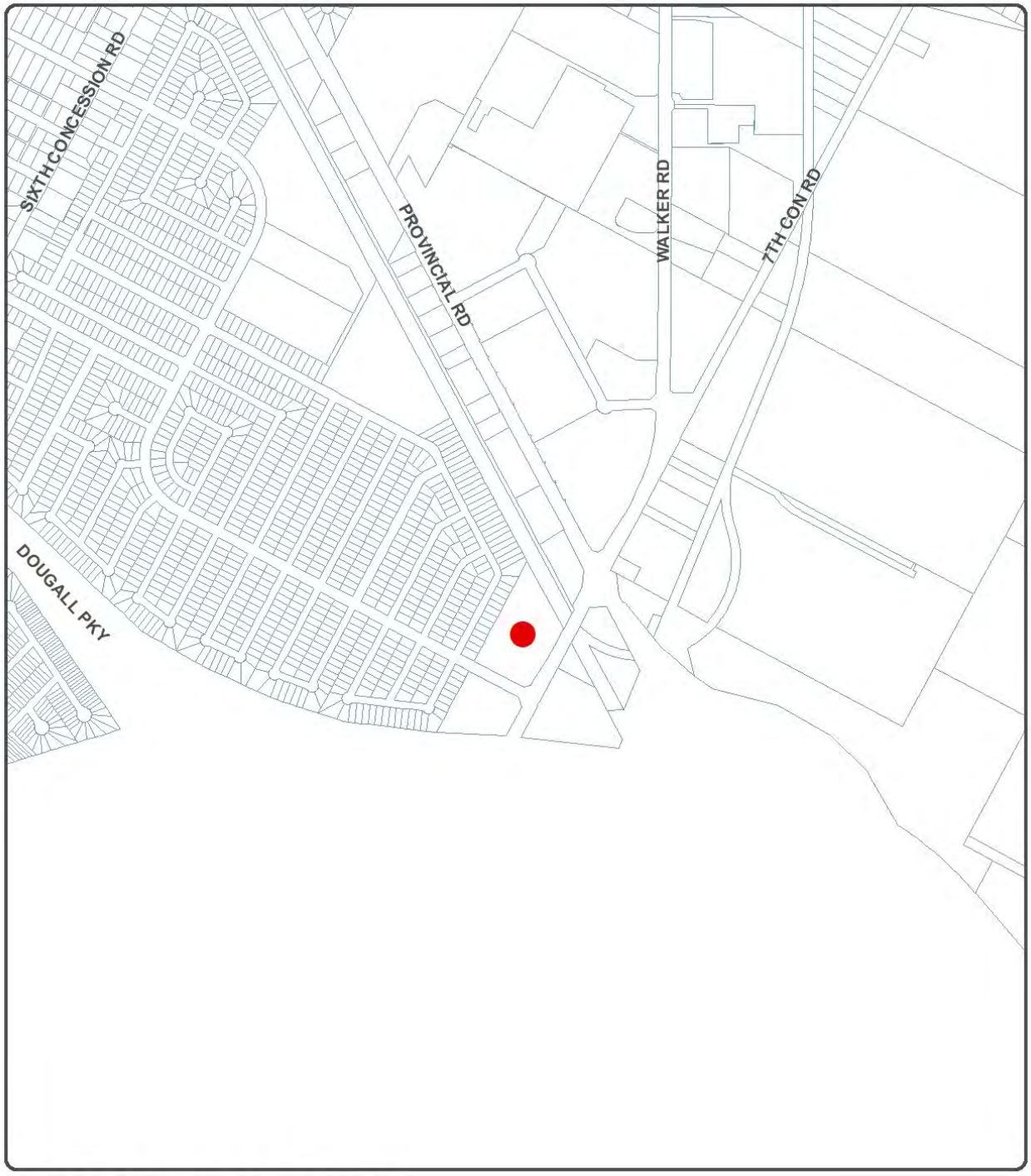
Recommendation:

THAT the application of 5042667 Ontario Ltd. for an exemption under Section 9(3) of The Condominium Act for approval of a plan of condominium (Standard Condominium), comprised of a total of 224 dwelling units and 7 commercial units within three (3) new Multiple Dwelling structures under construction or planned to be constructed, as shown on the attached MAP Nos. CDM-002/22-1, CDM-002/22-2, and CDM-002/22-3A,3B,3C, on parcels legally described as Pt Lot 13, Concession 6, PART 3 and Pt of PART 2 on Plan 12R-17667, and PARTS 6 to 9 on Plan 12R-24241, City of Windsor; located at 4755, 4775 and 4785 Walker Road, **BE APPROVED** for a period of three (3) years.

Executive Summary: N/A.

Background:

KEY MAP:



KEY MAP - CDM-002/22

SUBJECT LANDS

2017 EIS
Aerial Photo

AERIAL MAP - CDM-002/22

SUBJECT LANDS

Aerial Photo of New Building shown at 4785 Walker on Google Earth Photo, Jun 2022

Application Information:

LOCATION: Northwest corner of Ducharme Street and Walker Road (municipally known as 4755, 4775 and 4785 Walker Road)

WARD: 9 **PLANNING DISTRICT:** 08 - Roseland **ZDM:** 13

APPLICANT & OWNER: 5042667 Ontario Ltd. (contact: Steve Habib)

AUTHORIZED AGENT: None

ONTARIO LAND SURVEYOR: Verhaegen Land Surveyors (contact: Roy Simone)

PROPOSAL:

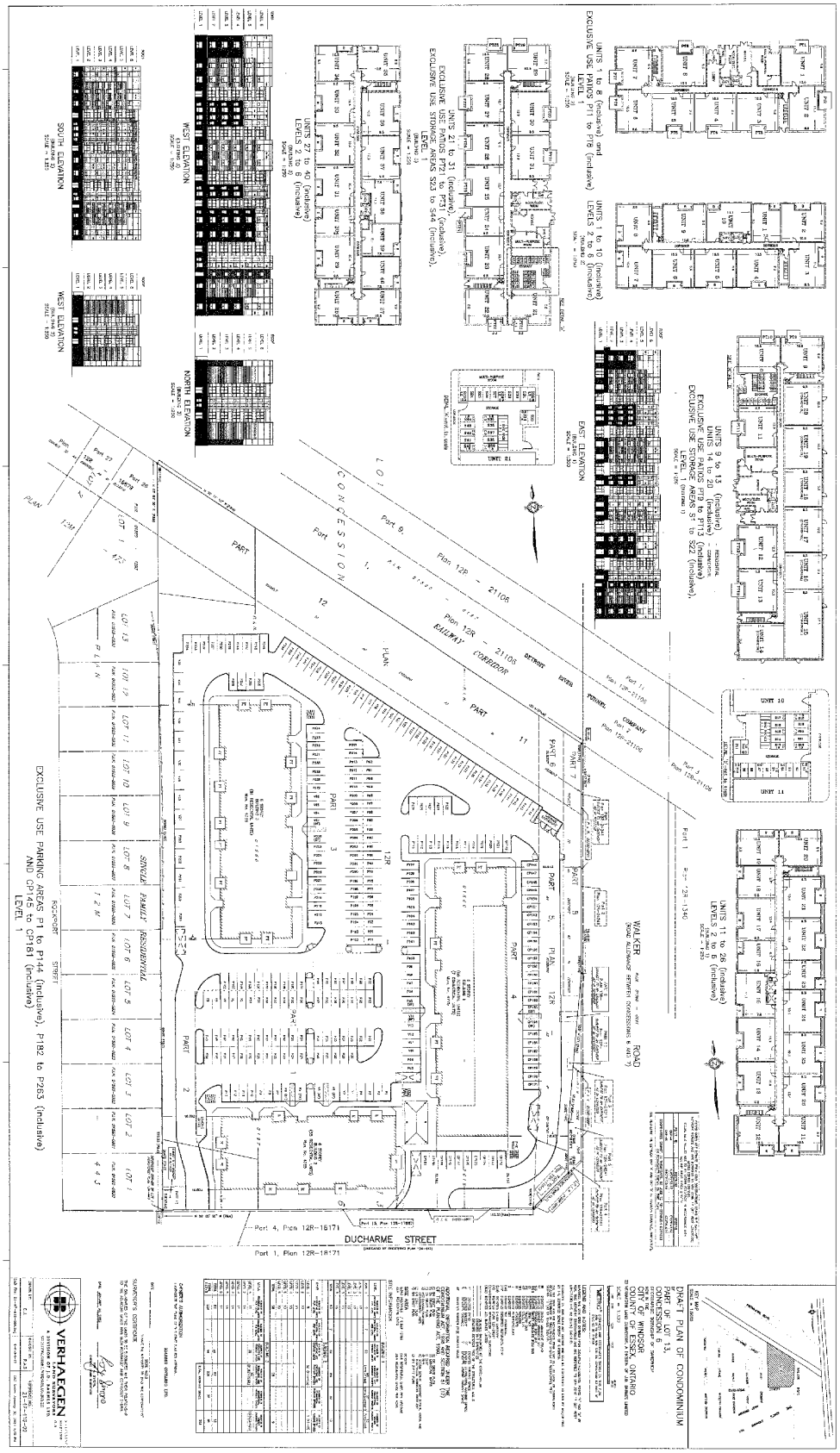
The applicant is applying for an exemption under Section 9(3) of *The Condominium Act* for approval of a plan of condominium for 3 Multiple Dwelling structures containing a total of 224 dwelling units and 7 commercial units.

The subject site has received a number of Site Plan Approvals for the proposed development of multiple dwellings on the subject lands. One of the Site Plan Approvals is File Number AMT-006/21 (SPC-021/18) registered as Instrument Number CE1036157, on October 1, 2021. AMT-006/21 (SPC-021/18) approved 2 multiple dwelling structures marked as Building 1 and Building 2, a total of 143 dwelling units, plus 7 commercial units and 207 surface parking spaces on the subject lands. The executed SPC agreement for the AMT-006/21 covers a range of municipal and agency requirements to be completed by the owner, including items such as the provision of landscaping, parking, parkland conveyance, levies and lighting, mostly required prior to the issuance of a construction permit.

A follow-up Site Plan Control application (File SPC -029/22) was approved on November 23, 2022, to permit the third multiple dwelling (Building 3) with 81 dwelling units and a total of 224 dwelling units across the three buildings on the entire land. The applicant has recently requested approval of some minor changes to the site plan approved by SPC-029/22.

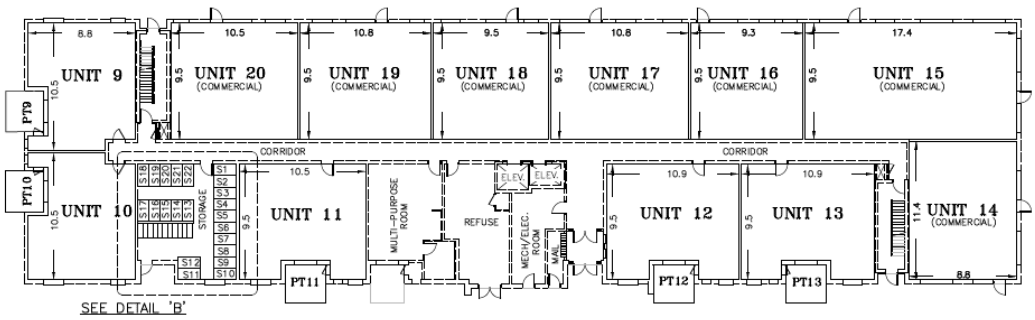
This proposed draft plan under consideration contains the latest approved plans and drawings for the proposed development of the three multiple dwellings on the subject lands.

Plan of Condominium:

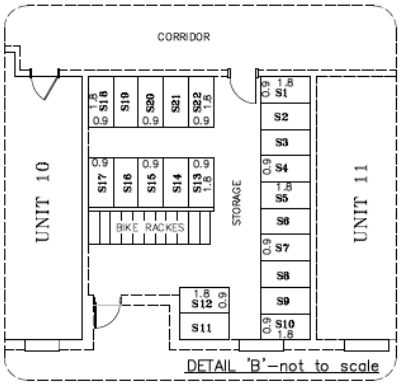


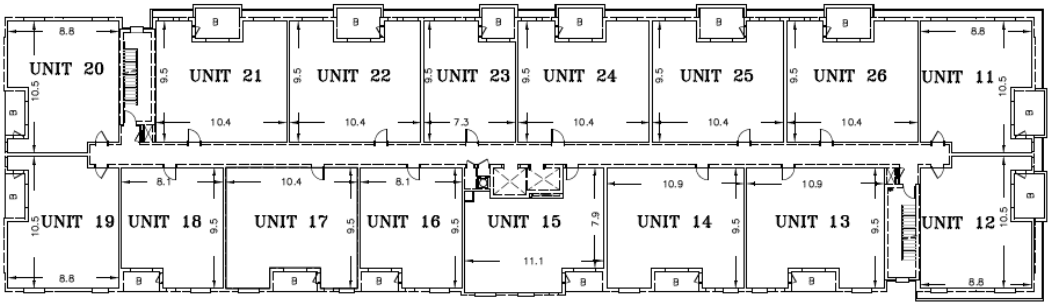
MAP No.: CDM-002/22-1

MAP No.: CDM-002/22-2



UNITS 9 to 13 (inclusive) – RESIDENTIAL
UNITS 14 to 20 (inclusive) – COMMERCIAL
EXCLUSIVE USE PATIOS PT9 to PT13 (inclusive)
EXCLUSIVE USE STORAGE AREAS S1 to S22 (inclusive),
LEVEL 1 (BUILDING 1)
SCALE = 1:250

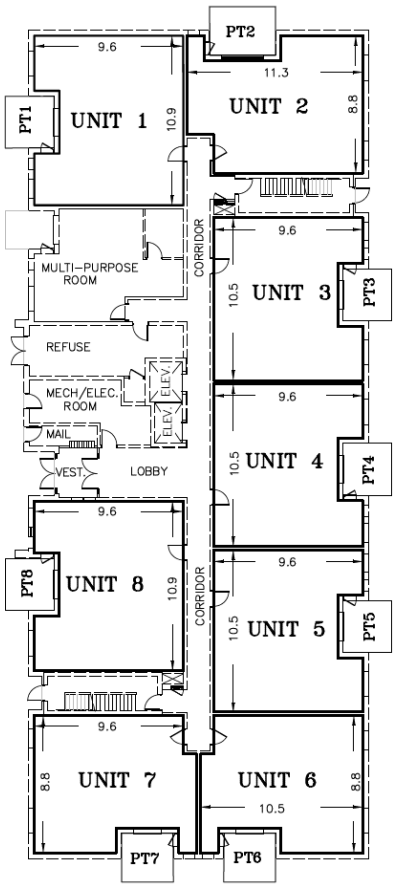




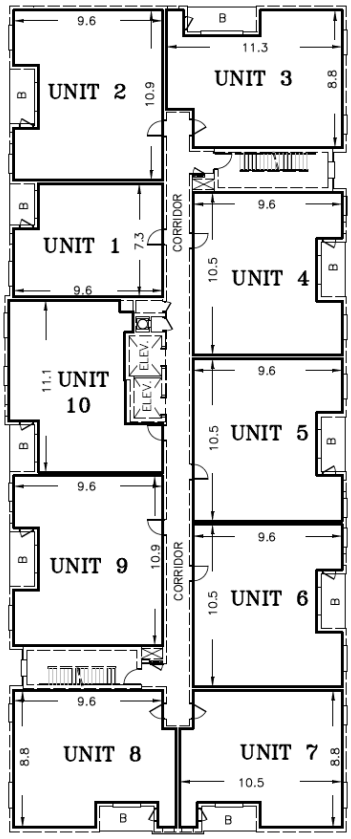
UNITS 11 to 26 (inclusive)
LEVELS 2 to 6 (inclusive)
(BUILDING 1)
SCALE = 1:250

EAST ELEVATION
(BUILDING 1)
SCALE = 1:300

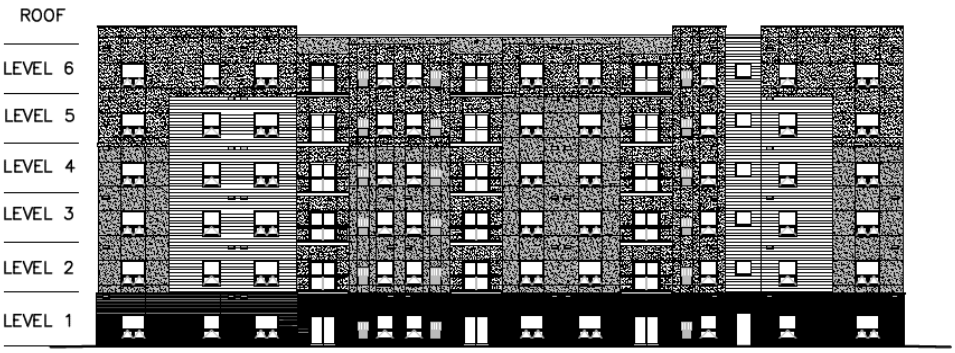
MAP No. CDM-002/22-3A



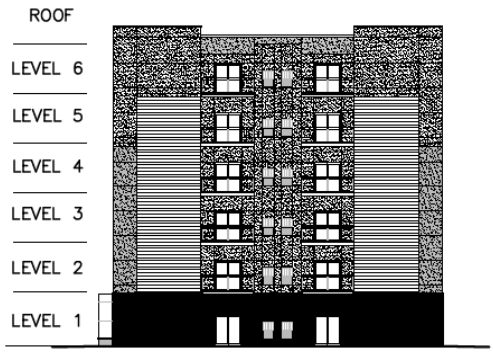
UNITS 1 to 8 (inclusive) and
EXCLUSIVE USE PATIOS PT1 to PT8 (inclusive)
LEVEL 1
(BUILDING 2)
SCALE = 1:250



UNITS 1 to 10 (inclusive)
LEVELS 2 to 6 (inclusive)
(BUILDING 2)
SCALE = 1:250

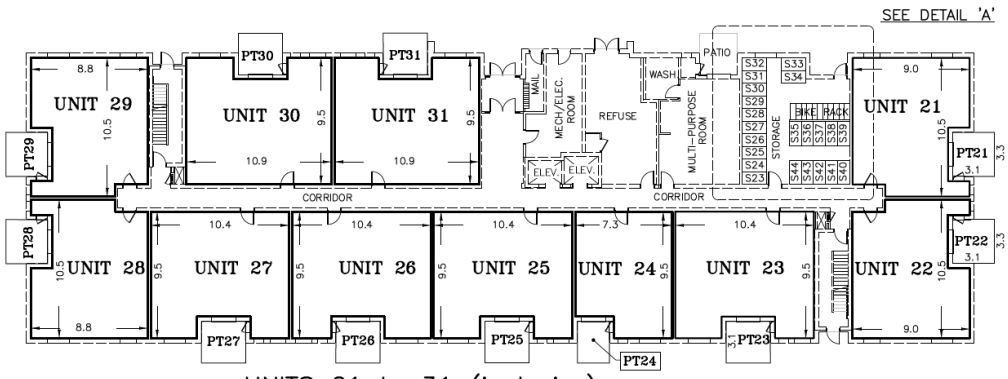


SOUTH ELEVATION
(BUILDING 2)
SCALE = 1:250

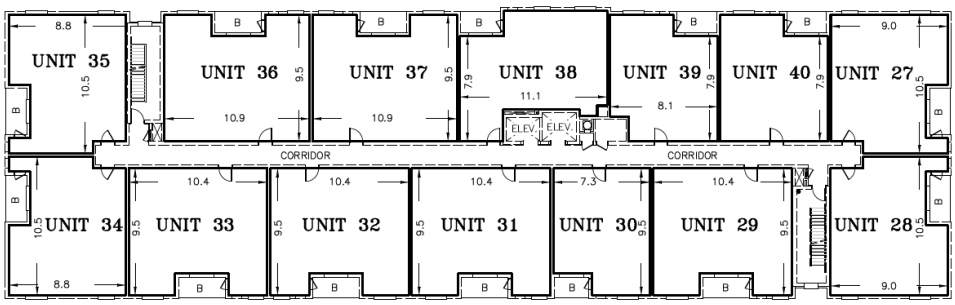


WEST ELEVATION
(BUILDING 2)
SCALE = 1:250

MAP No.: CDM-002/22-3B

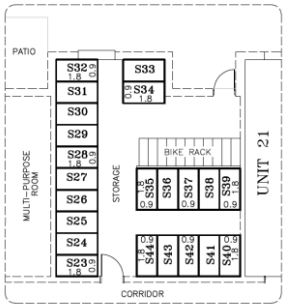


UNITS 21 to 31 (inclusive),
EXCLUSIVE USE PATIOS PT21 to PT31 (inclusive),
EXCLUSIVE USE STORAGE AREAS S23 to S44 (inclusive),
LEVEL 1
(BUILDING 3)
SCALE = 1:250



UNITS 27 to 40 (inclusive)
LEVELS 2 to 6 (inclusive)
(BUILDING 3)
SCALE = 1:250

NORTH ELEVATION
(BUILDING 3)
SCALE = 1:250



DETAIL 'A'–not to scale

WEST ELEVATION
(BUILDING 3)
SCALE = 1:250

MAP No.: CDM-002/22-3C

Site Information:

OFFICIAL PLAN	ZONING & ZDM	CURRENT USE(S)	*PREVIOUS USE(S)*
MIXED USE CENTRE (by OPA 159)	COMMERCIAL DISTRICT 2.2 (CD2.2) & S.20(1)348; ZDM13	6-sty multiple dwelling under construction	-Vacant -Single unit dwelling (demolished 2001)
FRONTAGE	**DEPTH**	**AREA**	**SHAPE**
113.32m (Ducharme Street)	Irregular	23,658.78sqm 2.365 ha (5.846 ac)	Irregular
Note: All measurements are approximate and for the entire site.			

Neighbourhood Characteristics:

The subject lands are situated at the southwest corner of the intersection of Walker Road and CN Rail, with ***surrounding land uses*** consisting of a mix of residential, commercial and industrial uses.

- CN Rail Corridor abuts the north limit of the subject lands. Next north are some industrial/commercial uses fronting on Provincial Road.
- A low-density residential neighbourhood (Walker Gates Estate), consisting of single detached dwellings, exists on the west and southwest sides of the subject lands.
- Ducharme Street abuts the south limit of the subject lands. Further south is a vacant commercial land; next south is Highway 401.
- Walker Road right-of-way abuts the east lot line of the subject lands. Next east are some industrial/commercial uses (Empire Roofing Corporation and Pear D & Sons Produce).

Municipal Infrastructure:

Municipal sewers and watermains are available in the subject area. There are hydro poles, underground and overhead conductors in the subject area. Abutting/nearby roads are classified as follows: (i) Walker Road - Class II Arterial Road, (ii) Ducharme Street - Class II Collector Road, and Rockport Street - Local Road. Public transit is available via the Walker 8 bus service on Walker Road and Ducharme Street. There is a transit bus stop along the south side of Ducharme Street across from the subject lands.

Discussion:

PLANNING ANALYSIS:

Statutory Regulations:

Under Section 9 of The Condominium Act, an owner may request approval of a plan of condominium subject to Section 51 of The Planning Act (subdivisions). As such, the usual approval process for plans of subdivision is invoked, i.e. review by municipal and provincial agencies, public notification, draft plan approval, a condominium agreement and final registration.

The Condominium Act also provides that owners can be exempted from the above mentioned Planning Act provision if the approval authority (i.e. the City of Windsor) is of the opinion that "such exemption is appropriate in the circumstances". The reasons for exemptions are not specified, but usually applicants can be exempted if the following conditions are satisfied:

(i) that all municipal requirements and conditions have been addressed (for example by an approved application for rezoning and/or site plan control); and

(ii) that the building(s) is suitable for a condominium by virtue of design and amenities.

The proposed condominium complies with the above conditions.

Official Plan:

The subject property is designated “Mixed Use Centre” on Schedule ‘D-1’ to OPA 159 – a supplementary schedule of the City of Windsor Official Plan Volume 1, Schedule D: Land Use. The Mixed Use Centre designation is intended to accommodate Medium and High Profile residential uses either as stand-alone buildings or part of a commercial-residential mixed-use building to achieve a mixed-use community. The designation also aims to promote residential intensification with Medium and High Profile buildings to meet the housing needs of the City in appropriate areas in proximity to municipal services, transit and employment areas. The multiple dwelling under construction and the remaining two multiple dwellings to be constructed, are medium profile housing types with a density that will promote residential intensification and help to meet housing needs in Windsor and the environs.

The City of Windsor has policies in the Official Plan (s.11.5.2.8) for approval of a plan of condominium with exemption under Section 9 of the Condominium Act. Applications for exemptions may be considered by Council if:

(a) a residential building is constructed or a building permit for its construction has been issued;
(b) the development has received site plan control approval; and
(c) the development does not contain any occupied residential rental units.

The proposed development of 3 multiple dwelling structures has received site plan control approvals [AMT-006/21(SPC-021/18) and SPC-029/22]. As noted earlier in this report, Site Plan Approval [File AMT-006/21 (SPC-021/18)] was registered as Instrument Number CE1036157, on October 1, 2021. The registered SPC Agreement pertains to Buildings 1 & 2 only.

Building Permit was issued on January 7, 2022 for the 58-unit dwelling (Building 2) and construction of the building is nearing completion. Building permit for the 85-unit dwelling with 7 commercial units (Building 1) is under review.

Ideally, all three buildings should be constructed or under construction or have building permits issued for their construction before a draft plan approval can be considered. However, Administration is satisfied with the fact that one building is already under construction (nearing completion) and a building permit application is being processed for another building on the site. Therefore, in my opinion, the requested approval of this draft plan of condominium with exemption under Section 9 of the Condominium Act meets the general intent of the Official Plan as in the above conditions.

Zoning By-Law

The property is currently zoned Commercial District 2.2 with site-specific provision s.20(1)348, by Zoning By-law 8600. The CD2.2 zoning category permits a multiple dwelling in a combined use building with retail use; the site-specific zoning provision [s.20(1)348] permits the proposed stand-alone Multiple Dwellings on the subject lands. As noted already, Building Permit has been issued for one of the multiple dwellings and construction of the building is nearing completion. See Site photos attached as Appendix A to this report.

Risk Analysis: N/A

Climate Change Risks: N/A

Financial Matters: N/A

Consultations:

1. DEPARTMENT AND AGENCIES

Municipal and agency requirements have been addressed and implemented through the site plan control approval process and the registration of a site plan agreement as Instrument Number CE1036157, October 1, 2021. Amendment to the Site Plan Agreement is expected in order to include the approval under SPC-029/22.

2. PUBLIC NOTICE

No public notification is required where exemptions are requested and the development is properly zoned for the permitted use. Nevertheless, notice was mailed to all property owners within 120 metres (400 feet) and notice was also given in the Windsor Star.

Conclusion:

The application has been processed and evaluated with regard to both T*he Planning Act* and *The Condominium Act*, as well as the City of Windsor Official Plan, and is in conformity with the zoning regulations and the City of Windsor Official Plan. Municipal requirements regarding this development have been addressed in the site plan control agreement (CE1036157) and will be further addressed upon amendment to the Agreement. The draft plan of condominium is deemed consistent with the approved site plans, AMT-006/21 (SPC-021/18) and SPC-029/22.

It is recommended that this application for draft plan of condominium approval be exempted from Section 51 of The Planning Act (per Section 9(3) of The Condominium Act). This means that the owner can proceed directly to registration following submission of an approved final plan of condominium.

Planning Act Matters:

I concur with the above comments and opinion of the Registered Professional Planner.

Michael Cooke, MCIP, RPP
Manager Planning Policy/ Deputy City Planner

Thom Hunt, MCIP, RPP
City Planner

I am not a registered Planner and have reviewed as a Corporate Team Leader

JP, *Commissioner of Economic Development & Innovation*

OC*, Chief Administrative Officer*

Approvals:

Name	Title
Michael Cooke, MCIP, RPP	Manager of Planning Policy / Deputy City Planner
Thom Hunt, MCIP, RPP	City Planner / Executive Director, Planning & Development
Wira Vendrasco	Deputy City Solicitor, Legal Services & Real Estate
Jelena Payne	Commissioner of Economic Development & Innovation
Onorio Colucci	Chief Administrative Officer

Notifications:

Name	Address	Email
APPLICANT /OWNER: 5042667 Ontario Ltd., c/o Steve Habib	5335 Outer Drive, Oldcastle, ON N9G 0C4	steve@hddevelopmentgroup.com
SURVEYOR: Verhaegen Land Surveyors, c/o Roy Simone	944 Ottawa Street, Windsor, ON N8X 2E1	rsimone@vshbbsurveys.com

Appendices:

1 Appendix A, Site Photos

View of West and South Walls of Building 2 from Ducharme Street at Juliet Crescent

View of East and South Walls of Building 2 from east side of Walker Road

View of East and North Walls of Building 2

Committee Matters: SCM 86/2023

Subject: Official Plan & Zoning Bylaw Amendments, Draft Plan of Subdivision Applications - Z 027-22 [ZNG-6832], OPA 163 [OPA-6833], SDN001/22 [SDN6834] - 1027458 Ontario Inc. - 0 Clover Avenue - NE Corner Florence & Beverly Glen - Ward 7

Moved by: Councillor Angelo Marignani
Seconded by: Councillor Mark McKenzie

Decision Number: **DHSC 483**

I **THAT** the City of Windsor Official Plan Volume II – East Riverside Secondary Plan Schedule ER-2 **BE AMENDED** by changing the land use designation of Block 65, Plan 12M-581, City of Windsor from Open Space to Neighbourhood Residential;

II **THAT** the City of Windsor Official Plan Volume II – East Riverside Secondary Plan Schedule ER-2 **BE AMENDED** by changing the land use designation of Blocks 63 and 64, Plan 12M-581, City of Windsor from School Site to Neighbourhood Residential;

III **THAT** an amendment to City of Windsor Zoning By-law 8600 **BE APPROVED**, changing the zoning of Block 65, Plan 12M-581 from Green District 1.1 (GD1.1) to Residential District (HRD) 2.3;

IV **THAT** a Hold provision **BE APPLIED** to Blocks 63-65, Plan 12M-581 and that it be removed when the conditions contained in Section 5.4 HOLDING ZONE PROVISIONS of City of Windsor Zoning By-law 8600 have been met;

V **THAT** subsection 1 of Section 20 of the City of Windsor Zoning By-law 8600 **BE AMENDED** for the lands described as Block 63-65, Plan 12M-581 by adding site specific regulations as follow:

466. **NORTH EAST CORNER OF FLORENCE AVENUE AND BEVERLEY GLEN STREET**

For the lands described as Blocks 63-65, Plan 12M-581, the total area of the *required front yard* occupied by a hard surface for the purpose of a walkway, driveway, *access area*, *parking space*, or any combination thereof, exceeding 60% of the *required front yard* shall be prohibited, and,

Lot Coverage – Maximum 50%

(ZDM 14; ZNG/6832)

VI **THAT** the application of 1027458 Ontario Inc. for Draft Plan of Subdivision approval of Blocks 63-65 (incl.), Plan 12M-581, City of Windsor; **BE APPROVED** on the following basis:

A That this approval applies to the draft plan of subdivision, as shown on the attached Drawing SDN001/22-1, which will facilitate the construction of 117 townhome dwellings and 2 blocks for a greenway/utility corridor.

B. That the Draft Plan Approval shall lapse on (5 years from the date of approval).

C. That the Owner Shall submit for approval of the City Planner, a final draft M-Plan, which shall include the names of all road allowances within the plan, as approved by the Corporation.

D. That the Owner undertakes to provide the following matters prior to the registration of the final Plan of Subdivision:

a. The Owner will include all items as set out in the results of circularization and other relevant matters set out in CR 233/98 (Standard Subdivision Agreement).

b. The Owner will create, prior to the issuance of a building permit, the following rights-of-way, in accordance with the approved Plan of Subdivision:

1. 20m right of way for the new Streets “Thunderbay Avenue” and “Ivanhill Avenue”
2. A right of way for the Court as shown on the Draft Plan of Subdivision west of Thunderbay Avenue, South of Block 28.

c. The Owner shall agree to fully construct all future municipal right-of-ways, including, but not limited to: pavements, curbs and gutters, utilities and the necessary drainage facilities, according to City of Windsor standard specification for the following road designations:

1. Local Residential Roads: complete with 20 metre right-of-ways. Pavements to be twenty-eight (28) feet (8.6 metres) in width.

2. Collector Roads:
   Class 2 Collector - Florence Ave is to be constructed as per the requirements of the Environmental Assessment.

d. The Owner will provide the following corner cut-offs on the approved Final Plan of Subdivision:

4.6m x 4.6m – Intersection of Thunderbay Avenue and Beverly Glen Street;
Intersection of Ivanhill Avenue and Beverly Glen Street;
Intersection of Thunderbay Avenue and Ivanhill Avenue;
Intersection of Thunderbay Avenue and Clover Avenue;
Intersection of Beverly Glen Street and Clover Avenue;
Intersection of Jerome St and Florence Avenue;
Intersection of Beverly Glen Street and Florence Avenue,

to the satisfaction of the City Planner and the City Engineer.

e. The Owner will comply with all the following requirements relating to sidewalks:
   Sidewalks will be constructed:
   On the East Side of Thunderbay Avenue and Ivanhill Avenue;
   On the South side of Thunderbay Avenue;
   On Florence Avenue as per the Environmental Assessment,
   All to the satisfaction of the City Engineer and the City Planner.

f. The Owner shall agree to retain a Consulting Engineer at its own expense to provide a detailed servicing study report on the impact of the increased flow to the existing municipal sewer systems, satisfactory in content to the City Engineer and prior to the issuance of a construction permit.

g. The Owner shall agree to:
   1. Undertake an engineering analysis to identify stormwater quality and quantity measures as necessary to control any increases in flows in downstream watercourses, up to and including the 1:100 year design storm, to the satisfaction of the Municipality and the Essex Region Conservation Authority.
   2. Install stormwater management measures identified above, as part of the development of the site, to the satisfaction of the City Engineer and the Essex Region Conservation Authority.
   3. Obtain the necessary permit or clearance from the Essex Region Conservation Authority prior to undertaking site alterations and/or construction activities.

h. The Owner shall agree to be responsible for the costs associated with the relocation of the sanitary sewer which presently extends south of Elinor Street and through Block 64, Plan 12M-581. All work to be done to the satisfaction of the City Engineer.

i. The Owner shall agree to convey any easement(s) as deemed necessary by Bell Canada to service this new development. The Owner further agrees and acknowledges to convey such easements at no cost to Bell Canada.

j. The Owner shall agree that should any conflict arise with existing Bell Canada facilities where a current and valid easement exists within the subject area, the Owner shall be responsible for the relocation of any such facilities or easements at their own cost.

k. The Owner shall agree to convey gratuitously to the Corporation Blocks 27 and 28 on the draft Plan of Subdivision (SDN 001/22-1) for the purposes of municipal infrastructure (existing sanitary sewer) to the satisfaction of the City Engineer and the City Planner prior to the issuance of a construction permits.

l. The Owner shall agree that a Stage 1 Archaeological Assessment and any further recommended assessments are required to be entered into the Ontario Public Register of Archaeological Reports to the satisfaction of the

City Planner and the Ontario Ministry of Heritage, Sport, Tourism, and Culture Industries, prior to the issuance of a construction permits.

m. The Owner shall agree that a final copy of the archaeological reports will be submitted to the City of Windsor.

n. The Owner shall agree to complete an MECP species at risk screening and comply with all requirements, including any required remediation measures, resulting from any study or report submitted to the MECP/MNRF regarding SAR assessment, all at its entire expense, to the satisfaction of the City Planner.

NOTES TO DRAFT APPROVAL (File: SDN-001/22)

1. The applicant is directed to Section 51(39) of *The Planning Act 1990* regarding appeal of any imposed conditions to the Ontario Land Tribunal. Appeals are to be directed to the City Clerk of the City of Windsor.
2. It is the applicant's responsibility to fulfil the conditions of draft approval and to ensure that the required clearance letters are forwarded by the appropriate agencies to the City of Windsor, to the attention of the Executive Director/City Planner, quoting the above-noted file number.
3. The applicant should consult with an Ontario Land Surveyor for this proposed plan concerning registration requirements relative to the *Certification of Titles Act.*
4. The final plan approved by the Corporation of the City of Windsor must be registered within thirty (30) days or the Corporation may withdraw its approval under Section 51(59) of *The Planning Act 1990.*
5. All plans of subdivision/condominium are to be prepared and presented in metric units and certified by the Ontario Land Surveyor that the final plan is in conformity to the approved zoning requirements.

VII **THAT** the City Clerk and Licence Commissioner **BE AUTHORIZED** to issue the required notice respecting approval of the draft plan of subdivision under Section 51(37) of *The Planning Act;* and,

VIII **THAT** prior to the final approval of the plan of subdivision by the Corporation of the City of Windsor, the Executive Director/City Planner shall **BE ADVISED**, in writing, by the appropriate agencies that conditions have been satisfied; and,

IX **THAT** the Chief Administrative Officer and City Clerk **BE AUTHORIZED** to sign all necessary agreements and documents approved as to form and content satisfactory to the City Solicitor; and,

X **THAT** the proponent **BE REQUESTED** to consider the feasibility of a North/South option off of Thunderbay Avenue.

Report Number: S 24/2023
Clerk's File: Z/14458

Clerk's Note:

1. The recommendation of the Development & Heritage Standing Committee and Administration are **not** the same.

2. Please refer to Item 7.3 from the Development & Heritage Standing Committee held on March 6, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: https://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230306/-1/9395

Subject: Official Plan & Zoning Bylaw Amendments, Draft Plan of Subdivision Applications - Z 027-22 [ZNG-6832], OPA 163 [OPA-6833], SDN001/22 [SDN6834] - 1027458 Ontario Inc. - 0 Clover Avenue - NE Corner Florence & Beverly Glen - Ward 7

Reference:

Date to Council: March 6, 2023
Author: Jim Abbs
Senior Planner
519-255-6543 x6317
jabbs@citywindsor.ca

Planning & Building Services
Report Date: February 14, 2023
Clerk's File #: Z/14458 & ZO/13950

To: Mayor and Members of City Council

Recommendation:

I **THAT** the City of Windsor Official Plan Volume II – East Riverside Secondary Plan Schedule ER-2 **BE AMENDED** by changing the land use designation of Block 65, Plan 12M-581, City of Windsor from Open Space to Neighbourhood Residential;

II **THAT** the City of Windsor Official Plan Volume II – East Riverside Secondary Plan Schedule ER-2 **BE AMENDED** by changing the land use designation of Blocks 63 and 64, Plan 12M-581, City of Windsor from School Site to Neighbourhood Residential;

III **THAT** an amendment to City of Windsor Zoning By-law 8600 **BE APPROVED**, changing the zoning of Block 65, Plan 12M-581 from Green District 1.1 (GD1.1) to Residential District (HRD) 2.3;

IV **THAT** a Hold provision be applied to Blocks 63-65, Plan 12M-581 and that it be removed when the conditions contained in Section 5.4 HOLDING ZONE PROVISIONS of City of Windsor Zoning By-law 8600 have been met;

V **THAT** subsection 1 of Section 20 of the City of Windsor Zoning By-law 8600 **BE AMENDED** for the lands described as Block 63-65, Plan 12M-581 by adding site specific regulations as follow:

466. **NORTH EAST CORNER OF FLORENCE AVENUE AND BEVERLEY GLEN STREET**

For the lands described as Blocks 63-65, Plan 12M-581, the total area of the *required front yard* occupied by a hard surface for the purpose of a walkway, driveway, *access area*, *parking space*, or any combination thereof, exceeding 60% of the *required front yard* shall be prohibited, and,

Lot Coverage – Maximum 50%

(ZDM 14; ZNG/6832)

VI **THAT** the application of 1027458 Ontario Inc. for Draft Plan of Subdivision approval of Blocks 63-65 (incl.), Plan 12M-581, City of Windsor; **BE APPROVED** on the following basis:

A That this approval applies to the draft plan of subdivision, as shown on the attached Drawing SDN001/22-1, which will facilitate the construction of 117 townhome dwellings and 2 blocks for a greenway/utility corridor.

B. That the Draft Plan Approval shall lapse on (5 years from the date of approval).

C. That the Owner Shall submit for approval of the City Planner, a final draft M-Plan, which shall include the names of all road allowances within the plan, as approved by the Corporation.

D. That the Owner undertakes to provide the following matters prior to the registration of the final Plan of Subdivision:

a. The Owner will include all items as set out in the results of circularization and other relevant matters set out in CR 233/98 (Standard Subdivision Agreement).

b. The Owner will create, prior to the issuance of a building permit, the following rights-of-way, in accordance with the approved Plan of Subdivision:

1. 20m right of way for the new Streets “Thunderbay Avenue” and “Ivanhill Avenue”

2. A right of way for the Court as shown on the Draft Plan of Subdivision west of Thunderbay Avenue, South of Block 28.

c. The Owner shall agree to fully construct all future municipal right-of-ways, including, but not limited to: pavements, curbs and gutters, utilities and the necessary drainage facilities, according to City of Windsor standard specification for the following road designations:

1. Local Residential Roads: complete with 20 metre right-of-ways. Pavements to be twenty-eight (28) feet (8.6 metres) in width.

2. Collector Roads:

Class 2 Collector - Florence Ave is to be constructed as per the requirements of the Environmental Assessment.

d. The Owner will provide the following corner cut-offs on the approved Final Plan of Subdivision:

4.6m x 4.6m – Intersection of Thunderbay Avenue and Beverly Glen Street;
Intersection of Ivanhill Avenue and Beverly Glen Street;
Intersection of Thunderbay Avenue and Ivanhill Avenue;
Intersection of Thunderbay Avenue and Clover Avenue;
Intersection of Beverly Glen Street and Clover Avenue;
Intersection of Jerome St and Florence Avenue;
Intersection of Beverly Glen Street and Florence Avenue,

to the satisfaction of the City Planner and the City Engineer.

e. The Owner will comply with all the following requirements relating to sidewalks:

Sidewalks will be constructed:

On the East Side of Thunderbay Avenue and Ivanhill Avenue;
On the South side of Thunderbay Avenue;
On Florence Avenue as per the Environmental Assessment,
All to the satisfaction of the City Engineer and the City Planner.

f. The Owner shall agree to retain a Consulting Engineer at its own expense to provide a detailed servicing study report on the impact of the increased flow to the existing municipal sewer systems, satisfactory in content to the City Engineer and prior to the issuance of a construction permit.

g. The Owner shall agree to:

1. Undertake an engineering analysis to identify stormwater quality and quantity measures as necessary to control any increases in flows in downstream watercourses, up to and including the 1:100 year design storm, to the satisfaction of the Municipality and the Essex Region Conservation Authority.

2. Install stormwater management measures identified above, as part of the development of the site, to the satisfaction of the City Engineer and the Essex Region Conservation Authority.

3. Obtain the necessary permit or clearance from the Essex Region Conservation Authority prior to undertaking site alterations and/or construction activities.

h. The Owner shall agree to be responsible for the costs associated with the relocation of the sanitary sewer which presently extends south of Elinor

Street and through Block 64, Plan 12M-581. All work to be done to the satisfaction of the City Engineer.

i. The Owner shall agree to convey any easement(s) as deemed necessary by Bell Canada to service this new development. The Owner further agrees and acknowledges to convey such easements at no cost to Bell Canada.

j. The Owner shall agree that should any conflict arise with existing Bell Canada facilities where a current and valid easement exists within the subject area, the Owner shall be responsible for the relocation of any such facilities or easements at their own cost.

k. The Owner shall agree to convey gratuitously to the Corporation Blocks 27 and 28 on the draft Plan of Subdivision (SDN 001/22-1) for the purposes of municipal infrastructure (existing sanitary sewer) to the satisfaction of the City Engineer and the City Planner prior to the issuance of a construction permits.

l. The Owner shall agree that a Stage 1 Archaeological Assessment and any further recommended assessments are required to be entered into the Ontario Public Register of Archaeological Reports to the satisfaction of the City Planner and the Ontario Ministry of Heritage, Sport, Tourism, and Culture Industries, prior to the issuance of a construction permits.

m. The Owner shall agree that a final copy of the archaeological reports will be submitted to the City of Windsor.

n. The Owner shall agree to complete an MECP species at risk screening and comply with all requirements, including any required remediation measures, resulting from any study or report submitted to the MECP/MNRF regarding SAR assessment, all at its entire expense, to the satisfaction of the City Planner.

NOTES TO DRAFT APPROVAL (File: SDN-001/22)

1. The applicant is directed to Section 51(39) of The Planning Act 1990 regarding appeal of any imposed conditions to the Ontario Land Tribunal. Appeals are to be directed to the City Clerk of the City of Windsor.

2. It is the applicant's responsibility to fulfil the conditions of draft approval and to ensure that the required clearance letters are forwarded by the appropriate agencies to the City of Windsor, to the attention of the Executive Director/City Planner, quoting the above-noted file number.

3. The applicant should consult with an Ontario Land Surveyor for this proposed plan concerning registration requirements relative to the Certification of Titles Act.

4. The final plan approved by the Corporation of the City of Windsor must be registered within thirty (30) days or the Corporation may withdraw its approval under Section 51(59) of The Planning Act 1990.

5. All plans of subdivision/condominium are to be prepared and presented in metric units and certified by the Ontario Land Surveyor that the final plan is in conformity to the approved zoning requirements.

VII **THAT** the City Clerk and Licence Commissioner **BE AUTHORIZED** to issue the required notice respecting approval of the draft plan of subdivision under Section 51(37) of The Planning Act; and,

VIII **THAT** prior to the final approval of the plan of subdivision by the Corporation of the City of Windsor, the Executive Director/City Planner shall **BE ADVISED**, in writing, by the appropriate agencies that conditions have been satisfied; and,

IX **THAT** the Chief Administrative Officer and City Clerk **BE AUTHORIZED** to sign all necessary agreements and documents approved as to form and content satisfactory to the City Solicitor.

Executive Summary:

N/A

Background:

On March 19, 2001, City Council approved an application for a plan of subdivision made by 1027458 Ontario Incorporated (J. Coco, principal) for an 87 ha parcel of land in East Riverside Secondary Plan area. The lands were generally located within the boundary of Little River Boulevard, Florence Avenue, Wyandotte Street East and Chateau Avenue (see Map Z-101/97-1). Through subsequent incremental registrations, the area south of Beverly Glen Street, and the land immediately adjacent to the North Side of Beverly Glen Street have been built out with both single and townhome dwelling units. Approximately 18 ha of the lands contained in that original draft plan remain undeveloped. The lands that are subject to these development applications were originally included in the Draft plan of subdivision as 2 blocks for school sites and a park area.

Lands Formerly Identified for School Sites:

As part of the East Riverside Secondary Plan and the original Draft Plan of Subdivision two parcels were identified for possible use for school purposes. The subdivision agreement required that the parcels reserved for school purposes be held for 5 years after a plan of subdivision was registered creating the parcel for the school reserves. The 5 year time frame was put in place to provide the school boards an opportunity to acquire the lands for school construction. The plan (12M-581) was registered on February 14, 2013. Therefore, the five year time frame ended February 14, 2018, without the school boards acquiring the lands. This made the lands that were reserved for school use available for development.

Lands Formerly Identified for Park purposes:

Since the original draft Plan of Subdivision approval, land transfers have taken place between the City and the Developer with the aim of consolidating parkland and storm water management facilities on the west of Florence Ave to provide a larger contiguous

area for recreational opportunities within the Little River Corridor and connecting to the Ganatchio Trail. Those transfers and conveyances resulted in the parkland dedication requirement for the original plan of subdivision being fulfilled, without requiring the transfer of the 1.1ha of land on the N/E corner of Florence Avenue and Beverley Glen Street. Because of this, the lands currently identified as parkland in the original draft plan of subdivision were not required to be, and had never been conveyed to the City of Windsor for park purposes. Through this application the Developer is requesting to change the official plan designation and the zoning bylaw provisions to permit construction of additional residential dwellings.

Application Information:

Location: 0 Clover Avenue - Blocks 63-65 (incl.), Plan 12M-581. (See Location Map).
Ward: 7 **Planning District:** East Riverside **ZDM:** 14
Registered Owner\Applicant: 1027458 Ontario Inc.
Agent: Dillon Consulting (Karl Tanner)

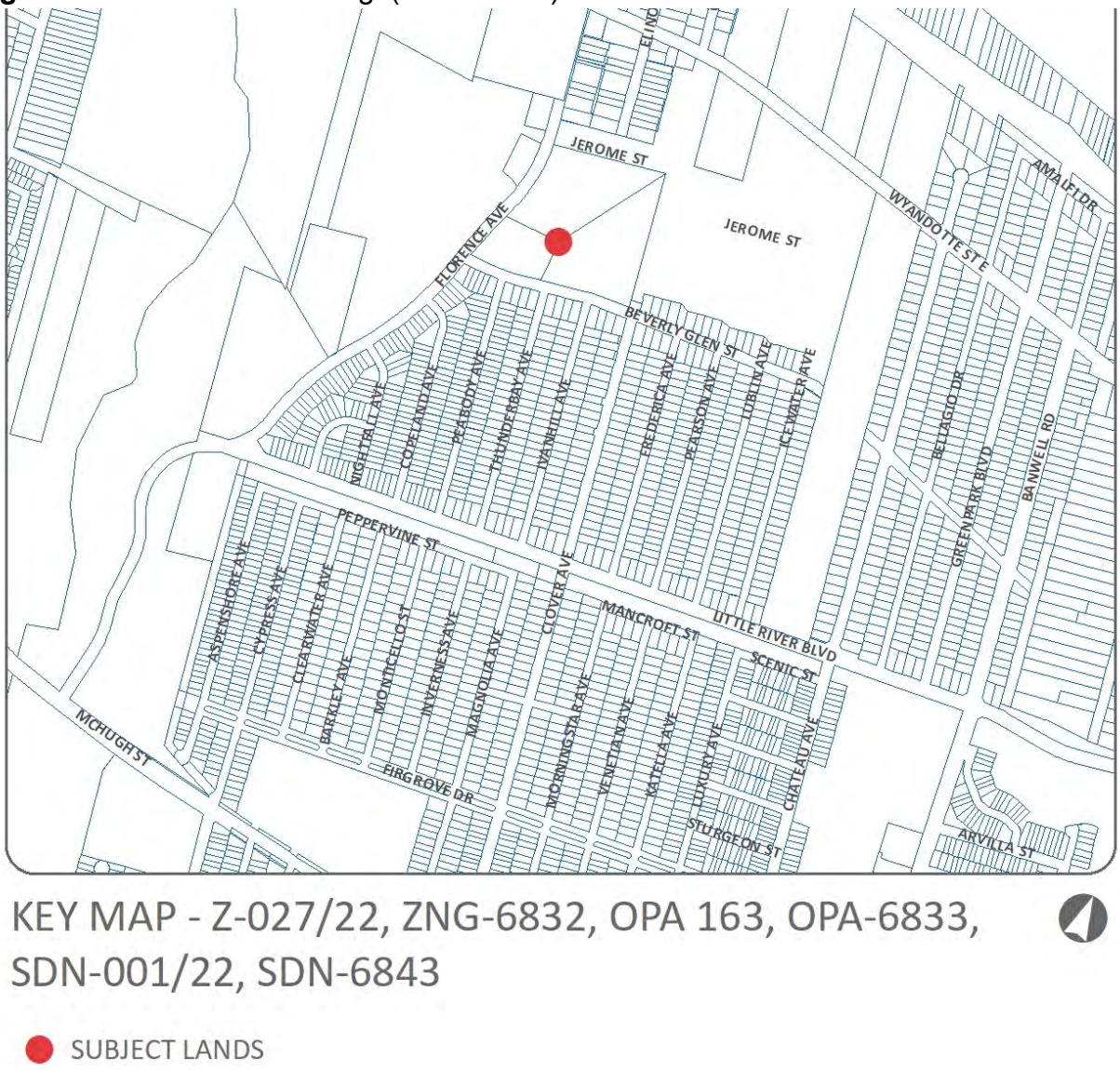
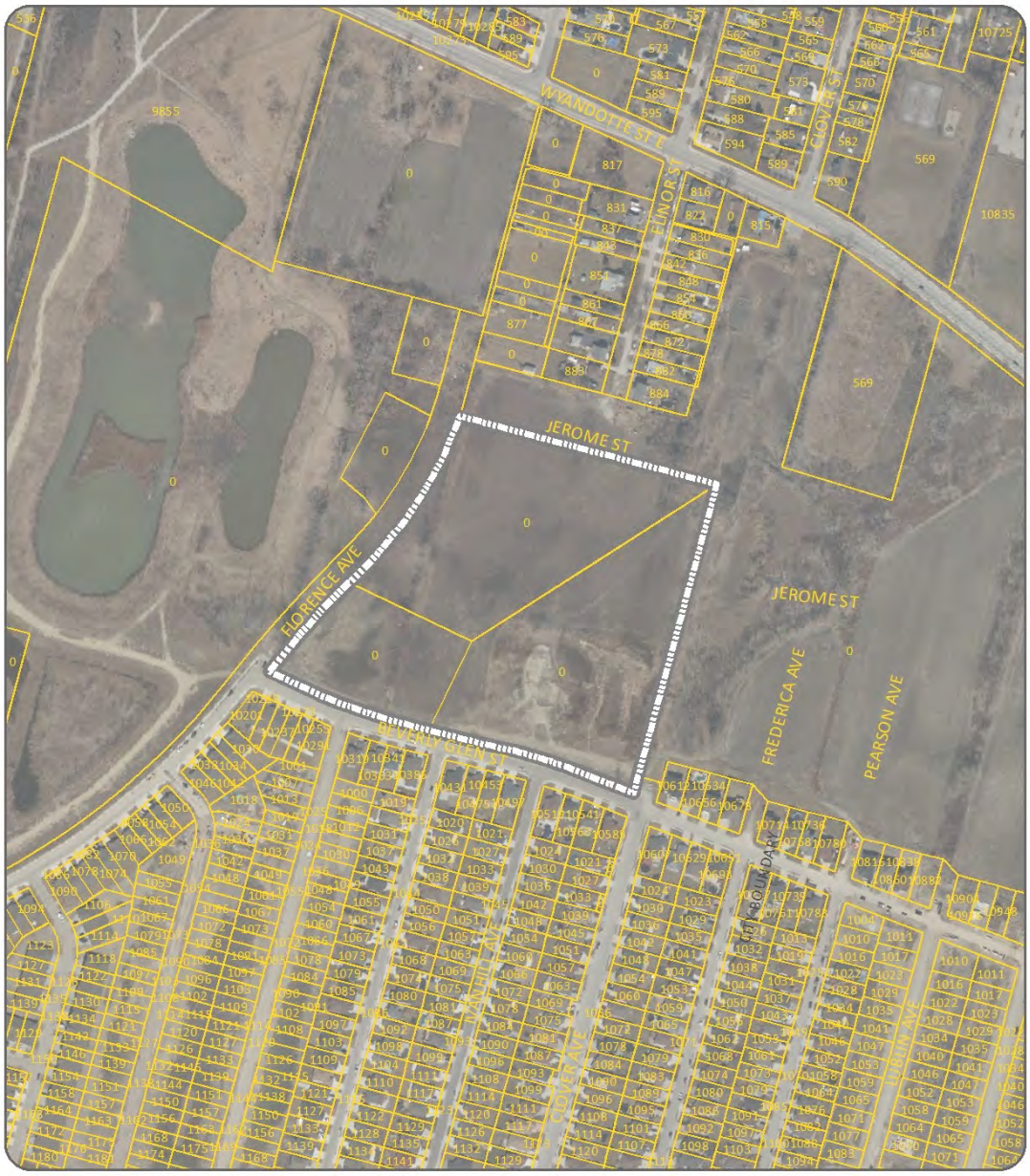


Figure 1: Location Map



NEIGHBOURHOOD MAP - Z-027/22, ZNG-6832, OPA 163, OPA-6833, SDN-001/22, SDN-6843

SUBJECT LANDS

Proposal:

The proposed development would culminate with the construction of 117 townhome dwellings, each with two (2) storeys, and two (2) new rights-of-way for the proposed extensions of Thunderbay Avenue and Ivanhill Avenue. The proposed development

also includes a Greenway which overlaps the existing easement containing a trunk sewer that bisects the site.

The applicant is requesting an amendment to the City of Windsor Official Plan, a site specific Zoning By-law Amendment to the City of Windsor Zoning By-law 8600, and Draft Plan of Subdivision. To facilitate the proposed residential subdivision, an Official Plan Amendment is required to change the land use designation on a portion of the subject site from Open Space and School Site to Residential Neighbourhood in the East Riverside Planning Area. The remainder of the subject site is appropriately designated as Residential Neighbourhood (ER1-2: Land Use Plan; East Riverside Secondary Plan).

To permit the proposed residential development, a Zoning By-law Amendment is required to re-zone a portion of subject site from Green District 1.1 (GD1.1) to a site specific Residential District 2.3 (RD2.3) zone with a provision for a maximum lot coverage of 50%. The majority of the site is currently zoned RD2.3.

NOTE : FOR INFORMATION ONLY. SEE LARGE SCALE DRAWINGS FOR FURTHER DETAILS.

DRAFT PLAN OF SUBDIVISION

MAP NO : SDN-001/22, SDN-6834

APPLICANT : 1027458 Ontario Inc

CITY OF WINDSOR PLANNING DEPARTMENT

Figure 2: SDN001/22-1

Site Information:

Official Plan	Zoning	Current Use	Previous Use
Residential Neighbourhood & Open Space Schedule ER-2: Land Use Plan, Secondary Plan East Riverside Planning Area	GD1.1, HRD2.3	Vacant	Vacant
Width	**Depth**	**Area**	**Shape**
+/-254 m	+/-309 m	6.22 ha	irregular
All measurements are approximate.			

Neighbourhood Characteristics:

This proposed residential subdivision is located at 0 Clover Avenue at the north east corner Florence Avenue and Beverly Glen Street. The site is currently vacant and is bounded as follows:

North - Elinor Street, Wyandotte Street East, single unit and townhouse dwellings.

East - Vacant/agricultural lands, Future Residential Development;

South - Beverly Glen Street, single unit dwellings, townhome dwellings;

West - Green District/Open Spaces uses including recreation trails; Storm Water Management Facilities; Little River Pollution Control Plant; and the Little River Corridor.

Discussion:

Provincial Policy Statement 2020 (PPS):

The Draft Plan Subdivision is an infill development (a development on underutilized or vacant land within the context of an existing urban or built up area) consistent with the Provincial Policy Statement (PPS) in that the development promotes the efficient use of existing land, promotes cost-effective development patterns and standards to minimize land consumption and servicing costs. Related to this direction, the PPS states:

"1.1.1 b) accommodating an appropriate range and mix of residential (including second units, affordable housing and housing for older persons), employment (including industrial and commercial), institutional (including places of worship, cemeteries and long-term care homes), recreation, park and open space, and other uses to meet long-term needs"

e) promoting cost-effective development patterns and standards to minimize land consumption and servicing costs;"

The requested Draft Plan Subdivision promotes cost-effective development by redeveloping an under-utilized vacant site. Allowing the proposed Draft Plan Subdivision in this location contributes to minimizing land consumption and servicing costs by using a site that already has available trunk infrastructure in the immediate area.

The PPS also states:

"1.1.2 Sufficient land shall be made available to accommodate an appropriate range and mix of land uses to meet projected needs for a time horizon of up to 20 years."

The PPS requires that land be available to diversify developments to meet the future needs of the community. The Draft Plan Subdivision is consistent with that requirement by accommodating new residential construction on lands designated for that purpose.

The PPS also states:

"1.4.1 To provide for an appropriate range and mix of housing types and densities required to meet projected requirements of current and future residents of the regional market area, planning authorities shall:

a. *maintain at all times the ability to accommodate residential growth for a minimum of 10 years through residential intensification and redevelopment and, if necessary, lands which are designated and available for residential development; and*

b. *maintain at all times where new development is to occur, land with servicing capacity sufficient to provide at least a three-year supply of residential units available through lands suitably zoned to facilitate residential intensification and redevelopment, and land in draft approved and registered plans."*

The requested Draft Plan of Subdivision is consistent with the PPS by developing a planned residential neighbourhood on for townhome dwellings. This development will help to provide additional residential inventory within the City of Windsor.

The PPS also states:

"1.4.3 Planning authorities shall provide for an appropriate range and mix of housing types and densities to meet projected requirements of current and future residents of the regional market area by:

a. permitting and facilitating:

1. all forms of housing required to meet the social, health and well-being requirements of current and future residents, including special needs requirements; and

2. all forms of residential intensification, including second units, and redevelopment in accordance with policy 1.1.3.3;

b. directing the development of new housing towards locations where appropriate levels of infrastructure and public service facilities are or will be available to support current and projected needs;

c. promoting densities for new housing which efficiently use land, resources, infrastructure and public service facilities, and support the use of active transportation and transit in areas where it exists or is to be developed; and"

Approving the Official Plan Amendment, Zoning By-law Amendment and Draft Plan of Subdivision would support residential development using the infrastructure that is already in place, instead of requiring more expenditure on new trunk infrastructure in an unplanned area. In terms of supporting active transportation and transit, the proposed Plan of Subdivision is in close proximity to Transit Windsor service, and in close proximity to an extensive trail system.

Official Plan:

The subject site is designated "Residential" Schedule D of the City of Windsor Official Plan. The site is also subject to the East Riverside Secondary Plan which shows the site designated both Open Space and School Site (Schedule ER-2).

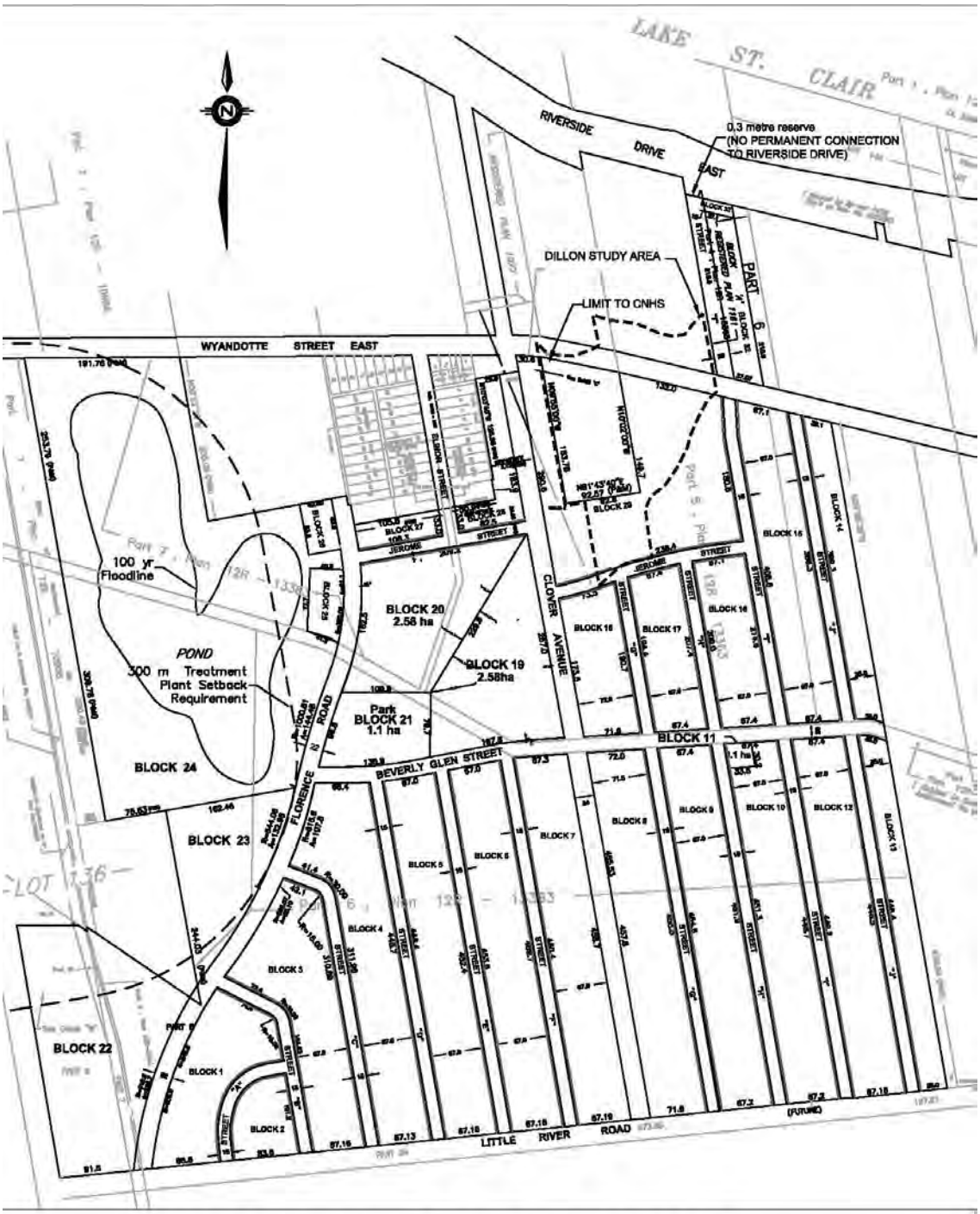
While Schedule ER-2 shows both the Open Space and School Site designations, Council Resolution 291/2001 modified the East Riverside Secondary Plan to remove the School Site designation and replaced it with the "Residential" Designation

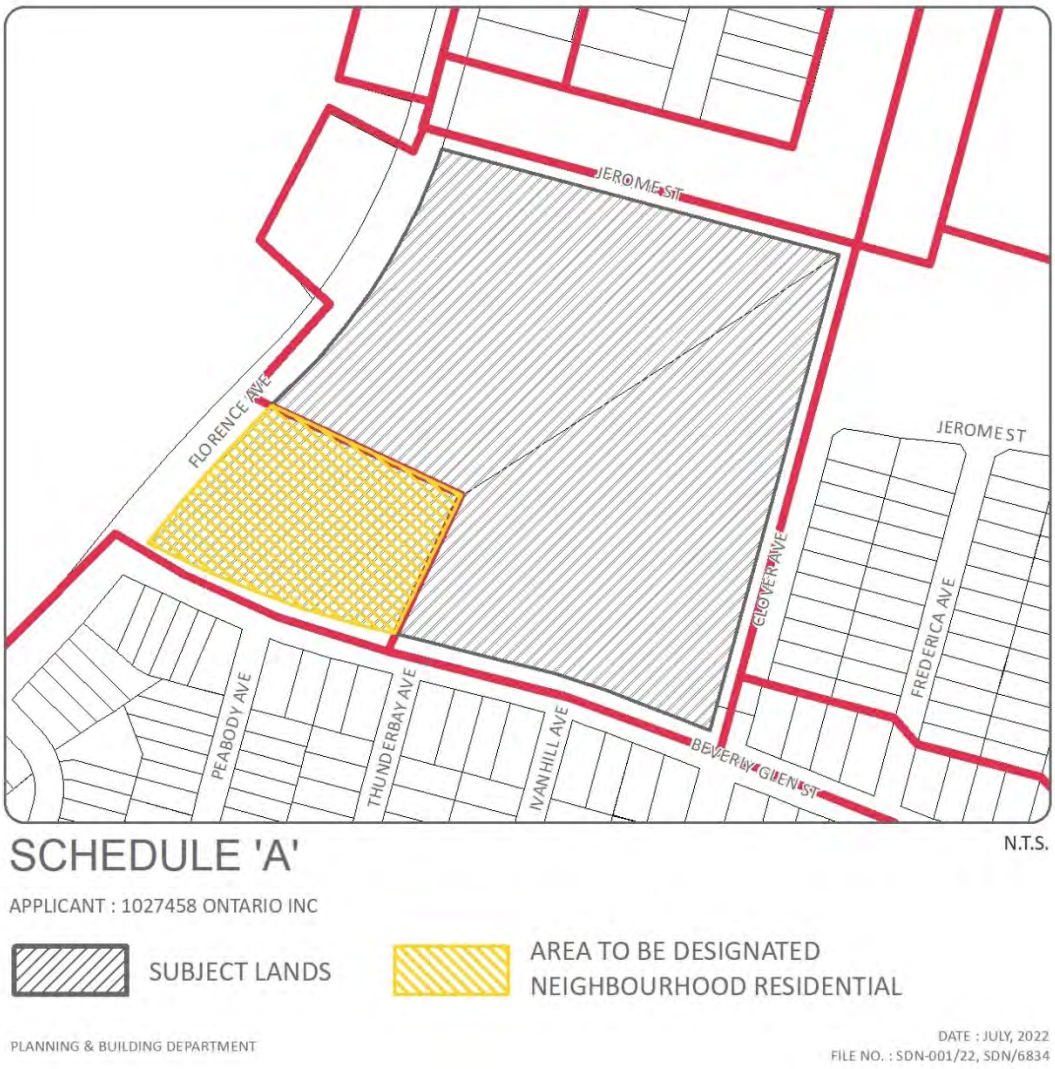
CR291/2001

I That the application of 1027458 Ontario Ltd., Mr. J. Slopen, solicitor, for amendments to the City of Windsor Official Plan, Volume II, East Riverside Secondary Plan **BE APPROVED** as follows (see Map No. Z-101/97-2 (Revised)), attached hereto:

(i) Blocks 19 and 20 on the west side of Clover, south of Jerome from 'Open Space' and 'School Site' to 'Residential';

Therefore, Blocks 19 and 20 (blocks 63 and 64 12M-581) on the North Neighbourhood Draft Plan of Subdivision do not require an amendment to the Official Plan, however, Schedule ER-2 should be updated to reflect the direction contained in CR291/2001.





Open Space block (Block 21, original Draft Plan, aka Block 65, 12M-581)

As a result of consolidation of parkland on the West Side of Florence Avenue, Block 21 on the original Draft Plan of Subdivision (Block 65, Plan12M-581) was never conveyed to the City for park purposes. As this parcel is no longer required to fulfill the parkland dedication requirements for the original draft plan of subdivision, it is ideally situated to provide an opportunity for residential intensification.

The appropriate designation for the subject lands is Residential in the City of Windsor Official Plan. This designation permits the low profile townhome residential development proposed. The City of Windsor Official Plan also contains policies that encourage the efficient use of existing infrastructure, promotes residential redevelopment as well as residential intensification. As such, the proposed development is consistent with the Official Plan.

Zoning:

Most of the site is zoned RD2.3 with a hold provision to ensure the property is developed to municipal standards by way of a plan of subdivision. The RD2.3 zone permits the proposed use. The Residential District 2.3 (RD2.3) zone permits the construction of semi detached, single unit and townhome dwellings with varied lot regulations geared for each specific dwelling type. The application proposes to create blocks for the construction of townhome dwellings that will comply with the zone regulations of the RD2.3 zone category. The developer can apply to remove the hold provision once the Plan has Final Registration.

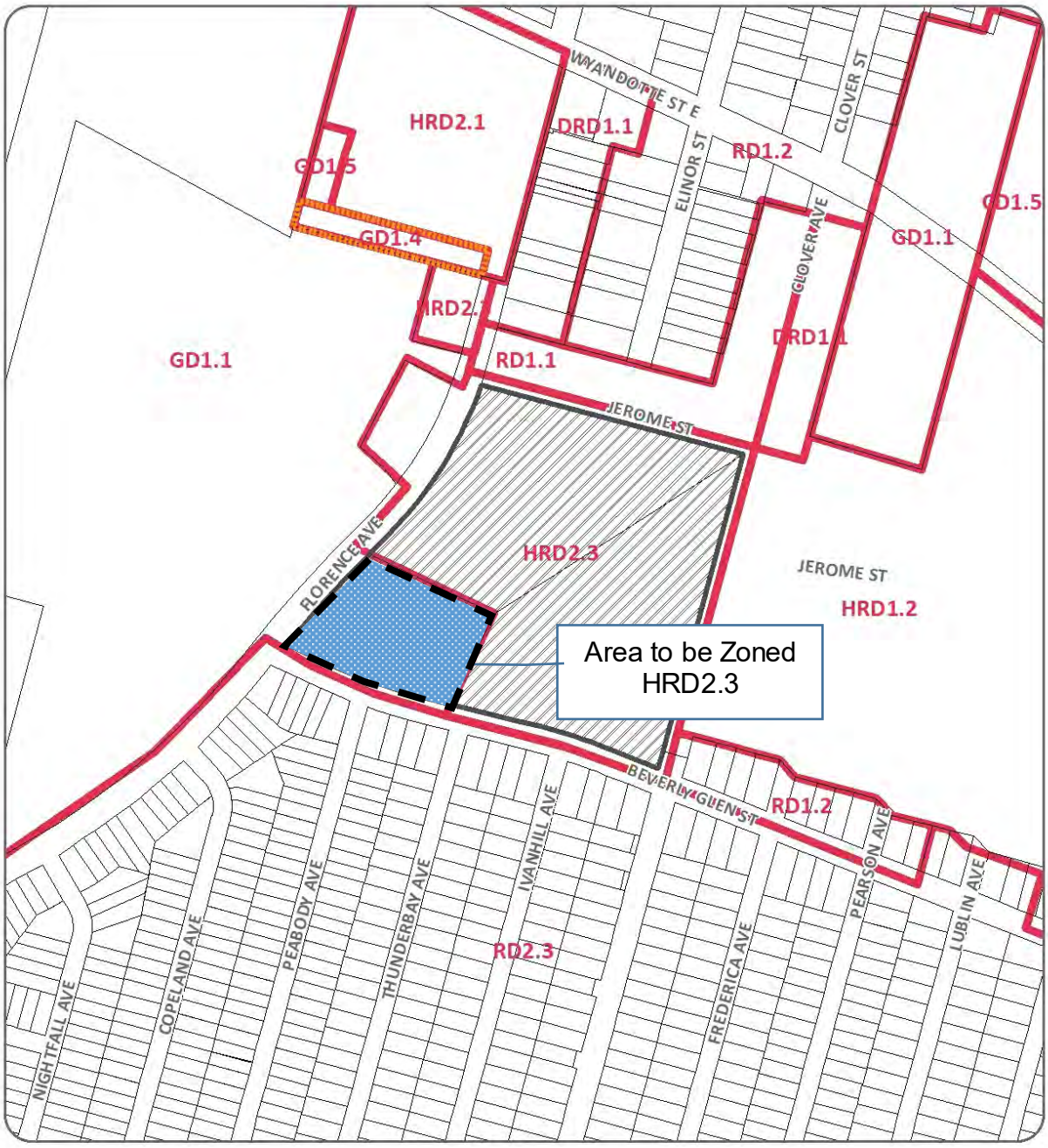
A 1.1 ha portion of the development site (Block 65) is zoned Green District 1.1 (GD1.1). Continuation of the RD2.3 Zone provisions on Block 65 is appropriate, in that the RD2.3 zone category would be an extension of the existing zoning on Blocks 64 and 65, as well as the same as the development south, on Peabody, Copeland and Thunderbay Avenues.

The development of townhomes using a similar building template on Copeland and Peabody Avenues has resulted additional municipal intervention when building permits were being issued for the townhome dwellings. Committee of Adjustment applications were made and approved to resolve issues related to total lot coverage and total area of the required front yard occupied by a hard surface for the purpose of a walkway, driveway, access area or a parking space or any combination thereof.

The applicant is requesting that the total lot area for a townhome dwelling be increased from 45% of the lot area to 50% of the lot area. The increase to the permitted maximum lot coverage will allow for a higher number of dwelling units and will bring additional housing opportunity. The proposed increase in lot coverage will have no negative implications for stormwater management as demonstrated through the supporting stormwater management study submitted as part of the application. The increase in lot coverage have no negative impact on future resident's quality of life as there are nearby amenity spaces that are accessible to residents that mitigate the loss of available lot area.

Interactions with residents after occupancy of similar townhome dwellings in this area revealed that the interface between neighbouring driveways, where 2 garages were connected was creating concerns related to the ongoing maintenance of the unpaved space. Residents looking to solve their maintenance ran afoul of Section 24.8.1.3 of the Zoning By-law when the space between driveways was paved. To avoid future maintenance issues for future residents, Administration recommends that the maximum amount of paved area for a front yard in this development be set to 60%. It should be noted that the provision increasing the permitted paved area is written as a prohibition, and as such will not variable by the Committee of Adjustment. Further changes to the

maximum paved area would have to be considered by Council through a Zoning Bylaw Amendment.



PART OF ZONING DISTRICT MAP 14

N.T.S.

REZONING

Applicant: 1027458 Ontario Inc

SUBJECT LANDS

PLANNING & BUILDING DEPARTMENT

DATE : JULY, 2022
FILE NO. : Z-027/22, ZNG/6832

Draft Plan of Subdivision:

The proposed development would culminate with the construction of 117 townhome dwellings, each with two (2) storeys, and two (2) new rights-of-way for the proposed extensions of Thunderbay Avenue and Ivanhill Avenue. The proposed development also includes a Greenway which overlaps the existing easement containing a trunk sewer that bisects the site. To facilitate this final form of development the applicant proposes a plan that will create 26 blocks on which townhome blocks will be built. Once completed, a parcel for each townhome will be created using the Part Lot Control process. This is consistent with the manner in which all other townhome lots have been created in the East Riverside area. The draft plan of subdivision as proposed will comply with the City of Windsor Official Plan as well as the provisions of the Zoning By-law.

Florence Avenue

The right of way for Florence Avenue had been conveyed to the City through a separate process and is not part of the Draft Plan of Subdivision. As a result, the construction of Florence Avenue cannot take place until such time as an Environmental Assessment has been completed. The City is currently undertaking a process to complete an EA for the section of Florence Avenue from its current end point north to Wyandotte Avenue E. Blocks 1, 10, 11 and 12 on the proposed Draft Plan of Subdivision are dependant on Florence Avenue for access, and as such, cannot be constructed until Florence Avenue is constructed. Therefore, prior to the construction of dwelling units on Blocks 1, 10, 11 and 12, the construction of Florence Avenue from its current end point to the Northern limit of this development (north limit of Jerome Street) is to be undertaken and funded by the developer as if it were part of the Draft Plan of Subdivision, once the required EA is complete.

Clover Avenue and Jerome Street

The right of way for Clover Avenue and Jerome Street are part of the original Draft Plan of Subdivision for the area and will be constructed by the developer as part of separate development approvals.

The conditions for the construction of Clover Avenue north of Beverly Glen have been captured in the registered subdivision agreement for the developers lands to the east (extensions of Lublin, Icewater, Pearson and Frederica Avenues). Registration of that Plan of Subdivision is imminent.

The conditions for the construction of Jerome Street between Florence Avenue and Clover Avenue will be captured in a future subdivision agreement that will be required before the registration of a plan of subdivision for the developers lands to the north of Jerome Street and to the West of Clover Avenue, north of Jerome Street. Registration of this Plan of Subdivision is expected shortly after the registration of the final plan of subdivision for the extensions of Lublin, Icewater, Pearson and Frederica Avenues.

The hold provision contained within the recommended zoning will ensure that the blocks fronting on these streets outside of this draft plan of subdivision application have access to a street that is the subject of an agreement (Subdivision Agreement) for the construction of the street.

Risk Analysis:

N/A

Climate Change Risks

Climate Change Mitigation:

The site will be subject to a subdivision agreement and will release storm water to the municipal system at a rate determined by a storm water management plan and development servicing plan that will be reviewed and approved by the City's Public Works department

Climate Change Adaptation:

The development on the site is close to existing bus routes and also community recreational opportunities. This will encourage the use of public transit and walking as modes of transportation, thereby helping to minimize the City's carbon footprint.

Financial Matters:

N/A

Consultations:

A Virtual Public Information Centre (PIC) was held February 22, 2022 prior to the submission of the Planning Application. The applicant discussed with residents the overall development and considered comments from the residents in the final revised concept included in Official Plan and Zoning By-law Amendments and proposed Draft Plan of Subdivision. The significant difference from the plan presented in the first PIC is the removal of a multiple dwelling building on the south west corner of the site, replaced with a townhome dwellings similar to townhome dwellings throughout the site and to the south of the proposed development.

A second additional in-person PIC was held in December 7, 2022 that provided information related to all of the developer's proposals in the East Riverside Area, the current concept plan was available for review by the residents.

As required in the Planning Act, notice was provided by advertisement in the Windsor Star. In addition, a courtesy notice to all property owners and tenants within 120 metres (400 feet) of the subject parcel were sent by mail.

The applications and relevant supporting studies were circulated to commenting agencies. Those responses are included as Appendix A – Agency Comments.

Conclusion:

The proposed development that includes amendments to the City of Windsor official plan and zoning bylaw as well as approval of a draft Plan of draft plan of subdivision is consistent with the provisions of the Provincial Policy Statement, conforms to the intent of City of Windsor Official Plan, complies with City of Windsor Zoning By-law and would provide the impetus for further development in an underutilized part of an established area.

Therefore, the proposed Draft Plan of Subdivision to create 26 blocks to facilitate the construction of 117 new townhome dwellings does constitute good land use planning.

Planning Act Matters:

I concur with the above comments and opinion of the Registered Professional Planner.

Michael Cooke MCIP RPP, Manager of Planning Policy/Deputy City Planner

Thom Hunt MCIP RPP, City Planner

I am not a registered Planner and have reviewed as a Corporate Team Leader

JP OC

Approvals:

Name	Title
Michael Cooke	Manager of Planning Policy/Deputy City Planner
Thom Hunt	City Planner
Wira Vendrasco	Deputy City Solicitor
Shelby Askin Hager	City Solicitor
Onorio Colucci	Chief Administrative Officer

Notifications:

Name	Address	Email
1027458 Ontario Inc.	949 Wilson Ave, Toronto ON M3K 1G2	jcoco@cocogroup.com
Dillon Consulting Limited (Theresa O'Niell)	3200 Dezeil Drive, Suite 608, Windsor ON N8W 5K8	toneill@dillon.ca
Councillor Marignani		

Appendices:

1 Agency Comments
2 12M-581
3 Section 5.4 - Holding

COMMENTS

Jason Scott – Transit Windsor

Transit Windsor has no objections to this development. The closest existing transit route to the middle of this development is with the Lauzon 10. The closest existing bus stop to the middle of this development is located on Wyandotte at Clover NW Corner. This bus stop is approximately 470 metres away from this development falling outside of our 400 metre walking distance guideline to a bus stop. This will remain unchanged with our Council approved Transit Master Plan.

Bell Canada – Circulations

We have reviewed the circulation regarding the above noted application. The following paragraphs are to be included as a condition of approval:

> "The Owner acknowledges and agrees to convey any easement(s) as deemed necessary by Bell Canada to service this new development. The Owner further agrees and acknowledges to convey such easements at no cost to Bell Canada.
>
> The Owner agrees that should any conflict arise with existing Bell Canada facilities where a current and valid easement exists within the subject area, the Owner shall be responsible for the relocation of any such facilities or easements at their own cost."

Upon receipt of this comment letter, the Owner is to provide Bell Canada with servicing plans/CUP at their earliest convenience to planninganddevelopment@bell.ca to confirm the provision of communication/telecommunication infrastructure needed to service the development.

It shall be noted that it is the responsibility of the Owner to provide entrance/service duct(s) from Bell Canada's existing network infrastructure to service this development. In the event that no such network infrastructure exists, in accordance with the Bell Canada Act, the Owner may be required to pay for the extension of such network infrastructure.

If the Owner elects not to pay for the above noted connection, Bell Canada may decide not to provide service to this development.

To ensure that we are able to continue to actively participate in the planning process and provide detailed provisioning comments, we note that we would be pleased to receive circulations on all applications received by the Municipality and/or recirculations.

We note that WSP operates Bell Canada's development tracking system, which includes the intake and processing of municipal circulations. However, all responses to circulations and requests for information, such as requests for clearance, will come directly from Bell Canada, and not from WSP. WSP is not responsible for the provision of comments or other responses.

Canada Post

Please see Canada Post's feedback regarding the proposal, below.

Service type and location

1. Canada Post will provide mail delivery service to the subdivision through centralized Community Mail Boxes (CMBs).
2. If the development includes plans for (a) multi-unit building(s) with a common indoor entrance, the developer must supply, install and maintain the mail delivery equipment within these buildings to Canada Post's specifications.

Municipal requirements

1. Please update our office if the project description changes so that we may determine the impact (if any).
2. Should this subdivision application be approved, please provide notification of the new civic addresses as soon as possible.

Developer timeline and installation

1. Please provide Canada Post with the excavation date for the first foundation/first phase as well as the date development work is scheduled to begin. Finally, please provide the expected installation date(s) for the CMB(s).

Please see Appendix A for any additional requirements for this developer.

APPENDIX A

Additional Developer Requirements:

- The developer will consult with Canada Post to determine suitable permanent locations for the Community Mail Boxes. The developer will then indicate these locations on the appropriate servicing plans.
- The developer agrees, prior to offering any units for sale, to display a map on the wall of the sales office in a place readily accessible to potential homeowners that indicates the location of all Community Mail Boxes within the development, as approved by Canada Post.
- The developer agrees to include in all offers of purchase and sale a statement which advises the purchaser that mail will be delivered via Community Mail Box. The developer also agrees to note the locations of all Community Mail Boxes within the development, and to notify affected homeowners of any established easements granted to Canada Post to permit access to the Community Mail Box.
- The developer will provide a suitable and safe temporary site for a Community Mail Box until curbs, sidewalks and final grading are completed at the permanent Community Mail Box locations. Canada Post will provide mail delivery to new residents as soon as the homes are occupied.
- The developer agrees to provide the following for each Community Mail Box site and to include these requirements on the appropriate servicing plans:
    - Any required walkway across the boulevard, per municipal standards
    - Any required curb depressions for wheelchair access, with an opening of at least two metres (consult Canada Post for detailed specifications)
    - A Community Mailbox concrete base pad per Canada Post specifications.

Enwin

HYDRO ENGINEERING: No Objection.
Please note that there are streetlight underground electrical conductors along the entire north side of Beverly Glen St.

WATER ENGINEERING: Water Engineering has no objections.

ERCA

The proposed development includes the construction of 117 townhome dwellings, and two 2 new rights-of-way, consisting of the extensions of Thunderbay Avenue and Ivanhill Avenue. The

proposed development also includes a Greenway, which overlays the existing easement containing a trunk sewer that crosses the site. An Official Plan Amendment is proposed to change the land use designation on a portion of the subject site from Open Space and School Site to Residential Neighbourhood in the East Riverside Planning Area. The area set aside for School Sites were previously zoned to HRD2.3 to permit the same uses as those that currently exist in the North Neighbourhood Area. The former school sites that make up remainder of the subject site is designated as Residential Neighbourhood.

DELEGATED RESPONSIBILITY TO REPRESENT THE PROVINCIAL INTEREST IN NATURAL HAZARDS (PPS) AND REGULATORY RESPONSIBILITIES OF THE CONSERVATION AUTHORITIES ACT

The following comments reflect our role as representing the provincial interest in natural hazards, as outlined by Section 3.1 of the *Provincial Policy Statement* of the *Planning Act,* as well as our regulatory role, as defined by Section 28 of the *Conservation Authorities Act.*

The above noted lands are subject to our *Development, Interference with Wetlands and Alteration to Shorelines and Watercourses Regulation under the Conservation Authorities Act (Ontario Regulation No. 158/06)*. The parcel falls within the regulated area of the Little River and Detroit River / Lake St. Clair.

The property owner will be required to obtain a Permit and/or Clearance from the Essex Region Conservation Authority, prior to any construction or site alteration or other activities affected by Section 28 of the *Conservation Authorities Act*.

WATERSHED BASED RESOURCE MANAGEMENT AGENCY

The following comments are provided in an advisory capacity as a public commenting body on matters related to watershed management.

SECTION 1.6.6.7 Stormwater Management (PPS, 2020)

ERCA has concerns with the potential impact of the quality and quantity of runoff in the downstream watercourse due to the proposed development on this site.

ERCA recommends that stormwater quality and stormwater quantity will need to be addressed up to and including the 1:100 year storm event and be in accordance with the guidance provided by the *Stormwater Management Planning and Guidance Manual, prepared by the Ministry of the Environment (MOE, March 2003) and the "Windsor-Essex Region Stormwater Management Standards Manual"*.

We therefore request inclusion of the following draft conditions be included in the Notice of Decision and implementing Subdivision / Development Agreement:

1.That the subdivision agreement, between the Owner and the Municipality, contain provisions, to the satisfaction of the Municipality and the Essex Region Conservation Authority, that stipulates, that prior to obtaining final approval, for any phase of the development, that the Owner, will finalize an engineering analysis, to identify stormwater quality and quantity measures, as necessary to control any increase in flows in downstream watercourses, in accordance with the *Windsor-Essex Region Stormwater Management Standards Manual* and any other relevant municipal/provincial, standards or guidelines, in consultation with the ERCA;

2.That the subdivision agreement between the Owner and the Municipality contain provisions, that requires, that the Owner, installs the stormwater management measures, for any phase of the development, identified in the final engineering analysis completed, as part of the development

for the site and undertake to implement the recommendations contained therein, to the satisfaction of the Municipality and the Essex Region Conservation Authority;

3.That prior to final approval the Essex Region Conservation Authority shall require a copy of the fully executed subdivision agreement between the Owner and the Municipality, in wording acceptable to the Essex Region Conservation Authority, containing provisions to carry out the recommendations of the final plans, reports and requirements noted above; and

4.That prior to undertaking construction or site alteration activities, any necessary permits or clearances, be received, from the Essex Region Conservation Authority, in accordance with Section 28 of the *Conservation Authorities Act*. If the works are located within an area, not regulated by Section 28 of the *Conservation Authorities Act*, then a Development Review Clearance, must be obtained from the Essex Region Conservation Authority, prior to undertaking construction or site alteration activities.

PLANNING ADVISORY SERVICE TO PLANNING AUTHORITIES - NATURAL HERITAGE POLICIES OF THE PPS, 2020

The following comments are provided from our perspective as an advisory service provider to the Planning Authority on matters related to natural heritage and natural heritage systems, as outlined in Section 2.1 of the *Provincial Policy Statement* of the *Planning Act*. The comments in this section do not necessarily represent the provincial position and are advisory in nature for the consideration of the Planning Authority.

We note that the subject property is adjacent to (within 120 m of) a natural heritage feature that may meet the criteria for significance under the PPS. Section 2.1.8 of the PPS, 2020 states – *"Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5 and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions."*

Our information indicates that the subject property may support habitat of endangered species and threatened species. As per Section 2.1.7 of the PPS, 2020 – "*Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements*". All species listed as endangered or threatened (aquatic species, plants, mammals, birds, reptiles, amphibians, etc.) as well as their related habitats, are protected under the Ontario *Endangered Species Act*.

Prior to initiating any proposed works on this property, it is the proponent's responsibility to contact the Species at Risk Branch of the Ontario Ministry of Environment, Conservation & Parks (MECP) to ensure all issues related to the *Endangered Species Act* are addressed. All inquiries regarding the *Endangered Species Act* should be made with Permissions and Compliance Section of the MECP (e-mail address: SAROntario@ontario.ca).

FINAL RECOMMENDATION

We have no objections to the development applications at this time, subject to the draft conditions noted above for the draft plan of subdivision.

We do ask that the City, in this case, to forward a copy of the Notice of Decision, Notice of Passing and Notice of Adoption for our records. If you have any questions or require any additional information, please contact the undersigned.

Sherif Barsom – Parks D&D

We have seen on the received report the below sentences:

"Greenway system will serve as public amenities connecting and defining neighbourhoods and contributing to Windsor's image. New development in Windsor will accommodate the needs of pedestrians, cyclists and other recreational activities."

"The proposed development also includes a Greenway which overlays the existing easement containing a trunk sewer that crosses the site."

We still need an answers for the below questions:

- What the plans are for this Greenway space?
- Is this a private or public space?
- Who will maintain it?
- If public who is designing the space?

Kristina Tang – Heritage Planner

The subject property is located within an area of high archaeological potential. A Stage 1 Archaeological Assessment and any further recommended assessments are required to be entered into the Ontario Public Register of Archaeological Reports to the satisfaction of the City of Windsor and the Ontario Ministry of Heritage, Sport, Tourism, and Culture Industries, prior to any additional land disturbances. A final copy of these relevant archaeological reports must also be submitted to the City of Windsor.

Shannon Deehan – Transportation

- Beverly Glen Street is classified as a Local Road with a required right-of-way width of 20 meters per the Official Plan. The existing right-of-way along the frontage of the subject property is sufficient, therefore, a conveyance is not required.
- Clover Avenue is classified as a Class I Collector Road with a required right-of-way width of 24 meters per the Official Plan. The existing right-of-way along the frontage of the subject property is sufficient, therefore, a conveyance is not required.
- Jerome Street is classified as a Local Road with a required right-of-way width of 20 meters per the Official Plan. The existing right-of-way along the frontage of the subject property is sufficient, therefore, a conveyance is not required.
- Thunderbay Ave is classified as a Local Road with a required right-of-way width of 20 meters per the Official Plan. The existing right-of-way along the frontage of the subject property is sufficient, therefore, a conveyance is not required.
- Ivanhill Ave is classified as a Local Road with a required right-of-way width of 20 meters per the Official Plan. The existing right-of-way along the frontage of the subject property is sufficient, therefore, a conveyance is not required.
- An EA is undertaken for a portion of Florence Ave that is currently City Right-of-Way. Construction of this section of Florence Ave cannot be constructed until the EA is completed.
- Corner cut-offs of 4.6 meters are required along Beverly Glen Street at the intersections of Florence Ave, Thunderbay Ave, Ivanhill Ave, and Clover Ave. The submitted plan shows corner cut-offs.
- Corner cut-offs of 4.6 meters are required along Thunderbay Ave at the intersections of Clover Ave. The submitted plan shows corner cut-offs. The submitted plan shows a corner cut-off at the intersection of Jerome St and Clover Ave and but not at the intersection of Jerome St and Florence Ave.

- Corner cut-offs of 4.6 meters are required along Jerome St at the intersections of Florence Ave and Clover Ave.
- The proposed street Thunderbay Ave on the site plan must align with Thunderbay Ave to the south.
- The proposed street Ivanhill Ave on the site plan must align with Ivanhill Ave to the south.
- Driveways for lots 1, 16, 32, 33, 46, 47, 60, 61, 74, 83, 87, 94, 95, and 117 should be set as far back as possible from the intersections or adjacent property. Furthermore, lots that are abutting two streets should have driveways on the lower classification street (local road).
- All parking must comply with Zoning By-Law 8600.
- Sidewalks are to be constructed at the owner(s) expense and according to City of Windsor Standard Specifications, concrete sidewalks along one side of each proposed local residential road and along both sides of any proposed collector roads as outlined by Engineering Right-of-Way and per the Official Plan.
- Detailed and dimensioned drawings showing the proposed driveways, curb cuts and cul-de-sac design are required to provide further comments on conveyances and additional requirements. All roadways should be constructed to City of Windsor Standards Engineering Drawings.
- Parking restrictions and required by-law amendments will be reviewed at the engineering drawings review stage.
- All accesses shall conform to the TAC Geometric Design Guide for Canadian Roads and the City of Windsor Standard Engineering Drawings.
- All exterior paths of travel must meet the requirements of the Accessibility for Ontarians with Disabilities Act (AODA).

Andrew Boroski / Rob Perissinotti– Engneering & ROW

The Applicant is requesting draft plan of subdivision approval, along with official plan and zoning by-law amendments for a 6.22 ha property currently forming of Block 63-65 on Plan 12M-581, subject to an easement as R1285381. The approvals are required in order to support the proposed redevelopment into 117 townhome dwellings, each with two storeys, and two new rights-of-way including the extensions of Thunder bay Avenue and Ivanhill Avenue. The comments included below should be reviewed in conjunction with those submitted with the subdivision application and the official plan amendment.

The subject lands are located at Florence Avenue and Beverly Glen Street, are currently zoned H Residential District 2.3 (HRD2.3) and Green District 1.1 (GD1.1) as per Zoning By-Law 8600. The Applicant is requesting an amendment the zoning to a site-specific Residential District 2.3 (RD2.3), to allow for the construction of a 117 Townhome dwellings. We have reviewed the servicing requirements of the subject lands pertinent to this application, and offer the following comments:

This site is currently serviced by a 250mm PVC pipe sanitary sewer located within the south boulevard of Beverly Glen St, with a 1500mm Reinforced Concrete Pipe, 1350 Reinforced Concrete Pipe storm sewer located north of centerline of Beverly Glen St. A 1500mm Reinforced Concrete Pipe sanitary trunk runs diagonally from the southeast to the

northwest of the property. A 350mm Asbestos Cement sanitary sewer runs from the north property line south to the 1500mm trunk. The existing 350mm sanitary sewer which extends south of Elinor Street and through the subject lands must be relocated at the applicants expense.

A Servicing Study is required to demonstrate that there is adequate capacity in the municipal sanitary and storm sewer networks. It must be demonstrated that no negative impacts will be realized by existing areas adjacent to the proposed development. This study must be completed in accordance with the City of Windsor Development Manual and the Windsor/Essex Regional Stormwater Management Standards.

In summary we have no objection to the proposed Zoning and Official Plan amendments. The Engineering Department recommends the following conditions be included as requirements of the zoning amendment approval:

Right-of-Way – The Official Plan classifies Florence Ave as a Class II Collector road. An Environmental Assessment (EA) is to be completed by the City for Florence Ave to identify the right-of-way-width and traffic functionality requirements. Following the City's adoption of this EA, the owner agrees to construct the Florence Ave right-of-way along their entire frontage to the satisfaction of the City Engineer and at their own expense.

The owner agrees to fully construct all future municipal right-of-ways, include, but not limited to: pavements, curbs and gutters, utilities and the necessary drainage facilities, according to City of Windsor standard specification for the following road designations:

- Local Residential Roads: complete with 20 metre right-of-ways. Pavements to be twenty-eight (28) feet (8.6 metres) in width.
- Collector Roads:
    - Class 2 Collector - Florence Ave is to be constructed as per the requirements of the EA.
    - Class 1 Collector – Clover Ave: complete with a 24 metre right-of-way. Pavement to be twenty-eight (28) feet (8.6 metres) in width

Corner Cut-off – The owner agrees prior to the issuance of a construction permit to gratuitously convey:
A 4.6m x 4.6m corner cut-off along Beverly Glen Street at the intersections of Florence Avenue, Thunder Bay Avenue, Ivanhill Avenue and Clover Avenue, as well as along Thunder bay Avenue at the intersection of Clover Avenue as well as along Jerome Street at the intersections of Florence Avenue and Clover Avenue in accordance with City of Windsor Standards.

Plan of Subdivision Agreement - The applicant enter into an agreement with the City of Windsor for all requirements under the General Provisions of the Plan of Subdivision Agreement for the Engineering Department.

Servicing Study – The owner agrees, at its own expense, to retain a Consulting Engineer to provide a detailed servicing study report on the impact of the increased flow to the existing municipal sewer systems, satisfactory in content to the City Engineer and prior to

the issuance of a construction permit. The study shall review the proposed impact and recommend mitigating measures and implementation of those measures.

ERCA Requirements – The owner(s) further agrees to follow all drainage and flood proofing recommendations of the Essex Region Conservation Authority (ERCA) may have with respect to the subject land, based on final approval by the City Engineer. If applicable, the Owner will obtain all necessary permits from ERCA with respect to the drainage works on the subject lands.

Sanitary Sewer Relocation – The Owner shall be responsible for the costs associated with the relocation of the sanitary sewer which presently extends south of Elinor Street and through the proposed school site. All work is to be done to the satisfaction of the City Engineer.

Sidewalks -The owner(s) agrees, to construct at their expense and according to City of Windsor Standard Specifications, concrete sidewalks constructed to the satisfaction of the City Engineer. Sidewalks are to be constructed at the following locations:

- Florence Ave – as per the EA
- Clover Ave – along both east and west boulevards
- Thunder Bay Ave – along the east and south boulevards
- Ivanhill Ave – Along the east boulevard

PLAN 12M– 581

I CERTIFY THAT THIS PLAN IS REGISTERED IN THE LAND REGISTRY OFFICE FOR THE LAND TITLES DIVISION OF ESSEX (12) AT 10:20 O'CLOCK ON THE 14TH DAY OF FEBRUARY 2013 AND ENTERED IN THE PARCEL REGISTER FOR PROPERTY IDENTIFIER 01596-01569 - 1101 AND REQUIRED CONSENTS ARE REGISTERED AS PLAN DOCUMENT NO CE 559783

Ryland Lavender
REPRESENTATIVE FOR LAND REGISTRAR

THIS PLAN COMPRISES PART OF THE LAND IDENTIFIED BY P.I.N. 01596–1101

Approved under Section 51 of the Planning Act, RSO 1990, this 6th day of FEB. 2013. On behalf of The Corporation of the City of Windsor.

Mayor

Steve Vlachodimos
Dep. Clerk

PART OF LOT 1 AND PART OF BLOCK 63 – SUBJECT TO EASEMENT AS IN CE83199.
PART OF BLOCKS 63, 64, 65, 69 & PART OF BEVERLY GLEN STREET – SUBJECT TO EASEMENT AS IN INST. No. R1285381.

PLAN OF SUBDIVISION OF PART OF LOTS 138, 139 & 140 CONCESSION 1

GEOGRAPHIC TOWNSHIP OF SANDWICH EAST

AND

PART OF STREETS & ALLEYS

(AS CLOSED BY BY–LAW, REGISTERED AS INSTRUMENT NO. R1088686)

PART OF LOT 13
REGISTERED PLAN 1230 (AS AMENDED BY JUDGE'S ORDER, REG'D AS INST. No. SE23271)
ALL OF BLOCKS 112 & 116 (0.30 RESERVES)
PART OF BLOCK 117 (0.30 RESERVE)
PART OF CLOVER AVENUE (AS CLOSED BY CE81383)
PLAN 12M–500

NOW IN THE

CITY OF WINDSOR
COUNTY OF ESSEX, ONTARIO

VERHAEGEN • STUBBERFIELD • HARTLEY • BREWER • BEZAIRE INC.

SCALE = 1:1000

0 10.00 20.00 40.00 60.00 METRES 100.00

"METRIC" DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

CERTIFICATE OF CORRECTION (Subsection 99(9) O.Reg. 43/96)
Corrected under an Order of the Examiner of Surveys Registered as No. CE598132
2014-01-21 Ryland Lavender
Date Representative for Land Registrar

LEGEND AND NOTES

BEARINGS ARE UTM GRID, DERIVED FROM SIMULTANEOUS GPS OBSERVATIONS ON MONUMENTS "A" AND "B", SHOWN HEREON, HAVING A GRID BEARING OF N08°52'10"W NAD83 (CSRS) (1997.0) AND ARE REFERRED TO THE CENTRAL MERIDIAN OF UTM ZONE 17 (81° WEST LONGITUDE).

DISTANCES ON THIS PLAN ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.99988400

SIB DENOTES 25mm X 25mm X 1.22m STANDARD IRON BAR
SSIB DENOTES 25mm X 25mm X 0.61m SHORT STANDARD IRON BAR
IB DENOTES 16mm X 16mm X 0.61m IRON BAR
IB ø DENOTES 19mm diameter X 0.61m ROUND IRON BAR
CC DENOTES CUT–CROSS
CP DENOTES 5mm X 50mm STEEL PIN
■ DENOTES SURVEY MONUMENT FOUND
□ DENOTES SURVEY MONUMENT SET AND MARKED 1528
WIT. DENOTES WITNESS (R) DENOTES PERPENDICULAR
(S) DENOTES SET (M) DENOTES MEASURED (D) DENOTES DEED
SSIB'S SHOWN ON THIS PLAN HAVE BEEN SET IN LIEU OF SIB'S WHERE THE POSSIBILITY THAT UNDERGROUND UTILITIES EXIST.

(S/P) DENOTES SET PROPORTIONALLY (OU) DENOTES ORIGIN UNKNOWN
(P) DENOTES PLAN 12M–500 (P1) DENOTES PLAN 12R–21263
(P2) DENOTES PLAN 12R–15252 (P3) DENOTES PLAN 12R–23795
(1502) DENOTES VERHAEGEN STUBBERFIELD HARTLEY BREWER BEZAIRE INC., O.L.S.
(1194) DENOTES JOHN B. SMEETON INC., O.L.S.

INTEGRATION DATA

COORDINATES ARE DERIVED FROM GPS OBSERVATIONS USING THE CAN–NET NETWORK SERVICE AND ARE REFERRED TO UTM ZONE 17 (81° WEST LONGITUDE) NAD83 (CSRS) (1997.0).
COORDINATE VALUES ARE TO AN URBAN ACCURACY IN ACCORDANCE WITH SECTION 14(2) O.REG 216/10

POINT ID	NORTHING	EASTING
A	N4688104.078	E342149.719
B	N4687632.946	E342223.234

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE–ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

CURVE SCHEDULE

CURVE	RADIUS	ARC	CHORD	CHORD BEARING
C1	444.93	55.50	55.47	N83°55'10"E
C2	464.04	57.97	57.93	N83°55'20"E
C3	464.04	27.14	27.14	N82°01'10"E
C4	464.04	18.55	18.55	N84°50'30"E
C5	464.04	12.27	12.27	N86°44'40"E
C6	444.93	11.86	11.86	N81°06'40"E
C7	444.93	14.41	14.41	N82°50'30"E
C8	444.93	18.56	18.55	N85°00'10"E
C9	444.93	10.08	10.07	N86°50'40"E
C10	464.04	15.79	15.79	N85°00'40"E
C11	464.04	2.76	2.76	N83°52'00"E
C12	463.74	27.24	27.23	N82°00'50"E
C13	444.93	0.30	0.30	N81°53'40"E
C14	444.93	0.30	0.30	N83°47'20"E
C15	463.74	57.98	57.94	N83°55'10"E

NOTE 1
STREETS AND ALLEYS ON REGISTERED PLAN 1230, CLOSED BY BY–LAW No. 9795 AND REGISTERED AS INSTRUMENT No. R1088686.

NOTE 2
SUBJECT TO EASEMENT IN FAVOUR OF THE CORPORATION OF THE CITY OF WINDSOR, THE WINDSOR UTILITIES COMMISSION – WATER DIVISION, ENWIN POWERLINES LIMITED, UNION GAS LIMITED, BELL CANADA AND COGECO CABLE SYSTEMS INC. REGISTERED AS TRANSFER No. LT399974.

NOTE 3
Parts 57 AND 58, Plan 12R–21263
Part of Beverly Glen Street (Closed by CE81383)

OWNER'S CERTIFICATE

THIS IS TO CERTIFY THAT:

1. LOTS 1 TO 62 (INCLUSIVE), BLOCKS 63, 64 AND 65, BLOCKS 66 to 71(inclusive) (0.30 RESERVES) & THE STREETS NAMELY BEVERLY GLEN STREET AND IVANHILL AVENUE HAVE BEEN LAID OUT IN ACCORDANCE WITH OUR INSTRUCTIONS.

2. THE STREETS ARE HEREBY DEDICATED AS PUBLIC HIGHWAYS TO THE CORPORATION OF THE CITY OF WINDSOR.

DATED THE 22nd DAY OF JANUARY, 2013.

1027458 ONTARIO INC.

JENNY GOOD, SECRETARY–TREASURER
"I HAVE THE AUTHORITY TO BIND THE CORPORATION"

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THIS SURVEY WAS COMPLETED ON THE 31st DAY OF JULY, 2012

DATE JANUARY 22, 2013

ROY A. SIMONE
ONTARIO LAND SURVEYOR
for VERHAEGEN STUBBERFIELD HARTLEY BREWER BEZAIRE INC.

WINDSOR
475 Devonshire Road, Suite 200
N8Y 2L5
Ph: (519)258-1772
Fax: (519)258-1791

VERHAEGEN STUBBERFIELD HARTLEY BREWER BEZAIRE INC.
ONTARIO LAND SURVEYORS

LEAMINGTON
187 Talbot Street East
N8H 1L8
Ph: (519)322-2375
Fax: (519)322-2675

www.vshbbsurveys.com

DRAWN BY: N.M.G. CHECKED BY: RAS
CAD Date: January 22, 2013 8:58:50 AM
CAD File: 42585900oSUB'Dd.dwg
WORK ORDER: 4–25859 FILE NO.: S–309'A'(WIND) PLAN FILE NO.: J–528'B'

5.4 HOLDING ZONE PROVISIONS

5.4.1 The purpose of the holding zone is to defer development or redevelopment until such time as specified conditions have been satisfied. A holding zone may supplement, alter, add or remove any of the By-law provisions affecting the use of the land.

5.4.10 Where the H symbol precedes any *zoning district* symbol or a specific zoning exception, a *use*, *building* or *structure* is prohibited except:

.1 For any *use*, *building* or *structure* erected, operated or maintained by the *City of Windsor*, a *public authority* or a *public utility*;

.2 For an *existing use*, *building* or *structure* that is permitted by the applicable *zoning district* or a specific zoning exception that the H symbol precedes, additions or alterations to *existing buildings* are permitted and/or structures and accessory buildings may be erected, provided such additions, alterations, structures, or accessory buildings are in accordance with the provisions of the *zoning district*, specific zoning exception and all other provisions of this by-law.

5.4.15 It is the responsibility of the property owner or their designate to satisfy the conditions of the holding zone and to make application to remove the H symbol.

5.4.20 Where the H symbol precedes a *zoning district* symbol or a specific zoning exception, the H symbol may be removed when the following conditions are satisfied:

.1 The property is on a registered plan of subdivision or condominium, subject to a part lot control exemption by-law or subject to an approved consent to sever by the Committee of Adjustment;

.2 A street paved to the satisfaction of the City Engineer, municipal storm water outlet, municipal sanitary sewer, municipal electrical service and municipal water service are available or an agreement to provide the aforementioned items is registered on title to the property;

.3 Where required by legislation, full compliance with remediation/mitigation recommendations in a required study, report or plan to the satisfaction of the appropriate approval authority, or an agreement registered on title to the property to comply with the remediation/mitigation recommendations;

.4 Where required, a site plan control agreement is registered on title to the property; and

.5 Other holding zone conditions contained within an approved amending zoning By-law.

Essex Region Conservation
the place for life

planning@erca.org
P.519.776.5209
F.519.776.8688
360 Fairview Avenue West
Suite 311, Essex, ON N8M 1Y6

August 15, 2022

Mr. Jim Abbs, Senior Planner
City of Windsor
350 City Hall Square West, Suite 210
Windsor, Ontario, N9A 6S1

Dear Mr. Abbs:

RE: Request for Comments
Draft Plan of Subdivision (SDN-001-22)
Zoning By-Law Amendment (Z-027-22 [ZNG 6832]) & OPA 163 [OPA 6833]
0 BEVERLY GLEN ST
ARN 373906046021945, 373906046022045, 373906046021845;
PIN: 015961168, 015961169, 015961167
Applicant: 1027458 ONTARIO INC

Our office has reviewed this proposal based on the mandate of the Essex Region Conservation Authority and the following comments are provided.

The proposed development includes the construction of 117 townhome dwellings, and two 2 new rights-of-way, consisting of the extensions of Thunderbay Avenue and Ivanhill Avenue. The proposed development also includes a Greenway, which overlays the existing easement containing a trunk sewer that crosses the site. An Official Plan Amendment is proposed to change the land use designation on a portion of the subject site from Open Space and School Site to Residential Neighbourhood in the East Riverside Planning Area. The area set aside for School Sites were previously zoned to HRD2.3 to permit the same uses as those that currently exist in the North Neighbourhood Area. The former school sites that make up remainder of the subject site is designated as Residential Neighbourhood.

DELEGATED RESPONSIBILITY TO REPRESENT THE PROVINCIAL INTEREST IN NATURAL HAZARDS (PPS) AND REGULATORY RESPONSIBILITIES OF THE CONSERVATION AUTHORITIES ACT

The following comments reflect our role as representing the provincial interest in natural hazards, as outlined by Section 3.1 of the *Provincial Policy Statement* of the *Planning Act,* as well as our regulatory role, as defined by Section 28 of the *Conservation Authorities Act.*

The above noted lands are subject to our *Development, Interference with Wetlands and Alteration to Shorelines and Watercourses Regulation under the* Conservation Authorities Act *(Ontario Regulation No. 158/06)*. The parcel falls within the regulated area of the Little River and Detroit River / Lake St. Clair.

The property owner will be required to obtain a Permit and/or Clearance from the Essex Region Conservation Authority, prior to any construction or site alteration or other activities affected by Section 28 of the *Conservation Authorities Act.*

Essex Region Conservation Authority
sustaining the place for life

Mr. Abbs
August 15, 2022

WATERSHED BASED RESOURCE MANAGEMENT AGENCY

The following comments are provided in an advisory capacity as a public commenting body on matters related to watershed management.

SECTION 1.6.6.7 Stormwater Management (PPS, 2020)

ERCA has concerns with the potential impact of the quality and quantity of runoff in the downstream watercourse due to the proposed development on this site.

ERCA recommends that stormwater quality and stormwater quantity will need to be addressed up to and including the 1:100 year storm event and be in accordance with the guidance provided by the *Stormwater Management Planning and Guidance Manual, prepared by the Ministry of the Environment (MOE, March 2003) and the "Windsor-Essex Region Stormwater Management Standards Manual"*.

We therefore request inclusion of the following draft conditions be included in the Notice of Decision and implementing Subdivision / Development Agreement:

1.That the subdivision agreement, between the Owner and the Municipality, contain provisions, to the satisfaction of the Municipality and the Essex Region Conservation Authority, that stipulates, that prior to obtaining final approval, for any phase of the development, that the Owner, will finalize an engineering analysis, to identify stormwater quality and quantity measures, as necessary to control any increase in flows in downstream watercourses, in accordance with the *Windsor-Essex Region Stormwater Management Standards Manual* and any other relevant municipal/provincial, standards or guidelines, in consultation with the ERCA;

2.That the subdivision agreement between the Owner and the Municipality contain provisions, that requires, that the Owner, installs the stormwater management measures, for any phase of the development, identified in the final engineering analysis completed, as part of the development for the site and undertake to implement the recommendations contained therein, to the satisfaction of the Municipality and the Essex Region Conservation Authority;

3.That prior to final approval the Essex Region Conservation Authority shall require a copy of the fully executed subdivision agreement between the Owner and the Municipality, in wording acceptable to the Essex Region Conservation Authority, containing provisions to carry out the recommendations of the final plans, reports and requirements noted above; and

4.That prior to undertaking construction or site alteration activities, any necessary permits or clearances, be received, from the Essex Region Conservation Authority, in accordance with Section 28 of the *Conservation Authorities Act.* If the works are located within an area, not regulated by Section 28 of the *Conservation Authorities Act*, then a Development Review Clearance, must be obtained from the Essex Region Conservation Authority, prior to undertaking construction or site alteration activities.

Mr. Abbs
August 15, 2022

PLANNING ADVISORY SERVICE TO PLANNING AUTHORITIES - NATURAL HERITAGE POLICIES OF THE PPS, 2020

The following comments are provided from our perspective as an advisory service provider to the Planning Authority on matters related to natural heritage and natural heritage systems, as outlined in Section 2.1 of the *Provincial Policy Statement* of the *Planning Act*. The comments in this section do not necessarily represent the provincial position and are advisory in nature for the consideration of the Planning Authority.

We note that the subject property is adjacent to (within 120 m of) a natural heritage feature that may meet the criteria for significance under the PPS. Section 2.1.8 of the PPS, 2020 states – *"Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5 and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions."*

Our information indicates that the subject property may support habitat of endangered species and threatened species. As per Section 2.1.7 of the PPS, 2020 – "*Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements*". All species listed as endangered or threatened (aquatic species, plants, mammals, birds, reptiles, amphibians, etc.) as well as their related habitats, are protected under the Ontario *Endangered Species Act*.

Prior to initiating any proposed works on this property, it is the proponent's responsibility to contact the Species at Risk Branch of the Ontario Ministry of Environment, Conservation & Parks (MECP) to ensure all issues related to the *Endangered Species Act* are addressed. All inquiries regarding the *Endangered Species Act* should be made with Permissions and Compliance Section of the MECP (e-mail address: SAROntario@ontario.ca).

FINAL RECOMMENDATION

We have no objections to the development applications at this time, subject to the draft conditions noted above for the draft plan of subdivision.

We do ask that the City, in this case, to forward a copy of the Notice of Decision, Notice of Passing and Notice of Adoption for our records. If you have any questions or require any additional information, please contact the undersigned.

Sincerely,

Kim Darroch

Kim Darroch, B.A.(Hons.), M.PL., RPP, MCIP
Team Lead, Planning Services
/kd

Essex Region Conservation Authority
sustaining the place for life

From: Paul Charbachi <Paul_Charbachi@viarail.ca>
Sent: Wednesday, March 1, 2023 3:37 PM
To: Dama, Janice <jdama@citywindsor.ca>
Subject: RE: PUBLIC NOTICE: Z 027-22 [ZNG-6832] & OPA 163 [OPA-6833] & SDN 001-22 [SDN-6834] - 1027458 ONTARIO INC. - NE CORNER FLORENCE & BEVERLY GLEN Clerk's Files: Z/14458 & ZO/13950

Hello,
The Applicant must submit engineering drawings signed and sealed by a certified professional. The engineering drawings will be reviewed by an engineering firms designated by VIA at the Applicant's expenses.
The Applicant must also submit locates to VIA. The locates must be submitted to VIA electronically and physically. The Applicant must meet the following requirements:

- **Transport Canada**:
- *Railway Safety Act*, Part III, Sections 24 and 25.
- **For Clearance**:
- *Railway Right of Way Access Control Policy*;
- *Wire Crossings and Proximities Regulations* – C.R.C., c. 1195;
- *Standards Respecting Railway Clearances* – TC E-05;
- Notice of Railway Works Regulations, a copy of the notice must be sent to VIA.

- **Traffic control near a railways**:
- *Circular 13 Railway Association of Canada*

For Grade Crossings:

- *Grade Crossings Regulations*;
- The provisions that must be adhered to with respect to the creation of new entrance ways or intersecting roads from the nearest rail. Reference GCR Sub-Section 101(1) and Grade Crossings Standards Article 11.
- *Grade Crossings Standards*;
- *Transport Canada Standard for LED Signals Modules at Highway/Railway Grade Crossings* – TC E-14;
- *Minimum Railway/Road Crossing Sightline Requirements for All Grade Crossings Without Automatic Warning Devices* – G4-A.
- The requirements surrounding sightlines, of which any construction or activities (Duplex development) on the property or new properties must ensure they do not obstruct the required minimum grade crossing sightlines. (reference Section 21 of the GCR).

- **Canadian Standards Association**:
- CAN/CSA C22.3 No. 1 – Overhead Systems;
- CAN/CSA C22.3 No. 7 - Underground Systems;
- CAN/CSA Z662 – Oil and Pipeline Systems;
- CAN/CSA-B137.4 - Polyethylene Piping Systems for Gas Services.

- **VIA**:
- *Buried Signal and Communication Guidelines*;
- *Guidelines for New Development*;
- *guidance which the Federation of Canadian Municipalities (FCM) has created on this topic specifically, you can find their guidance within the following link: Guidelines for New Development in Proximity to Railway Operations.*
- Adjacent landowners, buildings and overhead structures are not allowed to drain or modify existing drainage ways to divert water onto railway property without a hydraulic study and approval of the VIA Rail Infrastructure Department;
- All loads must be in compliance with Cooper E90;

- **The Federation of Canadian Municipalities and the Railway Association of Canada**:
- *Guidelines for New Development in Proximity to Railway Operations*.
- **Other**:
- Proper fencing must be included or planned to be installed in order to avoid any trespassing or intrusions into the VIA right-of-way;
- All fence maintenance will be done on the Applicant expense.

In addition, the Applicant must comply with the following areas of concern for which VIA request information, reassurances and/or commitments with regards to the application:

- **Utilities**:
- Electrical and Gas Supply

VIA would like assurances from the City and the Applicant that the new development will not negatively impact on the capacity, availability, stability of the supply and future growth capability thereof.

- Communications

VIA would like assurances from the City and the Applicant, that the new development will not impact VIA's operations as a result of potential alterations to the existing cellphone towers or any other fibre-optic infrastructures supplying the VIA station and property.

- **Water & Wastewater**:
- Drainage Sanitary/Storm

VIA would like assurances that the new development will not limit or interfere with its operations, specifically the main sanitary drainage that runs South-to-North from the Train Yards, through VIA's property towards the proposed development. Refer to the blue dashed line of Exhibit A, attached to this letter.

- Water supply

VIA would like assurances that the new development will not affect the supply and water pressure that is provided for the station.

- **Construction Disturbances**:
- VIA requests a copy of the Pedestrian study (from New Development to LRT).
- VIA is concerned by the flow of people that will go through our premises (either interior or exterior) to access the LRT station.
- Station access (vehicle traffic)

Confirmation that the New Development access/exits, and traffic volumes will not affect or interfere VIA traffic circulation. VIA also needs confirmation that Avenue L (yellow dotted line shown on Exhibit A), as well as the access to it, will be kept for our operations and upcoming growth.

- **Neighbour Relationships**:
- VIA requests the Applicant's monitoring and management plan of the impacts of its construction, including but not limited to:
- Air contaminants / Dust pollution;
- Noise pollution / Working hours;
- Existing conditions;
- and the impacts of vibrations.
- VIA requests the Applicant's communication and management plan for future tenants and or owners of the project with respect to VIA's active train station nearby, that may produce one or more of, but not limited to, the following: emission of noise, dust, vibration, fumes, odours and other gaseous or non-gaseous emissions that may affect the enjoyment of the development for which VIA shall not be held responsible.

VIA requests the Applicant's commitment to making all efforts not to interfere with VIA's operations, VIA's track infrastructure or use of VIA property. When in the vicinity of VIA property or Railway right-of-way, VIA requests the Applicant commitment to comply with and conform to all VIA, Department of Transport and Canadian Transportation Agency rules and regulations, or any other authority having jurisdiction.

When and where the City's or the Applicant's actions, whether direct or indirect, negatively impact any of the above, VIA's operations, and or VIA's property, VIA wants assurances from the City and

the Applicant that they will take all necessary and possible steps to mitigate or eliminate those impacts.

In light of our requests, VIA requires the City and the Applicant to indemnify VIA against any and all claims, damages or proceedings (including legal costs and other costs and expenses) that may arise in relation to the non-compliance to any condition contained in this letter.

Should you have any questions or concerns, please feel free to contact the undersigned.

Sincerely,

Paul Charbachi
Infrastructure Engineer
M: 514-607-5833
Paul_Charbachi@viarail.ca

From: Dama, Janice
To: Vacheresse, Christina
Subject: RE: PUBLIC NOTICE: Z 027-22 [ZNG-6832] & OPA 163 [OPA-6833] & SDN 001-22 [SDN-6834] - 1027458 ONTARIO INC. - NE CORNER FLORENCE & BEVERLY GLEN Clerk"s Files: Z/14458 & ZO/13950
Date: Thursday, March 2, 2023 8:41:56 AM

From: Ontario Lands <ONTLands@enbridge.com>
Sent: Thursday, February 9, 2023 2:42 PM
To: Dama, Janice <jdama@citywindsor.ca>
Subject: RE: PUBLIC NOTICE: Z 027-22 [ZNG-6832] & OPA 163 [OPA-6833] & SDN 001-22 [SDN-6834] - 1027458 ONTARIO INC. - NE CORNER FLORENCE & BEVERLY GLEN Clerk's Files: Z/14458 & ZO/13950

Thank you for your correspondence with regards to draft plan of approval for the above noted project.

It is Enbridge Gas Inc.'s request that as a condition of final approval that the owner/developer provide to Enbridge the necessary easements and/or agreements required by Enbridge for the provision of gas services for this project, in a form satisfactory to Enbridge.

Should you require any further information, please contact the undersigned.

Barbara M.J. Baranow
Analyst Land Support

Enbridge Gas Inc.
50 Keil Drive North, Chatham, ON N7M 5M1

Integrity. Safety. Respect.

From: Dama, Janice <jdama@citywindsor.ca>
Sent: Thursday, February 9, 2023 2:35 PM
To: 'Bell Canada' <circulations@wsp.com>; "Circulations Intake, MMM Group Limited ' ' <circulations@mmm.ca>; 'Cogeco Cable – Daniel Haggins' <Daniel.Haggins@cogeco.com>; "Conseil Scolaire Viamonde (French Public School Board) ' ' <planification@csviamonde.ca>; "CSC Providence' ' <blanjean@cscprovidence.ca>; Ontario Lands <ONTLands@enbridge.com>; "ERCA ' ' <planning@erca.org>; "Marvio Vinhaes ' ' <tsd@enwin.com>; "Ontario Power Generation ' ' <Executivevp.lawanddevelopment@opg.com>; "Shelley Armstrong, Superintendent of Business (Public School Board) ' ' <Shelley.Armstrong@publicboard.ca>; "Terry Lyons, Dir. of Ed. Catholic School Board ' ' <director@wecdsb.on.ca>; Paulic, Walter <wpaulic@citywindsor.ca>
Subject: [External] PUBLIC NOTICE: Z 027-22 [ZNG-6832] & OPA 163 [OPA-6833] & SDN 001-22 [SDN-6834] - 1027458 ONTARIO INC. - NE CORNER FLORENCE & BEVERLY GLEN Clerk's Files: Z/14458 & ZO/13950

Janice Dama | Development Applications Clerk

THE CITY OF WINDSOR
ONTARIO, CANADA

Council Services Department
350 City Hall Square West, Room 530
Windsor, ON N9A 6S1
Telephone (519) 255-6345, Fax (519) 255-6868
www.citywindsor.ca

---------- Forwarded message ---------
From: **Rafal Bulgarski (Personal)** <
Date: Mon, Mar 6, 2023 at 12:37 PM
Subject: Regarding: Official Plan and Zoning By-law 8600
To: <clerks@citiywindsor.ca>

Re: File numbers OPA 163 [OPA/6833], Z 027/22 [ZNG/6832] and SDN 001-22 [SDN/6834]

To Standing Committee,

Regarding the proposed changes to the zoning of the currently green space, please accept this email as our opposition to this change.

Monika, my wife, and I have moved to the East Riverside area with our four kids specifically due to the amount of green space available and the ability to enjoy this space with our kids. The green spaces are the most attractive aspect of our community. Many of our neighbours hold the same views and moved here for the same reasons. Taking away and reducing any amount of the green spaces will take away from the attractiveness of this area and goes against what this community values. There is also plenty of other land that is designated as development land, why do we have to take what is already being used for green space ? Please consider that setting this type of precedence is not something that should be taking lightly.

Regards,

Monika & Rafal Bulgarski
575 Bellagio Dr.
Windsor, ON
N8P 1J9

THE CITY OF WINDSOR ONTARIO, CANADA

Committee Matters: SCM 87/2023

Subject: Closure of part of E. C. Row Avenue East right-of-way, west of Banwell Road, Ward 9, SAS-6835

Moved by: Councillor Kieran McKenzie
Seconded by: Councillor Angelo Marignani

Decision Number: **DHSC 486**

I. That the portion of E. C. Row Avenue East right-of-way shown on Drawing No. CC-1819 (*attached* hereto as Appendix "A") and described as Parts 12, 13, 15 & 26 on the Draft Reference Plan (*attached* hereto as Appendix "B"), and hereinafter referred to as the "Subject Lands"**, BE ASSUMED** for subsequent closure;

II. That the Subject Lands **BE CLOSED AND RETAINED** by The Corporation of the City of Windsor and as necessary, in a manner deemed appropriate by the City Planner, subject to the following:
   a. Easements over Part 15 on the Draft Reference Plan being granted to the following parties, subject to their being accepted in the City's standard form and in accordance with the City's standard practice:
      i. Bell Canada to protect aerial and buried facilities running parallel to the north of the existing two-lane asphalt road.
      ii. EnWin Utilities Ltd. to accommodate existing hydro pole line with 27,600-volt primary electrical power circuit.

III. That prior to the closure of the Subject Lands, the Site Plan Agreement for Site Plan Control File No. SPC-2022-11, **BE AMENDED** to add a Special Provision requiring NextStar Energy Inc. to enter into an Access Agreement with Emergency Services (Essex-Windsor EMS, Windsor Fire & Rescue Services and Windsor Police Service), permitting Emergency Services the right to access the Twin Oaks Business Park through the NextStar Energy EV Battery Plant site in the event that the other area roads are impassable.

IV. That The City Planner **BE REQUESTED** to supply the appropriate legal description, in accordance with Drawing No. CC-1819 and the Draft Reference Plan.

V. That the City Solicitor **BE REQUESTED** to prepare the necessary by-law(s).

VI. That the matter **BE COMPLETED** electronically pursuant to By-law Number 366-2003.

VII. That the following City of Windsor vacant parcel **BE DECLARED** surplus: Municipal address: 3501 Banwell Road (vacant land situated on the south side of E. C. Row Avenue East, east of 9455 Anchor Drive) Legal Description: Part 3 on the Draft Reference PlanApproximate Lot size: 29.46 metres by 7.37 metres by 29.66 metres by 7.39 metresLot area: 218.0 square metres.

VIII. That the City Solicitor **BE AUTHORIZED** to prepare a by-law to dedicate Part 3 on the Draft Reference Plan as part of the public highway known as E. C. Row Avenue East to facilitate the construction of a cul-de-sac.

Carried.

Report Number: C 155/2022
Clerk's File: SAA2023

Clerk's Note:

1. The recommendation of the Development & Heritage Standing Committee and Administration are the same.

2. Please refer to Item 11.1 from the Development & Heritage Standing Committee held on March 6, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: https://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230306/-1/9395

Subject: Closure of part of E. C. Row Avenue East right-of-way, west of Banwell Road, Ward 9, SAS-6835

Reference:

Date to Council: March 6, 2023
Author: Brian Nagata, MCIP, RPP
Planner II - Development Review
(519) 255-6543 ext. 6181

Planning & Building Services
Report Date: February 21, 2023
Clerk's File #: SAA2023

To: Mayor and Members of City Council

Recommendation:

I. THAT the portion of E. C. Row Avenue East right-of-way shown on Drawing No. CC-1819 (*attached* hereto as Appendix "A") and described as Parts 12, 13, 15 & 26 on the Draft Reference Plan (*attached* hereto as Appendix "B"), and hereinafter referred to as the "Subject Lands"**, BE ASSUMED** for subsequent closure;

II. THAT the Subject Lands **BE CLOSED AND RETAINED** by The Corporation of the City of Windsor and as necessary, in a manner deemed appropriate by the City Planner, subject to the following:

   a. Easements over Part 15 on the Draft Reference Plan being granted to the following parties, subject to their being accepted in the City's standard form and in accordance with the City's standard practice:

      i. Bell Canada to protect aerial and buried facilities running parallel to the north of the existing two-lane asphalt road.
      ii. EnWin Utilities Ltd. to accommodate existing hydro pole line with 27,600-volt primary electrical power circuit.

III. That prior to the closure of the Subject Lands, the Site Plan Agreement for Site Plan Control File No. SPC-2022-11, **BE AMENDED** to add a Special Provision requiring NextStar Energy Inc. to enter into an Access Agreement with Emergency Services (Essex-Windsor EMS, Windsor Fire & Rescue Services and Windsor Police Service), permitting Emergency Services the right to access the Twin Oaks Business Park through the NextStar Energy EV Battery Plant site in the event that the other area roads are impassable.

IV. THAT The City Planner **BE REQUESTED** to supply the appropriate legal description, in accordance with Drawing No. CC-1819 and the Draft Reference Plan.

V. THAT The City Solicitor **BE REQUESTED** to prepare the necessary by-law(s).

VI. THAT the matter **BE COMPLETED** electronically pursuant to By-law Number 366-2003.

VII. THAT the following City of Windsor vacant parcel **BE DECLARED** surplus:

Municipal address: 3501 Banwell Road (vacant land situated on the south side of E. C. Row Avenue East, east of 9455 Anchor Drive) Legal Description: Part 3 on the Draft Reference PlanApproximate Lot size: 29.46 metres by 7.37 metres by 29.66 metres by 7.39 metresLot area: 218.0 square metres.

VIII. THAT the City Solicitor **BE AUTHORIZED** to prepare a by-law to dedicate Part 3 on the Draft Reference Plan as part of the public highway known as E. C. Row Avenue East to facilitate the construction of a cul-de-sac.

Executive Summary:

N/A

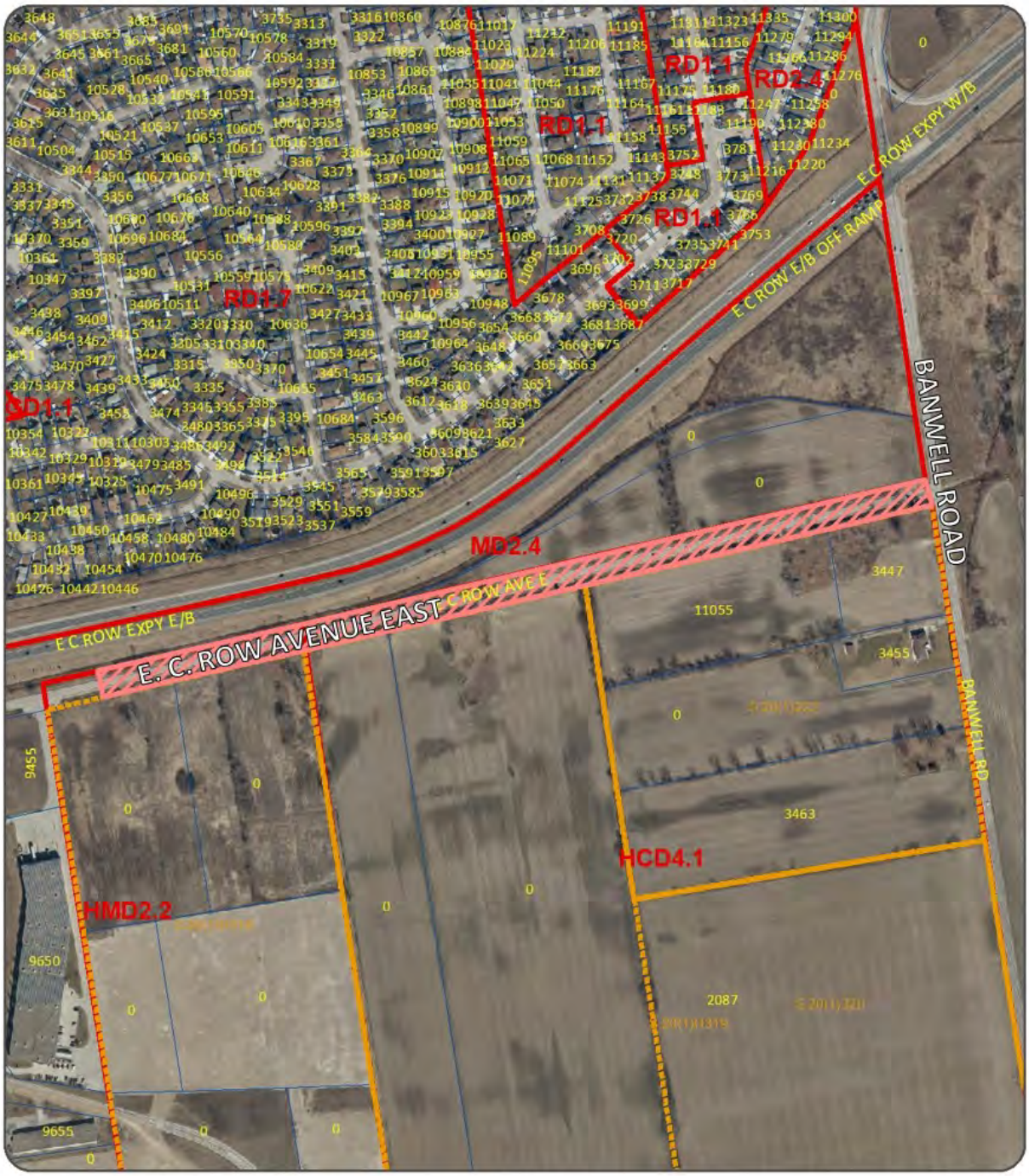


Figure 1 - Location Map

Background:

The City finalized the *Banwell Corridor Class Environmental Assessment Study* (EA) on September 30, 2016. The primary purpose of the EA was to investigate ways to improve the transportation corridor along Banwell Road from Tecumseh Road East to the City limit at the Town of Tecumseh. The EA's recommended preliminary road design includes the construction of a new interchange at Banwell Road and E. C. Row Expressway. This will require the removal of the E. C. Row Avenue East intersection with Banwell Road. The proposed closure of E. C. Row Avenue East that is the subject of this report, facilitates that process.

The City through negotiations with NextStar Energy Inc. (NextStar) agreed to include the E. C. Row Avenue East right-of-way and remnant lands to the north as part of the site for the proposed NextStar Energy EV Battery Plant (EV Plant). This consequently required the City to proceed with an application to close the right-of-way prior to the construction of the future interchange at Banwell Road / E. C. Row Expressway as identified in the EA.

The E.C. Row Avenue right-of-way is composed of a two-lane asphalt road with a parallel running municipal drain (Gouin Drain) to the south. The right-of-way is designated as a Class II Collector Road on *Schedule F: Roads and Bikeways* to the *Official Plan* and serves as one of two vehicular access points to the Twin Oaks Business Park (Business Park). The Business Park is described as those lands north of the Canadian Pacific Railway corridor, east of Lauzon Parkway, south of E. C. Row Expressway and west of the EV Plant site. The right-of-way contains utility poles with guy wires and anchors, culverts over the Gouin Drain, and heavy vegetation in a natural state along the Gouin Drain. (See Site Photos ***attached*** hereto as **Appendix "D"**)

The closure includes an approximately 870.0 metre portion of the 26.38-metre-wide E. C. Row Avenue East right-of-way (described as Parts 12 to 15 & 26 on the Draft Reference Plan), which is essential for the construction of the EV Plant.

The EV Plant is an integral component in positioning the Canadian economy for success in a low-carbon world. The EV Plant will secure a strong electric vehicle battery supply chain for Stellantis' North American manufacturing facilities, position Canada as a global leader in the production and distribution of electric vehicle batteries, support the development of a sustainable domestic battery manufacturing sector in Canada, and provide approximately 2,500 well-paying jobs with local economic spinoff.

NextStar is a joint venture between Stellantis and LG Energy Solution. The City is leasing the right-of-way and abutting lands to NextStar for the construction and operation of the EV Plant, with an option to purchase as a condition of the lease. The lease will exclude the approximately 9.07-metre-wide strip of land within the right-of-way (described as Part 14 on the Draft Reference Plan) and lands bordering the north boundary of the EV Plant site (described as Parts 22 to 25 on the Draft Reference Plan) required for the multi-use pathway identified in the Active Transportation Master Plan - May 2019. The City will also be excluding from the lease the 0.30 metre reserve shown as Parts 19 to 26 on the Draft Reference Plan.

The EV Plant received Site Plan Approval on August 22, 2022 (File No. SPC-2022-11). The approved Site Plan includes the removal of the E. C. Row Avenue East and Banwell Road intersection, together with the construction of a private road network connecting to Banwell Road and Twin Oaks Drive. The approved Site Plan also includes the construction of a cul-de-sac at the new easterly terminus of E. C. Row Avenue East.

The City issued a hoarding permit on August 25, 2022 (File No. PW 22-137523), granting the temporary closure of the right-of-way from August 25, 2022, to December 31, 2022. The temporary closure was necessary to allow the commencement of site works for the construction of the EV Plant to remain on schedule, while the Planning Department processed the street closure application. The City issued a three-month extension to the hoarding permit on December 13, 2022, to allow for site works to carry on while the Planning Department continues to process the said application. The additional time was necessary to allow for the Planning Department to affectively answer questions raised through consultation with Municipal Departments, external agencies and Business Park property owners. The Lauzon 10 has been rerouted for the duration of the temporary closure and no longer serves the Business Park as a result of previously recorded low levels of ridership.

Discussion:

The decision to recommend closure of a right-of-way is derived from the City's *Classification of Alleys and Suitability for Closure* guideline document (the document), **attached** hereto as **Appendix "F"**. The document details four classifications of right-of-ways based on their usefulness and provides corresponding criteria for determining suitability for closure.

Classification of Public Right-of-Ways

The initial step is to determine if the right-of-way is indispensable. This is achieved through the evaluation of the following criteria set forth in Section 1 of the document.

Right-of-Way:

1. *Does the right-of-way serve commercial properties*?

    a. The right-of-way indirectly serves commercial properties within the Business Park as a secondary means of vehicular access.

        - The right-of-way provides one of two vehicular accesses to the Business Park.
        - None of the commercial properties have frontage on the right-of-way, nor do they have vehicular access off it via another property.
        - In some instances, the closure will add to the travel distance to the Business Park for vehicles traveling from the east.

            - There are currently no short-term solutions for mitigation.
            - One long-term solution includes substantial improvements to Lauzon Parkway and County Road 42, proposed under the

approved *Lauzon Parkway Improvements Class Environmental Assessment Study*, completed on January 20, 2014, together with significant improvements to Banwell Road proposed under the EA.

- These upgrades are anticipated to improve traffic flow to and from the Business Park.

- A second potential long-term solution includes the extension (re-establishment) of Lauzon Road from just south of the Canadian Pacific Railway corridor to Munich Court.

    - This extension would require clearance from the Canadian Pacific Railway to construct a grade crossing, underpass or overpass through their rail corridor, clearance from the Ministry of the Environment, Conservation and Parks for Species at Risk, clearance/permit from the Essex Region Conservation Authority (ERCA), clearance from the City's Drainage Superintendent, undertaking of multiple engineering plans/reports/studies, Council approval, and funding.
    - Administration would require direction from Council to pursue establishing a second access to the Business Park.
    - This extension translates to a minimal reduction in travel distance, and potentially an increase in travel times due to Lauzon Road having a maximum posted speed limit of 50 kilometres per hour, which is likely not to be increased.

- The large scale of the EV Plant makes it unfeasible to extend Twin Oaks Drive to Banwell Road.
- The public's use of the EV Plant's private road network is not an option.

b. The Lauzon 10 service was modified on August 31, 2014, to include transit service to the Business Park. The 2019 Transit Master Plan concluded that the Lauzon 10 has experienced low ridership in the Business Park. As a result, the Plan recommended that the bus route discontinue service to the Business Park due to the low ridership (i.e. 12 passengers on average per day in 2019). The removal of the Lauzon 10 from the Business Park is included as part of Transit Windsor's 2023 budget proposal.
c. Notwithstanding More Than Transit's recommendation, Transit Windsor confirmed that an Alternative Service Delivery model such as on-demand service could be considered in the future if warranted. The City's Engineering Department is working on design concepts for extending Twin

Oaks Drive east of Valtec Court to the EV Plant site, with construction slated for 2023. The design will include a new bus turnaround.

2. *Does the right-of-way serve properties fronting on heavily traveled streets i.e., major arterial routes?* ***NO***

3. *Does the right-of-way contain sewers, and must the alley remain accessible for servicing?* ***NO***

4. *Does the right-of-way serve as the only vehicular means of access to rear parking areas and garages where the property has insufficient lot width for a side drive?* ***NO***

5. *Does the right-of-way contain Fire Department connections that are deemed to be necessary for firefighting access?* ***NO***

6. *Does the right-of-way lie within a Holding zone or other similar undeveloped areas where the right-of-way system is clearly obsolete and has never been developed, but where the City needs to keep its options open until new area plans are prepared and development is imminent?* ***NO***

Based on review of items referenced above, Administration is able to identify the right-of-way as being dispensable and can be recommended for closure.

It is the recommendation of Administration that upon closure, the Corporation of the City of Windsor retain the right-of-way in the manner described in the Recommendation section herein. A 9.07-metre-wide strip of land (described as Part 14 on the Draft Reference Plan) will be excluded from the closure to accommodate the multi-use pathway identified in the Active Transportation Master Plan.

Risk Analysis:

The recommended closure of the right-of-way will divest the City of associated liability risks and maintenance costs.

Climate Change Risks

Climate Change Mitigation:

N/A

Climate Change Adaptation:

N/A

Financial Matters:

The right-of-way as described in the Recommendation section herein is to be retained by the City and is included with the lands being leased for the EV Plant site. Therefore, there is no conveyance cost.

Consultations:

Consultations were held with Emergency Services, Municipal Departments and Utility Companies, which resulted in the information found below and ***attached*** hereto as **Appendix "D"**.

Notice of this application was issued twofold to property owners within the Business Park by regular mail on July 26, 2022, and August 16, 2022. Comments to this application were received from Jamieson Laboratories Ltd., Trillium Machine and Victory Reproductive Care (***attached*** hereto as **Appendix "G"**). The Planning Department met with Jamieson Laboratories Ltd. via Zoom on November 1, 2022, to discuss questions about the closure of the right-of-way raised through their comments.

The Planning Department has summarized all the questions raised through the comments in a table ***attached*** hereto as **Appendix "H"**. The table includes the desired mitigation (if provided) and administrative response to each question. The Planning Department, via emails, has advised the parties of the questions that they feel have been satisfactorily addressed.

The City and NextStar co-hosted a formal Information Session on February 9, 2023, at the WFCU Centre for businesses within the Business Park. The Information Session included presentations by the City and NextStar followed by a question period for the businesses. NextStar's presentation included an overview of their company, facility, project timeline and Site Plan. The City's presentation included an overview of the proposed closure and responses to questions raised through comments received from the businesses. The information session was attended by representatives of 10 businesses.

Notice for this Information Session was issues threefold in the following manner:

1. Mail to all property owners (January 25, 2023)
2. Email to property owners who had not responded to initial Notice (January 31, 2023) *
3. Phone call to remaining property owners who had not responded to previous two (2) Notices (February 7, 2023) **

*Emails were not available for nine (9) of the property owners

**Phone numbers were not available for two (2) of the property owners

Notice of Development & Heritage Standing Committee meeting and Council meeting are published in the Windsor Star prior to each of the meetings. In addition, notice of each of the public meetings will be mailed to the abutting/affected property owners prior to the meetings.

Conclusion:

The Planning Department recommends closure of the right-of-way shown on attached Appendix "B", subject to easements in favour of Bell Canada and EnWin Utilities Ltd.; and other conditions outlined in the recommendation section of this report.

The Planning Department further recommends that the portion of the subject lands required for the cul-de-sac be deemed surplus and dedicated as public highway, as in Recommendations VII and VIII.

Planning Act Matters:

Brian Nagata, MCIP, RPP
Planner II - Development Review

I concur with the above comments and opinion of the Registered Professional Planner.

Michael Cooke, MCIP, RPP *Thom Hunt, MCIP, RPP*
Manager of Policy Planning *City Planner*

I am not a registered Planner and have reviewed as a Corporate Team Leader.

JP *OC*

Approvals:

Name	Title
Michael Cooke	Manager of Planning Policy/Deputy City Planner
Thom Hunt	City Planner / Executive Director, Planning & Development Services
Frank Scarfone	Manager of Real Estate Services
Wira Vendrasco	Deputy City Solicitor, Legal Services & Real Estate
Jelena Payne	Commissioner, Economic Development & Innovation
Onorio Colucci	Chief Administration Officer

Notifications:

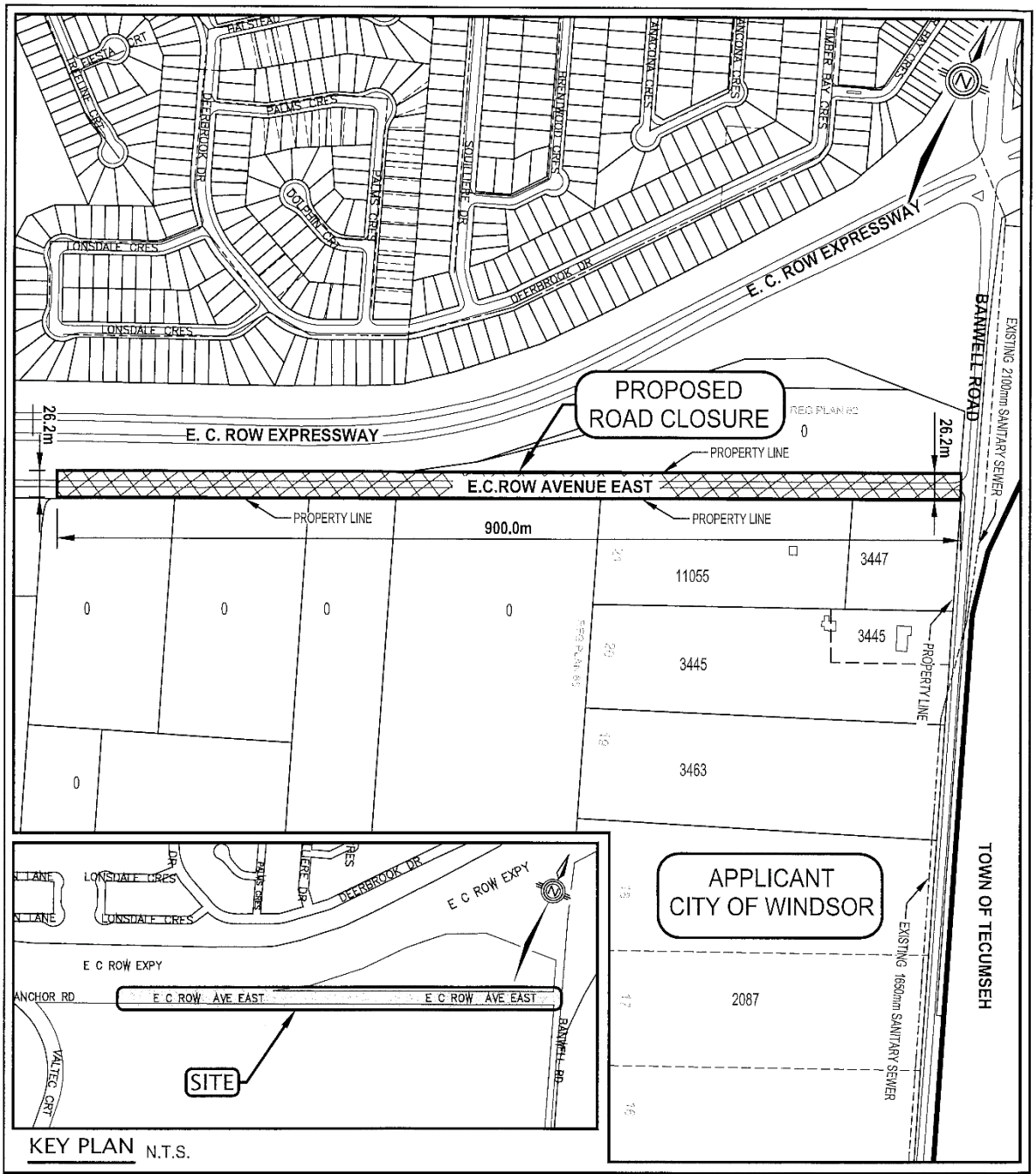
Name	Address	Email
Barry Horrobin (Director of Planning & Physical Resources)	Windsor Police Service Police Headquarters 150 Goyeau Street P.O. Box 60 Windsor, ON N9A 6J5	bhorrobin@windsorpolice.ca
Chris Grant (Deputy Chief)	Essex-Windsor EMS 360 Fairview Avenue West, Suite 218 Essex, ON N8M 1Y6	CGrant@countyofessex.ca
Jason Scott (Supervisor, Planning)	Transit Windsor 3700 North Service Road Windsor, ON N9A 1H7	jscott@citywindsor.ca
Jonathan Wilker (Deputy Chief)	Windsor Fire & Rescue Services 815 Goyeau Street	JWilker@citywindsor.ca

Name	Address	Email
	Windsor, ON N9A 1H7	
Josh Benoit (Operations Manager)	Windsor Central Ambulance Communications Centre 4510 Rhodes Drive, Suite 320 Windsor, ON, N8W 5K5	Josh.Benoit@ontario.ca
Kieran McKenzie (Ward 9 City Councillor)	350 City Hall Square West, Suite 220 Windsor, ON N9A 6S1	kmckenzie@citywindsor.ca
Marc Murphy (Inspector)	Windsor Police Service Police Headquarters 150 Goyeau Street P.O. Box 60 Windsor, ON N9A 6J5	mmurphy@windsorpolice.ca
Mike Coste (Chief Fire Prevention Officer)	Windsor Fire & Rescue Services 815 Goyeau Street Windsor, ON N9A 1H7	mcoste@citywindsor.ca
Ryan Lemay (Deputy Chief)	Essex-Windsor EMS 360 Fairview Avenue West, Suite 218 Essex, ON N8M 1Y6	RLemay@countyofessex.ca
Stephan Habrun (Director, Operations & Planning)	Transit Windsor 3700 North Service Road Windsor, ON N9A 1H7	shabrun@citywindsor.ca
Stephen Laforet (Fire Chief)	Windsor Fire & Rescue Services 815 Goyeau Street Windsor, ON N9A 1H7	slaforet@citywindsor.ca
Tyson Cragg (Executive Director)	Transit Windsor 3700 North Service Road Windsor, ON N9A 1H7	TCragg@citywindsor.ca
List of mailing labels for property owners within Twin Oaks Business Park issued to Clerks office		

Appendices:

Appendix A: Drawing No. CC-1819
Appendix B: Draft Reference Plan
Appendix C: EIS Drawing - Aerial Photo
Appendix D: Consultations with Municipal Departments and Utility Companies
Appendix E: Site Photos
Appendix F: Classification of Alleys and Suitability for Closure
Appendix G: Comments from Twin Oaks Business Park Businesses
Appendix H: Summary of Comments from Twin Oaks Business Park Businesses

APPENDIX "A"
Drawing No. CC-1819



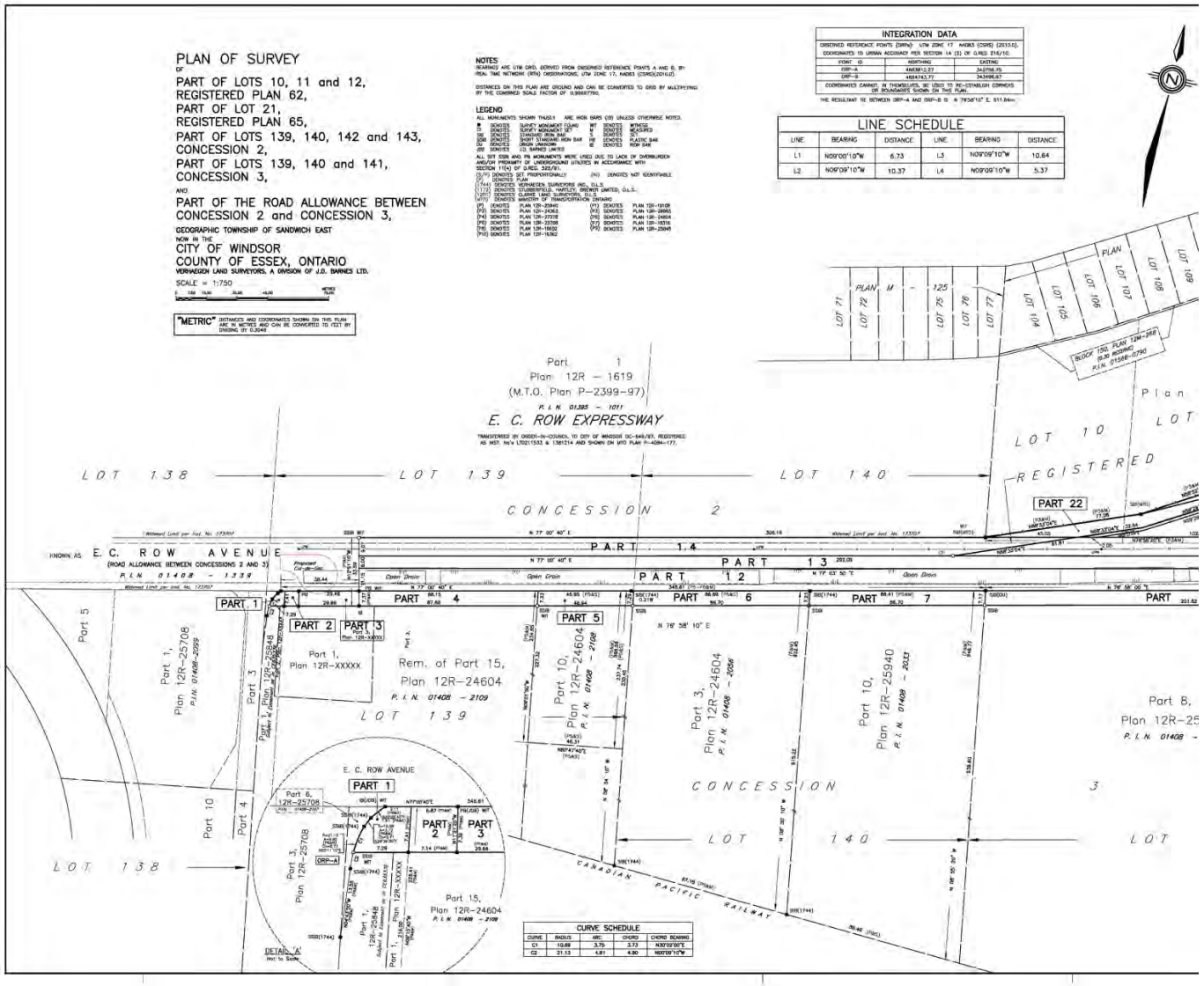
THE CORPORATION OF THE CITY OF WINDSOR - ENGINEERING DEPARTMENT

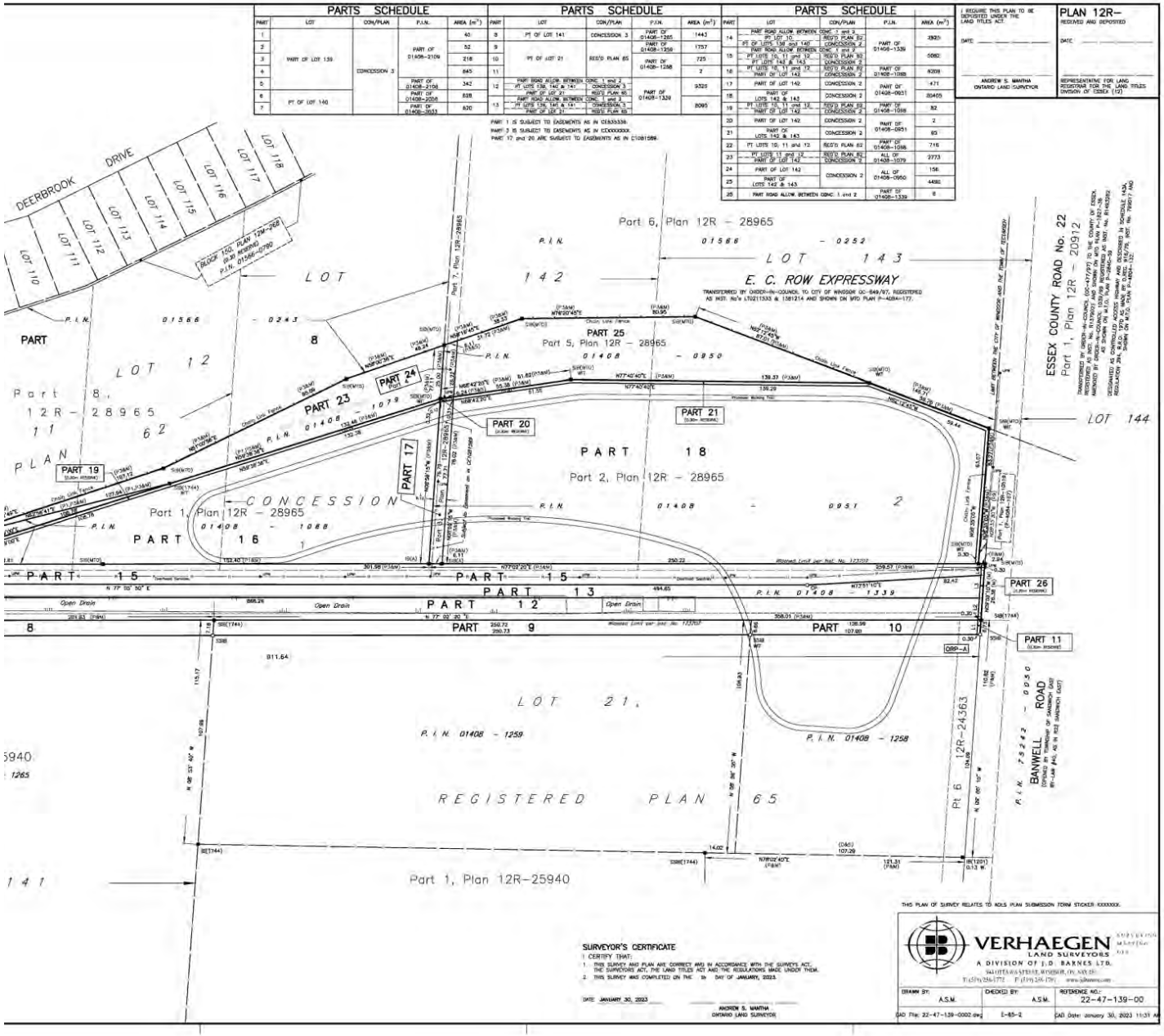
PROPOSED CLOSURE OF E.C. ROW AVENUE EAST

Kirk Tamm, Manager of Geomatics

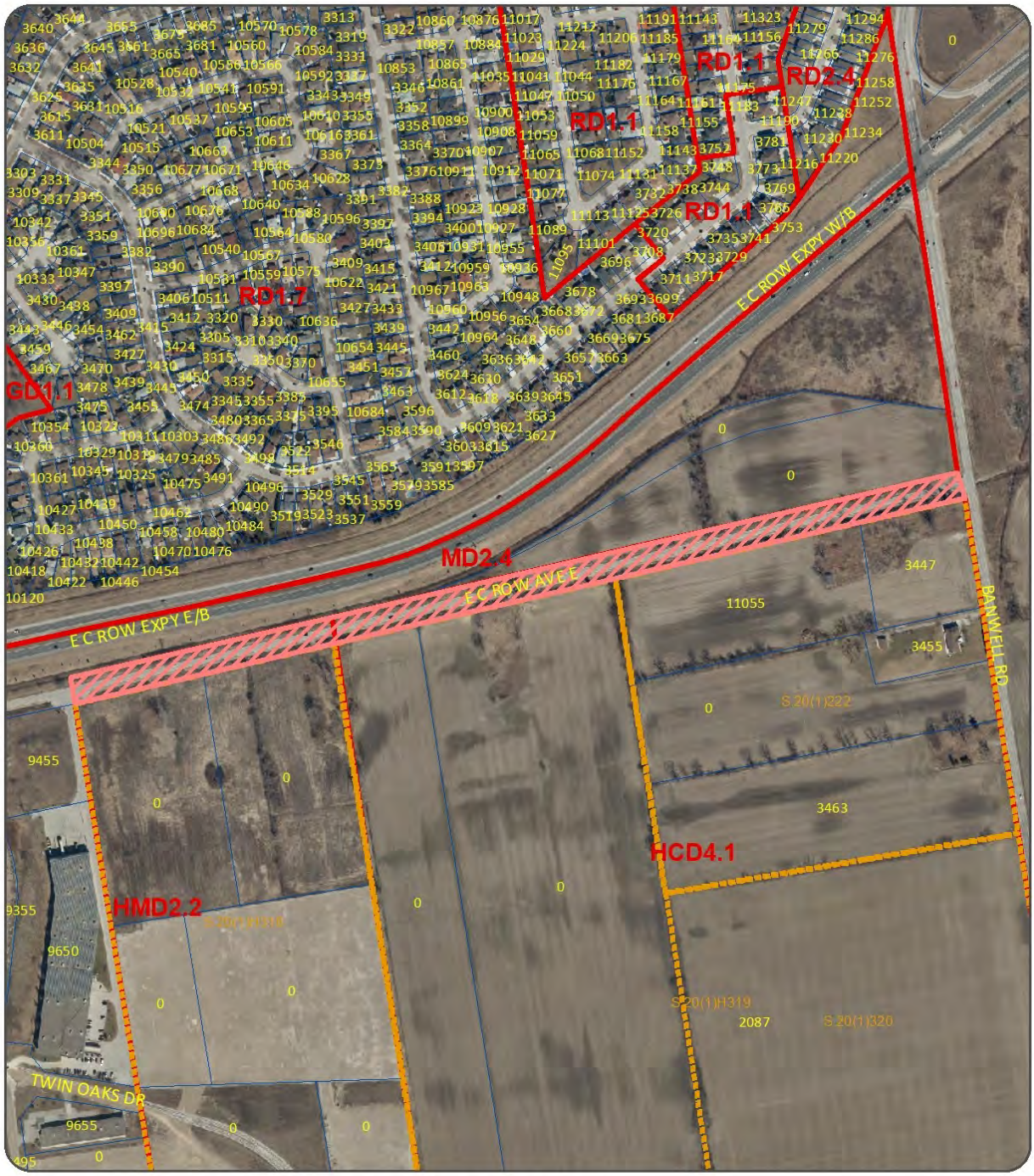
SCALE: 1:5000	DATE: AUGUST 2022	REVISED: —	DWG. NO.
DWN BY: G.P.	CHKD BY: PJU / M.M.	REVISION NO.: —	CC-1819

APPENDIX "B"
Draft Reference Plan




PARTS SCHEDULE
PARTS SCHEDULE
PARTS SCHEDULE
PLAN 12R–
I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.
ANDREW S. MANTHA ONTARIO LAND SURVEYOR
DATE:
RECEIVED AND DEPOSITED
REPRESENTATIVE FOR LAND REGISTRAR FOR THE LAND TITLES DIVISION OF ESSEX (12)
DEERBROOK DRIVE
LOT 110
LOT 111
LOT 112
LOT 113
LOT 114
LOT 115
LOT 116
LOT 117
LOT 118
BLOCK 150, PLAN 12M-968
P.I.N. 01566-0790
LOT 142
LOT 143
LOT 144
E. C. ROW EXPRESSWAY
TRANSFERRED BY ONSD-96-COUNCIL TO CITY OF WINDSOR GC-846/97, REGISTERED AS INST. No's LT0211533 & 1381214 AND SHOWN ON MTO PLAN P-4084-177.
ESSEX COUNTY ROAD No. 22
Part 1, Plan 12R – 20912
PART 6, Plan 12R – 28965
PART 25
Part 5, Plan 12R – 28965
PART 24
PART 23
PART 20
PART 21
PART 18
Part 2, Plan 12R – 28965
PART 19
PART 17
PART 8
Part 8, 12R – 28965
LOT 12
PLAN 62
CONCESSION 1
Part 1, Plan 12R – 28965
PART 16
PART 15
PART 13
PART 12
PART 9
PART 10
PART 26
PART 11
LOT 21
REGISTERED PLAN 65
BANWELL ROAD
Pt 6 12R-24363
Part 1, Plan 12R–25940
SURVEYOR'S CERTIFICATE
I CERTIFY THAT:
1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THIS SURVEY WAS COMPLETED ON THE 16 DAY OF JANUARY, 2023.
DATE: JANUARY 30, 2023
ANDREW S. MANTHA ONTARIO LAND SURVEYOR
THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM STICKER XXXXXXX.
VERHAEGEN LAND SURVEYORS
A DIVISION OF J.D. BARNES LTD.
DRAWN BY: A.S.M.
CHECKED BY: A.S.M.
REFERENCE NO.: 22-47-139-00
CAD File: 22-47-139-0002.dwg
CAD Date: January 30, 2023

APPENDIX "C"
EIS Drawing - Aerial Photo



STREET & ALLEY CLOSING (SAS/6835)

1:5,000

APPLICANT : CITY OF WINDSOR

SUBJECT LANDS

PLANNING DEPARTMENT - PLANNING POLICY

DATE: JULY, 2022

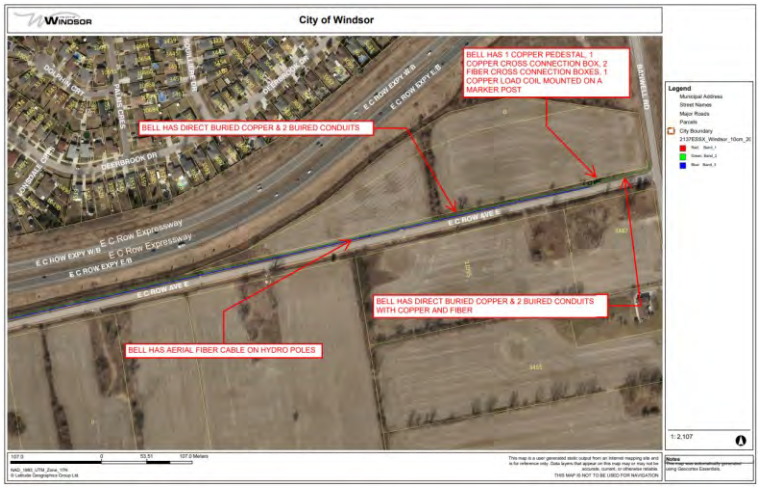
APPENDIX "D"

Consultations with Municipal Departments and Utility Companies

BELL CANADA WSP

It turns out we have far more facilities than I was anticipating, and engineering would prefer a 7.0 m easement. I've included an extra attachment with further details (see below).

[Charleyne Hall, Bell Canada External Liaison]



CANADA POST

No comments provided

COGECO CABLE SYSTEMS INC.

No comments provided

ENBRIDGE (FORMERLY UNION GAS)

After reviewing the provided drawings at E C Row Ave E and Banwell Rd and consulting our mapping system, please note that Enbridge Gas has active infrastructure in the proposed area. A PDF drawing has been attached for reference (see below).

Please Note:

1. The shown piping locations are approximate and for information purposes only
2. The drawings are not to scale
3. This drawing does not replace field locates. Please contact Ontario One Call for onsite locates prior to excavating, digging, etc.

Enbridge Gas requires a minimum separation of 0.6 m horizontal and 0.3 m vertical from all of our plant less than NPS 16 and a minimum separation 1.0 m horizontal and 0.6 m vertical between any CER-regulated and vital pipelines. For all pipelines (including vital pipelines), when drilling parallel to the pipeline, a minimum horizontal clearance measured from the

edge of the pipeline to the edge of the final bore hole of 1 m (3.3 ft) is required. Please ensure that this minimum separation requirement is maintained, and that the contractor obtains locates prior to performing any work and utilizes safe excavation practices while performing any work in the vicinity.

Also, please note the following should you find any abandoned infrastructure in the area:

- Any pipe that is excavated, please assume that it is live
- If during the course of any job, any pipe is found that is not on the locate sheet and is in conflict with your work, please call our emergency number (1-877-969-0999), and one of our Union Gas representatives will respond to determine if that plant is in fact live or dead
- Please note that our Enbridge Gas representative will respond to the live or dead call within 1-4 hours, so please plan your work accordingly

[James Makhlouf, Engineering Summer Student]

ENVIRONMENTAL SERVICES

There are no concerns with Environmental Services operations.

[Anne-Marie Albidone, Manager, Environmental Services]

ENWIN UTILITIES - HYDRO

No objection, however, an easement named to ENWIN Utilities Ltd is required in the north side of the road (if closing) to accommodate existing hydro pole line with a 27,600 volt primary electrical power circuit.

See sketch below.

[Anwar Nagar, Senior Hydro Engineering Technologist]

ENWIN UTILITIES - WATER

Water Engineering has no objections.

[Bruce Ogg, Water Project Review Officer]

ESSEX REGION CONSERVATION AUTHORITY (ERCA)

ERCA has taken a look at the area and are in agreement, that based on the most recent modeling, the existing main entrance to the development (Twin Oaks Drive) would not be inundated during the 100-year storm event. The only impact of the proposed road closure below, would be, the elimination of an alternative access route.

[Kim Darroch, Team Lead, Planning Services, Watershed Management Services]

LEGAL DEPARTMENT

As the closure is to close and retain for municipal purposes (no conveyance taking place) there is no conveyance cost.

[Chris Carpenter, Coordinator of Real Estate Services]

MNSi

MNSi does not require an easement through this closure area.

[Dave Hartleib, Outside Plant Manager]

PARKS & FACILITIES

Parks Development has no comments for this SAA/6835 LIAISON.

[Sherif Barsom, Landscape Architect]

PLANNING DEPARTMENT

No comments provided

PLANNING DEPARTMENT - LANDSCAPE ARCHITECT

This closure application is part of a larger Zoning and Site Plan Control process which has identified it as a necessary closure. Therefore, there are no objections from a landscape architectural perspective.

[Stefan Fediuk - Landscape Architect]

PUBLIC WORKS - ENGINEERING

The proposed road closure of EC ROW Avenue East is approximately 900 m long, west of Banwell Road. There are no sewers or manholes within this segment of E.C. Row Avenue East. The Gouin Drain runs along the south side of the road. An easement is required for the drain. There are hydro poles and guy wires within the closure. A utility easement will be required. A cul-de-sac is proposed to be constructed at Anchor Dr and E.C. Row Ave to city standards. Public Works will provide the requirements for the cul-de-sac through the Site Plan Control process. Public Works has no objections to the street closure subject to the easements.

[Pat Winters, Development Engineer]

PUBLIC WORKS - TRAFFIC

Signage should be reviewed in the vicinity (No Exit at Twin Oaks and Lauzon Parkway, dead end signs)

The closure will have an effect on any employees within the area who may walk or bike to work from east of Banwell, more so if it affects transit routes. Maintaining access by pedestrians and cyclists should be considered.

No objections to the closure as proposed.

[Mike Spagnuolo, Signal Systems Analyst]

ROGERS COMMUNICATIONS

No comments provided

TELUS COMMUNICATIONS

No comments provided

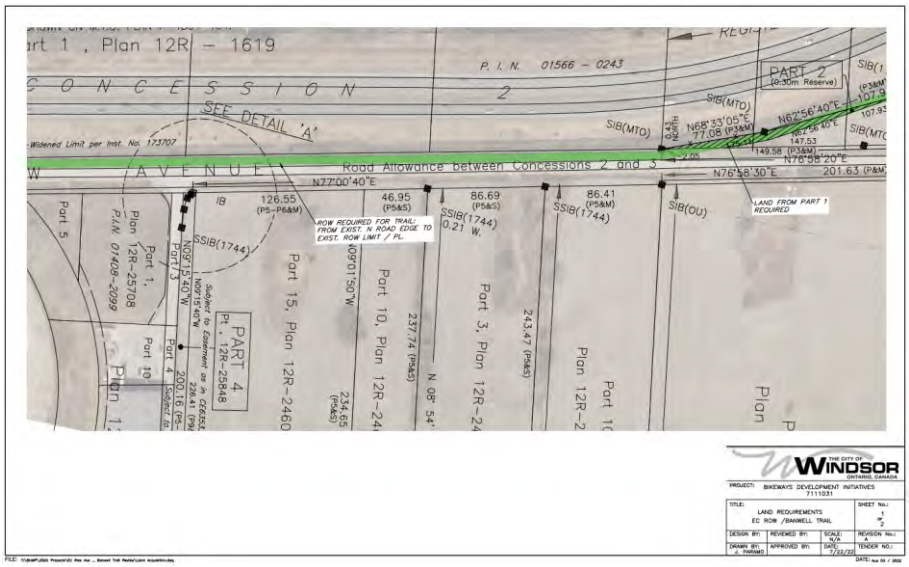
TRANSPORTATION PLANNING

A section of EC Row Avenue right-of-way shall be retained to accommodate a future Multi-Use Trail as per recommendations from the Active Transportation Master Plan that calls for a trail through this section of EC Row Avenue.

The area required for the trail is limited by the north edge of the existing EC Row Ave roadway. The remaining ROW including the roadway itself, could be closed since it won't be necessary for the trail.

See attachment for reference. Future area for trail is depicted in green.

[Juan Paramo, Transportation Planning Engineer]



TRANSIT WINDSOR

Transit Windsor will no longer be able to service the area of Twin Oaks/Anchor Drive in its current state if this road closure is approved. The Lauzon 10 route currently travels in one direction eastbound on EC ROW Ave E to Banwell for its southbound loop. A turn around cul-de-sac or large enough round about would need to be built at the end of Twin Oaks or the new end of EC ROW Ave E for buses to turn around to be able to provide a form of transit service to this area. The existing Lauzon 10 route wouldn't be able to provide transit service to this area even if that was built as it wouldn't have enough time to do it and would make the route inefficient. If transit service were to be put in for this area with the proper infrastructure built for buses to turn around, it would have to be a new conventional transit route or an on demand service. This would need budget approval by City Council.

[Jason Scott, Supervisor, Planning]

WINDSOR FIRE

September 7, 2022 (Revised)

I was under the assumption there would be no entrances off Banwell. I see there will be several when built. I am fine with the closure of the front street.

October 17, 2022

The Intersection is 4 lanes wide and quite large. The likely of the entire intersection being completely close is minimal at best. If it was completely closed, we would use other access point to gain entry in the area. The EV Plant is going to have several access points which will be a fire route for us to get through to the park off of Banwell. If the Intersection was closed, we would make sure that at least 1 lane would be open when possible.

[Mike Coste, Chief Fire Prevention Officer]

WINDSOR POLICE

August 9, 2022

The Windsor Police Service has no objections with the closure of this section of E. C. Row Avenue East. However, since this is currently an active and open roadway, non-objection to the closure is with the presumed understanding that access to the affected lands for emergency police vehicle response and general preventative patrol capability will not be eliminated or overly restricted.

October 3, 2022

That particular intersection is quite large overall and it is therefore unlikely the entire intersection would be entirely blocked off from emergency police vehicle access, in the event of a motor vehicle accident. When this kind of thing happens, we would attempt to use any other available access that could reasonably and effectively allow us access. In this case, this would presumably include use of the EV plant's private roadway connection, as needed under the circumstances. Therefore, it would seem prudent to include this access (as unlikely as it may be) in the site plan agreement. Windsor Police have many 4-wheel drive vehicles within our fleet so we could also, quite likely, maneuver around the blocked intersection to gain access as well.

[Barry Horrobin, Director of Planning & Physical Resources]

APPENDIX "E"
Site Photos (August 4, 2022)

Figure 1 - E. C. Row Avenue East looking west from driveway at 9455 Anchor Drive

Figure 2 - E. C. Row Avenue East looking east from driveway at 9455 Anchor Drive

Figure 3 - Looking east towards E. C. Row Avenue East from driveway at 9455 Anchor Drive

Figure 4 - Looking east towards Banwell Road from E. C. Row Avenue East

Figure 5 - E. C. Row Avenue East looking west from Banwell Road 1

Figure 6 - E. C. Row Avenue East looking west from Banwell Road 2

APPENDIX "F"
Classification of Alleys and Suitability for Closure

Classification of Public Rights-of-Ways:

Currently streets and alleys fall into four classifications on the basis of their usefulness:

1) Alleys that are **indispensable**. These would be alleys serving commercial properties and properties fronting on heavily traveled streets i.e. major arterial routes and alleys which contain sewers and must remain accessible for servicing; alleys or streets which serve as the only vehicular means of access to rear parking areas and garages where the property has insufficient lot width for a side drive; and, alleys which contain Fire Department connections that are deemed to be necessary for firefighting access.
2) Alleys that, **have some usefulness**, are nevertheless dispensable and may or may not be a complete liability.
3) Alleys that appear to serve **no useful purpose**, either now, or anticipated. Such alleys are in residential areas and locations where generally the lots are wide enough for side drives, or those alleys abutting parks and other parcels of land that do not require any servicing from the alley. Remnant or stub-end streets which are dead-ended and do not serve as access to other streets.
4) Alleys lying in Holding zones and other similar undeveloped areas where the alley system is **clearly obsolete** and has never been developed, but where the City needs to keep its options open until new area plans are prepared and development is imminent.

Suitability for Closing:

Following are the criteria and suitability for closing alleys in each of the above classifications.

1) Indispensable alleys should **not be closed**, conveyed, reduced or otherwise jeopardized through minority interests unless a suitable substitute alley is opened in lieu thereof. They are essential from the viewpoint of fire protection, police protection, emergency services (i.e. ambulance) and loading or unloading of goods, refuse collection, servicing of blocked sewers and utility services. Without such alleys, the above noted services would at least be more costly if not impossible to complete or adequately access; and would noticeably interfere with street traffic, thereby reducing the access capacity of the adjacent arterial, collector, or street for business.
2) Alleys having some usefulness should **be considered for closing** only upon request of abutting owners rather than by encouragement of the City.
3) Alleys that serve no useful purpose should **be closed** if at all possible, and in fact the owners abutting thereon should be encouraged to accept conveyance.
4) Alleys that are clearly obsolete should **not be closed** unless there is a municipal need or specific development proposals acceptable to the City are submitted.

APPENDIX "G"
Comments from Twin Oaks Business Park Businesses

JAMIESON LABORATORIES LTD.

From: [redacted]
Sent: Tuesday, September 27, 2022 11:31 AM
To: Matthews, Meghan <MMatthews@citywindsor.ca>
Subject: Jamieson concerns on Anchor Drive/EC Row Ave closure

Hi Megan,

Thanks for taking the time to talk today.

Our key points on the proposed closure of the east end of Anchor/EC Row Ave drive:

1. At the city's request, we previously relocated our truck entrance of 9650 Twin Oaks drive to Anchor drive to accommodate the rail line to CS Wind. Proposed closure of the east end of Anchor would now detour our trucks significantly in gaining access to Banwell and EC Row.
2. Commuter traffic/environmental. Employees coming in from the east end would now be required to drive an extra 3.3km each way to get to work (6.6km/day) to get to work. This equates to 1650 km/yr per employee.
3. There is also significant difficulties turning onto Twin Oaks from southbound Lauzon during peak hours. You often need to wait for many lights to make the left turn.
4. Single entrance to Twin Oaks Industrial. How do emergency vehicles get to our two sites if this single entrance is blocked?
5. Single entrance to Twin Oaks Industrial. This warehouse along with our INTL facility provide materials to our Rhodes site. If something were to block this intersection, our production schedules would be impacted.

Best regards,

[redacted]
T: [redacted] | C: [redacted]

Jamieson Laboratories Ltd.
4025 Rhodes Drive
Windsor, Ontario, Canada N8W 5B5
jamiesonvitamins.com

TRILLIUM MACHINE

From: [redacted]
Sent: January 31, 2023 9:10 AM
To: Nagata, Brian <bnagata@citywindsor.ca>
Subject: RE: RSVP for attendance

I'm not sure of the exact address…

I own the 3 acre parcel of land behind Jamieson, and were the (probably already approved) dead end is going to be.

Legal Description: PART LOT 138 CONCESSION 3 MCNIFF PARTS 1, 2 & 3 12R25708 SUBJECT TO AN EASEMENT OVER PTS 2 & 3 12R25708 IN FAVOUR OF PTS 4, 5, 7, 8, 9, 10 & 11 12R25708 AS IN CE685521 TOGETHER WITH AN EASEMENT OVER PTS 4 & 5 12R25708 AS IN CE685523 TOGETHER WITH AN EASEMENT OVER PTS 8 & 9 12R25708 AS IN CE685524 TOGETHER WITH AN EASEMENT OVER PT 11 12R25708 AS IN CE685525 CITY OF WINDSOR

I think that all the people that have to make a decision on this, drive into this industrial park every morning for 7am work start and leave at 3:30pm and then again at 5:00 pm…see what kind of cluster there is of traffic feeding out onto Lauzon parkway.

I would have never thought that a service road would be closed…sort of ridiculous.

[redacted]

TRILLIUM machine

4080-6 NORTH SERVICE RD. E.
WINDSOR, ONT.
N8W 5X2
(519) 945-2211
[redacted]

VICTORY REPRODUCTIVE CARE

From: [redacted]
Sent: Friday, October 14, 2022 9:55 AM
To: Nagata, Brian <bnagata@citywindsor.ca>
Subject: Economic Revitalization Community Improvement Plan

Dear Brian,

[redacted].

As well, do you have an update for me on any community meeting for the road closure? I just sent you an email asking for some help to implement some safety measures like speed signs and perhaps a stop sign for trucks heading westbound on Twin Oaks Drive. They travel so quickly that it's causing problems at our driveway that fronts Twin Oaks Drive. I even had a truck stop there the other day to inspect his rig and he completely blocked it!.

Many thanks,

[redacted]
Victory Reproductive Care
8100 Twin Oaks Drive
Windsor, Ontario
N8N 5C2
Direct: [redacted]

From: [redacted]
Sent: Friday, October 14, 2022 9:51 AM
To: Winters, Patrick <pwinters@citywindsor.ca>
Cc: Nagata, Brian <bnagata@citywindsor.ca>
Subject: Fwd: FW: Street Closure Application File No. SAS-6835 (E.C. Row Avenue East R.O.W.)

Dear Mr. Winters,

I am following up regarding my concern about the recent street closure of E.C. Row Avenue and the construction project for the EV battery plant at the east end of the Twin Oaks industrial park.

As the landlord of a large plaza within the park, I am concerned with the number of construction vehicles passing by throughout the day depositing dirt on our streets and parking lot. While I understand this is a normal part of this massive project, we are significantly impacted since the city has given permission for these trucks to have access via Twin Oaks and also Anchor Drive. I am looking for a commitment from the City of Windsor to create a regular cleaning schedule to tackle this ongoing issue.

As well, I am eager to discuss some street signs and speed signs in our area, specifically to slow down the heavy construction vehicles who barrel down the road at dangerous speeds. When they exit the construction site and head west towards Lauzon Road, they travel down the street at *high* speed. We have a driveway exit onto Twin Oaks Drive and our patients and staff are fearful of how quickly these trucks are coming. It seems like only a matter of time before there is an accident and I want to work with you to ensure this doesn't happen.

Our other exit is from Anchor Drive and your decision to close E.C. Row Avenue without consultation with us or other residents of this area has caused an incredible traffic jam twice per day when the local shifts change over. We now have a lineup to get out of our driveway and up the hill on Twin Oaks Drive to get out to the *only* exit. The bottleneck is compounded by the construction at the dangerous Lauzon/Twin Oaks intersection, which has left us scratching our heads as to how this was permitted. I am looking for some transparency and cooperation so we can get through this together. Our clinic sees hundreds of patients a week and our concerns for their safety is paramount. We have a bus stop on Anchor Drive but since you closed the road, what has happened to this route?

To date, I have not received any more information about a public meeting on the subject and would like an update at your earliest opportunity. I would welcome a phone call anytime at 519-996-1909 to discuss.

Sincerely,

[redacted]
Victory Reproductive Care
8100 Twin Oaks Drive
Windsor, Ontario
N8N 5C2
Canada

From: [redacted]
Sent: Saturday, September 17, 2022 4:30 AM
To: Nagata, Brian <bnagata@citywindsor.ca>
Cc: Matthews, Meghan <MMatthews@citywindsor.ca>
Subject: Re: Street Closure Application File No. SAS-6835 (E.C. Row Avenue East R.O.W.)

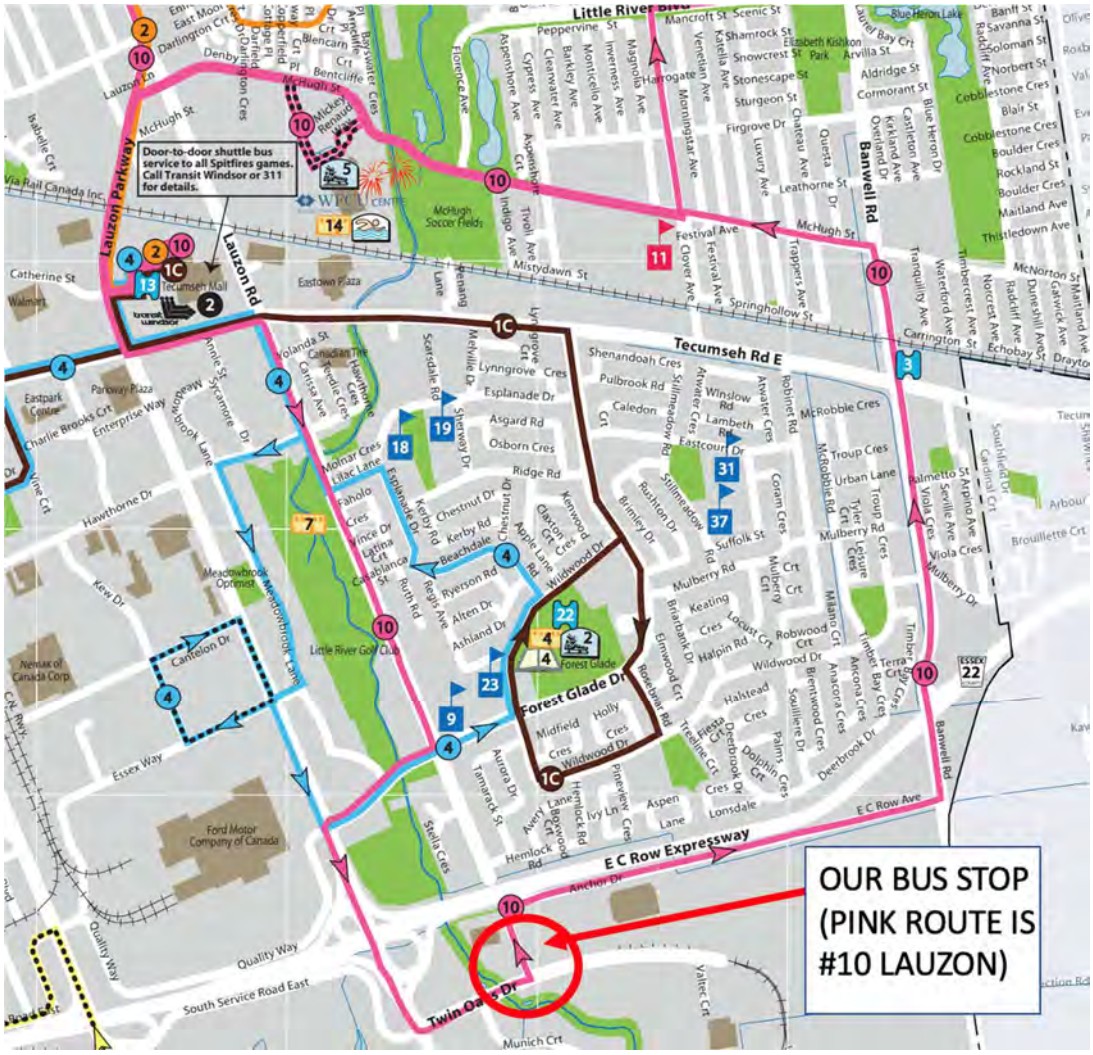
Dear Mr. Nagata,

Please accept my most sincere thanks for following up with me about our phone conversation on August 26th. Shortly after we spoke I traveled to [redacted] to attend to a [redacted] and neglected to email my list of concerns to you, which is rather shameful considering you so kindly reached out to me originally. I'm very sorry for the delay and am very grateful to you for remembering me and the issues at heart.

Regarding the proposed closure of E.C. Row Avenue, my [redacted] and I share the following concerns:

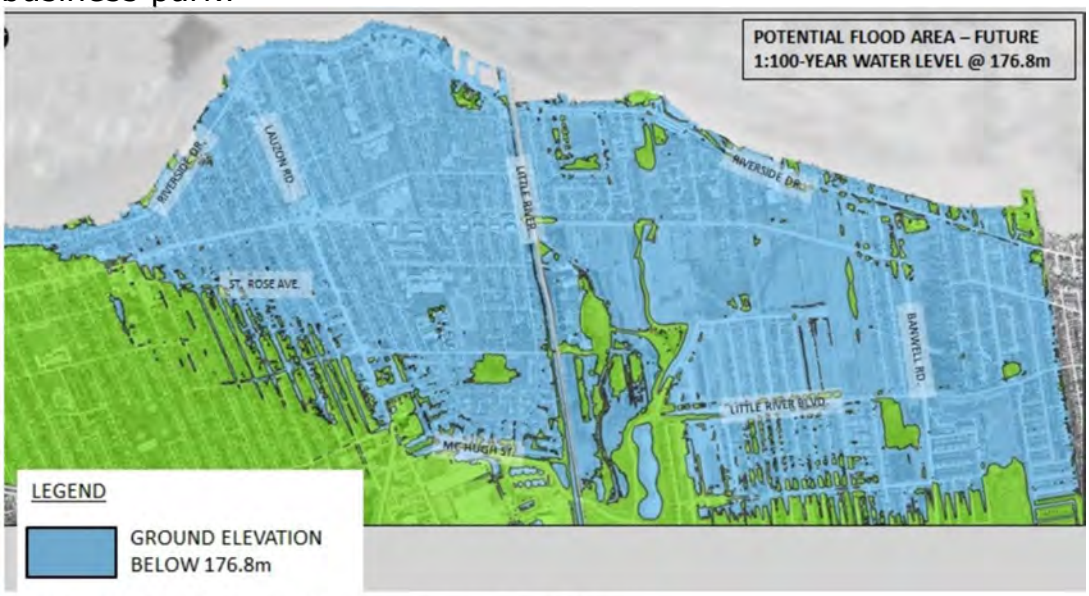
1. **Medical Offices and Community Accessibility:** Our plaza is part of the 160 acre business park located in the Twin Oaks Business Park immediately south of E.C. Row, bounded on the west by Lauzon Road and on the east by Banwell. You can find us at the corner of Twin Oaks Drive and Anchor Drive. The smaller of the two buildings is home to three clinics catering to women: the Midwifery Collective of Essex County, Sorella Women's Wellness (Pelvic Health Physiotherapy), and Dr. Randee Mayrand, a paediatric chiropractor. The larger building houses the medical offices for two OB/GYN/Fertility specialists, [redacted]. Complementary practices with two family doctors and a naturopathic doctor also operate from here alongside a bustling pharmacy. Victory Reproductive Care operates the region's only In-Vitro Fertilization (IVF) centre which is now the recipient of government-funded IVF services; starting or growing a family is now within reach for many Windsor patients for whom it was previously an impossible dream. Our clinic is currently 8000 square feet with plans to renovate another 4000 to meet the needs of our rapidly growing patient base. Soon to be added to our building as the last tenant will be a paediatrician. Our combined patient total comes to several hundred patient visits per week, many of whom benefit from the existing Windsor bus (#10 Lauzon) that services that area. We have a bus stop along Anchor Drive that takes patients from Anchor Drive, down E.C. Row Avenue to Banwell. Closing the road would prevent the bus from having an exit and we fear the city would cancel the service. Providing public

transportation to such an important medical centre dedicated to women & children seems intuitive, so we urge the City of Windsor to preserve service.



2. **Single Exit:** The proposed closure of E.C. Row Avenue would isolate this industrial area and create a single entrance/exit to all the businesses. With the hundreds of patients our location sees per week, in combination with the staff complements at Green Shield, Sunlife, Riverview Steele, CS Wind, Jamieson Laboratories and others, all will have to funnel out of one exit at Lauzon and Twin Oaks Drive. This particular intersection is already a very dangerous one as it's very location atop the hill restricts visibility from any approach. The sheer volume of automobiles that will need to exit will undoubtedly affect the traffic and safety at that intersection. When an inevitable accident occurs and the intersection is blocked during the aftermath, you will trap all the people in the business park. An alternative exit must be considered otherwise you hold the entire area hostage.
3. **Flood Plain:** The Twin Oaks Industrial park is situated in a known flood plain. With the historic flooding we saw in 2017 and 2018, we are very cognizant that Windsor's ability to handle excessive volumes of

water is limited. If this area were to experience flooding, the business park would have no ability to exit. For this reason, you must consider extending Twin Oaks Drive out to Banwell as an alternative exit for everyone in the area. Currently, the construction vehicles from the Stellantis project at E.C. Row Avenue and Banwell are exiting the construction site several dozen times daily, traveling west on Twin Oaks out to Lauzon Road. What are the long-term impacts to local drainage of this area with the massive construction project on the east side of the business park?



East Windsor flood plane map (Landmark Engineers/City of Windsor)

4. **Road Danger During Stellantis Project:** As discussed immediately above, construction vehicles have been given access rights across the City of Windsor property to exit westbound via Twin Oaks Drive. They travel at excessive speed up this road from their point of entry until the traffic light at Lauzon. Their size and speed is of great concern considering our parking lot has an entry on the Twin Oaks side. Cars full of pregnant women, children, and families are at risk of being hit by these trucks or chased off the road as these trucks come barrelling up the street unaware of the need to slow down. If the trucks have been given permission to use Twin Oaks Drive as an exit from the Stellantis property, then it follows that the city can extend the road to the east over to Banwell as a permanent alternative to closing E.C. Row Avenue.
5. **Road Safety at the Proposed Entry/Exit to the Twin Oaks Business Park:** A 2017 Road Safety Report by the City of Windsor (released May 22, 2018) identified this intersection as the 13th highest collision location in Windsor. In the five years leading up to that report, this intersection saw 48 collisions. If collisions continue at a similar rate, then those who frequent the business park will be held hostage as many times when the intersection is closed. An alternative exit from the business park is required if E.C. Row Avenue is allowed to close. This

intersection is currently undergoing some changes and entry/exit to the area is slow and restricted already. The City of Windsor needs to give some thought to how this slowdown and restricted access is affecting those who work in the business park.

6. **Community Planning:** The plan to close E.C. Row Avenue does not conform with local and regional development plans in that it will not encourage economic development in the area. Restricting this area to only one exit will bottleneck the area when shifts change for various businesses. Similar businesses in the County Road 22 and Patillo Road area have multiple options for access routes, whereas the project in the Twin Oaks Business Park needs are not given the same traffic flow considerations.
7. **Disturbing the Existing Community Character:** The Twin Oaks Business Park enjoys two unique walking trails that follow the Little River. Closing the road and funneling the traffic out of one exit at Lauzon Road will disturb these walks with long lineups of cars queuing up Twin Oaks Drive to exit the industrial park.

Thank you for allowing me to share our concerns over the road closure and I will definitely make a delegation request for the October 3rd meeting. If you would like any additional information or clarification, please feel free to contact me directly at [redacted]. I am still in [redacted] until next week, so if you call me please remember I am [redacted].

Sincerely,

[redacted]
Victory Reproductive Care
8100 Twin Oaks Drive
Windsor, Ontario
N8N 5C2
Canada

From: [redacted]
Sent: Wednesday, August 24, 2022 10:17 AM
To: Matthews, Meghan <MMatthews@citywindsor.ca>
Subject: Re: Update Request Re: Public Meeting To Close E.C. Row Ave E

Dear Meghan,

Thank you for your email, however you didn't address whether the requested closure of E.C. Row Avenue East is intended as a temporary or permanent measure. Currently, there is a digital sign that says the road will be closed as of tomorrow, so it seems the city has gone ahead and made its decision without holding this meeting. Closing the road prior to the hearing will allow them to make permanent steps to close that section of road and not allow the public to stop them; this seems unreasonable and undemocratic. The city has dollar signs in its eyes based on what this project means to Windsor and future jobs, so expecting the Planning, Heritage and Economic Development Standing Committee to listen to laypeople and surrounding business owners seems like a pipe dream. To me, it seems as though Stellantis and the City of Windsor are going to ask for forgiveness rather than permission for taking the measure to permanently close that road down for public access.

My property lies just behind this huge construction site and we house several doctors and practitioners in our very busy fertility practice. We are very keen to keep this road open for access in order to avoid having the only exit be the E.C. Row expressway. Several of our staff and patients use this road for access and will want to speak at the meeting, so please convey this to your team as they decide on a date for this important meeting. I would prefer an email notification for the meeting date, as there is a several day lapse between your mailing date and when it's received. Your letter dated August 16th arrived on the 23rd, and I don't want the scenario where I miss the meeting due to a slow mail service. Please notify me by email at [redacted] or by phone at [redacted] once the meeting date/time is set.

Sincerely,

[redacted]
Victory Reproductive Care
8100 Twin Oaks Drive
Windsor, Ontario
N8N 5C2
Canada

From: [redacted]
Sent: Tuesday, August 23, 2022 5:30 PM
To: Matthews, Meghan <MMatthews@citywindsor.ca>
Subject: Update Request Re: Public Meeting To Close E.C. Row Ave E

Dear Ms. Matthews,

I received your letter regarding the Real Estate Division of your Legal Department's application to close E.C. Row Avenue East dated August 16, 2022.

I am a property owner of 7900 Anchor Drive and 8100 Twin Oaks Drive and use E.C. Row Avenue East daily as do many of our employees and patients, so I am very surprised at this request. Is this proposed closure temporary or permanent?

I would like to be informed of any meeting regarding this matter so I can attend and have my concerns heard.

Sincerely,

[redacted]
Victory Reproductive Care
8100 Twin Oaks Drive
Windsor, Ontario
N8N 5C2
Canada

APPENDIX "H"
Summary of Comments from Twin Oaks Business Park Businesses

Comment	Desired Mitigation	Jamieson Laboratories Ltd.	Trillium Machine	Victory Reproductive Care	Administrative Response
Construction Traffic					
•Dirt and debris is being deposited on Anchor Drive and Twin Oaks Drive, and is subsequently ending up in Victory Reproductive Care's parking area	•Increased frequency in street cleaning			x	•The City's Engineering Department is actively monitoring this situation, and has taken necessary steps to mitigate when warranted
•Vehicle blocking Victory Reproductive Care's driveway on Twin Oaks Drive				x	•This falls under Parking By-law No. 9023, which is enforced by the City's Parking Enforcement •Parking Enforcement should be contacted immediately if this issue occurs again
•Vehicles travelling at excessive speeds westbound on Twin Oaks Drive (Patients and staff are consequently fearful of using Victory Reproductive Care's Twin Oaks Drive driveway)	•Posting of a stop sign for westbound traffic on Twin Oaks Drive at the intersection with Anchor Drive •Posting of speed limit signs for westbound traffic on Twin Oaks Drive •Posting of traffic calming signage for westbound traffic on Twin Oaks Drive			x	•Speeding falls under the *Highway Traffic Act* , which is enforced by Windsor Police •The City's Traffic Operations Division (Traffic Operations) has confirmed that the installation of stop signs at this intersection will only add to the traffic congestion being experienced within the Twin Oaks Business Park (Business Park) and on Lauzon Parkway •Traffic Operations is periodically monitoring this situation, and will take necessary steps to help mitigate it with additional signage and/or other measures if warranted
Jamieson Laboratories Ltd.					
•Guarantee that the north vehicular access to Anchor Drive/E. C. Row Avenue East from their facility at 9650 Twin Oaks Drive will be retained		x			•The City has no plans to remove this access •Anchor Drive/E. C. Row Avenue East is to be terminated at the NextStar Energy EV Battery Plant (EV Plant) via a cul-de-sac •The cul-de-sac will be located to the east of this access (refer to the Draft Reference Plan ***attached*** hereto as **Appendix "I"**)
•Property is being used as a cut through for vehicles using Banwell Road to enter/exit the Business Park		x			•The recommended closure will resolve this matter

Planning Policy					
•Closure does not conform with local and regional development plans, in that it will not encourage economic development in the area				x	•The City of Windsor is not subject to any Provincial Plans •The City of Windsor is a single-tier municipality, and as such is not under the jurisdiction of the County of Essex •The closure conforms to all but one of the relevant policies of the *Official Plan* listed below: -6.4.3 Industrial Policies -6.4.3.3 Industrial development shall be located where: (b) there is access to an arterial road; -The Business Park has access to Lauzon Parkway, a Class I Arterial Road (e) peak period public transportation service can be provided; and -The closure will require Transit Windsor to eliminate service to the Business Park -Refer to Section 1.b under the *Discussion* heading of the report for additional information on the removal of public transportation service from the Business Park and possible solutions for reinstating it in the future (f) there is access to designated truck routes -The Business Park has access to Lauzon Parkway, a designated Truck Route 6.4.3.4 At the time of submission, the proponent shall demonstrate to the satisfaction of the Municipality that a proposed industrial development is: (a) feasible having regard to the other provisions of this Plan, provincial legislation, policies and appropriate guidelines and support studies for uses: (iii) where traffic generation and distribution is a provincial or municipal concern; and -The Transportation Impact Study (TIS) completed for the EV Plant assessed the impact of the closure of E. C. Row Avenue East and anticipated trip generation from the EV Plant on the Business Park's transportation network and the intersection of Lauzon Parkway and South Service Road East/Twin Oaks Drive (the intersection) -The TIS did **NOT** identify any necessary improvements to the Business Park's transportation network or the intersection

Public Consultation					
•No consultation with businesses within the Business Park prior to the submission of this street closure application		x		x	•Notice of Application was issued twofold to property owners within the Business Park by regular mail on July 26, 2022 and August 16, 2022 •The City and NextStar co-hosted a formal information session on February 9, 2023 at the WFCU Centre for businesses within the Business Park -Refer to the Business Park section under the *Consultation* heading of the report for additional information on this information session -Notice for this information session was mailed and emailed to all property owners within the Business Park on January 25, 2023 and January 31, 2023 respectively -Information sessions are **NOT** typically held for street closure applications •The City has been working with Jamieson Laboratories Ltd. and Victory Reproductive Care to address their comments through ongoing conversations, emails and/or Zoom meetings
Public Safety					
•Queueing of vehicles on westbound Twin Oaks Drive could pose safety concerns to users of the crossing for the multi-use recreational trail within Little River Dragonfly Park, a linear park encompassing Little River within the Business Park				x	•There is a Pedestrian and Bicycle Crossing Ahead sign for eastbound and westbound traffic on Twin Oaks Drive
Single Access to Business Park					
•Blocking of the intersection from an accident or incident will disrupt production at the Jamieson Laboratories Ltd. facility at 4025 Rhodes Drive, which relies on the just in time delivery of materials from its two facilities within the Business Park		x			•2012, 2013 and 2017 Road Safety Reports for the City of Windsor ranked the top 25 signalized intersections based on collisions per million vehicles entering (collision rate) from 2008 to 2012, 2009 to 2013 and 2013 to 2017 respectively -This intersection ranked 12th, 9th and 13th respectively in the said reports, with respective collision rates of 0.97, 1.08 and 1.14 •2012, 2013 and 2017 Road Safety Reports for the City of Windsor identified 42, 47 and 48 collisions respectively at the intersection, during the respective reporting periods of 2008 to 2012, 2009 to 2013 and 2013 to 2017

					This equates to approximately 9.3 collisions per year and 0.8 collisions per month -Statistics on the number of collisions that blocked the entire intersection or part thereof are not available **(Emergency Services through their correspondence could not recall any time when the intersection was blocked by an accident or incident)** •The 2019 Road Safety Report for the City of Windsor did not include collision figures for this intersection, as it did not rank in the top 30 signalized intersections based on collision rates from the reporting period of 2015 to 2019 used for this report -The following factors may have contributed to the intersection not ranking within this report: -Increase in collision rate at several other intersections throughout the City -Installation of Traffic Lights Ahead warning sign for southbound traffic on Lauzon Parkway and the E. C. Row Expressway Eastbound Off Ramp •Improvements to this stretch of Lauzon Parkway proposed under the approved *Lauzon Parkway Improvements Class Environmental Assessment Study* , completed on January 20, 2014, should assist in reducing the number of collisions -Timing for these improvements is dependent on funding •The Transportation Planning Division (Transportation Planning) does **NOT** anticipate that the collision rate will be significantly impacted by the increased traffic volume resulting from the closure of E. C. Row Avenue East and the EV Plant •Notwithstanding, Transportation Planning reviewed and commented on the following ideas put forth by the Planning Department to help reduce the collision rate: -Installation of No Right Turn on Red Light Signage for westbound traffic on Twin Oaks Drive

					Transportation Planning stated that *"a no right on red would require a bylaw change only and minimal signage, cost would be in the range of $1,000. If there is already a significant back up on Twin Oaks, WB, this will only increase the back up. Looking at the 2020 turning movement count data, the right turn movement is the heaviest movement in both the lunch time and evening hours. This will then cause the right turning cars to block Twin Oaks and not allow people turning left or going thru, to get out. It may actually increase delays. Additionally, this would be a bylaw/movement restriction that is unusual in the Windsor area and drivers may not be used to it. Therefore requiring enforcement to ensure conformance."* -Installation of Traffic Lights Ahead signage for northbound traffic on Lauzon Parkway Transportation Planning confirmed that a Traffic Lights Ahead warning sign for northbound traffic on Lauzon Parkway will be installed in the near future
•Blocking of the intersection from an accident or incident will prevent vehicles from entering and exiting the Business Park	•Secondary access to Business Park	x		x	•Refer to Section 1.a under the *Discussion* heading of the report for details on establishing a second access to the Business Park
•Extension of Twin Oaks Drive to Banwell Road should be accommodated if the City is permitting NextStar to have their truck entrance/exit for the EV Plant off of Twin Oaks Drive				x	•Refer to Section 1.a under the *Discussion* heading of the report for details on extending Twin Oaks Drive to Banwell Road
•Flooding of Little River will make Twin Oaks Drive impassable, thus restricting vehicles from entering and exiting the Business Park	•Extension of Twin Oaks Drive to Banwell Road			x	•The Essex Region Conservation Authority (ERCA) through their comments attached ***hereto*** as **Appendix "C"**, has confirmed that vehicular access will not be impacted during a 100 year storm event •Refer to Section 1.a under the *Discussion* heading of the report for details on extending Twin Oaks Drive to Banwell Road
•How will Emergency Services access the Business Park if the intersection at Lauzon Parkway and South Service Road East/Twin Oaks Drive is blocked from an accident or incident?		x		x	•Emergency Services (Essex-Windsor EMS, Windsor Fire & Rescue Services and Windsor Police Service) will access the Business Park through the EV Plant using their private road network, via an Access Agreement -Refer to the *Emergency Services* section under the *Consultations* heading of the report for details on the Access Agreement

•Increased traffic volumes exiting the Business Park will increase the number of collisions at the already dangerous intersection •This is based on the intersection having a historically high collision rate	•Secondary access to Business Park			x	•Refer to the response to the first comment under the S*ingle Access to Business Park* heading herein
•Restricting the Business Park to only one exit will bottleneck the area when shifts change for various businesses				x	•Refer to the response to the second comment under the *Traffic Congestion* heading herein
Site Plan Control					
•Would like access to the Site Plan for the EV Plant		x			•NextStar shared their Site Plan at the information session
Storm Water Management					
•What are the long-term impacts to local drainage in the Business Park resulting from the EV Plant?				x	•The EV Plant will **NOT** have any negative impacts on the existing drainage system within the Business Park •The Site Plan Agreement for SPC-2022-11 includes Special Provisions and General Provisions requiring NextStar to submit drawings to the satisfaction of the City Engineer and Chief Building Official for the design of an internal storm water detention scheme to service the EV Plant, and site servicing drawings, report and/or calculations to the satisfaction of the City Engineer, together with a permit from ERCA
Traffic Congestion					
•Construction at the intersection is contributing to traffic congestion for vehicles entering and exiting the Business Park				x	•Construction has since concluded as of the writing of this report

•Queueing of vehicles on westbound Twin Oaks Drive at Lauzon Parkway during major shift changes (consequently resulting in queuing of vehicles on Anchor Drive and Munich Court, as well as Victory Reproductive Care's Anchor Drive exit) •Queueing of vehicles in southbound Lauzon Parkway left turn lane at South Service Road East/Twin Oaks Drive (takes multiple light sequences to make the turn)		x	x	x	•The TIS concluded that the traffic signals for the intersection are running over maximum capacity during peak periods -Traffic Operations confirmed that improvements to the traffic signals, such as the installation of traffic detection cameras, are futile when all of the signals are operating over maximum capacity during peak periods -Traffic Operations also noted that any improvements would require the replacement of the traffic signal system, which is 11 years beyond its end of life -The replacement of the traffic signals would cost approximately $350,000.00 •Refer to the administrative response to Section 6.4.3.4(a)(iii) under the *Planning Policy* heading herein for findings from the TIS completed for the EV Plant
•Southbound Lauzon Parkway left turn lane into the Business Park is difficult to access for vehicles coming off of the E. C. Row Eastbound Off Ramp, as it involves crossing three lanes of traffic over a short distance together with navigating heavy traffic volumes and unsafe driving practices such as speeding		x			•Traffic Operations has confirmed that this is attributed in part to the current road configuration -Improvements to this stretch of Lauzon Parkway proposed under the approved *Lauzon Parkway Improvements Class Environmental Assessment Study* do **NOT** address this issue -The proposed design under the approved *Lauzon Parkway Improvements Class Environmental Assessment Study* would need to be **significantly modified** to address this issue •Unsafe driving practices fall under the *Highway Traffic Act* , which is enforced by Windsor Police
•Vehicle queueing on Munich Court is attributing to vehicular operators becoming impatient and attempting to make unsafe left turns onto Twin Oaks Drive resulting in near collisions		x			•Unsafe left turns fall under the *Highway Traffic Act* , which is enforced by Windsor Police •Traffic Operations has confirmed that the installation of stop signs at this intersection will only add to the traffic congestion being experienced within the Business Park and on Lauzon Parkway
Travel Distance					
•Jamieson Laboratories Ltd. employees will be required to drive an extra 3.3 km each way per day (equates to 1,650.0 km per year per employee, increased fuel costs, and greater impact on the environment)		x			• Refer to Section 1.b under the *Discussion* heading of the report

•Jamieson Laboratories Ltd. relocated the truck entrance to their facility at 9650 Twin Oaks Drive from Twin Oaks Drive to Anchor Drive at the City's request to accommodate the construction of a spur rail line to the now former CS Wind manufacturing facility (Closure will significantly detour trucks arriving or heading south or east)		x			•Jamieson Laboratories Ltd. did relocate their truck entrance from Twin Oaks Drive to Anchor Drive around 2014 to accommodate the construction of a spur rail line to the now former CS Wind manufacturing facility -CS Wind ceased operations around 2018-2019 and the spur rail line has since been removed •The City's Engineering Department is working on design concepts for extending Twin Oaks Drive east of Valtec Court to the EV Plant site -The design concepts will include options for re-establishing a truck entrance off of Twin Oaks Drive -The City's Engineering Department will consult with Jamieson Laboratories Ltd. once the design concepts have been completed
Transit Windsor (Removal of Lauzon 10 Bus Route)					
•Patients rely on Lauzon 10 to attend appointments at Victory Reproductive Care	•Restore service to the Business Park			x	• Refer to Section 1.b under the *Discussion* heading of the report

Item No. 8.19

Committee Matters: SCM 88/2023

Subject: Downtown Windsor Enhancement Strategy and Community Improvement Plan Grant Applications made by Micheal de Rita for 2734844 Ontario Ltd. for 261-267 Pelissier Street, Ward 3

Moved by: Councillor Fred Francis
Seconded by: Councillor Mark McKenzie

Decision Number: **DHSC 487**

I. THAT the request made by 2734844 Ontario Ltd. (Owner) for the proposed development at 261-267 Pelissier Street to participate in:
   a. the Building/Property Improvement Tax Increment Grant Program **BE APPROVED** for 100% of the municipal portion of the tax increment resulting from the proposed development for up to five (5) years or until 100% of the eligible costs are repaid pursuant to the Downtown Windsor Enhancement Strategy and Community Improvement Plan;
   b. the Upper Storey Residential Conversion Grant Program **BE APPROVED** for $50,000 towards eligible costs pursuant to the Downtown Windsor Enhancement Strategy and Community Improvement Plan.

II. THAT Administration **BE DIRECTED** to prepare the agreements between the City and 2734844 Ontario Ltd. (Owner) to implement the Building/Property Improvement Tax Increment Grant Program at 261-267 Pelissier Street in accordance with all applicable policies, requirements, and provisions contained within the Downtown Windsor Enhancement Strategy and Community Improvement Plan.

III. THAT the CAO and City Clerk **BE AUTHORIZED** to sign the Building/Property Improvement Tax Increment Grant Program at 261-267 Pelissier Street to the satisfaction of the City Planner as to content, the City Solicitor as to legal form, and the CFO/City Treasurer as to financial implications.

IV. THAT the grants under Upper Storey Residential Conversion Grant Program for 261-267 Pelissier Street **BE PAID** to 2734844 Ontario Ltd. upon completion of the new residential unit as described in Report S16/2023 within two (2) years of Council approval subject to the satisfaction of the City Planner and Chief Building Official.

V. THAT Grant funds in the amount of $50,000 under the Upper Storey Residential Conversion Grant Program **BE TRANSFERRED** from the CIP Reserve Fund 226 to the City Centre Community Development Planning Fund (Project #7011022) when work is completed.

VI. THAT should the project not be completed in two (2) years, City Council **AUTHORIZE** that the funds under the Building/Property Improvement Tax Increment Grant Program and Upper Storey Residential Conversion Grant Program be uncommitted and made available for other applications.

VII. THAT the approval to participate in the Building/Property Improvement Tax Increment Grant Program **EXPIRE** if the grant agreement is not signed by applicant within one year following Council approval. The City Planner may extend the deadline for up to one year upon request from the applicant.
Carried.

Report Number: S 16/2023
Clerk's File: Z/12916

Clerk's Note:

1. The recommendation of the Development & Heritage Standing Committee and Administration are the same.

2. Please refer to Item 11.2 from the Development & Heritage Standing Committee held on March 6, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: https://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230306/-1/9395

Council Report: S 16/2023

Subject: Downtown Windsor Enhancement Strategy and Community Improvement Plan Grant Applications made by 2734844 Ontario Ltd. (Michael de Rita) for 261-267 Pelissier Street, Ward 3

Reference:

Date to Council: March 6, 2023
Author: Edwin Chiu
Assistant Planner
519-255-6543 ext. 6447
echiu@citywindsor.ca

Laura Strahl
Planner III - Special Projects
519-255-6543 ext. 6396
lstrahl@citywindsor.ca

Planning & Building Services
Report Date: February 1, 2023
Clerk's File #: Z/12916

To: Mayor and Members of City Council

Recommendation:

I. **THAT** the request made by 2734844 Ontario Ltd. (Owner) for the proposed development at 261-267 Pelissier Street to participate in:

   a. the Building/Property Improvement Tax Increment Grant Program **BE APPROVED** for 100% of the municipal portion of the tax increment resulting from the proposed development for up to five (5) years or until 100% of the eligible costs are repaid pursuant to the Downtown Windsor Enhancement Strategy and Community Improvement Plan;

   b. the Upper Storey Residential Conversion Grant Program **BE APPROVED** for $50,000 towards eligible costs pursuant to the Downtown Windsor Enhancement Strategy and Community Improvement Plan.

II. THAT Administration **BE DIRECTED** to prepare the agreements between the City and 2734844 Ontario Ltd. (Owner) to implement the Building/Property

Improvement Tax Increment Grant Program at 261-267 Pelissier Street in accordance with all applicable policies, requirements, and provisions contained within the Downtown Windsor Enhancement Strategy and Community Improvement Plan.

III. THAT the CAO and City Clerk **BE AUTHORIZED** to sign the Building/Property Improvement Tax Increment Grant Program at 261-267 Pelissier Street to the satisfaction of the City Planner as to content, the City Solicitor as to legal form, and the CFO/City Treasurer as to financial implications.

IV. THAT the grants under Upper Storey Residential Conversion Grant Program for 261-267 Pelissier Street **BE PAID** to 2734844 Ontario Ltd. upon completion of the new residential unit as described in Report S16/2023 within two (2) years of Council approval subject to the satisfaction of the City Planner and Chief Building Official.

V. Grant funds in the amount of $50,000 under the Upper Storey Residential Conversion Grant Program **BE TRANSFERRED** from the CIP Reserve Fund 226 to the City Centre Community Development Planning Fund (Project #7011022) when work is completed.

VI. THAT should the project not be completed in two (2) years, City Council **AUTHORIZE** that the funds under the Building/Property Improvement Tax Increment Grant Program and Upper Storey Residential Conversion Grant Program be uncommitted and made available for other applications.

VII. THAT the approval to participate in the Building/Property Improvement Tax Increment Grant Program **EXPIRE** if the grant agreement is not signed by applicant within one year following Council approval. The City Planner may extend the deadline for up to one year upon request from the applicant.

Executive Summary:

N/A

Background:

The Downtown Windsor Enhancement Strategy and Community Improvement Plan (Downtown CIP) was adopted by City Council on September 29, 2017 and an adopting by-law was passed by City Council on October 16, 2017.

The Downtown CIP provides financial incentives to encourage new residential development, retail investment, facade improvements, and building/property improvements

2734844 Ontario Ltd. (Michael de Rita) has applied for the Building/Property Improvement Tax Increment Grant Program and the Upper Storey Residential Conversion Grant Program under the Downtown CIP for the properties located at 261-267 Pelissier St (as shown on Appendix A). The applicant proposes the conversion of eight out of ten existing office building floor levels into residential apartments with the remaining two floors retained for commercial usage. A total of 31 new residential units are proposed. The property is known as the Security Building and listed on the Municipal Heritage Register (but not designated). The art deco skyscraper was constructed in 1927, and was designed by Architects Pennington & Boyde. The building currently has a food market on the ground floor which will positively impact the generated revenue of the surrounding commercial district.

Applicant Information:

Owner: 2734844 Ontario Ltd

Principle Owner: Michael de Rita

Agent: Joe Passa

Discussion:

Building/Property Improvement Tax Increment Grant Program:

This program is intended to provide economic incentive for the development, rehabilitation and redevelopment of properties in Downtown Windsor. The program provides an annual grant equal to 100% of the increase in municipal property taxes for five years, after the project is completed and reassessed to help offset the costs of rehabilitating and redeveloping properties, as long as such development results in an increase in assessment and therefore an increase in property taxes.

The proposed improvements to the building will increase the assessed value and therefore increase municipal taxes. This project qualifies for the Building/Property Improvement Tax Increment Grant and the Financial Matters section of this report discusses the estimated grant amount.

Upper Storey Residential Conversion Grant Program:

The upper storey conversion grant program is aimed at attracting new investment and interest in converting currently non-residential vacant or underutilized upper storey space to residential units by providing a financial incentive that will be targeted at the costs of converting the space to new residential units. It is intended to stimulate the creation of new residential units on the upper storeys of existing mixed use buildings.

Property owners will be eligible to receive a grant of $5,000 for every new residential unit created on the upper storey of an existing mixed use building, up to a maximum of $50,000 per property.

The owner's proposal is for thirty-one (31) new residential units on the upper storey of the existing building, therefore the project qualifies for a grant of $50 000 towards eligible costs.

Risk Analysis:

There is low risk associated with the approval of the subject Downtown CIP grant applications. An agreement between the City and applicant will be prepared to ensure the program requirements and provisions of the Downtown Windsor Enhancement Strategy and Community Improvement are met. The Upper Storey Residential Conversion Grant Program will only be paid after the work is complete to the satisfaction of the City Planner.

Climate Change Mitigation:

The subject development mitigates GHG emissions by reusing an already existing office building located on the property, which reduces material usage and construction time.

Climate Change Adaptation:

N/A

Financial Matters:

As mentioned in the discussion section of the report the proposed redevelopment is eligible for:

- $5,000 per new residential unit, therefore the project qualifies for the maximum grant amount of $50,000 for the thirty-one (31) new residential units.

CIP Reserve Fund 226 holds the funds for all active CIPs in the City. As CIP grant applications are approved, the approved grant amount is transferred to the capital project account (City Centre Community Development Planning Fund (Project #7011022) to be kept as committed funds, until the grant is ready to be paid out. The current uncommitted balance in the CIP reserve fund is $957,519.19 however this balance does not account for other CIP grant requests that are currently being considered by the standing committee or have been endorsed by the standing committee and are not yet approved by City Council.

If approved, funds will be transferred from the CIP reserve fund to the City Centre Community Development Planning Fund (Project #7011022) to disperse the maximum amount of $50,000 for the Upper Storey Residential Conversion Grant Program identified in this report when all work is completed.

Building/Property Improvement Tax Increment Grant Program

The program provides an annual grant equal to 100% of the increase in municipal property taxes for five (5) years, with the possibility of a five (5) year extension, up to a total of ten (10) years if the project is considered a Catalyst Project; a designated heritage property, projects where at least 20% of the residential units are considered affordable or the project is certified LEED bronze. The property is not a designated heritage property nor certified LEED bronze thus the project qualifies for a total of five (5) years for the tax grant towards eligible costs.

It is estimated that the conversion of eight of the ten existing office floors to residential units will increase the assessment by $1,258,000. However, the commercial assessment would drop to $264,500 for a new estimated total value of $2,293,000. The increase in municipal tax is estimated to be $8,108 per year.

The applicant indicates the estimate costs for the projects $5,050,000. The Planning Act stipulates that the grants under a CIP cannot be more than the eligible costs.

The total grant amount of $90,540 (including the $50,000 under the Upper Storey Residential Conversion Grant Program) is 1.80% of the estimate eligible costs

Estimate Property/Building Improvement Tax Increment Grant Calculation **261-267 Pelissier St**			
Annual Pre Development Municipal Taxes	Annual Estimate Post Development Municipal Taxes	Annual Estimate Value of Grant	Total Estimate Grant over five (5) years
$ 35,452	$ 43,560	$ 8,108	$ 40,540

Because the Grant Program does not cancel taxes, the applicant must pay the full amount of property taxes annually and will subsequently receive a grant for the difference between the pre and post-development municipal taxes. The City will retain the amount of pre-development (base) municipal taxes throughout the lifespan of the grant program; however will be foregoing any incremental property taxes which could otherwise be used to offset future budget pressures.

Consultations:

The Downtown CIP was subject to stakeholder and public consultation as part of the approval process, including public meets, a statutory public meeting and circulation among internal City staff and the Province.

Planning staff have consulted with the applicant prior to accepting the application. Staff from the Planning and Building Division were consulted in the preparation of this report.

Conclusion:

Staff recommends that the application for the Upper Storey Residential Grant Program and Building/Property Improvement Tax Increment Grant for five (5) years be approved.

Planning Act Matters:

N/A

Approvals:

Name	Title
Josie Gualtieri	Financial Planning Administrator
Neil Robertson	Manager of Urban Design/Deputy City Planner
Thom Hunt	City Planner/Executive Director, Planning and Development Services
Wira Vendrasco	Deputy City Solicitor, Legal Services & Real Estate
Janice Guthrie	Deputy Treasurer of Taxation, Treasury and Financial Planning
Joe Mancina	Commissioner, Chief Financial Officer/City Treasurer
Jelena Payne	Commissioner of Economic Development and Innovation
Onorio Colucci	Chief Administrative Officer

Notifications:

Name	Address	Email
Michael de Rita	1262 Oak Crossing Road, London, ON	Mike@mvmanagement.ca
2734844 Ontario Ltd.	1262 Oak Crossing Road, London, ON	Mike@mvmanagement.ca
Joe Passa		joseph@passa.ca

Appendices:

1 Appendix A - Location Map
2 Appendix B - Current Building Facade (2591 - A9)

LOCATION MAP : 261-267 PELISSIER STREET

SUBJECT PROPERTY

0 5 10 20 30 Meters

THE CITY OF WINDSOR ONTARIO, CANADA

Committee Matters: SCM 89/2023

Subject: Brownfield Redevelopment Community Improvement Plan (CIP) application submitted by Edna (Windsor) Inc., Walkerville Commercial Centre Inc., and Walkerville Walker Developments Inc for 0 Edna Street, 0 St. Luke Road, and part of 890 Walker Road (Ward 5)

Moved by: Councillor Fred Francis
Seconded by: Councillor Angelo Marignani

Decision Number: **DHSC 488**

I. THAT the request made by 1026738 Ontario Limited, Walkerville Commercial Centre Inc., and Walkerville Walker Developments Inc. to participate in the Brownfield Rehabilitation Grant Program **BE APPROVED** for 70% (or 100% if LEED certified) of the municipal portion of the tax increment resulting from the proposed redevelopment at 0 Edna Street, 0 St. Luke Road, and part of 890 Walker Road for up to 10 years or until 100% of the eligible costs are repaid pursuant to the City of Windsor Brownfield Redevelopment Community Improvement Plan; and,

II. THAT, Administration **BE DIRECTED** to prepare an agreement between 1026738 Ontario Limited, Walkerville Commercial Centre Inc., Walkerville Walker Developments Inc., the City, and any persons legally assigned the right to receive grant payments to implement the Brownfield Rehabilitation Grant Program in accordance with all applicable policies, requirements, and provisions contained within the Brownfield Redevelopment Community Improvement Plan to the satisfaction of the City Planner as to content, the City Solicitor as to legal form, and the CFO/City Treasurer as to financial implications; and,

III. THAT the CAO and City Clerk **BE AUTHORIZED** to sign the Rehabilitation Grant Agreement; and,

IV. THAT the approval to participate in the Brownfield Rehabilitation Grant Program **EXPIRE** if the agreement is not signed by applicant within one year following Council approval. The City Planner may extend the deadline for up to one year upon request from the applicant.

Carried.

Report Number: S 5/2023
Clerk's File: Z/14535

Clerk's Note:

1. The recommendation of the Development & Heritage Standing Committee and Administration are the same.

2. Please refer to Item 11.3 from the Development & Heritage Standing Committee held on March 6, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: https://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230306/-1/9395

Subject: Brownfield Redevelopment Community Improvement Plan (CIP) application submitted by 1026738 Ontario Limited, Walkerville Commercial Centre Inc., and Walkerville Walker Developments Inc for 0 Edna Street, 0 St. Luke Road, and part of 890 Walker Road (Ward 5)

Reference:

Date to Council: March 6, 2023
Author: Greg Atkinson, Senior Planner
519-255-6543 ext. 6582
gatkinson@citywindsor.ca
Planning & Building Services
Report Date: February 11, 2023
Clerk's File #: Z/14535

To: Mayor and Members of City Council

Recommendation:

I. THAT the request made by 1026738 Ontario Limited, Walkerville Commercial Centre Inc., and Walkerville Walker Developments Inc. to participate in the Brownfield Rehabilitation Grant Program **BE APPROVED** for 70% (or 100% if LEED certified) of the municipal portion of the tax increment resulting from the proposed redevelopment at 0 Edna Street, 0 St. Luke Road, and part of 890 Walker Road for up to 10 years or until 100% of the eligible costs are repaid pursuant to the City of Windsor Brownfield Redevelopment Community Improvement Plan; and,

II. THAT, Administration **BE DIRECTED** to prepare an agreement between 1026738 Ontario Limited, Walkerville Commercial Centre Inc., Walkerville Walker Developments Inc., the City, and any persons legally assigned the right to receive grant payments to implement the Brownfield Rehabilitation Grant Program in accordance with all applicable policies, requirements, and provisions contained within the Brownfield Redevelopment Community Improvement Plan to the satisfaction of the City Planner as to content, the City Solicitor as to legal form, and the CFO/City Treasurer as to financial implications; and,

III. THAT the CAO and City Clerk **BE AUTHORIZED** to sign the Rehabilitation Grant Agreement; and,

IV. THAT the approval to participate in the Brownfield Rehabilitation Grant Program **EXPIRE** if the agreement is not signed by applicant within one year following Council approval. The City Planner may extend the deadline for up to one year upon request from the applicant.

Executive Summary:

N/A

Background:

Brownfield Redevelopment Community Improvement Plan (CIP)

Brownfield sites are properties that may be contaminated due to previous industrial or commercial uses such as a manufacturing facility or gas station. City Council approved a Brownfield Redevelopment CIP at its April 19, 2010 meeting for the purpose of encouraging the study, clean-up, and redevelopment of contaminated properties. The approval of the CIP was the result of nearly five years of study and consultation, which began in October 2005.

Importance of Brownfield Redevelopment

In 2009 the City's Planning Department identified 137 brownfield properties (i.e. 226 hectares or 559 acres) that are candidates for redevelopment. While the inventory is not exhaustive, it illustrates the significance of Windsor's brownfield stock and the need to work with land owners to put these properties back into productive use. Based on approvals to date under the Brownfield CIP approximately 50 hectares (123 acres) or 22% of the inventory has been or is planned to be redeveloped. In total Council has approved over 50 applications under the CIP, which represents the potential addition of 2,104 residential dwelling units.

Historically, there has been little interest in redeveloping brownfield sites due to the uncertainty surrounding the extent of contamination and the potential cost of clean-up. The Brownfield Redevelopment CIP provides financial incentives to undertake the necessary studies and remedial work necessary to redevelop brownfield sites and reduce the potential negative impacts to the City's environment and neighbourhoods.

The benefits associated with brownfield redevelopment go far beyond the boundaries of the property. For example, they are often strategically located within existing built up areas of the City where services and other infrastructure, such as roads, schools, community facilities and public transit are already available, therefore additional infrastructure costs are not incurred to service these areas. The redevelopment of these sites also remove the negative stigma often associated with brownfield properties,

which increases the value of the subject property and adjacent properties.

Brownfield sites also represent a significant underutilization of the land base. According to the National Round Table on the Environment and the Economy (2003), every hectare redeveloped through a brownfield project saves up to an estimated 4.5 hectares of greenfield land from being developed (i.e. agricultural land on the edge of the City); and for every dollar invested in a brownfield redevelopment, it is estimated that $3.80 is invested in the economy.

Site Background

The subject site is located within the block east of Walker Road, south of Edna Street, west of St. Luke Road, and north of Richmond Street (see Appendix 'A': Location Map). The site consists of five industrial properties that are primarily vacant and total approximately 4.4 hectares (10.8 acres) in size. The properties are owned by different corporate entities: 1026738 Ontario Limited, Walkerville Commercial Centre Inc., and Walkerville Walker Developments Inc. The principal owner of all of the corporate entities is Ashok Sood.

The subject properties are designated 'Business Park' on Official Plan Schedule D: Land Use. The Walker Road frontage is zoned MD1.4 (Manufacturing District), and the St. Luke frontage is zoned H-MD1.4 (Holding—Manufacturing District). The zoning permits a range of light industrial, office, and service commercial uses. The holding zone cannot be removed until the appropriate environmental remediation/mitigation measures have been completed and the owner has submitted an application to remove the holding symbol.

While the subject site is currently vacant, previous uses on the various properties include manufacturing operations, vehicle manufacturing, military barracks, railway tracks, and more recently transport truck storage. Surrounding uses have included residential houses, commercial offices, a storage facility, a construction yard, and a bulk retail fuel outlet.

A Brownfield CIP application to participate in the Environmental Site Assessment (ESA) Grant program was approve by Council at its July 5, 2021 meeting (CR308/2021).

Discussion:

Development Proposal

The applicant proposes to construct a multi-phase, mixed-use redevelopment project containing 317 residential dwellings units (i.e. comprised of townhomes and multiple dwellings) as well as commercial space. Official Plan and Zoning By-law Amendments

were submitted in October 2022, which are currently being reviewed by Administration. The first phase of the proposal includes 30 townhome dwellings primarily located on the 0 Edna Street properties with subsequent residential and commercial buildings proposed for later phases.

Prior to issuance of a building permit a Record of Site Condition (RSC) confirming the soil and groundwater quality meet residential standards must be filed with the Ministry of the Environment, Conservation and Parks (MOECP). The Phase 2 Environmental Site Assessment work completed by the applicant identified approximately 600 m^3 of impacted soil that must be excavated and removed. There is also approximately 1,850 m^3 of impacted stock piled soil on site that must be removed prior to filing a RSC. The total eligible cost of the work required to file a RSC is estimated to be $3,655,685. The application also identifies $12,645,600 in site servicing costs will need to be incurred to support the full development which may be eligible under the Rehabilitation Grant Program.

Brownfield Rehabilitation Grant Program

The Brownfield Rehabilitation Grant Program encourages the remediation, rehabilitation and adaptive re-use of brownfield sites by providing grants to help pay for remediation costs as well as non-environmental rehabilitation costs normally associated with brownfield site redevelopment (e.g. development application and building permit fees, and upgrading on-site /off-site infrastructure).

The program offers annual grants funded through the increase in municipal property tax levy created by the investment for up to 10 years to help offset eligible costs. The CIP specifies Brownfield Rehabilitation Grants will equal 70% of the municipal property tax increase for a project that employs standard construction methods and 100% of the municipal property tax increase for projects that achieve any level of Leadership in Energy and Environmental Design (LEED) certification.

Annual grants are paid out following the filing of a RSC, reassessment of the property and the payment of the property taxes for the year in which the grant is to be provided. Issuance of the first grant payment typically occurs at least two years after approval to participate in the program but not before development is complete and has been reassessed by MPAC.

CIP Goals

City staff are supportive of the application as it meets all of the eligibility requirements specified within the Brownfield Redevelopment CIP. The proposed filing of a RSC and redevelopment of the property supports the following CIP goals:

- To promote the remediation, rehabilitation, adaptive re-use and redevelopment of brownfield sites throughout the City of Windsor in a fiscally responsible and sustainable manner over the long term;
- Improve the physical and visual quality of brownfield sites;
- Improve environmental health and public safety;
- Provide opportunities for new housing, employment uses, and commercial uses;
- Increase tax assessment and property tax revenues;
- Improving the land use compatibility of potential brownfield sites with surrounding land uses;
- Increase community awareness of the economic, environmental and social benefits of brownfield redevelopment; and
- Utilize public sector investment to leverage significant private sector investment in brownfield remediation, rehabilitation, adaptive re-use, and redevelopment.

Policy Support

The clean up, redevelopment, and intensification of the site is supported by numerous policies within the 2020 Provincial Policy Statement, the City's Official Plan, Community Energy Plan, and the City's Environmental Master Pan.

Risk Analysis:

As with all brownfield sites, there is a degree of risk associated related to the potential presence of contamination. In this case there is also a risk of the property remaining in a vacant state, which negatively affects the surrounding properties. The proposed clean-up and redevelopment of this site will assist in mitigating these risks.

Climate Change Risks

Climate Change Mitigation:

The proposed redevelopment implements Environmental Master Plan Objective C1: Encourage in-fill and higher density in existing built areas. In particular, the redevelopment would implement the action that supports the existing Brownfields Redevelopment Strategy and achieve its work plan.

Climate Change Adaptation:

The proposed redevelopment may be affected by climate change, in particular with respect to extreme precipitation and an increase in days above 30 degrees. While not the subject of this report, any new construction would be required to meet the current provisions of the Building Code, which would be implemented through the building

permit process. The site would also be required to incorporate storm water management best practices.

Financial Matters:

Phase 1 Development

The current property value assessment of 0 Edna Street, which is the primary parcel planned to accommodate Phase 1 of the development, is $248,000. The total current tax levy is $10,677.19 with the municipal portion being $8,494.79. Using property assessment values for a similar development completed by the applicant, the estimated annual grant related to Phase 1 as shown in the chart below is $101,665.83 or $1,016,658.30 over the 10 year approval.

Estimate of Brownfield Rehabilitation Grant for Phase 1 (30 townhomes)			
Annual Pre Development Municipal Taxes	Estimate of Annual Post Development Municipal Taxes	Estimate of Annual Rehabilitation Grant (70% of increase)	Total Estimated Grant Value over ten (10) years
$8,494.79	$153,731.70	$101,665.83	$1,016,658.30

Because the development is proposed to be constructed in phases the rehabilitation grant period would begin upon completion of Phase 1 and would continue for 10 years before ceasing. Construction to current Building Code standards would yield annual grant payments in the amount of 70% of the post municipal tax increase. The City would retain 30% of the increase, which is estimated to be $43,571.08 or $435,711 over the 10 year grant period.

Additional Proposed Development

It is important to note that the current total (base) municipal property taxes as they relate to the five parcels identified for this project are approximately $23,000. This base amount would be retained by the City (adjusted annually over the 10 year grant period) and would be factored into future grant calculations as appropriate. The grant value noted above would increase as additional assessment value is created through the completion of additional development phases over the 10 year grant period.

It is estimated that the remainder of the planned development could add an additional $30M in property assessment value and approximately $580,000 in annual municipal property taxes. As indicated in the chart below, this could bring the total annual grant value to $497,000 during the latter part of the 10 year grant period.

Estimate of Brownfield Rehabilitation Grant for Full Development		
Annual Pre Development Municipal Taxes	Estimate of Annual Post Development Municipal Taxes	Estimate of Annual Rehabilitation Grant (70% of increase)
$23,000	$733,000	$497,000

Again, due to the fact that annual grant is equal to 70% of the post municipal tax increase the City would retain 30% of the annual increase, which is estimated to $213,000.

If approved the rehabilitation grant program may offset between 6% and 36% of the estimated eligible rehabilitation and site servicing costs. The total grant value would depend on how quickly the proposed development phases proceed. The Brownfield Redevelopment grants are paid back to the applicant after redevelopment has occurred, property assessment value has been reassessed by MPAC, and total taxes as it relates to the redevelopment have been paid to the City in full. After the grant programs cease the full amount of increased annual municipal taxes would be retained by the City in perpetuity.

The proposed development may also be eligible for incentives under the Ford City CIP, however no application has been submitted as of the date of this report.

Consultations:

The development and approval of the Brownfield Redevelopment CIP was subject to extensive stakeholder and public consultation, which sought input from a wide range of stakeholders and internal City departments.

Planning staff have consulted with the applicant prior to accepting the application for the Brownfield Rehabilitation Grant Program. Staff from the Planning, Finance, and Legal Departments were consulted in the preparation of this report.

Conclusion:

Administration recommend Council approve the requests from 1026738 Ontario Limited, Walkerville Commercial Centre Inc., and Walkerville Walker Developments Inc. to participate in the Brownfield Rehabilitation Grant Program. The proposed clean-up and redevelopment of this brownfield site conforms to the Brownfield Redevelopment CIP; assists the City in the achievement of a number of CIP, Official Plan, Community Energy Plan, and Environmental Master Pan goals; and exemplifies the purpose for which the Brownfield Redevelopment Strategy was created.

Planning Act Matters:

N/A

Approvals:

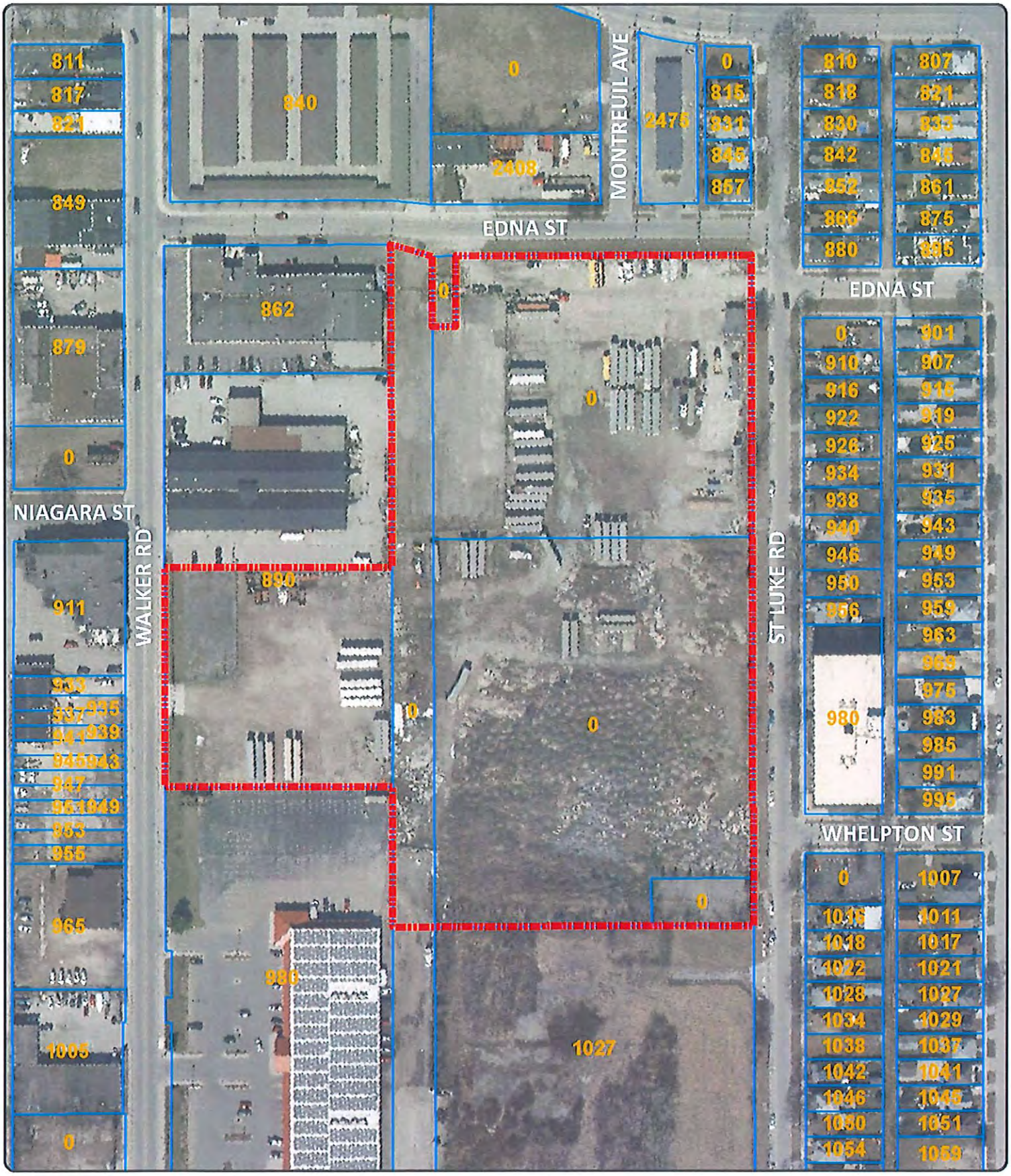
Name	Title
Josie Gualtieri	Financial Planning Administrator
Michael Cooke	Manager of Planning Policy / Deputy City Planner
Thom Hunt	City Planner / Executive Director, Planning & Development Services
Wira Vendrasco	Deputy City Solicitor, Legal Services & Real Estate
Janice Guthrie	Deputy Treasurer, Taxation & Financial Projects
Joe Mancina	Commissioner, Corporate Services Chief Financial Officer / City Treasurer
Jelena Payne	Commissioner, Economic Development & Innovation
Onorio Colucci	Chief Administration Officer

Notifications:

Name	Address	Email
Anuj Sood		

Appendices:

1 Location Map



LOCATION MAP: ST. LUKE ROAD AT EDNA STREET

SUBJECT PROPERTIES

0 15 30 60 90 Meters

Committee Matters: SCM 80/2023

Subject: United Way - ProsperUs Collective Impact Initiative - Progress of the PropserUS Cradle to Career Strategy for Windsor

Moved by: Councillor Fabio Costante
Seconded by: Councillor Jo-Anne Gignac

Decision Number: **CSPS 203**
That the presentation entitled "United Way – ProsperUs Collective Impact Initiative – Progress of the ProsperUs Cradle to Career Strategy for Windsor" **BE RECEIVED.**
Carried.

Clerk's File: MB2023

Clerk's Note:

1. Please refer to Item 6.1 from the Community Services Standing Committee held on March 1, 2023.

2. To view the stream of this Standing Committee meeting, please refer to: https://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230301/-1/9392

Committee Matters: SCM 78/2023

Subject: United Way - ProsperUs Collective Impact Initiative - Progress of the ProsperUS Cradle to Career Strategy for Windsor - Presentation - City Wide

PROSPERUS
Unlocking Potential - Cradle to Career

Cradle to Career Strategy

Prepared for:
City of Windsor
Community Services Standing Committee
Date: March 1, 2023

ProsperUs is a collective of over 40 system-leading organizations, including representation from non-profit, government, healthcare, education, labour, business, and inspired community members that have come together with residents to tackle childhood poverty in Windsor-Essex County.

THE STRATEGY

Cradle to Career

ProsperUs is committed to a common vision for our community: every young person in Windsor-Essex County has the opportunity and support to succeed from Cradle to Career (C2C). This means ensuring children and youth are able to meet six key milestones associated with long-term success:

- Milestone 1: Kindergarten readiness
- Milestone 2: Grade 3 Literacy achievement
- Milestone 3: Grade 6 Math achievement
- Milestone 4: High School Graduation
- Milestone 5: Completion of Post-Secondary Education
- Milestone 6: Transition to the Workforce

With an equity-driven approach, ProsperUs is focused on three priority neighbourhoods where data tell us children and youth face the greatest barriers to opportunity: West Windsor, Downtown Windsor, and Leamington.

Local data show that families in these neighbourhoods experience higher rates of low-income, housing insecurity, food bank usage, and unemployment. Children and youth are growing up facing more barriers to long-term success than their peers in other communities.

C2C is a proven strategy that focuses on systems change to ensure these young people have wrap-around supports from the time they are born until the time they enter the workforce.

Cradle to Career
Community Vision

1

CHILDREN WHO ARE KINDERGARTEN READY are more likely to have a foundation that supports future learning and better health. This includes the first 1,000 days (pre-natal care).

2

STUDENTS WHO ARE PROFICIENT IN READING IN 3RD GRADE are more likely to graduate from high school.

3

STUDENTS WHO ARE PROFICIENT IN MATH IN 6TH GRADE are more likely to complete post secondary and be prepared for the workforce.

4

STUDENTS WHO GRADUATE HIGH SCHOOL are less likely to experience poverty, receive public assistance, or become involved in the criminal justice system.

5

STUDENTS WHO ARE POST SECONDARY & CAREER READY are more likely to have better employment and earnings opportunities.

6

STUDENTS WHO ARE EMPLOYED within a year of graduation is crucial for achieving self-sufficiency and developing skills for the 21st century economy.

Foundation of Success

- FAMILY FINANCIAL STABILITY
- HEALTH & NUTRITION
- ACCESS TO HOUSING
- TRANSPORTATION
- SOCIAL INCLUSION

Elevating the Voices of Lived Experience to Drive the Cradle to Career Strategy

ProsperUs is working closely with residents, front-line service providers, and subject-matter experts to develop new programs and services to solve long-standing problems using *Human Centered Design*: an approach to problem solving from the perspective of the individuals experiencing the challenges, to better meet their true needs.

The resident-led working groups are called Community Action Networks (CANs). CANs reflect the diverse experiences of families that reside in priority neighbourhoods. They identified over 50 different barriers that prevent children from successfully achieving the key milestones, which span across housing, food and nutrition, health, education, and employment. ProsperUs aims to use a new collective approach to re-align existing resources, invest new resources where gaps exist, and advocate for long-term sustainability of solutions.

Through the solution design process, residents identified several barriers that cannot be addressed through programmatic interventions, and as a result the CAN **Advocacy Working Groups** have been formed. These resident-driven groups in Leamington and Windsor have prioritized key issues to tackle using advocacy strategies, with the goal of shifting systemic conditions for families and strengthening local civic infrastructure.

Leamington Advocacy Priority: Increase affordable rental housing
Windsor Advocacy Priority: Increase pediatric health care access

The residents of the ProsperUs Advocacy Working Groups look forward to engaging with local leaders in the near future to share their experiences and collaborate on action items related to these issues, to ensure that together we are working to improve outcomes for our children and youth

THE CITY OF WINDSOR ONTARIO, CANADA

Committee Matters: SCM 82/2023

Subject: 2023 Municipally Significant Event Status, Wards 2,3,4,6,7

Moved by: Councillor Jo-Anne Gignac
Seconded by: Councillor Mark McKenzie

Decision Number: **CSPS 205**
That the request from; 1933900 Ontario Ltd; Hotel-Dieu Grace Healthcare Foundation**;** Northern Heat Rib Series**;** Poutine Feast Ontario Inc.; Rotary Club of Windsor (1918)**;** Windsor Eats Inc.; and Windsor-Essex Pride Fest**;** for approval of designation as 'municipally significant' for the purpose of applying for their Special Occasions Permit – Public Event **BE APPROVED** by Council subject to the terms and conditions of the Special Event Agreement with the City; and further,

That City Council **APPROVE** the following proposed significant event dates for 2023:

Saturday May 27, 2023
Heart Breaker Challenge (Malden Park) hosted by Hotel-Dieu Grace Healthcare Foundation

Thursday June 1, 2023 through Sunday June 4, 2023
Windsor Rib Fest (Riverfront Festival Plaza and Riverfront Civic Terrace) hosted by Northern Heat Rib Series

Friday June 2, 2023 through Sunday June 4, 2023
Art in the Park (Willistead Park) hosted by Rotary Club of Windsor (1918)

Thursday June 8, 2023 through Sunday June 11, 2023
Poutine Feast (Riverfront Festival Plaza and Riverfront Civic Terrace) hosted by Poutine Feast Ontario Inc.

Thursday July 20, 2023
Dinner on the Pier (Assumption Park) hosted by Windsor Eats Inc.

Friday August 11, 2023 through Sunday August 13, 2023
Pride Fest (Lanspeary Park and Outdoor Rink) hosted by Windsor-Essex Pride Fest

Friday October 13, 2023 and Saturday October 14, 2023
Windsor Eats Craft Beer Fest (Willistead Park) hosted by 1933900 Ontario Ltd.
Carried.

Report Number: S 21/2023
Clerk's File: SR/14497

Clerk's Note:

1. The recommendation of the Community Services Standing Committee and Administration are the same.

2. Please refer to Item 8.1 from the Community Services Standing Committee held on March 1, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: https://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230301/-1/9392

Subject: 2023 Municipally Significant Event Status, Wards 2,3,4,6,7

Reference:

Date to Council: March 1, 2023
Author: Michelle Staadegaard
Manager, Culture & Events
(519) 253-2300 ext. 2726
mstaadegaard@citywindsor.ca
Recreation and Culture
Report Date: February 7, 2023
Clerk's File #: SR/14497

To: Mayor and Members of City Council

Recommendation:

THAT the request from; 1933900 Ontario Ltd; Hotel-Dieu Grace Healthcare Foundation**;** Northern Heat Rib Series**;** Poutine Feast Ontario Inc.; Rotary Club of Windsor (1918)**;** Windsor Eats Inc.; and Windsor-Essex Pride Fest**;** for approval of designation as 'municipally significant' for the purpose of applying for their Special Occasions Permit – Public Event **BE APPROVED** by Council subject to the terms and conditions of the Special Event Agreement with the City; and further,

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Saturday May 27, 2023
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Thursday June 1, 2023 through Sunday June 4, 2023
Windsor Rib Fest (Riverfront Festival Plaza and Riverfront Civic Terrace) hosted by Northern Heat Rib Series

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Poutine Feast (Riverfront Festival Plaza and Riverfront Civic Terrace) hosted by Poutine Feast Ontario Inc.

Thursday July 20, 2023
Dinner on the Pier (Assumption Park) hosted by Windsor Eats Inc.

Friday August 11, 2023 through Sunday August 13, 2023
Pride Fest (Lanspeary Park and Outdoor Rink) hosted by Windsor-Essex Pride Fest

Friday October 13, 2023 and Saturday October 14, 2023
Windsor Eats Craft Beer Fest (Willistead Park) hosted by 1933900 Ontario Ltd.

Executive Summary:

N/A

Background:

The Alcohol and Gaming Commission of Ontario (AGCO) administers the Special Occasion Permit (SOP) program, which allows for the sale, service and in most cases consumption of liquor on special occasions, such as cash bars at weddings or private receptions, as well as larger scale events that are open to the public, such as charity fundraisers.

A Special Occasion Permit (SOP) is required any time liquor is sold or served anywhere other than in a licensed establishment or a private place. SOPs are for occasional, special events only, and not for personal profit or running an ongoing business.

AGCO defines a Public Event as an event that is advertised to the public to attend. These events can be advertised and fundraising and/or profit from the sale of liquor at the event is permitted

Public Event permits can be issued for events of “municipal significance”.

An event of municipal significance requires a designation by the municipality in which the event will take place. SOP applications for a municipally significant public event must be accompanied by either a municipal resolution or a letter from a delegated municipal official designating the event as municipally significant. Requests for municipal significance must be requested on an annual basis.

Discussion:

Previously, Council approved sixteen (16) events as “municipally significant” at its meeting of April 11, 2022, as per CR S 38/2022. Administration has received a request for seven (7) events for the 2023 season to be designated as “municipally significant”.

All seven (7) events listed in the recommendation have received no objection from either Administration or the Special Events Resources Team (SERT). Administration has met with the local AGCO representatives, who did not object to any of the events applying for "municipal significance" status noted in this report

The event organizers will be required to enter into an agreement with the Corporation to the extent similar to the other festivals and events that currently are presented at other City of Windsor municipal locations, including indemnifying the City of Windsor from liability associated with the event.

Administration notes that the designation of an event as "municipally significant" can be delegated to a municipal official, pursuant to Section 3 of the Ontario Special Occasion Permit Guide. Council could direct Administration to include this item in the next round of Delegation of Authority Bylaw updates, along with the requirement to notify Council when the designations are provided.

Risk Analysis:

There is a significant risk that if the seven (7) events noted in this report are not given Significant Event Status designation, they will not get approval for an SOP by the AGCO. If Significant Event Status were not approved, these public events would not be able to occur.

The consumption of alcohol within the festival/event site will occur at these events if they are granted a SOP. The applicant will be required to provide the required insurance. All liquor services will adhere to the AGCO regulations and Municipal Alcohol Policy, which provides information that, covers requirements for Smart Service staffing resources. These factors will mitigate the risk factor to the Corporation.

Climate Change Risks

Climate Change Mitigation:

N/A

Climate Change Adaptation:

N/A

Financial Matters:

The applicants hosting events on City owned public property would be required to rent the respective venue and pay the applicable fees as per the 2023 Schedule of Fees.

Consultations:

SERT (Special Events Resource Team)

Conclusion:

The City of Windsor recognizes the importance of special events and festivals enhancing the quality of life, tourism, culture, recreation and education, not all of which would be possible without the invaluable services of volunteers, community groups, and sponsors that add their support and skills to enhancing the community events.

Planning Act Matters:

N/A

Approvals:

Name	Title
Michelle Staadegaard	Manager, Culture & Events
Jen Knights	Executive Director, Recreation & Culture
Ray Mensour	Commissioner, Community Services
Kristina Savi-Mascaro	Deputy City Solicitor – Purchasing, Risk Management & Provincial Offences
Onorio Colucci	Acting Chief Administrative Officer

Notifications:

Name	Address	Email

Appendices:

Committee Matters: SCM 81/2023

Subject: Asylum Claimants Transferred to Windsor Hotels by Immigration, Refugees and Citizenship Canada (IRCC) – City Wide

Moved by: Councillor Jo-Anne Gignac
Seconded by: Councillor Fabio Costante

Decision Number: **CSPS 204**
That the report of the Manager, Social Policy and Planning regarding the report dated February 10, 2023, entitled "Asylum Claimants Transferred to Windsor Hotels by Immigration, Refugees and Citizenship Canada (IRCC)-City Wide" **BE RECEIVED** for information; and,

That City Council **BE REQUESTED** to submit a letter to Immigration, Refugees, Citizenship Canada (IRCC) to state the City of Windsor does not have the capacity or resources to support additional asylum claimants beyond those estimated based on the current number of secured temporary accommodations; and,

That City Council **BE REQUESTED** to submit a letter to the appropriate senior levels of government, such as the Ministry of Labour, Immigration, Training and Skills Development (MLITSD), to have them identify and resource a local lead settlement agency to coordinate a response in Windsor and Essex County; and, that the correspondence **INCLUDE** a request to establish legal representation from the Refugee Law Office of Legal Aid Ontario.
Carried.

Report Number: S 22/2023
Clerk's File: SS2023

Clerk's Note:

1. The recommendation of the Community Services Standing Committee and Administration are **not** the same.

2. Please refer to Item 8.2 from the Community Services Standing Committee held on March 1, 2023.

3. To view the stream of this Standing Committee meeting, please refer to: https://csg001-harmony.sliq.net/00310/Harmony/en/PowerBrowser/PowerBrowserV2/20230301/-1/9392

Subject: Asylum Claimants Transferred to Windsor Hotels by Immigration, Refugees and Citizenship Canada (IRCC) – City Wide

Reference:

Date to Council: March 1, 2023
Author: Stephen Lynn
Manager, Social Policy & Planning
slynn@citywindsor.ca
519-255-5200 Ext. 5270
Community Development and Health Services
Report Date: February 10, 2023
Clerk's File #: SS2023

To: Mayor and Members of City Council

Recommendation:

THAT the report from the Manager, Social Policy and Planning regarding Asylum Claimants **BE RECEIVED** for information; and

THAT City Council **BE REQUESTED** to submit a letter to Immigration, Refugees, Citizenship Canada (IRCC) to state the City of Windsor does not have the capacity or resources to support additional asylum claimants beyond those estimated based on the current number of secured temporary accommodations; and

THAT City Council **BE REQUESTED** to submit a letter to the appropriate senior levels of government, such as the Ministry of Labour, Immigration, Training and Skills Development (MLITSD), to have them identify and resource a local lead settlement agency to coordinate a response in Windsor and Essex County.

Executive Summary:

N/A

Background:

Immigration, Refugees, Citizenship Canada (IRCC) has been providing temporary accommodations in hotels for asylum claimants entering Canada without accommodations since the onset of the COVID-19 pandemic to ensure they had a sufficient and suitable place to quarantine. Due to the border restrictions and public

health guidelines ending on October 1, 2022, a high number of claimants continue to arrive through the Roxham Road irregular border crossing into Quebec.

These individuals are intercepted by the Royal Canadian Mounted Police (RCMP) or local law enforcement and brought to the nearest Canada Border Services Agency (CBSA) port of entry or inland CBSA/IRCC office for immigration processing. In 2022, the total number of asylum claimants intercepted by the RCMP and brought to a CBSA office totalled 63,850 across Canada1. The majority of intercepts were at the Quebec and New York border, more specifically at Roxham Road. The high number of intercepts occurring at irregular crossings at the Quebec border has caused a significant strain on the Quebec local emergency shelter system while refugee claimants wait for their claims to be processed. The pressure on the social support system has led IRCC to expand its hotel operations outside of Quebec by transferring asylum claimants via charter bus to multiple municipalities across Ontario for temporary hotel accommodations.

It is important to note that this population are not permanent residents. Different than the two categories of permanent residents are permanent resident refugees; government-assisted refugees (GARs) and privately sponsored refugees (PSRs). GARs have their initial expenses provided by the Federal Government for up to 12 months after arriving in Canada. PSRs have their initial expenses covered by private sponsors for at least 12 months. These two categories are granted permanent residency in Canada when they arrive. GARs and PSRs fall within the jurisdiction of the Federal Government.

In addition to permanent resident refugee categories is the classification of asylum claimant (also known as refugee claimant or asylum seeker). An asylum claimant is a person(s) who have travelled to Canada without government assistance and made their refugee claim from within Canada. An asylum claimant has been forced to flee their home country due to factors outside of their control. These factors can include but are not limited to persecution, war, or risk of torture. Once a person(s) makes their refugee claim in Canada, they are allowed to live in Canada during the time it takes for IRCC to process and make a ruling. Asylum claimants are allowed to work in Canada once they receive a work permit and can only apply for one if they require a job to pay for basic needs. If IRCC approves a refugee claim, the claimant is now classified as a 'protected person,' which would make them eligible to apply for an open work permit and permanent residency. The independent Immigration Refugee Board of Canada (IRB) reviews and rules on each refugee claim.

Although IRCC is responsible for reviewing all refugee claims, the federal government is not responsible for supporting asylum claimants in Canada. In the Province of Ontario, the Ministry of Labour, Immigration, Training and Skills Development (MLITSD) is responsible for the Newcomer Settlement Program (NSP), a provincial-wide program to help facilitate the social and economic integration of newcomers, including asylum claimants, to Ontario. In Windsor-Essex, the Multicultural Council of Windsor and Essex County (MCC) works in partnership with the YMCA of Southwestern Ontario and with Women's Enterprise Skills Training Inc. (WEST) and College Boreal to deliver the NSP program

Discussion:

Immigration, Refugees, Citizenship Canada (IRCC) contacted City Administration on December 30th, 2022, with information about providing temporary accommodations for asylum claimants entering Canada without alternative accommodation plans. The accommodations are temporary until asylum claimants can find long-term housing. Initially, 175 hotel rooms were secured at one (1) hotel, but due to the increased pressure at the Quebec border, two (2) additional hotels have now been secured, totalling 439 rooms. According to the last demographic profile report from IRCC, over 500 claimants have arrived in Windsor, representing at least 30 nationalities and 18 languages.

Administration throughout the Human and Health Services (H&HS) Department immediately worked to assess the situation, obtain more information from Federal and Provincial officials, and coordinate with internal and external partners. Regular update meetings with IRCC and provincial officials continue to provide H&HS with the most up-to-date information about the number of intercepts at the Quebec border as well as local hotel operations. Contact was also made with other municipalities who have received claimants to share best practices and gain relevant insight.

Senior leadership from H&HS subsequently visited the first hotel to liaise with the operations lead from IRCC, view the hotel operations and visit with the numerous on-site community agencies providing services. It was evident from the site visit and subsequent meetings that Windsor would benefit from a local settlement agency for coordination services with various sector partners located in Windsor operating within the multisite hotel operations. Furthermore, that said services would be most appropriately provided by a local settlement agency with experience in working with various sector partners.

The H&HS department acknowledges and respects its duty to act as a supportive and collaborative partner to ensure the unique needs of asylum claimants arriving in Windsor are addressed in an effective, timely and compassionate manner. City administration does not take lightly the hardships endured by these individuals and families and will continue to assist where possible, while still recognizing that the Federal, Provincial and community partners all play a role in this to secure the appropriate supports needed for short and long-term success. To that end, the following departments and programs within the H&HS portfolio have been involved to date:

Employment and Social Services

Asylum Claimants are eligible to apply for Ontario Works benefits while they await their hearing with the Immigration Refugee Board of Canada (IRB). To provide support to the individuals transferred to Windsor, Employment and Social Services has deployed Ontario Works staff to process applications on-site. There is currently a small number of staff members on-site almost daily, each afternoon. As of February 15, 2023, the department has granted over 250 Ontario Works applications for asylum claimants.

Housing and Children's Services

Housing and Children's Services is actively monitoring the situation. There is currently no impact on the local emergency shelter system, but this could occur should the asylum claimant's checkout at the hotel for alternative accommodations. If that tenancy fails, the individual or family is not permitted back into the hotel and may seek to stay at a local emergency shelter.

For younger children, the Children Services Department is reviewing all opportunities to support families through their extensive network of friendly and welcoming EarlyOn Child and Family Centres. Families with school-aged children have been provided information about educational options by each of the local school boards.

Windsor Essex Local Immigration Partnership (WE LIP)

The Windsor Essex Local Immigration Partnership (WE LIP) is an initiative of Immigration, Refugees and Citizenship Canada (IRCC) to encourage communities across Ontario and Canada to develop a comprehensive plan for the delivery of newcomer services. The City of Windsor is the lead and holds the agreement with IRCC but contracts the work of the WE LIP to Workforce WindsorEssex. The WE LIP helps promote the long-term settlement and integration of immigrant newcomers into Windsor and Essex County. Although the mandate of the WELIP does not support asylum claimants, staff have been instrumental in liaising with IRCC operations and local healthcare sector partners, including Ontario Health West, Ontario Health Team, Windsor Regional Hospital and the Windsor Essex County Health Unit.

Overall, H&HS has repeatedly expressed concerns to both Federal and Provincial levels of government regarding the immediate, medium and long-term impacts this situation will have on the already stretched health care, housing and financial support sectors in Windsor-Essex County.

Risk Analysis:

The large number of asylum claimants arriving in Windsor over a relatively short period raises concerns about the City of Windsor and our partners' capacity to absorb the impact of this downward pressure without additional resources from the Federal and Provincial governments. In order to mitigate any further impacts, administration is seeking Council's support to submit a letter to IRCC and state that the City does not have the capacity or resources to support additional asylum claimants beyond current estimates based on the number of secured temporary accommodations.

The influx of Ontario Works applications has caused an increase in the overall ongoing caseload. As additional claimants arrive and other hotel sites are secured, the department anticipates a steady stream of applications being processed and granted. It is estimated that 600-650 additional OW cases could be added to the overall caseloads. In order to mitigate this additional burden, the department has submitted a one-time funding request to the Ministry of Children, Community and Social Services (MCCSS) to secure the human resources required to process and maintain the increase in

caseloads. The request included funding for additional staff to complete the applications and support the ongoing case management of the Refugee Claimants.

There is a high probability that our local housing market will feel additional pressures given the current rental vacancy rate of 1.8%, with an average two-bedroom rent of nearly $1200.00 per month (as per CMHC recent report). Furthermore, there is a low to medium risk that the local emergency shelter system could experience a surge in usage should the temporary accommodations end, or a failed tenancy occurs after seeking longer-term housing.

Climate Change Risks

Climate Change Mitigation:

N/A

Climate Change Adaptation:

N/A

Financial Matters:

The City of Windsor is the Consolidated Municipal Service Manager (CMSM) for the delivery of the Ontario Works (OW) program within Windsor and Essex County. The Province through the Ministry of Children, Community and Social Services (MCCSS) provides Ontario Works Funding to support program administration, delivery of employment services, and the provision of financial assistance. Ontario Works funding is provided through two streams.

Basic Financial Assistance is funded 100% by the Ministry for the provision of income assistance for necessities like food and housing and other discretionary or health related benefits.

Ontario Works Program Delivery funding is provided to municipalities to support program administration and the provision of employment services. The Ontario Works Program Delivery funding is cost-shared with the Ministry. The first $6.7 million of program delivery funding is funded 100% by the Ministry, and the remaining budget is cost-shared with the municipality at a rate of 50/50 to a capped level of $27.3 million. Any costs above the cap becomes a municipal cost. The County of Essex shares in the municipal contribution using the arbitrated weighted assessment formula.

In light of the expected growth in caseloads due to the influx of asylum claimants, the department has submitted a one-time funding request to MCCSS to secure the human resources required to process and maintain the increase in caseloads. The additional funding would be cost shared 50/50 with the Province. The municipal share can be accommodated within the current Ontario Works Program Delivery budget.

Consultations:

Kirk Whittal, Executive Director of Housing and Children's Services

Tanya Antoniw, Executive Director of Housing and Children's Services

Linda Higgins, Manager of Intergovernmental Subsidies

Conclusion:

Human and Health Services respects and values all people and will continue to work with our Federal, Provincial and community partners to respond to the unique needs of the asylum claimants in a timely, caring and non-judgmental manner. As the number of asylum claimants temporarily living in hotels increases, the City of Windsor and partner organizations anticipate significant, financial and human resources to respond to the new pressures placed on already stressed systems. Increased funding from senior levels of government for local coordination services and addressing immediate and long-term needs is essential to ensuring the successful integration of asylum claimants into Windsor and Essex County.

Planning Act Matters:

N/A

Approvals:

Name	Title
Stephen Lynn	Manager, Social Policy and Planning
Linda Higgins	Manager of Intergovernmental Subsidies
Andrew Daher	Commissioner, Human and Health Services
Joe Mancina	Chief Financial Officer/City Treasurer – Corporate Leader ,Finance & Technology
Onorio Colucci	Acting Chief Administrative Officer

Notifications:

Name	Address	Email

Appendices:

Subject: Hosting 2023 Western Ontario Regional FireFit Competition - City Wide

Reference:

Date to Council: March 20, 2023
Author: Stephen Laforet
Fire Chief
519-253-3016 x3753
slaforet@citywindsor.ca
Windsor Fire & Rescue
Fire and Rescue Services
Report Date: 2023-03-03
Clerk's File #: SR/14497

To: Mayor and Members of City Council

Recommendation:

THAT City Council **APPROVE** and **ENDORSE** the City of Windsor to host the 2023 Western Ontario Regional FireFit Competition on September 8, 9 and 10, 2023; and,

THAT City Council **APPROVE** the establishment of a 2023 Western Ontario Regional FireFit Competition Executive Committee comprised of staff from the following City departments and agencies:

- Windsor Fire & Rescue Service – City of Windsor
- Tourism Windsor Essex Pelee Island
- Finance – City of Windsor
- Risk Management – City of Windsor
- Recreation, Culture & Events – City of Windsor
- Sponsorship & Community Investment- Communications – City of Windsor

and,

THAT City Council **AUTHORIZE** the Executive Committee to proceed with all activities necessary to properly plan and to make decisions affecting the development and operation of the 2023 Western Ontario Regional FireFit Competition; and,

THAT City Council **AUTHORIZE** approval to establish the 2023 Western Ontario Regional FireFit Competition as a Capital Project; and,

THAT the Executive Committee **BE AUTHORIZED** to approve changes in budget allocations within the overall project budget based upon demonstrated needs; and,

THAT in cases where additional funding has been secured, and subject to a report back to City Council at the conclusion of the FireFit Competition, the Executive Committee **BE AUTHORIZED** to increase the overall project budget accordingly so that the net cost to the City remains the same; and,

THAT City Council **APPROVE** the establishment of a 2023 Western Ontario Regional FireFit Competition Organizing Committee, to be selected from within the community volunteer base, Windsor Fire & Rescue and City Administration; and,

THAT City Council **AUTHORIZE** the Organizing Committee to proceed with all activities necessary to properly execute the 2023 Western Ontario Regional FireFit Competition; and,

THAT City Council **AUTHORIZE** the CAO and/or City Clerk to sign agreements, contracts and/ or grant applications as considered necessary as it relates to the organization and hosting of the 2023 Western Ontario Regional FireFit Competition satisfactory in legal content to the City Solicitor, technical content to the Fire Chief, and financial content to the CFO/City Treasurer.

Executive Summary:

N/A

Background:

In the early 2000's Windsor hosted multiple successful FireFit events, including the world championships. At the time, the competition was formally known as the Combat Challenge. These previous events generated significant public interest and drew thousands of spectators and competitors while raising funds and donations for local charities. In addition, local firefighter participants won regional and national titles at these events.

In 2022, Windsor Hosted the Can-Am Police-Fire Games, which culminated in a FireFit event held at the Riverfront Festival Plaza on the closing weekend. The event was a tremendous success and the City along with Windsor Fire & Rescue received many inquiries from the public and potential competitors about the return of a FireFit event as a lead up to the FireFit National Competition.

Discussions with FireFit have identified an opportunity to host an event on the weekend of September 8, 9, and 10, 2023. It is expected that the event will generate over one thousand spectators and bring competitors and their families to the City of Windsor from across Ontario and beyond. With the FireFit National Championships taking place in Sarnia on September 15-17th, the Windsor event will be a draw for those firefighters competing as a last chance to qualify for Nationals, and will also provide an opportunity for those who will move on to Sarnia to participate in one final competition to enhance their skills and expertise.

Discussion:

Windsor Community & Tourism:

The marketing and promotions strategic plan will increase attendance amongst eligible firefighters through geographic reach and through direct contact with fire associations and administration to raise awareness of the Western Ontario Regional FireFit 2023 Competition. It will offer a well established “stay and play” hospitality program that will increase tourist visitation and expenditures.

The Windsor Fire & Rescue FireFit Event Organizing Committee will work with their community partners to strengthen our region’s position as an exciting tourism destination through elements that will include social media platforms, collateral materials, support services and media buys.

The competition schedule contributes to the spectacle event and collectively brings everyone together (participants, sponsors, supporters and volunteers). The Western Ontario Regional FireFit Competition will be available to the public free of charge. This event will deliver a friendly competition, camaraderie and a celebration with a community who cares and supports our first responders. These are the people who put their lives on the line to keep us safe and this FireFit Competition will give us – as a community – the opportunity to say “thank you.”

Additional goodwill will be demonstrated with support of donations from the Corporate Challenge Competition presented to the Canadian Mental Health Association (CMHA) on behalf of our community and Windsor Fire & Rescue.

This family-friendly competition will draw visitors to our community for extended stays, benefitting our tourism and hospitality industry, our local businesses and the overall economic well-being of our city, and they will provide an opportunity to showcase all that Windsor has to offer.

About the Competition:

The FireFit is a sporting championship where Canadian firefighters race to perform athletic feats involved in real-life emergencies.

There are many different levels of Competitors, from the seasoned veteran firefighters to the first time rookies. FireFit is an obstacle course designed for firefighters and is made up of tasks they might perform while on the job: lifting, running, drawing and aiming a fully loaded fire hose, carrying a dead weight, and more — all while under the load of 80 pounds worth of firefighting equipment, standard issue for those who work in the field.

Competitors race in individual and team categories within specific age groups. Both men and women complete the same tasks, though they compete in gender-specific divisions. The FireFit Competition was designed to give firefighters incentive to maintain and improve their fitness, a crucial element to the work that they do.

FireFit travels to various Cities throughout the summer and early fall putting on events. FireFit is experienced in working with municipalities to create great experiences for competitors and spectators alike. As a result, the event will also include opportunities for the public to interact with members of the fire service and participate in activities

such as a 5k run on September 09, 2023. The event is a great attraction for families and will likely generate significant spectators.

Risk Analysis:

An event of this magnitude will carry a certain level of risks. The need for additional insurance will be secured with the assistance of the City's insurer. Budgets have been established based upon known items and expenditures however are subject to change as the Competition approaches. The use of experts within the FireFit Organizing Committee will assist in mitigating this risk as these people are considered experts in their relative area of responsibility. Security protocols and communication plans will be designed to ensure the safety of all teams, volunteers and members of the public who attend in support of the Competition. Finally the Administrative support will come from city staff in addition to their daily responsibilities. Operational support for the competition will include some City staff and volunteers from the community and WFRS.

Climate Change Risks

Climate Change Mitigation:

N/A

Climate Change Adaptation:

N/A

Financial Matters:

FireFit has been holding competitions across Canada since 1995 (over 25 years) and will supply its own competition courses, material and props. FireFit charges $12,400 (including taxes) to host the event. The hosting party has to work closely with FireFit to put the event together. WFRS has volunteers and desires to be a part of this partnership.

In anticipation of hosting the event in Windsor, Tourism Windsor Essex Pelee Island (TWEPI) has submitted a request for funding from the Tourism Development Infrastructure & Program Reserve to an upset limit of $30,000. This funding will be used for purposes of the deposit as well as various marketing and promotional events. Given that these expenditures are being handled directly by TWEPI it is noted that these costs are not included in the budget summary table below.

Under the direction of the Executive Committee, the WFRS volunteers that make up the Organizing committee will plan and execute the event in collaboration with FireFit and most importantly with financial and resource support of the community partners. From previous events, the City of Windsor has the infrastructure and expertise to plan and produce this competition experience for the community.

The recent Can-Am Police Fire Games (Summer 2022) serves as a valuable information source for the tasks and resources involved. The budgetary table below is

comprised of such knowledge with updated estimates applicable to hosting the FireFit Competition. A summary of projected revenue and expenses is shown below:

Estimated Budget Summary	Amount
Sponsorships - Revenue	
Community Cash & In-Kind	48,000
Event Program Sales	8,000
Other	7,500
Subtotal	**63,500**
Expenses	
Event Liability Insurance Note 1	18,000
Facilities - Festival Plaza	8,079
Event Operation Equipment & Supplies	17,878
Security	9,628
Event various (discretionary) Note 2	3,915
Contingency	6,000
Subtotal	**63,500**
Net Cost to the City of Windsor	**-**

1. Event liability is an estimate subject to change with actual to be determined.
2. Expenses include Staging/Decor, Kids Zone, Community activities, competition Medals/Trophies all of which are discretionary and will be dependant upon sponsored revenue availability.

Net City cost is expected to be zero at the conclusion of this event. A community and corporate sponsorship program will be created to help secure cash sponsors and in-kind products and services to help offset costs associated with hosting the event. In addition, additional funding may be received through program sales and other community partnership initiatives.

It is also probable that sponsorship may exceed the cost and any surplus funds may be used to either increase the overall budget and/or will be brought to Council for consideration to be saved in order to create this event as an ongoing annual activity for the community going forward. In the event that sponsorship revenue does not meet the estimated expenses, the committee will cut back every expense possible and scale down the event and ensure the net City cost remains at zero.

Upon Council's approval of this report a new Capital project named WFRS-FireFit Competition will be set up to track the financial activity of this event.

In summary, the cost of hosting the event will be covered through a sponsorship program including support and partnership with TWEPI and other sponsor prospects and supporters of the Fire Department. The economic benefit of the community through restaurants, hotels, vendors and other attractions will see an increased number of day and overnight guests coming into the City creating a positive economic impact.

Consultations:

Monika Schneider, Financial Planning Administrator

Nora Bertram Romero, Corporate Marketing & Communications officer

Conclusion:

The return of FireFit Competition to Windsor provides an opportunity to market the community to visitors from across Ontario. The FireFit Competition was designed to give firefighters incentive to maintain and improve their fitness, a crucial element to the work that they do. With over 25 years experience in hosting FireFit events, it is believed the most important equipment is yourself, and communities take great pride and embrace an opportunity to showcase their own local firefighters.

Planning Act Matters:

N/A

Approvals:

Name	Title
Janice Guthrie	Deputy Treasurer, Taxation & Financial Projects
Joe Mancina	Commissioner, Corporate Services/Chief Financial Officer & City Treasurer
Shelby-Askin Hager	Commissioner, Legal & Legislative Services
Onorio Colucci	Chief Administrative Officer (A)

Notifications:

Name	Address	Email

Appendices:

N/A