



Council Meeting Agenda

Monday, June 14, 2021

Regular Council Meeting

Virtual

7:00 P.M.

This meeting is open to the public and is available through an online platform. Please subscribe to the [Township of Wilmot You Tube Channel](#) to watch the live stream or view after the meeting.

Delegations must register with the [Information and Legislative Services Department](#). The only matters being discussed at this meeting will be those on the Agenda.

- 1. MOTION TO CONVENE INTO CLOSED SESSION**
- 2. MOTION TO RECONVENE IN OPEN SESSION**
- 3. MOMENT OF SILENCE**
- 4. LAND ACKNOWLEDGEMENT – Councillor J. Gerber**
- 5. ADDITIONS TO THE AGENDA**
- 6. DISCLOSURE OF PECUNIARY INTEREST UNDER THE MUNICIPAL CONFLICT OF INTEREST ACT**
- 7. MINUTES OF PREVIOUS MEETINGS**

7.1 Council Meetings Minutes Monday May 31, 2021

RECOMMENDATION

THAT the minutes of the following meetings be adopted as presented:

Regular Council Meeting May 31, 2021.

8. PUBLIC MEETINGS

8.1 REPORT NO. ILS 2021-25

Public Meeting

Draft Procedural By-law Amendments**RECOMMENDATION**

THAT Report ILS 2021-25 be received for information.

9. PRESENTATIONS**9.1 Board of Trade**

Lyle Cressman and Joe Figliomeni

9.1.1 REPORT NO. DS 2021-022

New Hamburg Board of Trade

Waterwheel Project

RECOMMENDATION

THAT Report DS 2021-022, regarding the New Hamburg Board of Trade Waterwheel Project be received for information.

9.2 Transform WR 80x50 Plan

**Mary Jane Patterson, Executive Director, Reep Green
Solutions**

**Tova Davidson, Executive Director of Sustainable Waterloo
Region**

9.2.1 REPORT COR 2021-022

TransformWR 80x50

RECOMMENDATION

THAT the attached TransformWR strategy (Appendix A to report COR 2021-022) be endorsed as the community climate change mitigation strategy for the Township of Wilmot; and further;

THAT Council direct staff across the organization to develop detailed plans to implement the strategy, subject to available funding and resource allocations; and further,

THAT Council direct staff to work with local partners on implementation, monitoring, and reporting progress on the goals outlined in the strategy; and further,

THAT the Township of Wilmot advocate for provincial and federal support and action to achieve the community transformations outlined in the TransformWR strategy.

Registered Delegations

Lyndsay Dajka and Betsey Daub, Nith Valley Ecoboosters

9.3 Sustainable Waterloo Region Annual Report

Tova Davidson, Executive Director of Sustainable Waterloo Region

10. DELEGATIONS

11. CONSENT AGENDA

11.1 DS 2021-021

Lifting one (1) foot reserve and open as part of Heritage Drive

11.2 ILS 2021-24

**Petition for Drainage Works by Road Authority
Queen Street (Regional Road 12), South of Cottage Lane**

11.3 ILS 2021-23

**Encroachment Agreement
EJ's Tavern
39 Snyder's Road West, Baden
Township of Wilmot**

11.4 REPORT COR 2021-023

Sustainability Work Group – Annual Report

Recommendation

THAT Report Nos. DS 2021-021, ILS 2021-24, ILS 2021-23 and COR 2021-023 be approved.

12. REPORTS

12.1 PARKS, FACILITIES AND RECREATION SERVICES

12.1.1 REPORT NO. PFRS 2021-010

Artificial Turf Field License Agreement

RECOMMENDATION

THAT the ten (10) year agreement between the Township of Wilmot and the Waterloo Region District School Board (WRDSB) for operation of the artificial turf field at Waterloo Oxford District Secondary School (WODSS) be endorsed.

12.2 PUBLIC WORKS AND ENGINEERING

12.2.1 REPORT NO. PW 2021-013

Wilmot-Kitchener Boundary Road Maintenance Agreement

RECOMMENDATION

THAT Council approve and enter into an agreement with the City of Kitchener for the maintenance and repair services for two segments of road; a portion of Trussler Road and the entire segment of Waldau Crescent; and further,

THAT the Mayor and Clerk be authorized to execute all associated documentation.

13. CORRESPONDENCE

13.1 Integrity Commissioner Report Nos. IC-2021-02

RECOMMENDATION

That Correspondence Item No. 13.1 be received for information.

14. BY-LAWS

14.1 By-law No. 2021-30

Lifting of a One (1) Foot Reserve

14.2 By-law No. 2021-31

Authorize the Execution of an Agreement – Artificial Turf

14.3 By-law No. 2021-32

**Authorize the Execution of an Agreement –
Wilmot Line Boundary Agreement**

RECOMMENDATION

THAT By-law Nos. 2021-30, 2021-31 and 2021-32 be read a first, second and third time and finally passed in Open Council.

15. NOTICE OF MOTIONS

16. ANNOUNCEMENTS

17. BUSINESS ARISING FROM CLOSED SESSION

18. CONFIRMATORY BY-LAW

18.1 By-law No. 2021-33

RECOMMENDATION

THAT By-law No. 2021-33 to Confirm the Proceedings of Council at its Meeting held on June 14, 2021 be introduced, read a first, second, and third time and finally passed in Open Council.

19. ADJOURNMENT

RECOMMENDATION

THAT we do now adjourn to meet again at the call of the Mayor.



Council Meeting Minutes

Monday, May 31, 2021

Council Meeting

Electronic Online Participation

7:00 P.M.

Members Present: Mayor L. Armstrong, Councillors A. Hallman, C. Gordijk, B. Fisher, J. Gerber and J. Pfenning

Staff Present: Acting Chief Administrative Officer / Director of Parks, Facilities and Recreation S. Jackson, Director of Information and Legislative Services D. Mittelholtz, Director of Public Works J. Molenhuis, Director of Development Services H. O'Krafka, Director of Corporate Services / Treasurer P. Kelly, Fire Chief R. Leeson, Director / Curator Castle Kilbride T. Loch, Manager of Information and Legislative Services / Deputy Clerk T. Murray

1. MOTION TO CONVENE INTO CLOSED SESSION

Resolution No. 2021-108

Moved by: Councillor C. Gordijk

Seconded by: Councillor B. Fisher

THAT a Closed Meeting of Council be held on Monday, May 31, 2021 at 6:00 p.m. in accordance with Section 239(3.1) of the Municipal Act, 2001, for the purposes of Educational or training session.

CARRIED.

2. MOTION TO RECONVENE IN OPEN SESSION

Resolution No. 2021-109

Moved by: Councillor A. Hallman

Seconded by: Councillor J. Pfenning

THAT Council reconvenes in Open Session at 7:00 p.m.

3. MOMENT OF SILENCE**4. LAND ACKNOWLEDGEMENT**

4.1 Councillor B. Fisher read the Land Acknowledgement.

5. ADDITIONS TO THE AGENDA**6. DISCLOSURE OF PECUNIARY INTEREST UNDER THE MUNICIPAL CONFLICT OF INTEREST ACT****7. MINUTES OF PREVIOUS MEETINGS****7.1 Council Meetings Minutes Monday May 17, 2021****Resolution No. 2021-110**

Moved by: Councillor J. Pfenning

Seconded by: Councillor B. Fisher

THAT the minutes of the following meetings be adopted as presented:

Regular Council Meeting May 17, 2021.

CARRIED.

8. PUBLIC MEETINGS**8.1 REPORT COR 2021-021****Development Charges Update Study****Resolution No. 2021-111**

Moved by: Councillor J. Pfenning

Seconded by: Councillor C. Gordijk

THAT Report COR 2021-021, as prepared by the Director of Corporate Services / Treasurer, regarding the Development Charges Background Study Update, be received for information purposes.

CARRIED.

The Director of Corporate Services outline the report and introduced Andrew Grunda, Watson and Associates.

Andrew Grunda presented an overview of the study update, the presentation is attached as Appendix A.

9. PRESENTATIONS

9.1 Cultural Heritage Landscape Study

Christopher DeGeer, University of Waterloo Heritage Resource Centre

9.1.1 REPORT DS 2021-020

Cultural Heritage Landscape (CHL)

Township of Wilmot / Region of Waterloo

University of Waterloo Heritage

Resolution No. 2021-112

Moved by: Councillor C. Gordijk

Seconded by: Councillor J. Pfenning

THAT Council receives report DS 2021-020 for information.

CARRIED.

The Director of Development Services outlined the report and introduced Christopher DeGeer.

Christopher DeGeer presented an overview of the study, the presentation is attached as Appendix B.

Mr. DeGeer advised that the Indigenous community will be consulted throughout the process.

10. DELEGATIONS

11. CONSENT AGENDA

11.1 ILS 2021-22

Notice of Proposed Procedural By-law Amendments

Resolution No. 2021-113

Moved by: Councillor B. Fisher

Seconded by: Councillor J. Pfenning

THAT Report No. ILS 2021-22 be approved.

CARRIED.

12. REPORTS

12.1 PARKS, FACILITIES AND RECREATION SERVICES

12.1.1 REPORT NO. PFRS 2021-011

RFT Award Administration Building/Castle Kilbride HVAC & Boiler Equipment Replacement

Resolution No. 2021-114

Moved by: Councillor J. Pfenning Seconded by: Councillor C. Gordijk

THAT RFT 2021-22 be awarded to Keith's Plumbing & Heating Inc. for the supply and installation of new HVAC & Boiler equipment, as per their submission dated May 18, 2021, in the amount of \$930,313 including HST.

CARRIED.

The Director of Parks, Facilities and Recreation outlined the report and advised that the expected lifespan of approximately 20 years.

13. CORRESPONDENCE

14. BY-LAWS

15. NOTICE OF MOTIONS

- 15.1** Councillor A. Hallman brought forward the following Notice of Motion. All members of Council voted to have the Motion come forward.

Resolution No. 2021-115

Moved by: Councillor J. Gerber Seconded by: Councillor C. Gordijk

THAT Council proceed with the Notice of Motion at the May 31, 2021 meeting.

CARRIED.

Resolution No. 2021-116

Moved by: Councillor A. Hallman

Seconded by: Councillor J. Pfenning

Wilmot Township Council and staff stand with all impacted family members and community members in the wake of the discovery of the remains of 215 Indigenous children whose lives were stolen at the former Kamloops Indian Residential School. We are calling for truth for the Indigenous People in Canada.

Whereas, the bodies of 215 children were recently found at residential schools; be it resolved that the flags at every Township of Wilmot building be lowered for one hour for each child discovered.

Furthermore, that Wilmot Township Council call upon the Provincial and Federal Government of Canada to take action immediately and search for the remains of Indigenous children on the grounds of all 139 former historic Indian Residential Schools in Canada, as the Truth Reconciliation Commission of Canada 2008 demands the truth.

16. ANNOUNCEMENTS

16.1 Mayor L. Armstrong noted that June 1st marks the beginning of Pride Month and the Pride Flag will be raised at the Administration Complex, with the remainder of the municipal facilities having the flags raised following the honouring of the 215 Indigenous children found buried at a former residential school in Kamloops, British Columbia.

16.2 Councillor J. Pfenning shared the following portion of a letter she sent to Prime Minister Trudeau:

Dear Prime Minister Justin Trudeau,

I am writing to you today as a mother. A warning, what I have to say is very painful. I would not wish to catch you off guard.

I know your family has also experienced loss and your mother has endured the hell I know. While each loss we experience is unique, there is a resonance between them and a commonality of pain that binds us together as mothers of children who have died and another layer of commonality in having to search for them.

Many of you in the community know the story I shared in this letter to the Prime Minister. My husband and I lost our son in 2018 and the ensuing search was the worst time of my life. It was also a time that I experienced the incredible strength and love this community has to offer. We searched for three days.

I searched knowing he was dead. I searched knowing his body was the only thing left of him in our world. I searched because I needed truth. I needed closure.

For over one hundred years mothers and families have been denied this closure for the children stolen by the residential school system. Just a few days ago the discovery of 215 precious children's bodies hit me like a tidal wave of pain. I am not Indigenous. I am just another grieving mother who has a tiny glimpse of the horror that those mothers suffered. We claim these children and their families as Canadian citizens. But they were denied the comfort of community and all the support systems that were there for my family in our loss.

I am begging you to commit the resources to find the rest of the children who were buried without names, without care, torn from their families and discarded like they did not matter. Nothing we do can bring them back. But we can give them their names. Give them their families. Give the families the tiniest bit of comfort that truth may offer.

The tools exist, and we know where to look. We cannot deny them and hold our heads up.

Lowering flags, wearing orange, declaring days of mourning and recognition are meaningless if we do not act.

Writing to you in solidarity with the Indigenous mothers and families.

- 16.3** Councillor B. Fisher noted that the Baden community food drive that was held on Saturday May 29, 2021 was very successful with 2 truck loads of donations received.
- 16.4** Councillor C. Gordijk acknowledged the pain the community has been experiencing over the recent discovery of the mass grave, thanking Councillor J. Pfenning for her words and bringing a voice to some of the pain the community is feeling.

17. BUSINESS ARISING FROM CLOSED SESSION (May 20, 2021)

Resolution No. 2021-117

Moved by: Councillor J. Pfenning Seconded by: Councillor A. Hallman

THAT The Talent Company Ltd. be awarded a contract for Executive Recruitment Services, for the upset limit of \$60,000.00, plus HST; and further,

THAT the Mayor and Clerk be authorized to execute contract documents with The Talent Company Ltd.

CARRIED.

18. CONFIRMATORY BY-LAW

18.1 By-law No. 2021-29

Resolution No. 2021-118

Moved by: Councillor B. Fisher

Seconded by: Councillor J. Gerber

THAT By-law No. 2021-29 to Confirm the Proceedings of Council at its Meeting held on May 31, 2021 be introduced, read a first, second, and third time and finally passed in Open Council.

CARRIED.

19. ADJOURNMENT (8:05 p.m.)

Resolution No. 2021-119

Moved by: Councillor C. Gordijk

Seconded by: Councillor A. Hallman

THAT we do now adjourn to meet again at the call of the Mayor.

CARRIED.



Township of Wilmot 2021 Development Charges Update Study

Public Meeting
May 31, 2021



Introduction

Public Meeting Purpose

- This meeting is a mandatory requirement under the *Development Charges Act, 1997*, as amended (D.C.A.)
- Prior to Council's consideration of a by-law, a background study must be prepared and available to the public a minimum of 2 weeks prior to a public meeting and provided on the municipality's website 60 days prior to by-law passage
- Purpose of the public meeting is to provide an overview of the proposed amendment and to receive public input on the matter

D.C. Update Study and By-law Amendment



- Development Charges (D.C.) Update Study prepared to amend the Township's 2019 D.C. Background Study and By-law 2019-42
- Purpose of the proposed D.C. by-law amendment is to:
 - Reflect recent amendments to the D.C.A. made through the *More Homes, More Choice Act*, and *COVID-19 Economic Recovery Act*, including:
 - Changes to the D.C. recoverable costs (i.e. removal of the 10% statutory deduction and reallocation of service specific growth-related studies)
 - Changes to the timing of calculation and collection of D.C.s and statutory exemptions
 - Provide for updates to the increase in needs for services and capital cost estimates included in the Township's 2019 D.C. Background Study
- All other components of the 2019 D.C. Background Study and D.C. By-law 2019-42 remain unchanged

Changes to D.C. Eligible Costs



- Changes to the D.C. recoverable costs include:
 - Removal of the 10% statutory deduction from the calculation of the charge for Library Services, Parks and Recreation Services, and Growth-Related Studies
 - Updates to increase in needs service and capital costs estimates for Roads and Related Services, Fire Protection Services, Parks and Recreation Services, Library Services, Water Services, Wastewater Services, and Growth-Related Studies
 - Reallocation of service-specific studies and inclusions of D.C. amendment costs

Summary of Changes to D.C. Eligible Costs 2019\$



Service/Class	D.C. Eligible Costs (\$): 2019 D.C. Background Study	D.C. Eligible Costs (\$): 2021 Update Study	Change (\$)
Municipal-Wide			
Roads and Related	4,193,188	14,600,220	10,407,032
Fire Protection Services	797,941	4,477,684	3,679,742
Parks and Recreation	7,515,231	9,421,872	1,906,641
Library Services	311,216	345,630	34,415
Administration/Growth-Related Studies	970,007	274,609	(695,397)
Area-Specific/Urban Area			
Water Services	1,338,096	1,965,216	627,120
Wastewater Services	6,659,167	11,731,917	5,072,750
Total	21,784,845	42,817,148	21,032,303

2021 D.C. Amendment Proposed Schedule of Charges (indexed)



Service	Residential: Single and Semi-Detached Dwelling	Residential: Apartments - 2 Bedrooms+	Residential: Apartments - Bachelor and 1 Bedroom	Residential: Townhouse Dwelling	Residential: Lodging Units	Non-Residential: Industrial (per sq.ft. of G.F.A.)	Non-Residential: Commercial/Institutional (per sq.ft. of G.F.A.)
Municipal-wide Services:							
Roads and Related	\$7,667	\$5,219	\$3,228	\$5,839	\$2,720	\$2.06	\$4.31
Fire Protection Services	\$2,144	\$1,460	\$903	\$1,633	\$761	\$2.07	\$1.26
Parks and Recreation	\$5,896	\$4,013	\$2,483	\$4,491	\$2,093	\$0.51	\$0.51
Library Services	\$218	\$149	\$92	\$166	\$77	\$0.02	\$0.02
Total Municipal-wide Services	\$15,926	\$10,840	\$6,705	\$12,129	\$5,651	\$4.66	\$6.10
Urban Services							
Wastewater Services	\$6,186	\$4,211	\$2,604	\$4,712	\$2,195	\$1.66	\$3.47
Water Services	\$1,035	\$704	\$435	\$787	\$367	\$0.28	\$0.58
Total Urban Services	\$7,220	\$4,914	\$3,040	\$5,499	\$2,562	\$1.94	\$4.05
Grand Total Rural Area	\$15,926	\$10,840	\$6,705	\$12,129	\$5,651	\$4.66	\$6.10
Grand Total Urban Area	\$23,146	\$15,755	\$9,744	\$17,628	\$8,213	\$6.60	\$10.15

Comparison of Residential D.C.s (indexed)



Service	Current	Calculated
Municipal Wide Services:		
Roads and Related	\$2,188	\$7,667
Fire Protection Services	\$362	\$2,144
Parks and Recreation	\$4,679	\$5,896
Library Services	\$195	\$218
Administration Studies*	\$506	n/a
Total Municipal Wide Services	\$7,930	\$15,926
Area Specific Services:		
Wastewater Services	\$3,487	\$6,186
Water Services	\$700	\$1,035
Total Area Specific Services	\$4,187	\$7,220
Grand Total - Rural Area	\$7,930	\$15,926
Grand Total - Urban Area	\$12,117	\$23,146

*not applicable

Comparison of Non-Residential D.C.s (indexed)



Industrial (per sq.ft.) Comparison

Service	Current	Calculated
Municipal-wide Services:		
Roads and Related	\$0.59	\$2.06
Fire Protection Services	\$0.35	\$2.07
Parks and Recreation	\$0.40	\$0.51
Library Services	\$0.02	\$0.02
Administration Studies*	\$0.13	n/a
Total Municipal-wide Services	\$1.49	\$4.66
Area-Specific Services:		
Wastewater Services	\$0.93	\$1.66
Water Services	\$0.19	\$0.28
Total Area-Specific Services	\$1.12	\$1.94
Grand Total - Rural Area	\$1.49	\$4.66
Grand Total - Urban Area	\$2.61	\$6.60

*not applicable

Commercial/Institutional (per sq.ft.) Comparison

Service	Current	Calculated
Municipal-wide Services:		
Roads and Related	\$1.24	\$4.31
Fire Protection Services	\$0.21	\$1.26
Parks and Recreation	\$0.40	\$0.51
Library Services	\$0.02	\$0.02
Administration Studies*	\$0.29	n/a
Total Municipal-wide Services	\$2.16	\$6.10
Area-Specific Services:		
Wastewater Services	\$1.95	\$3.47
Water Services	\$0.39	\$0.58
Total Area-Specific Services	\$2.34	\$4.05
Grand Total - Rural Area	\$2.16	\$6.10
Grand Total - Urban Area	\$4.50	\$10.15



D.C. By-law Policies



D.C. By-law Policies - Calculation and Collection of D.C.s

- **Except for the following, policies within By-law 2019-42 remain unchanged**
- Rental housing and institutional developments will pay D.C.s in 6 equal annual payments, commencing from the date of occupancy
- Non-profit housing will pay D.C.s in 21 equal annual payments, commencing from the date of occupancy
- D.C. for developments proceeding through Site Plan or Zoning By-law Amendment will be determined based on the charges in effect on the day the application is made
 - Charges to be frozen for a maximum period of 2 years after planning application approval

D.C. By-law Policies - Interest Policy



- Interest on installment payments and charges calculated at Site Plan or Zoning By-Law Amendment application will be imposed as identified in the Township's Council approved Development Charges Deferral Payment and Interest Rate Policy:
 - D.C. Interest will be based on the current Bank of Canada Prime Rate plus two (2) percent
 - This interest rate is to be fixed throughout the duration of the installment payments
 - Interest will start accruing at the earlier of when the D.C. are calculated or when the first payment is due
 - No interest will apply for applications received for non-profit housing developments

D.C. By-law Policies – Statutory Exemptions



- Residential intensification (within existing residential buildings or structures ancillary to new residential buildings):
 - May add up to two apartments for a single detached home
 - Add one additional unit in semi-detached, medium-density and high-density buildings
 - The creation of a second dwelling unit in prescribed classes of new residential buildings, including structures ancillary to dwellings
- The proposed new principal dwelling and one ancillary dwelling unit must be located on parcel of land on which no other detached dwelling, semi-detached dwelling, or row dwelling would be located



D.C. By-law Policies – Non-Statutory Exemptions

- The exemption for a Temporary Use under section 39 of the *Planning Act* is proposed to be removed in acknowledgment of the additional statutory exemptions required for residential intensification
- No other changes to the existing non-statutory exemptions are proposed



Next Steps

Next Steps



- Council will receive input from the public and consider any amendments to the D.C Update Study and draft amending By-Law
- Council to approve D.C Update Study and consider adoption of amending D.C. By-Law – July 12, 2021
- By-law effective date – upon passage of the amending D.C. By-Law

Cultural Heritage Landscape Study

Presentation to Wilmot Council

May 31, 2021

Cultural Heritage Landscape

Provincial Policy Statement 2020

2.6.1 Significant built heritage resources and significant cultural heritage landscapes shall be conserved

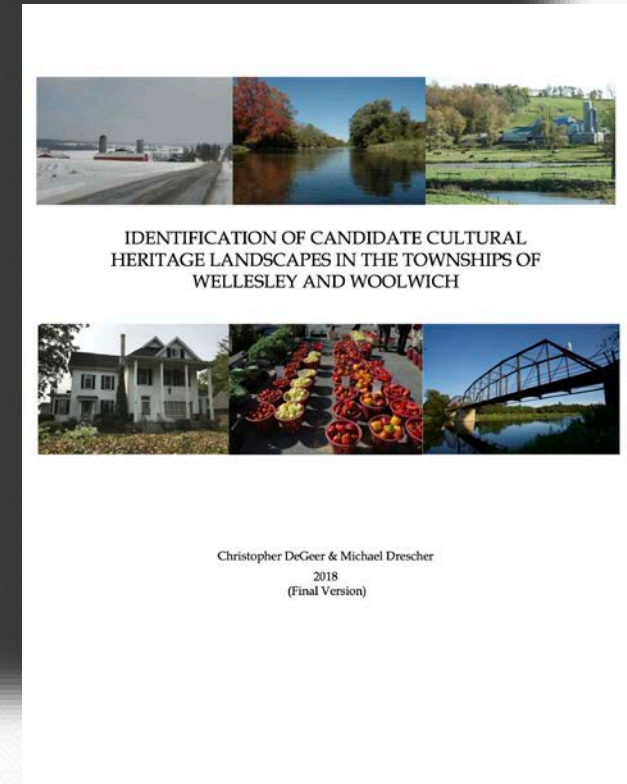
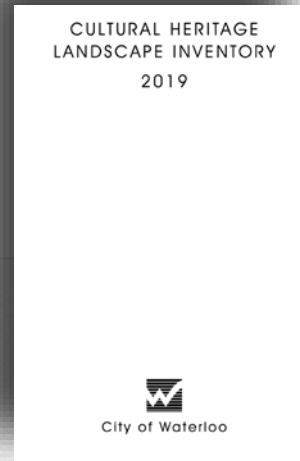
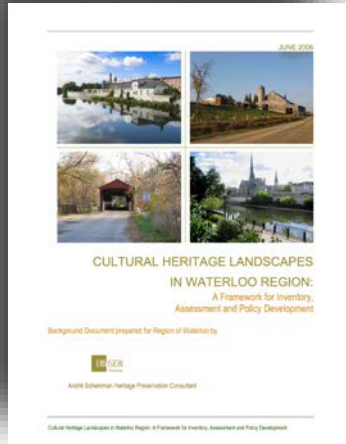
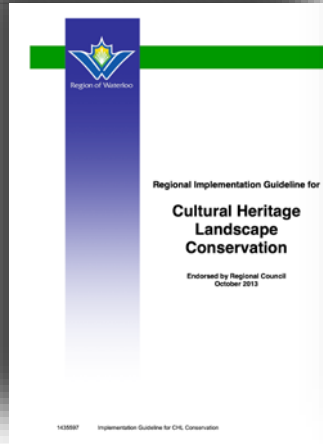
6.0 Definition: a defined geographical area that may have been modified by human activity and is identified as having cultural heritage value or interest by a community, including an Indigenous community. The area may include features such as buildings, structures, spaces, views, archaeological sites or natural elements that are valued together for their interrelationship, meaning or association.

Why Cultural Heritage Landscapes?

- Maintain a sense of place, community, and individual identity;
- Safeguard continuity with the past, which promotes creativity and cultural diversity, and;
- Enhance the quality of life of the community, support social development, and promote economic prosperity.

Regional Official Plan

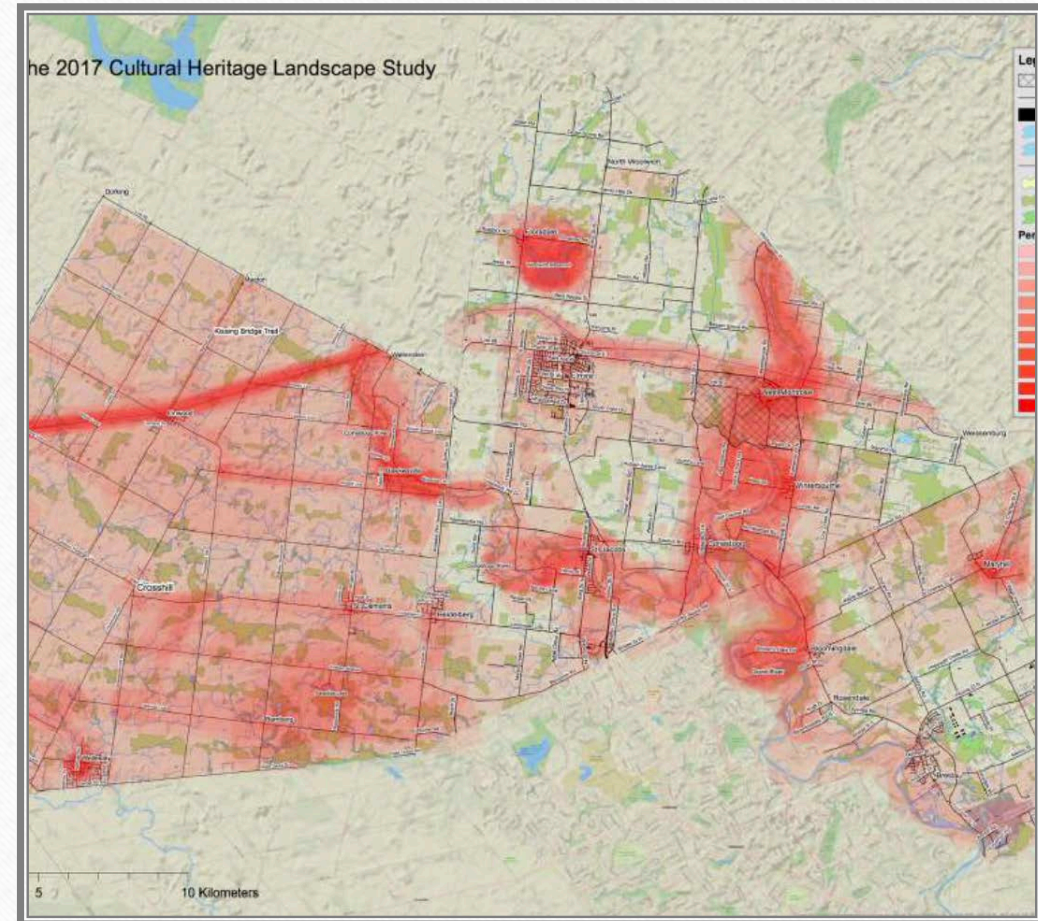
Guiding policies and previous work in ROW



Methods

- Community-centered research
 - Web-based survey on Engage WR
 - One-on-one interviews (online)
 - Mailout community workshop
- Windshield Surveys
- Historical Research
- https://www.engagewr.ca/cultural-heritage-landscape-study-in-wilmot-and-north-dumfries-townships?tool=survey_tool#tool_tab

Link to [CHL Study](https://www.engagewr.ca/cultural-heritage-landscape-study-in-wilmot-and-north-dumfries-townships?tool=survey_tool#tool_tab) on Engage WR



Timeline

- Spring 2021 until the winter of 2021/2022
- Final report and recommendations will be shared on the Engage Region of Waterloo page, as well as provided to the Townships of Wilmot and North Dumfries for their information and future heritage planning initiatives

Contacts

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Planning, Development and Legislative
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Researcher.
University of Waterloo
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Thank you

Questions?



INFORMATION AND LEGISLATIVE SERVICES *Staff Report*

REPORT NO: ILS 2021-25

TO: Council

SUBMITTED BY: Dawn Mittelholtz, Director Information and Legislative Services /
Municipal Clerk

PREPARED BY: Dawn Mittelholtz, Director Information and Legislative Services /
Municipal Clerk

REVIEWED BY: Sandy Jackson, Interim CAO

DATE: June 14, 2021

SUBJECT: Public Meeting
Draft Procedural Bylaw Amendments

RECOMMENDATION:

THAT report ILS 2021-25 be received for information.

SUMMARY:

This report is presented to facilitate discussion for draft amendments to the Procedural Bylaw. Members of the public and Council are invited to provide comments on the draft bylaw attached.

BACKGROUND:

The Municipal Act, 2001, requires all municipalities in the Province of Ontario to pass a Procedural By-law to govern the calling, place and proceedings of meetings of the municipality and its local boards. The current Township of Wilmot Procedural By-law was approved by Council on May 13, 2019, with updates occurring in 2020 to accommodate electronic participation.

This information is available in accessible formats upon request

REPORT:

Members of the public and Council are invited to provide the Clerk or Deputy Clerk with comments or proposals regarding amendments to the Procedural Bylaw, included in this report as Attachment A. This is the same attachment that was included in the May 31, 2021 Council Meeting, although some green highlighting was inadvertently omitted and now included. It is recommended that any proposed amendments be received by email, even for those who comment at the Public Meeting, and that respondents provide details on the intention of amendments rather than provide prescribed wording.

The deadline for feedback that will be incorporated into the final proposed Procedural By-law is end of the business day, 4:30 pm, on June 21, 2021. All feedback received will be addressed in the final report. The Township solicitor will receive a later draft of the Procedural By-law that includes the feedback from the Public Meeting and comments received.

Attachment A has been colour coded as followed:

Amendments proposed as part of report ILS 2020-06.

Amendments proposed based on feedback on February 24, 2020.

Approved amendments for electronic participation.

New proposed amendments.

Only amendments in **blue** and **green** will be commented on in this report. Proposed amendments in **yellow** were included in report ILS 2020-06 from February 24, 2020 or in the Council minutes of the same date.

Comments included below flow in order with the sections of the Procedural Bylaw.

Definitions

Delegation

Greater clarity on the difference between a delegation and presentation.

Friendly Amendment

Friendly amendments did not have legislative standing in the Procedural Bylaw as written. This definition allows for this commonly used amending practice to be used properly.

Point of Privilege

Providing clarity on a question Council may raise when the rights, immunities or integrity of themselves or any person present have been impugned.

Roles and Duties: General

Refinement of language to remove terms that may be offensive to some. This is highlighted in green.

The language highlighted in blue was proposed, and while this language is included in the proposed draft, further refinement of this language may be needed to avoid the potential for broad interpretations. As written, this could have far reaching implications that could be interpreted as preventing members of Council from attending, in an official capacity, community events occurring at places of worship. Further, leaders or elders of any religious or spiritual community may feel less welcome at Council or committee meetings or events. If the intention is for Council or Committee members and staff to not introduce religious or spiritual elements to Township meetings or events, while delegations are free to express their religious and spiritual beliefs, then this section can be reworded to reflect that approach.

Council Meetings: Inaugural Meeting

The proposed addition highlighted in blue provides a set Agenda for the Inaugural Meeting and order of business. This provides an established expectation for the incoming Council and staff for this meeting.

Council Meetings: Quorum

Additional clarity added for instances where more than one Member of Council has declared a Conflict of Interest and business of the Township can continue.

Council Meetings: Reports Under Separate Cover

Additional clarity on when Reports Under Cover provisions may not be used.

Order of Business – Council

Delegations are not listed with Presentations. This proposed amendment better reflects the difference between presentations and delegations.

Minutes

This proposed amendment provides greater clarity on what is included in the Minutes. The content of Council Meeting Minutes varies greatly from municipality to municipality as to how much discussion is included. For the purposes of recording the business of the Township, the corporation records the decisions of Council, but recording the discussion of how the decision was arrived at is not the intention of minutes. This was addressed by the introduction of video recordings of Council Meetings which was successfully introduced in March 2020. Any need to confirm a specific discussion can be done through those publicly available recordings and

requests for transcriptions can be made to the Information and Legislative Services Department.

Land Acknowledgement

Through discussions with First Peoples Group, it was noted that asking if any Indigenous person present wished to read the Land Acknowledgement may not be the best the process for the Township to follow as the intention is for non-Indigenous persons to acknowledge the traditions of the First Nations, Metis and Inuit peoples, historical agreements, traditional use of the land, and the people who lived on the land before settlers arrived.

Presentations

A time limit for presentations is being proposed for presentations to continue the need for efficient business focused meetings. Time limits are being proposed for Council and delegations as well. Time allocations overall allow for better Agenda planning and for those involved in the meeting to formulate their speaking points to be concise and focused.

Consent Agenda

As Consent Agendas were introduced at Wilmot Council Meetings, it became apparent that the best practice for reports removed from Consent Agenda would be for them to be disposed of immediately following. This provides for a simpler process for all persons involved to follow. Further clarification on what may be added to the Consent Agenda has been proposed and establishes expectations for this portion of the Council Meeting.

Delegations for Matters on the Agenda

This section has been altered to reflect the prioritization of matters on the Agenda. Further discussion of Delegations for Matters not on the Agenda are outlined below. Whereas the most recent approved version of the Procedural Bylaw included materials as part of a delegation being accepted within one hour before the start of the meeting, in the electronic meeting world, this is not possible with current staff resources. In recent meetings, staff who are responsible for the slide decks, videos and photos included as part of a delegation have had significant time challenges with receiving, testing, and troubleshooting delegation materials prior to Council meetings. With the reality of electronic meetings in the pandemic and ongoing desire to continue webcasting, this is not a feasible timeframe for staff to work within. An amendment has been proposed for a minimum of one business day for such materials to be received.

An amendment is proposed for the delegation time to be changed from 10 minutes to five minutes. Again, with the introduction of electronic meetings, more members of the public are engaging with Council Meetings and registering as delegations. This is an ideal opportunity to hear from more members of the public but has now resulted in extending meeting times beyond the 11:00 p.m. adjournment time. This revised delegation time continues to allow more delegations to address Council but will require them to be concise in their address. Municipalities across the Region range in time for delegations from five to ten minutes.

Additional language is being proposed that delegations only address Council once on an Agenda item. Delegations, historically and in keeping with Robert's Rules of Order, do not debate in a Council Meeting, and therefore should not have the opportunity to address Council more than once on the same item, in the same meeting.

Communications and Petitions

To provide further direction to staff and expectations to the public as to what should or should not be included as Correspondence in a Council Agenda. This allows for proper decorum towards members of the public and continues to provide the public an opportunity to object to the decisions and actions of Council and staff while not directing comments to them personally. This extension of decorum to what is received in writing promotes Council Meetings as a safe space for all members of the public.

Editorial Changes

These proposed changes give powers to the Clerk to make limited changes to bylaws and resolutions to ensure proper formatting, correction of typos, and to correct minor items that does not change the substance or intent of the bylaw or resolution. Any such corrections would be reported to Council for information and transparency.

Notice of Motion

Some recent Notice of Motion edits during meetings created some lack of clarity that may be avoided with an extended time period for the edits to occur and be re-circulated for consideration. The point of a Notice of Motion is to provide notice and time to Members of Council to consider what is being proposed and to consult or engage as they feel appropriate. Edits occurring during a meeting that alter the substance of the Motion removes this ability and may call into question the accountability and transparency of the process. When Council votes on a Motion, all of Council, staff, and the public should be clear on what is being voting on and the intent of the Motion.

Informally, the Member introducing the Notice of Motion had generally been given the opportunity to move the motion. The proposed amendment in blue formalizes this procedure.

Speaking Order and Limit

This language formalizes the speaking order and introduces some limitations regarding Council discussion for items on the Agenda to promote efficiencies in disposing of Council business and providing all Members with equal opportunities to speak in a timely fashion on the topic at hand.

A further amendment was introduced for the Chair to determine the speaking order based on the order of hands raised. This provides added clarity for the Chair and all Members of Council.

Points of Information, Order, Privilege, or Procedure

This language provides clarification to affirm the abilities and responsibilities of Council in terms of raising these questions to preserve order, decorum, and effective discussion.

Committee Reports to Councils

Although some committees have provided updates to Council over the years, no schedule has been established. This proposed addition benefits Council, the Committees, and the public to establish accountability and transparency requirements.

Review and Amendment to This Bylaw

The addition of requiring amendments to subsequent Procedural Bylaws being reviewed by the Township solicitor is a logical addition proposed by Council and is endorsed by staff.

Delegation for matters not on the Agenda requires a different procedure than what has been practiced thus far. The proposed amendments include language that delegations for matters not on the Agenda no longer be allowed to address Council. Going forward, it is recommended that such delegation requests be forwarded to the appropriate department head or Chief Administrative Officer to discuss the matter at hand. Alternately, members of the public may discuss the matter with a Member of Council who may then discuss the matter with staff or introduce a Notice of Motion or direction to staff for endorsement or consensus from the whole of Council for staff to report back on the matter. This process allows for an efficient meeting and for matters to be deferred to staff in an expedient manner. It also prevents discussion on an item where two parties have differing positions, yet Council is hearing only one side. Public Information Centres (PIC) will be considered as part of the Township's overall engagement strategy to allow opinions on a topic to be presented outside a Council meeting to ensure all parties are heard on a matter.

In some cases, delegations speaking on a matter before Council circumvents a legislated process that could introduce a process where certain parties have been provided an opportunity to address Council without the opportunity for response from all parties involved. This deviation from the legislated process was never endorsed but Procedural Bylaw 2019-25 prevented the Township from ensuring the legislated process was followed. This proposed amendment would give staff the ability to ensure legislated processes are followed in the fair and equitable manner intended.

Since this draft was presented and the notice of the public meeting was introduced on May 31, 2021, comments were received which are included below.

- Inclusion of definition for "Act" as the "Municipal Act, 2001, S.O. 2001, c.25, as amended." Whereas this is a logical inclusion in many municipal bylaws, the Procedural Bylaw currently includes this same definition for the term "Municipal Act" and uses it

throughout the document while making reference to “any other Act.” In this instance, adding a definition for “Act” is unnecessary.

- Proposal for adding a definition for “Agenda Package.” An addition of this definition would provide added clarity.
- An amendment is proposed to further define what is and is not appropriate for Correspondence. The proposal is for Correspondence “to be legibly written or printed, not contain any improper matter or language that speaks disrespectfully of or to any person.” Whereas this common courtesy of polite society should be expected of any person entering Council Chambers, attending Meetings virtually, or submitting documents for inclusion in the Agenda Package, this could be interpreted as circumventing the democratic right for members of the public to express their disagreement with the decisions or actions of Council or staff. The wording that has been proposed permits this questioning of a government body while ensuring it remains respectful by not allowing Correspondence to disrespect any person personally or making any negative allegations about members of the public. That being said, staff can re-examine this wording to see if it can be strengthened to establish expectations for the protection of the public and personal privilege of Council and staff.
- The section on Speaking Order and Limit is proposed to be reworded to address what happens if no other Council Member raises their hand and the Member speaking has reached their five minutes. This is a valid point that can be addressed and investigated for proposing alternative wording.

As stated earlier, members of the public and Council are invited to provide feedback or ask questions at the public meeting or in writing by June 21, 2021, at 4:30 pm.

ALIGNMENT WITH THE TOWNSHIP OF WILMOT STRATEGIC PLAN:

The holding of a Public Meeting for the draft Procedural By-law conforms with the Strategic Plan goals for community engagement and responsible government.

ATTACHMENTS:

Appendix A: Draft Procedural By-law

Amendments proposed as part of report ILS 2020-06.

Amendments proposed based on feedback on February 24, 2020.

Previously approved amendments for electronic participation.

New proposed amendments.

THE CORPORATION OF THE TOWNSHIP OF WILMOT
BY-LAW NO. 2021-XX
BEING A BY-LAW TO PROVIDE FOR
THE RULES OF ORDER AND PROCEDURE
FOR THE MUNICIPAL COUNCIL OF
THE CORPORATION OF THE TOWNSHIP OF WILMOT
AND TO REPEAL BY-LAW NO. 2019-25

WHEREAS Section 238.(2) of the revised Municipal Act, S.O. 2001, c.25 requires that every Council and local board shall adopt a procedural by-law for governing the calling, place and proceedings of meetings;

AND WHEREAS the Township of Wilmot Accountability and Transparency Policy states that accountability, transparency and openness are standards of good governance that enhance public trust and are achieved through the municipality adopting measures ensuring, to the best of its ability, that all activities and services are undertaken utilizing a process that is open and accessible to its stakeholders;

AND WHEREAS the general principles of parliamentary law should be upheld in the rules of any meeting:

- The majority must be allowed to rule;
- The minority have rights that must be respected;
- Members have a right to information to help make decisions;
- Courtesy and respect for others are required;
- All members have equal rights, privileges, and obligations; and
- Members have a right to an efficient meeting;

AND WHEREAS it is deemed expedient to adopt by by-law, rules governing the order and procedure of the Council of the Corporation of the Township of Wilmot.

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE TOWNSHIP OF WILMOT ENACTS AS FOLLOWS:

PART 1 DEFINITIONS

- 1.1 “**Abstain**” means a member who refuses to vote (abstain) will be recorded as voting in the negative;
- 1.2 “**Acting Mayor**” means the member of Council appointed by by-law to act from time to time in the place and stead of the Mayor, pursuant to Part 4 of this by-law.
- 1.3 “**ad hoc Committee**” means a Committee composed of Members of Council and established to review a specific matter and report its findings and recommendations to Council;
- 1.4 “**Advisory Committee**” means a Committee established by Council under a specified Terms of Reference to advise on matters which Council has deemed appropriate for the Committee to consider;

- 1.5 "Agenda"** means the order of proceedings for a meeting setting out the business to be considered at the meeting;
- 1.6 "Amendment"** means a change in the form of a Motion. An amendment is designed to alter or vary the term of the main motion without materially changing its meaning. It may propose that certain words be left out, that certain words be omitted and replaced by others, or that certain words be inserted or added. Every amendment must be strictly relevant to the question being considered.
- 1.7 "Business Day"** means days of the week the Administrative Complex for the Township of Wilmot is open for Township business, typically Monday to Friday, excluding holidays. The day in which a meeting is to occur shall not be included in the calculation of "business days."
- 1.8 "Calendar Day"** means any day of the week. The day in which a meeting is to occur shall not be included in the calculation of "calendar days."
- 1.9 "Chair"** means the person presiding over a meeting and who is charged with the responsibility to decide questions and points of order or practice, preserve order and maintain decorum in the proceeding. The Chair, except where disqualified, may vote on all questions;
- 1.10 "Chief Administrative Officer"** means the person appointed by by-law as the Chief Administrative Officer (CAO) of the Corporation of the Township of Wilmot and whose duties are therein prescribed and to include Section 229 of the Municipal Act;
- 1.11 "Chief Executive Officer"** shall mean the Mayor in accordance with Sections 226.1 of the Municipal Act;
- 1.12 "Clerk"** means the person appointed by by-law as the Clerk of the Corporation of the Township of Wilmot and whose duties are therein prescribed in Section 228 of the Municipal Act;
- 1.13 "Closed Session"** means a closed session of a committee or Council meeting which is closed to the public in accordance with the requirements of the *Municipal Act*;
- 1.14 "Consent Agenda"** means a board meeting practice that groups routine business and reports into one agenda item. The consent agenda can be approved in one action, rather than filing motions on each item separately
- 1.15 "Council"** is the term to refer collectively to the Mayor and 5 Councillors;
- 1.16 "Council Meeting"** is a collective term meaning any meeting of Council including: Regular Meetings (Section 4.8), Special Meetings (Section 4.13), Emergency Meetings (Section 4.17) and Closed Sessions (Section 5.1), as established by Resolution under Section 4.8 of the Procedural By-law or at the call of the Mayor.
- 1.17 "Councillor"** is the term consistent with the *Municipal Act*, and is the title assigned to a Member of Council, except the Mayor, elected to represent the electors of the Township of Wilmot;
- 1.18 "Declared Emergency"** means, any period where an emergency has been declared to exist in all or part of the Township of Wilmot under section 4 or 7.0.1 of the Emergency Management and Civil Protection Act, R.S.O. 1990, c. E. 9, as amended.
- 1.19 "Delegation"** means any person, group of persons, firm or organization, who is neither a Member of Council, Township staff or an appointed official of the Township and who has requested and are permitted to address Council, or an ad hoc, Advisory Committee, or Special Purpose Committee;

- 1.20 “Division of Question”** means a request by a Member of Council to have a motion containing separate questions, recommendations or amendments, voted on in sections or parts;
- 1.21 “Emergency Meeting”** means a meeting of Council held to consider any business of the Council which is deemed by the Chair to be of an emergency situation;
- 1.22 “Ex Officio”** means by virtue of office or position and carries with it the right to participate fully in the committee meeting and to vote unless prohibited by law;
- 1.23 “Friendly Amendment”** means an amendment made to the motion under debate with the consent of the mover and seconder, and without the requirement for an amending motion to be made.
- 1.24 “Head of Council”** means the Mayor or his/her designate;
- 1.25 “Improper Conduct”** means conduct which offers any obstruction to the deliberations of proper action of Council;
- 1.26 “Inaugural Meeting”** means the first meeting of Council held after a municipal election in a regular election year;
- 1.20 “Majority Vote”** means more than half of the votes cast by members entitled to vote at a meeting;
- 1.21 “Management Team”** means the Chief Administrative Officer and Department Heads of the Township of Wilmot;
- 1.22 “Mayor”** is the Head of Council who is elected by general vote to represent electors in The Township of Wilmot;
- 1.23 “Meeting”** means any regular or special meeting of Council, or any meeting of a Committee or Advisory Committee as defined in the Municipal Act, 2001;
- 1.24 “Member of Council”** means a person duly elected to serve on the Council of The Corporation of the Township of Wilmot;
- 1.25 “Motion”** means a question to be considered by the Council or Committee which is moved, seconded, presented, read by the Chair and is subject to debate. When a motion is adopted, it becomes a resolution;
- 1.26 “Municipal Act”** means the Municipal Act, 2001 S.O. 2001, chapter 25, as amended from time to time and any successor legislation thereto;
- 1.27 “Notice of Motion”** means an advance notice to Members of Council of a matter on which Council will be asked to take a position.
- 1.28 “Participate Electronically”** means that Members of Council are present at the Council Meeting through an online or telecommunications medium that allows for audio and/or video interactions for the purposes of participating in a Council Meeting and such participation includes voting.
- 1.29 “Pecuniary Interest”** means a direct or indirect pecuniary interest of a member as defined within the meaning of the *Municipal Conflict of Interest Act, R.S.O. 1990, chapter M.50*, as amended and any successor legislation thereto;
- 1.30 “Point of Information”** is a request directed to the Mayor or through the Chair to another Member or to staff, for information relevant to the business at hand but not related to a Point of Procedure;

- 1.31 "Point of Order"** means a statement made by a Member during a meeting, drawing the attention of the Mayor or his/her designate to a breach of the Rules of Procedure;
- 1.32 "Point of Privilege"** means the raising of a question which concerns a member of Council, Council as a whole, staff or the public, when a Member believes that their (Personal Privilege) rights, immunities or integrity or the rights, immunities or integrity of Council as a whole, staff, or the public have been impugned;
- 1.33 "Point of Procedure"** means a question directed to the Mayor or Chair to obtain information on a matter of parliamentary law or the rules of Council bearing on the business at hand, in order to assist a Member to make an appropriate motion, raise a point of order, understand the parliamentary situation or the effect of the motion;
- 1.34 "Presentation"** means
- i) presentations made by Council to recognize the contributions or achievements of individuals or organizations;
 - ii) presentations made to Council by individuals or organizations at the invitation of Council;
 - iii) presentations made to Council by an advisory or other Committee
- 1.35 "Presiding Officer"** means the Mayor or in his absence, the Acting Mayor, to act in his/her absence while presiding at meetings;
- 1.36 "Public Hearing"** means a meeting of Council or that portion of a meeting of Council or any Committee of Council which has been given authority by by-law or statute to conduct a hearing in matters pursuant to any legislation which requires Council to hear interested parties or to afford them an opportunity to be heard before taking action, passing a by-law or making a decision;
- 1.36 "Question"** means a motion that has been placed before the Council or Committee by the statement of the Chair. Only once duly stated by the Chair and "on the floor" can a motion be debated and put to a question of the members for proper resolution (Question On the Floor).
- 1.37 "Quorum"** means the majority of the whole number of the members of Council who are present in person;
- 1.38 "Recorded Vote"** means the recording in the minutes, the names of each Member of Council present and the manner of their vote on a matter or question before Council. Recorded Votes shall be taken upon request by any Member of Council. In the case of a Member who has a declared conflict or pecuniary interest in the matter or question, the minutes shall reflect the Member abstained from taking part in the discussion and the vote;
- 1.39 "Regular Meeting"** means a scheduled meeting of Council held in accordance with the approved schedule of meetings;
- 1.40 "Resolution"** means a formal determination made by Council or a Committee on the basis of a motion duly placed before a regularly constituted meeting of Council or a Committee for debate and decision, and duly passed;
- 1.41 "Rules of Procedure"** means the rules and regulations provided in this by-law;
- 1.42 "Special Meeting"** means a meeting of Council not scheduled in accordance with the approved calendar of meetings;

1.43 "Special Purpose Committee" means a Committee comprised of such members of Council and other persons as appointed by Council to address matters which Council has deemed necessary within the jurisdiction of Council;

1.44 "Tie Vote" means an equality of votes and the question being voted on is deemed lost.

1.45 "Treasurer" means the Treasurer of the Corporation of the Township of Wilmot.

2. GENERAL PROVISIONS

2.1 Rules and Procedures

The rules and procedures contained in this by-law shall be observed in all proceedings of Council as defined in the Municipal Act, and shall be the rules and procedures for the order and dispatch of business of the Council and its Committees thereof;

2.2 Parliamentary Procedure

Points of order or procedure not specifically governed by this By-law shall be decided by the Chair in accordance with, as far as reasonably practical, the most current edition of Robert's Rules of Order.

2.3 Meeting Decorum – All Persons Present

At no time shall any Member of Council, staff, delegations or member of public or media;

- (a) speak disrespectfully of or to any person;
- (b) use offensive words or unparliamentary language;
- (c) speak on any subject other than the subject for which he or she has received approval to address Council;
- (d) disobey the rules of procedure or a decision of the Mayor or Council;
or
- (e) interrupt, speak-over, or continue to speak when advised by the Mayor not to, or otherwise disrupt the proceedings of the meeting or the ability of Council or staff to conduct business.

2.3 Mayor - Ex Officio Member – All Committees

The Mayor shall be an ex officio member of all Committees established or appointed by Council. Where a committee is established by reference to a particular number of members without specifically providing for the membership of the Mayor, such number is automatically increased by one, except where prohibited by law, being the Mayor, as provided under this Section. The Mayor may vote and otherwise participate, unless prohibited by law, in the business of the committee or other body on the same basis as any other committee member.

2.4 Meetings Open to Public

Subject to Section 5 of this by-law, all meetings of Council and its Committees shall be open for attendance by the public, and no person shall be excluded therefrom, except for improper conduct.

3. ROLES AND DUTIES

3.1 General

It is the role and duty of all elected representatives, appointed committee members, and all staff to serve the residents of the Township of Wilmot. Business of the corporation of the Township of Wilmot shall be conducted in the best interest of the residents as a whole and not to serve the interests of any one individual or group of individuals above the common good with transparency and openness, conducting business that considers open and accessible communication to **members of the public every stakeholder**.

All meetings and ceremonies of Council and Committees shall be devoid of all religious or spiritual text, reference, prayer, or invocation so as to ensure a neutral space.

3.2 Role of the Mayor

It is the role of the Mayor:

- a) to act as chief executive officer of the municipality;
- b) to preside over council meetings so that its business can be carried out efficiently and effectively;
- c) to provide leadership to the council;
- (c.1) without limiting clause (c), to provide information and recommendations to the council with respect to the role of council described in clauses 224 (d) and (d.1) of the Municipal Act;
- d) to represent the municipality at official functions;
- e) to act as council's representative when dealing with other levels of government, their agencies and the private sector;
- f) to act as the Township's representative on council for the Regional Municipality of Waterloo;
- f) to carry out the duties of the head of council under the *Municipal Act* or any other Act;
- g) as chief executive officer of the municipality, the Mayor shall:
 - i) uphold and promote the purposes of the municipality;
 - ii) promote public involvement in the municipality's activities;
 - iii) act as the representative of the municipality both within and outside the municipality, and promote the municipality locally, nationally and internationally; and
 - iv) participate in and foster activities that enhance the economic, social and environmental well-being of the municipality and its residents

3.3 Role of Council

It is the role of Council:

- a) to represent the public and to consider the well being and interests of the municipality;
- b) to develop and evaluate policies and programs of the municipality;
- c) subject to legislative restrictions, develop regulations to be adopted in by-laws and resolutions for the overall benefit of the community;

- d) to determine which services the municipality provides in accordance with applicable legislation;
- e) to ensure that administrative policies, practices and procedures are in place and controllership policies, practices and procedures are in place to implement the decisions of Council;
- f) to ensure the accountability and transparency of the operations of the municipality, including the activities of the senior management of the municipality;
- g) to maintain the financial integrity of the municipality; and
- h) to carry out the duties of Council under the *Municipal Act* or any other Act.

3.4 Duty of the Mayor

It is the duty of the Mayor to preside over all meetings of Council and:

- a) to open meetings of Council by taking the Chair and calling the meeting to order;
- b) to receive and submit, in the proper manner, all motions;
- c) to put to a vote all motions and to announce the result;
- d) to serve as an ex-officio member of all committees and be entitled to vote at such meetings;
- e) to decline to put motions to a vote which infringe upon the rules of procedure;
- f) to inform the members of the proper procedure to be followed and to enforce the rules of procedure;
- g) to enforce on all occasions, the observance of order and decorum among the members;
- h) to call by name any member persisting in a breach of the rules of procedure and to order the member to vacate the Council Chambers;
- i) to permit questions to be asked through the Mayor, of any officer of the Township for information, to assist in any debate when the Mayor deems it proper;
- j) to provide information to members on any matter relating to the business of the Township;
- k) to authenticate by signature all by-laws and minutes of Council;
- l) to rule on any points of order raised by the members;
- m) to maintain order. Where it is not possible to maintain order, the Mayor may, without any resolution being put, adjourn the meeting to a time to be named by the Mayor;
- n) to adjourn the meeting when the business is concluded;
- o) to carry out the duties of the head of Council under the *Municipal Act*, or any other Act;
- p) to act in accordance with his/her Oath of Elected Office.

3.5 Duty of a Councillor

It is the duty of Councillors to attend all meetings of Council and:

- a) to prepare for meetings, including reviewing the agenda and background information prior to the meeting;
- i. to speak only to the subject under debate;
- ii. to vote on all motions before the Council unless prohibited from voting by law;
- iii. to observe proper procedure and decorum at all meetings;
- iv. to state questions to be asked through the Mayor;
- v. to attend committee meetings to which the Councillor has been appointed by Council;
- vi. to carry out the duties of Council under the Municipal Act, or any other Act;
- vii. to act in accordance with their Oath of Elected Office;

3.6 Duty of the Chief Administrative Officer

It is the duty of the Chief Administrative Officer:

- a) to exercise general control and management of the affairs of the municipality for the purpose of ensuring the efficient and effective operation of the municipality;
- b) to implement Council's decisions and establish administrative practices and procedures to carry out Council's decisions;
- c) to undertake or direct the undertaking of research and provide advice to Council on the policies and programs of the municipality;
- d) perform such other duties required under this or any Act and other duties as assigned by the municipality; and,
- e) provide leadership and direction to staff as the most senior member of staff.

3.7 Duty of the Clerk

It is the duty of the Clerk to attend all Council meetings and:

- a) to prepare and distribute agendas for all meetings of Council in accordance with this by-law;
- b) to record, without note or comment, all resolutions, decisions, minutes and other proceedings of the Council;
- c) if required by any member present at a vote, to record the name and vote of every member voting on any matter or question;
- d) to keep the originals or copies of all by-laws and of all minutes of proceedings of the Council;
- e) to make such minor clerical, typographical or grammatical corrections in form to any by-law, motion, resolution and/or minutes as may be required for the purpose of ensuring correct and complete implementation of the actions of Council;
- f) to perform the other duties required under the Municipal Act or any other Act;
- g) to advise Council on parliamentary procedure;
- h) to perform such other duties as are assigned by the municipality.

- i) the Clerk may delegate in writing to any person, other than a member of council, any of the Clerk's powers and duties under the Municipal Act and any other Act
- j) the Clerk may continue to exercise the delegated powers and duties, despite the delegation

3.8 Duty of the Treasurer

It is the duty of the Treasurer:

- i) to collect money payable to the municipality and issue receipts for those payments;
- ii) to deposit all money received on behalf of the municipality in a financial institution designated by the municipality;
- iii) to pay all debts of the municipality on behalf of the municipality and other expenditures authorized by the municipality;
- iv) to maintain accurate records and accounts of the financial affairs of the municipality;
- v) to provide Council with such information with respect to the financial affairs of the municipality as it requires or requests;
- vi) to ensure investments of the municipality are made in compliance with the regulations made under Section 418 of the Municipal Act;
- vii) to perform such other duties as are assigned by the municipality.

3.9 Municipal Administration

It is the role of the officers and employees of the municipality:

- (a) to implement Council's decisions and establish administrative practices and procedures to carry out Council's decisions;
- (b) to undertake research and provide advice to Council on the policies and programs of the municipality; and
- (c) to carry out other duties required under this or any Act and other duties assigned by the municipality.

4. COUNCIL MEETINGS

4.1 Place

The regular meetings of the Council of the Township of Wilmot shall be held in the Council Chambers pursuant to Section 236 of the Municipal Act. In the case of an emergency, or other circumstances, Council may hold its meetings at any convenient location within or outside the municipality, as approved by resolution of Council;

4.2 Participating Electronically

4.2.1 Notwithstanding any other provision of this By-law, a Member of Council may Participate Electronically in any Council Meeting, which is either open or closed to the public, and may be counted in determining whether or not a quorum of members is present at any point in time, subject to Sections 4A.1.2 and 4A.1.3 of this By-law.

4.2.2 The Chair of a Meeting of Council shall not be permitted to Participate Electronically in a Meeting of Council, except during a Declared Emergency.

4.2.3 In the absence of a Declared Emergency, where a Council Member wishes to Participate Electronically at any Council Meeting, such Council Member shall provide the Clerk with notice, in writing, at their earliest opportunity.

4.3 Seating Arrangement of Council

Councillors shall be seated to the right of the Mayor in Council Chambers in Ward order. For wards with more than one Councillor, those Members shall be seated in alphabetical order by last name.

4.4 Councillor – addressed

Members of council are to be addressed as: “Councillor (surname inserted)”.

4.5 Mayor - addressed

The Mayor shall be addressed as “Mayor” (surname inserted)” or as “Your Worship.”

4.6 Staff and Members of the Public – addressed

Staff and members of the public are to be addressed as “Dr.,” “Mr.,” “Mrs.,” “Ms.,” “Miss.,” “Mx.,” or “Ind.” (surname inserted) as preferred. Members of staff may also be addressed by title within the corporate structure.

4.7 Inaugural Meeting

The Inaugural meeting of the Council of the Corporation of the Township of Wilmot following a regular municipal election shall be held in accordance with the Municipal Act, 2001 at 7:00 p.m., in the Council Chambers;

The Agenda for the Inaugural meeting shall be established by the incoming Members of Council and the Clerk and will reflect the values of the community with respect for diversity and inclusion of all members of the community.

No business shall be conducted at the Inaugural Meeting of Council until the Declarations of Elected Office have been made by the members of the Council.

The order of proceedings at the first meeting of Council after the regular election shall be as follows: Processional, National Anthem, Land Acknowledgment, Moment of Silence, Declarations of office, (i) Mayor, (ii) Members of Council in order of wards, Inaugural Address by the Mayor, and passing of confirming By-Law.

4.8 Rotational Schedule – Acting Mayor

Each term, as soon after the commencement of its term as reasonably possible, Council shall appoint by by-law, in alphabetical order, each member of Council to serve for one calendar month as Acting Mayor for that time in the place and stead of the Mayor when the Mayor is absent from the Township area, absent through illness, or refuses to act, and the Acting Mayor shall have and may exercise all rights, powers and authority of the Mayor in his/her absence.

4.9 Regular Meetings

Following the Inaugural meeting, Regular meetings shall be held in the Council Chambers, at 7:00 p.m., local time, twice per month on Mondays as per the schedule approved by Council Resolution.

Regular Meetings – July, August and December

During the months of July, August and December in each year, there shall be one regular meeting of Council per month to be held at a time designated by Council to accommodate the ad hoc Budget Committee Meeting schedule and the summer holiday season.

Council may, by resolution or by-law, alter the time, day or place of any Council or Committee meeting.

4.10 Quorum

A majority of members of Council shall be necessary to constitute a quorum;

If no quorum is present one half hour after the time appointed for a meeting of Council, the Clerk shall record the names of the members present and the meeting shall stand adjourned until the date of the next regular meeting;

If during the course of a meeting a quorum is lost, subject to the provisions of the Municipal Conflict of Interest Act, then the meeting will stand adjourned, not ended, to reconvene at the same time of commencement on the next following day, or at such other time and place as the Mayor or his/her Designate will then announce;

If in the Mayor or his/her Designate's opinion it is not essential that the balance of the agenda be dealt with before the next regularly scheduled meeting, the Mayor or his/her Designate will announce that the unfinished business of Council will be taken up at the next regularly scheduled meeting.

Where the number of Members of Council who, by reason of provisions of the Municipal Conflict of Interest Act, are disabled from participating in a meeting is such that at that meeting the remaining Members of Council are not of sufficient number to constitute a quorum, then, the remaining number of Members of Council shall be deemed to constitute a quorum, provided such number is not less than 2 (two).

4.11 Absence – Head of Council

If the Head or Acting Head of Council, pursuant to the rotation list established by By-law, does not attend within fifteen (15) minutes after the time appointed for a meeting of Council, the Clerk shall call the members to order and an Acting Head of Council shall be appointed from among the members present and he/she shall preside until the arrival of the Head of Council or his/her designate and while so presiding, the Acting Head of Council shall have all the powers of the Head of Council and will be so entitled to vote as a member.

In the absence of the Head of Council, or if the office is vacant, Council may, from among its members, appoint a Head of Council, who, during such absence or vacancy or refusal to act, has all the powers of the Head of Council.

4.12 Notice of Regular Meetings (Agenda) – Delivered in Advance to Council, CAO, Management Team

The Agendas shall be considered as notice of regular meetings.

The Clerk shall cause to be delivered to each member of Council, an agenda for each regular meeting of Council, electronically and/or hard copy to the address provided by the Member of Council to the Clerk for delivery of such

agendas. The agenda shall be provided not later than three (3) business days before the holding of such meeting. At the same time the Clerk shall make available a copy of the agenda to the Chief Administrative Officer and to the members of the Management Team in electronic and/or hard copy format.

4.13 Agendas – Available to the Public/Media

Agendas for Open Session meetings of Council shall be made available to the public and media on the Township website within twenty-four (24) hours of delivery to the Members of Council.

4.14 Reports Under Separate Cover

Where the completion of the Agenda is delayed due to an overdue staff report, bylaw, or Presentation that is expected to be included on the Agenda and is time sensitive or deemed necessary to be included on the Agenda for political reasons, the Clerk will complete the Agenda within the timeframe provided in this By-law and provide notation on the Agenda that the overdue report or presentation will be provided under separate cover.

When the report, bylaw or Presentation is completed, the Report Under Separate Cover will be sent electronically to Members of Council, the CAO and the Management Team, if hardcopies have been requested by Members of Council or staff, they will be made available for pick-up.

The Report Under Separate Cover will be integrated into the online version of the Agenda for the public and media. Staff will notify the public and media of the Agenda being update through the website and Township social media channels.

A Report Under Separate Cover shall not include any Public Meeting held or other report, bylaw, or Presentation being proposed for adoption in accordance with any Act.

4.15 Special Meetings

In addition to regular meetings, special meetings of Council shall be held upon written direction signed by the Mayor and delivered to the Clerk stating the date, time and purpose of such meeting.

The Mayor may, at any time, summon a Special Meeting of Council on twenty-four (24) hours notice to the members and upon receipt of the petition of the majority of the members of Council, the Clerk shall summon a Special Meeting for the purpose at the time, date and place mentioned in the petition.

If time is of the essence, notice may be given to Council by telephone call.

No other business other than that stated in the notice shall be considered at a Special Meeting.

4.16 Agendas – Special Meetings – Delivered in Advance to Council, CAO, Management Team

Notice or an agenda to Council of a Special Meeting called in accordance with this by-law shall be delivered to the Members, CAO and Management Team by means of personal delivery, telephone, facsimile transmission or electronic mail. The Notice/Agenda to Council of the Special Meeting shall be provided not less than 24 hours before the hour set for such meeting.

4.17 Agendas – Special Meetings – Available to the Public/Media

Agendas for Special Meetings shall be made available to the public and media as soon as possible after they have been delivered to Members of Council.

If time is of the essence, notice or an agenda may be given to the press/media by telephone call.

4.18 Special meetings – agenda – provided at the meeting

The Clerk may provide the agenda of the Special meeting at the meeting where time constraints do not allow the Agenda to be delivered to the members of Council or the press at least 24 hours before the hour appointed for the holding of the Special meeting.

4.19 Emergency Meetings

Notwithstanding any other provision of this by-law, an emergency meeting may be held without notice, to deal with an emergency or extraordinary situation provided that an attempt has been made by the Clerk to notify members about the meeting as soon as possible and in the most expedient manner available.

4.20 Emergency – business specified – transacted

No business except business dealing with the emergency or extraordinary situation shall be transacted at the emergency meeting.

4.21 Lack of receipt of notice or an Agenda by the members of Council shall not affect the validity of the meeting or any action lawfully taken thereat.

4.22 Rescheduling or Cancellation of Regular Council Meetings

When it is deemed to be advisable, the Mayor is authorized to change the date and/or time of or cancel the regular Council meeting next following and the agreement of the majority of the members of Council, having been polled by the Clerk, shall be required to effect the change, provided a minimum of seven (7) days' notice is given of the change of date of the meeting. The Township website shall be updated.

5. CLOSED MEETINGS/SESSIONS

5.1 Closed meetings or sessions may be held as deemed necessary by the Head of Council in consultation with the Clerk. Such meetings or sessions may be closed to the public in accordance with the requirements of the Municipal Act, 2001. All reasonable efforts on the part of Council and staff will be made to keep meetings open to the public unless closure is specifically authorized under the Municipal Act and it is deemed necessary.

5.2 Matters that may be considered – closed

The only matters that may be considered in a closed session are as follows:

- (a) the security of the property of the municipality or local board;
- (b) personal matters about an identifiable individual, including municipal or local board employees;
- (c) a proposed or pending acquisition or disposition of land by the municipality or local board;
- (d) labour relations or employee negotiations;
- (e) litigation or potential litigation, including matters before administrative tribunals, affecting the municipality or local board;

- (f) advice that is subject to solicitor-client privilege, including communications necessary for that purpose;
- (g) a matter in respect of which a council, board, committee or other body may hold a closed meeting under another Act;
- (h) information explicitly supplied in confidence to the municipality or local board by Canada, a province or territory or a Crown agency of any of them;
- (i) a trade secret or scientific, technical, commercial, financial or labour relations information, supplied in confidence to the municipality or local board, which, if disclosed, could reasonably be expected to prejudice significantly the competitive position or interfere significantly with the contractual or other negotiations of a person, group of persons, or organization;
- (j) a trade secret or scientific, technical, commercial or financial information that belongs to the municipality or local board and has monetary value or potential monetary value; or
- (k) a position, plan, procedure, criteria or instruction to be applied to any negotiations carried on or to be carried on by or on behalf of the municipality or local board.

5.3 Matters to be considered – Closed – mandatory

A meeting shall be closed to the public if the subject matter relates to:

- a) the consideration of a request under the Municipal Freedom of Information and Protection to Privacy Act, when the council, board, commission or other body is acting as head of the institution for the purposes of the Act; or
- b) an ongoing investigation respecting the municipality, a local board or a municipally-controlled corporation by the Ombudsman appointed under the Ombudsman Act, an Ombudsman appointed by municipality in accordance with subsection 223.13 (1) of the Municipal Act, or the Closed Meeting Investigator referred to in subsection 239.2 (1) of the Municipal Act.

5.4 Procedure – convening into closed session

Before holding a meeting or part of a meeting that is to be closed to the public, a council or committee of council or local board shall state by resolution:

- (a) the fact of the holding of the closed meeting;
- (b) the general nature of the matter to be considered at the closed meeting.

5.5 Procedure – modifications

The rules governing the procedure of the Council and its Committees and the conduct of its members shall be observed in Closed meetings or sessions, with the necessary modifications, except that:

- a) a member shall not speak more than once to a motion until every member who desires to speak has spoken once;
- b) the number of times of speaking on any question shall not be limited;
- c) recorded votes are not permitted at closed sessions

5.6 Meeting not closed – during vote

Subject to Section 5.3, a meeting shall not be closed to the public during the taking of a vote.

5.7 Meeting closed during vote – exception

A meeting or part of a meeting may be closed to the public during a vote, if:

- (a) section 5.3. applies and
- (b) the vote is for a procedural matter or for giving directions or instructions to officers, employees or agents of the municipality or local board or persons retained by or under contract with the municipality or local board.

5.8 Minutes of Closed Meeting/Sessions

Minutes of all or part of a Council meeting that is closed shall be recorded by the Clerk and will be retained in confidence by the Clerk and such minutes will not be open to inspection by any member of the public.

The Clerk, in making the minutes shall not record any personal information as defined in the Municipal Freedom of Information and Protection to Privacy Act.

5.9 Agenda of Closed Meeting/Session

Agendas for Closed Meetings/Sessions will be circulated to Members of Council not later than 3 (three) business days before the holding of such meeting. Closed Meeting Agendas and reports shall only be circulated by hardcopy and will be collected by the Clerk at the close of Closed Meeting/Session for destruction. The Clerk shall identify the most amount of detail possible to allow for Council to consult with the Integrity Commissioner in regard to potential pecuniary interest.

6. PUBLIC NOTICE OF MEETINGS OF COUNCIL & COMMITTEES

6.1 Public Notice of Regularly Scheduled Meetings

Public Notice of regularly scheduled meetings of Council or a Committee for The Township of Wilmot shall be given by posting the schedule of Council meetings as approved by Council resolution on the Township's official website, and the meeting schedule of Committees as approved by the Committee members, on the Township's official website at the beginning of each calendar year or upon scheduling. The meeting schedule shall include the date, time and location of meetings.

6.2 Public Notice of Special Meetings

Public Notice of a Special Meeting of Council or a Committee shall be given by posting to the schedule of meetings on The Township of Wilmot's official website not less than one day in advance of the date of the meeting.

6.3 Public Notice of Emergency Meetings – Not Required

An emergency meeting of Council or a Committee may be held without public notice being given, to deal with an emergency or extraordinary situation.

6.4 Public Notice – Closed Meetings For the Purpose of Education and Training of Members

Public notice of a meeting of Council or a Committee that is closed to the public and is held for the purpose of educating or training the members of

Council or a Committee, as the case may be, shall be given by the passing of a resolution by Council or the Committee at a meeting open to the public stating;

- a) the fact of the holding of the closed meeting;
- b) the general nature of its subject matter; and
- c) the legislative provision allowing for the holding of the closed meeting

6.5 Public Notice – Other Closed Meetings

Public notice of a meeting of Council or a Committee that is closed to the public, except a meeting held for the purpose of educating or training the members of Council or a Committee, as the case may be, shall be given by the passing of a resolution by Council or the Committee at a meeting open to the public stating:

- a) the fact of the holding of the closed meeting, and
- b) the general nature of the matter to be considered at the closed meeting

6.6 Agendas – Open Session Meetings

Prior to the meeting, where possible and pending the distribution to the Members, the agenda for Council and Committee meetings shall be posted on the Township's official website within twenty-four (24) hours of delivery to the Members Council or the Committee. Notice of the posting of the Agenda shall be made public through the Township's social media account(s) and/or email list(s). This provision does not apply to agendas of meetings that are Closed Sessions.

6.7 Posting of Agendas – Failure to Post

Notwithstanding section 6.6 above, failure to post the agenda to the Township's official website, social media or email list shall not affect the validity of the meeting or any action lawfully taken thereat.

6.8 Emergency Meeting – Notice Not Required

Notwithstanding any other provision of this by-law, an emergency meeting may be held without public notice being given, to deal with an emergency or extraordinary situation.

6.9 Public Notice – Agenda – Not Received – Validity

Lack of receipt of Public Notice or an Agenda shall not affect the validity of the meeting or any action lawfully taken thereat.

7 ORDER OF BUSINESS - COUNCIL

7.1 General Provisions

The Clerk shall have prepared and printed a list of the items in the order of topics set out as the routine of business for the use of each Member at a regular meeting;

- 7.1.1 Any Member of Council may file in writing not later than 5 (five) business days before the holding of such meeting with the Clerk an item for inclusion on the Council Agenda to allow for a staff response if necessary.

7.2 Order of Business

- 7.2.1 As soon after the hour fixed for the holding of the meeting of Council as a quorum is present, the Head of Council shall take the Chair and call the meeting to order;
- 7.2.2 Immediately after the Head of Council or presiding officer has called the meeting to order the following order or procedure shall be observed for a regular Council meeting:

Call to Order
Closed Session
Reconvene Into Open Session
Moment of Silent Reflection
Land Acknowledgement
Additions to the Agenda
Disclosure of Pecuniary Interest Under the Municipal Conflict of Interest Act
Minutes of Previous Meeting
Public Meetings
Presentations
Consent Agenda
Reports
Correspondence
By-laws
Notice of Motions
Announcements
Business Arising from Closed Session
Confirmatory By-law
Adjournment

7.3 Minutes

7.3.1 The Clerk shall be the secretary of all Council Meetings. It shall be the duty of the Clerk to record the proceedings of Council in the form of minutes that shall contain the following:

- (i) The place, date, and beginning and ending time of Meetings.
- (ii) The names of Members present.
- (iii) The time Members arrive and leave the Meeting.
- (iv) Any declaration of Pecuniary Interest.
- (v) A record of the decision of each item for consideration.
- (vi) Recommendations to Council on each item.
- (vii) The names of Delegations appearing before Committee.

~~The Minutes shall record:~~

- ~~(i) the place, date and time of the meeting;~~
- ~~(ii) the names of the presiding officer, and the record of the members in attendance.~~
- ~~(iii) any disclosure made under the Municipal Conflict of Interest Act;~~
- ~~(iv) the reading, if requested, correction and adoption of the minutes of prior meetings;~~

~~(v) —other proceedings of the meeting without note or comment.~~

7.3.2 Such Minutes as referred to in Section 7.3.1 may be adopted by Council without having been read at the meeting considering the question of their adoption.

7.3.3 The Minutes shall be posted to the Township website within 48 (forty-eight) hours of the Minutes' adoption.

7.3.4 Video recordings of the meeting shall be retained in accordance with the Retention By-law.

7.4 Land Acknowledgement

7.4.1 The Land Acknowledgement, as approved by Resolution of Council, shall be read at the beginning of every Council Meeting and Committee of Council Meeting. **The Chair or presiding officer shall ask if any person present of Indigenous decent wishes to read the Land Acknowledgement. In absence of any person declaring their desire to read the Land Acknowledgement,** The Members of Council or the Committee, as the case may be, shall read the Land Acknowledgement on a rotating basis starting with the Mayor. Any Member can decline to read the Land Acknowledgement and may do so without explanation.

7.4.2 The Land Acknowledgement may be read at official functions of the Township or other community events at the discretion of the organizer.

7.5 Additions to the Agenda

Additions to the Agenda may be submitted by members of staff to the Clerk in writing for emergency items of a time sensitive nature. The Addition to the Agenda must be submitted not later than 4 (four) hours in advance of the Council Meeting and must be distributed to Council electronically and posted on the Township Website immediately upon receipt.

7.6 Disclosure of Pecuniary Interest

7.6.1 It shall be the responsibility of each individual member to determine if a conflict exists and disclose any pecuniary interest and the nature thereof in accordance with the provisions of the Municipal Conflict of Interest Act, R.S.O. 1990, Chapter M.50, as amended, in any regular or Special Council or Committee meeting.

7.6.2 Any member required to make a disclosure of pecuniary interest shall disclose any direct or indirect pecuniary interest and state the general nature of such interest in accordance with the provisions of the Municipal Conflict of Interest Act, as amended, and it shall be recorded by the clerk in accordance with the provisions of the Act or any amendments thereto;

7.6.3 Where a member of Council, either on his/her own behalf or while acting, by, with or through another, has a pecuniary interest, direct or indirect, in any matter and is present at a meeting at which the matter is the subject of consideration, the member shall:

- (i) prior to any consideration of the matter at the meeting, disclose the interest and the general nature thereof;
- (ii) not take part in the discussion;

- (iii) not vote on any question in respect of the matter;
- (iv) not attempt in any way whether before, during or after the meeting to influence the voting on any such question.

- 7.6.4 Where a meeting is not open to the public, in addition to complying to the requirements of this by-law, the member shall immediately leave the meeting for the part of the meeting during which the matter is under consideration;
- 7.6.5 Where the interest of a member of Council has not been disclosed for reason of absence from the particular meeting, the member shall disclose the interest and otherwise comply at the first meeting attended by the member after that particular meeting;
- 7.6.6 The failure of one or more members to comply with this section of the by-law shall not affect the validity of the meeting in regard to said matter.

7.7 Presentations

- 7.7.1 Any person making a presentation to Council, including staff members, consultants engaged by the Township, or individuals representing any other corporation, organization or local board of the Township, shall be permitted to address Council and shall be limited in speaking to not more than ten (10) minutes without a time limit.
- 7.7.2 All audio and visual materials presented to Council by a presenter must be reviewed by the Clerk and CAO relative to inappropriate language, graphic images or other messaging that does not reflect the decorum of Council Chambers. Such materials may include, but are not limited to, audio recordings, slide presentations, photos, videos and handouts but does not include the presenters speaking notes.
- Presenters must provide materials not less than five (5) business days before the commencement of the meeting of Council.

7.8 Consent Agenda

- 7.8.1 In preparing the agenda for Council and Committee meetings, the Clerk may identify items which are considered to be routine and non-controversial under the heading "Consent Agenda," which matters may be considered by Council as a summary matter in one motion rather than as separate items, unless a member of Council otherwise requests.
- 7.8.2 Any member of Council, before the consent motion is voted on, may add or remove any number of items of business from the consent motion. Members of staff may request, before the consent motion is voted on, to remove any number of items of business from the consent motion. Any report removed from the Consent Agenda will be disposed of immediately following the Consent Agenda.
- 7.8.3 In the event that a member declares a conflict of interest on an item that is included in the consent motion, that item shall be removed from the consent motion and dealt with separately.
- 7.8.4 Members of Council may ask clarifying questions only with regards to matters on the Consent Agenda. Questions of a more substantive nature require the report to be removed from the Consent Agenda. The Chair may interrupt the questions and declare that the report will be removed from the Consent Agenda.

~~7.9.4 Items removed from the consent motion at the request of a member of Council or staff will be considered under the “Reports” section.~~

7.8.4 The Consent Agenda may include, but is not limited to the following items:

- a) Staff appointments.
- b) Committee appointments .
- c) Reports provided for information only.
- d) Tenders.

7.9 Delegations for Matters on the Agenda

7.9.1 No person except members of Council and Township Officials shall be allowed to come within the bar during the sitting of Council without the permission of the Head of Council.

7.9.2 Persons desiring to verbally present information on matters of fact, or make a request of Council, relative to matters on the Agenda, shall give notice to the Clerk in writing, not later than four (4) hours before the commencement of the meeting of Council and may be heard on leave of the Mayor or other presiding officer of Council, but shall be limited in speaking to not more than five (5) minutes. Where a delegation consists of five or more persons, it may be permitted to have two spokespersons address Council, in which event each of such spokespersons shall be limited to speaking for not more than five (5) minutes. Delegations shall be permitted to speak only once on an Agenda item.

7.9.3 All audio and visual materials presented to Council by a delegation must be reviewed by the Clerk and CAO relative to profanity, graphic images or other messaging that does not reflect the decorum of Council Chambers. Such materials may include, but are not limited to, audio recordings, slide presentations, photos, videos and handouts but does not include the delegations speaking notes.

Delegations appearing relative to subsection 7.9.2 are required to provide materials not less than five (5) business days before the commencement of the meeting of Council so they may be included in the Council Agenda Package for Council’s information.
Delegations appearing relative to subsection 7.9.2 must provide materials not less than 24 (twenty-four) hours in advance of the scheduled meeting.

7.9.4 Requests for Delegations for Matters not on the Agenda will be directed to speak with staff on the matter or may submit their comments or questions as correspondence for inclusion as Correspondence as noted in section 7.10. Members of the public may also direct their comments or questions to a member of Council for a response from staff or for proposed direction by way of a Notice of Motion.

7.10 Communications and Petitions

7.10.1 Every communication, including petitions and correspondence, designed to be presented to Council shall be legibly written or printed and shall not contain any impertinent or improper matter or language and shall be signed by at least one person and filed with the Clerk. It is recommended the petitions conform the Township’s petition template, which can be obtained on the Township’s official website or by contacting the Clerk or Deputy Clerk.

7.10.2 Any person who files a petition must leave their name and contact information with the Clerk.

7.10.3 Any person who signs a petition must be made aware by the person filing the petition that their names, signatures, and contact information, as included on the petition, may be included in the Council Agenda and made available to the public including publication on the Township website.

7.10.4 Every petition or correspondence shall be delivered to the Clerk not less than five (5) business days before the commencement of the meeting of Council and if in the opinion of the Chief Administrative Officer, it contains any impertinent or improper matter or language, the Chief Administrative Officer shall decide whether it should be included in the agenda for a Council meeting. Correspondence or petitions containing negative allegations towards members of the public or profanity shall be redacted to remove the inappropriate allegations or language. Correspondence or petitions containing hate speech will be rejected. Correspondence or petitions containing criticisms of a personal nature against Members of Council or staff shall be redacted.

7.10.5 Every petition received shall be circulated to the Department Head responsible for the general service area the petition pertains to, or their designate. The Department Head, their designate, or the Chief Administrative Officer may contact the person who filed the petition to discuss the matter contained within the petition before the petition is added to the Agenda. After discussions with the Department Head, their designate or the Chief Administrative Officer have concluded, the person who filed the petition may contact the Clerk to withdraw the petition.

7.10.6 Correspondence or petitions addressed to Council shall be listed by the Clerk on the agenda and the Clerk shall briefly indicate therein the content of each such petition or communication.

7.10.7 Resolutions from other municipalities and addressed to Council shall be listed by the Clerk on the agenda for the next regular meeting, and shall be listed under Correspondence.

7.11 By-laws

7.11.1 All by-laws shall be considered by Council and shall be introduced and receive first, second and third reading by a motion;

7.11.2 Copies of all by-laws to be considered by Council shall be provided to each member of Council with the Agenda Package;

7.11.3 All by-laws when introduced shall be in type-written form, shall contain no blanks except such as may be required to conform to accepted procedure or to comply with provisions of any Act, and shall be complete with the exception of the date;

7.11.4 By-laws which received first and second reading at a previous meeting and have now been cleared for final reading shall be read a final time and approved in open Council;

7.11.5 Every by-law shall have three readings previous to it being passed;

7.11.6 The Clerk shall record on all by-laws enacted by Council, the date of the first, second and third readings;

7.11.7 Every by-law which has been enacted by the Council shall be numbered and dated and shall be sealed with the seal of the

Corporation and signed by the Mayor and the Clerk and shall be securely kept by the Clerk in compliance with the Act and the Township's Retention By-law.

7.11.8 Errors, Corrections, and Other Changes

- i. The Clerk may make the following changes to By-laws or resolutions to:
 - a. Correct spelling, punctuation or grammatical errors, or errors that are of a clerical, typographical or similar nature.
 - b. Alter the style or presentation of text or graphics to improve electronic or print presentation.
 - c. Correct an erroneous description of a date or time with the actual date or time.
 - d. When the title, location or address of a body, office, place or thing has been altered, change any reference to the title, location or address to reflect any alteration in title, location or address.
 - e. Correct errors in the numbering of provisions or other portions of a By-law and make any changes in cross-references that are required as a result.
 - f. Make a correction, if it is patent both that an error has been made and what the correction should be.
- ii. The Clerk:
 - a) may provide notice of the changes made under subsections 7.11.8(i)(a) to 7.11.8(i)(c) inclusive in the manner that they consider appropriate.
 - b) shall provide notice of the changes made under subsections 7.11.8(i)(d) to 7.11.8(i)(f) inclusive in the manner that they consider appropriate.
 - c) in determining whether to provide notice under subsection 7.11.8(ii)(a), shall consider:
 - 1) the nature of the change; and
 - 2) the extent to which notice, and the information provided in it, would provide assistance in understanding the relevant legislative history.
 - d) in providing notice under subsection 7.11.8(ii)(a) or 7.11.8(ii)(b), shall state the change or the nature of the change.
- (iii) No legal significance shall be inferred from the timing of the exercise of a power under this section.
- (iv) Regardless of when a change is made to a By-law under this section, the change may be read into the By-law as of the date it was enacted if it is appropriate to do so.

7.12 Notice of Motion

7.12.1 A Notice of Motion shall:

- i) be in writing;
- ii) shall be directed by the Clerk to the next regular Council meeting and shall be printed in full on the agenda.

7.12.2 Notice of all new motions except motions listed in Sections 11.8 and 11.9 shall be given in writing and delivered to the Clerk at least six (6) business days preceding the date of the meeting at which a motion is to be introduced and the motion shall be printed in full and unaltered on the agenda for that meeting of Council, as a means of introduction, and each succeeding meeting until the motion is considered or otherwise disposed of. The motion shall be submitted to the Clerk in writing which may include by email.

7.12.3 The right to move a notice of motion shall be deemed to be that of the Councillor who introduced the Notice.

7.12.4 Any amendments, except those of a typographical nature, to a Notice of Motion shall be deemed to have created a new Notice of Motion and shall be treated as such in accordance with this by-law. Amendments of a substantive manner cannot be made during a meeting without being re-introduced as though it is a new Notice of Motion.

7.12.5 When a Member's notice of motion has been called from the Chair in two successive meetings and not proceeded on, it shall be dropped from the agenda unless Council otherwise decides.

7.12.6 If Council determines that the notice of motion shall appear on the agenda at a third meeting, such notice of motion is called from the Chair and not proceeded with, it shall be deemed to have been withdrawn.

7.12.7 Any motion may be introduced without notice if Council, without debate, dispenses with notice on the affirmative vote of at least two-thirds of the members present and voting.

7.12.8 Members of Council are expected to prepare their Notice of Motion in accordance with traditional parliamentary formatting and use traditional parliamentary language. Assistance with formatting or language may be sought from the Clerk or Deputy Clerk.

7.12.9 Members of Council considering the submission of a Notice of Motion are encouraged to speak with the appropriate Department Head or CAO to ensure a Notice of Motion is the most efficient means of dealing with a matter.

7.12.10 Assistance with the substance of a Notice of Motion may be sought from the Department Head relative to the subject matter or the CAO.

7.12.11 Review of the Notice of Motion by staff shall not constitute support from staff on the content of the Motion.

7.13 Announcements

7.13.1 Members of Council may make any special event announcements or report on community activities.

7.14 Adjournment

7.14.1 A motion may be made at any time by a member who has the floor, requires no seconder and need not be in writing provided that no motion to adjourn may be made during the taking of a vote on any question.

7.14.2 Where a motion to adjourn is duly moved and carried and any item of business or any by-law then before Council is left undisposed of, such item of business or by-law may be considered at the appropriate place in the order of procedure at any subsequent regular meeting of Council.

7.14.3 Where a motion to adjourn is lost no second motion to the same effect may be made until after some intermediate proceeding shall have been had.

7.14.4 On a motion to Adjourn, no Member shall leave their seat until the Chair has declared the meeting adjourned.

7.14.5 A regular or special meeting of Council or Committee shall adjourn at the hour of 11:00 pm if in session at that time and shall reconvene at such other day and time as the Members may direct by resolution.

8. RULES OF DEBATE

- 8.1 Any member desiring to speak shall so indicate by raising his/her hand and, upon being recognized by the Mayor or other presiding officer, shall address the Chair by stating “through you, Mayor (surname)...” or “through you, Your Worship...”
- 8.2 When two or more members raise their hands to speak the Mayor or presiding officer shall recognize the member who raised his/her hand first.
- 8.3 The Mayor or other presiding officer may state his/her position on any matter before Council without leaving the Chair, but it shall not be permissible to debate the question without first leaving the Chair after appointing a member to preside during such remarks.
- 8.4 The Mayor or presiding officer shall resume the Chair for the taking of the vote.
- 8.5 The Mayor or presiding officer may, without leaving the Chair, address Council between proceedings on any matter pertinent to the business of the municipality.
- 8.6 When a member is speaking no member shall pass between him/her and the Chair or interrupt him except to raise a point of order.
- 8.7 Any member may require the question or motion under discussion to be read at any time during the debate but not so as to interrupt a member while speaking.
- 8.8 No member, without leave of Council, shall speak to the same question, or in reply, for longer than ten minutes.
- 8.9 A member may ask a question only for the purpose of obtaining information relating to the matter under discussion and such question must be stated concisely and asked only of the Chair.
- 8.10 Notwithstanding Section 8.9, when a member has been recognized as the next speaker, then immediately before speaking such member may ask a question of the Mayor or presiding officer on the matter under discussion only for the purpose of obtaining information, following which the member shall speak again.
- 8.11 The following matters and motions with respect thereto may be introduced orally without written notice and without leave, except as otherwise provided by this By-law:
 - i) a point of order or personal privilege;
 - ii) presentations of petitions;
 - iii) to move the question be put;
 - iv) to adjourn.
 - v) to refer;
 - vi) to table or to postpone, defer to a day certain;
 - vii) to amend;

- viii) to suspend the Procedural By-law
- ix) any other procedural motion.

8.12 Speaking Order and Limit

- (i) The Chair shall determine and administer the speaking order for Members of Council;
- (ii) Each Member may only speak for a maximum of 5 minutes at a time during debate, however, they may speak as often as they wish. This time restriction does not apply to Members when they are asking questions and seeking clarification from Delegations and staff.
- (iii) If requested, the mover or seconder of a Motion, has the right to be the last Member to speak on a Motion; and,
- (iv) When a Member is speaking to a Motion, they shall confine their remarks to the Motion.

9. POINTS OF INFORMATION, ORDER, PRIVILEGE OR PROCEDURE

- 9.1 The Mayor or presiding officer shall preserve order and decide on points of information, order, privilege, or procedure.
- 9.2 When a point of information, order, privilege, or procedure is raised or when a person present is called to order by the Mayor or presiding officer, the person speaking shall immediately cease until the Mayor or presiding officer has decided on the point of information, order, privilege or procedure and may further address Council only for the purpose of appealing to the Council from such decision.
- 9.3 The Mayor or presiding officer, in giving his/her decision, should cite the rule or law governing the case. The Mayor may ask for the assistance of the Clerk or Council in deciding the matter but the Mayor's decision shall be final if there is no appeal.
- 9.4 If the decision of the Mayor or presiding officer is appealed to Council, the Mayor shall restate the point in issue and ruling thereon and, without further debate, shall put the question "shall the ruling of the Chair be sustained". The Mayor or presiding officer may vote on this question and in the event of an equality of votes the Chair shall be deemed to be sustained.
- 9.5 When a member considers that his/her integrity or the integrity of Council as a whole, staff, or the public has been impugned, he/she may as a matter of personal privilege, at any time, with the consent of the Mayor or presiding officer, draw the matter to Council's attention.

10. CONDUCT OF MEMBERS IN COUNCIL

- 10.1 No Member shall:
 - i) speak disrespectfully of the Reigning Sovereign, the Governor General, the Lieutenant Governor of any province, or any person administering the Government of Canada or this Province;
 - ii) use offensive words or unparliamentary language in or against the Council or against any Member or against any staff;
 - iii) speak on any subject other than the subject in debate;

- iv) criticize any decision of Council except for the purpose of moving in accordance with the provisions of Section 12 that the question be reconsidered.
 - v) disobey the rules of Council, or a decision of the Mayor or presiding officer, or of Council on questions of order or practice, and upon the interpretation of the rules of Council, and in the case where a member persists in any such disobedience after having been called to order by the Mayor or presiding officer, the Mayor or presiding officer may forthwith put the question, no amendment, adjournment or debate being allowed, "that such member be ordered to leave his/her seat for the duration of the meeting of Council", but if the member apologizes he/she may, by vote of Council, be permitted to retake his/her seat.
- 10.2 No charge shall be made which involves the character, conduct or language of a member of Council unless such member is present to reply or unless due notice has been given to such member to be present to offer a defence.
- 10.3 A question put to a member may not contain imputations, epithets, ironical expressions or hypothetical cases, nor may a question refer to debates or answers to questions in the same meeting. A question may not be put which publishes the names of persons, or contains statements not strictly necessary to render the question intelligible, or contains charges which the member who asks the question is not prepared to substantiate. The solution of an abstract legal case may not be sought by a question. A question cannot be made a pretext for a debate, and when a question has been fully answered it cannot be renewed.
- 10.4 When a member has been called to order by the Mayor or presiding officer for breach of parliamentary decorum, it is the member's duty to defer at once to the decision of the Mayor or presiding officer and to make apology by explaining that there was no intent to infringe on any rule of debate, or by immediately withdrawing the offensive or unparliamentary language which may have been used. However, if a member persists in unparliamentary conduct, the Mayor or presiding officer shall be compelled to name such member and submit such conduct to the decision of Council. In such a case, the member whose conduct is in question should explain and withdraw and it shall be for Council to decide what action to take.

11. MOTIONS

- 11.1 A motion must be formally seconded before the Mayor or presiding officer can put the question or the motion can be recorded in the minutes.
- 11.2 When a motion is presented in Council in writing, it shall be read or if it is a motion which may be presented orally, it shall be stated by the Mayor or presiding officer before debate.
- 11.3 A motion in respect of a matter which is ultra vires the jurisdiction of Council shall not be in order.
- 11.4 After a motion is read or stated by the Mayor or presiding officer, it shall be deemed to be in possession of Council but may, with the permission of Council, be withdrawn at any time before decision or amendment.

- 11.5 A motion properly before Council for decision must receive disposition before any other motion can be received except motions in respect of matters listed in Sections 11.8 and 11.9.
- 11.6 A motion called in the order in which it stands on the agenda of the routine of business of a meeting and which is not decided by Council, shall be allowed to stand retaining its precedence on the agenda of the routine of business of the next ordinary meeting of Council.
- 11.7 A motion to refer a matter under discussion by Council to Township staff or a Committee shall preclude all amendments of the main question until it is decided.
- 11.8 If the amendment is not considered a “Friendly Amendment”, then the motion to amend:
- i) shall be presented in writing;
 - ii) shall receive disposition of Council before a previous amendment of the question;
 - iii) shall be relevant to the question to be received;
 - iv) shall not be received proposing a direct negative to the question;
 - v) may propose a separate and distinct disposition of a question;
 - vi) shall be put in the reverse order to that in which it was moved.
 - vii) shall contain only one motion to amend an amendment to the question and any further amendment must be to the main question;
- 11.9 A motion for the previous question:
- i) cannot be amended;
 - ii) cannot be proposed when there is an amendment under consideration;
 - iii) shall preclude all amendments of the main question;
 - iv) when resolved in the affirmative, shall to be put forward without debate or amendment;
 - v) can only be moved in the following words "that the question be now put"; and,
 - vi) may be voted against by the mover and seconder.
- 11.10 A motion on a matter of privilege shall receive disposition of Council forthwith upon receipt and when settled, the question so interrupted shall be removed to the point where it was suspended.
- 11.11 A motion for reference to a Committee or staff until it is decided, will preclude all amendments of the main question and any motion to postpone or defer, or to lay on the table.
- i) a motion to refer is debatable.
- 11.12 When the matter under consideration contains distinct recommendations or propositions, upon the request of any Member, a

vote upon each recommendation or proposition will be taken separately.

12. RECONSIDERATION

- 12.1 After any question, except one of indefinite postponement, has been decided, any member may, at the same session or at a subsequent session, move for a reconsideration thereof. Such motion must be made in writing, but no discussion of the main question shall be allowed unless the motion for reconsideration is passed by a two-thirds majority of all the members of Council, nor shall any question be reconsidered more than once.
- 12.2 A motion to reconsider an amendment may not be submitted until after the original motion to which the amendment was proposed has been considered and disposed of.
- 12.3 If a motion to reconsider is decided in the affirmative, such reconsideration shall become the next order of business, unless the motion calls for a future definite date, and debate on the question to be reconsidered may proceed as though it had never previously been voted on.
- 12.4 Debate on a motion for reconsideration must be confined to the reasons for or against reconsideration.
- 12.5 When a by-law has been defeated at any stage of the order of procedure, it shall be subject to a motion to reconsider and the foregoing rules shall apply thereto, except that, when a motion to reconsider a by-law is carried by the required majority, a motion that leave be given to introduce the said by-law shall become the next order of business and, if this motion is carried, the by-law shall be dealt with in accordance with the usual order of procedure as if it had been first introduced at the meeting during which the motion to reconsider was voted on.

13. VOTING ON MOTIONS

- 13.1 Immediately preceding the taking of the vote, the Mayor or presiding officer may state the question in the form introduced and shall do so if required by a member except when a motion for the previous question has been resolved in the affirmative. He/she shall state the question in the precise form in which it will be recorded in the minutes.
- 13.2 After a question is finally put by the Mayor or presiding officer, no member shall speak to the question or shall any other motion be made until after the vote is taken and the result has been declared.
- 13.3 Every member present at a meeting of Council when a question is put shall vote thereon unless prohibited by statute, by reason of conflict of interest or for any reason.
- 13.4 No vote will be taken in Council or Committee by ballot or by any other method of secret voting.
- 13.5 Upon the request of a member, immediately after a vote is taken, the Clerk shall record the negative vote of such member on any question.
- 13.6 If any member present at a meeting of Council when a question is put does not vote, he/she shall be deemed as voting in the negative except where he/she is prohibited from voting by law.
- 13.7 If a member disagrees with the announcement of the Mayor that a question is carried or lost he/she may, but only immediately after the declaration by the Mayor, object to the Mayor's declaration and require a recorded vote to be taken.

- 13.8 When the Mayor calls for the vote on a question each member shall remain in his/her seat until the result of the vote has been declared by the Mayor, and during such time no member shall walk across the room or speak to any other member or make any noise or disturbance.
- 13.9 When the matter under consideration contains distinct recommendations or propositions, upon the request of any Member, a vote upon each recommendation or proposition will be taken separately.
- 13.10 A member not present before the result of the division on a question is declared, shall not be entitled to vote on that question.
- 13.11 The manner of determining the decision of Council on a motion shall be at the discretion of the Mayor or presiding officer and may be by voice, show of hands or otherwise.
- 13.12 Upon the taking of any vote if all the members present when the vote is taken vote unanimously, the Mayor or presiding officer may direct the Clerk to record the vote accordingly.
- 13.13 Any question on which there is an equality of votes shall be deemed to be in the negative.

14. RECORDED VOTE

- 14.1 When a recorded vote is requested by a member, or is otherwise required, the Clerk shall record the name and vote of every member by ward, on any matter or question.
- 14.2 Where a vote is taken for any purpose and a member requests immediately prior to or immediately subsequent to the taking of the vote, that the vote be recorded, each member present, except a member who is disqualified from voting by any Act, shall announce his/her vote openly, and any failure to vote by a member who is not disqualified shall be deemed to be a negative vote and the Clerk shall record each vote accordingly.
- 14.3 When a recorded vote is requested by any member the Clerk will call of the vote, announce the division and will record them in the minutes of the meeting.

15. RECESS

- 15.1 A majority vote of Members present is required to recess a meeting, and the time of return shall be announced by the Mayor or Presiding Officer.

16. COMMITTEES (ad hoc/Advisory/Special Purpose)

- 16.1 Ad hoc, Advisory or Special Purpose Committees may be established by Council at any time as is deemed necessary for the consideration of matters within the jurisdiction of the Council, pursuant to Section 11 of the Municipal Act or as required by any Act or Statute of the Province of Ontario.

16.2 Establishment/Appointment

The names of the persons to be appointed to any ad hoc, Special Purpose or Advisory Committee to which Council is required or empowered to appoint persons, shall be determined by Council by resolution or by-law or as required by any Act or statute of the Province of Ontario at the first regular meeting of a new Council, or as soon thereafter as is reasonable.

16.3 General Role of Committees

The role of Committees shall generally be to:

- i) make recommendations to Council on matters which are in their jurisdictions;
- ii) guide and request staff through the Chief Administrative Officer, to provide reports on the direction and nature of policy development, fact findings, analysis and generation of possible alternatives required; and
- iii) receive public Delegations and establish mechanism to receive further public input within their jurisdiction.

16.4 General Role of Committee Members

The role of a committee member shall generally be to:

- i) attend committee meetings being prepared to discuss items on the Agenda;
- ii) discuss items on the Agenda in a respectful manner, and, when called, vote on the matter with the public interest in mind; and
- iii) to uphold the decision and actions of the Committee.

16.5 Election of Committee Chair

The Clerk, or their designate, shall preside at the first meeting of each Committee at the start of its term for the purpose of electing a Chair of the Committee.

16.6 Terms of Reference – Advisory Committees

Subject to the provision of any general or special Act, the Council, in establishing any Advisory Committee, will set forth Terms of Reference of the Committee, and such other provisions as the Council deems proper.

16.7 Procedures – Committees

The procedures of the Committees shall be the same as those set out for Council insofar as they are applicable, with the following exceptions:

- i) In Committees the vote on any particular item shall not be recorded however a member on request may be recorded as being opposed;
- ii) At the request of any member of the Committee present, any item on the agenda may be re-opened by a majority vote of the members present;
- iii) A quorum in any Committee is the majority of the Members of the Committee as appointed by Council, and the Mayor, if present, is a member to be included in determining the quorum;
- iv) If any Committee neglects to attend to its duties, the Council may intervene and order it to meet and report;
- v) The Chair of a Committee may vote on any question before the Committee;
- vi) Any question on which there is an equality of votes shall be deemed to be in the negative;
- vii) In Committee, members may speak more than once on the same question;

- viii) Should any member of a Committee refuse or neglect to attend the regular or special meetings thereof, the Chair may report such neglect or refusal to the Council who may remove such member from the Committee and appoint another member;
- viii) Advisory Committees shall prepare minutes and submit them to Council.

16.8 Committee Reports to Council

All Committees are required to provide bi-annual informational reports to Council to update on their activities.

17. REVIEW AND AMENDMENT TO THIS BY-LAW

- 17.1 Within six (6) months of the new term of Council, the Clerk shall review this by-law. If amendments are required, the Clerk shall follow the requirements of subsection 17.3. If no amendments are deemed necessary, the Clerk shall report same to Council.
- 17.2 If deemed necessary by Council, the CAO or the Clerk, the Clerk may review this by-law and propose amendments in accordance with section with subsection 17.3.
- 17.3 No amendment or rescinding of this by-law or any part of thereof shall be considered at any meeting of Council unless notice of the proposed amendment or rescinding has been given at a previous regular meeting of Council and the waiving of this notice by Council is prohibited.

17.4 Amendments to and subsequent Procedural By-laws shall be reviewed by the Township solicitor prior to being considered by Council.

18. SUSPENSION OF THE RULES

- 18.1 Any rules or procedures established by this by-law, other than a quorum requirement, may be suspended at or for a particular meeting, by resolution, provided two-thirds of members present vote in favour thereof, unless prohibited by law;

18. SEVERABILITY

- 18.1 Should any section, sub-section, clause or paragraph or provision of this by-law be declared by a court or competent jurisdiction to be invalid, the same shall not affect the validity of this by-law as a whole or any part thereof, other than the provisions so declared to be invalid.

19. REMARKS

- 19.1 In this by-law, words of the singular include the plural, words in the plural include the singular and words importing the masculine gender include the feminine gender where the context so requires.

20. ROBERT'S RULES

- 20.1 In all unprovided for cases in the proceedings of Council or Committee, resort shall be had to Robert's Rules of Order as a rule for guidance on the question, and in such cases the decision of the Mayor or other presiding officer shall be final and acquiesced in without debate.

21. SHORT TITLE

- 21.1 This by-law may be referred to as either the "Procedural By-law" or the "Rules of Procedure".

22. EFFECTIVE DATE

- 22.1 By-law No. 2019-25 and any other by-laws inconsistent with the provisions of this by-law are hereby rescinded.
- 22.2 This by-law shall come into force and effect on the date of passage.

READ a first and second time on the __ day of _____, 2021.

READ a third time and passed in open Council on the __ day of _____, 2021.

Mayor

Clerk

DRAFT

DEVELOPMENT SERVICES *Staff Report*

REPORT NO: DS 2021-022

TO: Council

SUBMITTED BY: Harold O'Krafka, MCIP RPP
Director of Development Services

PREPARED BY: Harold O'Krafka, MCIP RPP
Director of Development Services

REVIEWED BY: Sandy Jackson, Interim CAO

DATE: June 14, 2021

SUBJECT: New Hamburg Board of Trade
Waterwheel Project

RECOMMENDATION:

THAT Report DS 2021-022, regarding the New Hamburg Board of Trade Waterwheel Project be received for information.

SUMMARY:

The New Hamburg Waterwheel celebrates the importance of the power of the Nith River in the growth of New Hamburg; when operational, it was the largest operating waterwheel in North America.

Originally installed in 1990, the waterwheel was anticipated to have a life expectancy of 25 years; however, with investments by the Board of Trade in 2013 and 2015 the structure has been able to exceed its original life expectancy.

Recognizing the need to remove the existing waterwheel and ideally replace the structure the New Hamburg Board of Trade has been working with students at the University of Guelph on a detailed technical review and redesign for the rebuilding of the New Hamburg Waterwheel.

BACKGROUND:

The Township of Wilmot and the New Hamburg Board of Trade have a long history of working together on a variety of projects in the core area of New Hamburg to promote the community and entire Township as a destination for commercial investment and tourism, as well as creating appropriate public spaces for all residents to enjoy and identify with.

Collaborative projects include the New Hamburg Waterwheel, the Nith River promenade / trail, the New Hamburg Heritage Conservation District, the New Hamburg Streetscape Study and associated capital works, and the Centennial Fountain Park / New Hamburg Post Office expansion project.

More recently the Township and Board of Trade collaborated on some greening opportunities in the core of New Hamburg, and the Township has successfully obtained grant funding to allow for the refurbishment of the Nith River Promenade / Trail works, which are currently in the detailed design phase.

At the same time, the New Hamburg Waterwheel has passed its life expectancy and needs to be removed. In reviewing the opportunity to replace the waterwheel, the New Hamburg Board of Trade has partnered with the University of Guelph to assess and design a replacement structure. The goal for the replacement structure would be to capture the essence of the original structure, while enhancing upon the design both in terms of functionality and life expectancy.

Representatives of the New Hamburg Board of Trade will attend at Council to present the findings of their review and design exercise which is provided as Attachment 1 to this report.

ALIGNMENT WITH THE TOWNSHIP OF WILMOT STRATEGIC PLAN:

The New Hamburg Waterwheel is an important component of preserving and promoting the heritage of New Hamburg and our community. It has served as a cornerstone to successful Economic Development (Streetscape) and Heritage Protection (Conservation District) efforts since its construction in 1990.

FINANCIAL CONSIDERATIONS:

At this point in time, the Township has not made any direct financial commitments towards the refurbishment / rebuilding of the New Hamburg Waterwheel. Subsequent reporting to Council would be required should Council consider fiscal supports.

ATTACHMENTS:

Attachment 1:

Redesigning the New Hamburg Waterwheel – Report to the New Hamburg Board of Trade



121 Huron Street
New Hamburg, ON, N3A 1K1
Phone: 519-662-6628

ATTACHMENT 1

Web: www.nhbot.ca

Email: info@nhbot.ca

June 8, 2021

Dear Township of Wilmot - Mayor, Councilors and Staff,

Thank you for allowing us to present today.

As another Board of Trade initiative, we hope to build a new WaterWheel.

Please find attached the final report prepared by the University of Guelph students as their Capstone Year-end Project.

I would also ask that you note the letters of support at the end of the report from the local suppliers that helped the students.

This is a very exciting time and we look forward in partnering with the Township on this project.

Joseph Figliomeni

Joe Figliomeni
Chair – Waterwheel committee

cc Lyle Cressman President, NHBOT

Letter of Transmittal

April 14th, 2021

New Hamburg Board of Trade
121 Huron Street
New Hamburg, Ontario, Canada
N3A 1K1 - Box 457

Ref: Proposal for the Project *Redesigning the New Hamburg Waterwheel*


Group 36
Thornbrough Building
50 Stone Road East
Guelph, Ontario, Canada
N1G 2W1

Dear New Hamburg Board of Trade,

As discussed, and displayed, in our presentation on March 24th at the New Hamburg Board of Trade meeting, the group's efforts to design a new waterwheel for New Hamburg's Scott Park have resulted in a final proposed design that is believed to satisfy all parties involved.

We submit the following final report in support of this project, to convey relevant background information, calculations, research, and recommendations. Additional supplementary files are also provided to support the design. David Lubitz, or any of the design team members, can be contacted for access to the OneDrive folder that holds these files.

Sincerely,


Adel Elkhodr, Max Fisher, Tara Lockhard, Emily MacNeil and J. Sebastien Williams



Redesigning the New Hamburg Waterwheel

Group 36

Adel Elkhodr, Max Fisher, Tara Lockhard, Emily MacNeil, and
J. Sebastien Williams

April 14th, 2021

New Hamburg, ON, Canada

Executive Summary

The New Hamburg Waterwheel is the largest waterwheel in North America and has been a local landmark for 30 years. However, due to material failure caused by environmental wear, the wheel has become a safety concern and must be replaced. The purpose of this project is to provide the New Hamburg Board of Trade with design options for a potential replacement waterwheel. These alternatives include material options, various frame and bucket designs, and potential methods for on-site power generation. To ensure the proposed designs meet the needs of the New Hamburg Board of Trade, meetings have been conducted to address all questions and concerns from both the design team and Board of Trade members.

The key criteria for this project included maintaining the historical aesthetic of the wheel, minimizing the upfront cost, maintenance, and complexity, and maximizing weather resistance and longevity of the structure. Constraints that needed to be met by the new wheel include not interfering with the fish ladder or dam, generating power, withstanding flood conditions, and retaining the title of Largest Working Waterwheel in North America. Background research on the history of waterwheels, the New Hamburg Waterwheel, various types of structural material and hydropower generation and utilization was performed to determine which options were practical and applicable to this project.

From this research, it was determined that Corten steel is the best material to fit the wheels structural and aesthetic needs and that the optimal bucket design for the New Hamburg application is one that mimics the appearance of a Pelton wheel bucket. Additionally, since electrical components cannot be sized without knowledge of how the proposed wheel will perform, research done regarding hydropower generation provided information that will be useful to the Board of Trade in the future when more information about the wheel's operation is known.

Using information gained through the research process, three frame design alternatives were composed. After presenting these options to the entire New Hamburg Board of Trade on March 24th, 2021, the truss design was chosen to be moved forward with. Since this meeting, slight changes have been made to the design including bucket options, assembly options and a more thorough costing estimate. Additionally, recommendations of future additions to Scott Park to complement the new wheel have been made and could be considered during the refurbishment of the park in the upcoming years.

Acknowledgements

The authors would like to thank the technical consultants and members of the New Hamburg Board of Trade for the clear expectations and constant support, Joe Figliomeni, Lyle Cressman, Ross Steckley, Stephen Clarke, Luke Shantz, and Brian Verspagen. Your input provided a new perspective to the group and your knowledge of the New Hamburg Waterwheel's history was invaluable.

Additionally, we would like to thank Dr. David Lubitz, our faculty advisor at the University of Guelph, for introducing us to this project, providing technical assistance, and keeping us motivated along the way.

As with any project, it is important to realize that the problems faced are all part of the fun!

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Table of Acronyms

Acronym	Explanation
AC	Alternating Current
DC	Direct Current
FEA	Finite Element Analysis
GRCA	Grand River Conservation Authority
HDPE	High Density Polyethylene
LCA	Life Cycle Analysis
PVC	Polyvinyl chloride
RPM	Rotations per Minute
WPC	Wood Plastic Composite

1 Introduction

The New Hamburg Waterwheel is the largest waterwheel in North America and has been a local landmark for 30 years. Environmental factors and age have compromised the structural integrity of the wheel, rendering it unsafe to operate. Thus, the purpose of this project is to design a new waterwheel for the New Hamburg Board of Trade.

The waterwheel is a rallying point for the town of New Hamburg and therefore maintaining the emotional connection that the residents of the town have with the wheel is integral. Balancing the historical aspect of the wheel with the need for a new, safer and more weather resistant design has been a key focus. The aesthetics of the waterwheel are particularly important, as the wheel has been used in local business logos and is a point of pride for residents. Therefore, input from members of the New Hamburg Board of Trade has been crucial in shaping the design.

Members of the Board of Trade who have played a large role in the design include Stephen Clark, who was the Structural Engineer on the original waterwheel as well as Joe Figliomeni (Board of Trade Executive Member) and Lyle Cressman (current Board of Trade President), who have provided insights on the Board of Trade's stance on various areas of the design. Additionally, non-Board of Trade members who have been vital to the design process include Ross Steckley, who was involved in the original waterwheel construction, and Brian Verspagen, who is a Water Resource Engineer supporting this project.

Since the wheel is an important landmark to the community and continuing to perform repairs was no longer economically viable, a replacement wheel was requested. The new wheel is to retain the title of Largest Working Waterwheel in North America and the original wheel's historical aesthetic while improving upon the original wheel's weather resistance and longevity.

Additionally, through discussions with the aforementioned Board of Trade members and other consultants, it was conveyed that power generation is a priority in the new waterwheel design. As such, the power generation capabilities of the new wheel and the possible use of a separate turbine have been researched. Producing power using a renewable energy source will help to offset the carbon footprint of the materials used to manufacture the new waterwheel. In addition to an eco-friendly aspect, the wheel has always been a draw for tourists, and the design team would like to build on that. A new waterwheel with interactive features has the possibility of attracting more tourism which would be beneficial for the local economy.

2 Background

To ensure the design of the proposed new waterwheel aligned with industry standards and mathematical principles, an in-depth review of various areas related to the project was performed. This allowed for practical idea generation to occur, resulting in multiple feasible design alternatives.

2.1 Location: New Hamburg, Ontario

The waterwheel is in Southwestern Ontario in the town of New Hamburg, Ontario, west of Kitchener. The area is regulated by the Grand River Conservation Authority (GRCA). The waterwheel is in the center of the town, as can be seen in Figure 2-1 [1]. New Hamburg is prone to severe flooding in late winter to early spring. The area that becomes affected during severe floods is marked by the hatched area in Figure 2-1; the floodplain shows the effects of Hurricane Hazel centered directly over New Hamburg [2].

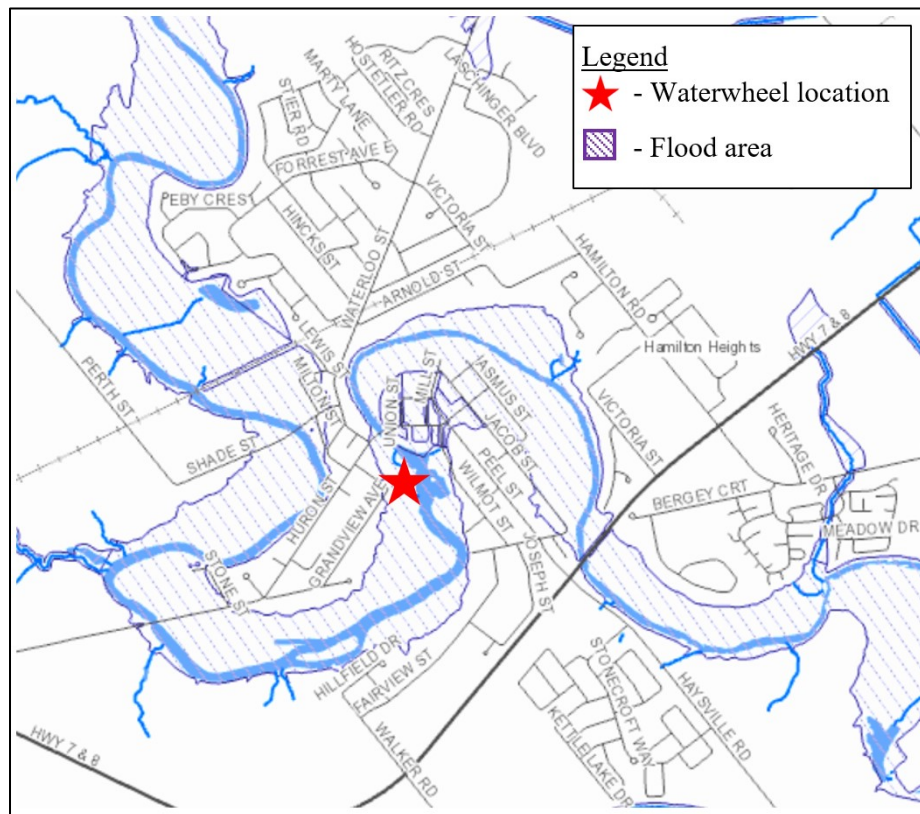


Figure 2-1: Map of New Hamburg

The waterwheel sits along the banks of the Nith River. For the waterwheel to turn, water from the Nith River is routed through a penstock to a nozzle which directs the water at the waterwheel's buckets, which applies a force, allowing the wheel to turn. The greater the height difference between the inlet and outlet of the penstock, the more force will be applied to the waterwheel. Since a thorough site survey has not yet been performed, the inlet of the penstock continues to be unknown. In the package of engineering drawings provided to the design team at the start of the project, two drawings, Drawing 901 and Drawing 894, contained information about the underground piping system, however, the drawings contained opposing information. The two possible inlets of the penstock can be seen in Figure 2-2. For the purposes of the design, possible inlet location #1 was used. Unfortunately, after multiple inquiries with contacts from the Board of Trade, no definitive answers were provided on the actual inlet location.

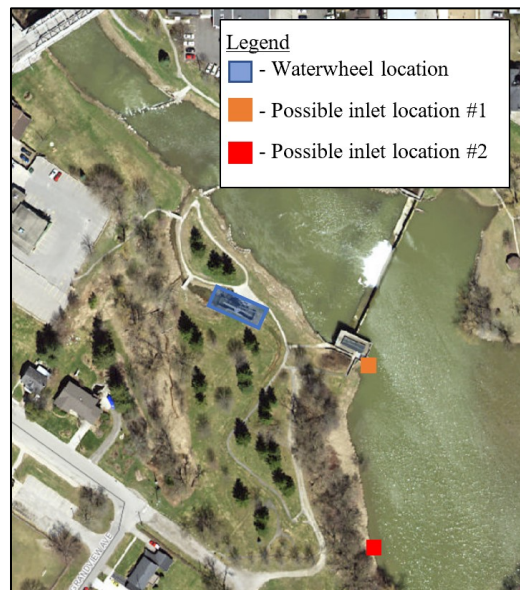


Figure 2-2: Possible Penstock Inlet Locations

2.2 The History of the Waterwheel

The waterwheel was first seen in ancient Greece and Rome as early as the year 13 B.C [3]. They were very inefficient but were able to produce flour from grain by powering a grindstone [4]. In the early middle ages, the waterwheel was an integral part of the agriculture-based economy and was labeled as the greatest tool for generating power in the 1500s [3] [5]. The first waterwheels were crafted out of wood, and many still are today. However, after 1770, waterwheels began being fabricated out of metal [3]. With this advancement in available materials came further exploration into the harnessing of hydropower. In the early 1800s a French engineer introduced the idea of curved blades on waterwheels, which improved the amount of kinetic energy from the water that could be transformed into mechanical energy [4]. Around the same time, turbines started to appear: a smaller and more efficient way to extract energy from water. The most famous include the Pelton Wheel, an impulse turbine which is further described below in Section 2.5, and the Francis Turbine, a reaction turbine that uses stationary guiding veins to spin a runner and the most common turbine in large hydropower plants [6].

Multiple types of waterwheels exist, the most common being the overshot, breastshot, and undershot [4]. The difference between these three types is the location at which the water enters the wheel, either from above, midway down, or the bottom, respectively. The main factors used to decide which type of wheel

will be most effective are the available head, flow rate, and the presence of infrastructure affecting the body of water, such as a dam [7].

2.3 The New Hamburg Waterwheel

The original New Hamburg waterwheel officially opened on October 8th, 1990, to commemorate the grist-mill that had been the heart of the town in the mid-1800s [8] [9]. It stands in Scott Park, named after New Hamburg's founder, William Scott [9]. The impressive 50ft tall, undershot waterwheel can be seen in Figure 2-3. The wheel is unique in the way that it is rotated, using the force of a water jet which strikes the wheel's buckets at the base of the wheel. The wheel's frame is made of 20, 8x8" wooden spokes, connected by three concentric circles of brace planks. At the hub of the wheel, there are 40 knee braces that attach to the wheel at an angle. The hub is supported by four columns made of "high strength, low-alloy steel" and all original wooden components were made from red cedar [10] [11]. Red cedar has good weather resistance but is a soft wood with a low density and is therefore not normally used when building large scale structures [10] [12].

In addition to the material selected for the structure, another issue lies in the amount of wood surrounding many of the bolt connections. The current design places the connections very close to the end of the frame, approximately 1 cm from the edge, which is inadequate when designing a timber frame [10]. In addition, the connections consist of end-grain wood, which is not very strong [10]. When building a timber frame, it is recommended that there is at least 2" of cross-grain wood around a bolt; 3" if using end-grain [10]. The use of soft wood, insufficient connections between wooden components, age and environmental exposure has led to the degradation of the wheel.

The waterwheel was meant to last for 25 years and has exceeded expectations, with the replacement of the bearings, in 2013, and the knee braces, in 2015 [8]. However, the replacement of the braces was considered a "band aid" fix, as no repairs could extend the life of the wheel indefinitely [10]. Additionally, during these repairs, the wheel was tied down and ropes were used to rotate it to access different areas [10]. This was a major safety concern because the wheel is very heavy and, if released from the ropes, could pick up speed and injure a maintenance worker or bystander.



Figure 2-3: The New Hamburg Waterwheel [13]

2.4 Material Selection

As previously mentioned, the waterwheel was originally constructed out of red cedar which has particularly good weathering resistance but lacks the structural strength of harder woods, such as white oak [10]. Additionally, due to the softness of red cedar, it has required significant repairs over the past decade. Unfortunately, these repairs have not been able to extend the wheel's life indefinitely. For this reason, the New Hamburg Board of Trade has raised interest in non-wood designs to reduce the required maintenance and prolong the lifespan of the replacement wheel [14].

Avoiding wood is possible by using metals, plastics, composites, or a combination of these three materials. Metals have a longer lifespan than wood but will also begin to corrode and breakdown over time. Alternatively, composites and plastics can have a very long life and can be made to resemble wood to provide a historic feel. However, composites can become very expensive, particularly in the quantities required for the New Hamburg Waterwheel.

2.4.1 Composites and Plastics

Plastics and composites can be made to mimic the appearance of other materials, like wood, which makes them particularly useful for creating a waterwheel design with a modern look and historic feel. Composites, which have an appearance like wood, are commonly used in deck applications. Such deck boards are often composed of a mixture of wood or plant fibers and thermoplastics, though some are made entirely of plastic [15]. The plastic, often HDPE, can be either virgin or recycled, which can help reduce the environmental impact of the plastic's life cycle [15]. A wood-plastic composite (WPC) would also contribute a long working lifespan to the waterwheel. In deck materials, the expected lifespan of WPC or HDPE boards is between 25 and 30 years, though HDPE pipes can have expected lifespans of 250 years [16] [17].

The limits of these materials are evident with their structural properties. According to a range of tests performed by *Youssef et. al.*; the material properties of WPC is dependent on the ratio of wood fiber and HDPE content; as the plastic content increases, the Modulus of Elasticity and Maximum Bending Stress increases as well [18]. Also, whether the composite material is made with virgin or recycled HDPE has an impact on the Modulus of Elasticity, which can be significantly reduced if recycled HDPE is used [18]. With 40% virgin HDPE, the Modulus of Elasticity is 3807 MPa, but this value is reduced to 3050.6 MPa with the same amount of recycled HDPE [18]. The Maximum Bending Stress is consistent between virgin and recycled HDPE, however; at 40% plastic content, virgin and recycled HDPE samples were found to have maximum bending stresses of 30.70 and 30.75 MPa, respectively [18]. In comparison, red cedar at 12% moisture content has a Modulus of Elasticity of 7,700 MPa and a Maximum Bending Stress of 53 MPa [19] [12]. Furthermore, the density of HDPE is between 890 and 951 kg/m³, while red cedar at 12% moisture content has a density of 330 kg/m³ [18] [12]. With at least twice the Modulus of Elasticity and triple the density of wood, a significantly larger member of HDPE will be required, which will drastically increase the structure's mass. Considering the poor structural properties, the potential for HDPE to be used in any significant capacity is likely limited.

While WPC's are intended to replicate wood in appearance, there are many other composites that can be used as building materials while also giving the new waterwheel design a modern aesthetic. Glass and carbon fibers, when combined with an epoxy matrix, have high mechanical stiffness (45 and 145 GPa, respectively), and high tensile strengths (1020 and 1240 MPa, respectively) [20]. These properties, coupled with low densities of 2,100 kg/m³ for fiberglass and 1,700 kg/m³ for carbon fiber make these materials very comparable to metals; for comparison, A36 steel has a density of 7850 kg/m³ with a stiffness of 207 GPa and a tensile strength of 400-500 MPa [20]. Additionally, these fiber-reinforced polymer composites are relatively chemically and thermally inert and can be designed to provide specific material properties [20].

The primary issue with implementing these composite materials in the New Hamburg Waterwheel is the relative cost. Fiberglass typically costs around 28 times as much as A36 steel, and a carbon fiber composite can cost between 43.1 and 330 times as much as steel; comparatively, aluminum and its various alloys typically cost between 2.1 and 14.7 times the price of steel [20]. While fiber-reinforced composites have very good material properties, the benefit is unlikely to outweigh the drastic cost difference.

2.4.2 Metals

Metals are commonly used as building material when high strength is required. Additionally, as an isotropic material, they are perfect for applications involving moving structures, such as a wheel. The main metals considered for the structure of the wheel were steel and aluminum. When determining the optimal metal to be used, factors such as cost, weight, corrosion, fatigue, tensile strength, and carbon footprint were considered.

In terms of cost, steel prices are constantly fluctuating, however steel is usually significantly cheaper than aluminum [20]. Additionally, when the manufacturing and tooling costs of each metal are compared, aluminum working processes are usually more expensive, as it is less user friendly for processes like welding. However, some processes such as bending and forming are easier with aluminum [21].

Weight is a significant factor when determining the optimal material for the waterwheel as it will affect the structural loads on the wheel and its supports, as well as how easily the wheel will rotate. In general, steel is 2.5 times heavier than aluminum however some lightweight steel alloys can shrink this gap [21].

For corrosion resistance, aluminum performs exceptionally well due to its ability to form an oxide layer. Also, the use of alloys and additional surface treatments can be implemented to increase its resistance [20]. Alternatively, basic steel does not have the required level of corrosion resistance for this project. However, there are some steel alloys and coatings that could be sufficient for this application. Stainless steel has a similar corrosion resistance when compared to aluminum, but this comes at an increased material and manufacturing cost as it is more expensive to produce and less workable during bending operations [20]. Galvanized steel is another option that would be applicable as it has decent corrosion resistance. In comparison, it is less resistant than stainless steel but more affordable. Overall, galvanized steel with an additional coating is an adequate option but there would likely be an increased maintenance cost.

A factor that is important when considering aluminum is fatigue life. The rotation of the water wheel will cause cyclical loading on the structure leading to fatigue in the chosen material. Aluminum is known for having poor fatigue characteristics which could present a significant problem for the longevity of the wheel [22]. For steels, the material fatigue strength is usually between 35-60% of its tensile strength. On the other hand, aluminum traditionally does not have a set fatigue strength and will typically continue to fatigue under cyclical loading until failure [20]. However, this is not to say that aluminum is not a viable option as there are alloys and design changes that can greatly increase aluminum's fatigue strength. Additionally, an advantage of aluminum's light weight is a reduction in overall load, resulting in less fatigue [22].

Strength is a highly variable consideration. On average, steel is stronger, though some aluminum alloys can compete with steels in terms of strength [21]. Once other factors had been considered, research into viable alloys was conducted. This allowed appropriate option with the required tensile strength to be selected while maintaining a low cost.

Lastly, carbon footprint is an important factor when considering the life cycle of the wheel and its environmental impact. Steel has a better carbon footprint on average at around 2 tons of carbon per ton of steel produced compared to aluminum, which is closer to 12 tons of carbon per ton. When considering the carbon footprint, choosing a supplier is important as transportation cost and emissions can be greatly

reduced by using a local supplier. Also, Canadian aluminum has the lowest carbon footprint worldwide [23].

Based on these considerations the optimal material for the waterwheel is a steel alloy. The main points that led to this decision was steel's lower cost and easier welding process compared to aluminum, its ability to handle fatigue stresses, its high strength even without selecting specialized alloys, and its lower carbon footprint. Two contending factors were steel's higher weight and lower corrosion resistance compared to aluminum. When considering weight, our main goal was making the wheel lighter than the previous wheel so that the current support system would not have to be redesigned, adding additional cost to the project. In the case of the final proposed design, by selecting an appropriate wall thickness of 3/16" for the structure's square tubes, the weight of the wheel is less than the previous design despite using steel. Corrosion resistance is where the main issues came from when considering steel. Firstly, common steel alloys have much poorer corrosion resistance when compared to aluminum. Though a coating could be used to extend its life, the Board of Trade indicated that coatings should be avoided due to the maintenance cost. Then, a stainless-steel option was investigated as it is a coating-less, highly corrosion resistant option. However, the use of stainless-steel for the main structure would greatly increase the cost of the project and additional processes would be required to reach an acceptable surface finish to match the aesthetic of the wheel. Therefore, a weathering steel was considered.

2.4.2.1 Corten Weathering Steel

The current material recommendation for the main structure of the wheel is Corten weathering steel. This material was mentioned during a meeting with Board of Trade members as an option for a corrosion resistant steel. Corten is a name for ASTM A847 steel which is a cold-formed low alloy steel that can be welded and shaped into square tubing. It is a high strength steel with a 50 ksi (344 MPa) minimum yield strength and a 70 ksi (482 MPa) minimum tensile strength [24]. Most importantly, when exposed to corrosive conditions, Corten will still rust, however the layer of rust formed will stabilize and not continue to penetrate the material any further. This gives Corten excellent corrosion resistance without the need for additional coatings [24]. While Corten is more expensive than basic steels (around three times A36, though it varies depending on current steel prices) it is still cheaper than using stainless steel (around seven times A36) [20]. Another reason Corten was chosen was because of its aging process. Corten's rust layer slowly darkens its color providing a rustic historic aesthetic that is similar to the aging process of red cedar.

There is one additional consideration that needs to be made for Corten in this application. There are cases of Corten underperforming in humid areas due to the excess moisture content in the air. While Corten is designed to be exposed to the elements, including rain, a constantly humid environment can result in the material having trouble building and stabilizing its rust layer [24]. While humidity is not perceived to be an issue in New Hamburg as other structures such as bridges in the area have preformed well, the specific application on the water wheel may result in more water exposure compared to those structures. Videos of the previous wheel turning show water runoff from the buckets showering onto the wheel constantly. This consistent water exposure would increase corrosion on any material. To minimize this, splash guards have been included on the buckets that direct water runoff away from the wheel as much as possible. This will hopefully leave the wheel mostly dry during sunny days allowing it to slowly build up its rust coating. The design team has limited knowledge on the use of Corten and as such this concern should be addressed by those more experienced in applying this material in local conditions, such as those at Iron Bridge.

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2.5 Impulse Turbines

Impulse Turbines are one of the main types of turbines used in hydropower. They are utilized when high head, low flow conditions are encountered [25]. To transfer the potential energy of the water to usable energy, water is carried from a high elevation to a lower elevation via a penstock. Once the lower elevation is reached, the water in the penstock travels to a nozzle which decreases the pressure of the water, increasing the velocity of the water. The water then leaves the nozzle as a jet stream and strikes the runner. The force of the jet stream acting on the runner causes an impact force, resulting in the runner rotating. To increase the rotational speed of the runner, multiple jets around the runner are often used, increasing the torque. The main type of impulse turbine is the Pelton wheel (or Pelton turbine) [26]. The Pelton wheel is unique in that it utilizes buckets which are made of two semicircular surfaces joined at the center, arranged around the outside of the runner, as shown in Figure 2-4 [27].

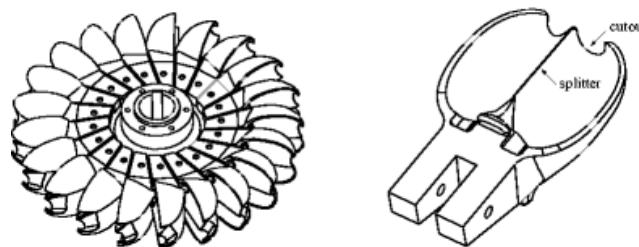


Figure 2-4 Pelton Wheel and Bucket

Since the rotation of the runner relies on the force of the water jet on the buckets, the design of the buckets is of the upmost importance. When determining the bucket dimensions, the system is designed for the initial condition of the system, which is when the wheel is stationary [28]. It is important that this is the condition that is studied because the water jet must overcome the inertial forces on the runner which act to keep it stationary [28]. Once the runner begins rotating, inertia will act rotationally, helping the runner to continue spinning and requiring a lower impact force.

The first important bucket parameter for the transfer of energy from impact force to mechanical energy is the exit angle, which is the angle that water is directed out of the bucket at. The exit angle that produces the greatest transfer of energy is 180° , however, it would result in the water hitting the next bucket on the runner in the opposite direction of motion, making it impractical [28]. Instead, a bucket angle of 165° - 175° is used in practice [28]. Additionally, the depth, width and height of the bucket are determined by multiplying the jet diameter by a predetermined factor, as shown in Figure 2-5 [28].

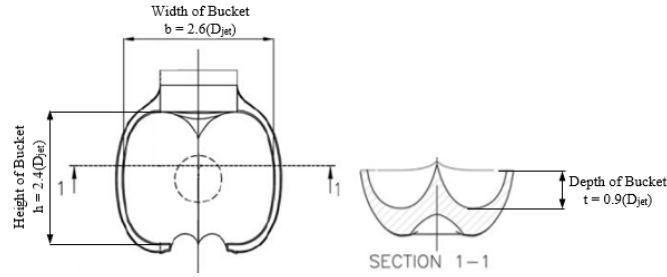


Figure 2-5 Dimensions of a Pelton Wheel Bucket, where D_{jet} is the Diameter of the Water Jet

The final important criterion for designing a Pelton wheel is the optimal number of buckets around the runner. Ideally, fitting as many buckets as possible on the runner would lead to a more constant force on the buckets, leading to a higher power output [27]. However, in practice when the water jet hits the bucket, a small counter-torque is produced [27]. This energy loss is small, though repeated over each bucket is enough to prevent the system from being optimal [27]. There have been a variety of different methods published to determine what the optimal number of buckets are, based on the diameter of the jet and the pitch diameter of the runner. These methods are summarized in Table 2-1 [27].

Table 2-1: Methods to calculate optimal number of buckets on a Pelton wheel

Published by	Equation to calculate the number of buckets
M. Eisenring	$N_b = \frac{\pi D_p}{2d_o}$, D_p is the pitch circle diameter
I.U. Atthanayake	$N_b = \frac{D_p}{d_j} + 15$, d_j is the jet diameter
B.A. Nasir	$N_b = \frac{D_p}{2d} + 15$, d is the jet or nozzle diameter

2.6 Hydropower Generation

Hydropower is commonly generated utilizing turbines such as a Pelton, Reaction or Turgo turbines. Waterwheels are not commonly used to generate power as they rotate relatively slowly compared to other alternatives. This slow rotation poses an issue when transforming the rotational motion into electricity using a generator, which must rotate at very high speeds.

Generators are composed of a stator and a rotor. In standard generators, the stator contains multiple coils of wire and remains stationary while the rotor contains a magnet which rotates. In permanent magnet generators however, the stator contains magnets while the rotor has wire coils. In both types of generators, the rotation of the rotor around the stator creates power which is extracted and wired to a load. Rotational speed plays a key role in determining what the frequency of the output power will be, as can be seen from the formula below.

$$frequency = \frac{N \times P}{120} \quad [1]$$

where, N = rotational speed [RPM] and P = number of poles

In North America, all alternating current (AC) loads run on electricity with a frequency of 60 Hz. Also, most AC generators are manufactured with a low number of poles which means the rotational speed required to operate the generator at a frequency of 60 Hz is usually over 1000 RPM. Alternatively, direct current (DC) generators do not have the constraint of producing power at a specific frequency to be used by the grid. Instead, the DC power produced can be routed to a DC load or a battery bank for storage.

However, since most loads operate using AC power, more equipment is required in the system to change the power from DC to AC.

Due to the low RPM that waterwheels produce, traditional generators cannot be directly coupled to the wheel as a method to produce electricity. There are two main methods that could be implemented to solve the low rotational speed that comes with generating power from a waterwheel: a gearbox to increase the speed, or an inline turbine that avoids using the waterwheel.

Inline turbines consist of a turbine within a pipe, normally at the pipe outlet, where the potential energy is the greatest. They have also been implemented in city systems and use the high-pressure head of city pipe systems to induce a high flow of water through the turbine, producing electricity [29]. Additionally, the option of using an inline turbine reduces construction costs as it can be mounted inside an existing pipe. Each turbine is rated for a specific pressure head and pipe diameter. The main drawback of inline turbines is they are manufactured to extract as much power from the water as possible, leaving the water with little or no energy left at the outlet to turn the wheel.

To prevent power reduction in the water resulting from using an inline turbine, a gearbox can be implemented instead. Gears are used to transmit power between two shafts, and a gear train exchanges torque for rotational speed [30]. With this concept, a high-speed shaft with low torque can be connected via gears to a separate shaft to produce low speed with high torque, or vice versa. The most common gearboxes are speed reducers, which take a high-speed input and produce a low-speed output; these are used in cars to reduce the speed from the engine and produce torque at the wheels. A similar device can be used with a waterwheel, with the intention of producing high speeds at the output. Due to the characteristic large diameter of a waterwheel, a significant amount of torque is created on the shaft. With a gear pair, the output shaft velocity can be greatly increased. The main issue with this is the gear ratio of a single gear pair should not exceed 10:1 [30]. To accommodate for this specification, a compound gear train can be used to further increase the output. A compound gear train consists of a series of gear pairs where at least one shaft carries more than one gear [30]. A speed increaser gearbox, which is necessary for creating useful power from a generator, consists of a compound gear train, bearings for the gear shafts, and an oil bath. There are multiple methods of lubricating gears, though an oil bath in a gearbox is most common and preferred [30]. The main constraint for designing the casing for a gearbox is that it is oil-tight, so no lubrication is lost.

2.7 Electrical Components

In any power generation project, there are a variety of products that are included to convert the electricity produced by the generator to usable energy. After electricity is produced by the generator, the power may be either DC or AC. There are also electrical components which can change AC power to DC power or vice versa. This ability is important because most appliances use AC power while batteries are only able to store DC power. The electrical components that can achieve this are a rectifier and an inverter. Rectifiers work to change AC power to DC power and are very important in power generation operations that require excess power to be stored in batteries. Alternatively, inverters are used to change DC power to AC power and usually exist between battery storage and a load that requires AC power.

Another component that is used in the design of power generating systems is a DC-to-DC converter. This converter is especially important in systems that generate DC power. This equipment “smooths” out any imperfections in the input current, making the generated power usable [31]. After the current flows through a DC-to-DC converter, it can then be used by other components such as an inverter or a battery bank.

When the power is produced, there are normally two options for how to make the power useable: it can be routed directly to a load or sent to a battery bank for storage. For most applications where the power

produced is not sent to the grid, a battery bank is used as it provides the user flexibility as to when the power is used. There are a variety of batteries that are normally used in pico-hydro applications (applications that generate less than 5 kW) the most common being lead-acid and lithium-ion. Lead-acid batteries are one of the most common types of batteries on the market and have the greatest specific energy density as well as the longest lifespan [32]. However, the main issue with lead-acid batteries is their energy storage mechanism; these batteries contain both lead and sulfuric acid, which are very toxic. If any lead-acid batteries were to leak, it could result in harmful electrolyte entering the river. Lead acids also perform better in sub-zero conditions when compared to lithium-ion batteries [33]. However, when compared to other types of batteries, they do not perform as well when deep cycled though are still used in many recharging applications such as electric vehicles, golf cart and forklifts [33]. Finally, lithium-ion batteries are used in many applications because of their high energy density, however they also operate at high temperatures which can lead to a fire risk [32]. In addition to batteries, there are other forms of energy storage that can be used, such as pumped hydro storage, compressed air, flywheels and more.

The final component that should be included, specifically when a battery system is in place, is a dump load. A dump load is a very large resistor that the power is directed to when the batteries become fully charged, preventing them from overcharging [31]. This load could be an electric heater used to heat a large body of water, a series of lightbulbs, an air heater or other resistive loads [31]. The main factor to keep in mind when selecting a dump load is that the load should be able to dissipate more power than is supplied by the source [31].

3 Design Methodology

The key steps taken to generate the following designs included preliminary calculations and research of existing waterwheels and Ferris wheels. These calculations helped provide a basic understanding of the capabilities of the Nith River at the site of the waterwheel, while research of other wheel designs provided inspiration. With this base knowledge, research on possible materials, bucket designs, and power generation and utilization could be done. Modeling of the site and current wheel design completed using HEC-RAS and SolidWorks respectively, was also useful in the idea generation process. However, the most important resources used to narrow down the design alternatives were virtual meetings with members of the New Hamburg Board of Trade and other professionals, such as engineers and tradespeople, who were involved in the construction/maintenance of the original wheel and/or are involved in the current revamping of Scott Park, where the wheel is located. Their input and knowledge were used to focus our creativity and research. A list of those consulted is provided in Appendix B.

3.1 Criteria Used to Evaluate the Design

During the February 5, 2021 meeting with select Board of Trade members, the criteria of the project was discussed and the importance of each criteria for the Board of Trade members was discussed. This allowed a general understanding of the direction that the members wish to proceed in with the design to be determined. The following criteria were kept in mind when determining which design options would be acceptable for the Board of Trade, as discussed in Sections 3.2, 3.3 and 3.4.

The most important criterion to the Board of Trade was the aesthetic appeal of the design. The waterwheel is a landmark in New Hamburg and ties into many other areas such as the downtown. Additionally, events such as weddings take place at the waterwheel and the park is frequently visited by townspeople and tourists, further showing the importance of aesthetics. Since this decision is of such importance, it is imperative to determine if the design should feature a modern or historic design. When assigning a rating to each design option, the comments received from the Board of Trade were taken into consideration. Therefore, a design which received positive feedback was assigned a high weighting while a design that did not receive favorable feedback was assigned a low weighting.

Additionally, the upfront cost of the project is of relative importance to the Board of Trade. Although no specific budget for the project has been provided, the New Hamburg Board of Trade have specified that they will be relying heavily on donations from the community to build the new structure. Since the waterwheel is large, any material orders will likely be specialty orders. Therefore, material selection will be very important when determining the optimal design since most of the cost lies there. During the ranking process, designs that had a high cost received a low weighting while those with a low overall cost were assigned a high weighting.

Another aspect of value to the New Hamburg Board of Trade is the amount of maintenance required over the lifetime of the waterwheel. As previously mentioned, the waterwheel will be built using donations from the community. Therefore, it is important for annual costs to be kept to a minimum. To analyze the effect of maintenance, it has been broken into three parts: frequency of maintenance, cost of maintenance, and the ease of performing the maintenance. Analyzing these three areas will allow for the design team and the Board of Trade to gain an understanding of the cost of possible maintenance as well as the complexity. Designs which require frequent and costly maintenance will be assigned a low weighting while those with minimal maintenance requirements will be awarded a high weighting.

New Hamburg is prone to cold winters and springtime flooding. Therefore, an important consideration for the design is the ability of the material to resist ice buildup as well as flood conditions. One of the reasons

the previous design failed after 30 years was the inability of the wood to be continuously wet and submerged when the river flooded. When assigning weight factors, designs that will be minimally affected by ice buildup as well as severe flooding will receive a high rating.

The previous design of the New Hamburg Waterwheel lasted for 30 years. Since the waterwheel is a symbol of New Hamburg, it is important that it lasts for a long period of time, allowing it to become a prominent landmark that brings tourists to the area. Based on discussions with Board of Trade members, the ideal life of the structure is 50 years or more. Designs that are predicted to last over 50 years will receive a high rating while designs with uncertain lifespans will receive a low rating.

Another important factor is the complexity of the design. As complexity increases, the number of consulting parties involved increases which can result in longer construction/installation time due to logistics and increased costs from consultants. The weighting of each design will be compared against the complexity of the current design as well as designs that are currently used in industry when building waterwheels or Ferris Wheels. A complex design is one that requires various tradespeople, engineers and equipment and thus designs that involve these parties will receive a low rating.

Finally, a criterion that will be kept in mind when selecting materials and designs is the environmental impact of the design. It was requested by the Board of Trade that considerations be made, where economically possible, to choose an option that has the lowest carbon footprint. To accommodate this, a Life Cycle Analysis (LCA) of each design option will be performed before determining the optimal design.

3.2 Constraints, Criteria and Assumptions

The criteria mentioned in Section 3.1 above is summarized in Table 3-1. They were shaped by meetings with shareholders and knowledge of general design principles.

Table 3-1: Constraints and Criteria

Constraints	Criteria
<ul style="list-style-type: none"> Use existing concrete channel and steel support columns 	<ul style="list-style-type: none"> Minimize cost of new design.
<ul style="list-style-type: none"> Stay within Grand River Conservation Authority (GRCA) and Kitchener-Wilmot hydro guidelines [34] [35] [36]. 	<ul style="list-style-type: none"> Minimize maintenance and related costs.
<ul style="list-style-type: none"> Must be able to withstand flooding conditions (water level at 20 ft above the bottom of the pit). 	<ul style="list-style-type: none"> Ensure the new design is aesthetically pleasing and retains the wheel's historical significance for the town.
<ul style="list-style-type: none"> Must be able to withstand impact of ice floes and ice buildup on the wheel. 	<ul style="list-style-type: none"> Minimize environmental impact.
<ul style="list-style-type: none"> Must have a wheel height of at least 50ft to retain title of North America's largest waterwheel and preserve the previous wheel's legacy [8]. 	
<ul style="list-style-type: none"> Must not interfere with the operation of the fish ladder. 	
<ul style="list-style-type: none"> Must have a minimum design life span of 50 years. 	
<ul style="list-style-type: none"> Must have the ability to be retrofitted for power generation. 	

3.3 Design Ideas: Waterwheel

In the initial design phase, three designs were prepared. These designs differed in aesthetics and materials, allowing for a wide variety of options to be conveyed to the Board of Trade. These initial designs were presented to the Board of Trade to ensure that they made an informed decision as well as one that they will be content with for years to come. After receiving feedback on the direction, they wanted to proceed in, the design team was able to focus their efforts and finalize the design.

3.3.1 Design 1: Revamped Original Design

The first design which was presented to the Board of Trade was a wheel based on the design of the current waterwheel, with substituted materials. This option was simple in concept but allowed for the aesthetics of the old wheel to be matched perfectly. This design would match the construction of the old wheel with minor changes based on lessons learned from the previous construction, such as extra material left between connections and a different material than wood being used. Instead of wood, the main structural posts would be made from with 8” metal square tubing with the bracing posts being made from either cables or rectangular tubing. Figure 3-1 shows a model of the original wheel which, when made of metal, would illustrate the revamped original design idea.

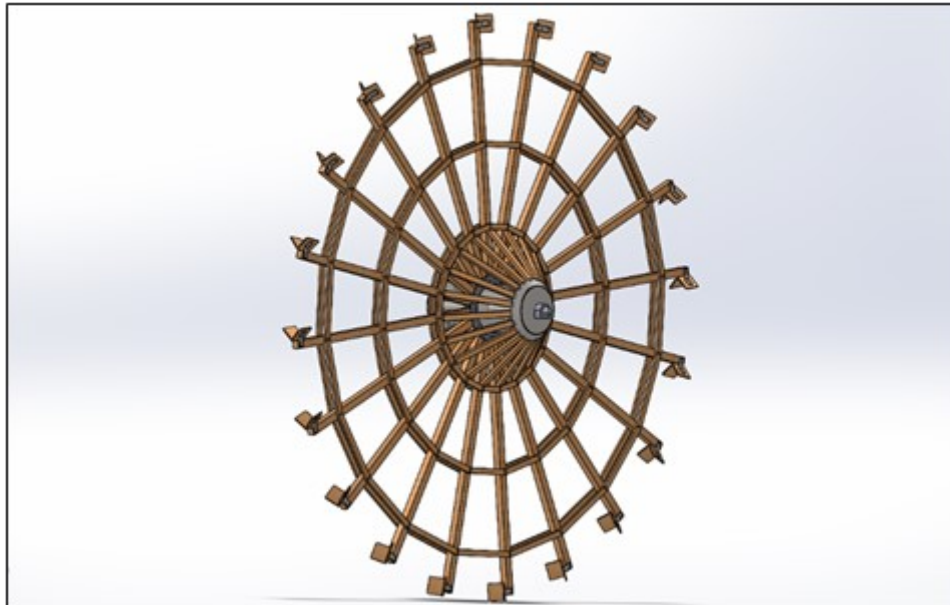


Figure 3-1: Original Waterwheel Design

After evaluating the criteria, this design was not chosen despite its aesthetic appeal since it would likely not be feasible in practice. If metal were used in this design instead of wood, the weight of the structure would increase drastically, likely resulting in the wheel being unable to turn given the power available in the water. Further, the amount and size of the metal required for this design would be very expensive to purchase and install.

3.3.2 Design 2: Cable/Bike Tire Design

The second design that was presented to the Board of Trade resembles a bicycle wheel with tensioned metal cables for spokes and a continuous rim. This design is common in larger Ferris wheels as it helps to minimize the weight of the wheels structure. This would aid in the power generation application since the wheel would be able reach its maximum speed quicker and have less frictional losses. Additionally, this design has high structural integrity because the cable spokes keep the rim in compression [20]. This design can be seen in Figure 3-2 below.

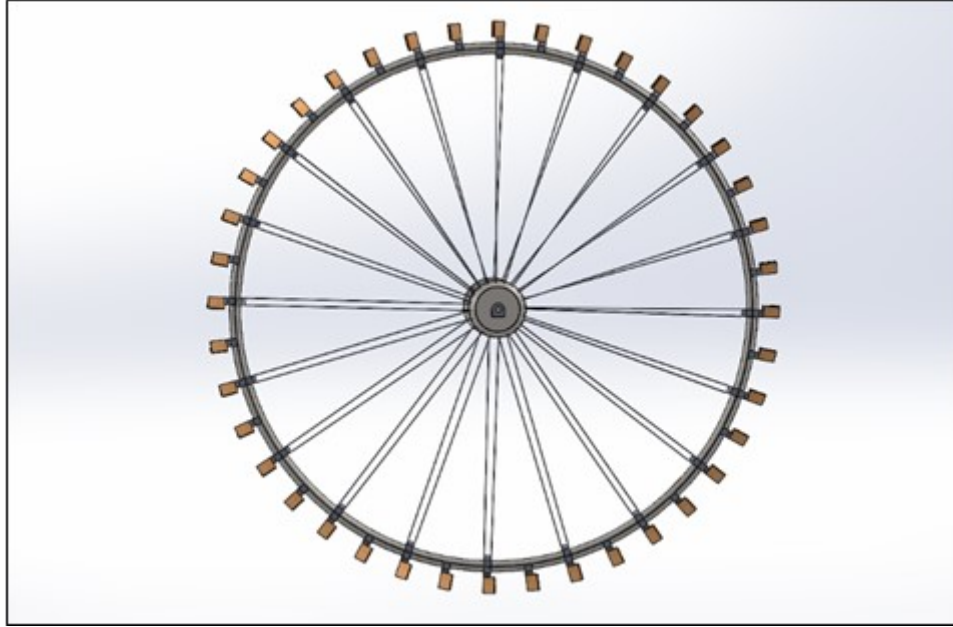


Figure 3-2: Cable/Bike Tire Design

Originally, the design team favored this option since it provided the greatest weight reduction and strength properties. However, through discussions with the Board of Trade, it was determined that the aesthetic of this design strayed too far from that of the original wheel. Also, the reduced weight would cause the rotational speed to be less consistent due to decreased moment of inertia.

3.3.3 Design 3: The Angled Truss Design

The final design that was presented to the Board of Trade, shown in Figure 3-3, was a truss and cable design that was designed to resemble the profile of the previous wheel. Through researching waterwheels and Ferris wheels, it was noticed that a truss design was commonly used. This design is an effective method of creating a structurally sound design while also keeping costs low. The initial design used 2” square tubing as the main structure of the wheel, with the addition of cables between the beams for extra support. It also only had one support ring around the exterior and did not include the steeper angled inner cage connected to the thinner truss sections. This was later changed when the Board of Trade made it clear that they wanted some elements of the previous wheel to be present in the new design. To accommodate their opinion, the angle in the truss design and three support rings were added to better resemble the profile and appearance of the current wheel design.

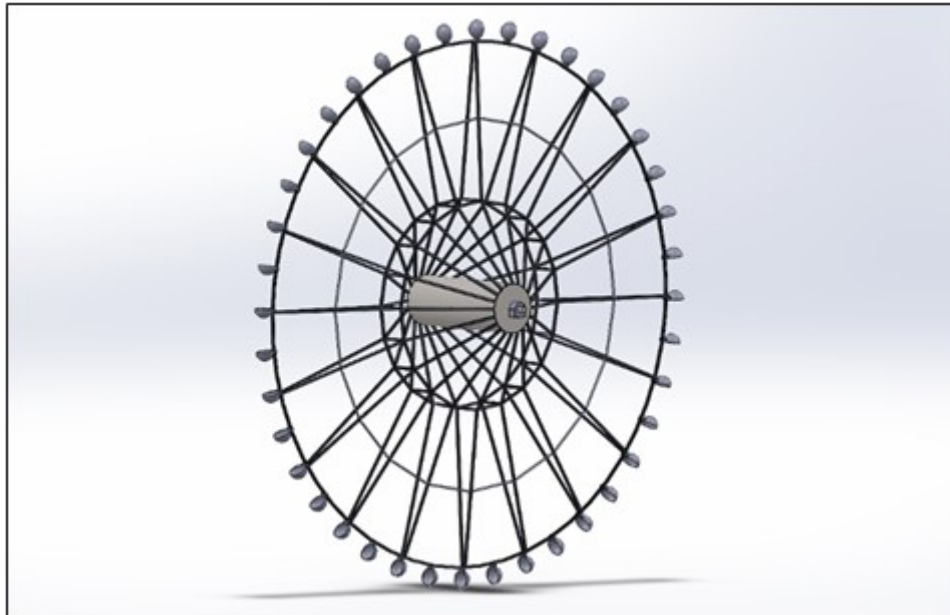


Figure 3-3: Angled Truss Design

When this design was brought to the executive members of the Board of Trade, this was the concept that was chosen to be pursued for the final design. The deciding factor was its aesthetic similarity to the existing wheel, as well as its simple and robust construction. After this option was selected, it was further refined. The refinements are discussed in Section 3.5.

3.4 Design Ideas: Buckets

A waterwheel with the specifications of the New Hamburg waterwheel (i.e. 50ft tall, low head, etc.) is not usually used to produce hydropower. However, as power generation was a key design criterion, ways in which the speed of the wheel could be optimized were considered. One idea was to model the waterwheel's buckets after those on a Pelton wheel, a type of impulse turbine which was discussed in detail in Section 2.5. The elements of a Pelton wheel bucket that were incorporated into the new waterwheel's bucket design were the splitter and the angled sides. The splitter in the middle of the bucket and the angled sides work together to capture the energy of the water jet. The splitter splits the water jet into two streams which then flow along the inside of the bucket and exit at the same angle as that of the bucket's sides, as seen in Figure 3-4. This change in direction of the water's momentum creates a torque which rotates the wheel [26]. The larger the change in momentum, the larger the torque and, subsequently, the faster the wheel spins [25]. This bucket design should be more efficient than the original wheel's buckets because the splitter minimizes any splash back into the line of the water jet and forces the water to exit the bucket at a more optimal angle for energy capture. The most optimal exit angle for the buckets would be 180° , however that is not practical and thus an angle of 165° is most commonly used in industry, as can be seen in Figure 3-4 below [25].

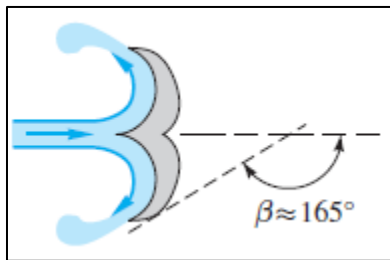


Figure 3-4: Top View of a Pelton Wheel Bucket [25]

With the Pelton bucket in mind, three possible bucket designs have been researched: a cast bucket, a formed bucket, and a bucket fabricated out of pipe.

The first design idea very closely resembled a Pelton wheel bucket with a rounded underside and a cut-out at the leading edge. This design was formulated with a casting fabrication process in mind. After speaking with a representative from Iron Bridge Fabrication, a bucket design that would lend itself more easily to a forming process was a valid option as well. It was suggested that the buckets be formed out of stainless-steel sheet metal. This is not something that Iron Bridge can perform in house, but they specified they have contacts who could perform the job [37].

3.4.1.1 Cast Bucket

The casted bucket, shown in Figure 3-5, appears very similar to a Pelton wheel bucket. The main difference is the lack of cut-out at the front lip of the bucket. This was removed because it was deemed to be unnecessary since its purpose on a Pelton wheel bucket is to reduce interference of the water jet caused by the buckets being so close together. The new waterwheel design proposes only 20 buckets spread out along the circumference of the wheel (approximately equal to 157 ft) and thus there would be no chance of interference occurring.

The optimal thickness of the bucket walls for castability is $3/8''$ and the splitter should be not less than $1/8''$ thick [38]. Representatives from Alloy Casting suggest casting it from stainless steel and then performing a smoothing process to remove the gritty texture left after casting. On normal Pelton wheels, only the surfaces exposed to the water jet are smoothed to reduce costs however, the entire bucket would likely need to be smoothed to reduce the chance of algae buildup on the back of the buckets. Stainless steel was suggested because of its good corrosion and erosion resistance, and a smooth finish will allow for the water

to flow out of the bucket better and reduce potential algae growth [38]. During the smoothing process, the splitter could also be thinned down from the width that was cast to that of what was in the original drawing to ensure a successful casting process [38].

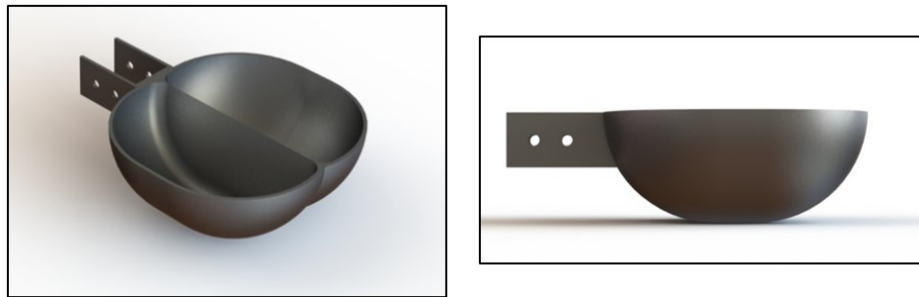


Figure 3-5: Cast Bucket – Isometric and Side View

3.4.1.2 Formed Bucket

Like the cast bucket, this design also does not include a cut-out. Additionally, this bucket strays from the traditional Pelton bucket look as it consists of a flat bottom and back, and a flat angled front and sides. These simplifications were made to allow for it to be fabricated using a forming process. The main part of the bucket can be formed out of a sheet of stainless steel using a press that will angle the sides at the desired angle of 165° . After forming, a folded and shaped piece of sheet metal could be welded onto the center of the bucket to create the splitter. A 3D model rendering of this bucket can be seen in Figure 3-6. This design is the one that is currently shown on the final 3D model of the proposed new wheel and has been discussed with Iron Bridge. Iron Bridge does not do forming in house, however they have many contacts whom they could contract the job out to [37].

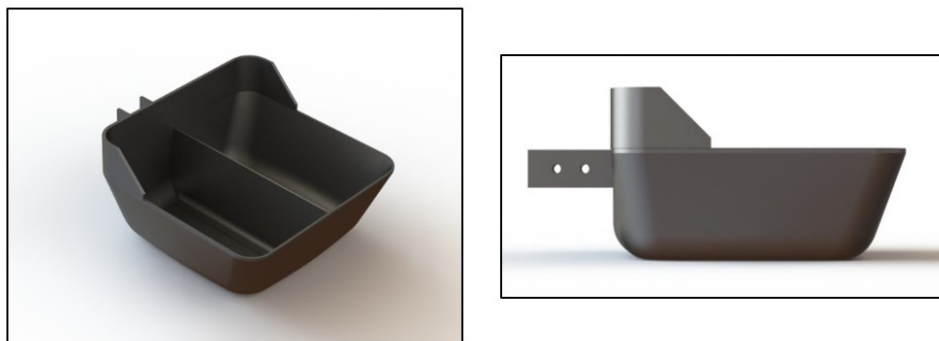


Figure 3-6: Formed Bucket - Isometric and Side View

3.4.1.3 Pipe Bucket

A potentially cheaper option for the buckets is to fabricate them out of a pipe that has been cut in half and welded together side by side. The rounded bottom, curved sides and splitter would imitate the look of a Pelton wheel bucket. This design is illustrated in Figure 3-7. Canadian Hydro Components, a manufacturer near Ottawa, has suggested using an 8" thin-walled steel pipe with an epoxy coating [39]. This bucket design could also be made from aluminum or stainless steel if desired. The epoxy coating is available in several colours and would increase the life of the buckets as well as require no maintenance. A link to more information on the epoxy coating can be found in Appendix C.

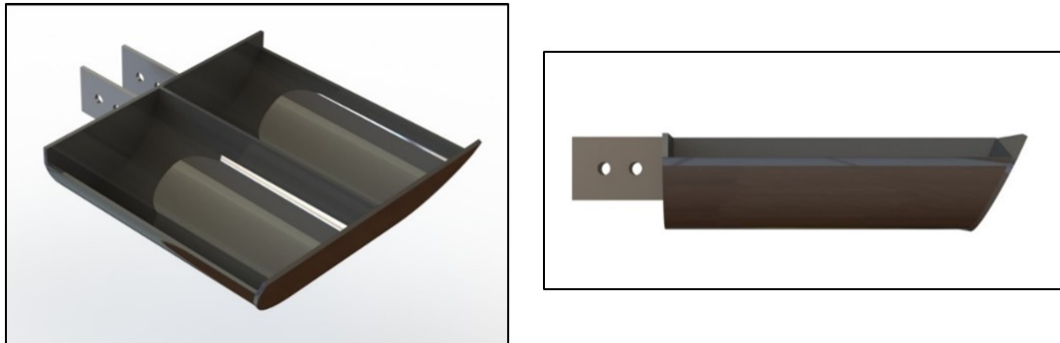


Figure 3-7: Pipe Bucket – Isometric and Side View

The proposed attachment method for all bucket designs is two parallel plates that will slide inside the 3x3" tube that connects each bucket to the rest of the wheel. Holes through the plates will line up with holes in the tube to allow for a bolt connection.

Using the formulas shown in Figure 2-5 in Section 2.5, the cast and formed bucket were both made to be 15.6" wide, 5.4" deep, and 14.4" from front to back. These values are based on an assumed jet diameter of 6". The pipe bucket also has a front to back length of 14.4" but has a width of 16.47" and depth of 3". These differences are because the model is based on the dimensions of an 8", 20 schedule steel pipe and the pipe halves would need to be cut on one side at the point where a line tangent to the pipe is at an angle of 165° to the centre plane of that half. The leading edge has been modeled to be at an angle of 25°. SolidWorks models and 2D drawings for each bucket are included with the supplementary files that have been provided to the Board of Trade.

3.5 Design Ideas: Power Generation

To determine the optimal method to generate power using the waterwheel, two main power generation options were investigated: an inline turbine which would be mounted inside the penstock leading to the waterwheel and a generator mounted to the side of the waterwheel that utilizes a gearbox to increase the rotational speed so that it is in a usable range for a generator.

The utilization of an inline turbine originally appeared to be the ideal model as the turbine could be easily mounted inside the existing penstock, minimizing unwanted equipment which would be visible to parkgoers and detract from the aesthetic appeal of the park. Additionally, because the turbine is mounted inside the pipe, the flow would be relatively constant, allowing for the electricity that was generated to be constant. Implementation of this component in the system would also be relatively simple since most inline units come with a built-in generator. Despite all these positive aspects to implementing an inline turbine on site, there were two main concerns. The first concern was that the available head left for the waterwheel after the turbine would be too small to allow for the wheel to turn, and the second was that a unit that could

accommodate the small pressure head may not exist and therefore is not available for purchase. To have the best chance of maintaining enough power to turn the waterwheel, it was determined that this system would have to have two pipes, one which went to the waterwheel and the other which went to the turbine. This would allow the pressure head to be maintained across the two pipes, allowing for the greatest amount of power to be transferred to both the turbine and the waterwheel. An additional idea that was brought up was the option of switching the flow between the turbine and the waterwheel. In this option, during daytime hours, when the park is most often visited, all the water in the pipe would be directed to the waterwheel. At night, the flow would be changed from the waterwheel to the turbine. This would result in the waterwheel not turning at night but allow for the greatest amount of power to be generated from the turbine. Upon further investigation of the available products on the market, it was determined there are no options that would be able to generate power using the available head on site, making this option infeasible.

The alternative of using a gearbox and generator to generate power was then investigated. This option was composed of two sections: generator selection and gearbox design. Since an inline turbine was not feasible, two types of generators were considered, a low RPM AC permanent magnet generator and a low RPM DC permanent magnet generator. A low RPM option was selected since the initial RPM of the wheel is very low. Most commercial generators rotate at over 1200 RPM, which would not be easily attainable given the low rotational speed of the waterwheel. The benefit of using an AC generator is that the power generated could be sent directly from the generator to the grid or load. Additionally, low RPM AC generators are more common than low RPM DC generators, making purchasing a generator easier. When the feasibility of this option was discussed with a local generator manufacturer, it was determined that the varying RPM of the waterwheel would prevent the waterwheel from producing clean (usable) power. The manufacturer recommended that the optimal option for this application would be a DC low RPM permanent magnet generator. Using a low RPM DC generator would allow for the generated power to be routed to a battery bank for storage and when needed, be fed through an inverter which would produce clean AC power.

Through observing videos taken of the current waterwheel turning when the penstock was completely open, it was determined that the operating speed of the wheel was approximately 2 RPM. Originally, it was assumed that a premade gearbox could be used to minimize cost and manufacturing time. Most generators operate at thousands of RPMs, meaning that the required gearbox would have to step the speed up from 2 RPM to approximately 1500 RPM. Most generators available for purchase are not able to step up speed this much. Therefore, it was determined that a custom gearbox would be optimal for this application as it would allow for the exact gear ratio to be obtained. However, when the options of having the gears manufactured and buying off-the-shelf gears was researched, it became apparent that the cost of manufacturing custom gears would be too great and that buying pre-made gears would be optimal.

4 Proposed Design

The final structural design with bolted and welded connection options, as well as three potential bucket designs, has been proposed along with additional add-on features, such as power generation and a locking mechanism. SolidWorks was used as the main modeling software for creating design concepts and models. In addition, SolidWorks was used to check calculations for object properties such as weight and moment of inertia. To ensure the design was structurally sound, ANSYS Static Structural was used to generate a finite element model and assess all forces acting on the structure.

4.1 Waterwheel Structures

The current proposed design for the wheels structure is heavily based off the angled truss design introduced in Section 3.2. Some modifications were made to the initial design to cut down on excess cost, implement realistic assembly options and implement ideas and concerns that were brought forward by the Board of Trade. The final isometric view of the waterwheel can be seen in Figure 4-1 and each individual component is discussed further in the following sections. The SolidWorks model and 2D drawings for the wheel and components have been provided in the Supplementary Files folder accompanying this report.

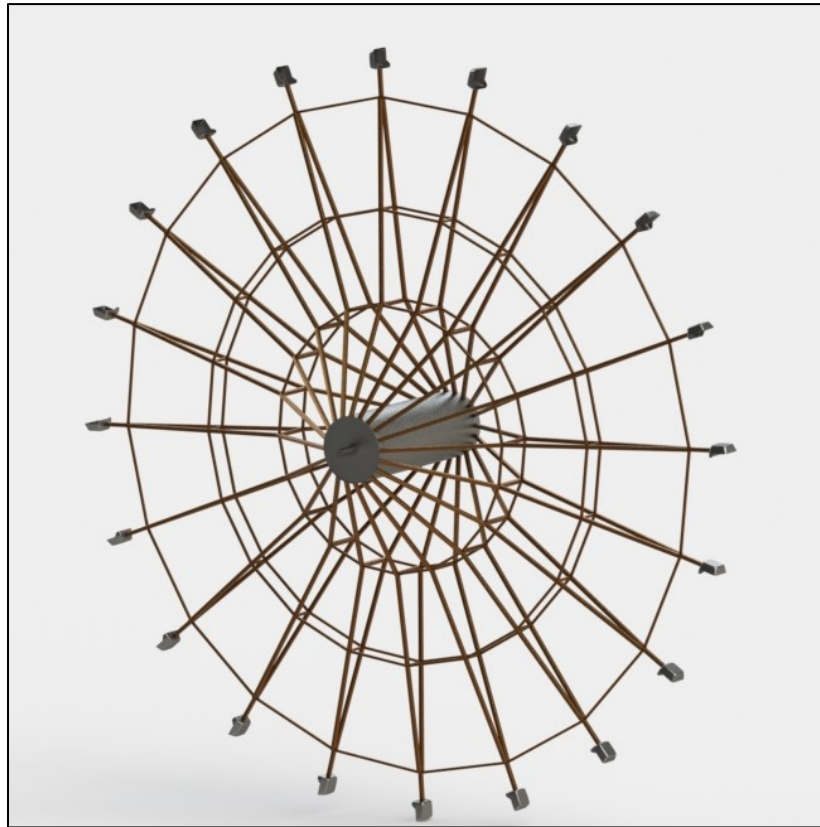


Figure 4-1: Proposed Design with Stainless Steel Hub

4.1.1 The Hub

The new hub of the wheel is almost the same as the hub of the current wheel. This was done to maintain some of the current wheel's aesthetic in the new design, and because the current hub design has been proven to provide adequate support for the wheel. Changes to the design include removing the bolted connection rings previously used to attach the 8x8" spokes to the hub, as well as changing the material of the hub to Corten or stainless steel. The decision to change the material of the hub is mainly an aesthetic one. It was

originally planned to have the hub entirely made from Corten, however the contrasting aesthetics between the Corten frame and stainless-steel hub and buckets is also pleasing to the eye. As this is mainly an aesthetic decision, both the stainless steel and Corten options have been shown in the proposed design, as can be seen in Figure 4-1 and Figure 4-2, respectively. Furthermore, if stainless steel is used in the final design, the difference in material properties will have to be accounted for in the final structural analysis and the material cost of those components will increase from what they are currently estimated to be. Also, it should be noted that the Corten appearance used in most renderings of the waterwheel is intended to resemble Corten at the six month point of aging and that this color will darken over time. The full aging process of Corten can be seen in Figure 4-3 below [40].

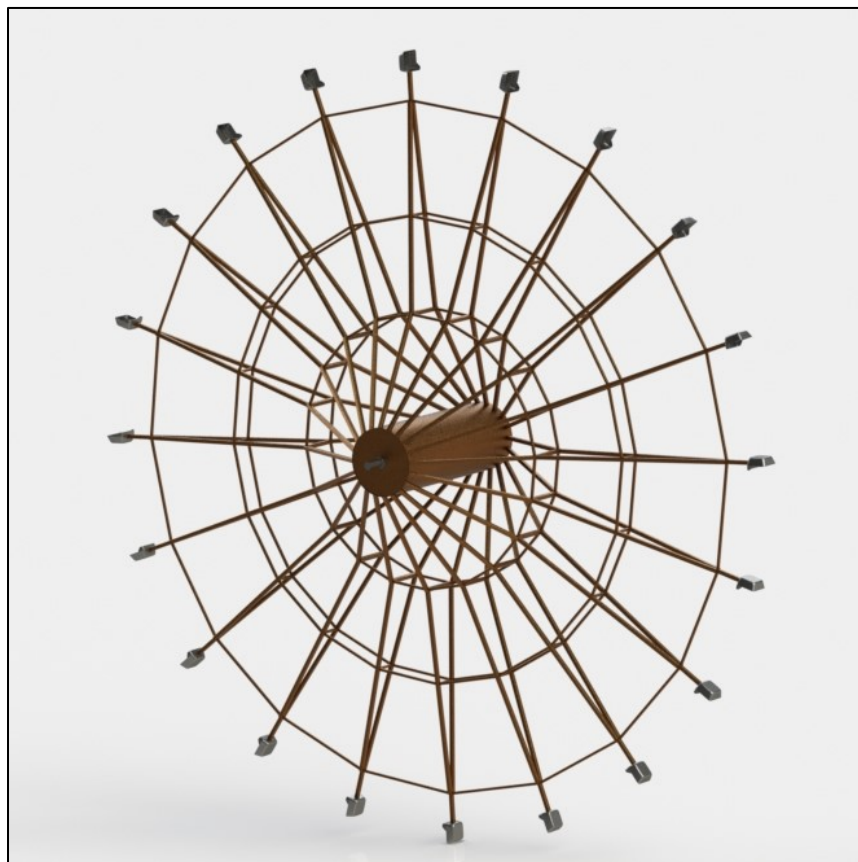


Figure 4-2: Proposed Design with Corten Hub

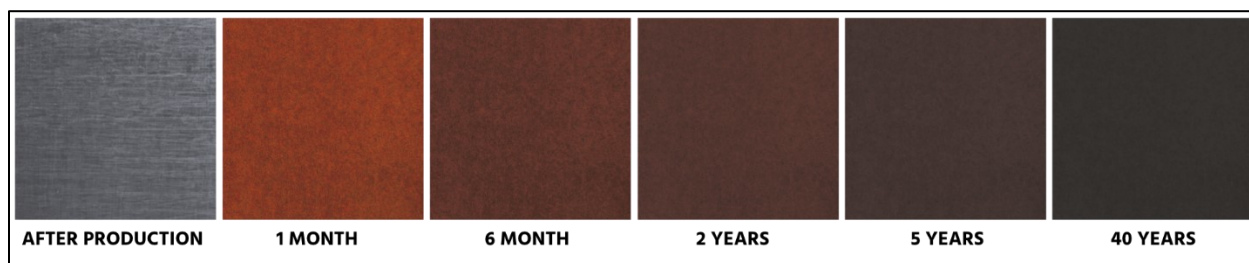


Figure 4-3: Aging Process of Corten

One consideration that was made regarding the hub was the thickness of the drum exterior. This component is made from a rolled and welded sheet of 3/8" steel. This thickness was required by the current wheel

because a significant portion of the wheels weight was held by the middle of the hub. However, the new proposed design has shifted this load to the ends of the hub, closer to the shaft end and bearings. By shifting this load, the moment on the shaft and stress on the hub have been decreased significantly. Additionally, the proposed design has successfully reached its goal of being lighter than the previous wheel. If additional weight reduction or cost reduction is desired, the gauge of the drum exterior could likely be reduced. If this thickness is reduced, the diameter of the support rings would need to be increased to match the new inner diameter of the drum. It is important to note that these loading cases have not been tested and a thorough analysis would need to be performed before proceeding with this modification.

4.1.2 Square Tube Truss Structure

The main frame of the new proposed design is the square tube truss structure. This structure is comprised of 20 identical spokes connected to each other through three rings of supports. The structural components used are 3/16" thick 3x3" and 2x2" square tubes. Originally 1/4" thick tube was considered however, this thickness resulted in the new wheel being heavier than the current wheel. On advice from Mercedes Mattes at Iron Bridge, to reduce the weight, material usage and cost, the more standard size of 3/16" was used. There are four main components of this spoke structure, the inner cage, the main truss spoke, the support rings, and the bucket connector section.

4.1.2.1 The Inner Cage

The inner cage is made from the base supports and base connector beams, both 3x3" tubes, as seen in Figure 4-4. The purpose of these supports is to direct the weight of the wheel to the edges of the hub as well as mimic the look of the previous wheel's support beams.

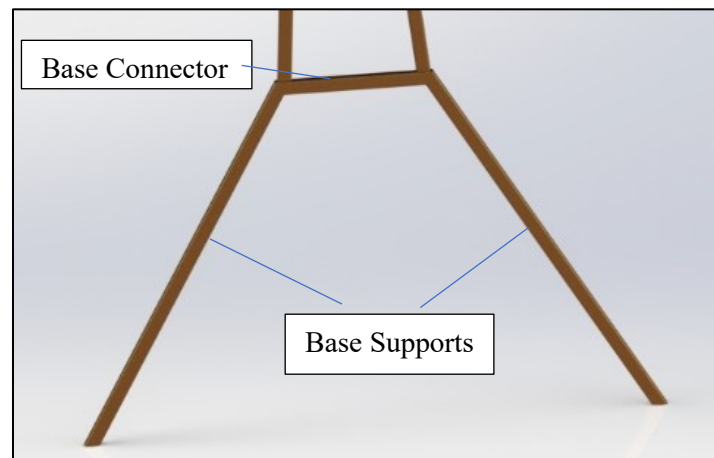


Figure 4-4: Inner Cage

4.1.2.2 The Main Truss Spokes

The main truss spokes are made from the main bars (3x3") and middle connector (2x2"), which can be seen in Figure 4-5. These are the main support for the truss structure and connect the inner cage to the bucket connector. In addition, the identical 20 large spokes duplicate the look of the spokes on the current wheel.

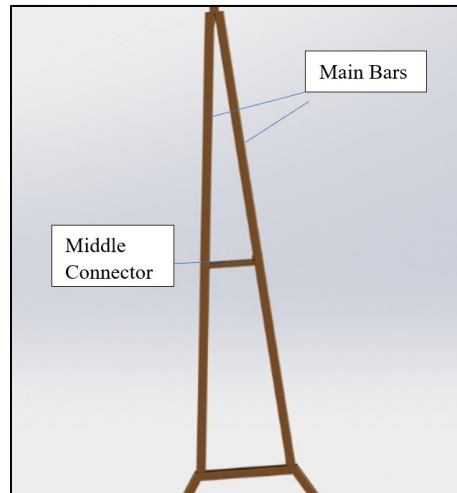


Figure 4-5: Truss Spoke

4.1.2.3 The Support Rings

Figure 4-6 shows the support rings, which consists of the central, middle, and outer rim bars, all 2x2" tubes. Their purpose is to connect the spokes and provide lateral support to the structure. The three concentric rings also copy the look of the three support rings on the current wheel. In the design explanation they are called rings as they appear circular from a distance though they are technically icosagons made from 20 identical connection beams.

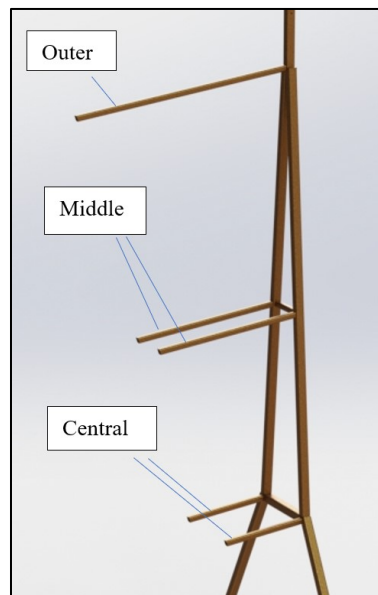


Figure 4-6: Support Rings

4.1.2.4 Bucket Connector

The bucket connector section is made from the bucket connector and endcap plate (see Figure 4-7). The purpose of this section is to connect the main truss spokes to the bucket and to act as the endcap for the truss spokes. Early designs had placed the buckets directly on the outer ring however by extending the bucket past the outer ring, material could be saved by making the rings and spokes smaller while still maintaining a diameter of 50 feet. This design also better matches the outline of the current wheel.

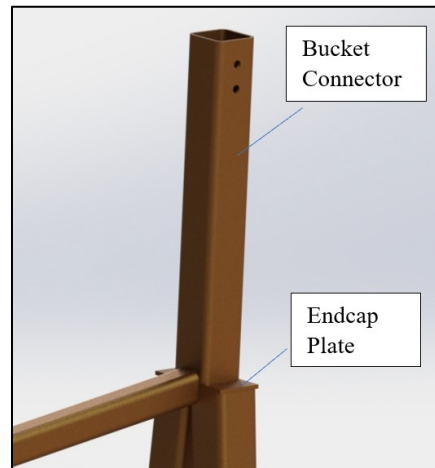


Figure 4-7: Bucket Connector Section

4.1.3 Connections

The component connections for the wheel are very important design considerations, both for the wheels structure and for assembly. The design team's expertise does not lie in manufacturing processes and as such, the final decisions for component fabrication and assembly will be left to the experts, however, recommendations and as much information as possible have been provided.

The hub (Figure 4-8) will likely be assembled entirely using welded connections. The most important consideration during the hub assembly is ensuring the shaft pipe and shaft ends are concentric. If this connection is slightly off it could introduce misalignment into the bearings, adding undue stress to the wheel's structure and shortening the life of the bearings.

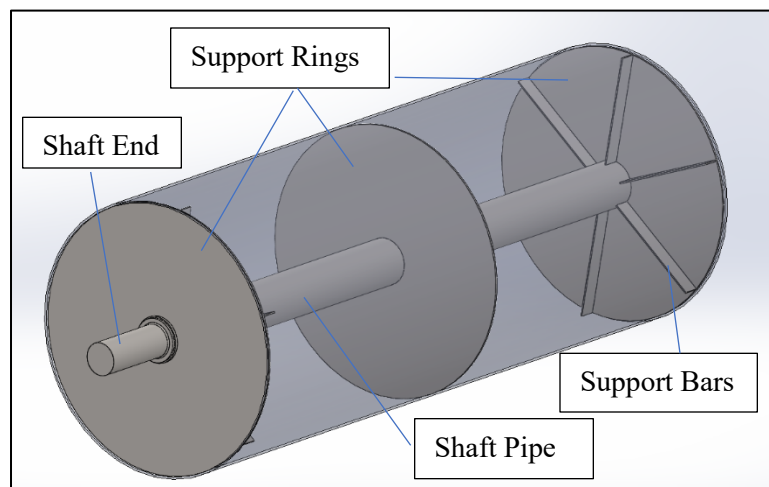


Figure 4-8: Hub with Transparent Drum Exterior

The connections for the rest of the structure were originally intended to all be welds. However, in meetings with the Board of Trade, interest in bolted connections was expressed since it offers easier assembly and part replacement, if necessary. Alternatively, in discussions with Iron Bridge, it was learned that cutting and replacing welded connections made from Corten is a common practice. As both welding and bolting are viable options, recommendations have been provided for both as one may be easier depending on the decided method of construction.

4.1.3.1 Hub Connection

The hub connection is a very important connection, as it attaches the main structure of the wheel to the hub and shaft, as seen in Figure 4-9 and Figure 4-10. A simple welded connection between the drum exterior and base support tubes allows for this connection, however, the angle of this weld is imperative as it determines the angle of the spoke. Achieving this level of precision may be accomplished by a jig set-up in a shop. However, if the wheel were to be assembled on site getting this angle correct would prove to be difficult. For this reason, a possible bolted connection involving two ¼" plates welded to the hub has been provided. This connection also has two bolt holes, allowing them to snugly fit onto the base support tubes as well as allow for the bolts to be properly located. Also, in the figures shown below, the connection plates are shown in grey to allowing them to stand out against the structure. In reality, these could be made from Corten to help them blend in or stainless steel to provide some contrast.

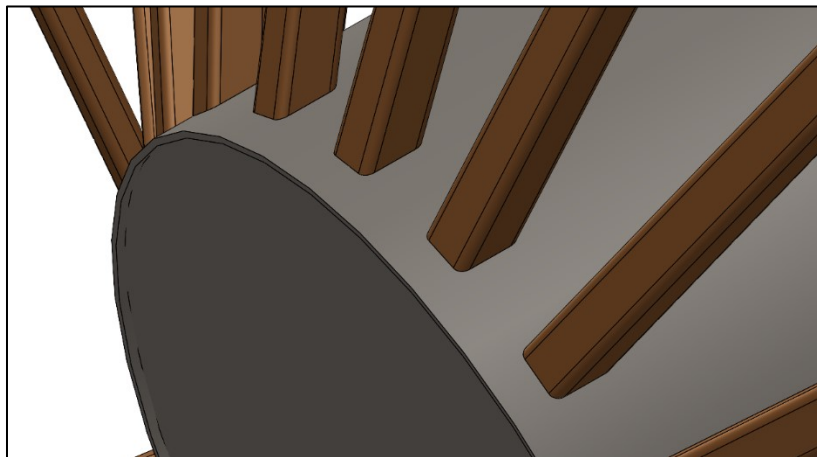


Figure 4-9: Hub Welded Connection

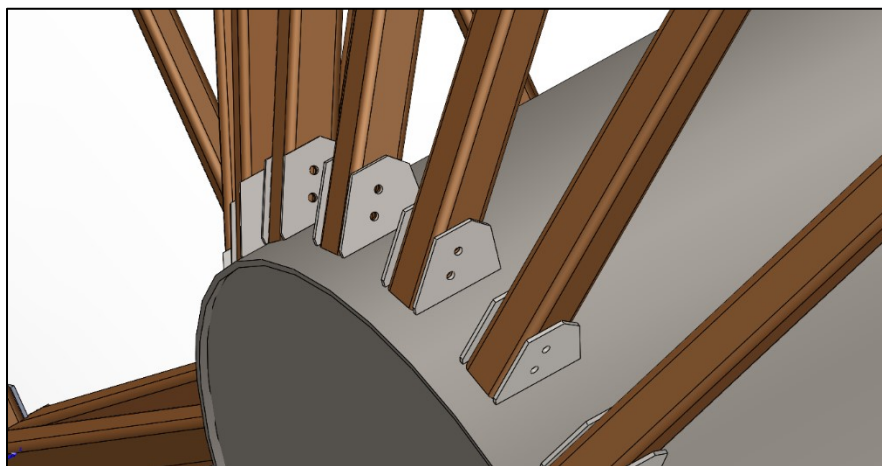


Figure 4-10: Hub Bolted Connection

4.1.3.2 Inner Cage Connection

The inner cage connection joins the inner cage to the truss spoke and the central ring, which is shown in Figure 4-11 and Figure 4-12. Permanently welding the truss spoke to the inner cage should have no negative structural effects over time. The central ring may also be welded to the inner cage, however, to provide more options for assembly a bolting option for this connection has also been shown. This bolted connection is similar to the hub connection, with two plates welded to the inner cage that hold the central rim bars in place.

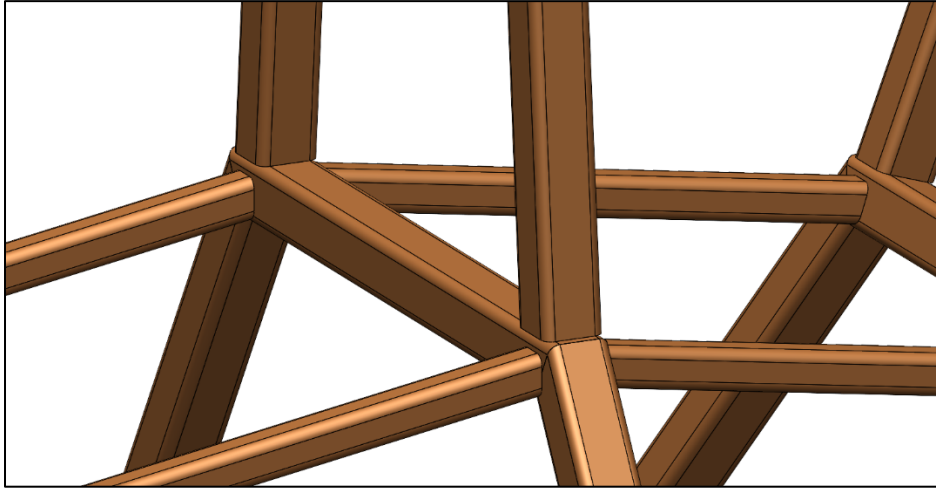


Figure 4-11: Inner Cage Welded Connection

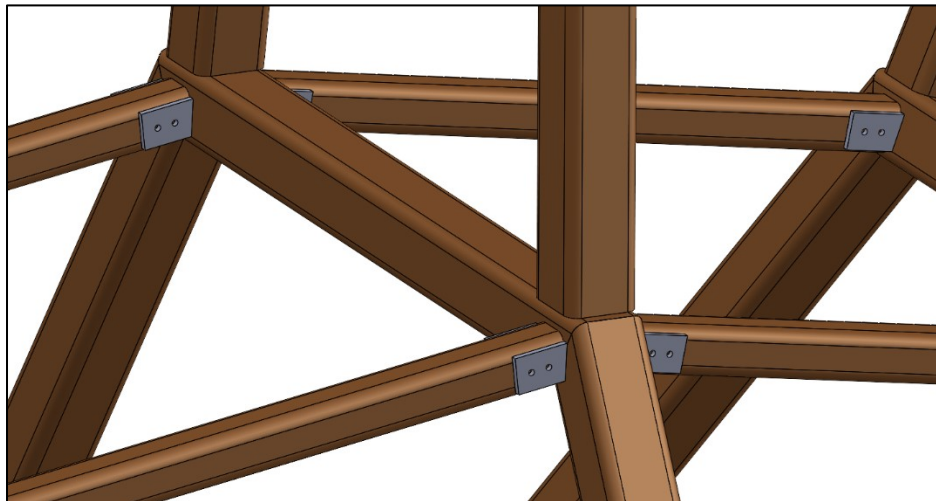


Figure 4-12: Inner Cage Bolted Connection

4.1.3.3 Middle Ring Connection

The middle ring connection attaches the main bars using the middle connector to form the truss spoke, and links the middle rim bars to the truss spoke. This configuration can be seen in detail in Figure 4-13 and Figure 4-14. The middle connector will likely have no issue being permanently connected to the main bars. The middle rim bars may also be welded, however, once again, an option for bolted connections has been shown to provide all options for assembly. The connection plates for this connection are almost identical to those from the central rim bars, though they are in a different orientation as they are attached to a vertical beam instead of a horizontal beam.

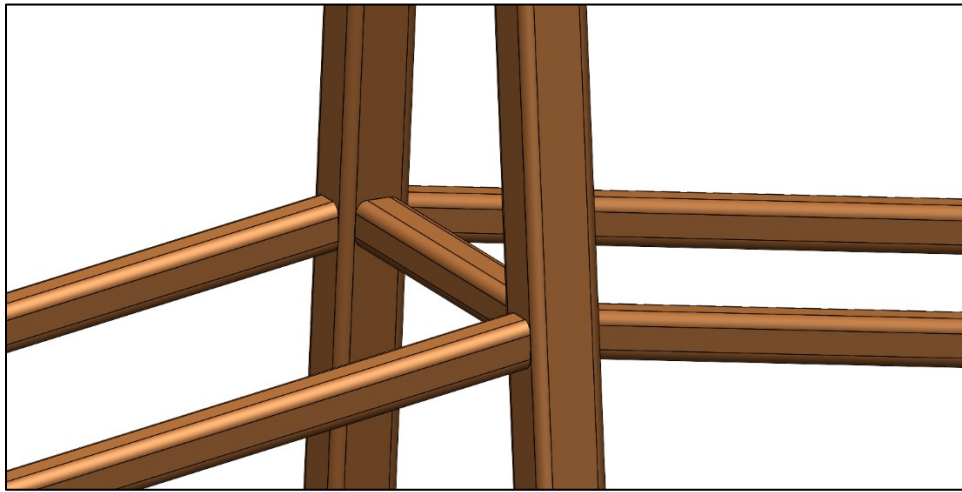


Figure 4-13: Middle Ring Welded Connection from Weldment Assembly

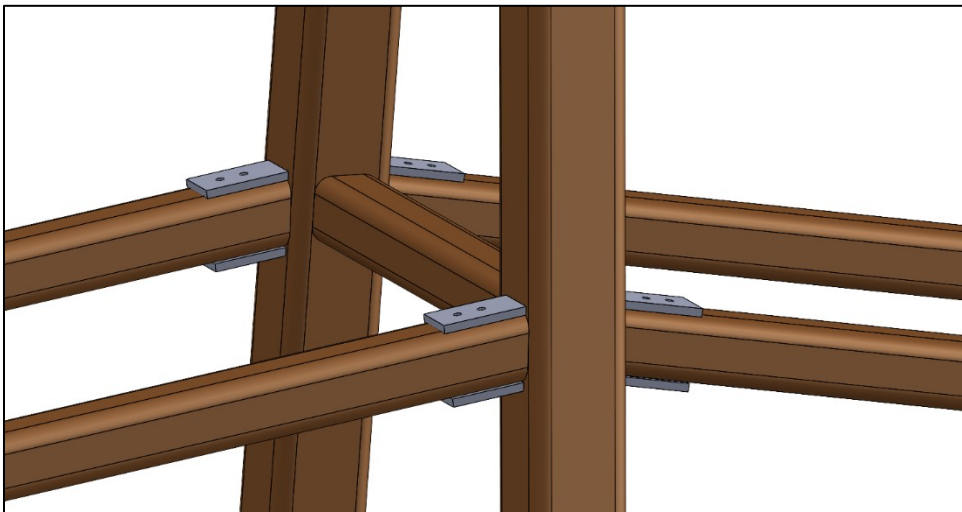


Figure 4-14: Middle Ring Bolted Connection from Full Assembly

4.1.3.4 Outer Ring Connection

The outer ring connection connects the truss spoke, bucket connector, and outer rim, as seen in Figure 4-15 and Figure 4-16. It is not expected that any issues will arise from the bucket connector being permanently welded to the truss spoke. The outer rim bars may also be welded, and as with previous connection options, a bolted connection has also been shown as an alternative. The connection plates for this joint are almost identical to those for the central rim bars. The only issue with this connection is that the section of the connector plates that goes above the endcap plate does not sit flush with the metal since it is close to the

rounded edge of the bucket connector tube. This could possibly be a welded connection, though if weld strength is a concern, the connector plate could be moved up or down the spoke to allow for the connection plates to be welded.

An additional recommendation for this joint involves the addition of a gusset between the outer rim bar and bucket connector tube. This addition would be beneficial if the weld strength on the endcap plate is a concern, although it is currently unlikely to be a concern. To fix the gusset in place, it would most likely need to be welded on. It is important to note that if a bolted connection were used in combination with a gusset, the gusset would likely prevent the outer rim bar from being easily removed.

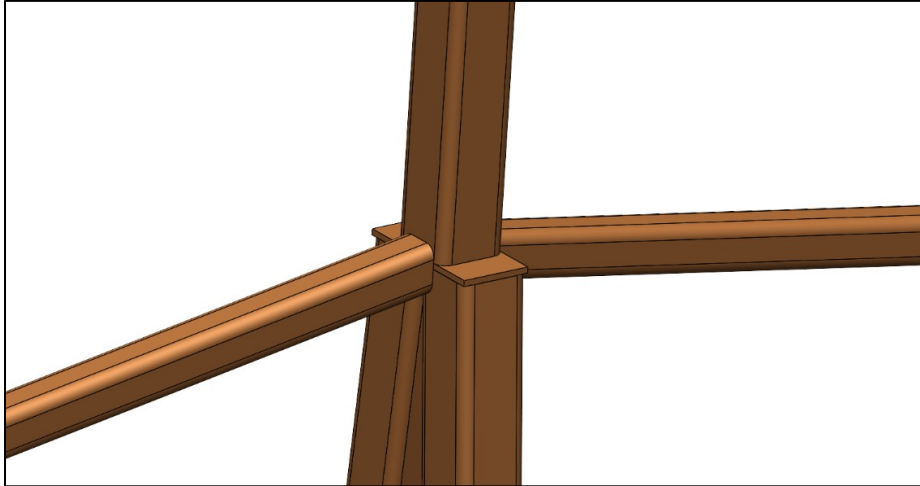


Figure 4-15: Outer Ring Welded Connection from Weldments Assembly

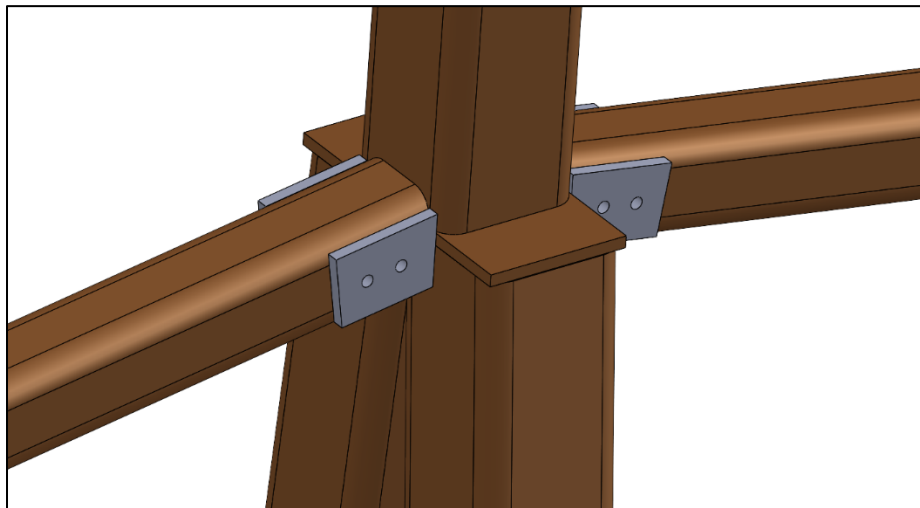


Figure 4-16: Outer Ring Bolted Connection from Full Assembly

4.1.3.5 Bucket Connection

The bucket connection is a bolted connection that allows for simple assembly and replacement or maintenance to be performed on the buckets. This connection can be seen in Figure 4-17. This joining method was accomplished using two small plates that are welded to the bucket and fit snugly inside the bucket connector tube. Two bolt holes secure them in place. It should be ensured that this is a snug connection, through the use of gaskets or washers to prevent water from getting inside the tube and causing corrosion.

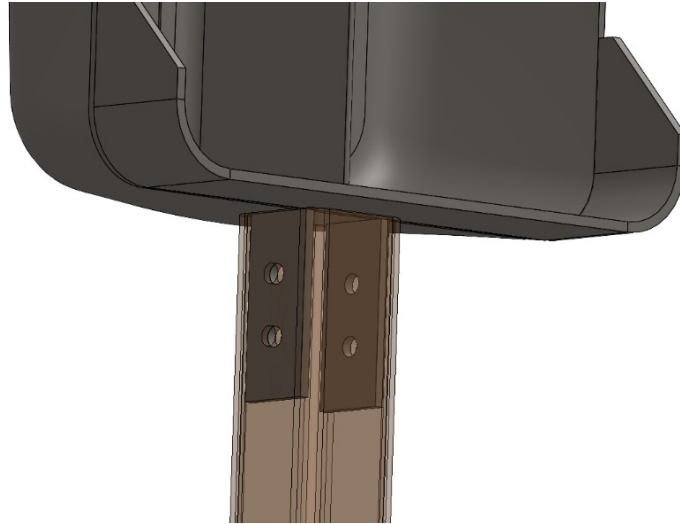


Figure 4-17: Bucket Connection from Full Assembly

4.1.4 Moving Forward

In the future, a detailed analysis on weld stress should be preformed for the welded connections as one has not been performed thus far. This will be required before the design can be finalized. Also, a bolt stress and tear out analysis should be performed on all bolted connections to determine the proper bolt sizing.

Additionally, at any point where dissimilar metals (chosen bolt material, stainless steel and Corten, etc.,) come into contact, the possibility for corrosion must be analysed. Galvanic corrosion is a process where one metal corrodes in the presence of another metal it is contacting through an electrolyte. Since the wheel is outside, rain and river water could create an environment conducive to this process if left alone. For this reason, when choosing a bolt material or the class of stainless steel, it must be chosen to have similar corrosion potential to Corten or a separator between the materials must be used.

4.1.5 Finite Element Analysis

Finite Element Analysis (FEA) is a powerful engineering tool that can be used to verify theoretical models and solve complex systems. A preliminary finite element analysis of the final proposed waterwheel design was performed using the Static Structural module in ANSYS Workbench 2020 R2. Unfortunately, the available license for the ANSYS Workbench software limits the number of elements or nodes that can be used in a model to approximately 500,000. To minimize the necessary number of nodes and elements, a plane of symmetry was added at the wheel's center of gravity in the plane of rotation. The resulting model can be seen in Figure 4-18.

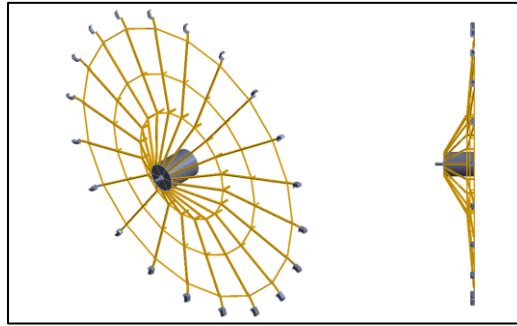


Figure 4-18: Isometric View (left) and Right View (right) of FEA Model in Static Structural

The primary issue that arose when meshing the model is the thickness of the metal used for the waterwheel structure. Since the square tubing is hollow, resulting in a larger surface area, many small elements are required to properly mesh the geometry; this produces fewer overall elements, but many nodes, which quickly causes the mesh to exceed the capabilities of the license. To simplify the model further, the buckets and bucket connections were removed from the model, reducing the number of nodes and elements to an acceptable level. Various components of the mesh were then refined based on the geometry to further optimize the mesh. The final meshed model can be seen in Figure 4-19; it contains 509,415 nodes and 103,840 elements.

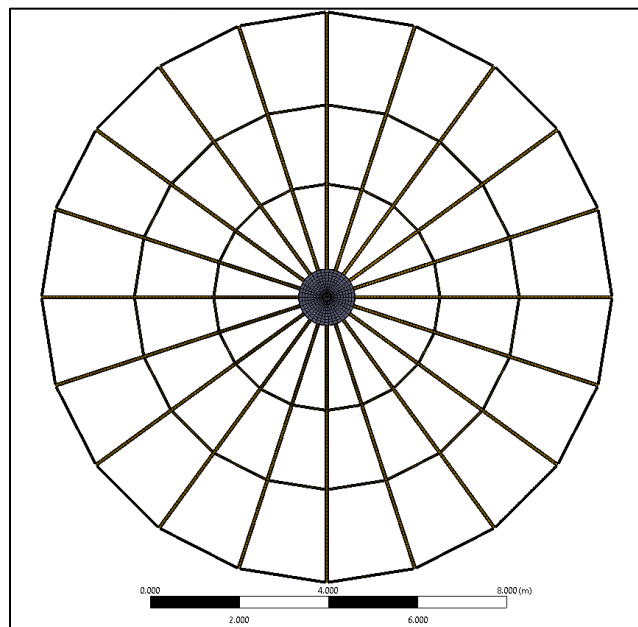


Figure 4-19: Meshed Model in ANSYS Static Structural

First, the model was tested under basic operating conditions, with only Standard Earth Gravity and Rotational Velocity acting on the wheel, with a Remote Force acting on the bottom bucket, to simulate the jet force. From this simulation, the Maximum Equivalent (Von-Mises) Stress on the wheel was seen to be 40.333 MPa. The tensile yield strength of Corten is 50 ksi (344.74 MPa), which is 8.5 times greater than the maximum stress calculated for this model [41]. The model set-up can be seen in Figure 4-20, and the points of Maximum and Minimum stress can be seen in Figure 4-21.

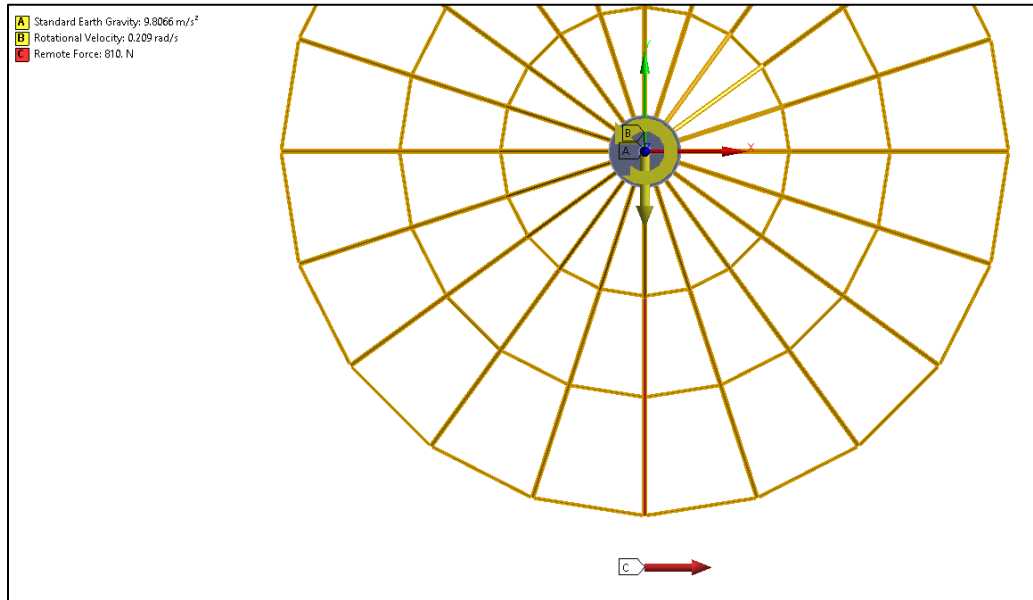


Figure 4-20: ANSYS Simulation 1; Standard Operating Conditions

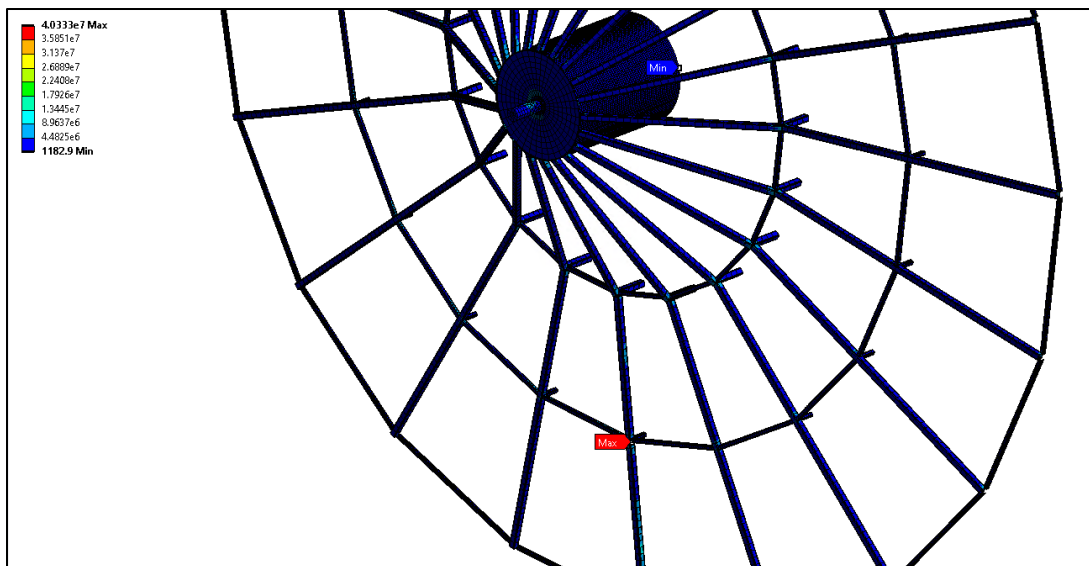


Figure 4-21: Points of Maximum and Minimum Stress during Normal Operating Conditions

The point of maximum stress was not located as expected. It is more likely for the maximum stress to occur at the end of the spoke since the end of the spoke has a longer moment arm. Upon further inspection, an unexpected stress concentration appears to be the cause of the increased stress. This stress concentration can be seen in Figure 4-22.

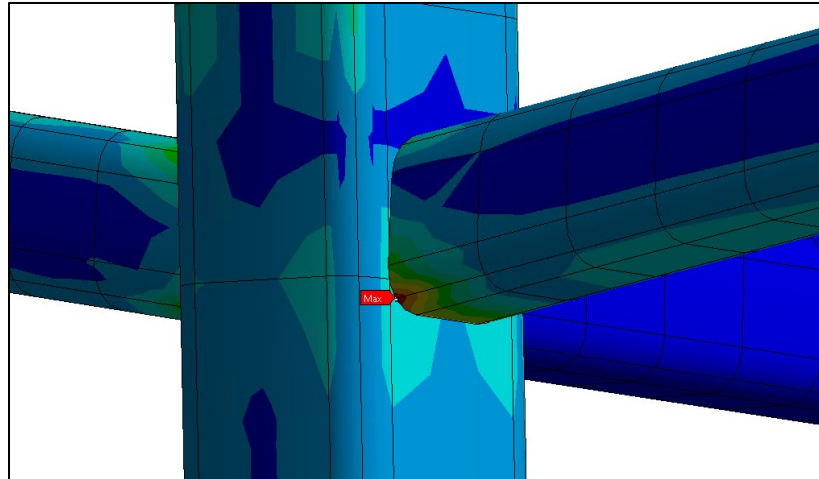


Figure 4-22: Point of Maximum Stress

This concentration is likely caused by the necessary coarseness of the mesh, and the welded connection. If an upgraded license were available, and the model was constructed to reflect the realistic bolted connections, this stress concentration may resolve itself.

After this simulation, a worst-case scenario simulation was run. This simulation included the previously mentioned forces, with the addition of strong winds (26.4 m/s) acting along the axis of rotation, and hydrostatic forces to simulate severe flooding conditions (approximately 5m of flooding) [42]. The wind speed was determined by referencing the National Building Code of Canada 2015 [42]. The building code provides hourly wind speeds for a variety of locations that have a 1 chance in 10 and 50 of being exceeded in any one year [42]. As the loading case is to determine the maximum force on the waterwheel, the 1 in 50 case was used. New Hamburg is a small town and unfortunately wind data that was specific to New Hamburg was not listed. Instead, wind data for Stratford and Kitchener was found and the higher of the two values, Stratford was used. It was assumed that these two cities would accurately represent the conditions seen in New Hamburg as they are the closest cities that had data lying east and west of New Hamburg. The flooding depth was determined based on a HEC-RAS model provided by the GRCA. This height approximately corresponds with a 100 year flood and the HEC-RAS model is available in the supplementary files provided to the Board of Trade. These additional forces can be seen in Figure 4-23.

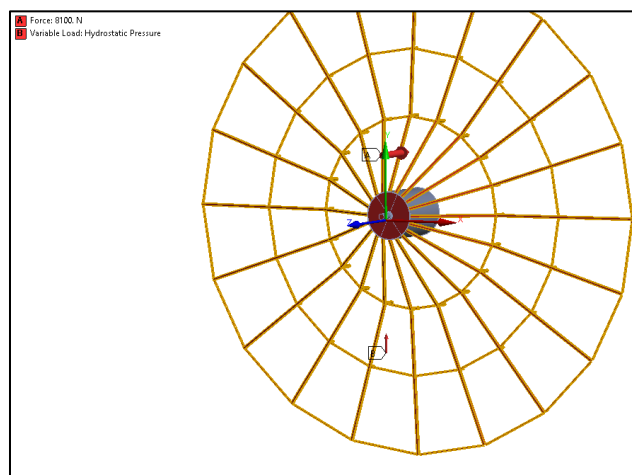


Figure 4-23: ANSYS Model with Wind and Hydrostatic Loading

In this severe-case model, the maximum stress was found to be 38.367 MPa, indicating a factor of safety of 9.0; the point of maximum stress can be seen in Figure 4-24.

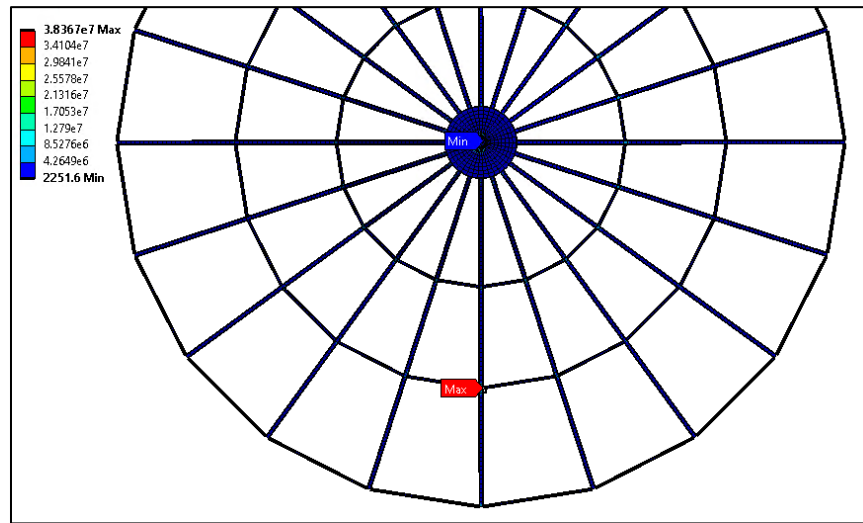


Figure 4-24: Maximum and Minimum Stresses for Severe Loading Case. Units in Pa

It is unreasonable for the maximum stress in this loading case to be lower than the maximum stress in the normal operating conditions, but the presence of unrealistic stress concentrations is likely the cause of the abnormal behaviour. These stress concentrations tend to mask the true points of maximum stress, which are important points to be aware of when designing a structure. To account for this, the scale was broadened, to highlight higher stresses across a larger range of values. Figure 4-25 uses this modified scale to indicate how the connection points have high stress during the severe loading conditions.

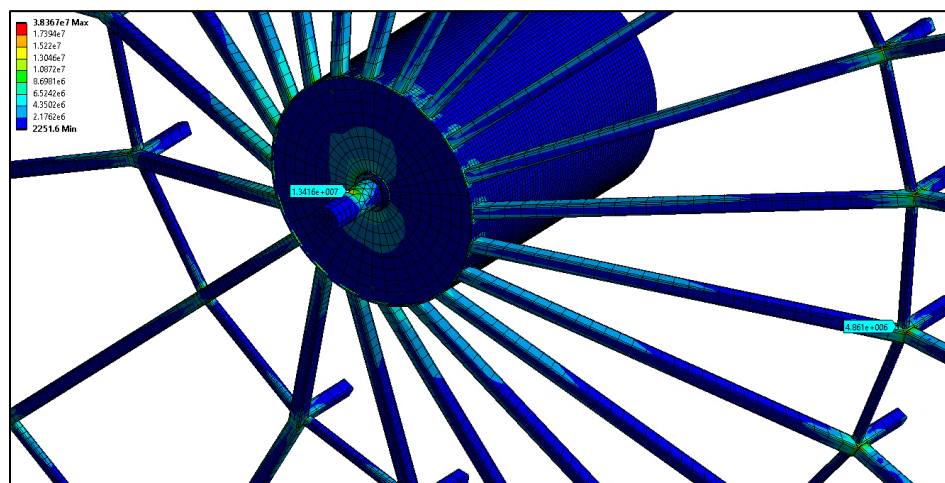


Figure 4-25: Actual Points of High Stress. Units in Pa

From the figure, the stress at the connection point is approximately 5 MPa, which leads to a safety factor of approximately 70.

Figure 4-26 uses the same scale to indicate areas of higher stress on the shaft, near the bearing, and within the hub. The support ring has been removed in this image to provide a view into the hub.

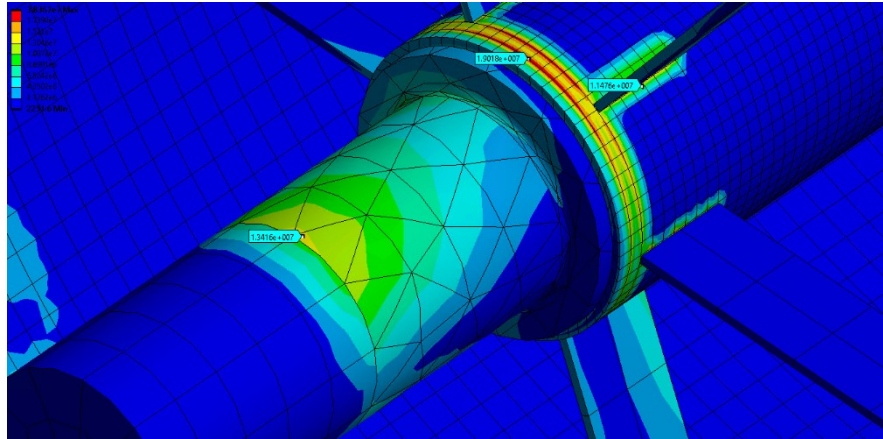


Figure 4-26: Points of High Stress in Hub. Units in Pa

Here, it is clear there is relatively high stress where the bearing ends, and where the support ring typically rests. Similarly, the support bars place high stress onto the inner shaft. From this image, the highest stress is located where the support ring rests and is nearly 20 MPa. This stress value is still significantly below the yield strength of Corten steel, with a safety factor of approximately 17. If the hub is made with stainless-steel instead of Corten, the yield strength will be comparable to Corten, if not greater, if a cold-rolled variety is used, indicating structural integrity will not be greatly affected by the hub material [20].

Finally, the wind force was removed from the front of the wheel and placed on the side, along the plane of rotation, originating from the left side of the wheel. The other forces were maintained from the severe loading case. Using the same scale as above, Figure 4-27 shows the points of high stress for this loading case. A closer view of within the hub is shown in

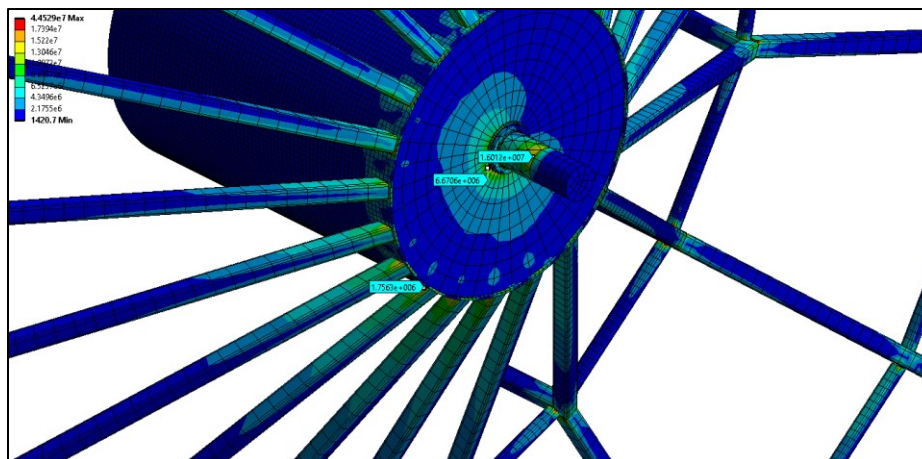


Figure 4-27: Points of High Stress with Side Wind Loading. Units in Pa

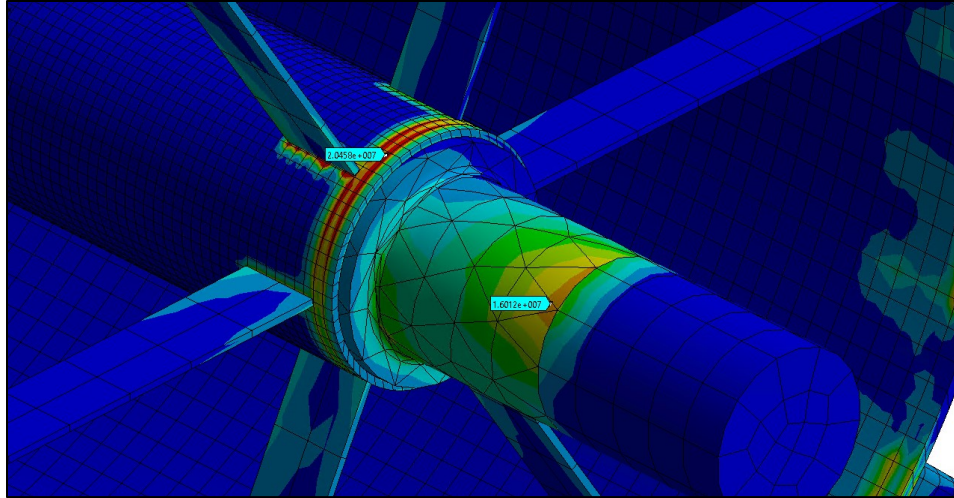


Figure 4-28: Points of High Stress within the Hub for Side Wind Loading Case

The maximum stress in this loading case is approximately 44.5 MPa, though the stress concentration still affects the model. The highest stress seen in Figure 4-27 is nearly 18 MPa, while the highest in Figure 4-28 is approximately 20 MPa. These points of high stress, and stress values, are very comparable to the values seen in the front wind loading case.

Overall, a more thorough analysis of the structure using appropriate tools should be performed before fully accepting the results of this simulation; to aid with this, an archive of the ANSYS model has been provided in the supplementary files along with this report. The analysis should include a verification of the forces and strengths at the wheel's connection points, in addition to a verification of the analysis performed here. However, this preliminary assessment indicates, by the high factors of safety, that the structure is likely overdesigned.

4.2 Bucket Design

As discussed in Section 3.3, three possible bucket designs have been proposed and the formed bucket option is the one featured on the final 3D model of the proposed new waterwheel. Each bucket was designed with a Pelton wheel bucket in mind to improve the wheel's efficiency, even if the efficiency would only be altered by a small amount.

All three of the bucket ideas have a different potential supplier, two of which are local New Hamburg companies and one that is based out of Almont, Ontario. However, the bucket design suggested by the company near Ottawa, Canadian Hydro Components, could very likely be fabricated by a manufacturer in New Hamburg as it simply consists of a pipe split in two, and welded together with some additional sheet metal plates. The proposed buckets' material and supplier options are summarized in Table 4-1.

The representative from Canadian Hydro Components that the team spoke with commented that he believes all three bucket designs will perform similarly and only increase the efficiency of the wheel by a few percent when compared to the buckets used on the original wheel [39]. Thus, from his perspective, the bucket design made from a pipe is the best option because it would likely be the cheapest [39].

From an aesthetics point of view, the formed bucket most closely matches the original wheel's bucket shape and would possibly be the option that best matches the overall aesthetic of the wheel. The cast bucket has a more rounded shape, though both designs would match the hub if it is chosen to be made from stainless steel.

Table 4-1: Proposed bucket designs and their material and supplier options

Bucket Design	Material	Potential Supplier
Cast Bucket	Stainless steel	Alloy Casting
Formed Bucket	Stainless steel	Iron Bridge
Pipe Bucket	Steel OR Aluminum	Canadian Hydro Components OR New Hamburg-based manufacturer

4.3 Lock Design

A reliable lock would allow for maintenance, and other such situations that require the wheel to be stationary, to occur more safely. As mentioned in section 2.3, in previous situations where the current wheel needed to be stopped and held in place, ropes were used to tie it down. This method did work, though, it was not reliable or very safe.

The proposed idea for a locking mechanism, as illustrated in Figure 4-29 and Figure 4-30, is to have two telescopic beams made from hollow structural steel (HSS) that stretch from one side of the wheel's concrete basin to the other. The beams would be either directly secured to the concrete wall or attached via a hinge which would allow the retracted beams to be moved to a position flush with the wall while not in use. A lockable clamp feature could be implemented to ensure the beams are held in position and not used by unauthorized personnel.

When the beams are in their outstretched, or locked, position, they would rest on U-shaped supports that are attached to the opposite wall. A through-hole in the support that lines up with a through-hole in the beam would allow for a pin to be inserted, blocking the beams from accidentally being retracted. A lock could be incorporated into this aspect as well. A SolidWorks model can be found in the supplementary files provided to the Board of Trade.

Through conversations with the Board of Trade, it was determined that closing the gate valve, which controls the flow of water to the wheel, was a sufficient way of stopping the wheel. Thus, this locking mechanism should not be used for bringing the wheel to a stop as it is not further designed to do so. This design also does not include a feature that would rotate the wheel into different positions, therefore it is suggested that ropes are used for this task.



Figure 4-29: Possible Locking Mechanism - Locked Position



Figure 4-30: Possible Locking Mechanism - Retracted Position

4.4 Power Generation

Due to the issues with an inline hydro turbine outlined in Section 3.5, the final recommendation for a power generation system is connecting a DC Permanent Magnet Generator to the main shaft through a speed increaser gearbox. These generators produce useful power over a wide range of speeds, which is beneficial for the New Hamburg Waterwheel due to the Nith River's dynamic water level. Based on videos of the New Hamburg Waterwheel in operation (See Appendix C) the wheel spins at approximately 2 RPM, though this speed is entirely dependent on the wheel's design. Due to a lack of information about the penstock to the wheel, it is very difficult to accurately estimate how the new design of the waterwheel will behave in operation. For this reason, a complete power generation system could not be designed.

Despite this lack of information, a significant amount of research and mock calculations were performed to aid with a future design project regarding the power generation system for the waterwheel. Once the wheel is constructed, some on-site measurements can be taken and used to design the system. There are ultimately two system designs that could be implemented, and the effectiveness of each depends on the power production of the wheel.

First, if a significant amount of power can be produced, on the scale of multiple kilowatts, the system can be tied to the grid. With a net-metering connection to the grid, the power generated in the park provides a credit for other electricity uses [43]. The basic electrical components for this system include a generator and an inverter, as well as a utility meter for the park. The inverter would provide frequency regulation while the utility meter tracks the exported power used to calculate the credit for power usage. The main issue with this system, irrespective of actual power output from the wheel, is the logistical difficulty of this system. The North American power grid operates at a frequency of 60 Hz, so any power exported to the grid must operate at the same frequency. Using Equation 1 from Section 2.6, with a typical 4-pole generator, the required rotational speed from the generator is 1800 RPM. With the uncertainty of the wheel's operational speed, coupled with the importance of maintaining the grid frequency, there is a significant amount of risk with this system. Typical hydropower generators use the grid to regulate their rotational speed, but due to the large inertia of the waterwheel this is infeasible. As such, the necessary inverter for this system would likely need to be custom built to accommodate the range of voltages and frequencies produced by the wheel. Additionally, if the wheel is only capable of producing a small amount of power, the connection may not be worth the additional cost and complexity, and it may be more beneficial to consider a simpler system.

If the available wheel power is around 1 kW or less, on the order of a few hundred watts, an off-grid system can be designed to provide power locally, throughout the park. Based on initial power calculations of the estimated wheel operating conditions, this is more likely the case in New Hamburg (see Appendix A for full calculations). Instead of using an inverter directly after the generator, this system connects the DC generator to a DC charge controller to charge a battery bank. On the other side of the batteries, an inverter can convert the stored power in the batteries to AC, which can then be distributed to a circuit in the park. This system is ultimately simpler than the previous system since there is no restriction on rotational speed. There are many commercially available charge-controllers intended for use with solar panels that might function as required in this situation, though, due to a lack of electrical system knowledge, the design team is unable to make a specific recommendation. In a discussion with the University of Guelph School of Engineering Lab Technician, Michael Speagle, he expected a DC generator could be connected to a DC charge controller and used to charge an array of batteries [31]. However, he admitted his expertise was with solar power systems and indicated there may be issues with operating a system in this way that could prevent it from functioning or damage the components.

An overview of each of the system designs can be seen in Figure 4-31.

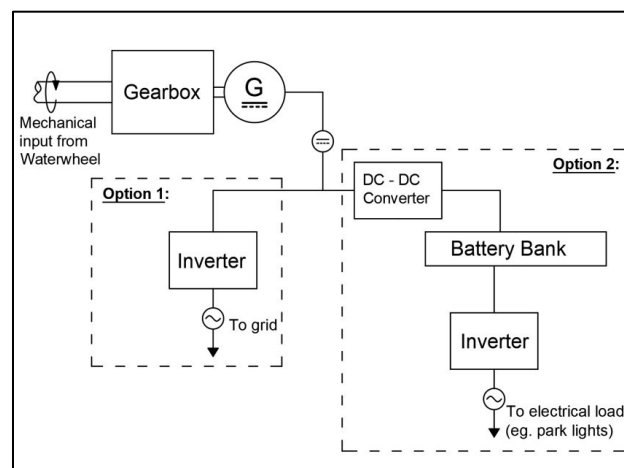


Figure 4-31: Two Alternatives for Electrical System Design

As previously mentioned, due to the wide range of uncertainty regarding the waterwheel penstock and the performance of the new wheel, the power generation system cannot be designed in full. Once the new waterwheel design is constructed and operational, if a power generation system is still desired, the operating conditions of the new wheel should be measured. The most important information for the design of this system is the rotational speed of the wheel, and how that varies at different flow conditions. Disregarding the annual flooding conditions, the Nith River is still subjected to a wide range of water flow rates throughout the year. The effect these dynamic flow conditions have on the waterwheel is unknown which makes estimating the rotational velocity of the wheel impossible. If the wheel is found to rotate at a relatively constant speed for all operational flow rates, a speed increaser gearbox can easily be designed to produce a constant amount of power. Contrarily, if the waterwheel's rotational speed is found to vary drastically, the produced power will not be nearly as reliable, and the system will need to be designed with that consideration in mind. In this case, the gearbox should be designed to increase the rotational speed to a point where the selected generator can produce a reasonable amount of power for the range of speeds provided by the wheel. The charge controller should be able to prevent the batteries from being harmed by this variable power, but the battery stack and park load will need to be sized appropriately so the generator can fully power the system.

To design or select the gearbox, the available input speed is required, along with the desired output speed. Selecting an appropriate generator is thus necessary to determine the required output speed. After a discussion with Neil Hevenor from Sommers Generator Systems, it was determined a DC generator would likely be the best option, since generating power in AC requires exceptional speed control. Further research found some small generators capable of producing small amounts of power at rotational speeds under 1000 RPM. A generator like the Windstream® Permanent Magnet DC Generator can produce approximately 125 W at 500 RPM, which can be reasonably achieved in this situation with a gearbox [44].

Initially, it was hoped that a standard gearbox could be selected, or a local company, like Ontario Drive & Gear (ODG), would be able to help develop such a gearbox. Unfortunately, after discussing their products with an engineer from ODG, it was clear their speciality is in speed reduction gearboxes with relatively low ratios, so their gearboxes are not particularly applicable to the waterwheel application. Instead, it was recommended a gearbox be designed using commercially available gears from an online supplier or similar. Some calculations and further descriptions are available in Appendix A, which outlines the design of a three-stage speed increaser gearbox. Ultimately, it was found that three stages can be used to increase the speed from 2 RPM to 500 RPM using a series of gears with standard numbers of teeth from Boston Gear [45]. Other suppliers that may be able to provide similar gears include: Robust Gear and Industries, Oakville, Ontario [46]; and Arrow Gear Company, Downers Grove, Illinois [47] who have custom gearing, and others like McMaster-Carr and Motion Industries may be able to provide gears as well.

The other components required for the power generation system are a charge controller, inverter, and a battery stack. The charge controller is intended to route the DC power from the generator to the batteries while preventing the batteries from being overcharged and consequently damaged. Once the batteries are fully charged, if there is less power drawn than is being produced, the charge controller sends the excess power to a dump load, which can be as simple as a large resistance water heater. The design of the battery stack will be dependent on the amount of power available from the wheel and will inform the selection of a charge controller circuit. Similarly, the inverter will need to be sized appropriately to the load and available power in the batteries. The inverter will convert the DC power from the battery circuit into AC power, which can then be exported to the circuit within the park near the waterwheel. Unlike the gearbox and battery stack, it will likely not be possible to custom-build the inverter and charge controller. Commercially available components for solar power systems will likely suffice for the purposes of this system, provided they are rated for similarly sized systems. It is recommended an individual with electrical engineering expertise provides input on the final component selection.

Overall, selecting these components requires a significant amount of information regarding the performance of the power generation system, which is currently unavailable. With a better sense of the new wheel's performance, it is expected a separate design project can be initiated to fully design the power generation system.

4.5 Cost Data and Estimated Energy Savings LCA

After discussing the project with multiple local suppliers, there was a clear interest among the contacts in keeping the waterwheel project local. First, Iron Bridge was contacted regarding the structural materials of the wheel. They have expertise working with Corten steel and have many connections to suppliers and manufacturers who can construct all necessary components. Their recommendation is to use stainless steel for the buckets, and to form the buckets instead of casting them. This may reduce costs and may also be a simpler process than casting would be. Iron Bridge was able to review the SolidWorks models and bill of materials (see Appendix E) and provided a quote for the materials and labour/installation costs. Overall, Iron Bridge estimates the Corten for the tubing and hub, and stainless steel for buckets can be provided for \$150,750.00, and the installation will cost between \$12,500.00 and \$15,000.00. The latter figure includes

all necessary equipment and personnel required to install the wheel. The relevant email correspondence can be seen in Appendix D. Unfortunately, Iron Bridge was not able to review the model after the gauge of the Corten tubing was reduced. Since the reduction from 1/4" to 3/16" steel reduces the overall amount of material and uses a more standard gauge of steel, it is expected this alteration will reduce the materials cost. Also, using a stainless-steel hub instead of Corten will change the cost for the hub. Iron Bridge has since received the updated models and bill of materials and will hopefully be able to provide the Board of Trade with an up-to-date quote upon request.

Additionally, through some contacts at the Board of Trade, Schaeffler Canada in Stratford, Ontario was contacted. The Industrial Schaeffler plant in Oakville, Ontario provided the bearings for the original wheel in 1990, along with the replacement bearings in 2013. Upon connecting with engineers from the Industrial Schaeffler plant, the model of bearing used previously was able to be determined and reassurance that these bearings would be sufficient for the new wheel design was provided as well [48]. Furthermore, the engineers were able to provide an estimated cost for the set of two new bearings. It is expected these bearings will cost between \$3,000.00 and \$5,000.00 however, since the previous bearings were generously donated to the Board of Trade, Schaeffler may be able to donate the new bearings as well [48]. This has not been confirmed yet and further discussion with Schaeffler is required.

Some additional suppliers were contacted for quotes. Specifically, Alloy Casting Industries in New Hamburg was contacted about providing stainless steel casted buckets, though a quote from them has not yet been provided. The contact information for each supplier can be found in Appendix B, along with the relevant email correspondence in Appendix D. Through discussions with the local suppliers, it is clear there is support within the community for this project. As such, it is possible these local suppliers may be willing to provide materials and labour for reduced costs to support this large-scale community project.

4.6 Life Cycle Analysis

Excluding the small components like bearings, most of the new waterwheel design is made from some form of steel. As such, the highest energy expense throughout the construction process is the refining of steel. Steel refining is a notoriously dirty process that uses a significant amount of energy and creates a lot of carbon dioxide emissions. To determine the overall impact of the waterwheel design, a life cycle analysis (LCA) was performed for the steel.

Based on the SolidWorks model, the wheel was found to weigh approximately 12,000lbs which equates to slightly less than 5,500kg. The exact density of Corten could not be found for the model, so this estimate was used for the LCA. The type of Corten being used is ASTM A847 which is a cold rolled steel [49].

From literature, the actual energy requirements for cold rolling steel is 1.2GJ/metric ton on average [50]. Using these values and the approximate expected power output of 125W from Section 4.4, the expected "energy payback period" is 1.67 years of operational time. Detailed calculations can be found in Appendix A. Of course, it is not reasonable to expect the waterwheel to produce power 100% of the time; it is likely the wheel will be shut off in the winter, and there may be times when the water levels in the Nith river are too low to spin the wheel. With this in mind, it may be more reasonable to assume a 50% availability, which would effectively double the payback period to 3.35 years. Further uncertainties arise in the other values, which cannot be effectively measured for the New Hamburg Waterwheel at this time. The generated power, wheel mass, and amount of energy required for production of the wheel are all assumed values. Additionally, if the power generated by the wheel is not relatively constant, and changes drastically with the Nith river flow, and if the mass of the wheel is different from that of the SolidWorks model, the payback period will once again be affected.

Therefore, there are too many unknowns to provide an exact estimate of the energy payback period of the wheel. However, the values calculated here do provide some reassurance that the overall energy required to manufacture the steel can be repaid if a sufficient power system can be implemented on the wheel.

5 Design Defense

To ensure that the design would function to the likes of the New Hamburg Board of Trade, the proposed design was analyzed and critiqued in the categories of functionality, safety, economic and environmental and social impact.

5.1 Primary Function

The original intent of the New Hamburg waterwheel was to commemorate the milling history of the town and to be a tourist attraction. Over its three-decade lifespan, the wheel has become a town landmark. The new wheel will continue to represent the town of New Hamburg and its history with its aesthetics and shape and continue to draw visitors with its size. As mentioned previously, the material suggested for the wheel frame, Corten, goes through an aging process that is very similar in appearance to that of red cedar, which is what the original wheel is made from. The new wheel design also mirrors the silhouette and three-ringed design of the original wheel. Retaining this appearance with an updated material allows for the history and vision that the town has of the wheel to be preserved while improving the structures longevity and resistance to environmental wear. The fact that the new wheel design involves the wheel being approximately the same height as the current wheel means that the novelty of the wheel will be conserved, as well as its overall presence.

5.2 Safety

A prominent concern that was raised about the current New Hamburg waterwheel is the safety of workers during maintenance. This was brought up during a conversation with Earl Laverty, who has previously performed maintenance on the wheel, and it became evident that a lock or locking mechanism is required [10]. The current wheel has no lock, thus when performing maintenance, the workers would tie down the wheel using ropes. This is a huge safety concern since the wheel would not be fixed in place and could still spin, or wobble which could potentially injure someone. A locking mechanism would allow the wheel to be fixed in place, completely restricting movement, allowing workers to perform maintenance on any part of the wheel without risk of spinning the wheel and causing injury. See Section 4.3 for more details about the proposed lock design.

Another area of potential concern is the structural integrity of the concrete blocks and fence surrounding the wheel. Through meetings with the Board of Trade, it has been determined that the integrity of these structures will be analyzed, likely by Stephen Clarke. There is reasonable cause for concern that the integrity of the fence and concrete structure are no longer capable of safely protecting the wheel from damage. The fence was erected 30 years ago and has worn down in that time. The fence and concrete blocks protect the wheel from ice floes being carried downstream and striking the wheel. It also serves as a barrier to prevent people from accessing the wheel and touching/climbing on it. New Hamburg is subject to bouts of flooding and when severe flooding occurs, the water level can reach upwards of 15 feet above the ground. In these cases, a significant portion of the wheel is underwater and thus, the wheel no longer spins during this time. Based on the hydrostatic analysis performed in ANSYS, there is no major issue caused by the water directly. The major concern is that chunks of ice that are carried downstream could impact the wheel which could damage the structure and/or buckets. As previously mentioned, the structure of the wheel will be made from Corten steel, which is much stronger and more reliable than red cedar. When exposed to water for extended periods of time, wood can become waterlogged. This results in weaker, heavier wood, which can rot and break apart much easier than dry wood. Alternatively, steel cannot become waterlogged since the material does not absorb or retain any water, and thus, will last much longer than red cedar. The strength of Corten is discussed in Section 2.4.

Another environmental factor that is cause for concern is the wind forces acting on the wheel and how the proposed design would respond to high wind forces. Calculations were made in accordance with the National Building Code 2015 that takes into account wind speeds in New Hamburg and the resulting wind force on the wheel, these calculations can be seen in Appendix A4. After analyzing the effects of the wind force using ANSYS software, it was determined that the wind force should not have any detrimental effects on the structural integrity of the wheel, as seen in section 4.1.5.

Finally, there is a concern for people attempting to climb the wheel. While there is no way to entirely prevent this from happening, barring completely closing off the wheel and making it inaccessible, signage can be posted along the concrete fence encouraging general caution and warning of the dangers of climbing, as well as signs that deter vandalism and littering.

5.3 Economic Impact

The New Hamburg Waterwheel project will be funded primarily through fundraising performed by the New Hamburg Board of Trade. One of the main goals of this project was to provide the Board of Trade with an overall cost estimate so the Board could begin the fundraising process. Ultimately, through conversations with multiple suppliers, a high-cost estimate is \$170,750.00. This figure includes the Corten and stainless steel that will be used to construct the wheel trusses, buckets, and hub, along with the high-cost values for bearings and labour. If the current waterwheel supports prove to be sufficiently stable after inspection, there should be few extra costs associated with the waterwheel design. If commercially available power generation components are available for use in the power system, the additional cost associated with the system should be a fraction of the above figure.

The above figure considers 1/4" gauge Corten steel, as opposed to the final design's 3/16" thickness. 3/16" thickness is a more standard size, so it is more accessible, and has less overall material than 1/4"; thus, it is expected the overall cost will be lower than the \$170,750.00. Further, this figure does not consider donations made by suppliers for any of the desired materials or components. For example, the previous bearings were donated by Schaeffler, and other local suppliers raised an interest in being part of the project while indicating a willingness to reduce their cost. Having such a vested interest within the community may help to reduce the cost, and the overall burden on the fundraising efforts.

Upon replacement of the New Hamburg waterwheel, the structure will once again be a great landmark of the area and an exceptional tourist attraction. Improving tourism within the town will provide economic benefits for the local businesses, which provides additional incentive for completing the project. Improving the park surrounding the waterwheel will also help to solidify the New Hamburg Waterwheel and the town of New Hamburg as a landmark and a tourist destination.

5.4 Social/ Environmental Impact

The New Hamburg waterwheel is a rallying point for the town of New Hamburg and is central to the town's sense of community. The iconic waterwheel is featured on some businesses logos as well as banners featured in the downtown. The waterwheel is also a tourist attraction for the town as it is the largest working waterwheel in North America. Therefore, providing the Board of Trade with a plan and replacement option for the wheel will allow for the waterwheel to live on in the community. The proposed replacement was designed so the status of the tallest working waterwheel in North America could be maintained which will continue to encourage tourists to visit the town of New Hamburg. Additionally, since the new wheel will offer a new look, it could encourage people who grew up in the town to return to see the new waterwheel, drawing more people to the area. The new waterwheel will also be implemented around the same time as other refurbishments in William Scott Park. Therefore, it will further encourage the community to visit both the new park and the waterwheel specifically.

Environmental factors were also very important when designing the new waterwheel since the site of the waterwheel is in a floodplain and any runoff from the waterwheel will fall into the Nith River, potentially damaging the surrounding ecosystems. To begin, in order to ensure the proposed design would not negatively affect the flooding in New Hamburg, the GRCA was contacted to ensure all guidelines and protocols were followed. The two main concerns that were addressed were the effects that implementing the waterwheel would have on flooding and on erosion.

Since the difference in volume between the current and proposed waterwheel is negligible, there should be no, or very little, change in the level of flooding levels upstream and downstream of the waterwheel. To ensure that no negative effects occur, and to comply with GRCA standards, the Board of Trade will have to submit a Hydraulic Analysis Memo and a HEC-RAS model to the GRCA for review. This memo will include a brief outline of the proposed design, any assumptions made during hydraulic modelling, changes that were made to the model to create the proposed conditions and a table depicting the difference in flood elevation cross sections upstream and downstream of the wheel for the current condition and proposed condition. The table will show the flood cross sections for all design events, including 1:5 year flood, 1:100 year flood, and regional flows (Hurricane Hazel). The HEC-RAS model will include flood levels for the 1:5 year flood, 1:100 year flood and the regional flood (Hurricane Hazel) for both the proposed design and current design to ensure that the flood level is not increased by more than 0.1m upstream or downstream as a result of the wheel being replaced. Unfortunately, the design team's specialty lies in Mechanical and Biomedical Engineering, meaning that we do not have the knowhow or capabilities to create HEC-RAS models to the level that would be required by the GRCA. Therefore, a civil, environmental, or water resource engineer, or someone else with the knowledgebase to perform this analysis, should be consulted.

The second factor that was important to the GRCA was if any erosion would occur because of the new wheel being built. The number of disturbances to the ground is expected to be minimal when the new wheel is constructed since the existing basin and supports will be reused. Therefore, there should be no erosion from the new wheel being built. This information was supplied by Katelyn Lynch at the GRCA. Email correspondence with Katelyn Lynch and Trevor Heywood can be found in Appendix D.

The other environmental consideration that was investigated during the design process was if any runoff would occur and if the runoff would be toxic to the environment. There were two main areas of the design in which this was a concern. The first was the use of Corten weathering steel. Corten forms a rust on its exterior overtime, allowing it to be protected from the environment. The issue with this is when the structure is in the rusting phase and becomes wet, there will be runoff into the river. Through conversations with a project manager at Iron Bridge, the design team was reassured that Corten is frequently used in bridge designs and the runoff is non-toxic to the surrounding environment [37]. The second area of concern was the epoxy coating that would be applied to the buckets, if the bucket option of using a pipe that is split in two, welded together and coated with epoxy is used. The epoxy coating that was recommended was given to the design team by Canadian Hydro Components. This company uses the epoxy coating in components of hydro generating stations which are frequently in contact with water. Therefore, it is assumed that there is either minimal runoff or the runoff that occurs does not harm the ecosystems.

6 Risks and Uncertainties

During this project, there were many areas where data or information was lacking or uncertain. Before proceeding with the project, these areas should be identified and more information to better define the problem should be sought.

6.1 Sources of Error and Uncertainty

During the design of the waterwheel, there were many uncertainties that arose. The main reason why these uncertainties arose was due to COVID-19. The presence of COVID prevented the group from performing a thorough site visit. Originally, the team planned to bring surveying equipment from the University of Guelph School of Engineering to survey the area. However, the School of Engineering was closed due to COVID. It also prevented all group members from being able to visit the site. Luckily, three of the five group members were able to travel to site to gain a better understanding of the problem. The main concern associated with being unable to survey the site was the lack of data collected. In order to properly size components, such as the buckets and electrical components, the flow rate and nozzle diameter must be accurately known.

Normally, the flow rate can easily be calculated by determining the elevation difference between the inlet and outlet of the pipe and the major and minor losses through the pipe. As mentioned in Section 2.1, there are two possible inlet locations. For calculations, the inlet in the dam was used. However, if this is incorrect, it would change the flow rate through the pipe since the elevation would be different as well as the length of pipe which would affect the major losses. Additionally, the penstock pipe is 30 years old which means there could be buildup inside the pipe since the water running through it is not filtered. This could result in less flow passing through the pipe than expected since the diameter would not be the same as what is depicted in the engineering drawings. The roughness of the pipe would also be affected by this because, for calculations, the roughness was assumed to be zero since the pipe is PVC. This would result in an increase of the losses in the system, meaning there is less energy available in the system than expected. In order to minimize the effect of these uncertainties, none of the electrical generating equipment has been sized. Instead, a thorough description of how to size the components has been supplied to the Board of Trade. This will allow for them to perform a complete site evaluation before any equipment is purchased, once COVID restrictions are lifted.

The nozzle diameter was very important when designing the buckets. As discussed in Section 2.5, the dimensions of the buckets of a traditional Pelton bucket are based off the nozzle diameter, to allow for the water leaving the nozzle to be caught by the bucket. Therefore, the larger the nozzle is, the larger the bucket must be. During the data collection process, there was a great deal of uncertainty surrounding the diameter of the nozzle. Supplied engineering drawings stated that the nozzle diameter was 8" while site visits performed suggested that the nozzle was 6" or 4". Currently, the buckets have been designed for a 6" nozzle since it seems the most realistic based on images supplied. However, when a thorough site visit is performed and the exact diameter is determined, the size of buckets used may need to be increased to allow for the bucket to catch all the water, if the diameter is 8", or decreased, if the diameter is 4", to reduce the cost of material because the water will not be dispersed as much.

Another area of uncertainty that could become problematic is the weight of the existing wheel. It is important to have an understanding of the weight of the existing wheel because it affects the RPM that the wheel will spin at. As mentioned before, there is a great deal of uncertainty surrounding the amount and force of the water leaving the penstock. Therefore, the weight of the current wheel was used to determine if the proposed wheel would turn since the force of the jet will not be changed. Although a SolidWorks

model was generated for the original waterwheel, the density of the wood remains unknown. This is because the wood is likely waterlogged since it has been exposed to the elements for the past 30 years. A rough estimate of what the waterlogged weight of the wood would weigh was used in the model, however there still exists some uncertainty. Since the weight of the proposed waterwheel is much less than the estimate of the existing wheel, there should not be any issues regarding turning as even if the wheel was more waterlogged than expected, it would only increase the weight of the existing wheel, meaning that the new wheel will spin faster than the original.

6.2 Technical Recommendations

Throughout the course of this project, electrical systems and components have been explored, however none of the design team members have a specialty in electrical systems or their design. Therefore, it is recommended that an electrician, electrical engineer, or someone with a similar skill set is retained to provide input on the power generation system. Through communicating with these professionals, issues inherent to the aforementioned systems that will prevent them from operating may arise, or there may be alternative solutions brought up that have not been considered. Also, an engineer must review all calculations and structural analysis stated in this report, as well as perform additional analysis to ensure that the wheel is structurally sound prior to construction. As part of this, a thorough site visit is necessary to verify the integrity of the concrete basin, fence, and support beams so that no unexpected problems arise. Additionally, as previously mentioned, a full HEC-RAS model must be submitted to the GRCA for review to certify that the wheel does not increase the flood level by anything greater than 0.1 m upstream or downstream.

6.3 Ideas for the New Hamburg Waterwheel

During the course of this project, the team has had a multitude of ideas for the wheel and surrounding park that exceed the scope of the project. The first proposed idea involves an interactive display that showcases different aspects of the wheel in an educational and informative format. This could encourage families to visit the wheel and could serve as a school field trip destination for lessons on hydro power or other forms of renewable energy. The display could show the time it would take until the generated power from the wheel offsets the costs of construction, provide information about renewable energy, and information about the history of the town and of the waterwheel itself. Adding a motion sensor or camera and motion tracking software to the wheel to track the number of rotations the wheel has made in its lifetime and its current rotational speed would also be interesting statistics to show on the display. To add a tangible component, a small hand crank that children can spin as an activity could be placed beside the display, which would read out how much power the crank is generating and compare that to the wheel.

To ensure the wheel can be admired at all times of the day, spotlights and other types of lighting fixtures could be placed in the concrete basin or surrounding the wheel to illuminate it in various ways. Using light bulbs with colour changing abilities would add an element of fun and allow for creative light displays.

Adding to the renewable energy theme provided by the hydropower aspect of the wheel design, solar panel powered lamp posts could be placed throughout the park as a means of making the park a green space.

Also, the addition of picnic tables and/or benches would help to welcome tourists and residents of New Hamburg to the area. After the current wheel is taken down, any wood that can be salvaged from the waterwheel could be refurbished and used for the picnic tables or other park decorations.

Finally, as mentioned in Section 4.3, adding a lock would improve the overall safety of the waterwheel. Thus, it is highly suggested that this recommendation be implemented. Being able to reliably secure the

wheel in place could also make maintenance, and other activities that require the wheel to be stationary, safer, and easier.

7 Conclusions

Over the last eight months, the design team has been able to generate a solid foundation for the redesign of the New Hamburg Waterwheel that the New Hamburg Board of Trade should be able to build off to complete the replacement in upcoming years. Meetings with prominent Board of Trade Members allowed for the criteria of the project to be determined which ensured all work performed on the project aligned with the vision that the Board of Trade had.

A final design of the waterwheel structure was created and features a profile that is very similar to the current waterwheel. The new design is made of Corten which allows for the aesthetic of red cedar to be mimicked, keeping multiple historic aspects of the wheel in place. Additionally, three options for bucket replacements were specified, which will allow the Board of Trade to decide which alternative they prefer based on quotes they receive from suppliers. To increase safety, the option to add a locking device to the structure has also been included. A thorough analysis of methods that could be used to assemble the structure were also supplied which included options to weld the structure together or bolt the components together. This will give the Board of Trade freedom to select the method they prefer, depending on their aesthetic preference and if they wish for replacement to be relatively straightforward. The option of power generation was also included in the final design of the waterwheel. Although, the full electrical system was not supplied due to too many unknowns in the system, the foundation for the steps that would need to be taken in the future was supplied.

In addition to final design, the design team was also able to make great strides when determining local companies that would be interested in participating in the project as well as rough quotes for the cost of materials and labour. A list of all companies that the design team was in contact with over the design process as well as their contact information has been supplied for the Board of Trade to reference in the future. Additionally, quotes from Schaeffler and Iron Bridge allowed for a high-cost estimate of \$170,750.00 to be determined, which includes the material required for the structure of the waterwheel and the bearings.

This design is only the starting point for multiple refurbishments that are planned to be made in William Scott Park, in New Hamburg. With the implementation of a new waterwheel and other additions such as a digital display showing interesting information about the waterwheel or park, new picnic tables made from the current waterwheel or solar powered lighting, the park can continue to be a tourist attraction for the town of New Hamburg for decades to come.

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- [54] H. Zainuddin, M. Yahaya, J. Lazi, M. Basar and Z. Ibrahim, "Design and Development of Pico-hydro Generation System for Energy Storage Using Consuming Water Distributed to Houses," *World Academy of Science, Engineering and Technology*, vol. 35, pp. 154-160, 2009.

Appendix A. Calculations

Table A-1 states the assumptions made to perform fluid mechanics calculations. These calculations were important for gauging the energy available in the water that will be used by the waterwheel.

Table A-1: Assumptions made for fluid mechanics calculations

Assumptions
<ul style="list-style-type: none">• Water is an incompressible fluid.
<ul style="list-style-type: none">• There are no leaks along the length of the penstock.
<ul style="list-style-type: none">• Steady-state conditions.
<ul style="list-style-type: none">• There is no debris in the penstock which would block flow.
<ul style="list-style-type: none">• Gate valve is fully open.
<ul style="list-style-type: none">• There are no sharp bends in the penstock.
<ul style="list-style-type: none">• Conservation of mass between the jet and the surface of the bucket.

A1. Power Generation Calculations

The available hydraulic energy at the wheel is calculated from the rotational speed of the wheel at a typical flow. Due to the lack of information regarding the nozzle, the nozzle velocity was assumed.

Definition	Variable	Value
Rotational Speed	N	2 RPM
Wheel Diameter	d	50ft = 15.24m
Nozzle Diameter	A_N	0.00811 m^2
Nozzle Velocity	V_N	$V_N = 10 \text{ m/s}$
Initial Bucket Velocity	$V_{B,Initial}$	0 m/s
Water Density	ρ_w	1000 kg/m^3

To estimate the available power in the water, the rotational speed of the current waterwheel was considered. Using the same value, the bucket velocity (V) and angular velocity (ω) can be calculated:

$$\omega = N \frac{2\pi}{60} = (2 \text{ RPM}) \left(\frac{2\pi \text{ rad/rot}}{60 \text{ s/min}} \right) = 0.2094 \text{ rad/s}$$

so, the angular velocity is 0.2094 rad/s, and:

$$V = \omega r = (0.2094 \text{ rad/s}) \left(\frac{15.24 \text{ m}}{2} \right) = 1.6 \text{ m/s}$$

Since little information about the nozzle and penstock is available, nozzle velocity was assumed to be 10m/s. With this, the bucket velocity is approximately 15% of the nozzle velocity.

The force of water on the bucket can be taken as the mass flow rate of water multiplied by the difference in bucket and jet velocities. Thus, the maximum force will occur when the jet first hits the wheel and begins the rotation. The mass flow rate is equivalent to the nozzle velocity multiplied by the nozzle area and the density of water.

$$F_{max} = \dot{m}(V_N - V_{B,Initial}) = V_N^2 \rho_w A_N = (10 \text{ m/s})^2 (1000 \text{ kg/m}^3) (0.00811 \text{ m}^2) = 811 \text{ N}$$

Therefore, the estimate force on the bucket is 811 N. The torque on the waterwheel shaft can be calculated as:

$$\tau = F * \frac{d}{2} = (811 \text{ N}) \left(\frac{15.24 \text{ m}}{2} \right) = 6179.24 \text{ Nm}$$

And finally, the maximum power can be calculated:

$$P_{max} = \tau \omega = (6179.24 \text{ Nm}) (0.2094 \text{ rad/s}) = 1.29 \text{ kW}$$

So, based on the assumption defined above, the maximum power provided by the nozzle with a 10 m/s jet is 1.29 kW.

A2. Gearbox Calculations

The calculations and information here have been adapted from Machine Design: An Integrated Approach, 5 ed. [30]

To design a gearbox, the input and output speeds are required. For these calculations, a wheel speed of 2 RPM and an output speed of 500 RPM will be assumed. Since some of the power will be removed from the wheel as it spins, the rotational speed of the wheel will be reduced. Since no performance data is available for either wheel design, the rotational speed under load will be estimated to be 1 RPM.

So, if the input speed is 1 RPM and the output speed is 500 RPM, the speed ratio is 1:500. Typically, the ratio for a single gear pair should not exceed 1:10, so a compound gear train is needed. A compound geartrain refers to a set of gears in which at least one shaft carries more than one gear. Thus, a number of “stages” are required to achieve the ultimate gear ratio.

The number of required stages can be estimated by taking the n^{th} root of the ratio, where n is the required number of stages:

$$\sqrt{500} = 22.36 > 10$$

Since the square root of 500 is greater than 10, this ratio cannot be achieved in two stages.

$$\sqrt[3]{500} = 7.94 < 10$$

Therefore, the necessary ratio can be achieved in three stages, each with a ratio of approximately 1:8.

From here, using tables available on gear supplier websites (e.g., see [45], pg. 311), the standard number of gear teeth can be found. Then, an iterative process is required to determine the optimal combination of gear teeth. Using the above conditions, the desired ratio can be achieved as follows:

$$\left(\frac{N_{\text{Gear},1}}{N_{\text{Pinion},1}}\right)\left(\frac{N_{\text{Gear},1}}{N_{\text{Pinion},1}}\right)\left(\frac{N_{\text{Gear},1}}{N_{\text{Pinion},1}}\right) = \left(\frac{90}{12}\right)\left(\frac{80}{10}\right)\left(\frac{100}{12}\right) = 500$$

Then, the diametral pitch for each stage should be determined, along with the pitch diameter and shaft diameter. The desired gears may not be possible with the available diametral pitches, and the necessary pitch diameter for a desired gear may not be feasible in reality. Instead, the closest realistic combination of gears should be selected. This issue can also be mitigated by increasing the number of stages so the gears for a given pair can be closer in diameter. This may also help in reducing the size of the gearbox overall but will increase the complexity of the iteration process.

Ultimately, designing a gearbox for this application will require significant iteration, and care should be taken to appropriately design the shafts for each gear, and select bearings for each shaft. With an increase in velocity, the output torque will be decreased, so the highest torque will be on the first gear pair, which is attached directly to the wheel; this should be considered.

Additional online tools may be useful for helping design the gear box. Gear Generator is a simplistic website that can be used to create and visualize gear trains [51].

A3. LCA Calculations

For cold-rolled steel, approximately 1.2 GJ of energy are required per metric tonne of steel produced [50].

If the generator can produce 125 W of power year-round, the annual energy produced is:

$$125 \text{ W} * 8760 \text{ hrs} = 1100 \text{ kWh}$$

Then, the overall energy required for steel production is:

$$1.2 \frac{\text{GJ}}{\text{Tonne}} * 5.5 \text{ Tonne} = 6.6 \text{ GJ}$$

So, the expected energy payback period is:

$$\frac{6.6 \times 10^6 \text{ kJ}}{1100 \text{ kWh/yr}} * \frac{1 \text{ kWh}}{3600 \text{ kJ}} = 1.7 \text{ years}$$

If the generator availability is only 50%, the annual energy produced is halved, so the payback period becomes:

$$\frac{6.6 \times 10^6 \text{ kJ}}{550 \text{ kWh/yr}} * \frac{1 \text{ kWh}}{3600 \text{ kJ}} = 3.3 \text{ years}$$

Hot-rolled steel requires approximately 2.2 GJ of energy per tonne produced [50].

If hot-rolled steel is used the overall energy required is:

$$2.2 \frac{\text{GJ}}{\text{Tonne}} * 5.5 \text{ Tonne} = 12.1 \text{ GJ}$$

So, the payback period with 50% availability becomes:

$$\frac{12.1 \times 10^6 \text{ kJ}}{550 \text{ kWh/yr}} * \frac{1 \text{ kWh}}{3600 \text{ kJ}} = 6.1 \text{ years}$$

A4. Wind Loading Calculations

In order to determine the amount of wind that the waterwheel could be subject to, the wind force at the 1:50 wind speed case, taken from the Ontario Building Code 2015 was used. The 1 in 50 speed represents the hourly wind speed that has a 1 in 50 chance of being exceeded in any one year [42]. This speed represents winds with a 1 in 50 chance of occurring in a year. The calculations for this are shown below. The equation and C_D value are taken from *White, Frank M., 2016*, where C_D is the drag coefficient of a square cylinder, equal to 2.1 [25]. The area was taken as the surface area of the front-facing surfaces of the waterwheel using ANSYS, and the overall force was rounded up as a conservative value for use in the FEA model.

$$F_{wind} = \frac{1}{2} C_D \rho A v^2$$
$$F_{wind} = \frac{1}{2} (2.1) (1.225 \text{ kg/m}^3) (17.387 \text{ m}^2) (26.4 \text{ m/s})^2$$
$$F_{wind} = 15.6 \text{ kN} \approx 16 \text{ kN}$$

For the side loading case used in the ANSYS model the following calculation was performed to find the wind force.

$$F_{wind} = \frac{1}{2} C_D \rho A v^2$$
$$F_{wind} = \frac{1}{2} (2.1) (1.225 \text{ kg/m}^3) (16.654 \text{ m}^2) (26.4 \text{ m/s})^2$$
$$F_{wind} = 14.9 \text{ kN} \approx 15 \text{ kN}$$

Appendix B. Contacts

Table B - 1: Stakeholders and technical consultants involved in the redesign of the New Hamburg waterwheel

Names	Occupation	Involvement
Stephen Clarke, P. Eng.	President at Stephen B. Clarke & Associates Ltd.	Structural engineer who worked on the original waterwheel.
Lyle Cressman	Owner of Puddicombe House and current New Hamburg Board of Trade President	New Hamburg Board of Trade President.
Joe Figliomeni, CPA, CGA	Certified Financial Planner at KLT Wealth Management	New Hamburg Board of Trade Executive.
David Lubitz, PhD, P.Eng.	Associate Professor in the School of Engineering at the University of Guelph	Project Faculty Advisor.
Luke Shantz	President of Arcadian Projects	Registered Millwright who is part of the revamping of Scott Park. Employed at Arcadian Projects.
Ross Steckley	Partner at Sanford Holshouser	Involved in the original waterwheel design and construction.
Brian Verspagen, M.Sc., P.E., P. Eng.	Partner at WalterFedy Engineering	Civil and Water Resource Engineering contact.

Table B - 2: Contact information for companies contacted during the project

Company	Product?	Representative
Alloy Casting Industries Ltd.	Bucket casting	Steve Blenkhorn – sblenkhorn@alloycasting.com
Canadian Hydro Components	Bucket fabrication?	Mike Dupuis - mikedupuis@canadianhydro.com Tyler VanderVelde, P. Eng. - tylervandervelde@canadianhydro.com
Iron Bridge Fabrication Inc.	Corten & Stainless Steel	Mercedes Mattes – mmattes@ironbridgefab.com
Schaeffler Canada Inc.	Bearings	Tom Stoehr, P. Eng. – tom.stoehr@schaeffler.com Juergen Endres, P. Eng. – jurgen.endres@schaeffler.com

Table B - 3: Additional potentially useful contacts

Name	Occupation	Contact Information
Trevor Heywood	Resource Planner at the GRCA	theywood@grandriver.ca
Robert Hunter	Ontario Drive & Gear Employee	rwh@odg.com
Earl Lavery	Owner of Lavery Wood Homes & Timber Frames Inc.	www.Laverytyloghomes.ca
Katelyn Lynch, P.Eng	Water Resource Engineer at the GRCA	klynch@grandriver.ca
Bob Reiter, P. Eng.	Ontario Drive & Gear Employee	519.662.2840 ext 249

Table B - 4: Author's contact information

Name	Email
Adel Elkhodr	aelkhodr@uoguelph.ca aelkhodr@gmail.com
Max Fisher	mfishe13@uoguelph.ca maxfisher4@gmail.com
Tara Lockhard	tlockhar@uoguelph.ca tara.lockhard@sympactico.ca
Emily MacNeil	emacne01@uoguelph.ca emacneil4@gmail.com
J. Sebastien Williams	jwilli29@uoguelph.ca sebastienwilliams@yahoo.ca

Appendix C. Supplementary Information

C1. Videos of Wheel Turning

Nith River Waterwheel – Squadcopter: <https://youtu.be/HKaZG8Fbm4c>

Water wheel – Gary Chittim: <https://youtu.be/W16rHAK0kW4>

C2. Epoxy Coating Information

Canadian Hydro Components uses “either Navy Gray - 9186402 or Safety Blue - 9125402, depending on location and both with 9102402 Activator” [52]. More information can be found at the following link:

<https://www.rustoleum.com/product-catalog/industrial-brands/high-performance/epoxy-coatings/9100-system-dtm-epoxy-mastic>

Appendix D. Email Correspondence

D1. Iron Bridge Correspondence

MM

Mercedes

Mattes <mmattes@ironbridgefab.com>

Tue 3/23/2021 2:48 PM

To: Maxwell Fisher

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Hi Max,

Thank you for your patience on this.

Unfortunately I was still unable to open the STP files, I believe it is because you have a newer version of solidworks. However, I used your BOM for a budget number for the Waterwheel which is as follows:

***Budget* for Corten Water Wheel with Stainless Steel Buckets – New Hamburg**

Supply & Delivery Only: \$150,750.00

The budget number is for the steel only, Corten and Stainless. This does not include for any mechanical components or concrete work (if required). This is based on today's steel prices. Also a very rough budget as I wasn't able to open the drawing.

Budget for installation if required would be \$12,500.00 - \$15,000.00 this would include all equipment (crane etc.) and personnel to lift the wheel in place.

Please let me know if you have any questions.

Also, see below companies for the gear box, hopefully they will be of help or will be able to point you in the right direction:

- Ontario Drive and Gear
- Rapid Precision Machining & Gearing LTD

Thank you kindly,

Mercedes

Mattes-Kroisenbrunner

mmattes@ironbridgefab.com

(519) 595 - 6830 Office Ex. 37

(519) 897 - 1523 Cell

(226) 779 - 4240 Fax

D2. GRCA Correspondence

D2.1 Water Resource Correspondence

Emily MacNeil

From: Katelyn Lynch <klynch@grandriver.ca>
Sent: February 23, 2021 2:23 PM
To: Emily MacNeil
Cc: Trevor Heywood
Subject: RE: New Hamburg Waterwheel Redesign Project

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Hi Emily,

I am sorry for the delay in response. I have cc'd the Resource Planner for New Hamburg as well as he would act as the file manager for any projects such as this that require a permit.

Trevor - feel free to add anything else that you think might be helpful for this project from the permitting perspective.

From the technical engineering review perspective, there are a few different things that I would need any permit application for a structure in the floodplain to demonstrate in order to be able to approve the proposed structure. We do not have strict design guidelines for a structure such as this, however we expect the proposal to be able to demonstrate that there are no negative impacts to either flooding or erosion from the proposed construction when compared with existing conditions. This would include reviewing the existing and proposed conditions hydraulic modelling for the return period events (1:5 year event through the 1:100 year event) and the Regional (Hurricane Hazel) events to ensure that the design does not cause a significant increase in flood elevations during all events (no greater than 0.1m increase), and does not obstruct flood flows. We would want the project proposal to demonstrate that the structure is secure during the Regional event flows so that it will not become an obstruction at a downstream bridge increasing the flood hazard or otherwise become a hazard during a flood. We would ensure that a significant amount of fill is not being brought into the regulatory (Regional - Hurricane Hazel) floodplain. The proposed conditions hydraulic model should be revised at the applicable cross-sections to reflect the size of the proposed structure, including any railings around it and any additional fill that will be placed.

For a permit application I would request that a short Hydraulic Analysis Memo be included along with a copy of the HEC-RAS modelling files. The memo would outline a design brief describing the project, any assumptions that were made during the hydraulic modelling, the changes that were made to the model to create the "proposed conditions" and summary tables comparing the existing and proposed flood elevations at cross-sections upstream, at and downstream from the project area demonstrating any changes to the flood elevations under all the design events (1:5 year, 1:100 year and Regional flows for example).

In the specific case of the New Hamburg Waterwheel we would not require that the wheel is floodproofed (ie walls to prevent floodwater reaching the wheel) as long as it is demonstrated that the wheel is secure during Regional flood flows.

I hope this helps, and if you have any questions, or need more clarification please feel free to call me at (519) 242-6692.

Katelyn Lynch, P.Eng.
Water Resources Engineer
Grand River Conservation Authority

-----Original Message-----

From: Emily MacNeil <emacne01@uoguelph.ca>
Sent: February 18, 2021 8:33 AM
To: Katelyn Lynch <klynch@grandriver.ca>
Cc: James Williams <jwilli29@uoguelph.ca>; Tara Lockhard <tlockhar@uoguelph.ca>; Adel Elkhodr <aelkhodr@uoguelph.ca>; Maxwell Fisher <mfishe13@uoguelph.ca>
Subject: RE: New Hamburg Waterwheel Redesign Project

Hi Katelyn,

I wanted to touch base with you to see if you had a chance to look into my inquiry regarding GRCA permits that would be required when rebuilding the New Hamburg Waterwheel. If you have not already, it would be much appreciated if you could look into this issue in the next week, as we plan to have this project wrapped up in approximately one month and any pertinent information regarding hurdles that may be faced during the project would be helpful to have sooner rather than later.

Thank you for your time.

Sincerely,

Emily MacNeil and group

-----Original Message-----

From: Katelyn Lynch <klynch@grandriver.ca>
Sent: February 3, 2021 7:47 PM
To: Emily MacNeil <emacne01@uoguelph.ca>
Subject: Automatic reply: New Hamburg Waterwheel Redesign Project

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The Grand River Conservation Authority (GRCA) is closely monitoring the COVID-19 situation in Ontario and taking steps to help prevent the spread of infection.

As of March 19, most GRCA staff are working remotely to help further reduce the spread of this virus. We will continue to serve the community as best possible over the phone and by email.

I am working from home with access to email and voicemail. I will respond to your message as soon as possible.

Best regards,

Katelyn Lynch, P.Eng.
Water Resources Engineer
Grand River Conservation Authority
400 Clyde Road Cambridge, ON N1R 5W6
P: (519) 621-2763 x2262
F: (519) 621-4844
www.grandriver.ca<<http://www.grandriver.ca>>

D2.2 Resource Planner Correspondence

Emily MacNeil

From: Trevor Heywood <theywood@grandriver.ca>
Sent: February 23, 2021 3:00 PM
To: Emily MacNeil
Cc: Katelyn Lynch
Subject: RE: New Hamburg Waterwheel Redesign Project

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Hey Emily,

Katelyn covered the key requirements. The only additional comments I have are that we require plans to show the proposed structure and any environmental mitigation details. That's what we stamp and attach to the permit to illustrate what's approved, and review for any follow-up inspections.

We'd need a detailed plan showing the extent of work and any grading, as well as an erosion and sediment control plan for the construction phase. If in-water work is required, there may be an applicable fisheries timing window that the project would need to adhere to, so we'd recommend screening the project with Fisheries and Oceans Canada (DFO) to determine the window (and that also needs to be noted on any construction plans).

If you have any other questions about permitting, feel free to ask. As a U of G alumni, I wish you luck with your project.
Regards,

Trevor Heywood
Resource Planner
Grand River Conservation Authority
519-621-2763 x2292 | theywood@grandriver.ca

D3. Schaeffler Correspondence

In addition to the following emails, supplementary files were provided by Schaeffler, and have been passed on to the New Hamburg Board of Trade.

From: James Williams <jwilli29@uoguelph.ca>
Sent: March-19-21 8:30 AM
To: Stoehr, Tom SN/ICD-I; Endres, Jurgen SN/ICD-I
Subject: Loading Cases for New Hamburg Waterwheel

**** CAUTION - email originated from outside the Schaeffler organization**

Hi Tom and Jurgen,

Sorry for the delay getting this to you. I've put together a few different loading cases that are possible, and hopefully they seem reasonable.

First, is the typical operating conditions – static loading on bearings is just the mass of the wheel acting directly down, with no axial loads: 34.5kN / bearing
Second, realistic maximum operating conditions – during a large flood with water moving at an angle to the wheel, and strong winds blowing perpendicular to the wheel: 34.6kN/bearing (radial) and 7.4kN/bearing (axial).
Third, maximum loading conditions – maximum flood conditions, strong winds, and a layer of ice coating the wheel: 38.9kN/bearing (radial) and 7.6kN/bearing (axial).

We expect the wheel to turn near 2 RPM, but due to a lack of information regarding the nozzle, it's very difficult to predict the actual rotational speed. We are going based off some videos we've seen of the wheel turning.

Let me know if there's any other information you need, I'll gladly help if I can. It's important to note that we are not Professional Engineers, and our calculations will need to be reviewed by the engineer who ends up signing off on the project. As such, these values are just for a preliminary assessment of the bearings to provide us with an idea of the expected cost and an estimation of the whether or not the original bearing type can be used again.

Thank you both for meeting with us, it was quite beneficial to learn about bearings from both of you.

Cheers,
Sebastien & Group

Hi James,

According to the submitted photos (IMG_1891.JPG + IMG_1892.JPG), the existing water wheel is supported by spherical roller bearings (SRBs) which are accommodated in split pillow block housings. Photo IMG-20121002-00223.jpg indicates that the housing part no. is SAF 534. Photo IMG_1891.JPG shows that the housings are equipped LER type triple seal rings (i.e. labyrinth seals).

The applicable SRB part no. for this housing size is 22234-E1-XL-K (see attached Medias data sheet). The standard shaft diameter for the SAF 534 housing unit is 5-15/16 in. It is, however, also available with other shaft sizes (e.g. 150 mm, 6"). Assuming that these units were originally supplied with the standard diameter of 5-15/16 in, then the following replacement parts would have to be ordered:

- SAF534X0515U housing assembly
- 22234-E1-XL-K spherical roller bearing
- H3134X515 adapter sleeve

Note: The housing material is gray cast iron. It is also available in ductile cast iron (SAFD534X0515U).

If a split pillow housing of the universal design (SAF...U) is ordered, then the delivery includes the housing, 2 labyrinth seals, 1 locating ring, and 1 endcover. With these accessories, it is possible to realize the following arrangements in any combination:

- locating or non-locating bearing arrangement
- continuous shaft (housing open on both sides) or non-continuous shaft (housing closed on one side).

The Medias data sheet for the complete assembly is found attached for your reference.

Our preliminary analysis for the locating 22234-E1-XL-K is found attached for your review. This analysis contains the 3 different load cases mentioned in your email. A time duration of 99% has been assumed for load case 1 and 0.5% for load cases 2 and 3. Based on the given loads and an operating speed of 2 rpm, the bearings appear to be over-dimensioned with respect to fatigue life. The bearing selection was most likely dictated by the shaft strength requirements. For load case 2, one of the bearing roller rows is not subjected to load. Even though this does not represent an optimum operating mode for SRBs, it often occurs in practice. In this case, it is not an issue owing to the relatively low bearing loads and the very low operating speed. If you have any questions regarding the BEARINX report, then please give me a call.

PS Can you please provide us with the grease brand name (and nominal base oil viscosity) that is used to lubricate these bearings. How often are the bearings lubricated? What relubrication quantities are used for these bearings?

Regards,

Juergen Endres, P. Eng.
Application Engineer

Schaeffler Canada Inc.
1375 North Service Road E, Unit 101
Oakville, Ontario Canada L6H 1A7
Tel: (905) 287-4930 / Cell: (905) 399-0310
Fax: (905) 829-9915

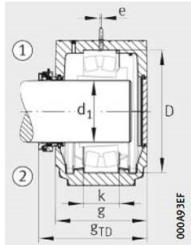
Hi James,

As an upgrade, you should consider using a ductile iron housing (equipped with a Taconite seal + end cover) at each end of the water wheel. A Taconite seal is more suitable for applications involving extreme operating conditions with heavy contamination.



Assuming that the units were originally supplied with the standard diameter of 5-15/16 in, then you would need to order the following parts:

- > 2 - SAFD534X0515U ductile iron housings
- > 2 - 22234-E1-XL-K spherical roller bearings
- > 2 - H3134X515 adapter sleeves
- > 2 - TA140X0515 Taconite seals



Taconite seal TA
Endcover EC

Regards,

Juergen Endres, P. Eng.
Application Engineer

Schaeffler Canada Inc.
1375 North Service Road E. Unit 101
Oakville, Ontario Canada L6H 1A7

Tel: (905) 287-4930 / Cell: (905) 399-0310
Fax: (905) 823-9915

Appendix E. Bill of Materials

Part Name	Quantity	Description	Notes:	Length (inch) (without cuts)	Approximate Final Weight, from SolidWorks (lbs)	Total Length (inch)	Total Weight (lbs)	
Weldments:								
Base Supports	40	3"x 0.1875" square tube		89.5			3580	
Base Conector	20	3"x 0.1875" square tube		33.69			673.8	
Central Rim Bars	40	2"x 0.1875" square tube		28.57			1142.8	
Main Bars	40	3"x 0.1875" square tube		151.23			6049.2	
Middle Conector	20	2"x 0.1875" square tube		14.73			294.6	
Middle Rim Bars	40	2"x 0.1875" square tube		50.47			2018.8	
Outer Rim Bar	20	2"x 0.1875" square tube		76.12			1522.4	
Bucket Conector	20	3"x 0.1875" square tube		20.88			417.6	
Endcap Plate	20	6"x0.25" plate		3			60	
		3"x 0.1875" square tube total				10720.6		
		2"x 0.1875" square tube total				4978.6		
Weldment Spoke Assembly	20				385.31		7706.2	
Hub:								Weight drawn
			The thickness of this piece could likely be reduced. Though further structural analysis is required.					
Drum Exterior	1	PL 155.875" x 3/8" Rolled into drum		131	2174.2	131	2174.2	
Support Rings	3	PL 49.125" x 3/8" Cut into circles		49.125	196.77	147.375	590.31	
Support bars	12	PL 3" x 1/4"		21	4.34	252	52.08	
Shaft Ends	2	Bar 8" OD		28	302.12	56	604.24	
Shaft Pipe	1	Pipe 8" ID		131	240.97	131	240.97	
						Hub total Weight:	3661.8	
						Weight of hub and weldments	11368	
Other:								
Buckets	20	Dependent on design chosen (see report)						
Only Applicable if some bolted connections are used:								
Nuts and Bolts								
Connection Plates:								
2inTubeBoltConnector	240	1.5"x1/4" plate cut and drilled		2.25	0.44	540	105.6	
MiddleConectorPlates	80	a set of 1.5"x1/4" plates cut and drilled	Bottom plate is shorter	2.6	0.5	208	40	
HubBoltPlate	80	5.5x1/4" plate cut and drilled		4	2.45	320	196	

Dear New Hamburg Board of Trade

It has been a very interesting journey so far, and an honor to be part of the local group working with the University of Guelph team to collectively come up with a design and plan, to put things into motion for the potential Replacement of the Iconic New Hamburg Waterwheel!

Myself and our team at Arcadian Projects, (Multi-Trade contractor and Energy Solutions provider, located here in Baden) would be happy to support and partner with the Board of Trade on their exciting venture of building a new Waterwheel.

I look forward to this project moving forward!

Regards;



Luke Shantz

President

June 1, 2021

New Hamburg Board of Trade
121 Huron Street
New Hamburg, ON
N3A 1k1

Subject: New Hamburg Waterwheel

Dear, New Hamburg Board of Trade

Iron Bridge Fabrication would be more than happy to support and partner with the Board of Trade on their exciting venture of building a new Waterwheel in New Hamburg.

Iron Bridge looks forward to this project moving ahead and assisting where required!

Sincerely,



Mercedes Mattes-Kroisenbrunner

mmattes@ironbridgefab.com

(519) 595 - 6830 Office Ex. 37

(519) 897 - 1523 Cell

(226) 779 - 4240 Fax



phone 519-662-1324
fax 519-662-2330
email: mail@nithvalley.com
www.nithvalley.com

June 2, 2021

Dear New Hamburg Board of Trade

I would be happy to support and partner with the Board of Trade on their exciting venture of building a new Waterwheel.

The Waterwheel has been a part of New Hamburg for more than 3 decades and has become *synonymous with downtown New Hamburg's landscape.*

The Waterwheel has even been incorporated in some town and local business signage.

I look forward to this project moving forward.

Regards

A handwritten signature in black ink, appearing to read 'J. Zehr'.

Bob Zehr, GSC

Nith Valley Construction Ltd.
568 Huron St.
New Hamburg, Ontario, Canada
N3A 1J9
Phone: (519) 662-1324
Fax: (519) 662-2330
Email: bob@nithvalley.com
www.nithvalley.com

2020-0600-01

June 3, 2021

Joe Figliomeni, CPA, CGA

New Hamburg Board of Trade
121 Huron Street
New Hamburg, ON N3A 1K1

Dear New Hamburg Board of Trade:

RE: New Waterwheel, New Hamburg, Ontario

At WalterFedy we believe that Community Building is one of our core values. We believe that we have a responsibility to contribute positively to the communities where we live and work. We know from our deep history of community involvement that giving back is vital to community health and growth, as well as to our own well-being. At WalterFedy/AEC, we pursue and engage in community-building activities both corporately and individually. WalterFedy has supported development of the new waterwheel in New Hamburg through contribution of time and professional advice to mentor the student team that developed the preliminary concept under consideration. We would be pleased to continue our involvement and support by partnering with the Board of Trade on their exciting venture of building a new Waterwheel.

We look forward to this project moving forward.

Best Regards,

WALTERFEDY



Garth Cressman, P.Eng., MBA, CEA
CEO
Partner

gcrestman@walterfedy.com
519.576.2150, Ext. 430
/ajw



Brian Verspagen, M.Sc., P.E., P.Eng.
Water Resources Practice Lead, Civil
Partner

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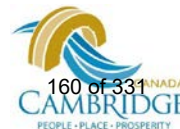
TransformWR:

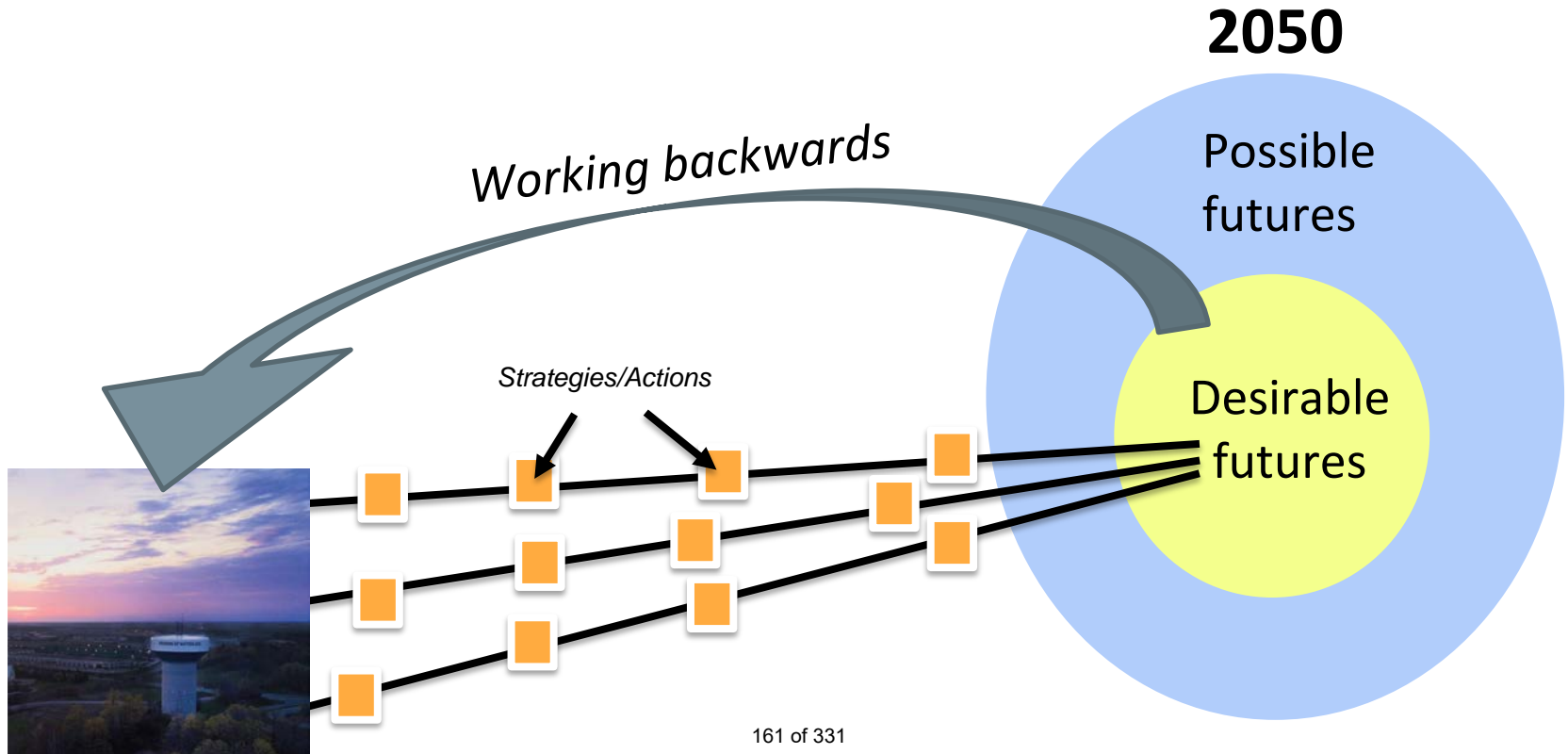
Waterloo Region's Transition to an
Equitable, Prosperous, Resilient
Low Carbon Community

Coordinate

Measure

Engage





Over **1,600** Community members across Waterloo Region contributed to this strategy!

36 = 900+ = 857

Events throughout
Waterloo Region

Community Members
engaged with

Community Suggestions

11

Focused Group
Conversations

50+

In-depth Interviews

460

Survey Respondents

5 = 84

Community Workshops

162 of 331

Participants

Over **100** Technical experts contributed to this strategy!

29

Municipal technical staff
workshop participants
from across Waterloo
Region

16

Community technical
expert workshop
participants

57

Technical experts
surveyed:

Including:

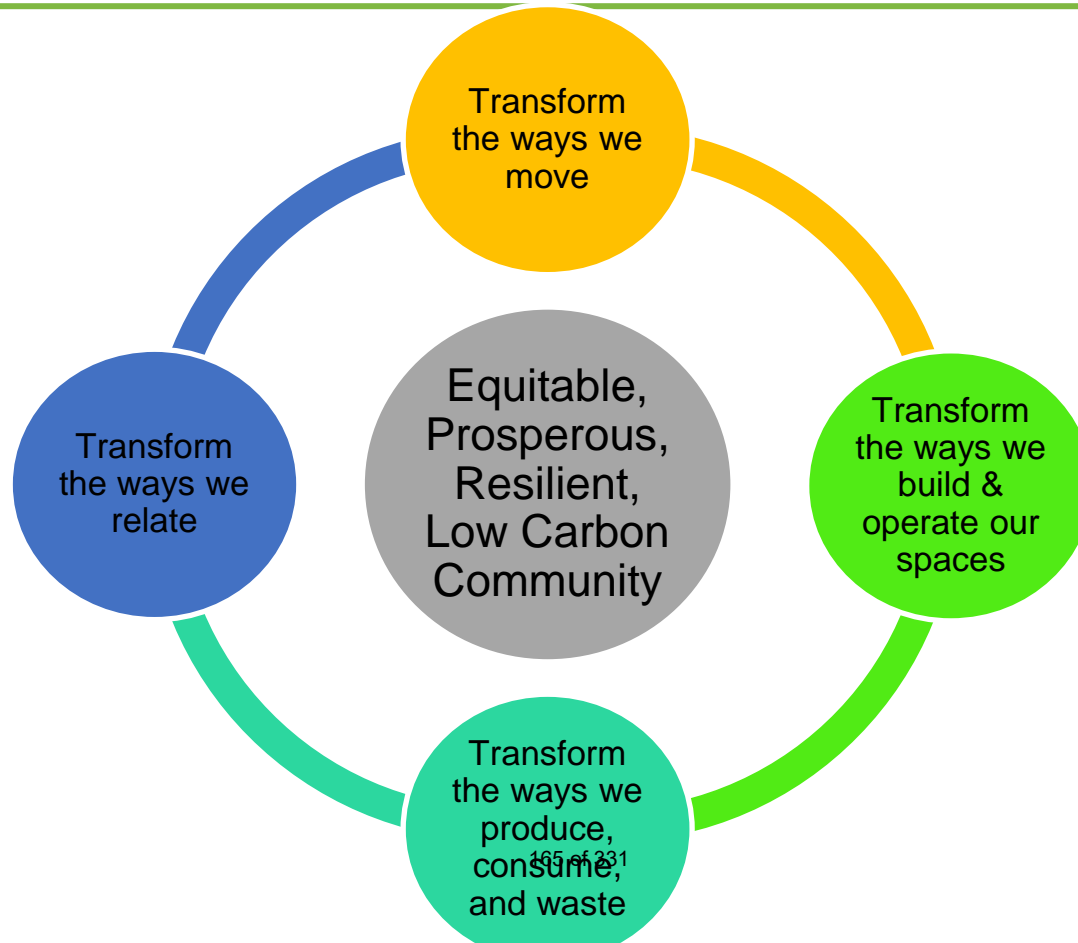
- Engineers
- Architects
- Utilities
- Local Municipalities
- External Municipalities
- Technical Solution Providers
- Universities and Colleges
- Association of Energy Engineers
- External Community Technical Groups
- Community Technical Leaders



SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD





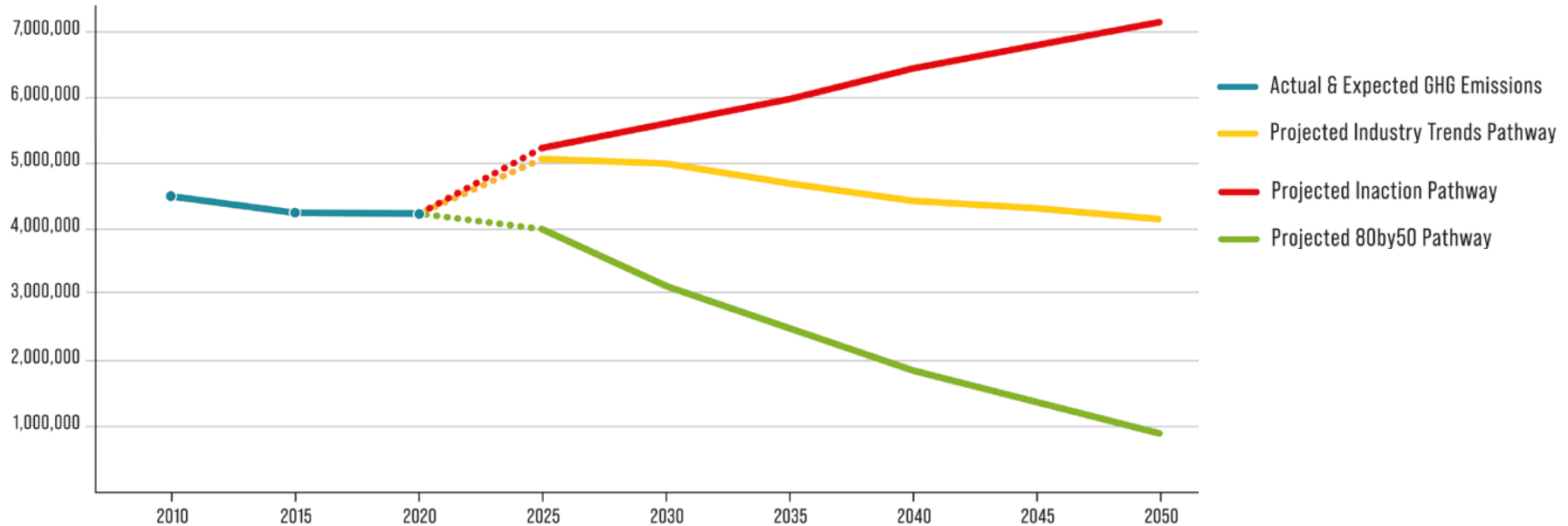


Figure: *Trajectory to achieve an 80% GHG emissions reduction (from 2010 levels) by 2050*

- Inaction:** Our population continues to grow as expected, but no further efforts are made to reduce our GHG emissions;
- Industry Trends:** Our population continues to grow as expected, and predicted industry trends help us reduce emissions per person over time;
- 80by50:** Our population continues to grow as expected, industry trends help us reduce emissions per person over time, and we make further conscious changes to meet our 80by50 reduction target.

Transformative Change #1: By 2050, most trips are taken using active transportation, with the support of a robust public transit system.

Key Milestones:

Results	2030	2050
Fewer trips between homes and workplaces	10%	40%
Fewer discretionary trips	4%	18%
Shorter trips	2%	10%
Switch to lower energy trips	10%	80%



Transformative Change #1: By 2050, most trips are taken using active transportation, with the support of a robust public transit system.

What is your municipality's role in helping us get there?

- Redesign, rebuild, and maintain our transportation system to prioritize active transportation:
 - Plan a network of active transit corridors.
- Support people to walk, cycle, or roll, and build a culture of active transportation and public transit ridership:
 - Connect people to intercity, multimodal, and emerging transportation solutions.



Transformative Change #2: By 2050, remaining personal and commercial vehicles are zero emissions vehicles.

Key Milestones:

Results	2030	2050
Switch to zero-emission vehicles	50%	99%



Transformative Change #2: By 2050, remaining personal and commercial vehicles are zero emissions vehicles.

What is your municipality's role in helping us get there?

- Switch commercial vehicles to zero emission vehicles:
 - Plan to transition fleets to zero emission vehicles.
 - Collaborate on region-wide electric vehicle strategy.
- Build a network of charging/refuelling infrastructure:
 - Provide electric vehicle charging stations in public spaces.
 - Require new residential parking spaces to be "EV-ready".



Transformative Change #3: By 2050, businesses and homes no longer use fossil fuels for space heating and cooling, and water heating.

Key Milestones:

Results	2030	2050
Buildings use electric heat pumps (or energy efficient equivalent)	20%	85%
Buildings use energy efficient and low-carbon water heaters	20%	85%
Reduction in fuel oil and propane use for home heating	100%	100%



Transformative Change #3: By 2050, businesses and homes no longer use fossil fuels for space heating and cooling, and water heating.

What is your municipality's role in helping us get there?

- Decarbonize building heating and cooling, and water heating:
 - Offer innovative loans for energy-related building upgrades.
- Build new buildings to be, or transition to, net-zero carbon:
 - Develop building standards to support zero-carbon development.



Transformative Change #4: By 2050, Waterloo Region uses less, wastes less, and no longer disposes of organic matter in landfills.

Key Milestones:

Results	2030	2050
Maintain the same level of methane emissions from our landfills as we had in 2010.	45,774 tCO ₂ e	45,774 tCO ₂ e

(tCO₂e = tonnes of carbon dioxide equivalent)



Transformative Change #4: By 2050, Waterloo Region uses less, wastes less, and no longer disposes of organic matter in landfills.

What is your municipality's role in helping us get there?

- Use less, and use it again:
 - Implement community waste reduction and circular economy campaigns.
 - Reduce unnecessary building demolitions and construction waste.



Transformative Change #5: By 2050, Waterloo Region has a thriving local food system built on local farming, and food production and processing that feeds much of our community.

Key Milestones:

Results	2030	2050
Maintain the same level of methane emissions from livestock as we had in 2010	213,559 tCO ₂ e	213,559 tCO ₂ e

(tCO₂e = tonnes of carbon dioxide equivalent)



Transformative Change #5: By 2050, Waterloo Region has a thriving local food system built on local farming, and food production and processing that feeds much of our community.

What is your municipality's role in helping us get there?

- Protect agricultural land and the local agricultural system:
 - Continue to develop and enforce robust land use planning protections for prime agricultural land.
- Support leadership in farming communities to plan and lead GHG reduction efforts:
 - Support the reduction of emissions from livestock, and the development of methane capture and energy production from manure.



Transformative Change #6: By 2050, Waterloo Region has leveraged reducing GHG emissions increase equity, prosperity, and resiliency for all

Key Milestones:

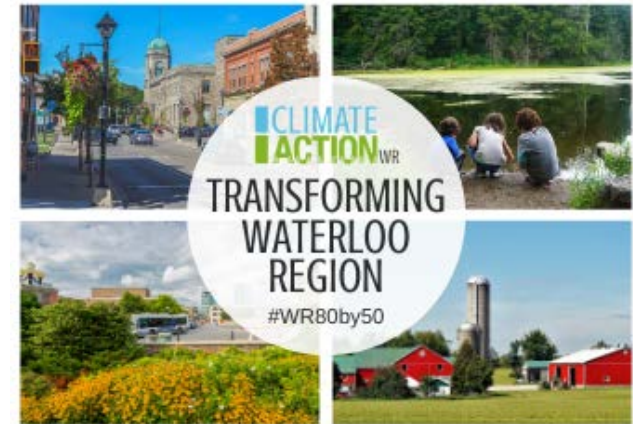
Results	2030	2050
Next steps: Establish metrics to measure progress in reducing inequities, and creating climate action solutions that increase equity	TBD	TBD
Locally produce energy from carbon neutral, renewable sources	4%	38%



Transformative Change #6: By 2050, Waterloo Region has leveraged reducing GHG emissions increase equity, prosperity, and resiliency for all

What is your municipality's role in helping us get there?

- Prioritize increasing equity throughout GHG reduction planning:
 - Establish metrics to measure progress on increasing equity through GHG reduction initiatives.
- Ramp up local renewable energy generation:
 - Collaborate on evaluating how to identify and protect optimal areas for renewable energy generation.
- Coordinate advocacy to senior levels of government.



QUESTIONS?



CORPORATE SERVICES

Staff Report

REPORT NO: COR 2021-022

TO: Council

SUBMITTED BY: Ashton Romany, CPA Manager of Finance / Deputy Treasurer
Sustainability Working Group

PREPARED BY: Ashton Romany, CPA Manager of Finance / Deputy Treasurer

REVIEWED BY: Sandy Jackson, Interim CAO

DATE: June 14, 2021

SUBJECT: TransformWR 80x50

RECOMMENDATION:

THAT the attached TransformWR strategy (Appendix A to report COR 2021-022) be endorsed as the community climate change mitigation strategy for the Township of Wilmot; and further;

THAT Council direct staff across the organization to develop detailed plans to implement the strategy, subject to available funding and resource allocations; and further,

THAT Council direct staff to work with local partners on implementation, monitoring, and reporting progress on the goals outlined in the strategy; and further,

THAT the Township of Wilmot advocate for provincial and federal support and action to achieve the community transformations outlined in the TransformWR strategy.

SUMMARY:

This report outlines the TransformWR strategy document that aims to achieve 80% reductions in emissions by 2050 in Waterloo Region.

BACKGROUND:

Over the past two years, staff representatives of the eight regional municipalities have worked together with REEP Green Solutions and Sustainable Waterloo Region, through the ClimateActionWR collaborative to produce a broad umbrella strategy called TransformWR. Under this strategy, municipalities, businesses, organizations and households will work to transition our community off of fossil fuels.

Based on extensive community and technical consultation and expertise, the strategy was developed using a “backcasting” approach, identifying a community vision for Waterloo Region as a low-carbon community in 2050, and working backward to identify what is required to achieve this. The recommended 80by50 “technical pathway” describes what we need to do to reduce our emissions, and how fast we need to do it.

Based on this technical pathway, the draft strategy identifies six Transformative Changes that must be achieved to reduce emissions and achieve an equitable, prosperous, resilient low-carbon community by 2050. Each transformative change is supported by strategies and actions to achieve it.

The Six Transformative Changes to be achieved by 2050 are as follows:

- 1) Majority of travel is taken using active transportation, with the support of a robust public transit system.
- 2) Remaining personal and commercial vehicles are zero emissions.
- 3) Businesses and households no longer use fossil fuels for heating and cooling, and water heating.
- 4) Waterloo Region uses less, wastes less, and no longer disposes organic matter in landfills.
- 5) Waterloo Region has a thriving local food system built on local farming and food processing that feeds much of our community.
- 6) Waterloo Region has leveraged reducing GHG emissions to increase equity, prosperity, and resiliency for all.

As an interim target, the strategy contains a 10-year plan for work to be completed in the next decade to:

- 1) Reach an interim target of 30% by 2030
- 2) Lay the groundwork to substantially transform Waterloo Region by 2050.

Bold and immediate action is needed to achieve GHG reductions, and to ensure that we are doing everything we can locally to reduce GHG emissions and do our part in achieving the Paris Agreement objectives. With increased support from other levels of government, it may be possible to exceed this target.

In April 2021, the Sustainability Working Group (SWG) received a presentation on the strategy by Samantha Tremmel from ClimateActionWR. This initiative was then fully supported by the SWG.

REPORT:

Municipalities are key capacity holders in the transition to a low-carbon community, and as a result, this strategy is intended to guide bold and immediate action by municipalities across Waterloo Region over the next 30 years. The strategy expects the same bold and immediate action from other organizations, businesses, and individuals, and identifies ways to support them in this work. A summary of the actions that Wilmot is responsible for as a co-lead, collaborator, supporter, and participating organization is available in Appendix B.

The TransformWR strategy sets out aggressive actions and timelines to meet the 2030 target of 30% reduction in greenhouse gas emissions. The strategy identifies 78 actions required to reach that target. Rural areas in the region, including Wilmot, are identified as the co-lead for 24 actions. Wilmot will work collaboratively with area municipalities on these items where applicable.

Implementing actions identified in the strategy will require funding as approved or secured by the municipality, in addition to anticipated financial support from higher levels of government.

Achieving the strategic goals in a timely and effective manner requires the staff capacity and expertise to implement and advise on the actions. Moving forward with the strategy, consideration for a partnership with Regional Townships to share in resources to achieve best outcomes, as well as benefit from efficiencies of scale, may be required.

Area Municipality Communication and Public/Stakeholder Engagement:

Community consultation was a key component of the project throughout the strategy development process. Approximately 1,600 community members were engaged during the strategy development process.

More recently, the draft TransformWR strategy was available for public consultation on the EngageWR platform from March 10 to April 12, 2021. During this period, more than 3000 individuals visited the project page, and more than 500 downloaded the full strategy document. The feedback survey was completed by 364 visitors. A summary of what was received in this final consultation, and the changes made in response are included as Appendix C.

Members of the ClimateActionWR collaborative team have facilitated consultation with staff throughout their municipalities, and staff at all eight Municipalities are recommending approval of the strategy by their councils.

Implementation:

The implementation plan would detail actions that could be accomplished with existing township resources as well as identify additional resources that would be required to accomplish the remaining actions.

Each department will be asked to consider and include actions outlined in the TransformWR strategy in their annual budgets for council approval.

ALIGNMENT WITH THE TOWNSHIP OF WILMOT STRATEGIC PLAN:

This strategy is aligned with the Strategic Plan goal of Environmental Protection.

FINANCIAL CONSIDERATIONS:

ClimateActionWR, with support from the Region and all Area Municipalities, received funding from the Federation of Canadian Municipalities (FCM) through its Transition 2050 program to develop the TransformWR strategy. Annual operating funding for the ClimateActionWR program is provided to Reep Green Solutions and Sustainable Waterloo Region by the Region of Waterloo and the Cities of Cambridge, Kitchener, and Waterloo.

Implementing of several actions identified in the strategy will require funding as approved by the municipality, in addition to anticipated financial support from higher levels of government.

Future consideration of area Townships sharing resources to implement the actions outlined in the strategy may demonstrate a need for additional funding. Any funding needs will be included in future operating and capital budgets.

ATTACHMENTS:

Appendix A - TransformWR: Waterloo Region's transition to an equitable, prosperous, resilient, low carbon community TransformWR Strategy

Appendix B - Summary of Municipal Actions - Township of Wilmot

Appendix C – Final Community Consultation Results Summary

Appendix D - Frequently Asked Questions (FAQs) about TransformWR

CLIMATE ACTION_{WR}



TRANSFORM_{WR}

Waterloo Region's Transition to an
Equitable, Prosperous, Resilient Low Carbon Community

“If you can do something about it, why wouldn’t you want your Earth to live longer?”



Edward, 10 years old

I. EXECUTIVE SUMMARY

TransformWR is Waterloo Region’s community-wide response to the global climate crisis. Understanding that we need to take action as a community, the following outlines our long-term strategy to achieve an 80% local greenhouse gas emission (GHG) reduction target (based on 2010 levels), and identifies local action needed to reduce our emissions by 30% by the year 2030. We must take bold and immediate action to ensure that we are doing everything we can locally to exceed these targets and do our part in achieving the Paris Agreement objectives.

Our **call to action** is to transform our community, in the ways we move, the ways we build and operate our spaces, the ways we produce, consume and waste, and the ways we relate to one another. Six **Transformative Changes** will guide us along that journey:

- 1 By 2050, most trips are taken using active transportation, with the support of a robust public transit system;
- 2 By 2050, remaining personal and commercial vehicles are zero emission vehicles;
- 3 By 2050, businesses and homes no longer use fossil fuels for space heating and cooling, and hot water heating;
- 4 By 2050, Waterloo Region uses less, wastes less, and no longer disposes of organic matter in landfills;
- 5 By 2050, Waterloo Region has a thriving local food system built on local farming and food production and processing that feeds much of our community; *and*
- 6 By 2050, Waterloo Region has leveraged reducing GHG emissions to increase equity, prosperity, and resiliency for all.

For each Transformative Change, a set of strategies and action items have been identified, along with key **milestones** to help track our progress. The outcome of this collective action will lead to achieving our **vision for 2050**, and **ultimately** transform Waterloo Region into an equitable, prosperous, resilient low carbon community.

Every community member, business, organization, and local municipality has an important role to play in Waterloo Region’s transition to a low carbon community. This strategy is meant to influence all future planning. Official plans, corporate plans, organizational planning etc. should look to this document, and the work outlined in the following should be integrated into all planning processes for the next 30 years, to align our community with success. Achieving and exceeding the goals outlined in this plan also depends on bold and immediate action by other levels of government beyond Waterloo Region. As a result, advocacy is a key part of this strategy. This is a launching point for the next 30 years of local climate action, and the years ahead of us are where the real work comes into play.

CALLS TO ACTION

The things we do to help us achieve the milestones & outcomes

TRANSFORMATIVE CHANGES

The big changes that need to occur by 2050

MILESTONES

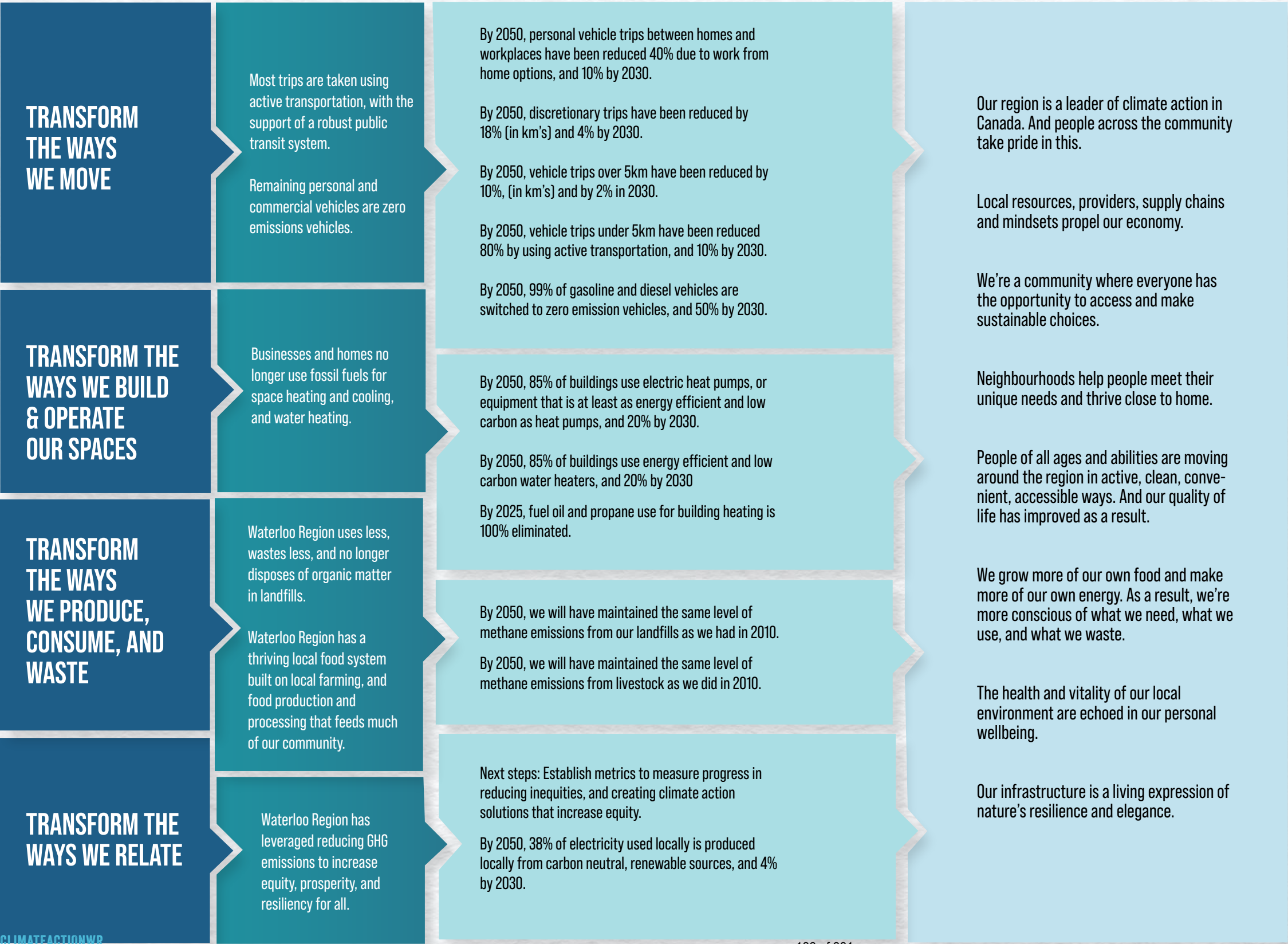
The measurable results of our actions

VISION FOR 2050

The outcomes of our transformed region in 2050

THE ULTIMATE WHY

The community benefits we're working towards



EQUITABLE
PROSPEROUS
RESILIENT

II. CLIMATEACTIONWR COLLABORATIVE

This work was made possible through the collaborative efforts of eight municipalities, local organizations, and community members.

The 10 organizations formally completing the project through the ClimateActionWR collaborative are:

- The City of Cambridge
- The City of Kitchener
- The City of Waterloo
- Reep Green Solutions
- The Region of Waterloo
- Sustainable Waterloo Region
- The Township of North Dumfries
- The Township of Wellesley
- The Township of Wilmot
- The Township of Woolwich

The project has been led by a committee composed of representatives from each:

CURRENT COMMITTEE MEMBERS:

- Lisa Keys, Manager of Facilities, City of Cambridge
- Claire Bennett, Corporate Sustainability Officer, City of Kitchener
- Anna Marie Cipriani, Sustainability Coordinator, City of Waterloo
- Samantha Tremmel, Plan Manager, ClimateActionWR
- Mara Mackay, Project Coordinator, ClimateActionWR
- Mary Jane Patterson, Executive Director, Reep Green Solutions
- Kate Hagerman, Manager of Environmental Planning & Sustainability, Region of Waterloo
- Kate Daley, Environmental Sustainability Specialist, Region of Waterloo
- Tova Davidson, Executive Director, Sustainable Waterloo Region
- Michelle Poissant, Recreation & Community Services Coordinator, Township of North Dumfries
- Wendy Huber, Recreation/Fire Department Administrative Assistant, Township of Wellesley
- Ashton Romany, Manager of Finance / Deputy Treasurer, Township of Wilmot
- Ann Roberts, Environmental Coordinator, Township of Woolwich

PAST/CONTRIBUTING MEMBERS:

- Paul Wilms, Sustainability Planner, City of Cambridge
- Michelle Lee, Senior Policy Planner, City of Waterloo
- Sue Arndt, ClimateActionWR
- Katarina Milicic, ClimateActionWR
- Sarah Fries, ClimateActionWR
- Andreas Mertes, ClimateActionWR
- Matthew Day, WR Community Energy

III. LAND ACKNOWLEDGMENT

We acknowledge that Waterloo Region, including the three cities and four townships, is located on the traditional territory of the Haudenosaunee, Anishnaabe and Neutral People. We recognize the enduring presence of the Indigenous people with whom we share this land today, their achievements and their contributions to our community. We value their traditional knowledge about how to live sustainably on this land that we share and will leave for our future generations. As

a community we are committed to engage in the necessary learning, building of relationships, and action required to work towards reconciliation between Indigenous and non-Indigenous peoples in our community.

To learn more about the importance of land acknowledgements and the Indigenous communities on this territory, you can visit the website of LSPIRG Know the Land.

IV. ACKNOWLEDGEMENTS

The ClimateActionWR collaboration acknowledges the input of many individuals and organizations that participated in the development of this strategy.

In particular, we acknowledge the organizations below for their valuable contributions to this work:

- Federation of Canadian Municipalities (FCM). ClimateActionWR received financial assistance to develop this Community Climate Action Strategy from the FCM Transition 2050 Grant
- Unless Design Partners
- WalterFedy
- Viessmann Centre for Engagement and Research in Sustainability (VERiS)
- McDiarmid Climate Consulting
- ClimateActionWR Sector Committee Members
- ClimateActionWR Street Team Volunteers

V. A MESSAGE FROM THE CLIMATEACTIONWR COLLABORATIVE

First and foremost, we want to thank the members of our community who helped shape this plan, whether it was through sharing your vision for 2050, participating in a workshop, having a conversation, or through climate action efforts of your own or as part of our community.

We hope you, the reader of this document, see yourself in this better future we are committed to creating. The vision and actions outlined in this document are not only included to make your future, and that of your family, better in years to come. They are also included to help you chart your path to being part of the creation of this better community for all. We hope you are inspired by what you read, that you are encouraged to take action in your daily lives as you travel through our community, and in your work and home life as well. You are an essential part of this plan. You have inspired it and all that worked on it.

Now is the time to act! Please read through this document, look for the ways you see yourself in it, and join the entire community in helping to create a better future for us today and for generations to come. Together we can build a stronger, healthier, more sustainable future!

-The ClimateActionWR Collaborative Partners Committee

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INTRODUCTION

TransformWR is Waterloo Region’s strategy to do our part in addressing climate change, in order to create a low carbon community that is equitable, prosperous, and resilient.

What’s laid out in the following is a pathway for how our community will build upon its history of climate action and show leadership in reducing greenhouse gas emissions that lead to climate change.

The opening sections provide context for how this strategy was developed, and how it should be used. This includes the foundations this strategy must build from, the challenges

it must address, and the opportunities it must realize. The section entitled **Climate Change and Climate Action**, frames the global and Canadian contexts within which our region is situated. **Understanding our Target** and **Our Journey to ‘80by50’** lay out the critical work that’s already happened and demonstrate momentum for an ambitious 30-year agenda for achieving Waterloo Region’s greenhouse gas (GHG) reduction target of 80% by the year 2050.

This agenda is nothing short of transformational. It is simultaneously seeking to honour our history and reconcile our past, embrace the interconnectedness of our economic, social and ecological realities, and leverage our commitment to a more just future for both people and the planet.

It’s a community plan.



More than 1600 community members informed this work through events, workshops, interviews, focus groups, and surveys. Efforts were made to reach stakeholders across the entirety of Waterloo Region, hearing from people from a variety of backgrounds, ages, sectors, job titles, and education levels. See Appendix A for the full Community Engagement Summary.

This work is directly informed by widespread community engagement that brought to light the community’s fears, hopes, and ideas for what a flourishing region ought to look like in 2050. Regardless of perspective, everyone consulted influenced and informed this work.

What emerged were glimpses of a hopeful future—[Our Vision for 2050](#)—that helps us visualize the reality of meeting our targets.

The vision led to a set of common elements—**Principles**—that serve as guidelines for making decisions and keeping us on track when unexpected obstacles and outcomes arise. They are meant to help when we get lost in the complexity of a problem, or when we need a reminder about what’s most important.

FYI: Throughout this document, when we refer to ‘Waterloo Region’ or ‘the region,’ we are describing the entire community in the geographic area. When we refer to ‘the Region’ or ‘the Region of Waterloo,’ we mean the Regional Municipality of Waterloo, which is the upper-tier government in this area.

Neither the vision nor the principles contain the exact series of steps to reach our goals. To guide this, **Transition to a Low Carbon Community** outlines the **6 Transformative Changes** our community must collectively make. It outlines what we need to achieve as a community to make this vision a reality, and what we expect to see, feel and experience along the way.

There will be many obstacles and challenges that face our community in the coming decades. *TransformWR* sees the connections between these obstacles and the climate reality we face and takes a holistic approach to turning our vision of 2050 into reality.

CLIMATE CHANGE AND CLIMATE ACTION

Climate change is a global problem with local causes and local solutions. The United Nations Framework Convention on Climate Change (UNFCCC), explains climate change as the changes in our climate that are directly or indirectly associated with human activity. The results of these activities alter the balance of our global atmosphere and lead to increasing global temperatures beyond naturally occurring climate variability.

That explanation leaves out a critical piece: it’s harmful. For people and all living things. It’s also only part of the story. Climate change is a signal that this planet is out of balance in devastating ways.

Without doubt, the biggest contributor to climate change is greenhouse gas emissions (GHGs). Many GHGs come from natural sources, but the accelerated changes in our climate that we are seeing are a result of human activity and the systems we have created, mostly as a result of burning fossil fuels for energy (see section titled: Transforming our Energy and our Community).

As we move forward—as individuals, as communities, as nations and as a species—we must think of climate change and climate action in two ways: adapting to the changes in our climate that are already happening and are now out of our control, and mitigation to focus on the causes of climate change and reduce GHG emissions for us and for future generations. This strategy focuses specifically on mitigation.

In 2015, 196 parties around the world agreed to the terms of The Paris Agreement. This international agreement outlines a long-term goal to limit average global temperature increases below 2°C, with a target of 1.5°C compared to pre-industrial levels. The Pan Canadian Framework on Clean Growth and Climate Change is Canada’s approach to fulfilling our Paris Agreement commitments. At the provincial level, the Made-in-Ontario Environment Plan aims for a 30% GHG reduction by 2030 (below 2005 levels). To do our part locally, Waterloo Region has committed to our ‘80by50’ target. At the time of writing, there is crucial momentum building for even more significant targets by provincial and federal levels of government.

This is a global challenge with local causes and local solutions, which is cause for optimism, inclusion, and hope. *TransformWR* is our strategy to significantly transform many parts of our community—for the better, and shows that we can do our part in Waterloo Region to address this global challenge.

UNDERSTANDING OUR TARGETS

This strategy is built on two distinct GHG emission reduction targets, both of which are based on 2010 levels; our long-term ‘80by50’ target to reduce GHG emissions 80% by 2050, and our short-term ‘30by30’ interim target to reduce GHG emissions 30% by 2030 (See ‘Our Path to 2030’ for details on this target).

When we talk about reducing GHG emissions, we start with an inventory, which is how we officially count our local emissions. Our first community GHG emissions inventory was based on 2010

data, and we have used that as our baseline emissions, from which we compare our reduction efforts against over time.

A follow up inventory was completed in 2015, and our next will be based on 2020 data and published in 2022.

Historically, our local inventories have been conducted by collecting data from five primary sectors:

- Transportation
- Workplaces / Schools
- Homes
- Agriculture
- Waste

What produces one tonne of CO₂e?

25
ROUND TRIPS FROM UPTOWN WATERLOO TO DOWNTOWN TORONTO WITH A TOYOTA COROLLA



2
ROUND TRIP FLIGHTS FROM TORONTO (YYZ) TO VANCOUVER (VYR)



Our GHG emissions are reported as a measure of carbon dioxide equivalent (CO₂e). This is a term used to describe different GHGs in a common unit. Greenhouse gases like methane (CH₄) and nitrous oxide (N₂O), each have different impacts on climate change. For example, 1 tonne of methane has the same impact on climate change as 25 tonnes of carbon dioxide, so it is expressed as 25 tonnes of CO₂e.

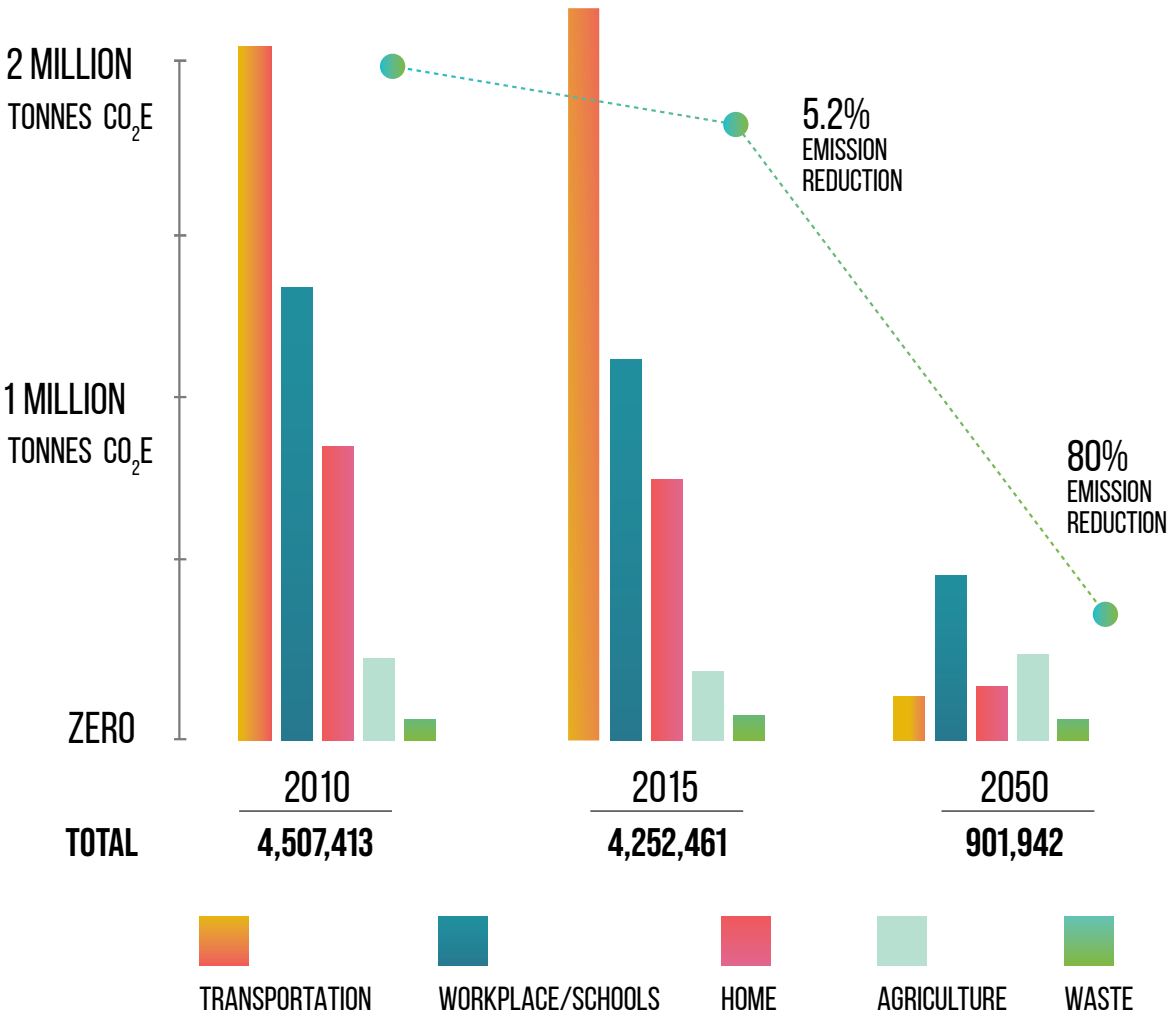


Figure 1: Results of Waterloo Region’s 2010 and 2015 GHG inventories show a local GHG reduction of 5.2%. To achieve our long-term 80% reduction target, significant collaborative efforts will need to be made over the next 30 years.

Transportation, workplaces, and homes have been the largest contributors of GHGs in our local inventories, which reflects how energy is used in our community. With 94% of our emissions coming from these sources, TransformWR prioritizes how we use energy.

Achieving and exceeding the ‘80by50’ and ‘30by30’ goals outlined in this strategy will depend on bold and immediate action by provincial and federal levels of government, and therefore advocacy is a key part of this work.



OUR JOURNEY TO 80BY50

CLIMATEACTIONWR IN THE COMMUNITY

It's often said that a long journey begins with a single step.

In Waterloo Region, our community has long understood the imminent need for local climate action. Fortunately we have already taken many steps on the journey towards being a low carbon community.

For over a decade, **we've developed a culture of collaboration around climate action.** Stemming from an initial collaboration between Reep Green Solutions, Sustainable Waterloo Region, and the Region of Waterloo, ClimateActionWR was born to serve the community by working to mitigate climate change by reducing local greenhouse gas emissions at their source. In 2013, the Cities of Cambridge, Kitchener and Waterloo, and the Region of Waterloo collaborated to develop our region's first climate action plan, *A Climate Action Plan for Waterloo Region*. This provided the foundation of our baseline inventory and aimed to achieve a local GHG reduction target of 6% by 2020.

Through careful measurement and the completion of our second GHG inventory for 2015, the results of which were released in *Our Progress, Our Path*, we've **built a thorough understanding of our local climate impact** and where our community can take meaningful action.

Since then, local sustainability networks have grown significantly. Broader and deeper partnerships on climate action now exist among local organizations and all eight municipalities.

We've built momentum for change across the region. Over the last ten years, our emissions inventories, reduction targets, and action plans have been key drivers for major projects in diverse sectors across the community. They've informed projects and initiatives such as:

- ION Light Rail Transit (LRT)—an electrified rail service to meet our community's future transportation needs

- evolvl—Canada’s first certified zero carbon building
- Expansion of our local publicly accessible EV charging station network
- Completion of over 2,000 home energy retrofits and ongoing advocacy to federal and provincial governments for greater incentives to support home energy retrofits
- Project Neutral—an online tool for calculating household emissions
- Expansion of the Region’s green bin and waste management programs

We’ve shown climate leadership. Building on our first community target, in 2018 the organizations and municipalities in the ClimateActionWR collaborative began looking ahead and worked to establish a new long-

term target. The resulting ‘80by50’ target was endorsed by each municipal council across the region: the Region of Waterloo, Cities of Cambridge, Kitchener, and Waterloo, and the Townships of North Dumfries, Wellesley, Wilmot, and Woolwich. Recognizing our unique collaborative strength and innovative approaches to planning, the Federation of Canadian Municipalities awarded ClimateActionWR one of only thirteen ‘Transition 2050’ grants across Canada to support this work.

This local commitment and federal support led to the development of *TransformWR* — a comprehensive community strategy for transforming our region over the next 30 years.

HOW THIS STRATEGY WAS DEVELOPED

This work enabled us to think and plan differently than we had in the past—where we had worked only with the assets we had and towards goals that felt easily achievable. This time, we took a more ambitious approach, leveraging a backcasting methodology: a planning method that starts with defining a desirable future and then works backwards to identify the actions necessary to connect that future to the present. This meant looking to global, federal, and provincial targets, as well as other municipalities across Canada, to understand our local responsibility in the fight against climate change. That led us to defining our ‘80by50’ target. Informed by our local community, we articulated a transformative vision for 2050, which our work would direct us toward achieving. With input from local, national, and global experts, the barriers, opportunities, and actions to get us to our vision were identified. From there, the elements were brought together to form our long and short-term plans.

DEVELOPMENT OF THIS STRATEGY INVOLVED 3 KEY PHASES:

PHASE 1

Starting with community engagement, we heard from more than 1600 community members across the entire region. Through events, workshops, interviews, focus groups, and surveys, we heard from members of our community about what they wanted the low carbon future of Waterloo Region to look like, and their insights on how we can get there. This work directly informed **Our Vision of 2050**, and the **Principles for Designing a Low Carbon Future**.

PHASE 2

Through workshops, surveys, and conversations with over 100 technical experts, locally, nationally, and internationally, we learned about the existing and emerging solutions and technologies that could be leveraged to achieve our goal and vision.

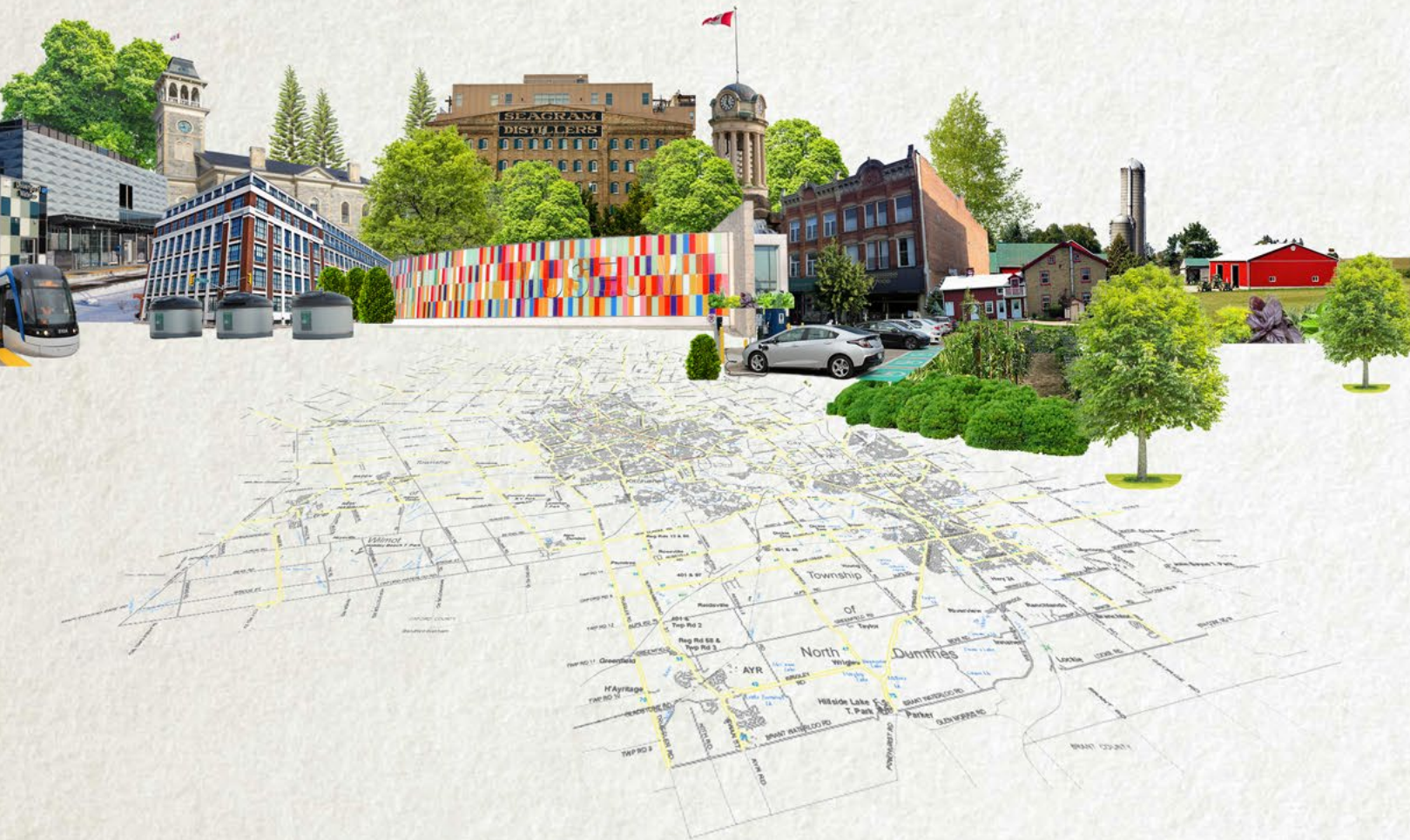
PHASE 3

Based on both the community and technical data and insights, followed by cross sector collaboration, the pathway to guide our **Transition to a Low Carbon Community** was developed. Based on this pathway, we identified **6 Transformative Changes to create an Equitable, Prosperous, Resilient Low Carbon Community**. These are the six things we must change by 2050 to achieve our vision and meet our GHG reduction goals. For each **Transformative Change**, a set of strategies were identified, as well as the short-term action items used to inform our **10-year plan**.



Throughout the development of this strategy, ClimateActionWR participated in workshops on sustainability justice delivered by the Viessmann Centre for Engagement and Research in Sustainability (VERiS). Through this, we began our sustainability justice journey, to help ensure that an equity and inclusion lens is applied to this work, and will be a critical element of the implementation stages in the years to come. We acknowledge that we are at the beginning of this journey, and we will continue to take active strides to ensure equity and sustainability justice are a core focus of local climate action.

PART I: TRANSFORM^{WR} 30 YEAR STRATEGY



OUR VISION FOR 2050

Directly informed and inspired by what we heard from the community, what follows is the hopeful vision of what Waterloo Region will look, feel and operate like in 2050.

As a set, these statements reflect how the community sees GHG reductions integrated into other parts of a healthy region. If we transform the ways we move, the ways we build and operate our spaces, the ways we produce, consume and waste, and the ways we relate to one another, we will create a more equitable, prosperous, and resilient community. These statements give us a sense of how we'll know we've reached our goals—beyond the numbers. All of these statements reinforce one another. They work together illustrating *a web of benefits that enriches the entire community in ways far beyond meeting a GHG target.*

When reading them, imagine yourself standing in our community in 2050. It's not crystal clear and no one can predict every detail, but these vision statements describe glimpses of a future that is ours to create.

IN OUR VISION OF THE FUTURE...

OUR REGION IS A LEADER IN CLIMATE ACTION IN CANADA. AND PEOPLE ACROSS THE COMMUNITY TAKE PRIDE IN THIS.

Waterloo Region is a national example of a community that reorganized itself for the betterment of all life. People tell stories about how tackling climate change and exceeding GHG reduction targets was a challenge the region rose to, collectively. Our legacy continues to be one of innovation, of coming together, and of mobilizing around need. Our response to climate change and our active stewardship of our environmental home fuels economic prosperity, binds the community together and makes people want to live, work, and play in Waterloo Region.

WE'RE A COMMUNITY WHERE EVERYONE HAS THE OPPORTUNITY TO ACCESS AND MAKE SUSTAINABLE CHOICES.

We take pride in our collective action and we have a hopeful sense of what's possible because we lift everyone together. We have systems that are not just better for the same people, they're better for everyone, especially equity-deserving groups and those who were disadvantaged in the past. Beyond our region, we're known for the outcomes of our integrated approach to economic, environmental and social wellness. We're good welcomers and caretakers. People feel safe, seen, and cared for, and in turn take care of the land. Climate responsibility is second nature—an accessible default for everyone. We continue to make it convenient and financially accessible for people to act in a sustainable way, which reinforces sustainable lifestyles.

PEOPLE OF ALL AGES AND ABILITIES ARE MOVING AROUND THE REGION IN ACTIVE, CLEAN, CONVENIENT, ACCESSIBLE WAYS. AND OUR QUALITY OF LIFE HAS IMPROVED AS A RESULT.

We have a reliable network of mobility options, and safe, seamless infrastructure that supports active modes of transportation. We have reduced our reliance on fossil fuels and single occupancy vehicles to move us around the region. For trips that can't be taken using low carbon and active modes of transportation, electric vehicles are an affordable option and regional infrastructure supports their use. There are fewer parking lots, select car-free streets, and the region's arteries reflect a focus on moving people, rather than traffic. As our modes have become low-energy and low carbon, we see and experience other benefits that move us towards healthier families and community.

WE GROW MORE OF OUR OWN FOOD AND MAKE MORE OF OUR OWN ENERGY. AS A RESULT, WE'RE MORE CONSCIOUS OF WHAT WE NEED, WHAT WE USE, AND WHAT WE WASTE.

We participate in local food and energy systems. These systems are no longer hidden from view. People's practices and choices are influenced by this visibility—it's changed the way we produce, access, distribute, consume, and waste. Individual consumption habits are evidence of our focus on nourishment and need rather than excess and status. Our regional self-reliance makes us more resilient and adaptable to a constantly changing world.

THE HEALTH AND VITALITY OF OUR LOCAL ENVIRONMENT ARE ECHOED IN OUR PERSONAL WELLBEING.

There is momentum for environmental stewardship and we understand its link to whole community wellness—physical, mental and emotional. Climate-aware action is folded into the ways we take care of ourselves and each other. We're now seeing and feeling the ripple effects of lots of time spent outdoors, of an increased sense of safety and belonging in those spaces, and of balance. Movement throughout the region is primarily active, clean and shared, and fuels a holistic approach to personal health and the health of our relationships. The look, feel, and design of the region are evidence of this shift—we see it in our transitways, our gathering spaces, and the places between our destinations. Access to green spaces is available to all members of our community in a fair and equitable way.

WE GROW MORE OF OUR OWN FOOD AND MAKE MORE OF OUR OWN ENERGY. AS A RESULT, WE'RE MORE CONSCIOUS OF WHAT WE NEED, WHAT WE USE, AND WHAT WE WASTE.





LOCAL RESOURCES, PROVIDERS, SUPPLY CHAINS AND MINDSETS PROPEL OUR ECONOMY.

Economic prosperity has grown out of community wellness and environmental health—our primary measures of regional prosperity. The way we work and the way we live are integrated in healthy, sustainable, and equitable ways. Individual, isolated stories of winning are rare—the culture doesn’t produce them nor does it see them as virtuous. What we have grown is our community security and connectedness. People feel cared for here—all people—and we in turn extend that care to the land. We shifted—knowingly or unknowingly—our desires. We strive for less material and wealth accumulation and more relationships and connectedness. This shift has changed our orientation towards ownership—of things, of property, of ideas—and fuelled economies of sharing and access. We’ve embodied the idea of thinking globally and acting locally.

OUR INFRASTRUCTURE IS A LIVING EXPRESSION OF NATURE’S RESILIENCE AND ELEGANCE.

Our infrastructure—old and new—is designed and built to connect people and the natural world. We see it in our choice of materials, in our expectations about performance, durability and impact, and in our practice and craft of engineering, planning, and design. The boundaries between “built” and “natural” worlds have softened. We see more green. We see more life. Vibrant urban forests and outdoor spaces support new relationships between people and the planet and perpetuate our awareness of, and action towards, reducing impact while ensuring resilience to a changing climate.

NEIGHBOURHOODS HELP PEOPLE MEET THEIR UNIQUE NEEDS AND THRIVE CLOSE TO HOME.

We’ve built and organized into a collection of complete neighbourhoods, each with a unique assortment of businesses and services meeting people’s daily needs. We rely on each other, in part because we’ve recognized our individual limits. We look to nature for inspiration and are forming harmonies of urban, social and economic biodiversity. Connected, walkable, complete neighbourhoods encourage and sustain thriving micro-sharing economies. These economies promote strong relationships, accessibility, and diversity. In our neighbourhoods, all residents feel they belong and are valued. We’re actively cultivating a sustainable legacy of localized production and consumption, and an increased sense of community, physical activity level, and connection to—and appreciation of—the natural spaces we live amongst.

WE ARE A COMMUNITY THAT KNOWS WE’RE NOT SEPARATE FROM THE PLANET.

We have a better understanding of our impact. We’ve evolved from using measures that focus predominantly on humans, to those that demonstrate concern for all life. We have succeeded at reducing our negative impact, and now we focus on having a positive impact. We act in ways that signal a deep awareness of interdependencies. With guidance from our elders, children grow up with an awareness of their part in a greater whole, and our learning institutions weave this mentality into their culture. With a sense of duty and responsibility, we are fulfilling our role within the greater ecosystems in ways that enable all life and all people to thrive.



PRINCIPLES FOR DESIGNING A LOW CARBON FUTURE

WHAT ARE PRINCIPLES?

Principles are a set of considerations for making decisions and setting priorities over time. They're a guiding light for aligning our intentions and actions, and articulate a framework that decisions should be evaluated against. They help to communicate the values we're working towards in our path to a low carbon community that is equitable, prosperous, and resilient.

Whether you are a citizen interested in taking climate action at home or in your neighbourhood, a new business, an educational institution, a faith community, a multinational corporation that calls Waterloo Region home, and whether you find yourself in a rural or urban setting, use these principles to guide how you take climate action, and implement your own actions and strategies to move us toward our goals.

As with the Vision and many other parts of *TransformWR*, these principles emerged from many conversations with members of this community.

PRINCIPLES:

PRIORITIZE IMPROVING THE WELLBEING OF, AND REDUCING NEGATIVE IMPACTS ON, EQUITY-DESERVING GROUPS.

The impacts of climate change disproportionately affect people who experience structural and systemic oppression. Often, these groups also benefit less from the solutions we create and, in some cases, may be further disadvantaged by them. Do the work to understand how a proposed change will affect these groups as well as future generations—not just the current majority—and insist that this understanding shapes future approaches and solutions.

TAKE AMBITIOUS ACTION NOW.

Think in the long-term, and act in the short-term. In doing so, we set ourselves up for not only achieving our targets, but overshooting them. Acting today, even if it seems small, is better than acting tomorrow.

IDENTIFY AND RESPOND TO GAPS.

Even the tiniest changes or unaddressed details can impact participation in a decision. Figure out what parts of systems aren't helping us meet our goals, and fix them. There are often unforeseen issues that arise after implementation. Stay focused, notice and address these ripple effects, and close any loops that may be unintentionally incomplete.

INVITE CONSTRUCTIVE CRITIQUE AND STAY OPEN TO DOING THINGS DIFFERENTLY.

Plan in ways that recognize uncertainty and multiple potential outcomes. Overconfidence in any one approach should prompt us to explore additional context and expand our conversations to generate more options.

DESIGN FOR ACCESS AND FACILITATE COMMUNITY OWNERSHIP.

Personal ownership can drive consumption and waste in the name of convenience and status. Instead, focus on maximizing usage—of spaces and products—and on minimizing down or idle time. Coordinate systems and incentives to support this kind of sharing.

MAKE IT EASY FOR ORGANIZATIONS AND INDIVIDUALS TO REDUCE THEIR IMPACT.

Make the most convenient and affordable options the most sustainable ones, and make climate-harming options difficult, inconvenient, costly, or inaccessible.

HELP PEOPLE SEE AND FEEL THEIR IMPACT.

We are feedback hungry creatures. Draw attention to the positive and negative impacts of action and inaction. Tell success stories, give people real-time feedback, and make evidence unmistakably obvious to inspire action.

MODEL RESPECTFUL CARETAKING OF, AND PARTNERSHIP WITH, THE NATURAL WORLD.

The way we treat the soil, water, and air eventually comes back to us. If we recognize and value all life around us, we are less likely to think of it as something to conquer, and more likely to nurture, replenish, honour and learn from it.

Pay attention to what metrics and measurements reinforce, and what they leave out.

Individual data points can be misleading in complex systems. They tend to tell partial stories. Take a step back and work to identify the other changes, benefits, risks and consequences associated with them.

SUPPORT EACH OTHER THROUGH THE CHANGE.

Everyone is at different places on their climate journey. Be mindful of what the change means for others and recognize resistance to change as an invitation to provide support. Listen to understand their challenges, meet people where they are, and help those who need support through the transition.

ENSURE 'IMPACT ON CLIMATE' IS A KEY DECISION MAKING FACTOR IN ALL DECISIONS.

Include climate at decision making tables. Make *awareness of impact* part of more conversations. Evolve to reduce our negative impact. Strive for positive impact.

Equity-deserving groups refer to members of society who experience barriers to equal access, opportunities and resources due to historical disadvantages and discrimination and are often underrepresented in key decision-making positions. These are groups that deserve recognition, a reduction in burdens, and fairer access to societal benefits. Groups that are actively seeking social justice and reparation are referred to as equity-seeking groups (Canada Council for the Arts, n.d.). The following are examples of relevant equity-deserving and seeking groups in the Canadian context: low-income, racialized groups, immigrants, people with disabilities, people experiencing homelessness, Indigenous groups (who are also seeking sovereignty in addition to equity), 2SLGBTQIA+, women, youth, seniors, refugees, and workers affected by green transitions.



What is your vision for Waterloo Region in 2050?

“We have a stronger sense of community because we appreciate and respect our home together.” – *Waterloo Region community member*



TRANSITION TO A LOW CARBON COMMUNITY

Building on our community’s vision for 2050 and the principles that will guide action moving forward, a ‘GHG reduction pathway’ was developed. This helps us understand the big changes our community needs to make over the next three decades to reach our targets and the speed at which they need to be made.

A key consideration in the development of this pathway was population growth. In 2020, Waterloo Region was named the fastest growing community in Canada¹, with forecasts expecting our region to grow to approximately 923,000 by 2051 (representing an increase

of approximately 366,400 persons between 2016 and 2051)². This makes emissions reductions even more challenging, as we need to decrease our overall emissions, not just our emissions per person.

With that in mind, the GHG reduction pathway is built on a model that examines three possible scenarios:

- 1. **Inaction:** Our population continues to grow as expected, but no further efforts are made to reduce our GHG emissions;
- 2. **Industry Trends:** Our population continues to grow as expected, and predicted industry trends help us reduce emissions per person over time; and
- 3. **80by50:** Our population continues to grow as expected, industry trends help us reduce emissions per person over time, and we make further conscious changes to meet our ‘80by50’ reduction target.



Our ‘80by50’ pathway uses GHG emissions projections for our electricity grid currently used by the Independent Electricity System Operator for Ontario. They presume that we will meet our increasing electricity needs using natural gas plants, and thus our emissions from electricity are expected to rise significantly over the timeframe of this strategy. Changes that reduce GHGs associated with electricity generation could make the actions and strategies in this pathway produce larger emissions reductions.

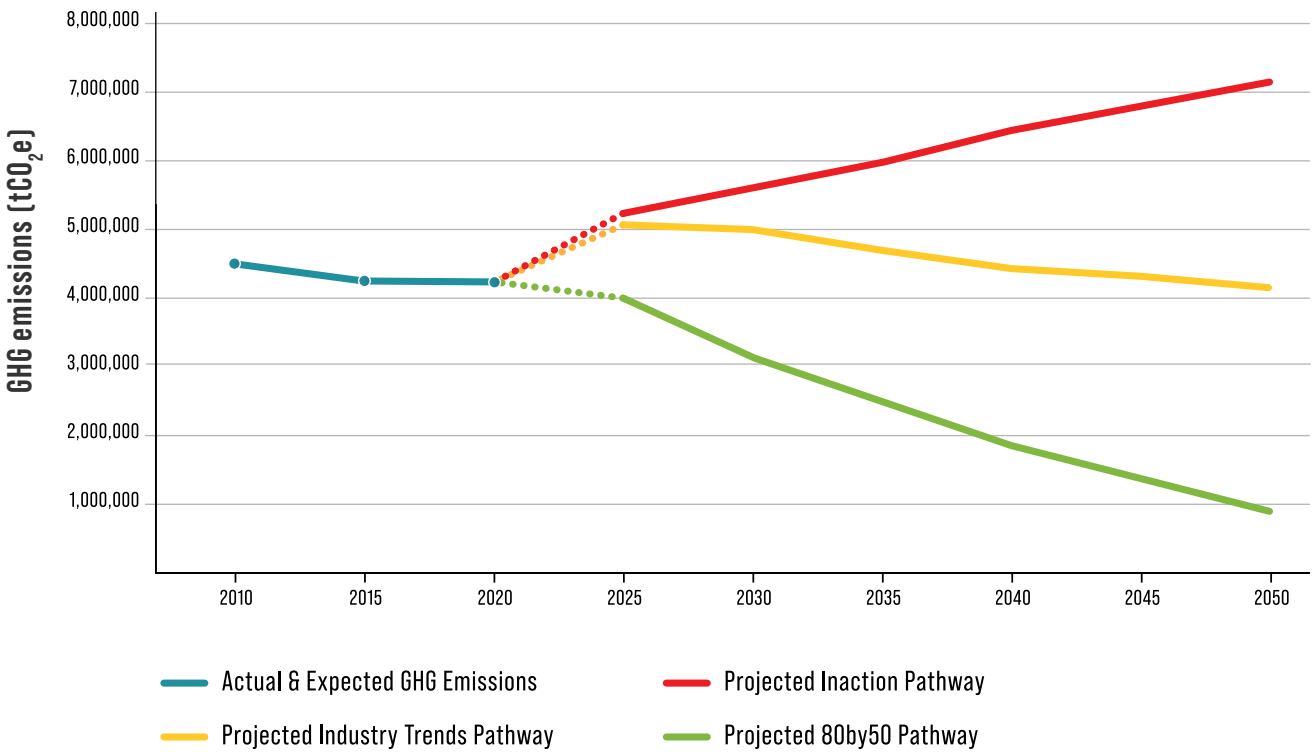


Figure 2: Actual and expected Waterloo Region total GHG inventories meeting the 3 projected pathways: inaction, industry trends and our ‘80by50’ pathway with an interim 30% GHG reduction by 2030

This third scenario forms the ‘80by50’ pathway, the technical model on which this strategy is based, and includes our interim ‘30by30’ target (See Our Path to 2030 in Part II: TransformWR 10 Year Plan for more on why a ‘30by30’ target has been selected). Based on this model, six Transformative Changes were identified to transform the ways we move, the ways we build and operate our spaces, the ways we produce, consume and waste, and the ways we relate to one another. If we make those six Transformative Changes over the next 30 years, we will have met our 80% reduction target and built an equitable, prosperous, resilient low carbon community that fulfills our vision.

1 Statistics Canada. (2020, February 13). Canada’s population estimates: Subprovincial areas, July 1, 2019. Retrieved from <https://www150.statcan.gc.ca/n1/daily-quotidien/200213/dq200213a-eng.htm>.
2 Region of Waterloo. (2020, December). Regional Official Plan Review.

TRANSFORMING OUR ENERGY AND OUR COMMUNITY

Human-generated GHG emissions can come from many different sources. Some sources include methane emissions from our landfills, and leaks from certain kinds of refrigerants in appliances or industrial processes. However, most of our GHG emissions come from our energy use. We burn fossil fuels to power cars and equipment, to heat and cool our homes, and heat our water. Even in our electricity system, which no longer burns coal to produce electricity, natural gas is burned to meet some of our electricity needs. In 2017, 82% of the GHGs emitted in Canada were emitted from the energy sector (combustion, transportation, and gas and vapours from industrial processes)³.

Locally in Waterloo Region, 94% of our 2015 emissions were produced by energy consumption and combustion in our three highest emitting sectors: transportation, workplaces, and homes.

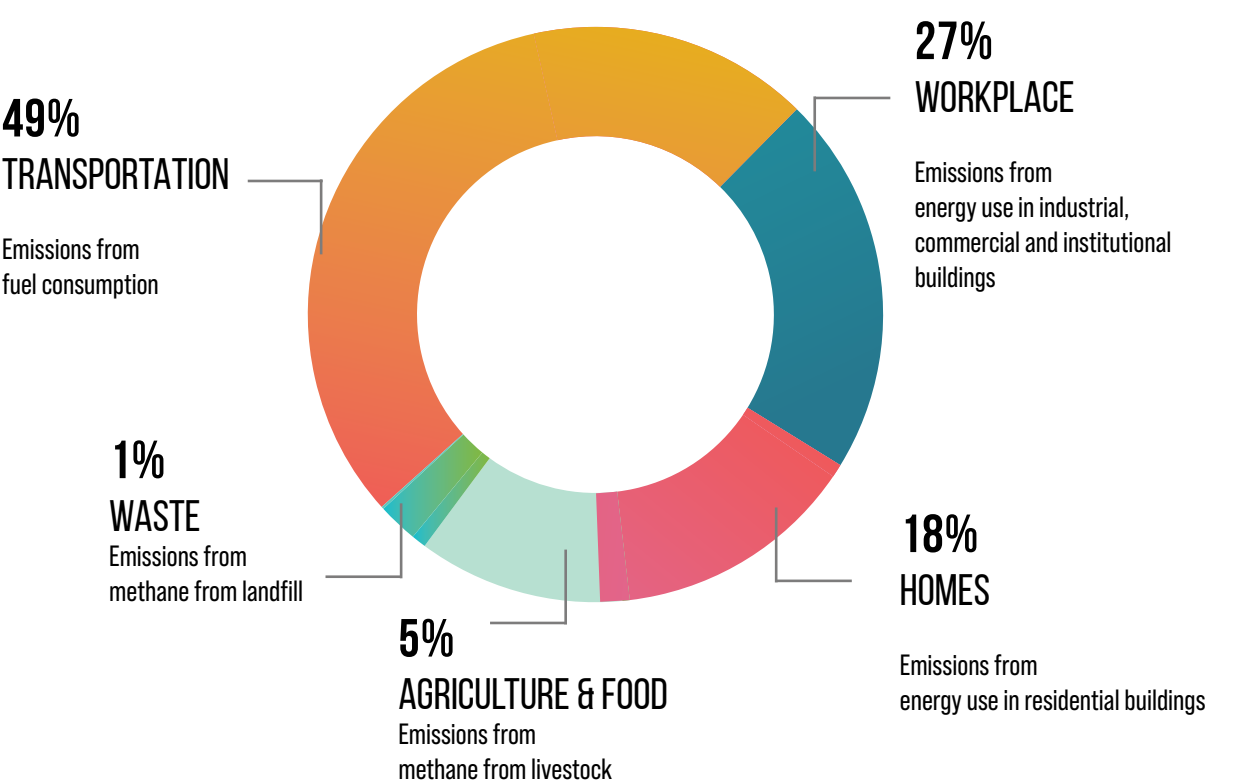


Figure 3: Waterloo Region's emissions breakdown by sector, from 2015 data

3 Environment and Climate Change Canada. (2019, April 15). Canada. 2019 National Inventory Report (NIR) English. UNFCCC.

Within these sectors, there are six primary energy/fuel sources that contribute to greenhouse gases:

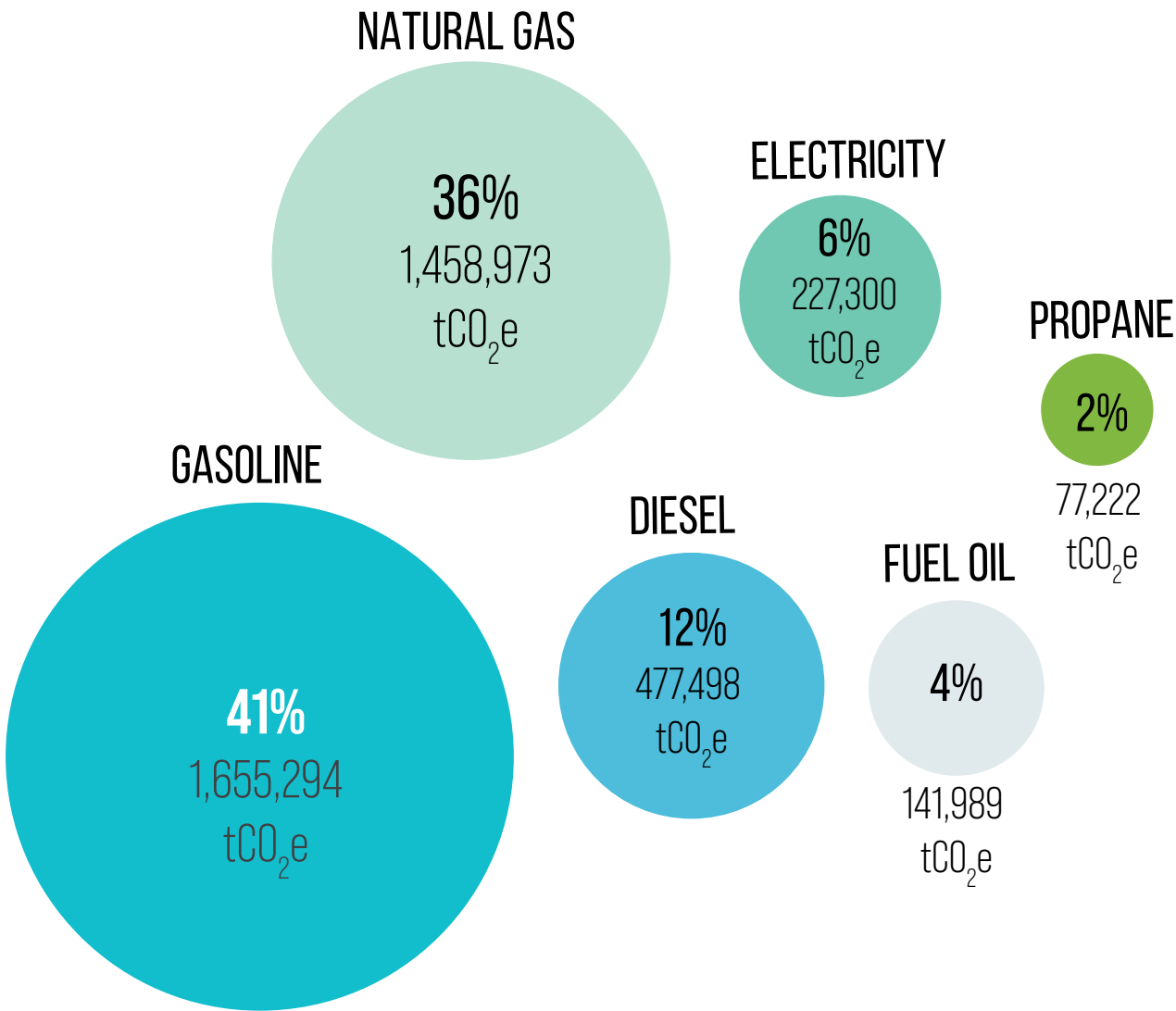


Figure 4: Waterloo Region's greenhouse gas emissions by energy source, based on 2015 data. tCO₂e refers to tonnes of carbon dioxide equivalent, it is a metric used to compare emissions from various greenhouse gases based on their global warming potential.

As a result, addressing our local emissions is primarily about changing our energy usage, and the systems that supply that energy.

3 APPROACHES TO REDUCING GHGS FROM ENERGY

There are three main approaches we can use to reduce GHG emissions from energy:

1) ENERGY CONSERVATION AND ENERGY EFFICIENCY: USE LESS ENERGY AND USE IT MORE EFFICIENTLY

In many cases, the most effective (and cost-effective) action we can take to reduce GHG emissions from energy is to use less, or to avoid using energy altogether. These are closely related.

Examples of reducing GHG emissions by reducing energy use include:

- Adding insulation to your building or home so that less energy is needed to maintain a comfortable temperature;
- Adjusting your building's temperature settings and dress code so that people can be comfortable with an extra degree or two hotter in the summer and colder in the winter; and
- Taking public transit or a small car instead of a truck or an SUV for your trip to the grocery store.

In many cases, it is possible to avoid using energy altogether. Examples of avoiding energy use include:


- Putting on a sweater or a blanket instead of turning on the furnace;

- Eliminating a car trip to the pharmacy by combining destinations and picking up your prescription at a location next to your grocery store; and
- Walking or cycling to work or to do errands instead of driving.

2) FUEL SWITCHING: USE CLEAN ENERGY

Fuel switching means transitioning from fossil fuels to low or zero carbon energy sources.

In most cases, this means using electricity to heat, cool, or move things. Electricity is the most versatile form of energy we have, as it can be used to power a vast diversity of mechanisms, from heating our homes and buildings to powering our vehicles. In some parts of Canada, electricity from the power grid produces considerable GHG emissions, as they still burn coal to produce electricity, however, in Ontario electricity is a very low carbon energy source. In 2019, 94% of Ontario's electricity was generated using emissions free sources⁴.




Solar walls are a technology used to absorb solar heat and passively heat a building.

There are other ways of storing and transporting clean energy, such as the use of "green hydrogen," which is hydrogen generated using low carbon electricity. There are also opportunities to use and share heat energy in different ways, for example through the creation of **solar walls**, or between buildings in **district energy systems**.

Nevertheless, most fuel switching focuses on electrification.

It is possible to reduce emissions by changing one fossil fuel to another. For example, a home heated using fuel oil can produce more GHG emissions than a home heated using a natural gas furnace. However, to achieve our goals to significantly reduce emissions, fuel switching must in most cases focus on electrification and the elimination of emissions. Changes that simply use fossil fuels more efficiently can "lock in" GHG emissions for the life of the equipment, making it more difficult to make significant reductions in the future.



Instead of producing heat for space and water on-site (such as your furnace or hot water heater), **district energy systems** produce heat in a single location and use a network of insulated pipes to deliver hot water or steam to buildings. This is often much more efficient than individual on-site heat generation.



Sustainable home concept.

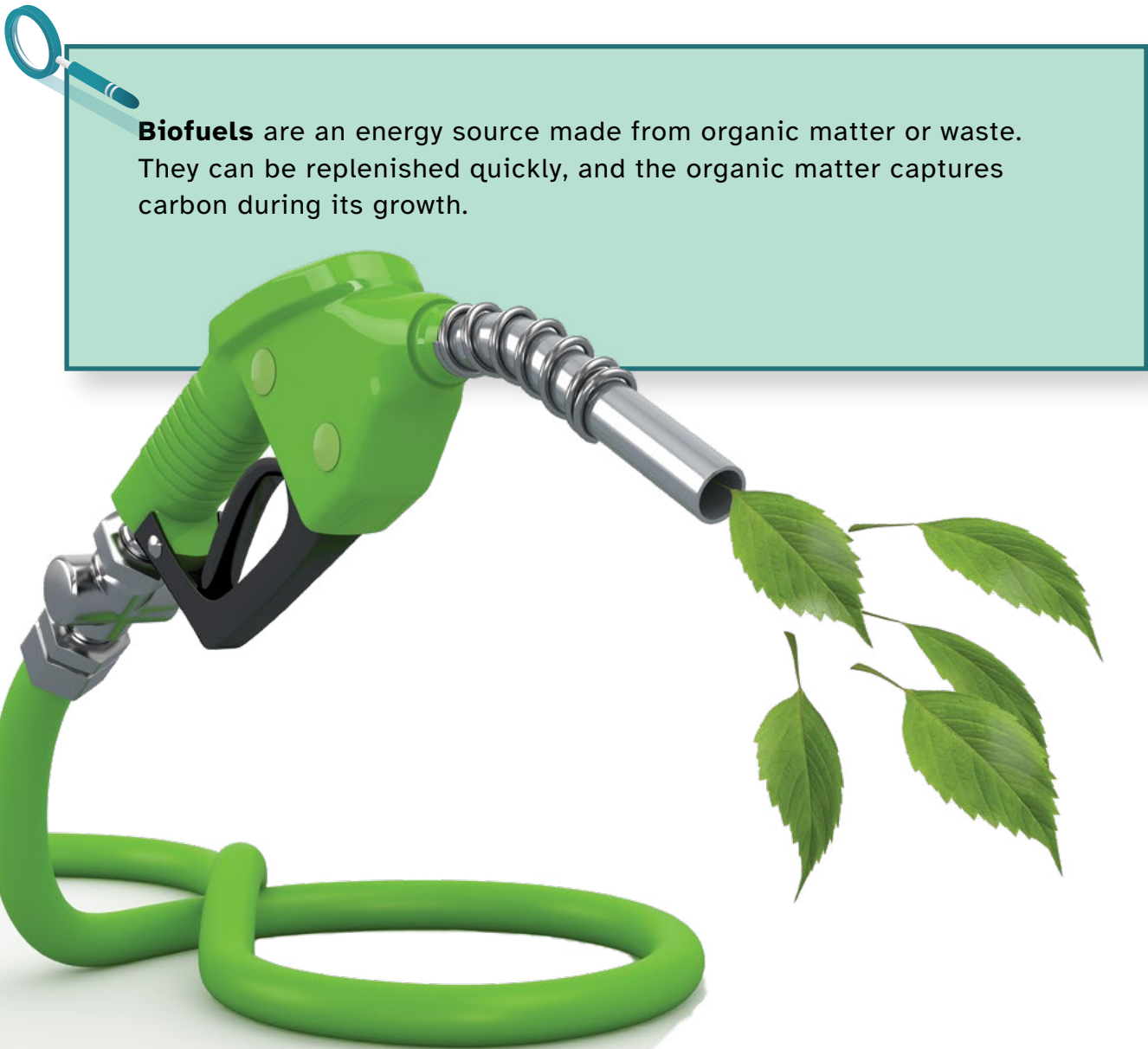
⁴ Transmission-Connected Generation. Ieso.ca. (2020). Retrieved from <https://www.ieso.ca/power-data/supply-overview/transmission-connected-generation>.

3) GENERATION: MAKE LOCAL CLEAN ENERGY

To address energy emissions at their source, we must transition to processes that generate energy without emitting any GHG emissions at all, such as solar power systems, wind turbines, **geo-exchange**, and **biofuels**. These are often referred to as renewable energy sources, which are created through natural processes that are replenished at a rate that is equal to or faster than the rate at which they are consumed.

Local renewable energy generation is an opportunity to:

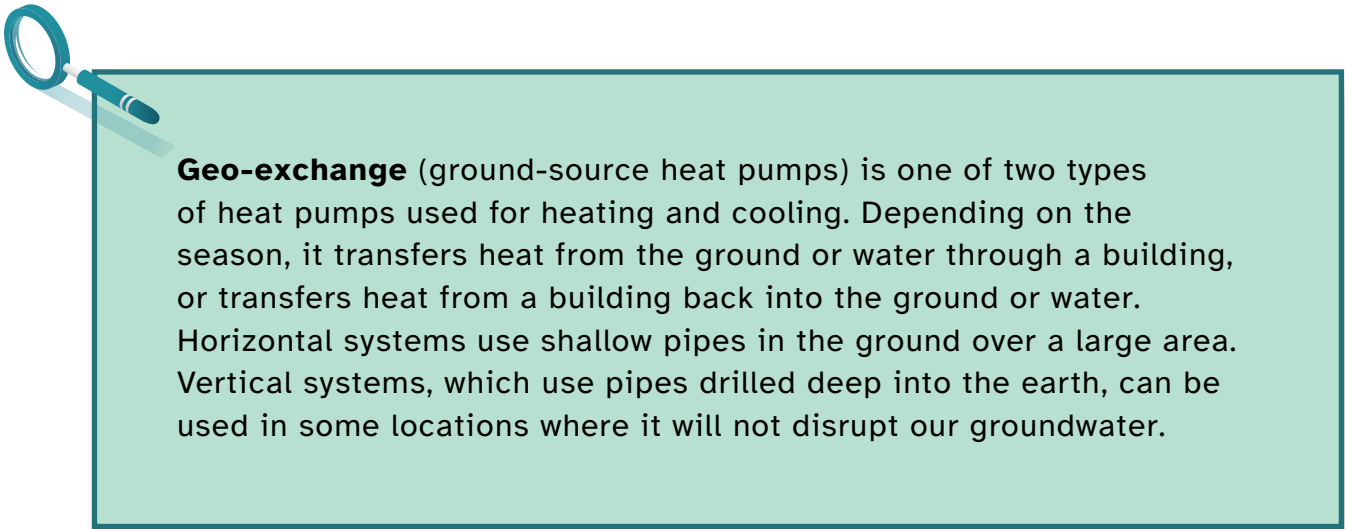
- Provide affordable, reliable, clean energy to our community;
- Improve the systems that transport, store, and use energy;
- Increase local job opportunities;
- Keep more energy dollars in our local community;



Biofuels are an energy source made from organic matter or waste. They can be replenished quickly, and the organic matter captures carbon during its growth.

- Make our energy system more resilient and less vulnerable to external supply and fuel prices; and
- Explore different ownership structures that allow communities like ours, to find the best solution to our location and economic situations.

Through community energy planning, non-fossil fuel consuming micro-grids and district energy systems, energy efficient and low-GHG communities can be achieved. This often involves looking for new opportunities to store clean energy, so that it can be used on demand. Energy storage solutions are emerging technologies, with a range of options to suit diverse needs. The options continue to improve and evolve rapidly with new advancements.



Geo-exchange (ground-source heat pumps) is one of two types of heat pumps used for heating and cooling. Depending on the season, it transfers heat from the ground or water through a building, or transfers heat from a building back into the ground or water. Horizontal systems use shallow pipes in the ground over a large area. Vertical systems, which use pipes drilled deep into the earth, can be used in some locations where it will not disrupt our groundwater.

USING LESS ENERGY, USING CLEAN ENERGY, MAKING LOCAL CLEAN ENERGY

These three approaches – conservation, fuel switching, and generation – all work best when used together.

Energy conservation supports fuel switching, as using less energy means that more options are available to supply the lower amount of energy. Since the energy needs are less, fuel switching is often more affordable. Energy conservation also means that locally generated energy, either at your home or business or in larger industrial settings, can fill more of our energy needs.

Fuel switching to electricity enables equipment to run on locally generated renewable energy. In many cases, fuel switching also helps with energy conservation. This is because the use of fossil fuels is often inefficient, and much of the energy escapes as heat. Therefore, less energy is required to power an electric car than a gasoline car.

As a result, transforming Waterloo Region requires us to use less energy, use clean energy, and make local clean energy, which is a core focus of the 6 Transformative Changes we as a community need to make. The model shows that these energy changes will contribute the following GHG reductions compared to the ‘Inaction’ scenario:

Change Initiatives	2025	2030	2035	2040	2045	2050
Building Upgrades	148,612	288,256	415,904	561,262	761,851	944,739
Building Use Optimization	83,488	169,108	246,097	346,219	483,696	639,858
Fuel Switching	361,446	482,374	690,327	876,131	971,785	1,100,578
Net-zero Electricity Generation	20,208	40,640	59,904	94,078	139,850	204,844
Reduced Travel /Active Transit	174,980	330,833	690,588	888,199	1,045,630	1,182,572
Electric Vehicles	464,882	1,190,617	1,396,309	1,819,941	2,029,046	2,179,487

Table 1: The emission reduction effect (tCO₂e) of each method by year. The cumulative results of these initiatives move Waterloo Region away from the Inaction pathway and toward our ‘80by50’ pathway goal.

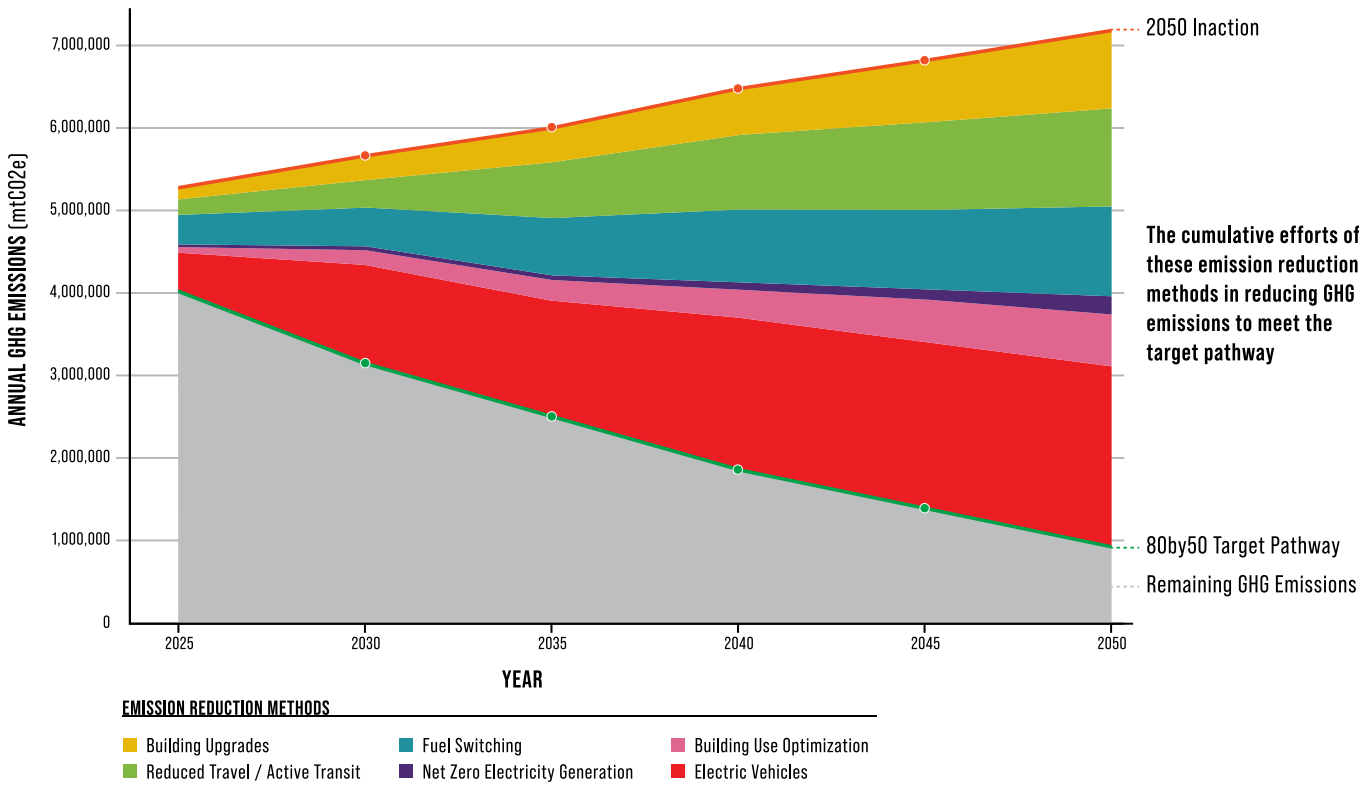


Figure 5: Effect of emission reduction methods on diverting our GHG emission pathway from the inaction trajectory to our ‘80by50’ pathway.

Because existing industry trends are expected to contribute to these changes, the local work that must be done on top of those industry trends is expected to result in this portion of the emissions reductions:

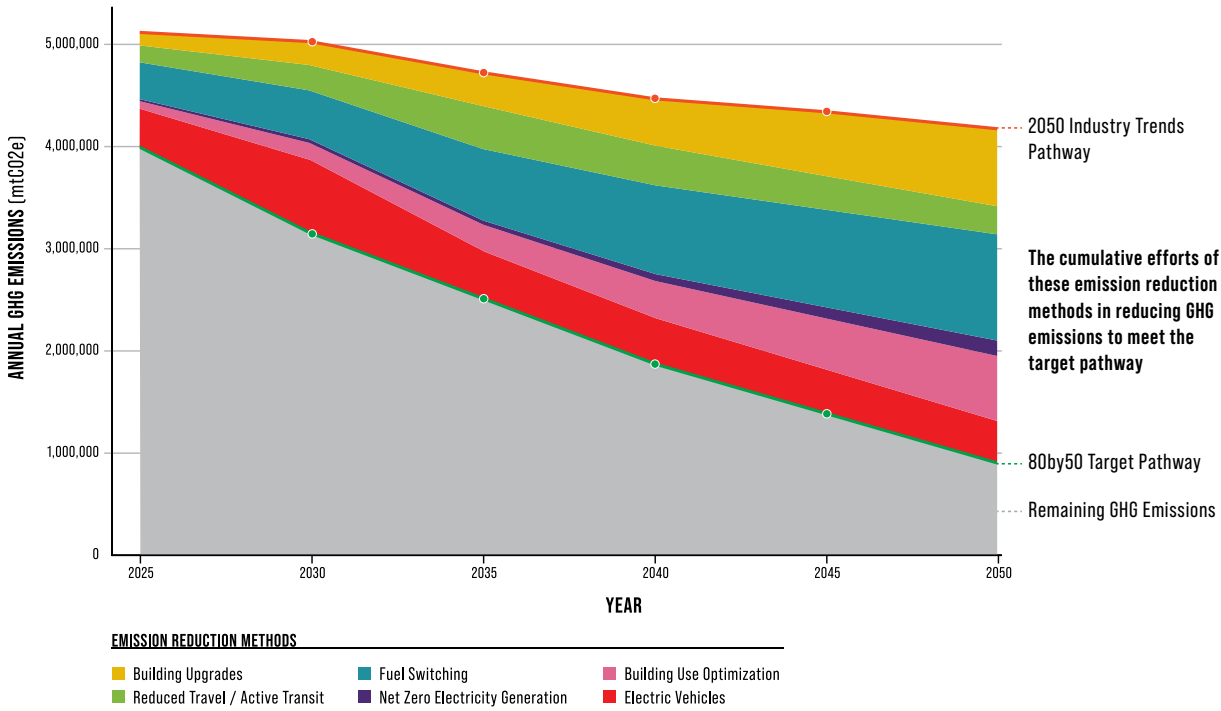
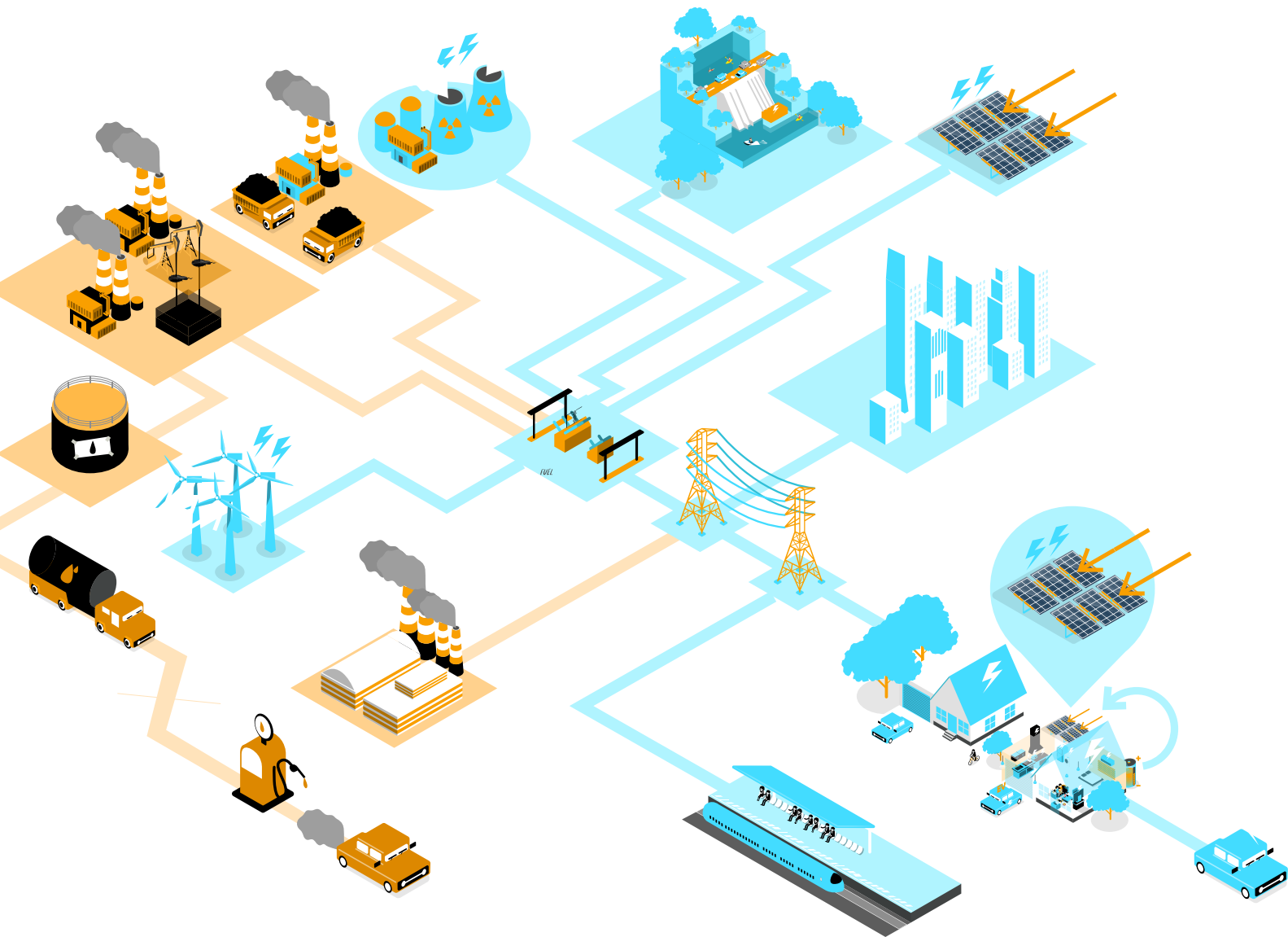


Figure 6: Effect of emission reduction methods on diverting our GHG emission pathway from the industry trends trajectory to our ‘80by50’ pathway.

SIX TRANSFORMATIVE CHANGES TO CREATE AN EQUITABLE, PROSPEROUS, RESILIENT LOW CARBON COMMUNITY



We often talk about sustainability as a three-legged stool. Environmental sustainability is one leg, but the other legs are social justice and economic prosperity. Without one of the legs, the stool collapses. Likewise, the actions we take to address climate change must work to make our community more equitable and support the most vulnerable. Through this work, we can provide a solid basis for Waterloo Region to thrive in a global low carbon economy.

LOCAL ACTION

To meet our goal, we must first act locally, reducing the emissions generated within Waterloo Region that are measured in our local GHG inventories. We cannot address climate change without changing our behaviours on a daily basis by how we live, move around, and provide for ourselves. Through community collaboration, supporting change and acting locally will allow everyone to both participate in climate action, and benefit from the outcomes.

ADDRESSING OUR IMPACTS OUTSIDE OF WATERLOO REGION

While local action is our first priority, we also need to reduce our climate impacts outside Waterloo Region. Our GHGs don't end at our borders. While we are only able to fully monitor emissions created within the region, we know that the energy used to produce and transport our consumer goods, food, and building materials, and deal with our waste produce GHGs. Therefore we are each responsible for creating emissions in other jurisdictions to support our lives and businesses. To address these, we must make changes to our purchasing habits, understand where we source our goods from, and include GHG emissions as a primary decision making factor in our daily choices.

To fully do our part to contribute to a low carbon world, we need to reduce the energy used to support our lifestyles. This means transforming the ways we move, the ways we build and operate our spaces, and the ways we produce, consume and waste. We also need to transform the ways we relate to one another. Sustainability cannot be achieved without participation from everyone, meaning our transition must be equitable and support those who need it most through the transition.

In what follows, we identify four calls to action that result in six Transformative Changes to reduce our climate impacts locally and beyond, to transition to an equitable, prosperous, resilient low carbon Waterloo Region. We each have a role to play in making these changes, whether it be at the individual, business and organization, community, or municipal level. In what follows, many of the strategies associated with the Transformative Changes are at the systemic level, and will be brought to life through the agency and influence of our local municipalities. While municipalities are not the only stakeholders responsible for transformative climate action, the activities within their reach will significantly propel us toward success. The short-term action items associated with the systemic level changes are found in Part II: TransformWR 10 Year Plan.

As community capacity builders, businesses and organizations, and individuals, the *Principles for Designing a Low Carbon Future* are intended to guide the development of your own strategies and actions. For each Transformative Change, we provide examples of actions based on the principles. If you're stuck for how you can take action- refer back to the Principles.

TRANSFORM THE WAYS WE MOVE

TRANSFORMATIVE CHANGE #1: BY 2050, MOST TRIPS ARE TAKEN USING ACTIVE TRANSPORTATION, WITH THE SUPPORT OF A ROBUST PUBLIC TRANSIT SYSTEM.

Active transportation means any method of travelling to a destination that uses primarily human power, which we describe here as “walking, cycling, or rolling.” This includes trips made using, or propelled, by your body, a mobility device, a bicycle or tricycle (with or without assistance from an electric battery), a skateboard, or a scooter.

In 2015, nearly half (49%) of our community’s GHG emissions came from how we move people and goods. Furthermore, short distance trips of less than five kilometres make up nearly 50% of all travel by residents within the Region⁵ that could generally be achieved using active forms of transportation.

Existing short trips need to be made by walking, cycling, or rolling. Longer trips, where

possible, need to be replaced by shorter trips. For example, instead of driving to a grocery store across town, more people will walk, cycle, or roll to a store nearby.

Public transit service is crucial for making most trips using active transportation. It gives people a low-energy, convenient option for trips that they can’t walk, cycle, or roll to. It supports being able to live fulfilling lives without owning a vehicle and is accessible to people of different incomes and abilities. In this way, a robust transit service needs to be used to supplement our active transportation goals.

KEY SUCCESS METRICS:

To make this Transformative Change, we need to make fewer trips, make shorter trips, and make lower energy trips. Of the reductions we’ve committed to make by 2030, these changes are expected to accomplish 13% of that amount. Of the reductions we’ve committed to make by 2050, these changes are expected to accomplish 19% of that amount. This is compared to keeping our energy use patterns the same as 2010, as our population grows. More specifically, we expect that specific reductions in transportation energy use will be made in these ways:

Results	2030	2040	2050
Make fewer trips: Reduction in travel between homes and workplaces due to work from home options (% reduction in vehicle trips to workplaces)	10%	30%	40%
Make fewer trips: Reduction in discretionary trips (% reduction in vehicle distance travelled for discretionary trips)	4%	14%	18%
Make shorter trips: Reduction in trip length (% reduction in vehicle distance travelled, for trips over 5km)	2%	6%	10%
Make lower energy trips: Replacing personal vehicle use for trips under 5km by using active transportation (% of existing short vehicle trips switched to walking, cycling, or rolling)	10%	40%	80%



“CycleWR is pleased to be partnering with ClimateActionWR and regional municipalities to make cycling a safe, convenient and respected option for all who can take advantage of this healthy and climate-friendly transportation option. We see community active transportation hubs as one important tool to make this choice more accessible and attractive. A key focus is to ensure that equity-deserving communities are included in our support and outreach.”
– David Trueman, Steering Committee, CycleWR

5 Region of Waterloo. (2019, June). Moving Forward - 2018 Transportation Master Plan. Retrieved from https://www.regionofwaterloo.ca/en/living-here/resources/Transportation-Master-Plan/DOCS_ADMIN-3030800-v3-TMP_Report_Moving_Forward_Main_Report_FINAL_2019-06-12.pdf

STRATEGIES TO CHANGE OUR SYSTEMS:

Strategy 1.1: Redesign, rebuild, and maintain our transportation system to prioritize active transportation.

While significant work has been undertaken to support choice in transportation modes, the current transportation system still largely focuses on moving personal vehicles that require large amounts of energy. That focus needs to shift toward low or no energy ways of providing mobility.

To do this, we need to redesign and rebuild our entire mobility system to put active transportation first, making facilities for walking, cycling, and rolling the first priority on our roads and trails. This redesign process will need to address current challenges, such as ensuring that the system serves people of all ages and abilities and in all weather conditions and times of day. Doing so will make moving around the region easier, more affordable, safer, healthier, and more energy efficient.

Spotlight on Climate Justice:

Affordability is a key factor in making our transportation system equitable, low energy, and low carbon. This means making low-cost options like walking, cycling, rolling, and transit the easiest choice to meet daily needs. It also means making sure that everyone can access what they need to use these systems, like low-cost bicycles and transit passes for low-income community members.

Strategy 1.2: Continue to build a robust and accessible public transit system that conveniently and safely serves people across the community.

While our whole transportation system has to change to put active transportation first, public transit needs to be prioritized, as well. This allows people to take trips to places they can't walk, cycle, or roll to, using an energy efficient means of transportation. This will also serve to better connect people from across the entire region, and provide sustainable transportation options across both cities and townships.

Spotlight on Climate Justice:

Developing our transportation systems in rural parts of the region is an important component of making low and no emission travel accessible to all. Transportation and land use planning in both urban and rural communities, and applying these approaches in context-sensitive ways that meet diverse needs, is essential to reducing our emissions.

Strategy 1.3: Support people to walk, cycle, or roll, and build a culture of active transportation and public transit ridership.

Enabling people to build their lives around active transportation and/or public transit instead of personal automobile travel has a number of community benefits. It will not only contribute to reductions in local GHG emissions, but will increase community wellbeing and physical activity, and decrease air pollution that causes adverse health effects. Surveys have shown that there are large segments of the population who are interested in increasing their active transportation, however, safety concerns and other barriers such as transporting goods, access to equipment, and social norms stop them^{6,7}. People must be provided with tools and resources to support changing the way we move around.

Strategy 1.4: Transition to low energy movement of commercial goods.

Movement of goods is essential to Waterloo Region's strong business, manufacturing and industrial sector, and so people can meet their daily needs. Locally this ranges from auto parts heading to major manufacturing plants, supplies destined to offices in urban centres, distribution of food and consumer goods, movement of aggregate resources, and heavy trucks moving along our highways destined for other markets. Goods in Waterloo Region are currently primarily moved by large trucks, but also using freight by rail on the CP and CN rail lines. In order to significantly reduce

GHGs associated with transportation, we must support a transition toward efficient, low energy methods of moving commercial goods.

Strategy 1.5: Build compact urban and settlement areas that are efficient for energy, services, infrastructure, and transportation, and make existing and new communities "complete communities."

The amount of energy it takes to get around our communities depends heavily on the way they are built and designed. We can improve efficiency by planning and creating more complete communities, where goods, services, and employment can be reached conveniently by walking, cycling, or rolling. Emissions from conventional vehicles are also reduced as a result of less distance travelled. These are also known as "15-minute communities." More compact communities that use less energy for transportation help us use less energy to provide services and build infrastructure, further reducing emissions. This must be a key consideration for land use planning.

A 15-minute community is where people can meet their daily needs for goods, services, and employment using active transportation, within a short walk, bike ride, or roll.

6 Ontario Ministry of Transportation. (n.d.) 2016 Transportation Tomorrow Survey results for Region of Waterloo.

7 ClimateActionWR. (2020). ClimateActionWR 2020 Active Transportation Survey.

COMMUNITY CAPACITY BUILDERS ARE ORGANIZATIONS OR GROUPS THAT PROVIDE RESOURCES AND SUPPORT TO OTHER ORGANIZATIONS OR COMMUNITY MEMBERS. THIS CAN SOMETIMES INCLUDE CERTAIN COMMUNITY GROUPS AND VOLUNTEER GROUPS.

Toyota plans to phase out 90% of gas vehicles by 2050 and GM plans to only build zero emission light-duty vehicles by 2035.



Take action in every part of your life, to ensure that by 2050, most trips are taken using active transportation. There are endless ways you can act. Here are some examples. If you're stuck for how you can take action, refer back to The Principles for Designing a Low Carbon Future!

Community Capacity Builders

- Create welcoming spaces (hubs) that provide support and tools to help people choose active transportation
- Expand and innovate programming to support employers to provide resources and services that make sustainable transportation the easy choice
- Develop educational resources and provide access to mobility options, such as bike libraries and community bike lending

Businesses & Organizations

- Develop 'work from home' policies
- Make your office conducive to active transportation: Install employee showers, secure bike/scooter storage, bike share stations, etc.
- When locating or relocating, select sites that can be easily accessed using active and public transportation systems

Individuals

- Commit to walking, cycling, rolling and public transit for all destinations within 5km of your home
- Group errands together to reduce the number of trips you need to take

Green hydrogen is a clean burning fuel that uses renewable energy to split water into its component elements of hydrogen and oxygen. It has several applications including as an energy source for vehicles.

TRANSFORMATIVE CHANGE #2: BY 2050, REMAINING PERSONAL AND COMMERCIAL VEHICLES ARE ZERO EMISSION VEHICLES.

While most trips will be made using active transportation by 2050, many trips will still require powered vehicles. This includes public transit vehicles, and personal and commercial vehicles. This is especially the case for rural parts of Waterloo Region where active transportation is constrained by long distances, and there is limited access to public transit. All remaining vehicles in 2050 must be zero emission vehicles.

Electric vehicles (EV's) are zero emissions, and are already available to consumers. Most major auto manufacturers are already producing electric models, and many automobile manufacturers such as Toyota and General Motors have announced dates by which they will phase out gasoline powered vehicles. While some types of industrial and commercial vehicles may need to use other zero emissions technologies like **green hydrogen**, with strong investments in charging infrastructure, the future of most vehicles is electric.

KEY SUCCESS METRICS:

Without further intervention, we estimate that market trends will mean approximately 20% of vehicles in Waterloo Region will be zero emission vehicles by 2030. To achieve our target of reducing overall emissions by 30% by 2030, we will need to show leadership and go farther, converting half of vehicles on the road to zero emission vehicles in the next decade. Of the reductions we've committed to make by 2030, switching to zero emission vehicles is expected to accomplish 47% of that amount. Of the reductions we've committed to make by 2050, switching to zero emission vehicles is expected to accomplish 35% of that amount. This is compared to keeping our energy use patterns the same as 2010, as our population grows.

Results	2030	2040	2050
Gasoline and diesel vehicles switched to zero emission vehicles (% of vehicles that are electric)	50%	80%	99%

STRATEGIES TO CHANGE OUR SYSTEMS:

Strategy 2.1: Switch personal and commercial vehicles to zero emission vehicles.

Global commitments to electric vehicle production, and regulations phasing out combustion engines, will heavily contribute to this shift, but ultimately we must act locally to ensure we are replacing personal, commercial, and fleet vehicles with EV's steadily over the next

30 years. Supporting this shift will include completing Waterloo Region’s electric vehicle strategy, providing local motivation and incentives, and public outreach to increase our local awareness.

Strategy 2.2: Build a network of charging/refuelling infrastructure to support the shift to zero emission vehicles.

To support our community’s transition to zero emission vehicles, we must simultaneously build our charging and refuelling infrastructure. We must work now to prepare for our short-term needs, but more importantly, build for the

long-term visions we are planning to support. This means a future where the majority of parking spaces, both public and private, will require charging infrastructure. Providing public charging and refuelling infrastructure, supporting businesses in providing access for their customers and employees, and aiding individuals to support their own transitions are all critical elements of this work.

Another key element of building this network will include further exploration outside of electrification options, into alternative zero emission vehicle options and their required refuelling methods, such as green hydrogen.



Take action in every part of your life, to ensure that by 2050, remaining personal and commercial vehicles are zero emissions vehicles. There are endless ways you can act. Here are some examples. If you’re stuck for how you can take action, refer back to The Principles for Designing a Low Carbon Future!

COMMUNITY

CAPACITY BUILDERS

- Develop resources to support organizations and individuals in their decisions to switch to zero emission vehicles

BUSINESSES & ORGANIZATIONS

- Begin replacing fleet vehicles with electric alternatives
- Install electric vehicle charging stations at your office
- Install electric vehicle charging stations at multi-unit residential buildings

INDIVIDUALS

- If you own a vehicle, consider electric if and when you need to replace it
- If you are knowledgeable about zero emission vehicles, share your stories and learnings with your friends and networks

TRANSFORM THE WAYS WE BUILD & OPERATE OUR SPACES

TRANSFORMATIVE CHANGE #3: BY 2050, BUSINESSES AND HOMES NO LONGER USE FOSSIL FUELS FOR SPACE HEATING AND COOLING, AND WATER HEATING.

45% of our local GHG emissions in 2015 came from energy used in buildings. Most of this is from natural gas or other fossil fuels used to heat our workplaces and homes, and provide hot water.

Space heating in most of the homes and businesses in Waterloo Region currently comes from natural gas. HVAC equipment, such as furnaces and boilers, transfer heat generated from the natural gas combustion to air or water, which is distributed throughout the building to provide space heating. In the average Canadian home, the hot water heater uses nearly a fifth of a home’s total energy from all fuel sources⁸. Switching off of fossil fuels for heating and cooling needs in businesses and homes is one of the most impactful changes we can make to reduce GHG emissions locally.

We must address fuel switching while increasing energy efficiency in the buildings that already exist, as well as set expectations for how new ones will be built.

KEY SUCCESS METRICS:

To achieve this Transformative Change, we need to convert our buildings off of fossil fuels, while also building and retrofitting them to be more efficient in the first place. Of the reductions we’ve committed to make by 2030, these changes are expected to accomplish 38% of that amount. Of the reductions we’ve committed to make by 2050, these changes are expected to accomplish 43% of that amount. This is compared to keeping our energy use patterns the same as 2010, as our population grows.

Results	2030	2040	2050
Buildings using electric heat pumps, or equipment that is at least as energy efficient and low carbon as electric heat pumps, instead of natural gas (% of buildings with heat pumps, or equipment with a minimum COP of 3 that produces no more GHG emissions than an equivalent electric heat pump)*	20%	60%	85%
Buildings using energy efficient and low carbon water heaters instead of natural gas (% of buildings with electric water heaters, or equipment with a minimum COP of 3 that produces no more GHG emissions than an equivalent electric water heater)	20%	60%	85%
Reduction in fuel oil and propane use	100%	100%	100%

⁸ Government of Canada. (2020, November 27). Heating equipment for residential use. Retrieved from <https://www.nrcan.gc.ca/energy-efficiency/products/product-information/heating-equipment-residential-use/13740>

*For equipment to be energy efficient and low carbon enough to be consistent with this strategy, the new equipment installed or fuel sources used, must be at least as efficient as an electric heat pump. This means it must have a “coefficient of performance” (COP) of three. It must also not produce more emissions than an electric heat pump would, meaning that the direct or in-direct carbon emissions factor associated with the source energy must be equivalent to or less than the current (at the time of equipment replacement) Ontario grid blended carbon emissions factor.

STRATEGIES TO CHANGE OUR SYSTEMS:

Strategy 3.1: Decarbonize building heating and cooling, and water heating, by replacing furnaces and hot water heaters with highly energy efficient and low carbon equipment or fuel sources.

Electric heat pumps are inherently very efficient systems because they move heat rather than generating heat. Just like a fridge, these systems use refrigerants that absorb heat in one location and deliver it in another through the use of condensers. Modern heat pump water heaters (HPWHs) are capable of generating all of the hot water needs of a residential home much more efficiently than conventional water heaters.

Innovative financing options, including public and private partnerships can play an important role in attracting investors, and raising and mobilizing capital to scale up energy retrofits. Many solutions should be explored locally, to build up the retrofit industry and enable our community to achieve our climate goals.

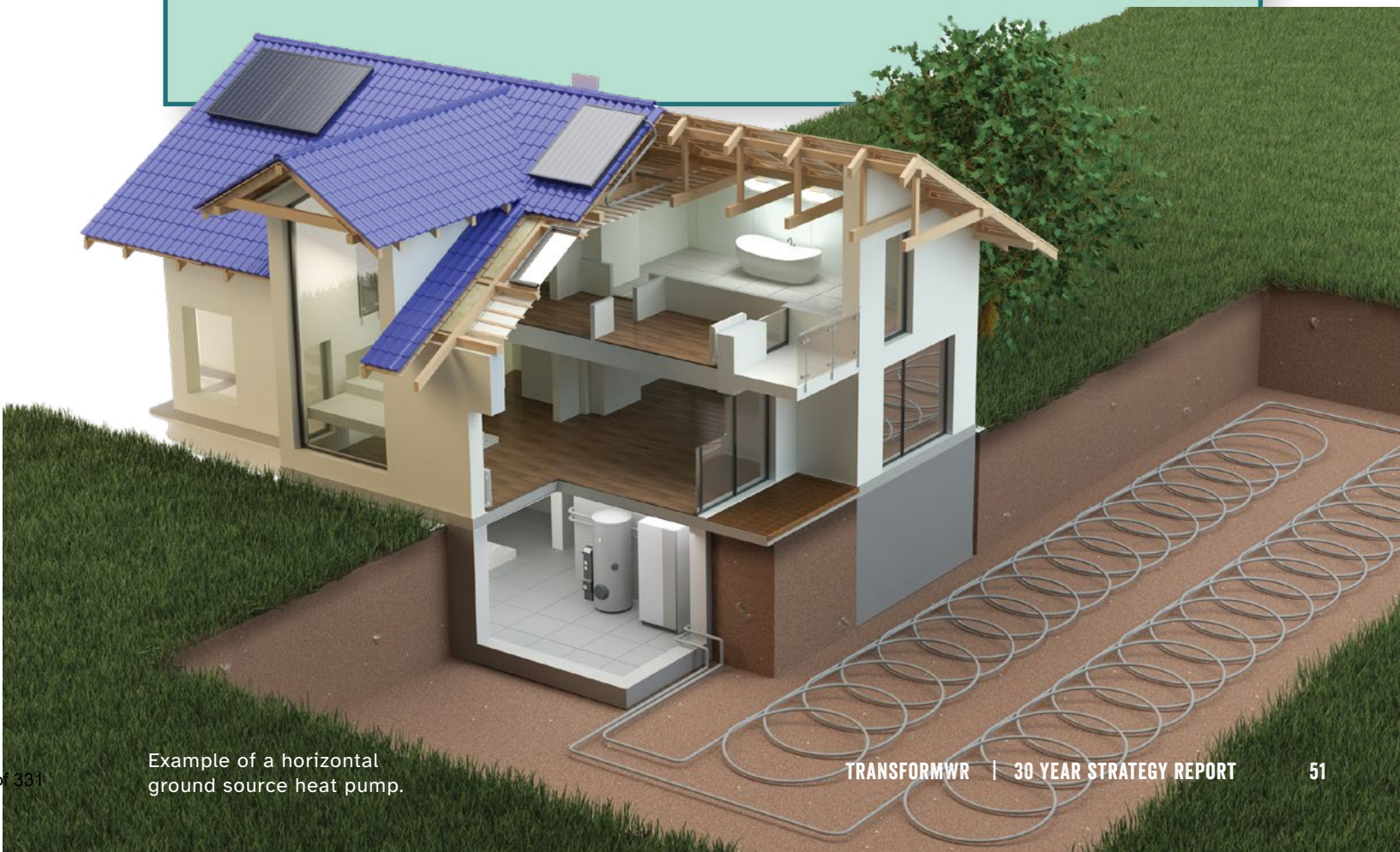
The Coefficient of Performance (COP) for heating and cooling equipment is found by dividing the power output of the equipment by the power input, both in KWh. The higher the COP, the more efficient the equipment is.

Because they are proven, commercially available, and highly efficient, electric heat pumps are a critical part of our community’s path to ‘80by50’. This is especially true in the next decade, since we need to start now to rapidly scale existing technology to make significant emissions reductions by 2030. Installing an electric heat pump is a step that can be taken right now to transition a building off of fossil fuels.

In the longer term, other non-fossil fuel options are expected to play an important role in our energy transition. This includes the potential to use a mix of renewable natural gas and green hydrogen to fuel some equipment that currently runs on natural gas, or to power energy-intensive activities like industrial operations.

Fuel switching off of natural gas for space heating and cooling, and water heating, significantly reduces GHG emissions. Of course, fuel switching is best accomplished with additional efficiency upgrades, like insulation, that reduce total energy needs.

Electric heat pumps are a proven and reliable heating and cooling technology in Canada. There are two main types: **Air-Source** are the most common, drawing heat from outside air during the heating season and rejecting heat outside for cooling. These allow adequate heating even during cold weather. **Ground-Source** use the earth, ground water, or both as the source of heat in the winter, and as a reservoir to reject heat from the home in the summer. These are less common. Some of these applications require drilling deep holes, and can only be used where they will not disrupt our groundwater. Electric heat pumps are capable of being far more efficient than other heating equipment. One unit of energy going into a heat pump can result in an average of three units of heat energy moved into or out of a building. For systems that rely on burning fuels, only a fraction (60-95%) of the fuel energy is converted to usable heat energy⁹.



9 McDiarmid, H. (2020, October). Analysis of the Residential Electrification Potential for the Waterloo Region. McDiarmid Climate Consulting. Retrieved from https://wrclimatechange.weebly.com/uploads/1/3/0/1/130157067/electrification_report.pdf

Example of a horizontal ground source heat pump.

Strategy 3.2: Build new buildings to be net-zero carbon, or build to transition to net-zero carbon.

Since most buildings are built to last, the choices made while constructing a building will affect energy needs in the community for decades to come. Constructing net-zero carbon buildings that don't use fossil fuels, is easier than changing existing buildings to meet those standards. Therefore, when a new building is built, it needs to be designed to be highly efficient right from the start. However, the amount of carbon used in the building process and creating the building materials can be so significant that it takes decades to pay it back in operational carbon savings.

'Net-zero emissions' and 'carbon neutrality' refer to achieving an overall balance between GHGs produced and GHGs reduced or offset by renewable energy.

A net-zero carbon building is designed to be highly energy efficient, is made from low emission building materials, and contributes no net emissions from its operations by using zero emission renewable energy.

Policies that support sustainable building standards for new builds are critical to ensuring we meet our GHG reduction targets. This includes looking at the entire lifecycle of our buildings to address GHGs in the materials we use and where we source them. This applies to the development of all forms of homes (townhomes, multi-unit residential buildings, rural and urban single-family homes, etc.) and all industries/sectors (small business, commercial, education, industrial, healthcare etc.). This also presents opportunities to use planning development review processes to support and integrate net-zero carbon buildings into future developments.

'Embodied Carbon' is a measurement of the carbon used in the manufacturing and transport of a good or service, before it is even used. This includes carbon emitted into the atmosphere during the growth, mining, extraction, harvesting, transport, manufacturing, and distribution of materials.

Spotlight on Climate Justice: It is especially important that new buildings intended to serve lower-income community members be built to net-zero or net-zero ready standards. This ensures that people across the community have access to comfortable homes with lower utility bills for the long-term. The use of heat pumps in these buildings is especially important as extreme heat increases due to climate change, since heat pumps provide cooling as well as heating, and can help protect community members who experience high levels of vulnerability from extreme weather events.

Take action in every part of your life, to ensure that by 2050, businesses and homes no longer use fossil fuels for space heating and cooling, and water heating. There are endless ways you can act. Here are some examples. If you're stuck for how you can take action, refer back to The Principles for Designing a Low Carbon Future!

**COMMUNITY
CAPACITY BUILDERS**

- Create resources to educate building and home owners on the benefits of switching to electric heating systems
- Identify supports and incentives to help building and home owners afford retrofits for fuel switching

BUSINESSES & ORGANIZATIONS

- Investigate options for switching your building's heating systems from fossil fuels to electric
- Have a professional conduct an energy audit of your building, and make energy efficient upgrades

INDIVIDUALS

- Switch your space and water heating from natural gas to electric systems
- Have a professional conduct a home energy audit to learn how you can make your home more energy efficient
- Make energy efficiency a priority decision making factor when moving to a new home



TRANSFORM THE WAYS WE PRODUCE, CONSUME, AND WASTE

TRANSFORMATIVE CHANGE #4: BY 2050, WATERLOO REGION USES LESS, WASTES LESS, AND NO LONGER DISPOSES OF ORGANIC MATTER IN LANDFILLS.

Waste has significant consequences for GHGs. When organic material is disposed of in landfills, they break down into methane, which is 25 times more damaging to our climate than carbon dioxide. We account for some of that methane in our community inventory, but this only reflects what has

been landfilled at our local public landfills (residential waste that is collected through the Region's curbside collection program). Waste from businesses and multi-residential buildings with more than six units is arranged and paid for privately, without involvement from the Region or Area Municipalities. Much of this commercial waste leaves the community and is sent to landfills elsewhere. Since this process is arranged by landlords, condominiums, and businesses, we do not know how much waste is produced locally, where it goes, or whether GHG-emitting organics have been removed before the waste is landfilled.

Additionally, and what we cannot fully account for locally, is the energy used in making the things that we consume, and transporting it to us and eventually to the landfill or recycling centre.

Reducing our energy use and reducing our energy emissions relies on us using less, and building a circular economy (using items as long as possible, extracting the maximum value from them, and recovering, repurposing, and/or regenerating new products).

KEY SUCCESS METRICS:

In our pathway to '80by50', we assume that we will maintain the same level of methane emissions from our landfills as we had in 2010. This is because much of the emissions from our landfills are the result of organic material that was added to them years or even decades ago. Moving forward, we need to stop landfilling organic matter altogether. Success in achieving this Transformative Change will require us to make significant changes to what and how we consume across our community.


Results	2030	2040	2050
Maintain the same level of methane emissions from our landfills as we had in 2010 tCO ₂ e = tonnes of carbon dioxide equivalent. It is a metric used to compare the emissions from various greenhouse gases on the basis of their global-warming potential.	45,774 tCO ₂ e	45,774 tCO ₂ e	45,774 tCO ₂ e

“At Ekko, we’re excited to be a collaborating organization on the Community Climate Action Strategy to reduce takeout waste in Waterloo Region, and create a circular economy through our reusable takeout container service.”
– Chloe & Crystalle Kruis, Co-Founders of Ekko

STRATEGIES TO CHANGE OUR SYSTEMS:

Strategy 4.1: Optimize the use of existing waste management infrastructure, including expanding diversion programs and energy capture from waste.

Residential curbside waste collection, diversion, and disposal services are delivered by the Region of Waterloo, servicing residents of the Area Municipalities. The Region has made great strides in waste management, expanding collection programs to reduce waste going to landfill, and shifting to every other week residential waste collection schedules to encourage waste reduction, recycling, and organics composting. From 2013 to 2019, green bin collection increased by 17 kilotons/year and residential garbage collection was reduced from 93 to 65 kilotons/year. Overall waste diversion rates have also increased, from 52% in 2011 to 65% in 2019¹⁰.



Did you know?
After the transition to bi-weekly curbside garbage collection in 2019, the region’s green bin usage went up 150% from 2017 rates!¹¹

The Region will continue to manage residential waste with leading edge best practices. Additional efforts are required across the community to change how commercial, industrial, and multi-unit residential buildings deal with solid waste, and to minimize the amount of GHGs that are released from landfills both inside and outside the region.

Strategy 4.2: Use less, and use it again.

While we maximize the municipal waste management system and improve commercial waste disposal, our community will need to take action to achieve a future where we not only reduce, reuse, recycle, and rot, but normalize recovering, repairing, refurbishing, and sharing.

These steps help us move away from a linear economy (take, make, dispose), and move towards a circular economy- a closed loop system where items are continuously reused. This results in lower GHG emissions largely due to the significant reduction in energy required when we use items that already exist.



Take action in every part of your life, to ensure that by 2050, Waterloo Region uses less, wastes less, and no longer disposes of organic matter in landfills. There are endless ways you can act. Here are some examples. If you’re stuck for how you can take action, refer back to The Principles for Designing a Low Carbon Future!

COMMUNITY CAPACITY BUILDERS	BUSINESSES & ORGANIZATIONS	INDIVIDUALS
<ul style="list-style-type: none">Organize neighbourhood tool shedsHost community repair workshops	<ul style="list-style-type: none">Share your waste diversion rates in marketing communications, and continually look for ways to improve itLook for zero-waste catering options for eventsEvaluate manufacturing and other processes for ways to produce less waste, or reuse it elsewhere	<ul style="list-style-type: none">Talk to your landlord about the importance of implementing organics collection in your buildingWhen shopping for food, clothes and other household items, consider where items came from, under what circumstances they were produced, their lifecycle, and their waste footprintComplete a home waste audit to understand the waste you are creating, and identify zero waste solutions and alternatives

“The KW Library of Things is excited to participate in our community’s Community Climate Action Strategy. When you share infrequently used items like tools, kitchen gear and garden equipment, you reduce landfill and greenhouse gas emissions. More than that, you save money, join a vibrant community and support meaningful employment opportunities. We look forward to working together for positive change!”
– Sara Wilbur-Collins, Operational Librarian
KW Library of Things (a project of Extend-A-Family Waterloo Region)

^{10,11} Region of Waterloo. (2020) Waste Management Annual Report 2019. Retrieved from https://www.regionofwaterloo.ca/en/living-here/resources/Documents/Waste/WasteManagement_AnnualReport2019-access_Final.pdf

TRANSFORMATIVE CHANGE #5: BY 2050, WATERLOO REGION HAS A THRIVING LOCAL FOOD SYSTEM BUILT ON LOCAL FARMING, AND FOOD PRODUCTION AND PROCESSING THAT FEEDS MUCH OF OUR COMMUNITY.

Agricultural producers are directly impacted by a changing climate, and therefore the agricultural industry is actively planning to contribute to GHG emissions reduction efforts. Within this sector, the main sources responsible for GHG emissions are livestock, application of synthetic nitrogen fertilizers and manure, fossil fuel combustion associated with farm machinery, and the manufacturing of fertilizers and farm machinery.

While methane emissions from livestock at local farms make up 5% of our local GHG inventory (and are counted as our local agriculture sector emissions), some of the emissions from the food we eat appear in other sections of our local inventory. These show up as business use of fossil fuels for farm operations, or when vehicles are used to transport food or food waste. While we have strong local food production, much of our food is made or grown elsewhere. The emissions used to make and grow food elsewhere and transport it to the region for us to eat can be significant and are important to address. We must consider emissions from our food systems holistically, and this includes expanding our local food system here in the region, considering our impacts in other communities from foods grown elsewhere, and making efforts to eat seasonally appropriate foods.

A significant way to reduce emissions caused by the food we eat is to make more of our food close to home. A locally-based food system is

also more resilient, as we are less reliant on supply chains from other parts of the world, and less vulnerable to changes or shocks in those systems.

We are fortunate in Waterloo Region to be a strong agricultural community, with land, people, and a food system that can serve as the foundation for a future where we make more of our own food.



Waterloo’s diverse food processing sector includes nearly 1,400 farms and more than 130 regional food manufacturers. Our strengths include crop and animal production, snack food, confectionary, bakery, beverage manufacturing and distribution. Our community is part of the Toronto-Waterloo-Guelph Corridor, the largest food manufacturing area in Ontario and third largest in North America. Our community is just 105km from Canada’s largest consumer market (Toronto), with a total of 150 million consumers within a one day drive (1200km/745mi)¹². (WaterlooEDC).

12 Waterloo Region Economic Development Corporation. (n.d.) Food and Beverage. Retrieved from <https://www.waterlooeDC.ca/en/industries/food-processing.aspx#:~:text=Waterloo's%20diverse%20food%20processing%20sector,than%20130%20regional%20food%20manufacturers.&text=This%20community%20includes%20global%20brands,Fine%20Foods%20and%20Weston%20Foods.>

KEY SUCCESS METRICS:

For our local inventory, we expect to maintain the same level of methane emissions from livestock as we did in 2010 over the next 30 years. Doing so while making more of the food we consume close to home will require reducing the emissions created by each animal, as well as consuming fewer animal products per person. This will be challenging but necessary to achieving our long-term GHG reduction target.

Results	2030	2040	2050
Maintain the same level of methane emissions from livestock as we had in 2010	213,559 tCO ₂ e	213,559 tCO ₂ e	213,559 tCO ₂ e

tCO₂e = tonnes of carbon dioxide equivalent.
It is a metric used to compare the emissions from various greenhouse gases on the basis of their global-warming potential.

STRATEGIES TO CHANGE OUR SYSTEMS:

Strategy 5.1: Protect agricultural land and the local agricultural system.

Waterloo Region has been a long-time leader in the development and implementation of land use planning protections for prime agricultural land. This protection is a continued priority for community members, those in the agricultural industry, and municipalities, and these policies must continue to be strong. Building and maintaining close relationships between our local municipalities and organizations within our local agricultural communities is critical to ensuring we meet and exceed best practices to protect our agricultural land.



Regenerative land management is a set of principles and practices that reverse current trends of degradation in soil, water and air quality by enhancing the soil ecosystem and restoring its biology. This helps mitigate climate change: reducing dependence on chemicals and pesticides resulting in more nutrient dense food, and generating greater economic viability for farmers. It also greatly assists with climate change adaptation: drawing carbon into soil and increasing resilience against drought, floods, and extreme weather events (Regeneration Canada, 2021).

“At the Food Systems Roundtable Waterloo Region, we are taking a multifunctionality approach to the climate emergency. Multifunctionality in food and farming focuses on interrelationships between agriculture production, biodiversity regeneration, and the numerous social services we derive from the land. As we are dealing with complexity, creating the conditions for the emergence of sustaining food systems requires we move beyond a check box approach for a given practice as “climate smart” and look at farming and food in this integrated way”

– Jodi Koberinski, Advisor, Food Systems Roundtable

Strategy 5.2: Diversify and strengthen the local agri-food sector with a focus on serving local food needs.

Supporting and continuing to build our agricultural and agri-food industry can increase the amount of food that we grow, make, and consume locally. This significantly reduces the energy needed to transport food into and out of the region. Supporting our local agricultural community directly contributes to strengthening our local economy, and increases our resilience by reducing our reliance on international supply chains.



Spotlight on Climate Justice:

Indigenous knowledge and cultural practices are crucial to addressing climate change. From a food perspective, hunting, fishing, and gathering are an integral part of that knowledge and practice. While working to reduce emissions from our diets, these practices must be respected and encouraged, and we must work toward achieving food sovereignty. Food Sovereignty is “the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems” (Food Secure Canada, 2021).

Strategy 5.3: Support leadership in farming communities to plan and lead GHG reduction efforts, such as improving livestock production efficiency, reducing and replacing fossil fuels, and sequestering carbon.

Given our community’s vision to expand local food production for local use and consumption, we do not plan for livestock emissions to decrease over the next 30 years. However, the emissions per animal, and total animals needed to fulfill our needs, must be reduced to avoid increasing our emissions from livestock. Developing methane capture strategies will contribute to this goal as our local population and therefore food production needs grow.

Strategy 5.4: Adopt low GHG emission diets.

Being aware of what is on our plate can lead to significant GHG emission reductions. Eating locally grown/produced foods reduces emissions while supporting our local economy. Community and personal gardens, as well as local foraging with an experienced guide, are great ways to become more self-reliant as well.

While eating locally is important, some foods are significantly higher in GHGs than others are. This depends on how different foods are grown/raised, processed, in addition to where they come from. Making conscious food choices in our homes, as well as having a variety of low-GHG food options including plant-based products at local restaurants and grocery stores, will contribute to our goals.





Take action in every part of your life, to ensure that by 2050, Waterloo Region has a thriving local food system built on local farming and food processing that feeds much of our community. There are endless ways you can act. Here are some examples. If you're stuck for how you can take action, refer back to The Principles for Designing a Low Carbon Future!

COMMUNITY CAPACITY BUILDERS

- Develop resources to help local restaurants connect with local farmers
- Develop guides to help businesses and individuals choose low-GHG food options
- Make healthy low-GHG food options affordable and easily accessible

BUSINESSES & ORGANIZATIONS

- Commit to sourcing the majority of your food and beverages locally, adjusting dining options seasonally
- Only provide plant-based lunch options in meetings or at events
- Implement methods to capture methane and produce energy from manure in agricultural settings
- Utilize farming practices that sequester carbon in soils

INDIVIDUALS

- Adjust your meal planning routines seasonally, to prioritize the use of locally available products
- Reach out to your local grocery/supermarket and request they carry more locally grown/made products
- If you consume meat, participate in 'Meatless Mondays', and gradually reduce your meat consumption on a weekly and daily basis



What is your vision for Waterloo Region in 2050?

“There is a greater reliance on local farmers in the universities and communities.”

-Waterloo Region community member



TRANSFORM THE WAYS WE RELATE



The ways that we relate to one another is a critical factor in how we foster relationships at all levels, and is essential to making ambitious progress towards our goals. The word ‘relate’ is rich, meaning to show or establish a connection between two or more things, or to have an understanding (of people or ideas). Our ability to relate to one another influences how we interact and communicate with, as well as learn from, those within our local community, and to others outside of that. Developing a deep understanding of how people, organizations, and communities that are different from ourselves operate and live their lives can be a powerful catalyst for action that is equitable, and raises everyone up together, especially those who have traditionally experienced disproportionality and disparity.

TRANSFORMATIVE CHANGE #6: BY 2050, WATERLOO REGION HAS LEVERAGED REDUCING GHG EMISSIONS TO INCREASE EQUITY, PROSPERITY, AND RESILIENCY FOR ALL.

The transition required to address climate change is a once-in-a-century opportunity to build the community we want. This came through strongly in our community consultation. While making the Transformative Changes, enacting the strategies, and accomplishing the action items, we must ensure that we do so in a way that makes our community more equitable, prosperous, and resilient. This will take ongoing collaboration and coordination of efforts between local sectors, community members and organizations, and with senior levels of government. There are specific strategies and activities that can support this work, identified in this section.

KEY SUCCESS METRICS:

To achieve our GHG reduction targets, we must work toward locally producing energy from carbon neutral, renewable sources. This work, as well as the other Transformative Changes, must be done in a way that increases equity and supports the members of our community that need it most. A crucial first step in doing this is establishing metrics that enable us to measure progress in reducing inequities and creating climate action solutions that increase equity. From there, we can work towards being recognized as a national leader in sustainability, clean tech, renewable energy, and energy retrofits by 2050, in a just way that benefits all.

Results	2030	2040	2050
Next steps: Establish metrics to measure progress in reducing inequities, and creating climate action solutions that increase equity	TBD	TBD	TBD
Locally produce energy from carbon neutral, renewable sources (% of local electricity consumption that is produced through local carbon neutral sources)	4%	17%	38%


STRATEGIES TO CHANGE OUR SYSTEMS:

Strategy 6.1: Prioritize increasing equity throughout GHG reduction planning.

Not everybody experiences the impacts of climate change in the same way or has the same means of coping with the negative consequences. Similarly, not everyone benefits from the solutions to address climate change in the same way, and in many cases, solutions that purely focus on GHG emission reductions can harm those who experience a high level of vulnerability.

As we take action on climate change, we must work to identify opportunities for reducing inequities every step of the way, prevent existing inequities from continuing further, and focus on solutions that increase equity. Building and maintaining reciprocal relationships between equity-deserving groups and local municipalities and climate action organizations is a crucial first step. Simultaneously, metrics to measure progress to ensure we achieve what we set out to must be established. To make a meaningful impact, this work must be ongoing, adequately funded, and continually evolve to reflect our community’s needs. This work must be guided by the voices of those with lived experience, as we strive to meet and exceed our short and long-term targets. For this purpose, we need to ensure that our decision-making committees and leadership reflect the diversity of our community and include meaningful representation from equity-seeking groups.

Strategy 6.2: Position Waterloo Region as a hub of clean tech, sustainability, renewable energy, and retrofits.



Spotlight on Climate Justice:
An example of the importance of considering climate justice is solar panel subsidy programs. Subsidies often benefit homeowners and those that can afford installation on private properties. But depending on how those subsidies are paid for, they can increase costs for lower-income homeowners and renters who are not able to afford installations even with subsidies. To address this, programs could be intentionally designed and implemented to support installation of solar panels and subsidies on low-income and rental housing, in a way that works for their needs and contexts. Those residents would benefit from a lowered electricity bill while GHGs are also being reduced.

Reducing GHGs is good for the economy, and a strong equitable economy is good for ensuring quality livelihoods of our community members. Transition planning, and the many mitigation projects and actions that will support it, encourage growth of the region’s low carbon economy. This is through creating new jobs, tapping into our booming local technology sector, and contributing to ‘building back better’ in a way that leaves no one behind, as the region recovers from the impacts of the COVID-19 pandemic. By sticking to our commitments and collectively prioritizing our GHG reduction work, we

can build a reputation for advancing clean economy innovation as this emerging sector continues to expand and evolve globally.

Strategy 6.3: Ramp up local renewable energy generation.

Local renewable energy generation has multiple benefits for our community. It provides resiliency, allowing for local sources of energy that are not dependent on global supply chains. It provides considerable investment opportunities and jobs within the community, and allows community members to be active participants in achieving our energy future.

In the longer term, we need to set up Waterloo Region to significantly scale renewable energy generation after 2030, in order to be able to produce 38% of our electricity locally by 2050.

Over the next 10 years, we need to ramp up the implementation of existing renewable energy technologies in Waterloo Region. In the short-term, this will contribute to our GHG reduction target for 2030.

Strategy 6.4: Support GHG reduction transition planning in all organizations and households.

To achieve our goals and ensure future prosperity, all organizations will need to transition off of fossil fuels for their buildings and transportation needs. This includes businesses, non-profit and community service organizations, and governments. Individuals and households will also need to make changes so they can move around the

community and heat their homes in clean, zero emission ways.

Transitioning off of fossil fuels requires strategic planning, and everyone and every organization has an important role to play. At the same time, in order to do our parts we must be supported through this change by our local community and the structures and organizations that have the tools to make the transition realistic and attainable.

Strategy 6.5: Coordinate advocacy to senior levels of government.

Municipal governments currently have direct or indirect control over approximately 44% of GHG emissions in Canada , while other sources of emissions that are regulated provincially and federally make up the rest. That means that while we take the lead to address climate change in our community, the success of our efforts will also depend on policies from other levels, such as carbon pricing and the emissions from Ontario’s electricity grid, and changes to provincial land use planning regulations. Achieving our 2030 and 2050 visions will require working with local organizations and governments, as well as other municipalities across Ontario and Canada, to have a coordinated voice in expressing our needs for climate action that supports equity, prosperity, and resiliency. In doing so, we should advocate for higher levels of ambition, in line with the 1.5°C degree Paris Agreement target as well as the justice and equity principles outlined in this strategy. With strength in numbers, we can provide proactive guidance to provincial and federal governments so our local action and efforts produce the intended outcomes.

13 Federation of Canadian Municipalities. (2009, October 8). *Act Locally: The Municipal Role in Fighting Climate Change*. Retrieved from <https://fcm.ca/sites/default/files/documents/resources/report/act-locally-municipal-role-fighting-climate-change.pdf>



Take action in every part of your life, to ensure that by 2050, Waterloo Region has leveraged reducing GHG emissions to increase prosperity, equity, and resiliency for all. There are endless ways you can act. Here are some examples. If you're stuck for how you can take action, refer back to The Principles for Designing a Low Carbon Future!

COMMUNITY

CAPACITY BUILDERS

- Provide resources to guide businesses and organizations to ensure climate action plans focus on building equity alongside deep GHG reductions
- Provide templates for businesses and individuals to plan their renewable energy transition

BUSINESSES & ORGANIZATIONS

- Invest in doing the work to understand how your organization can work effectively with equity-seeking groups in co-creating climate actions that are equitable and accessible
- Commit to sourcing a portion of your operating energy from renewable sources

INDIVIDUALS

- Educate yourself on issues of equity, sovereignty, and accessibility, and how they relate to sustainability justice
- Participate in local climate action advocacy efforts, to aid in coordinating senior levels of government in supporting our local transition to a low carbon community

“We at 50by30WR are excited to see momentum building for bold climate action grounded in social justice as demonstrated by this report, and look forward to partnering with everyone involved in this effort to transform our region in response to the climate emergency. The moment is urgent. Waterloo region must strive to do our fair share to keep warming below a 1.5°C rise in global average temperatures worldwide to secure a safe climate future for all, as Canada committed to do in the Paris Accord, which means a minimum 50% reduction in greenhouse gases region-wide by 2030. Strong climate action implemented and scaled across multiple sectors can bring with it great and lasting benefits to a region, jumpstarting a just clean economy. 50by30WR remains committed to convening community support and engaging in the necessary advocacy to achieve the scale and speed of action required.”

– Abhilasha Dewan, Andres Fuentes Martinez, Barbara Schumacher, Kai Reimer-Watts, Laura Hamilton, Megan Ruttan, Scott Morton-Ninomiya, Stephanie Goertz



PUTTING ACTIONS INTO MOTION

This strategy is meant to provide direction for all future planning by all stakeholders in Waterloo Region. While the specific strategies to move us toward each of the Transformative Changes and the actions in the 10 year plan provide helpful starting steps, the more detailed implementation of this strategy must take place through additional planning by all.

Implementation will look different between rural and urban settings, between cities and townships, between sectors, and throughout different organizations, based on the GHG emissions and makeup of their respective work and areas of influence. This might mean that implementation will happen at different speeds in different settings. The next stages include not only implementing the actions we already understand, but continually working to identify the additional actions and finer details of ‘how’ we go about taking climate action, within our respective spheres. The important piece is that we all continually look for opportunities to contribute to and exceed this community goal.

We must all combine this strategy with our specific expertise across our community, to build all our future work around transforming Waterloo Region into an equitable, prosperous, resilient low carbon community.



MEASUREMENT, MONITORING, AND VERIFICATION

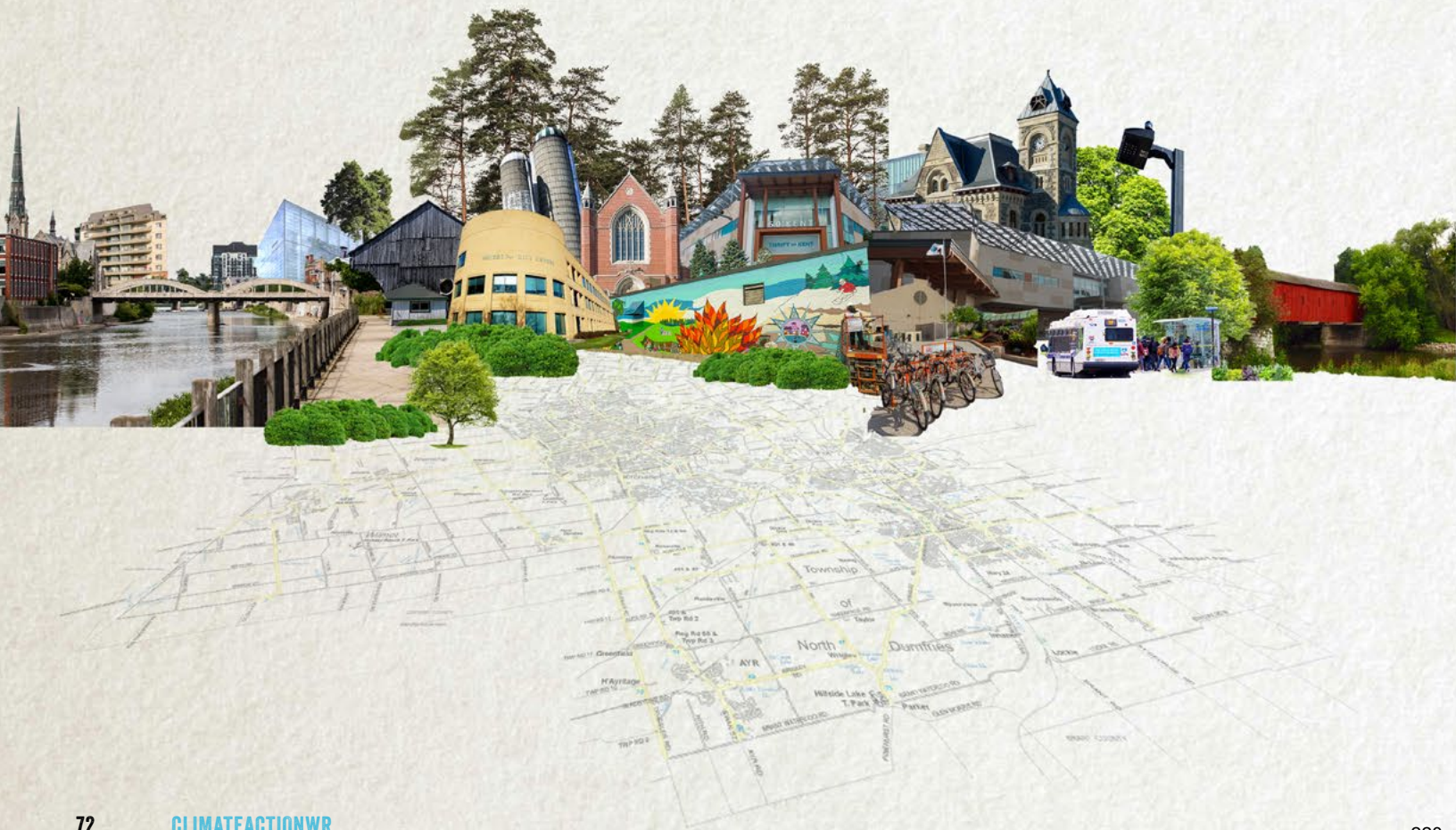
Continuous monitoring of Waterloo region’s GHG emissions across all sectors is essential to measuring progress towards achieving our community’s GHG emission reduction targets.

Measuring emissions throughout an entire community is extremely difficult. There are situations where data is reliable, accurate and readily available (eg. facilities electricity data) but there is also data that is not readily available and requires creative approaches and methodologies to estimate (eg. personal vehicles).

As technology develops over the next 30 years, we will see advancements in the ease of collecting relevant data, and the increased availability of it.

Fulsome GHG inventories will be completed no less than every 5 years, with efforts to monitor progress on action items annually. To do this, the ClimateActionWR collaborative will identify indicators to aid in tracking progress against our targets and the key success metrics associated with each Transformative Change, and provide real-time data on trends as they emerge.

PART II: TRANSFORM^{WR} 10 YEAR PLAN



OUR PATH TO 2030

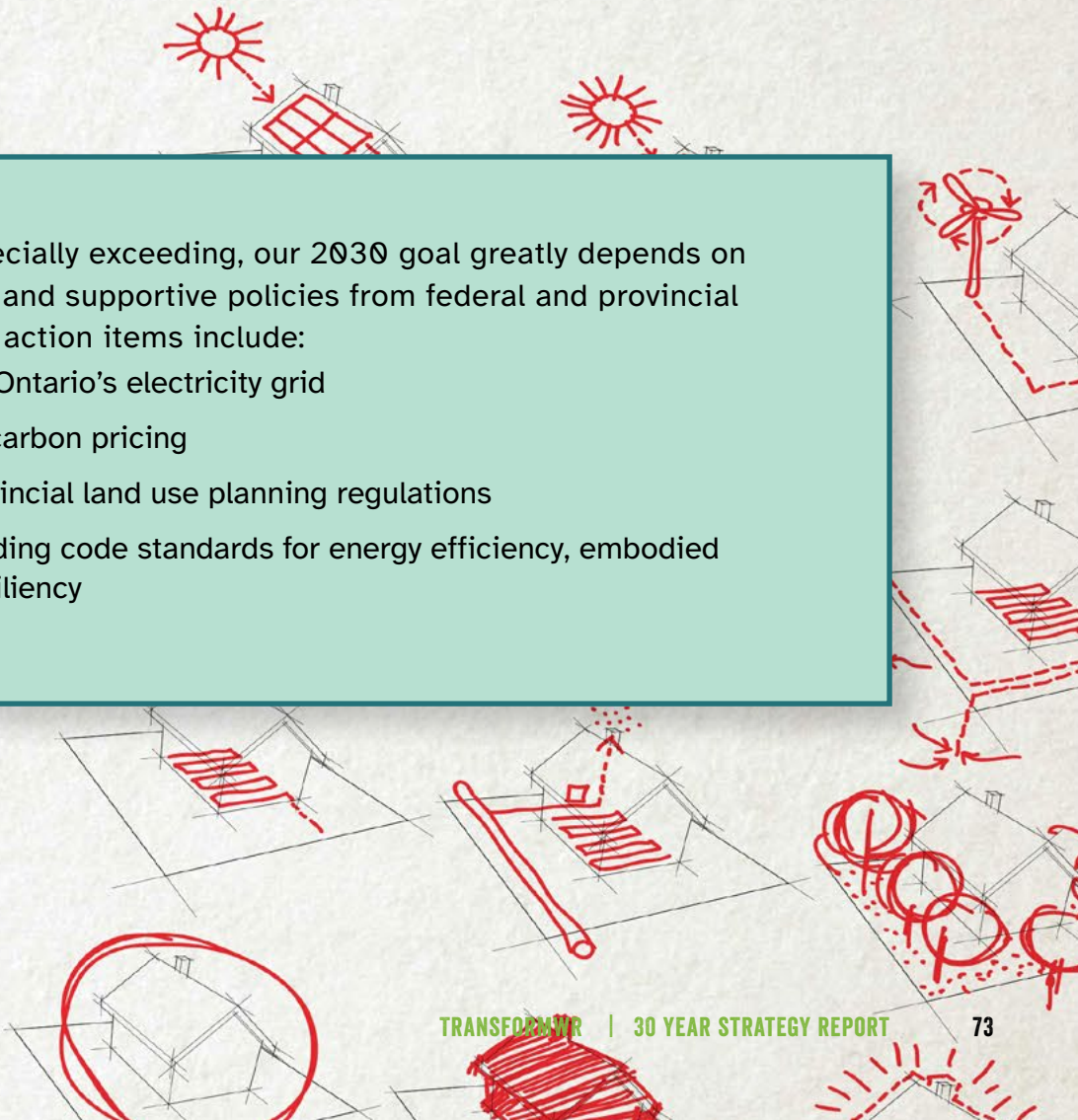
TransformWR 30 Year Strategy identifies six Transformative Changes that will help us to build an equitable, prosperous, resilient low carbon community by 2050.

To get there, the next 10 years are crucial. We know from the science that change cannot wait.

To better align our work with global climate goals, we have defined an interim absolute target (total reduction) of a 30% reduction in GHG emissions by 2030. Based on population projections, this will reduce emissions 49% per person by the year 2030. Our local ‘30by30’ target was informed by not only the GHGs we need to reduce by 2030, but by prioritizing positioning us to have laid a solid foundation for achieving our long-term target by then. Significant action will be required within the region in the coming years to achieve this interim target, but the pathway that follows is deemed both ambitious, yet achievable.



- Meeting, and especially exceeding, our 2030 goal greatly depends on immediate action and supportive policies from federal and provincial governments. Key action items include:
- decarbonizing Ontario’s electricity grid
 - implementing carbon pricing
 - enhancing provincial land use planning regulations
 - increasing building code standards for energy efficiency, embodied carbon and resiliency



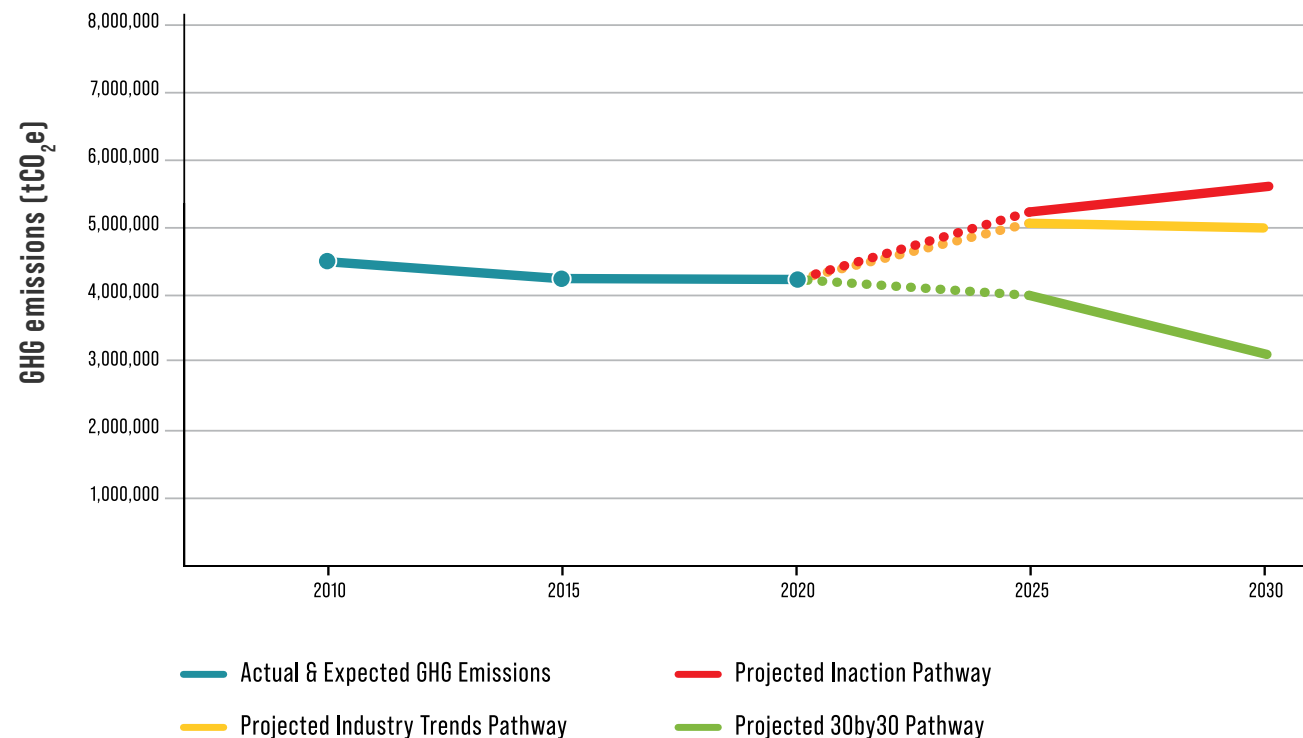


Figure 7: Waterloo Region’s GHG Reduction Pathways to achieve an interim target of 30% GHG emission reduction by 2030 (based on 2010 levels).

- This GHG reduction pathway is built on a model that examines three possible scenarios:
- Inaction:** Our population continues to grow as expected, but no further efforts are made to reduce our GHG emissions;
 - Business as usual:** Our population continues to grow as expected, and predicted industry trends help us reduce emissions per person over time; and
 - 30by30:** Our population continues to grow as expected, industry trends help us reduce emissions per person over time, and we make further conscious changes to meet our ‘30by30’ reduction target.

- Locally, we need immediate actions to meet our goals for 2030. Those actions must be focused on two key outcomes:
- By 2030, we have reduced our GHG emissions by 30% below 2010 levels; and
 - By 2030, we have laid the groundwork for transforming our community the rest of the way to achieve our target to reduce GHG emissions by 80% by the year 2050.

To meet our ‘30by30’ target, real changes to our energy use have to start now, so that we will burn fewer fossil fuels next year, the year after, and so on.

The following action list is just the beginning. It is by no means exhaustive, and the actions

differ in their scale, but it is intended to guide the next decade of climate action across our community. It is meant to serve as a starting point for more detailed planning.

Identification of these action items is step one. Implementation plans will need to be made next, and timelines will vary significantly by action. Each municipality, and indeed, each organization, household, and individual in our community will need their own climate action plans, to guide and implement their portion of this work.

While a lot of planning work is needed in the first few years, we must move quickly to implementation, so that real changes have been made by 2030.

HOW TO READ THESE ACTIONS

The 10 year plan below identifies the overarching key Transformative Changes required of our community by 2050, their associated key strategies to get there, and the specific actions that must be taken in the first decade. Many of the action items have a lead organization identified. This indicates that they are one organization committing to move this work forward, however, many of these actions will require collaboration from across the entire community, and will benefit from having multiple partners and supporting organizations involved on each one.

There are four key categories of lead organizations identified in the actions that follow. In some cases they are referred to as a whole, and in other cases, specific, named organizations or specific sectors of a category are identified.



Municipalities: There are 8 municipalities in Waterloo Region. The Region of Waterloo is the upper-tier municipality, and the 7 Area Municipalities refer to the Cities of Cambridge, Kitchener, and Waterloo, and the Townships of North Dumfries, Wellesley, Wilmot, and Woolwich.



Community Capacity Builders: Organizations that provide resources and support to other organizations or community members. This can sometimes include certain community groups and volunteer groups. Examples include Reep Green Solutions, Sustainable Waterloo Region, CycleWR, and the KW Library of Things.



Utility Companies: Organizations that maintain the infrastructure for a public service. This includes organizations such as Enbridge Gas, Energy Plus, Kitchener Utilities, Kitchener-Wilmot Hydro, and Waterloo North Hydro.



Businesses and Organizations: These include for-profit businesses, non-profit organizations, and community service organizations.

In some cases, the first step forward will be to identify the lead organization. Do you see an action that you or an organization you are associated with would like to become involved with? Let us know! Connect with the ClimateActionWR team at connect@climateactionwr.ca

SUMMARY LIST OF ACTIONS:

TRANSFORMATIVE CHANGE #1: BY 2050, MOST TRIPS ARE TAKEN USING ACTIVE TRANSPORTATION, WITH THE SUPPORT OF A ROBUST PUBLIC TRANSIT SYSTEM.

Strategy 1.1: Redesign, rebuild, and maintain our transportation system to prioritize active transportation.

- Action 1.1.1:** Plan a network of major active transportation corridors across cities and townships, that will provide high-volume priority travel for walking, cycling, and rolling to key destinations across the region, as well as access to public transit.
- Action 1.1.2:** Plan for and build neighbourhood connections to the active transportation network.
- Action 1.1.3:** Implement further policies across the region to prioritize active transportation in road and trail design and reconstruction.
- Action 1.1.4:** Identify and implement policy and program opportunities to disincentivize driving.
- Action 1.1.5:** Design and maintain active transportation infrastructure to ensure year-round access, safety, and comfort for people of all ages and abilities.

Strategy 1.2: Continue to build a robust and accessible public transit system that conveniently and safely serves people across the community.

- Action 1.2.1:** Complete Phase 2 ION to Cambridge, and plan for future higher-order transit service on additional key corridors.
- Action 1.2.2:** Ensure priority access for walking, cycling, and rolling to transit stations and bus stops.
- Action 1.2.3:** Continue to expand access to public transit across cities and townships.
- Action 1.2.4:** Connect people to intercity, multimodal, and emerging transportation solutions.
- Action 1.2.5:** Improve transit infrastructure and technologies to increase rider comfort and convenience.

Strategy 1.3: Support people to walk, cycle, or roll, and build a culture of active transportation and public transit ridership.

- Action 1.3.1:** Launch micro mobility systems (bike, e-bike and e-scooter-sharing systems) in Waterloo Region communities.
- Action 1.3.2:** Expand and innovate on existing programming (e.g. Travelwise) that supports employers and employees in making active transportation and transit the easy and preferred choice for commuting and business travel.

- Action 1.3.3:** Create community active transportation hubs to provide customized support, education, training, and resources.
- Action 1.3.4:** Develop active transportation and transit programs that target equity-deserving communities.
- Action 1.3.5:** Post-pandemic continued adoption of work from home and flexible work schedules for reducing trips or shifting trips to off-peak times.

Strategy 1.4: Transition to low-energy movement of commercial goods.

- Action 1.4.1:** Increase the efficiency of commercial goods movement.

Strategy 1.5: Build compact urban and settlement areas that are efficient for energy, services, infrastructure, and transportation, and make existing and new communities “complete communities.”

- Action 1.5.1:** Create “15 minute neighbourhoods” where people can meet their daily needs by walking, cycling, or rolling.
- Action 1.5.2:** Implement design standards for new developments to build for walking, cycling, and rolling to be the primary mode of travel.
- Action 1.5.3:** Site key community services, health facilities, subsidized housing, etc., in central areas where they can be easily accessed using the active transportation and public transit systems.

TRANSFORMATIVE CHANGE #2: BY 2050, REMAINING PERSONAL AND COMMERCIAL VEHICLES ARE ZERO EMISSIONS VEHICLES.

Strategy 2.1: Switch personal and commercial vehicles to zero emission vehicles.

- Action 2.1.1:** Complete a region-wide electric vehicle strategy.
- Action 2.1.2:** Plan and begin to implement a transition to zero emission vehicles for municipal fleets, working towards a goal of at least half of municipal vehicles being zero-emissions by 2030.
- Action 2.1.3:** Plan and begin to implement the transition of commercial vehicle fleets to zero emissions vehicles.
- Action 2.1.4:** Grand River Transit to pilot zero emission vehicles, and implement a full zero emission vehicle strategy (full transition expected to be complete by 2040).
- Action 2.1.5:** Develop and implement an electric vehicle public outreach and communication strategy for personal vehicles.
- Action 2.1.6:** Address barriers to a transition to zero emission school buses.

Strategy 2.2: Build a network of charging/refuelling infrastructure to support the shift to zero emission vehicles.

- Action 2.2.1:** Provide more public electric vehicle charging stations in public spaces, commercial spaces and other places visited by the public.

Action 2.2.2: Require all new residential parking spaces, and a portion of new non-residential parking spaces, to be constructed as “EV-ready”.

Action 2.2.3: Investigate and implement local opportunities to address barriers to adding electric vehicle charging infrastructure in existing multi-residential buildings and homes.

Action 2.2.4: Investigate hydrogen vehicle trends and refuelling infrastructure options.

TRANSFORMATIVE CHANGE #3: BY 2050, WATERLOO REGION USES LESS, WASTES LESS, AND NO LONGER DISPOSES OF ORGANIC MATTER IN LANDFILLS.

Strategy 3.1: Decarbonize building heating and cooling, and water heating, by replacing furnaces and hot water heaters with highly energy efficient and low carbon equipment or fuel sources.

Action 3.1.1 Upgrade commercial and residential building walls, foundations, attics, windows and doors to reduce heat loss and air leakage.

Action 3.1.2: Implement a public literacy campaign to explain and promote the adoption of heat pumps for space and water heating in residential and commercial buildings.

Action 3.1.3 Switch home and business heating and water heating off of fossil fuels.

Action 3.1.4: Investigate and plan for full replacement of natural gas with other, non-fossil fuel sources, such as a combination of renewable natural gas and hydrogen.

Action 3.1.5: Identify and implement necessary supports to transition anyone still using fuel oil, or propane for heating to other fuel sources by 2025.

Action 3.1.6: Install renewable energy generation in business and residential buildings.

Action 3.1.7: Support households on lower income with building envelope improvements, electrifying space and water heating, and renewable energy generation.

Action 3.1.8: Identify opportunities to incentivize landlords to perform energy efficiency upgrades.

Action 3.1.9: Offer innovative loans for energy-related residential and commercial building upgrades.

Action 3.1.10: Create a one-window service to support energy-related upgrades for homes and businesses.

Action 3.1.11: Education for the development industry, architects, engineers, building inspectors, and trades on deep energy building upgrades and working with technologies such as heat pumps and solar.

Action 3.1.12: Integrate energy profiles of buildings and homes into real estate sales and leases.

Strategy 3.2: Build new buildings to be net-zero carbon, or build to transition to net-zero carbon.

Action 3.2.1: Support the adoption of highly efficient building envelope designs, hyper-efficient mechanical systems, and on-site renewable energy options for new buildings.

Action 3.2.2: Develop resources for assessing the life-cycle emissions of building materials.

Action 3.2.3: Develop region-wide building standards to encourage and support zero-carbon development of all new buildings in the region.

Action 3.2.4: Incorporate energy planning considerations into the development application review process.

Action 3.2.5: Provide training for and build capacity of building operators and property managers in operating their buildings to zero-carbon standards.

Action 3.2.6: Build capacity and expertise in the local design and construction sector to build net-zero carbon buildings.

Action 3.2.7: Show leadership by building net-zero carbon in the public sector.

TRANSFORMATIVE CHANGE #4: BY 2050, WATERLOO REGION USES LESS, WASTES LESS, AND NO LONGER DISPOSES OF ORGANIC MATTER IN LANDFILLS.

Strategy 4.1: Optimize the use of existing waste management infrastructure, including expanding diversion programs and energy capture from waste.

Action 4.1.1: Continue to maximize opportunities to expand residential curbside diversion programs, landfill gas capture and waste to energy, and reduce waste overall.

Action 4.1.2: Provide organics collection in all multi-residential buildings.

Action 4.1.3: Support the use of compost/organics collection programs for all commercial buildings.

Strategy 4.2: Use less, and use it again.

Action 4.2.1: Implement community waste reduction and circular economy campaigns.

Action 4.2.2: Build community champion programs to provide best practices and recognition for innovative commercial waste management.

Action 4.2.3: Build incentives or a local program for low to zero waste take-out options.

Action 4.2.4: Reduce unnecessary building demolitions and construction waste.

Action 4.2.5: Support programs and services that offer repair, refurbishment, and resource sharing in the community.

TRANSFORMATIVE CHANGE #5: BY 2050, WATERLOO REGION HAS A THRIVING LOCAL FOOD SYSTEM BUILT ON LOCAL FARMING AND FOOD PROCESSING THAT FEEDS MUCH OF OUR COMMUNITY.

Strategy 5.1: Protect agricultural land and the local agricultural system.

Action 5.1.1: Continue to develop and enforce robust land use planning protections for prime agricultural land.

Strategy 5.2: Diversify and strengthen the local agri-food sector with a focus on serving local food needs.

Action 5.2.1: Create a region-wide agricultural industry strategy to support the agriculture and agri-food sector.

Strategy 5.3: Support leadership in farming communities to plan and lead GHG reduction efforts, such as improving livestock production efficiency, reducing and replacing fossil fuels, and sequestering carbon.

Action 5.3.1: Support the reduction of GHG emissions from livestock, and develop methane capture and energy production from manure.

Action 5.3.2: Support ongoing efforts to reduce and replace fossil fuel use, and sequester carbon, in the agricultural industry.

Strategy 5.4: Adopt low GHG emission diets.

Action 5.4.1: Education on low GHG/sustainable eating habits.

Action: 5.4.2: Provide a variety of low GHG food options and plant-based dining options in local restaurants, grocery stores, and catered events.

TRANSFORMATIVE CHANGE #6: BY 2050, WATERLOO REGION HAS LEVERAGED REDUCING GHG EMISSIONS TO INCREASE EQUITY, PROSPERITY, AND RESILIENCY FOR ALL.

Strategy 6.1: Prioritize increasing equity throughout GHG reduction planning.

Action 6.1.1: Establish metrics to measure progress on increasing equity through GHG reduction initiatives in our community.

Action 6.1.2: Incorporate education on sustainability justice and equity into climate action planning.

Action 6.1.3: Fund a climate justice committee led by community members from equity-seeking groups.

Action 6.1.4: Provide specialized resources/support to organizations on prioritizing equity while planning their transition.

Action 6.1.5: Collaborate with Mennonite communities in the rural townships to build customized energy transition support to meet their unique needs.

Action 6.1.6: Build reciprocal relationships between Indigenous groups and local municipalities and climate action organizations to ensure GHG reduction work is done in equitable ways that respect the land and traditions of Indigenous groups.

Action 6.1.7: Increase broadband internet access.

Action 6.1.8: Apply an equity lens to all the actions in this transformation.

Strategy 6.2: Position Waterloo Region as a hub of clean tech, sustainability, renewable energy, and retrofits.

Action 6.2.1: Develop and support a clean technology cluster in Waterloo Region.

Strategy 6.3: Ramp up local renewable energy generation.

Action 6.3.1: Build the capacity for renewable energy installation.

Action 6.3.2: Implement a public literacy campaign for homeowners and property owners on renewable energy systems.

Action 6.3.3: Implement a literacy and awareness campaign for commercial scale renewable energy generation.

Action 6.3.4: Evaluate how to identify and protect optimal areas for industrial-scale renewable energy generation.

Strategy 6.4: Support GHG reduction transition planning in all organizations and households.

Action 6.4.1: Develop an energy transition plan template, and provide outreach programs and target setting support for all organizations.

Action 6.4.2: Develop an energy transition plan template, and outreach programs for all households.

Strategy 6.5: Coordinate climate advocacy to senior levels of government.

Action 6.5.1: Bring community organizations and local governments together to collectively identify and communicate advocacy priorities to multiple levels of government.



FULL DESCRIPTIONS OF ACTIONS

TRANSFORMATIVE CHANGE #1: BY 2050, MOST TRIPS ARE TAKEN USING ACTIVE TRANSPORTATION, WITH THE SUPPORT OF A ROBUST PUBLIC TRANSIT SYSTEM.

Strategy 1.1: Redesign, rebuild, and maintain our transportation system to prioritize active transportation.

Action 1.1.1: Plan a network of major active transportation corridors across cities and townships, that will provide high-volume priority travel for walking, cycling, and rolling to key destinations across the region, as well as access to public transit.

To rebuild the transportation system to prioritize active transportation, it must be planned around a region-wide network of active transportation corridors that can help large numbers of people move across the region by walking, cycling, or rolling. This network will serve as the base structure of a sustainable mobility network, and should be built for people of all ages and abilities. This work will build on the considerable efforts already underway to include all modes of travel in our transportation system. It will be led by the Region of Waterloo and the Area Municipalities.

Action 1.1.2: Plan for and build neighbourhood connections to the active transportation network.

To prepare for a time when most trips are made by walking, cycling, or rolling, neighbourhoods across the region must have comfortable, safe access to the transportation system using these modes of travel. New neighbourhoods can be designed with this access from the start, and existing neighbourhoods need to be retrofitted to ensure good access to the network. This work will be led by the Cities and Townships, in collaboration with the Region of Waterloo.

Action 1.1.3: Implement further policies across the region to prioritize active transportation in road and trail design and reconstruction.

Policies need to be in place to ensure that all renewal of infrastructure and road redesign projects are built to achieve the goal of having most trips taken by walking, cycling, or rolling, with support from transit. This work will be led by the Region of Waterloo and Area Municipalities.

Action 1.1.4: Identify and implement policy and program opportunities to disincentivize driving.

Driving and parking facilities are expensive for our community and inefficient ways of moving people, but current policies encourage driving by subsidizing roads and parking, and designing public and private spaces around car travel. Removing these incentives while improving active transportation and transit will help these efficient and low carbon alternatives become the normal and preferred means of getting to destinations. These changes must be planned to coincide with the expansion of viable low carbon transportation choices across the community, to ensure equity. This work will be led by the Region of Waterloo and Area Municipalities.

Action 1.1.5: Design and maintain active transportation infrastructure to ensure year-round access, safety, and comfort for people of all ages and abilities.

For most trips to be made by walking, cycling, or rolling, our transportation infrastructure needs to be built and maintained to be used all year, by people of all ages and abilities. This means making sure that the urban heat island effect is minimized in the hot weather, and surfaces are quickly and consistently cleared of ice and snow in the cold weather. As climate change gives us warmer, wetter, and wilder weather, this will become even more important over time. This work will be led by the Area Municipalities and the Region of Waterloo.

Strategy 1.2: Continue to build a robust and accessible public transit system that conveniently and safely serves people across the community.

Action 1.2.1: Complete Phase 2 ION to Cambridge, and plan for future higher-order transit service on additional key corridors.

ION light rail is an efficient and zero emission way of providing “higher order” transit service, where transit vehicles operate in their own dedicated lanes, making service faster and more reliable. ION efficiently moves people where transit ridership is highest, and plays a crucial role in building a reliable and frequent transit system. The second phase of ION will bring light rail transit service to Cambridge, and work on Phase 2 is currently underway. Beyond Phase 2 ION, we must advance planning for future higher-order transit service for other key corridors in the region. This work will be led by the Region of Waterloo.

Action 1.2.2: Ensure priority access for walking, cycling, and rolling to transit stations and bus stops.

For transit to support most trips being made using active transportation, we need to build seamless active transportation connections to and from transit stations and stops. This work will be led by the Region of Waterloo, in collaboration with the Area Municipalities.

Action 1.2.3: Continue to expand access to public transit across cities and townships.

More of the region’s communities and residents can conveniently travel to their destinations using transit when the service is frequent, direct and available at the times it is needed. Programs to ensure everyone can afford to use transit are also crucial. This work will be led by the Region of Waterloo.

Action 1.2.4: Connect people to intercity, multimodal, and emerging transportation solutions.

The transit system must support car-free living and must therefore meet intercity travel needs and connect people to diverse and emerging energy efficient modes of travel. This includes electrified two way all day GO service to Toronto and connections to other travel modes such as active transportation, aviation, car share, buses and trains. This work includes the development of the Central Transit Station Hub, and will be led by the Region of Waterloo, Area Municipalities, and Metrolinx.

Action 1.2.5 Improve transit infrastructure and technologies to increase rider comfort and convenience.

A comfortable and convenient travel experience will encourage more residents to shift away from personal vehicle ownership and use. This includes upgrades to transit

shelters, real-time trip information, etc. This work will be led by the Region of Waterloo.

Strategy 1.3: Support people to walk, cycle, or roll, and build a culture of active transportation and public transit ridership.

Action 1.3.1: Launch micro mobility systems (bike, e-bike and e-scooter-sharing systems) in Waterloo Region communities.

People must have access to the tools and resources they need to reach all parts of our communities easily and conveniently without a personal vehicle. This work will be led by the Region of Waterloo and Area Municipalities.

Action 1.3.2: Expand and innovate on existing programming (e.g. Travelwise) that support employers and employees in making active transportation and transit the easy and preferred choice for commuting and business travel.

Commuting and business travel are significant sources of our transportation emissions yet many of these trips can be made by active transportation and/or transit. Programs such as carpool matching, GRT’s Corporate Transit Pass, and reimbursement for emergency rides home can help make these choices easy, normal, and low risk. This work will be led by businesses and employers, and the Region of Waterloo.

Action 1.3.3: Create community active transportation hubs to provide customized support, education, training, and resources.

While there is lots of interest in walking, rolling, and cycling, sometimes people do not know how to get started. Customized supports can help, like programs that provide DIY bike repair facilities and training, safe

riding workshops, and route planning. This work will be led by the Region of Waterloo in collaboration with Area Municipalities and community capacity builders such as CycleWR.

Action 1.3.4: Develop active transportation and transit programs that target equity-deserving communities.

Not all individuals and communities have the resources to transition to low or no emission transportation. Programs to address diverse barriers must be implemented so that all residents can travel easily and safely to their destinations. These programs must be designed in partnership with equity-deserving groups, and consider interconnected barriers such as safety, funding, education, and community design. This work will be led by the Region of Waterloo and Area Municipalities.

Action 1.3.5: Post-pandemic continued adoption of work from home and flexible work schedules for reducing trips or shifting trips to off-peak times.

Working from home more often reduces our energy needs for travel by eliminating trips from work to home and back, which tend to be longer than other kinds of trips. Transportation emissions from commuting can be reduced if workplaces adopt models that include work from home and flexible work schedules. This work will be led by all businesses and employers.

Strategy 1.4: Transition to low-energy movement of commercial goods.

Action 1.4.1 Increase the efficiency of commercial goods movement.

For people to make shorter and fewer trips, we need to be able to move goods throughout the community in energy efficient ways. Route optimization, fleet right-sizing, and a shift to low energy transportation options where possible (e.g. using cargo bikes for short distances) can reduce the energy used to move commercial goods in, out of, and around our Region, and the GHG emissions that result. This work will be led by the businesses in the manufacturing and industrial sectors, with support from the Region of Waterloo and Area Municipalities.

Strategy 1.5: Build compact urban and settlement areas that are efficient for energy, services, infrastructure, and transportation, and make existing and new communities “complete communities.”

Action 1.5.1: Create “15 minute neighbourhoods” where people can meet their daily needs by walking, cycling, or rolling.

Each neighbourhood can function as a vibrant and complete community, offering most, if not all, of the daily goods, services, and employment people need within walking, cycling, or rolling distance. These compact neighbourhoods help to reduce the need to travel longer distances that are impractical to make using active transportation. This work will require promoting and planning at the municipal level, and will be led by the Region of Waterloo and Area Municipalities.

Action 1.5.2: Implement design standards for new developments to build for walking, cycling, and rolling to be the primary mode of travel.

Design standards can ensure active transportation is the priority when making

transportation impact assessments of new and existing developments. These standards can also address site design issues such as secure bicycle parking, pedestrian access, and vehicle parking. These standards should ensure new developments are built for people of all ages and abilities. This work will be led by Area Municipalities, with support from the Region of Waterloo.

Action 1.5.3: Site key community services, health facilities, subsidized housing, etc., in central areas where they can be easily accessed using the active transportation and public transit systems.

For people to be able to walk, cycle, or roll to meet most of their daily needs, and to rely on transit for other trips, important destinations need to be located where they are easy to access using these modes of transportation. All organizations should evaluate relocation options and future facility needs while prioritizing central access to transit and robust active transportation facilities. This work must be done by all governments, social service agencies, and community organizations.

TRANSFORMATIVE CHANGE #2: BY 2050, REMAINING PERSONAL AND COMMERCIAL VEHICLES ARE ZERO EMISSION VEHICLES.

Strategy 2.1: Switch personal and commercial vehicles to zero emission vehicles.

Action 2.1.1: Complete a region-wide electric vehicle strategy.

Market trends alone will likely translate into 20% of vehicles in the region being zero emission by 2030. Under this plan, 50% of

remaining vehicles must be converted by 2030. This means our community needs to go faster and farther to electrify vehicles quickly. To support this push, a region-wide electric vehicle strategy should be created that will include partnerships, incentives, public outreach, communication and awareness strategies, and policies. The strategy is to be completed no later than 2024 and will be led by WR Community Energy, in collaboration with the electric utilities, Area Municipalities, and the Region of Waterloo.

Action 2.1.2: Plan and begin to implement a transition to zero emission vehicles for municipal fleets, working towards a goal of at least half of municipal vehicles being zero emissions by 2030.

Since businesses and households are being asked to convert at least 50% of vehicles to zero emission vehicles by 2030, municipalities can do their part by meeting or exceeding that target in their corporate fleets. Important initial steps in this work include identifying barriers to fleet transition, gathering and analyzing data on fleet performance and conversion options, and identifying funding for this work. Particular focus should be given to the vehicles that produce the most GHGs. This work will be led by the Region of Waterloo and Area Municipalities.

Action 2.1.3: Plan and begin to implement the transition of commercial vehicle fleets to zero emission vehicles.

Transitioning commercial vehicle fleets to zero emission vehicles will require planning to meet the diverse fleet needs of private companies, non-profit organizations, and governments in a low carbon future. In many cases, light duty vehicles may be easiest to convert first using electrification, but all vehicles must be transitioned off of fossil fuels by 2050. By 2030, 50% of gasoline

and diesel vehicles in the region need to be zero emission, so fleet conversion must begin in the next few years. All businesses must lead this work, and opportunities to support through education programs, industry best practices, and public policies will be examined as part of creating a region-wide EV strategy (Action 2.1.1).

Action 2.1.4: Grand River Transit to pilot zero emission vehicles, and implement a full zero emission vehicle strategy (full transition expected to be complete by 2040).

Transit is a much more energy efficient and lower carbon way to make trips. Nevertheless, as transit fleets expand to provide new services, transit must also convert to zero emission vehicles. ION light rail transit is already zero emissions, running on electricity. Grand River Transit will pilot zero emission buses beginning as early as 2022, and new bus purchases are expected to be zero emissions only beginning in 2025. As diesel buses are replaced at the end of their life, the entire fleet is expected to be converted by about 2040. This work will be led by the Region of Waterloo.

Action 2.1.5: Develop and implement an electric vehicle public outreach and communication strategy for personal vehicles.

While longer term needs for public outreach and communication on electric vehicles will be evaluated during the creation of an EV strategy (Action 2.1.1), this work cannot wait for the strategy to be completed. Community members need information now that can help them make sure their next vehicle is zero emissions, and this will be key to reaching an ambitious 50% target for conversion of vehicles. An initial communications strategy for the first few years should be prepared in 2021, and implemented no later than 2022. This work will be led by ChargeWR with support from WR Community Energy, the

Region of Waterloo, Area Municipalities, and local electric utilities.

Action 2.1.6: Address barriers to a transition to zero emission school buses.

Recognizing that the provision of mass transportation for students is in itself an emissions-reduction mechanism, school buses remain key targets for a rapid transition to zero emission due to the health benefits for children from decreased air pollution and the opportunities arising from standardization and economies of scale. This is challenging to implement due to high upfront costs and the limited distance buses travel annually, as well as the required coordination between school boards, municipalities, and higher levels of government. Opportunities to address these challenges will be examined and where appropriate, advocacy to the Ministry of Education and/or the provincial government to capacitate the purchase and use of emissions free school transportation vehicles will be conducted. This work will be conducted by Student Transportation Services of Waterloo Region.

Strategy 2.2: Build a network of charging/refuelling infrastructure to support the shift to zero emission vehicles.

Action 2.2.1: Provide more public electric vehicle charging stations in public spaces, commercial spaces and other places visited by the public.

To support our community's transition to electric vehicles, our charging infrastructure must be built so that it is ready and convenient to access as people look to adopting electric vehicles. This work will be led by organizations, businesses, and governments, with support from Sustainable Waterloo Region.

Action 2.2.2: Require all new residential parking spaces, and a portion of new non-residential parking spaces, to be constructed as "EV-ready".

It is much less expensive to design new buildings to accommodate electric vehicle charging infrastructure than it is to add it afterwards. Once the right electrical conduits, capacity and outlets are in place, it is easy to add charging stations down the road as demand increases. Regulations that are part of the development review application process can require new parking spaces to be built in this way. This work will be led by Area Municipalities, in collaboration with the Region of Waterloo.

Action 2.2.3: Investigate and implement local opportunities to address barriers to adding electric vehicle charging infrastructure in existing multi-residential buildings and homes.

For existing homes, charging infrastructure will need to be added to serve all residential parking spaces, since most vehicle charging is expected to happen at home. This may be especially challenging in multi-residential buildings, where dozens or hundreds of cars may need to be charged on a nightly basis. Opportunities to address these specific challenges will be examined as part of the creation of an EV strategy, led by WR Community Energy and ChargeWR.

Action 2.2.4: Investigate hydrogen vehicle trends and refuelling infrastructure options.

Some vehicle manufacturers are building or designing zero emission vehicles that use hydrogen as a fuel. While these technologies are still under development, hydrogen is expected to provide potential solutions for key commercial vehicles that are hard to electrify. Our community must monitor this trend and

make plans to ensure that access to refuelling infrastructure is not a barrier to adoption of hydrogen vehicles. This work will be led by WR Community Energy.

TRANSFORMATIVE CHANGE #3: BY 2050, BUSINESSES AND HOMES NO LONGER USE FOSSIL FUELS FOR SPACE HEATING AND COOLING, AND WATER HEATING.

Strategy 3.1: Decarbonize building heating and cooling, and water heating, by replacing furnaces and hot water heaters with highly energy efficient and low carbon equipment or fuel sources.

Action 3.1.1 Upgrade commercial and residential building walls, foundations, attics, windows and doors to reduce heat loss and air leakage.

It is easier and more economical to upgrade the heating system of a building when the building's total energy needs are reduced through air sealing and the use of added insulation and upgraded windows and doors. This work will be led by building owners with support from community capacity building organizations such as Reep Green Solutions and Sustainable Waterloo Region.

Action 3.1.2: Implement a public literacy campaign to explain and promote the adoption of electric heat pumps for space and water heating in residential and commercial buildings.

If building owners are to replace their existing heating systems with electric heat pumps or highly efficient and low carbon alternatives, they must first be aware of the need to make this switch, learn about the reliability and efficiency of heat pumps and alternatives,

and plan for the switch to occur when their existing systems reach their end of life. Various communications methods should be explored to reach diverse communities across the region. This work will be led by businesses and community capacity builders such as Reep Green Solutions and Sustainable Waterloo Region.

Action 3.1.3 Switch home and business heating and water heating off of fossil fuels.

As space and water heating systems fuelled by natural gas reach their end of life, they must be replaced with highly efficient, low carbon alternatives such as electric heat pumps. By 2030, 20% of homes will be using electric heat pumps for water and space heating. By 2050, this will rise to 85% of homes. This work will be led by building owners with support from community capacity building organizations such as Reep Green Solutions and Sustainable Waterloo Region.

Action 3.1.4: Investigate and plan for full replacement of natural gas with other, non-fossil fuel sources, such as a combination of renewable natural gas and hydrogen.

While electric heat pumps are key to our transition to a low carbon community, especially in the next decade, other fuels can also play an important role, particularly for activities that are especially energy intensive. A particularly promising option that is being explored is to replace fossil fuel-based natural gas with a mix of renewable natural gas and green hydrogen. Pursuing options for transitioning existing natural gas operations to zero-carbon is crucial for achieving our 2050 target. This work will be led by Enbridge and Kitchener Utilities.

Action 3.1.5: Identify and implement necessary supports to transition anyone still using fuel oil, or propane for heating to other fuel sources by 2025.

A proportion of buildings in the region are still heated using fuel oil or propane. These are relatively expensive and carbon intensive ways to heat buildings, but there can be specific challenges building owners face in switching to other fuels. WR Community Energy will lead the investigation of these barriers locally. Implementing supports in time for transition by 2025 will require assistance from local electric and natural gas utilities, as well as municipalities.

Action 3.1.6: Install renewable energy generation in business and residential buildings.

Buildings with renewable energy generation will require less energy from the grid thereby reducing emissions associated with electricity generation. By 2030, 4% of the electricity consumed by residential and commercial buildings will be generated through solar PVs, and by 2050, that will rise to 38% of such electricity. This work will be led by building owners with support from community capacity building organizations.

Action 3.1.7: Support households on lower incomes with building envelope improvements, electrifying space and water heating, and renewable energy generation.

Not all households will have the ability and resources to transition their buildings to be low and no emission. Programs are needed to ensure lower income residents are not left behind, or left with high energy bills as a result of changes to the energy system and increasing carbon prices. This work will be led by community capacity builders such as Reep Green Solutions and utilities.

Action 3.1.8: Identify opportunities to incentivize landlords to perform energy efficiency upgrades.

Landlords may be hesitant to invest in energy

efficiency upgrades when it is the tenant who enjoys the benefits of the resulting utility bill savings. Exploring ways to share the costs and benefits of upgrades or finding other ways to incentivize these upgrades will be important for reducing energy poverty and promoting health and wellbeing of tenants. This work will be led by community capacity builders such as Reep Green Solutions, WR Community Energy, and utilities.

Action 3.1.9: Offer innovative loans for energy-related residential and commercial building upgrades.

New financing options allow more building owners to undertake energy upgrades. These loans may have flexible repayment plans and may be tied to the property rather than the property owner, allowing current and future owners to share in both the resulting utility savings and the project costs. This work will be led by Area Municipalities and the Region of Waterloo with support from community capacity builders such as Reep Green Solutions and Sustainable Waterloo Region.

Action 3.1.10: Create a one-window service to support energy-related upgrades for homes and businesses.

Initiating energy-related building upgrades can be time-consuming, intimidating, and involve many technical decision points. A one-window service makes the process easier. This service may include information on all applicable incentives and best practices for energy-related upgrades, behavioural change campaigns and other supports. The service will help more building owners in performing more upgrades that reduce building-related emissions. This work will be led by WR Community Energy in collaboration with Reep Green Solutions, the Region of Waterloo, Area Municipalities, and the local utilities.

Action 3.1.11: Education for the development industry, architects, engineers, building inspectors, and trades on deep energy building upgrades and working with technologies such as heat pumps and solar.

A better informed building industry is able to plan for and provide renovations that lead to low-emission buildings. This work will be led by WR Community Energy, in collaboration with educational institutions, industry and trades organizations.

Action 3.1.12: Integrate energy profiles of buildings and homes into real estate sales and leases.

Energy profiles will allow buyers and renters to consider the operational energy costs of all buildings (both new and established) and any investments needed to upgrade the building to be carbon neutral by 2050. This will generate greater demand and value for energy-related upgrades. Outreach to realtor boards and developers will ensure they understand and support this work. As a first step, a lead organization will need to be identified for this work.

Strategy 3.2: Build new buildings to be net-zero carbon, or build to transition to net-zero carbon.

Action 3.2.1: Support the adoption of highly efficient building envelope designs, hyper-efficient mechanical systems, and on-site renewable energy options for new buildings.

The building industry must transition toward constructing new buildings to generate no net emissions during its operation. This will involve making buildings air-tight, insulated to high standards, reliant on electrified space and water heating and other highly efficient mechanical systems, and capable of generating on-site renewable energy. Ideally,

a building's total annual energy use will be reduced to the point that it can be offset by the total annual output of its on-site renewable energy generation: it will be net-zero carbon. Outreach to developers and other industry professionals with information on best practices and other supports will be needed, and can be implemented quickly. This work will be led by WR Community Energy with support from Sustainable Waterloo Region.

Action 3.2.2: Develop resources for assessing the life-cycle emissions of building materials.

There are carbon emissions associated with the extraction, manufacturing, transportation, installation, use, and disposal of building materials: the embodied carbon. Tools for assessing such emissions can help builders and developers to choose materials that have low embodied carbon. It will also be important to include equity impacts as a metric in life-cycle emissions resources. This work will be led by Sustainable Waterloo Region with support from WR Community Energy, in collaboration with industry associations.

Action 3.2.3: Develop region-wide building standards to encourage and support zero-carbon development of all new buildings in the region.

Building standards can help to promote transition of local construction to building all new buildings to net-zero carbon. While local municipalities cannot directly regulate energy efficiency of buildings, energy-focused common standards across local municipalities can help to encourage buildings to be built to net-zero or net-zero ready building standards earlier, and reduce the number of buildings that need to be retrofitted later. These standards will take time to develop but will support the efforts in actions 3.2.1 and 3.2.2. This work will be led by the Area Municipalities with support from the Region of Waterloo.

Action 3.2.4: Incorporate energy planning considerations into the development application review process.

How neighbourhoods are designed can affect the energy efficiency and energy generation opportunities for decades after construction. Development review processes must incorporate our long-term energy goals. For example, buildings in neighbourhoods can be oriented to maximize rooftop solar potential, allow for community energy systems, and consider energy generation, distribution, and storage at different sites. This work will be led by the Region of Waterloo and Area Municipalities with support from local utilities and WR Community Energy.

Action 3.2.5: Provide training for and build capacity of building operators and property managers in operating their buildings to zero-carbon standards.

Even with the right design, how a building and its energy systems are used is key to how much energy the building uses. Post construction, building owners and operators are critical to the net-zero or low carbon operations of their buildings. The work includes technical management of the building as well as multilingual tenant engagement to ensure human behaviour follows the model needed for energy efficiency in the building. This work will be led by Sustainable Waterloo Region, with support from WR Community Energy.

Action 3.2.6: Build capacity and expertise in the local design and construction sector to build net-zero carbon buildings.

One of the barriers to building more sustainable buildings is the availability of expertise and trades that use the newest and best technologies. Collaborations with colleges and trades organizations will help prepare the workforce to construct the buildings of

the future. This work will need to be led by educational institutions such as Conestoga College and industry associations. Public and private sector organizations can contribute to building capacity in the building sector by engaging their contractors to build net-zero carbon or net-zero carbon ready buildings, and learning the process together.

Action 3.2.7: Show leadership by building net-zero carbon in the public sector.

Public sector organizations must show leadership by having all new public sector buildings constructed to net-zero carbon. While all public sector buildings should meet this standard by no later than 2030, near-term building plans should be modified wherever possible to meet this standard, in order to decrease future retrofit costs. This work will be led by Area Municipalities, the Region of Waterloo, and other public sector land owners.

TRANSFORMATIVE CHANGE #4: BY 2050, WATERLOO REGION USES LESS, WASTES LESS, AND NO LONGER DISPOSES OF ORGANIC MATTER IN LANDFILLS.

Strategy 4.1: Optimize the use of existing waste management infrastructure, including expanding diversion programs and energy capture from waste.

Action 4.1.1: Continue to maximize opportunities to expand residential curbside diversion programs, landfill gas capture and waste to energy, and reduce waste overall.

Organic matter that is disposed of in landfills breaks down into methane, which is 25 times more damaging to our climate than carbon dioxide, so diverting organics from landfills significantly reduces emissions. As



our community transitions off of fossil fuels, local landfills may also be an increasingly important resource to generate renewable energy from landfill matter and gas. As the organization that operates the only landfill located in Waterloo Region and provides a lot of residential waste collection, the Region evaluates and implements best practices for diversion, waste reduction, gas capture, and energy generation through its waste operations. This work will be led by the Region of Waterloo.

Action 4.1.2: Provide organics collection in all multi-residential buildings.

Under provincial rules, apartments and condominiums with more than six units are responsible for their own waste collection. While the province is expected to require significant organics diversion in these buildings by 2025, multi-residential buildings face specific challenges in successfully implementing diversion programs. All residents of Waterloo Region must have access to residential organics collection. This work will be led by rental businesses and condominium corporations. Public policy options to support this transition should be explored.

Action 4.1.3: Support the use of compost/organics collection programs for all commercial buildings.

Commercial buildings are responsible for their own waste collection. While the province is expected to require significant organics diversion in these buildings by 2025, additional educational and resource supports will help owners and occupants develop the practical solutions needed to implement organics collection. This work will be led by community capacity builders such as Sustainable Waterloo Region.

Strategy 4.2: Use less, and use it again.

Action 4.2.1: Implement community waste reduction and circular economy campaigns.

The circular economy means reusing, sharing, repairing, refurbishing, remanufacturing and recycling to create closed-loop systems for resources. This practice minimizes the use of resource inputs and the creation of waste, pollution and carbon emissions (e.g. the emissions associated with the manufacturing, transportation and breakdown of the product). Eliminating single use plastics is a particular priority, and the Zero Waste Challenge is a program that has been developed to help raise awareness of the challenge. This work will be led by community capacity builders such as Reep Green Solutions, Sustainable Waterloo Region, and Area Municipalities and the Region of Waterloo.

Action 4.2.2: Build community champion programs to provide best practices and recognition for innovative commercial waste management.

Commercial businesses need role models, support and encouragement to increase their waste diversion rates for organics and recyclables, and develop innovative ways to build the circular economy. This reduces landfill emissions from the breakdown of organics, and also reduces the emissions from the transportation of waste. This work will be led by Sustainable Waterloo Region.

Action 4.2.3: Build incentives or a local program for low to zero waste take-out options.

Since local businesses share common challenges associated with eliminating or reducing the environmental impact of take-out containers, common solutions can be

found. Programs such as returnable takeout containers used at many different businesses should be explored. Some local efforts are already underway, including local reusable takeout container programs Ekko and A Friendlier Company. As a first step, a lead organization will need to be identified for this work.

Action 4.2.4: Reduce unnecessary building demolitions and construction waste.

Constructing and demolishing buildings uses significant amounts of energy and creates emissions. Manufacturing construction materials is also energy and emission-intensive. Best practices can reduce construction waste at building sites. Reusing and repurposing existing buildings and construction materials, where appropriate, can reduce the energy needed for new buildings. This work will be led by Area Municipalities and the Region of Waterloo, with support from the construction and development industries, and community capacity builders such as Architectural Conservancy Ontario.

Action 4.2.5: Support programs and services that offer repair, refurbishment, and resource sharing in the community.

These programs can lead to longer product lifespans and less waste going to landfills, while also creating jobs in the community. Because products are not replaced as often, there are fewer emissions associated with manufacturing and disposal of the products used in our community. This work will be led by community capacity builders such as the Kitchener-Waterloo Library of Things.

TRANSFORMATIVE CHANGE #5: BY 2050, WATERLOO REGION HAS A THRIVING LOCAL FOOD SYSTEM BUILT ON LOCAL FARMING AND FOOD PROCESSING THAT FEEDS MUCH OF OUR COMMUNITY.

Strategy 5.1: Protect agricultural land and the local agricultural system.

Action 5.1.1: Continue to develop and enforce robust land use planning protections for prime agricultural land.

A locally based food system relies on prime agricultural lands and the agri-food network that supports it (such as infrastructure and transportation networks; on-farm buildings and infrastructure; agricultural services, farm markets, distributors, and primary processing; and vibrant, agriculture-supportive communities). Municipalities in Waterloo Region have a strong history of providing robust protections for prime agricultural lands, and upcoming revisions to the Regional and Area Municipal official plans are expected to continue to build on that strength. This work will be led by the Area Municipalities and the Region of Waterloo.

Strategy 5.2: Diversify and strengthen the local agri-food sector with a focus on serving local food needs.

Action 5.2.1: Create a region-wide agricultural industry strategy to support the agriculture and agri-food sector.

To rely more on food grown locally, we need to protect and build an entire industry around food production, processing, and delivery.

An agricultural industry strategy can support this work while helping to build our economy. Region-wide efforts to develop a strategy to support the agri-food industry are in the early stages, and development of a formal strategy is expected to begin in 2021. This work will be led by the Region of Waterloo.

Strategy 5.3: Support leadership in farming communities to plan and lead GHG reduction efforts, such as improving livestock production efficiency, reducing and replacing fossil fuels, and sequestering carbon.

Action 5.3.1: Support the reduction of GHG emissions from livestock, and develop methane capture and energy production from manure.

When manure breaks down, it generates methane, a gas that is 25 times more damaging to our climate than carbon dioxide. When this methane is captured and burned, it reduces overall emissions and generates energy that can be used on-site. This work will be led by local agricultural organizations and the Townships, with support from WR Community Energy and local utilities regarding energy generation.

Action 5.3.2: Support ongoing efforts to reduce and replace fossil fuel use, and sequester carbon, in the agricultural industry.

Fossil fuel use can be reduced through the use of more efficient or electrified farm equipment, and through the use of renewable energy sources such as biomass, geothermal, wind and solar. Farming practices can increase the sequestration of carbon in soils while trees and shrubs in shelterbelts and woodlots can sequester carbon from the air. As a first step, a lead organization will need to be identified for this work.

Strategy 5.4: Adopt low GHG emission diets.

Action 5.4.1: Education on low GHG/sustainable eating habits.

Information from external sources on eating low GHG diets can be both confusing and contradictory, as it varies greatly depending on where you live. Local resources must be developed in culturally sensitive ways, and made easily accessible, to guide our community in how we can choose sustainable/low GHG eating habits. This includes plant-based diets, information on personal and community gardens, urban agriculture, and even local foraging. As a first step, a lead organization will need to be identified for this work.

Action: 5.4.2: Provide a variety of low GHG food options and plant-based dining options in local restaurants, grocery stores, and catered events.

Some foods are associated with significantly higher emissions than others. When tasty low GHG food options are more readily available for all cultural and income groups in our community, they can become a part of our everyday food choices and a part of our culture. They also reduce the environmental impact of business operations. This work will need to be done by businesses across the region, with support from organizations like Business Improvement Associations and Chambers of Commerce.



Diversify and strengthen the local agri-food sector with a focus on serving local food needs.



TRANSFORMATIVE CHANGE #6: BY 2050, WATERLOO REGION HAS LEVERAGED REDUCING GHG EMISSIONS TO INCREASE EQUITY, PROSPERITY, AND RESILIENCY FOR ALL.

Strategy 6.1: Prioritize increasing equity throughout GHG reduction planning.

Action 6.1.1: Establish metrics to measure progress on increasing equity through GHG reduction initiatives in our community.

Metrics must be established to measure progress in reducing inequities for the first 5-10 years of the plan. These will focus on people who are facing barriers to climate action, and identify opportunities to increase equity alongside carbon emissions reductions. This work will be led by the Region of Waterloo and Area Municipalities.

Action 6.1.2: Incorporate education on sustainability justice and equity into climate action planning.

A critical component of sustainability justice and equity is widespread education of the history of Indigenous groups, the traditional territory of the Haudenosaunee, Anishnaabe and Neutral Peoples, and systemic racism. There must be a strong understanding of the barriers that prevent the full participation of some groups in climate action, for our community to identify and eliminate them. This work will be done by all municipalities and partnering businesses, organizations, and community capacity builders.

Action 6.1.3: Fund a climate justice committee led by community members from equity-seeking groups.

Building and maintaining reciprocal relationships between equity-deserving groups, local municipalities, and climate action organizations is crucial to ensuring emission reduction planning prioritizes increased equity in our community. This is the first step in identifying additional programs and supports beyond those identified in this plan. This work will be led by the Region of Waterloo and Area Municipalities, with the support of the Viessmann Centre for Engagement and Research in Sustainability.

Action 6.1.4: Provide specialized resources/ support to organizations on prioritizing equity while planning their transition.

Many organizations are at the beginning of their equity journey, which means that equity work must scale up at the same time as transition planning scales up. To achieve a future that is equitable, prosperous, and resilient for all, organizations need support to prioritize equity as they design and implement their transition plans. This is a crucial component of broader work to build capacity, empower equity-seeking groups, build diverse leadership teams, and address ongoing inequitable practices in all organizations. This work will be led by local capacity building organizations, with support from the Area Municipalities and the Region of Waterloo.

Action 6.1.5: Collaborate with Mennonite communities in the rural townships to build customized energy transition support to meet their unique needs.

Mennonite communities in the region's rural areas have unique energy needs and will face unique challenges and opportunities as our community transitions off of fossil fuels. We must establish and maintain relationships with local Mennonite residents, and find solutions to ensure that these communities are not left behind in the transition to a low

carbon future. This work will be led by the Townships, with support from the Region of Waterloo.

Action 6.1.6: Build reciprocal relationships between Indigenous groups and local municipalities and climate action organizations to ensure GHG reduction work is done in equitable ways that respect the land and traditions of Indigenous groups.

This transformation plan is a call to action in Reconciliation efforts to build relationships between Indigenous groups and local municipalities and climate action organizations. This is critical in ensuring the voices and needs of Indigenous groups are centred in this work. This work will need to be done by all municipalities and local climate action organizations.

Action 6.1.7: Increase broadband internet access.

Reliable, fast internet access is essential to taking part in many aspects of climate action, from being enabled to work from home, accessing resources such as transit schedules, and connecting to services. Ensuring that the entire region, especially rural areas where this is not widely available today, has access to broadband connection is an important first step in empowering our community to participate in climate action, while building a more equitable community. As a first step, a lead organization will need to be identified for this work.

Action 6.1.8: Apply an equity lens to all the actions in this transformation.

It is only by integrating equity considerations into all of our actions and decisions that we can transform our community into a low carbon society that enriches all of its members. This includes actively working toward climate justice, anti-racism, and

decolonization. This work will be done by all municipalities and partnering businesses, organizations, and community capacity builders.

Strategy 6.2: Position Waterloo Region as a hub of clean tech, sustainability, renewable energy, and retrofits.

Action 6.2.1: Develop and support a clean technology cluster in Waterloo Region.

The global clean economy sector will continue to grow in coming decades to support the transition off fossil fuels. We can help our community to thrive in this new economy by marketing Waterloo Region as a place to advance clean economy innovation. This will help us attract businesses, industries, investments, and expertise that will help to advance the clean economy both here and around the world. The first stage of work, to produce a cluster map, is underway through a partnership between the Region of Waterloo, Sustainable Waterloo Region, Waterloo EDC, and WR Community Energy.

Strategy 6.3: Ramp up local renewable energy generation.

Action 6.3.1: Build the capacity for renewable energy installation.

Contractors must be engaged and trained in the installation of local renewable energy generation if this industry is to ramp up to meet our goals. By 2050, 38% of our local electricity will be generated through local renewable energy generation. This work will involve training institutions, industry associations, and investors.

Action 6.3.2: Implement a public literacy campaign for homeowners and property

owners on renewable energy systems.

Introduce homeowners and property owners to the generation potential, benefits, financing opportunities, policies, technologies, and other dimensions for the next wave of solar rooftop and other small on-site renewable energy systems. This work will be led by community capacity builders such as Reep Green Solutions with support from local utilities.

Action 6.3.3: Implement a literacy and awareness campaign for commercial scale renewable energy generation.

Introduce commercial property owners to the generation potential, benefits, financing structures, policies, technologies, international examples and other dimensions for the next wave of commercial scale renewable/local energy systems. As a first step, a lead organization will need to be identified for this work and should include collaboration with local utilities.

Action 6.3.4: Evaluate how to identify and protect optimal areas for industrial-scale renewable energy generation.

Suitable sites for large, industrial-scale renewable energy production in the region must be identified and planned for, to ensure that those sites are both available and accessible to meet future local energy production needs. This work will be led by the Region of Waterloo, in consultation with the Area Municipalities and local utilities.

Strategy 6.4: Support GHG reduction transition planning in all organizations and households.

Action 6.4.1: Develop an energy transition

plan template, and provide outreach programs and target setting support for all organizations.

All organizations will need to adopt sustainability practices and transition off of fossil fuel use in their buildings and fleet owned vehicles. This transition will require awareness of the goals, and strategic planning supports. This work will be led by Sustainable Waterloo Region.

Action 6.4.2: Develop an energy transition plan template and outreach programs for all households.

All households will also need to adopt sustainability practices and transition off of fossil fuel use in their homes and vehicles. A template emission reduction plan can help each household plan their own energy transition in a way that supports the climate goals of their community. This work will be led by Reep Green Solutions.

Strategy 6.5: Coordinate climate advocacy to senior levels of government.

Action 6.5.1: Bring community organizations and local government together to collectively identify and communicate advocacy priorities to multiple levels of governments.

Our local climate goals cannot be achieved without supportive policies and regulations from provincial and federal governments. By reaching consensus on the key issues, local organizations and municipalities can more effectively advocate for climate change policies that support our local climate goals. These key issues are to be identified by 2022. This work will be led by the Region of Waterloo and Area Municipalities.

LOOKING AHEAD

TransformWR leverages community input, technical advice, and collaboration with municipal partners to guide the Region’s 30-year transition to a low carbon future.

The context within which this transition must take place is complex and the changes required will be transformational. With that being said, a strong sense of hope emerges out of this vision and strategy.

A promise of a flourishing community that sees economic and social prosperity as fundamentally connected to ecological health. A rallying call to leverage our strengths, collaborate, and overcome adversity, together. A global challenge with local causes and local solutions.

This strategy is designed to be resilient to the challenges and opportunities that exist over the next 30 years—some we can predict and others we can’t. It’s a framework, rather than an exact to-do list. It contains a clear direction but isn’t so rigid that it breaks down under the weight of time and uncertainty.

Everybody belongs in the future we are envisioning together, and thus, there is room for everyone in these pages. There has to be. It will take significant effort and community collaboration to realize the goals outlined within them. ClimateActionWR will continue to convene partners around these strategic directions and build momentum towards change.

For our community and for generations to come.

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“Because the future and well-being of our youth, our planet and all the diverse species who inhabit it is worth more than profits and power.”

Beth, 23 years old



APPENDICES

APPENDIX A: COMPANION DOCUMENTS

The following documents are available as companion documents. They either provide supporting information on how the strategy was developed, or are resources as part of a growing toolkit that expands on some of the key points addressed within.

All of these documents can be found on the climateactionwr.ca website.

Supporting Documents

Community Engagement Report. A summary of the community engagement efforts associated with the development of this strategy, led by Unless Design Partners.

Technical Engagement Report. A summary of the technical engagement efforts associated with the development of this strategy, led by WalterFedy.

Technical Report. The full report developed by WalterFedy, that was used to develop the technical pathway to achieving our 80% GHG emission reduction targets by 2050.

Toolkit Resources

Sustainability Justice Guide. A guide to help organizations surface considerations of equity, sovereignty, and accessibility early in project planning and decision making processes.

Decision Making Framework. The integration of a climate lens in decision making begins with our municipal processes. This resource provides a simplified guide for understanding the channels for community level decision making, and how other organizations and individuals can support municipal decision makers.

APPENDIX B: COMMENTARY ON A ROADMAP TO CARBON NEUTRAL BY 2050

Since our ‘80by50’ target was first endorsed, we recognize there has been significant community momentum towards carbon neutrality (a 100% GHG reduction by 2050) and local interest from community groups in setting an interim target of 50% GHG reduction by 2030 (based on 2010 levels).

Waterloo Region’s 80% GHG reduction target was set and endorsed by our local municipalities in 2018. At that time, this ambitious target was in line with both the provincial and federal reduction targets, as well as several other municipalities across Canada. While this long-term strategy is focused on achieving an 80% reduction, we position the 80% as the minimum we need to achieve. We understand the urgency for ambitious climate action and our strategy is reflective of that, along with what we have heard is realistic from our local experts and community members.

Note: The Province of Ontario uses 2005 for their baseline year, while Waterloo Region uses 2010 based on when local emissions data became available after the completion of our first community inventory. Provincial emissions in 2010 were very similar to what they were in 2005, and therefore our baseline years are comparable.

A secondary analysis was developed to demonstrate the additional requirements needed to achieve a goal of 100% reduction by 2050, with a more significant interim goal of 50% GHG reduction by 2030. The following charts show the 11 largest impact changes necessary to achieving these alternate pathways, and compares our current targets (in blue) to the more ambitious proposed targets (in green).

Residential Actions	By 2030: 30%	By 2030: 50%	By 2050: 80%	By 2050: 100%
Homes using electric heat pumps, or equipment that is at least as energy efficient and low carbon as electric heat pumps, instead of natural gas (% of residential buildings with electric heat pumps, or equipment with a minimum COP of 3 that produces no more GHG emissions than an equivalent electric heat pump)	20%	60%	85%	100%
Homes using energy efficient and low carbon water heaters instead of natural gas (% of residential buildings with electric water heaters, or equipment with a minimum COP of 3 that produces no more GHG emissions than an equivalent electric water heater)	20%	60%	85%	100%
Locally produce energy from carbon neutral, renewable sources (% of local electricity consumption that is produced through local carbon neutral sources)	4%	20%	38%	250%*
Business Actions	By 2030: 30%	By 2030: 50%	By 2050: 80%	By 2050: 100%
Make ICI processes more energy efficient (% of energy reduced)	10%	10%	30%	60%
Buildings using electric heat pumps, or equipment that is at least as energy efficient and low carbon as electric heat pumps, instead of natural gas (% of buildings with heat pumps, or equipment with a minimum COP of 3 that produces no more GHG emissions than an equivalent electric heat pump)	20%	60%	85%	100%

Business Actions	By 2030: 30%	By 2030: 50%	By 2050: 80%	By 2050: 100%
Buildings using energy efficient and low carbon water heaters instead of natural gas (% of buildings with electric water heaters, or equipment with a minimum COP of 3 that produces no more GHG emissions than an equivalent electric water heater)	20%	60%	85%	100%
Locally produce energy from carbon neutral, renewable sources (% of local electricity consumption that is produced through local carbon neutral sources)	4%	20%	38%	250%*
Transportation Actions	By 2030: 30%	By 2030: 50%	By 2050: 80%	By 2050: 100%
Reduction in trip length (% reduction in vehicle distance travelled, for trips over 5km)	2%	20%	10%	10%
Replacing personal vehicle use for trips under 5km by using active transportation (% of existing short vehicle trips switched to walking, cycling, or rolling)	10%	70%	80%	100%
Reduction in travel due to work from home options (% reduction in vehicle trips to workplaces)	10%	40%	40%	50%
Reduction in discretionary trips (% reduction in vehicle distance travelled for discretionary trips)	4%	10%	18%	18%
Increase efficiency of delivery routes (% reduction in fuel consumption for trips over 5km)	4%	10%	18%	50%

**Note that the ‘100by50’ pathway requires the use of carbon offsets.*

To enable the key changes identified in the table, additional supports would be required:

- Provincial changes must be made to the electricity grid, to ensure our electricity comes from as low GHG emitting sources as possible (and remains that way); and
- Carbon offsets will need to be used as a mechanism to achieve carbon neutrality by 2050.

Our analysis while developing this strategy shows the recommended ‘30by30’ target is very ambitious, especially in consideration of the planning time required to put actions into motion before the results of such changes are evident. With that said, throughout implementation of the ‘80by50’ climate action strategy, we will keep these additional targets front of mind, and take every opportunity we can to encourage more ambitious climate action where opportunities arise, to achieve our 80% reduction target earlier, and set us on a path to exceed it.



Carbon offsets are a reduction in carbon dioxide or other GHG emissions made in order to compensate for emissions made elsewhere. They are sold to enable the purchaser to claim the GHG reductions as their own.

APPENDIX C: SUMMARY OF ENGAGEMENT

In order to create both long and short-term approaches to GHG reductions, it was crucial to gain the perspectives and tap the wisdom of a wide group of people through thorough engagement of a wide range of stakeholders across our community as well as beyond. Engagement for this project was split into two sections: Community Engagement and Technical Engagement. With collaborative efforts on this project extended to the local expertise involved in its development, each section was led by a local consultant with expertise engaging related stakeholders.

The summary reports on community and technical engagement from the consultants who led those initiatives, can be found on the climateactionwr.ca website (see Appendix A: ‘Companion Documents’)

C.1 COMMUNITY ACTIONS

Community engagement and brainstorming was an important element of understanding what our community’s vision of 2050 is, and what it wants from a climate action strategy. Between June 2019 and January 2020, ClimateActionWR connected with over 1600 community members to hear and discuss their insights on the future of Waterloo Region. In addition to the insights provided in the full Community Engagement Summary prepared by Unless Design Partners (See

Appendix B), the following shares the outputs and action items that resulted specifically from ‘Street Team’ efforts, and our community workshop series.

With the support of ‘Street Team volunteers’, ClimateActionWR attended 35 local events to ask the community “What should be in place in Waterloo Region to make it possible for you to reduce your (GHG) emissions at work, home, and in transportation?”



Figure 8: The most common words in all 1400 action ideas with size corresponding to the frequency, most frequent being the largest.

Over 900 community members participated and provided ideas and insights. Over the course of 5 community workshops, 83 community members participated in a long-term visioning exercise, imagining the state of the region 10, 20 and 30 years into the future while recording the actions that would take place to help reach the end goals.

With the workshop encouraging our community to imagine what potential changes we can see in the coming decades, we noted trends envisioning: innovation with vertical farms, growth with a circular economy, increased efficiency of waste handling and sorting, changes in mindsets and food choices for more sustainable options, and a general bump in the sense of community support and sharing needed to achieve our goals.

Over 1400 individual action ideas were collected from these engagement and outreach activities. Trends emerged where the community hopes to receive support in making sustainable

changes and choices in their lives. Areas where government support was proposed include electric vehicle subsidies, incentives for renewable energy, water conservation, and universal basic income pilot projects.

There was support for additional regulations at local, national and international levels with plastic bans, increased carbon taxes, restrictions on multiple car and home ownership, and laws against idling. Community members recognize that some climate action changes can be done on an individual scale by making sustainable choices but others require aid from regulatory agents.

Residentially, net-zero solutions and increasing density were the most common themes. Many community members envision a future in our region with more co-operative housing, co-mortgages available, and multi-generational housing or home-sharing becoming the norm. Their hopes are that we will see existing homes receive incentives to aid with retrofitting and implementing renewable energy generation tools, and new homes will be designed with sustainability and functionality in mind, and an increase of community food gardens.

Within the ICI sector, packaging, office spaces, employee behaviours, were all larger areas of concern/idea generation. For companies that produce products that require packaging, programs that offer ways to recycle the packaging were recommended, the elimination of plastic packaging was also suggested, and having things be sold for their “true cost”, which would include embodied carbon. Before the COVID pandemic made it necessary, the community was already wanting to see an increase of work from home policies and flexibility with working hours. In offices, a transition to paperless practices, practices that encourage turning off lights and electronic devices when not in use, elimination

of plastics, and introduction of composting to office kitchens, were all mentioned repeatedly.

Waterloo Region community members seem keen to make changes with their transportation habits and infrastructure based on the volume and range of related action items. Of all transportation action items received, 27% were related to public transit and 16% were related to electric vehicles. The recurring actions within the transportation sector were more affordable public transit, extended public transit infrastructure across the region and the province, increased costs associated with personal vehicle ownership including parking and fuel, and innovation with electric vehicle batteries.

Waterloo Region is socially and geographically diverse, and there were notable differences of insights gathered between the rural and urban areas. The most common areas of action identified from residents of our four local townships were increased public transportation options between the townships and cities, additional bike lanes, alternative energy generation, more affordable electric vehicles and charging stations, reduction of single-use plastic, and waste programs for local events & businesses. Changes within downtown core areas were also commonly identified, with community members envisioning areas where personal vehicles are banned, separated bike lanes, expanded light rail transit to include the rural areas, infrastructure that supports pedestrians and small businesses, complete streets, and food forests are all featured.

APPENDIX D: COMMUNITY CARBON BUDGET FOR WATERLOO REGION

This strategy looks at emissions reductions in terms of meeting annual future targets, which has been a common way of planning GHG reductions. A carbon budget is another, complementary way of planning GHG reductions. It is based on determining how much of the world’s remaining carbon emissions a community is entitled to use.

There are a few key features of carbon budgets:


Carbon budgets are based on science. Because greenhouse gases released into the atmosphere remain for decades or centuries, there is a limited amount of greenhouse gases that can be released into the atmosphere while limiting warming to a 1.5°C increase in average global temperatures. A carbon budget splits up the remaining carbon that can be released on a per capita basis, and allocates it to communities or organizations to use as they work to end their emission of GHGs.

Carbon budgets recognize that carbon is a finite resource. Like a financial budget, a carbon budget recognizes that, once some carbon has been spent, less is available for future spending. There is a limited amount of carbon humans can continue to emit while limiting the worst impacts of climate change. In this way, carbon is like money, except without the opportunity to refill the bank account.

Carbon budgets are about equity. They are intended to ensure that rich countries like Canada do not continue to use most of the world’s carbon for their own activities, and leave less affluent countries with fewer energy resources to complete their own transitions off of fossil fuels.

Carbon budgets make it clear that emissions reductions made earlier are better than emissions reductions made later. Since what matters is the total amount of carbon spent in the coming decades, carbon budgets favour early action. Making changes early means that the resulting emissions reductions often continue over subsequent years. Making the same changes later will make less of a difference to the overall emissions produced.

Municipal councils in Waterloo Region, as part of declaring a climate emergency or crisis, have expressed interest in approaches using carbon budgets. As part of the ‘80by50’ project, community and municipal stakeholders asked for WalterFedy to also calculate the community’s carbon budget. This will provide a common starting point for any future tools or approaches that are developed locally for specific organizations that are based on this carbon budgeting approach.



The total carbon budget for Waterloo Region is calculated to be 66.84 megatonnes of CO₂e, or 66,840,000 tonnes of CO₂e.

CALCULATING WATERLOO REGION'S CARBON BUDGET

C40 Cities has developed a carbon budget for some of the largest cities in the world. Other cities, such as Edmonton, are using this approach to determine their own carbon budgets to identify how much of the world's remaining carbon their residents are entitled to. For their assessment, WalterFedy used the methodology used by the C-40 cities and the City of Edmonton.

The carbon budget for Waterloo Region is based on the following key data points:

- The per capita GHG emissions in 2016, which for 2016 was estimated to be 7.04 tonnes per person
- The per capita GHG emissions that are needed in 2050, which is zero
- The per capita GHG emissions that are needed in 2030, which is set by the C-40 cities at 3.1 tonnes per person

Then a curve is created using a function, to produce a graph that looks like this:

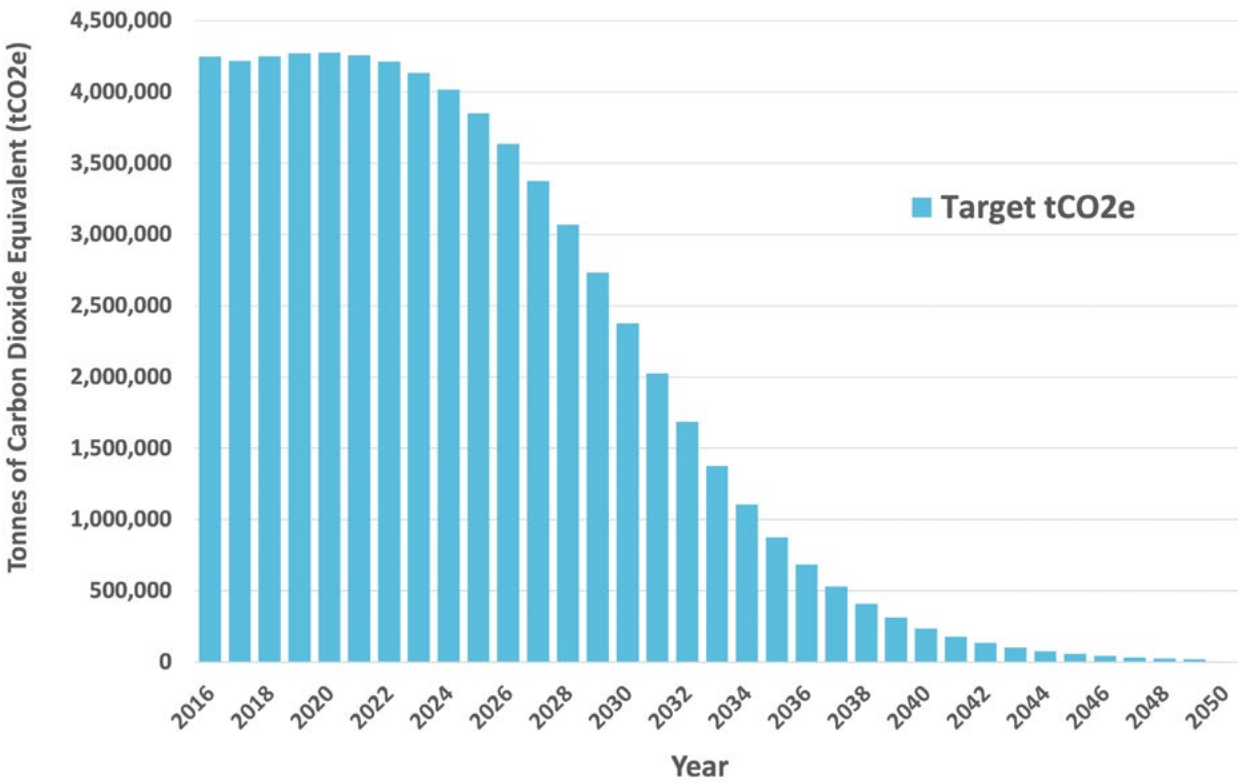


Figure 9: Waterloo Region's carbon budget curve with tonnes of carbon dioxide equivalent by year to stay within our carbon budget.

Once the GHGs per year are identified using this calculation, all the years' emissions are added together. This produces one number that represents the total amount of carbon the community is entitled to spend over the next several decades, before reaching net-zero emissions.

	Target tCO ₂ e	Population	Target tCO ₂ e/person		Target tCO ₂ e	Population	Target tCO ₂ e/person
2015	–	593,854	7.2	2033	1,377,352	773,327	1.8
2016	4,249,375	603,824	7.0	2034	1,106,048	783,298	1.4
2017	4,218,607	613,795	6.9	2035	875,314	793,268	1.1
2018	4,251,846	623,766	6.8	2036	684,402	803,239	0.85
2019	4,272,339	633,737	6.7	2037	529,934	813,210	0.65
2020	4,276,125	643,707	6.6	2038	407,167	823,180	0.49
2021	4,258,339	653,678	6.5	2039	310,953	833,151	0.37
2022	4,213,248	663,649	6.4	2040	236,364	843,122	0.28
2023	4,134,491	673,620	6.1	2041	179,021	853,093	0.21
2024	4,015,630	683,590	5.9	2042	135,217	863,063	0.16
2025	3,851,110	693,561	5.6	2043	101,916	873,034	0.12
2026	3,637,602	703,532	5.2	2044	76,693	883,005	0.09
2027	3,375,544	713,502	4.7	2045	57,642	892,976	0.06
2028	3,070,387	723,473	4.2	2046	43,282	902,946	0.05
2029	2,732,953	733,444	3.7	2047	32,475	912,917	0.04
2030	2,378,422	743,415	3.2	2048	24,353	922,888	0.03
2031	2,024,008	753,385	2.7	2049	18,254	932,859	0.02
2032	1,686,026	763,356	2.2	2050	0	942,829	0
CUMULATIVE TOTAL					66,842,437 tCO ₂ e 66.8 MtCO ₂ e		

Using this approach, the total carbon budget for human GHG emissions made within Waterloo Region is 66.84 MtCO₂e. This 66.84 megatonnes is the amount of the world's remaining carbon to which our community is entitled.

Once the final number is identified, the annual numbers are much less important. While the specific annual numbers in the graph above can give a sense of whether the community is on track to stay within its carbon budget, carbon expenditures in a given year do not have to align with the graph, necessarily. The idea behind a carbon budget is to use that total budget number to create a plan to transition off of fossil fuels that stays within that carbon budget. This could involve “spending” more carbon up front and then reducing emissions more quickly after, or it could involve a more consistent reduction in the amount of carbon spent over time. What matters is staying within the overall carbon budget.

PLANNING FOR WATERLOO REGION'S CARBON EXPENDITURES

This total carbon budget number is an important tool. Knowing how much carbon we are entitled to spend helps us to evaluate different approaches to reducing and eliminating emissions in the coming decades. In planning for the community, our long-term goal is to reduce and eventually eliminate GHG emissions from human activities.

At the same time, our local strategy moving forward must be based on ambitious but achievable actions that can be taken to reduce emissions. This approach is outlined in the full strategy document.

We are able to assess our emissions reduction plans in comparison to this carbon budget number, by calculating the expected total emissions from the ‘80by50’ pathway. The ‘80by50’ pathway produces an expected 96.51 megatonnes CO₂e. While the more aggressive timelines assessed in Appendix A get closer to Waterloo Region's carbon budget (at 77.11 megatonnes CO₂e), none of the potential pathways explored for this project is currently expected to keep the community's carbon expenditures within our calculated carbon budget.

To stay within our carbon budget, significant changes will be needed outside of our local control. In particular, the model used to develop our recommended pathway uses projections of GHG emissions from our electricity grid currently used by the Independent Electricity System Operator for Ontario. They presume that we will meet our increasing electricity needs using natural gas plants, and thus our emissions from electricity are expected to rise significantly over the timeframe of this strategy. Staying within our carbon budget will require a zero emission electricity grid. It will also likely require the use of additional carbon offsets, which are not included in our recommended ‘80by50’ pathway.

What this means for action in our community is clear. Over the next three decades, we need to achieve everything outlined in this strategy, and more. The path forward, guided by this strategy, will put Waterloo Region in the best possible position to make future, further gains in emissions reductions as our technology, our society, and our community continue to change over the next 30 years.

“ Our future is at stake, it has now become our job to ensure we don't exceed the climate tipping point, where change is too late. Now we must take action and prevent this problem from getting worse, ... we have the power in our hands, right now to make sure this doesn't happen. Together as a community we can make a difference and we can make change happen.”



Kayley, 14 years old



WWW.CLIMATEACTIONWR.CA

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IN PARTNERSHIP WITH:

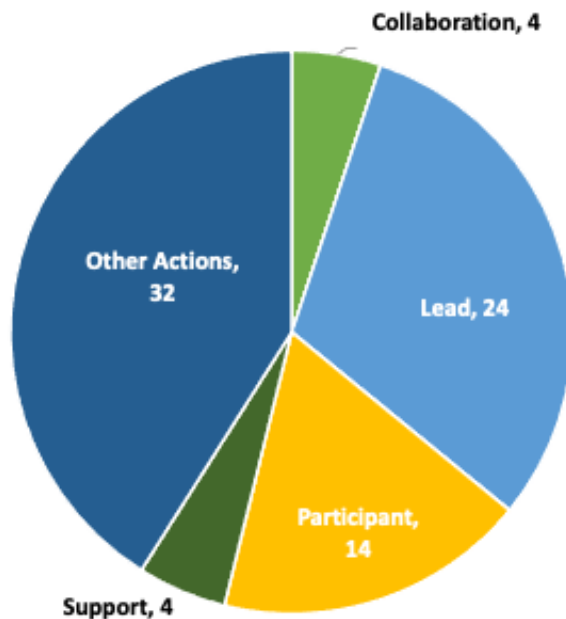
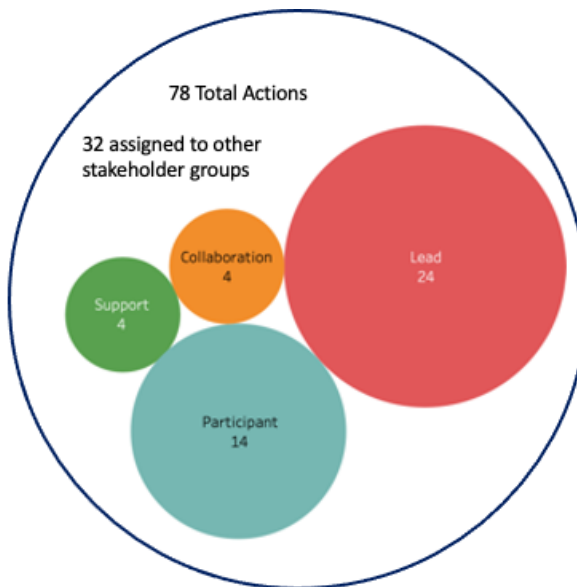


Appendix B: Summary of Municipal Actions - Township of Wilmot

Within the TransformWR Strategy, there are a total of 78 action items outlined in the 10 Year Plan.

Of these 78 action items, the Township of Wilmot has responsibilities outlined in the following ways:

- Lead organization for 24 action items
- Collaborating organization for 4 action items
- Supporting organization for 4 action items
- Participating organization for 14 action items



The following table shows the specific action items associated with the Township of Wilmot.

Lead Organization:

These organizations will take the lead on planning and implementing the action item, gathering support, and identifying additional collaborators or supporters to drive progress. They will also lead the identification and monitoring of success metrics through the ClimateActionWR collaborative.

Note: Many action items name more than one Lead organization, and in most cases where a municipality is identified, all Area Municipalities and often the Region of Waterloo are also listed as Leads.

Action	Role
Action 1.1.1: Plan a network of major active transportation corridors across cities and townships, that will provide high-volume priority travel for walking, cycling, and rolling to key destinations across the region, as well as access to public transit.	Lead
Action 1.1.2: Plan for and build neighbourhood connections to the active transportation network.	Lead
Action 1.1.3: Implement further policies across the region to prioritize active transportation in road and trail design and reconstruction.	Lead
Action 1.1.4: Identify and implement policy and program opportunities to de-incentivize driving.	Lead
Action 1.1.5: Design and maintain active transportation infrastructure to ensure year-round access, safety, and comfort for people of all abilities.	Lead
Action 1.2.4: Connect people to intercity, multimodal, and emerging transportation solutions.	Lead
Action 1.3.1: Launch micro mobility systems (bike, e-bike and e-scooter-sharing systems) in Waterloo Region communities.	Lead
Action 1.3.4: Develop active transportation and transit programs that target equity-deserving communities.	Lead
Action 1.5.1: Create “15 minute neighbourhoods” where people can meet their daily needs by walking, cycling, or rolling.	Lead
Action 1.5.2: Implement design standards for new developments to build for walking, cycling, and rolling to be the primary mode of travel.	Lead

Action	Role
Action 2.1.2: Plan and begin to implement a transition to zero emission vehicles for municipal fleets, working towards a goal of at least half of municipal vehicles being zero emissions by 2030.	Lead
Action 2.2.2: Require all new residential parking spaces, and a portion of new non-residential parking spaces, to be constructed as "EV-ready".	Lead
Action 3.1.9: Offer innovative loans for energy-related residential and commercial building upgrades.	Lead
Action 3.2.3: Develop region-wide building standards to encourage and support zero-carbon development of all new buildings in the region.	Lead
Action 3.2.4: Incorporate energy planning considerations into the development application review process.	Lead
Action 3.2.7: Show leadership by building net-zero carbon in the public sector.	Lead
Action 4.2.1: Implement community waste reduction and circular economy campaigns.	Lead
Action 4.2.4: Reduce unnecessary building demolitions and construction waste.	Lead
Action 5.1.1: Continue to develop and enforce robust land use planning protections for prime agricultural land.	Lead
Action 5.3.1: Support the reduction of GHG emissions from livestock, and develop methane capture and energy production from manure.	Lead
Action 6.1.1: Establish metrics to measure progress on increasing equity through GHG reduction initiatives in our community.	Lead
Action 6.1.3: Fund a climate justice committee led by community members from equity-seeking groups.	Lead
Action 6.1.5: Collaborate with Mennonite communities in the rural townships to build customized energy transition support to meet their unique needs.	Lead
Action 6.5.1: Bring community organizations and local government together to collectively identify and communicate advocacy priorities to multiple levels of government.	Lead

Collaborating Organization:

These organizations will work with the lead organization to drive progress toward the goals/metrics, and contribute to the reporting process as relevant to their work.

Action	Role
Action 1.2.2: Ensure priority access for walking, cycling, and rolling to transit stations and bus stops.	Collaboration
Action 1.3.3: Create community active transportation hubs to provide customized support, education, training, and resources.	Collaboration
Action 2.1.1: Complete a region-wide electric vehicle strategy.	Collaboration
Action 3.1.10: Create a one-window service to support energy-related upgrades for homes and businesses.	Collaboration

Supporting Organization:

These organizations will provide support to the lead and collaborating organizations, on an as-needed basis, to drive progress toward the metrics associated with the action items.

Action	Role
Action 1.4.1 Increase the efficiency of commercial goods movement.	Support
Action 2.1.5: Develop and implement an electric vehicle public outreach and communication strategy for personal vehicles.	Support
Action 3.1.5: Identify and implement necessary supports to transition anyone still using fuel oil, or propane for heating to other fuel sources by 2025.	Support
Action 6.1.4: Provide specialized resources/support to organizations on prioritizing equity while planning their transition.	Support

Participating Organization:

Being listed as a Participating Organization means your municipality will have a role in conducting this work from the perspective of an organization, in the same way that other organizations and businesses within the community are being asked to participate in these action items.

Action	Role
Action 1.3.2: Expand and innovate on existing programming (e.g. Travelwise) that supports employers and employees in making active transportation and transit the easy and preferred choice for commuting and business travel.	Participant
Action 1.3.5: Post-pandemic continued adoption of work from home and flexible work schedules for reducing trips or shifting trips to off-peak times.	Participant
Action 1.5.3: Site key community services, health facilities, subsidized housing, etc., in central areas where they can be easily accessed using the active transportation and public transit systems.	Participant
Action 2.1.3: Plan and begin to implement the transition of commercial vehicle fleets to zero emissions vehicles.	Participant
Action 2.2.1: Provide more public electric vehicle charging stations in public spaces, commercial spaces and other places visited by the public.	Participant
Action 3.1.2: Implement a public literacy campaign to explain and promote the adoption of electric heat pumps for space and water heating in residential and commercial buildings.	Participant
Action 3.1.3 Switch home and business heating and water heating off of fossil fuels.	Participant
Action 3.1.6: Install renewable energy generation in business and residential buildings.	Participant
Action 4.1.3: Support the use of compost/organics collection programs for all commercial buildings.	Participant
Action: 5.4.2: Provide a variety of low GHG food options and plant-based dining options in local restaurants, grocery stores, and catered events.	Participant
Action 6.1.2: Incorporate education on sustainability justice and equity into climate action planning.	Participant

Action	Role
Action 6.1.6: Build reciprocal relationships between Indigenous groups and local municipalities and climate action organizations to ensure GHG reduction work is done in equitable ways that respect the land and traditions of Indigenous groups.	Participant
Action 6.1.8: Apply an equity lens to all the actions in this transformation.	Participant
Action 6.3.4: Evaluate how to identify and protect optimal areas for industrial-scale renewable energy generation.	Participant

Appendix C: Final Community Consultation Results Summary:

The draft TransformWR strategy was available for final public consultation from March 10th to April 12, 2021. This included:

- Discussions with key stakeholder groups (municipal staff, utilities, agricultural sector, community groups, municipal sustainability committees, school board representatives etc.);
- An Equity and Sustainability Justice review and focus group conducted by compensated BIPOC Knowledge Holders; and
- Widespread public consultation using the EngageWR platform.

Information about the final EngageWR consultation on the climate action strategy was provided through the following channels:

- An email to subscribers of the EngageWR page for the project;
- Social media posts from ClimateActionWR, partner non-profits, and municipalities;
- A joint news release from all eight municipalities issued through the Region's communications staff;
- Paid online advertising from ClimateActionWR;
- Direct requests to stakeholders and community groups to circulate the engagement opportunity through their networks;
- Feature segments on 570 news, the Mike Farwell show, and the Business to Business Radio Program.

The project's EngageWR page showed the following participation during the final consultation period:

- 3262 "Aware" participants (who viewed at least one page);
- 1058 "Informed" participants (who downloaded a document, visited multiple pages, answered the survey, or viewed an image); and
- 364 "Engaged" participants (who answered the survey).

In the survey, participants were asked to provide their thoughts on:

- Which parts of the Vision are most important;
- Which of the 6 Transformative Changes would be most important to achieve, and which would be most challenging;
- What types of actions are most important and most challenging to adopt;
- What supports are most important for respondents to be able to take action in their lives; and
- Whether anything was missing from the strategy, or whether parts were unclear.

Responses generally showed considerable engagement with the substance of the strategy. Overall, 66% of respondents indicated that the strategy provides what they need to take action toward this low carbon future. Of the 33% who indicated it did not, most provided thoughtful feedback that has been considered in final revisions to the strategy.

A summary of what was heard in this final consultation, and the changes made in response, are outlined in the following table:

What we heard	Response and changes made
<p>There are additional opportunities to highlight equity considerations</p>	<ul style="list-style-type: none"> • Strengthened language in the ‘Principles’ to emphasize the importance of prioritizing the needs of equity-deserving groups in climate action work. • Added a ‘Spotlight on Climate Justice’ series of callout boxes throughout the strategy, to highlight some of the equity considerations that need to go into this work. • Added 2 new action items to specifically address equity concerns: <ul style="list-style-type: none"> ○ Action 6.1.2 Incorporate education on sustainability justice and equity into climate action planning ○ Action 6.1.7: Increase broadband internet access • Strengthened language in a number of sections to ensure equity is a key focus of this strategy, such as: <ul style="list-style-type: none"> ○ Including equity impacts as a metric in resources; ○ Recognizing the importance of empowering equity-seeking groups in climate action work; ○ Ensuring a lens of climate justice, anti-racism, and decolonization informs sustainability work; ○ Recognizing diverse outreach methods needed in awareness campaigns, to serve diverse populations of residents; ○ Respecting cultural traditions in actions related to food choices; and

What we heard	Response and changes made
	<ul style="list-style-type: none"> ○ Recognizing Indigenous ways of understanding food, and relationships with food and the land.
<p>Inconsistent language is used to reflect that the active transportation and transit systems must be accessible for people of all ages and abilities</p>	<ul style="list-style-type: none"> ● Incorporated language around this in the ‘Vision’ statements. ● Strengthened language in the following areas, to ensure a focus on accessibility and considerations for people of all ages and abilities: <ul style="list-style-type: none"> ○ Strategy 1.1 ○ Action 1.1.1 ○ Action 1.1.5 ○ Strategy 1.2 ○ Action 1.5.2
<p>Safety is an important consideration in the transportation system</p>	<ul style="list-style-type: none"> ● Added considerations of age in action items, which helps address safety concerns (see above). ● Added specific references to highlight the importance of safety in the following items: <ul style="list-style-type: none"> ○ Action 1.3.4 ○ Strategy 1.1 ○ Strategy 1.2
<p>There are additional opportunities to recognise the differences between urban and rural areas</p>	<ul style="list-style-type: none"> ● Strengthened language in the ‘Principles’ to ensure the differing needs between rural and urban settings will be taken into consideration. ● Added clarifying language in the ‘Implementation’ section to address that implementation will look different in different settings, and among the different municipalities.

What we heard	Response and changes made
There are additional opportunities to highlight the unique role of the Agriculture sector	<ul style="list-style-type: none"> Added example actions that farmers and those in the agriculture industry can take, to the 'Take Action' sections. Added information about the role of regenerative land management in climate change mitigation.
Clarify the role of advocacy in this work	<ul style="list-style-type: none"> Strengthened language to communicate the importance of provincial and federal support in achieving and exceeding our goals. Added references to specific actions and policies needed at provincial and federal levels to meet and exceed our goals.
Additional groups wanted to be identified as potential collaborators in the Strategy	<p>Added new potential collaborators to action items:</p> <ul style="list-style-type: none"> CycleWR added to Action 1.3.3 Ekko and A Friendlier Company to Action 4.2.3 Architectural Conservancy Ontario to Action 4.2.4 KW Library of Things to Action 4.2.5
New actions/concepts added as suggestions from the community	<p>New action items added:</p> <ul style="list-style-type: none"> Action 6.1.2: Incorporate education on sustainability justice and equity into climate action planning. Action 6.1.7: Increase broadband internet access. <p>New concepts added:</p> <ul style="list-style-type: none"> Added a callout box to highlight the role innovative financing options can play in scaling up retrofits. Added a callout box on regenerative land management. Added callout box on food sovereignty.

What we heard	Response and changes made
<p>There is a need to reduce emissions by more than 30% by 2030</p>	<ul style="list-style-type: none"> • Strengthened language indicating the need for bold and immediate action in the short-term, to meet and exceed our short-term target; • Added further explanation on how this strategy contributes to the Paris Agreement objectives. • Added more references to the importance of advocacy to other levels of government to meet and exceed our local targets.
<p>Some technical details are unclear or would benefit from more explanation</p>	<ul style="list-style-type: none"> • Added callout boxes to explain additional technical terminology. • Added clarifying text to explain that air source heat pumps are most common, and ground source heat pumps can only be used where they will not disrupt our groundwater. • Added clarifying text to emphasize the importance of increasing the energy efficiency of <i>existing</i> buildings (in addition to new builds).

Appendix D: Frequently Asked Questions (FAQs) about TransformWR

TransformWR Strategy Development

Q: Who developed the *TransformWR* strategy?

The TransformWR strategy was developed through the ClimateActionWR collaborative. Led by Reep Green Solutions and Sustainable Waterloo Region, and funded by the cities and the Region, ClimateActionWR focuses on climate change mitigation (reducing GHG emissions). To create our community's long-term climate action plan, all four townships in the region joined the collaborative, and funding was secured from the Federation of Canadian Municipalities to support this project. Led by ClimateActionWR staff, the project team included representatives from Reep Green Solutions, Sustainable Waterloo Region, the cities, the townships, and the Region.

Q: Who is the TransformWR strategy for?

TransformWR is intended to guide decisions made by everyone in our community over the next three decades: from municipalities and businesses to organizations and households.

Q: How did community members help to build this strategy?

ClimateActionWR connected with over 1,600 community members to discuss what they wanted the low-carbon future of Waterloo Region to look like, and their insights on how we can get there. This directly informed Our Vision of 2050, and the Principles for Designing a Low Carbon Future, which were key inputs into the development of the technical pathway. For the results of this consultation, see the [Community Engagement Summary Report](#) by Unless Design Partners. Most recently, the draft TransformWR strategy was available for public consultation on the EngageWR platform from March 10th to April 12, 2021. The results of that consultation are summarized in Appendix B of this report.

Q: Were technical experts involved in the creation of the TransformWR strategy?

Yes. Energy consultants from WalterFedy led the creation of the technical pathway. To inform this process, technical consultation included workshops, surveys, and conversations with over 100 technical experts, locally, nationally, and internationally, including municipal leadership and staff.

Our Targets

Q: Why are 2010 levels the baseline for our targets?

Our first community GHG emissions inventory was based on 2010 data, and we have used that as our baseline emissions, from which we compare our reduction efforts against over time. 2010 data is the earliest community GHG data that we have available for Waterloo Region.

Q: Why 80% by 2050?

In 2018, the 80by50 target was endorsed by each municipal council across Waterloo Region: the Region of Waterloo, the Cities of Cambridge, Kitchener, and Waterloo, and the Townships of North Dumfries, Wellesley, Wilmot, and Woolwich. At that time, this target was in keeping with some of the most ambitious targets being set by other municipalities in Canada, and there was strong support in the community for the target.

Q: Don't we need to be net-zero by 2050?

Since the 80by50 target was endorsed by municipalities in 2018, there has been growing recognition that we must go faster and farther to complete our global energy transition by mid-century. Our 80% target is based on local changes we can make to reduce emissions, and is a minimum. We will take every opportunity we can to drive forward more ambitious climate action where opportunities arise. By using caution in our modelling, and building an ambitious plan based on it, we will be well positioned to potentially achieve our 80% reduction target earlier, and set us on a path to exceed it.

Q: Why 30% by 2030?

While big changes need to happen quickly, it will take time to plan and do the work. Based on these timelines, reducing our total emissions by 30% by the year 2030 is an ambitious goal that will require immediate and significant action by everyone across our community. Our model shows what local actions we need to take to reduce our emissions by 30% by the year 2030. Based on population projections for Waterloo Region, this will reduce emissions 49% *per person* by the year 2030.

Q: Why not 50% by 2030?

Ramping up local action will take time, making it unrealistic to electrify homes and vehicles and change our travel patterns and transportation system fast enough to cut emissions in half by 2030. The speed of change required for a 50% reduction by 2030 is shown in *Appendix B* of the TransformWR strategy. This would require immediate and significant financial support and regulatory requirements from federal and provincial governments. Additionally, the emissions reductions that result from our local actions will vary based on decisions made by senior levels of government, most notably the use of natural gas in the electricity system. If the Government of Ontario eliminated natural gas from the electricity system by 2030, the same local changes would reduce emissions by about 40% instead of 30%, meaning any further local changes would have a bigger GHG reduction impact. In short, this plan is built to maximize what we can do locally, so that any changes at other levels that further reduce emissions will help us to exceed our local targets.

What's in TransformWR?

Q: Why do many parts of the strategy focus on electrification?

To reduce emissions quickly and meet our 2030 target, we must expand the use of existing available technologies. Electric options for home heating, cooling, water heating, and vehicles are available today, and when used can immediately eliminate most of the emissions associated with heating, and driving. Electric equipment is significantly more efficient than equipment that burns fossil fuels, and to transition our energy off of fossil fuels, we need to use less energy overall. Fuel switching to electricity can also enable equipment to run on locally-generated renewable energy.

Q: Are carbon offsets part of our plan? Do carbon offsets help meet our target?

No, carbon offsets are not part of our pathway to 80by50. Carbon offsets are a reduction in GHG emissions made in order to compensate for emissions made elsewhere. They are sold to enable the purchaser to claim the GHG reductions as their own. While this is a mechanism to reduce emissions, they do not address the root cause of our local emissions.

Q: What about the growing population in the region?

Our GHG reduction targets are absolute targets. This means we are working to lower our overall emissions based on our 2010 levels, even while our population and economic activity grows. This makes our targets more challenging to achieve, compared to ‘intensity-based’ targets which are based on emissions per person.

Q: What is the purpose of the Carbon Budget section (*Appendix D of strategy document*)?

When several municipalities in Waterloo Region declared a climate emergency or climate crisis in 2019, there was considerable interest in carbon budgets. At the request of the municipalities, the project’s technical consultants (WalterFedy) apply the carbon budget methodology used by Edmonton and the C-40 cities to identify a total carbon budget number for the Waterloo Region community as a whole. Information on this calculation is included in an appendix in the strategy document, so that municipalities and others have a common reference they can use as a starting point for any related work.

What’s Next?

Q: Is the TransformWR Strategy feasible?

Yes. TransformWR is focused on identifying ‘what’ needs to be done in order to do our community’s part to address climate change.

Q: What needs to happen next?

The next step of this journey is implementation, for all municipalities, businesses, organizations, and households. Detailed implementation plans must be developed and resourced to make the changes outlined in the strategy.

Q: How does this plan impact our community’s social and economic priorities?

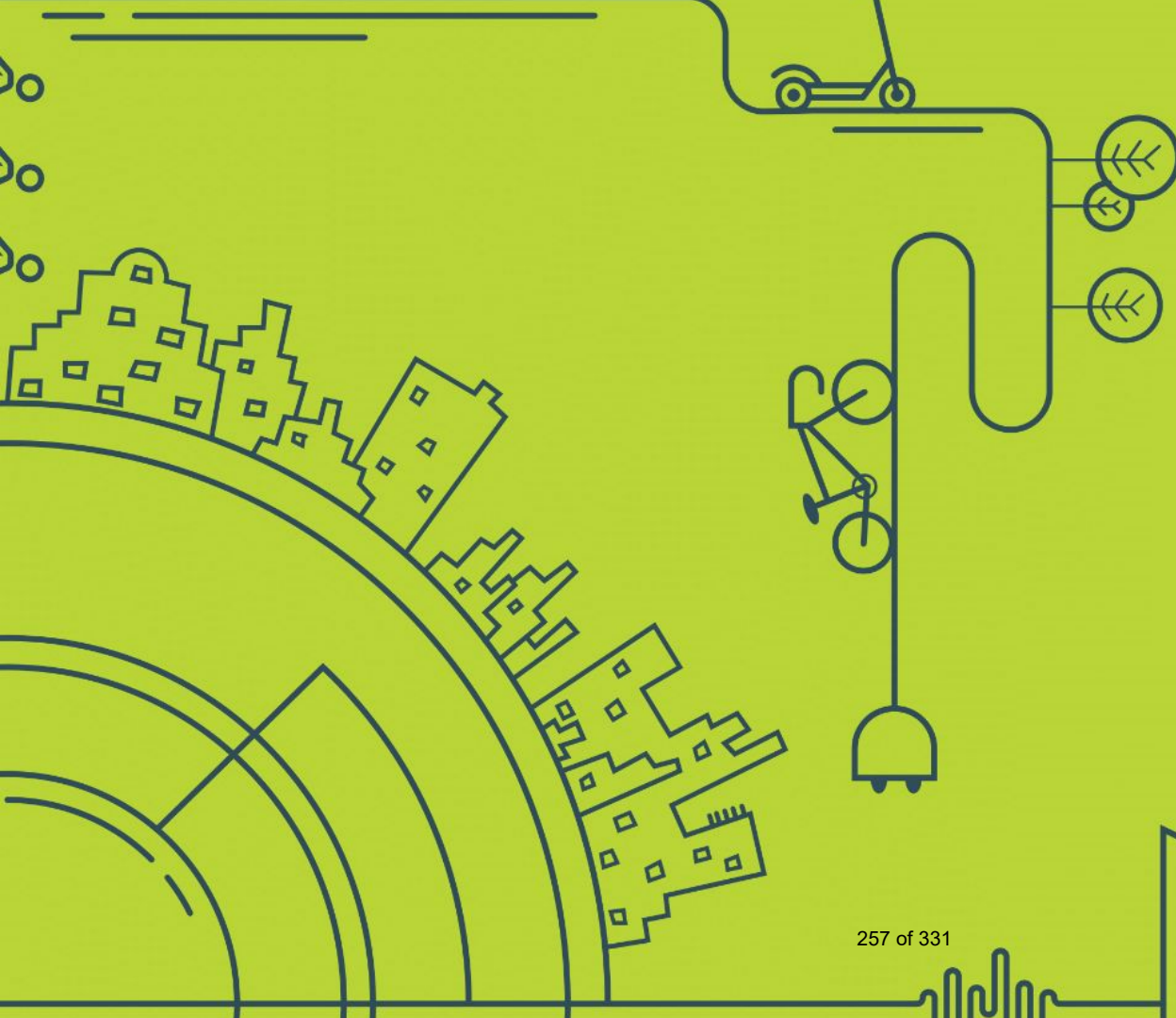
This strategy aims to use GHG reductions to create a more equitable, prosperous, resilient low-carbon community. Transforming our energy system will prepare Waterloo Region to thrive in a low-carbon global economy in the coming decades. Redesigning our transportation, buildings, waste, and food systems to use less energy are opportunities to improve quality of life, especially for those who experience the most barriers in our current, high-energy systems.

Q: How will progress be tracked?

The ClimateActionWR Collaborative will track GHG emissions on an annual basis, with full GHG inventories completed no less than every 5 years. Key performance indicators will also allow monitoring of progress on an ongoing basis.

Q: How will advocacy play a role in our success?

The success of our efforts will depend on policies from other levels of government, such as decarbonizing Ontario’s electricity grid. Achieving our targets will require working with local organizations and governments, as well as other municipalities across Ontario and Canada to have a coordinated voice in expressing our needs for climate action that supports equity, prosperity, and resiliency.





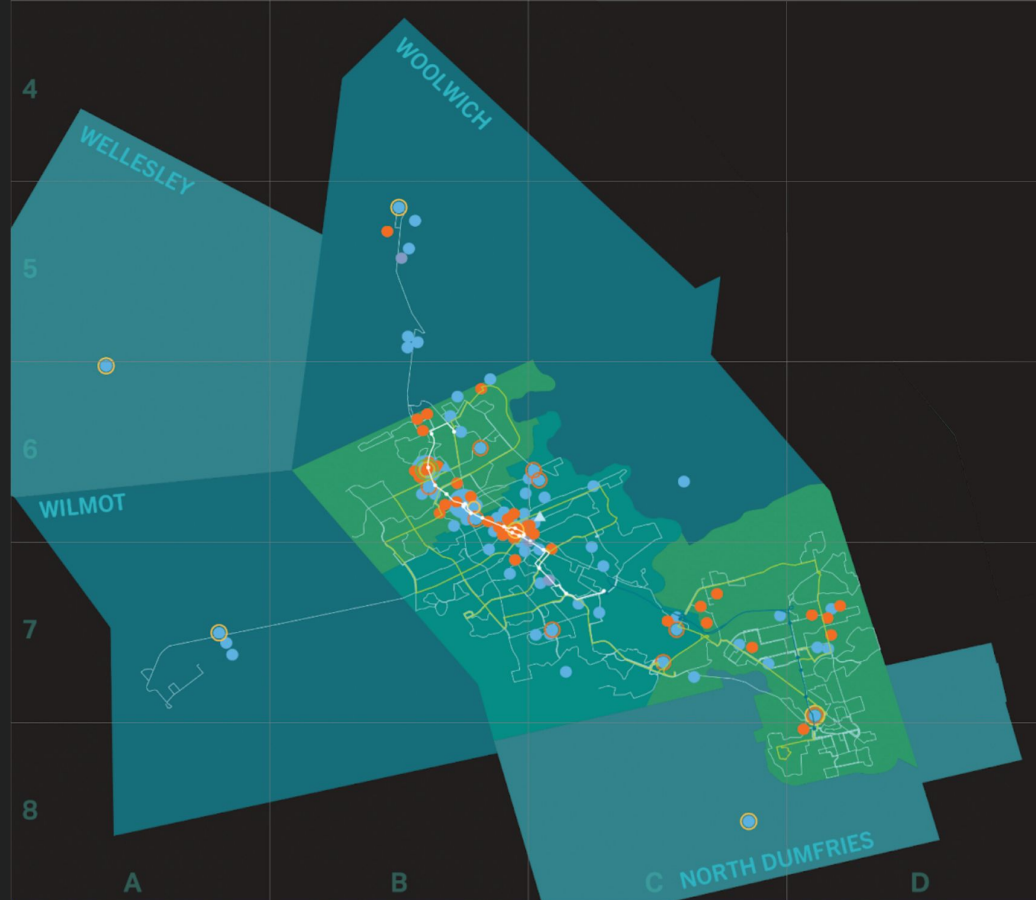


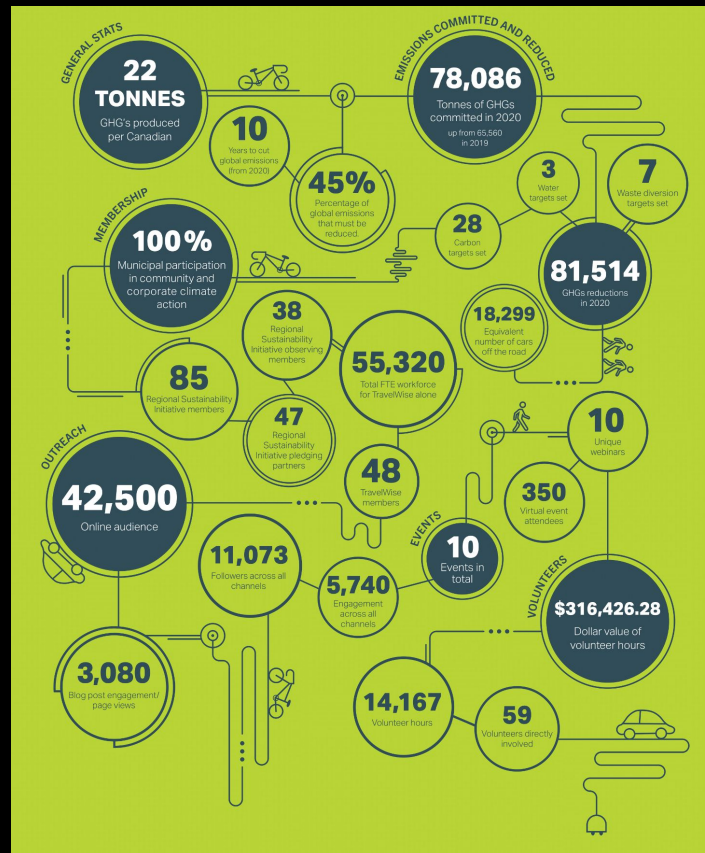


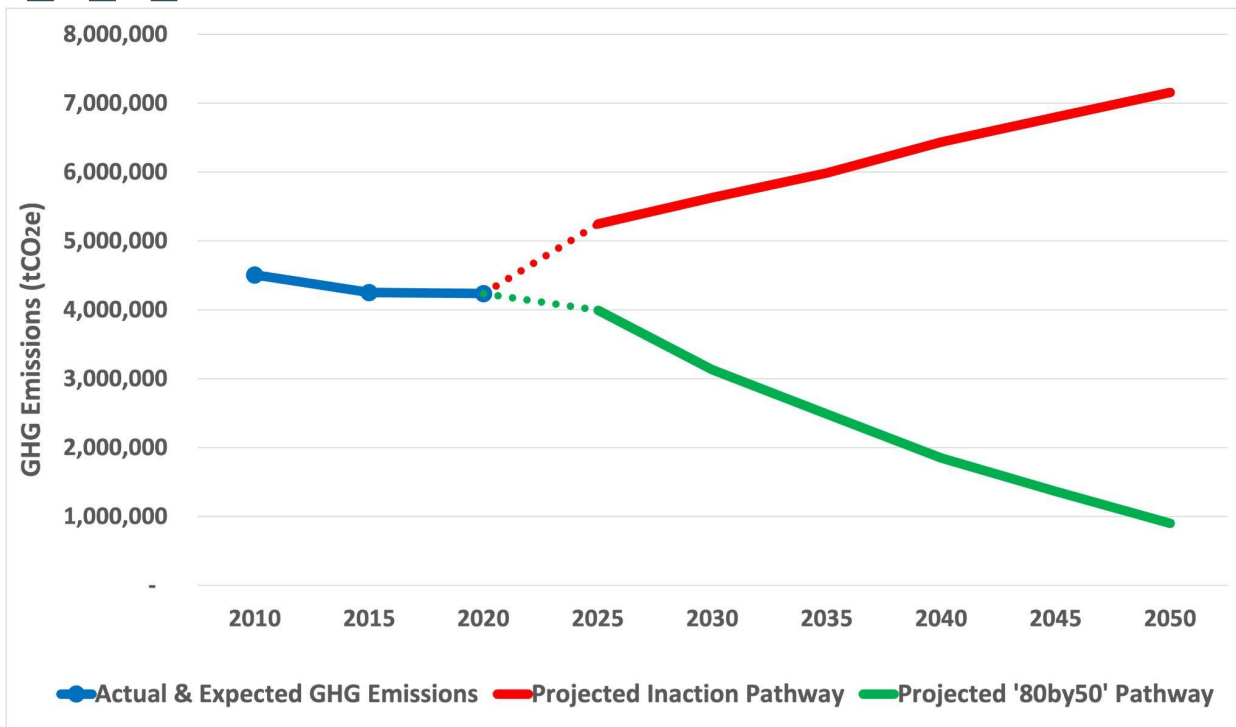
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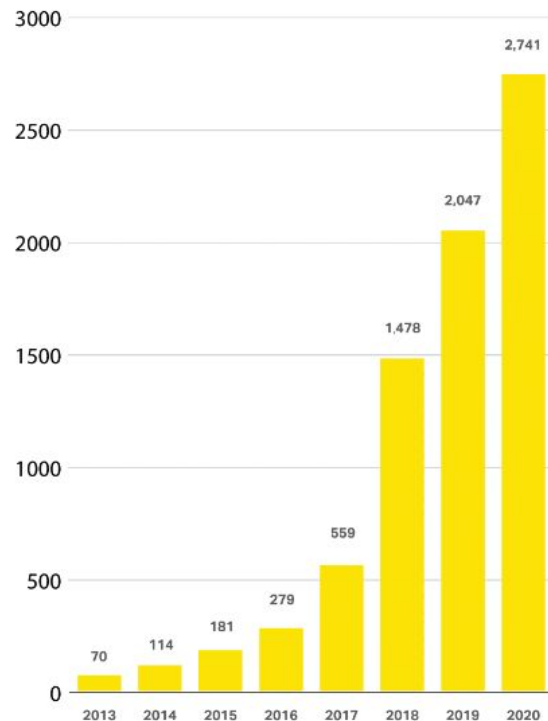




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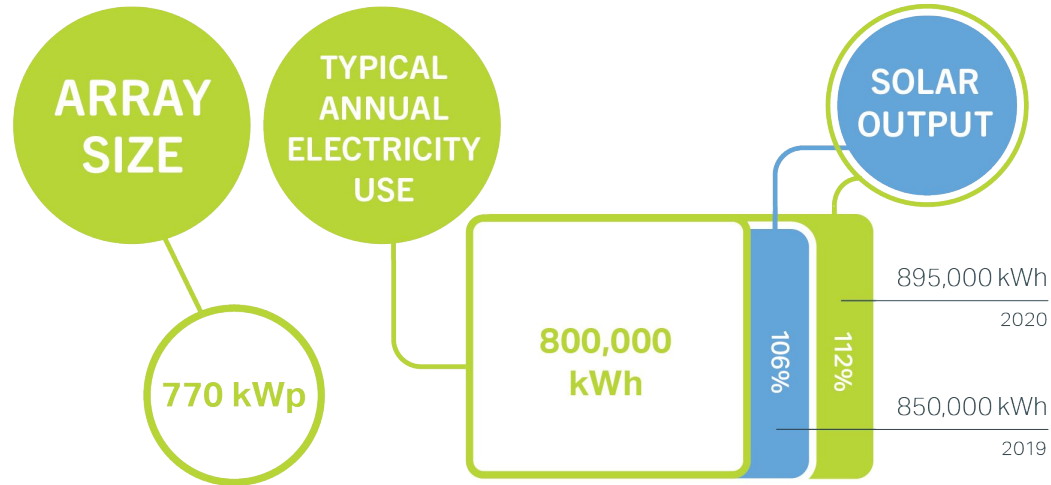
Electric vehicles in Waterloo region







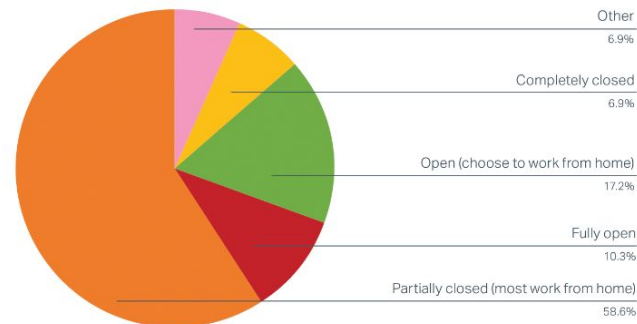
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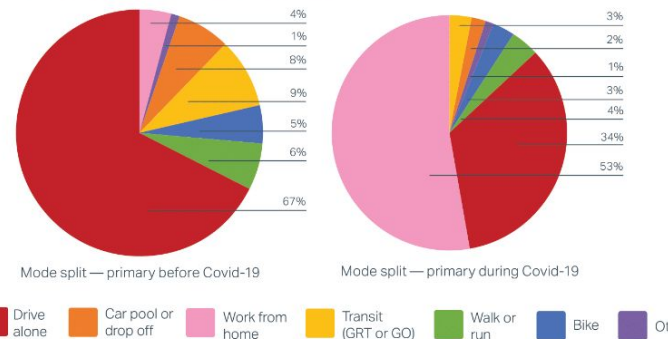




Worksite status during survey



Employee Travel Survey Results





Satisfaction with mode of transportation

Before COVID-19



During COVID-19



Very satisfied Satisfied Neutral Unsatisfied Very unsatisfied

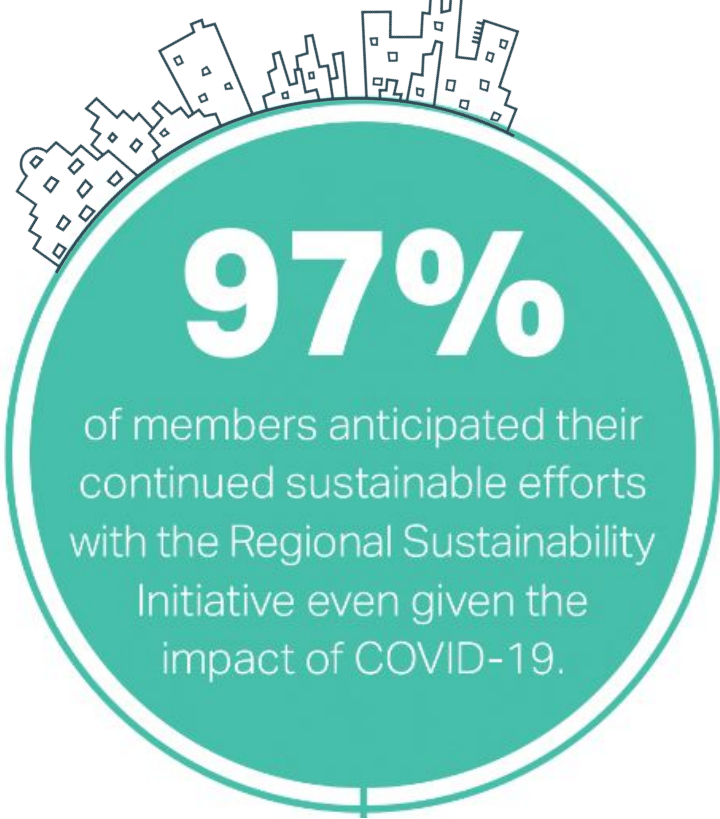




Regional Sustainability Initiative







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DEVELOPMENT SERVICES

Staff Report

REPORT NO: DS 2021-021

TO: Council

SUBMITTED BY: Harold O'Krafka, MCIP RPP
Director of Development Services

PREPARED BY: Andrew Martin, MCIP RPP
Manager of Planning and Economic Development

REVIEWED BY: Sandy Jackson, Interim CAO

DATE: June 14, 2021

SUBJECT: Lifting one (1) foot reserve and open as part of Heritage Drive

RECOMMENDATION:

THAT the Council endorse lifting an existing one (1) foot reserve along Heritage Drive and pass a by-law to open it as part of Heritage Drive.

SUMMARY:

The owner of lands at the northwest intersection of Bleams Road and Heritage Drive is currently working on development plans for the parcel. Through review of title, their solicitor determined that there is a portion of Reserve Block A, Plan 1450 remaining across the frontage of the property on Heritage Drive.

Staff have had the necessary title searches completed to determine that there are no conditions tied to the removal of the one (1) foot reserve, which presently impedes legal access and frontage on a portion of Heritage Drive.

BACKGROUND:

Reserve Block “A” was created through the registration of subdivision plan 1450 in 1978. Plan 1450 is the subdivision plan that established a portion of what is now Heritage Drive and associated parcels on that road. Reserve Block “A” was conveyed to the Township of Wilmot as part of that subdivision approval. Portions of the block have been lifted and opened as part of the road since 1978.

REPORT:

The lands at the northwest intersection of Bleams Road and Heritage Drive are presently undeveloped. The owner is pursuing development of the parcel and has made application to remove the one (1) foot reserve encumbering a portion of their property. The area in question is illustrated on the sketch included as Attachment A. There is an additional portion of Reserve Block A that fronts the Maple Leaf Foods property at the north end of Heritage Drive. This parcel is also illustrated on the aforementioned sketch.

Staff have had the necessary title searches completed to determine that there are no conditions tied to the removal of any of the remaining one (1) foot reserve along Heritage Drive. As such, staff recommend that the entire reserve be lifted and opened by by-law as part of Heritage Drive at this time. Upon passage of the by-law, staff will initiate the registration of the by-law on title and the block will be opened as part of Heritage Drive.

ALIGNMENT WITH THE TOWNSHIP OF WILMOT STRATEGIC PLAN:

Opening reserve blocks ensure logical and orderly development of the community.

FINANCIAL CONSIDERATIONS:

The application fees, established by the Township of Wilmot Fees and Charges By-law, were collected at the time of application. All legal and survey costs associated with review, preparation and registration of the By-law will be borne by the applicant.

ATTACHMENTS:

Attachment A Property location sketch





INFORMATION AND LEGISLATIVE SERVICES *Staff Report*

REPORT NO: ILS 2021-24

TO: Council

SUBMITTED BY: Dawn Mittelholtz, Director of Information and Legislative Services /
Municipal Clerk

PREPARED BY: Tracey Murray, Manager of Information and Legislative Services /
Deputy Clerk

REVIEWED BY: Sandy Jackson, Interim CAO

DATE: June 14, 2021

SUBJECT: **Petition for Drainage Works by Road Authority**
Queen Street (Regional Road 12), South of Cottage Lane

RECOMMENDATION:

THAT the Township of Wilmot accept the Petition for Drainage Works by Road Authority received from The Region of Waterloo for Queen Street (Regional Road 12), culvert approximately 90m south of Cottage Lane intersection, Township of Wilmot, and;

THAT the Clerk be authorized to proceed accordingly under The Drainage Act.

SUMMARY:

Receiving a petition for drainage works is the first step in the Municipal Drain process under the Province's Drainage Act.

REPORT:

The Region of Waterloo has submitted and filed a petition with the Clerk May 31, 2021 to construct a culvert on Queen Street (Regional Road 12) approximately 90m south of Cottage Lane intersection, Township of Wilmot. The Drainage Superintendent has met with the petitioner and has confirmed that this is a valid petition. A map of the subject area is attached for reference.

Pursuant to the Drainage Act, once the petition is filed, it proceeds to Council for acceptance. Following acceptance of the petition, staff will forward written notice within 30 days to: each petitioner, the Grand River Conservation Authority, and the Ministry of Natural Resources

ALIGNMENT WITH THE TOWNSHIP OF WILMOT STRATEGIC PLAN:

The acknowledgement of the petition supports the infrastructure within the municipality.

FINANCIAL CONSIDERATIONS:

If the municipal drainage works proceed pursuant to the Drainage Act, then the property owners that are affected would be assessed in accordance with the assessment schedule that will be prepared by the Engineer as part of his report. At this time, there are no financial considerations.

ATTACHMENTS:

Petition for Drainage Works by Road Authority, Form 2
Area Map

**Petition for Drainage Works by Road
Authority – Form 2**

Drainage Act, R.S.O. 1990, c. D.17, subs. 4(1)(c)

To: The Council of the Corporation of the Township of Wilmot


Re: Road name and road location (provide description of road or section of road that requires drainage)
Queen Street (Regional Road 12) culvert approximately 90m south of Cottage Lane intersection
See attached plan

I, van De Keere, Steve, as an individual having jurisdiction over
(Last, first name)

the above road system for the Region of Waterloo
declare that the road described above requires drainage and hereby petition under subsection 4(1)(c) of the *Drainage Act* that
this area be drained by means of a drainage works.

Organization

The Regional Municipality of Waterloo

Position Title	Signature	Date (yyyy/mm/dd)
<u>Director, Transportation</u>		<u>2021/05/31</u>

Petitioners become financially responsible as soon as they sign a petition:

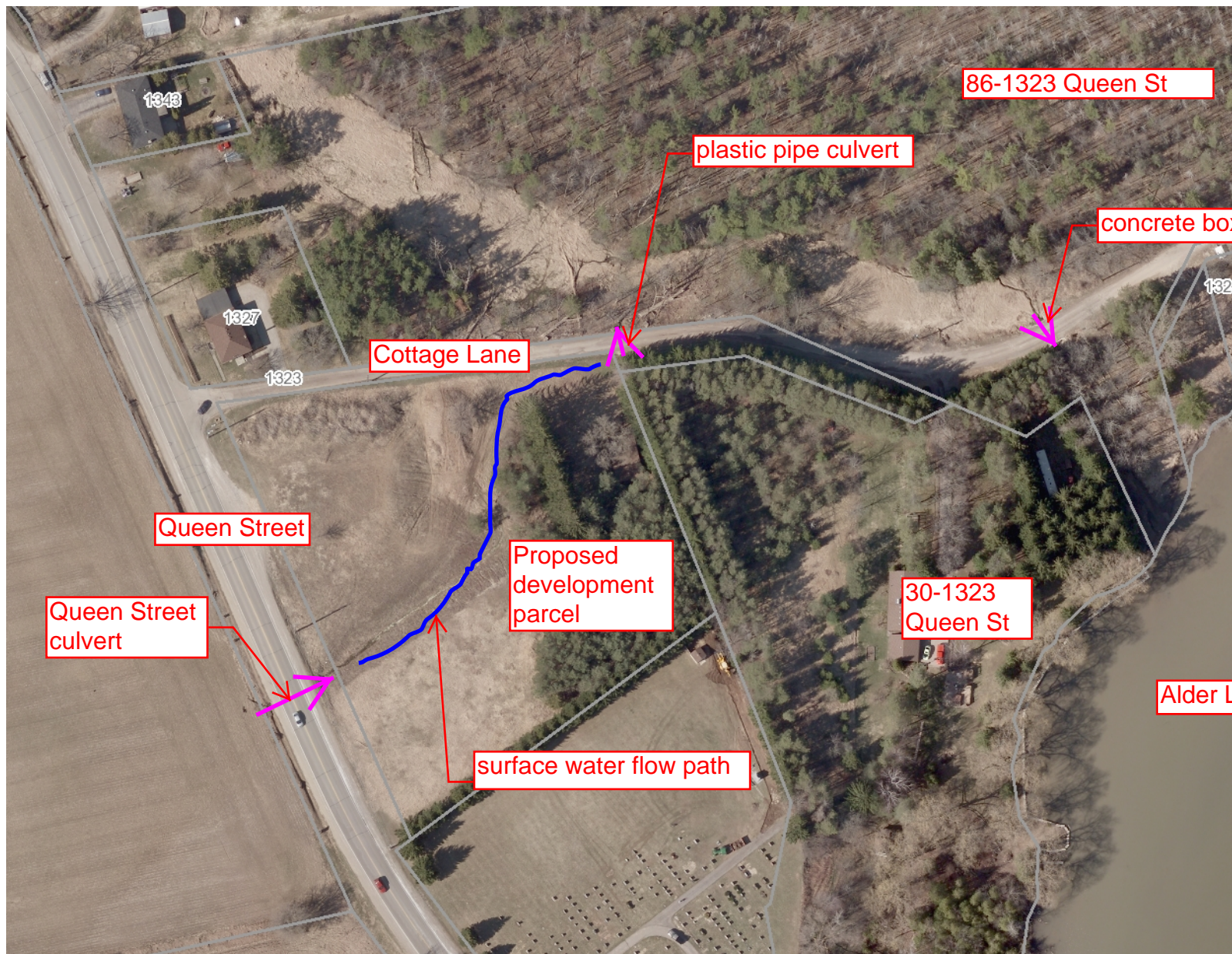
- Once the petition is accepted by council, an engineer is appointed to respond to the petition. *Drainage Act*, R.S.O. 1990, c. D. 17 subs. 8(1).
- After the meeting to consider the preliminary report, if the petition does not comply with section 4, the project is terminated and the road authority is responsible for the costs. *Drainage Act*, R.S.O. 1990, c. D. 17 subs. 10(4).
- After the meeting to consider the final report, if the petition does not comply with section 4, the project is terminated and the road authority is responsible for the costs. *Drainage Act*, R.S.O. 1990, c. D. 17 s. 43.
- If the project proceeds to completion, a share of the cost of the project will be assessed to the involved properties in relation to the assessment schedule in the engineer's report, as amended on appeal. *Drainage Act*, R.S.O. 1990, c. D. 17 s. 61.



Region of Waterloo

Legend

- Addresses
- Assessment Parcels
- Municipal Boundaries



114.7 0 57.33 114.7Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere
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This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Notes

Plan for Region of
Waterloo Petition
April 6, 2021



Queen St - Cottage Lane

Map for Region of
Waterloo Petition
April 6, 2021

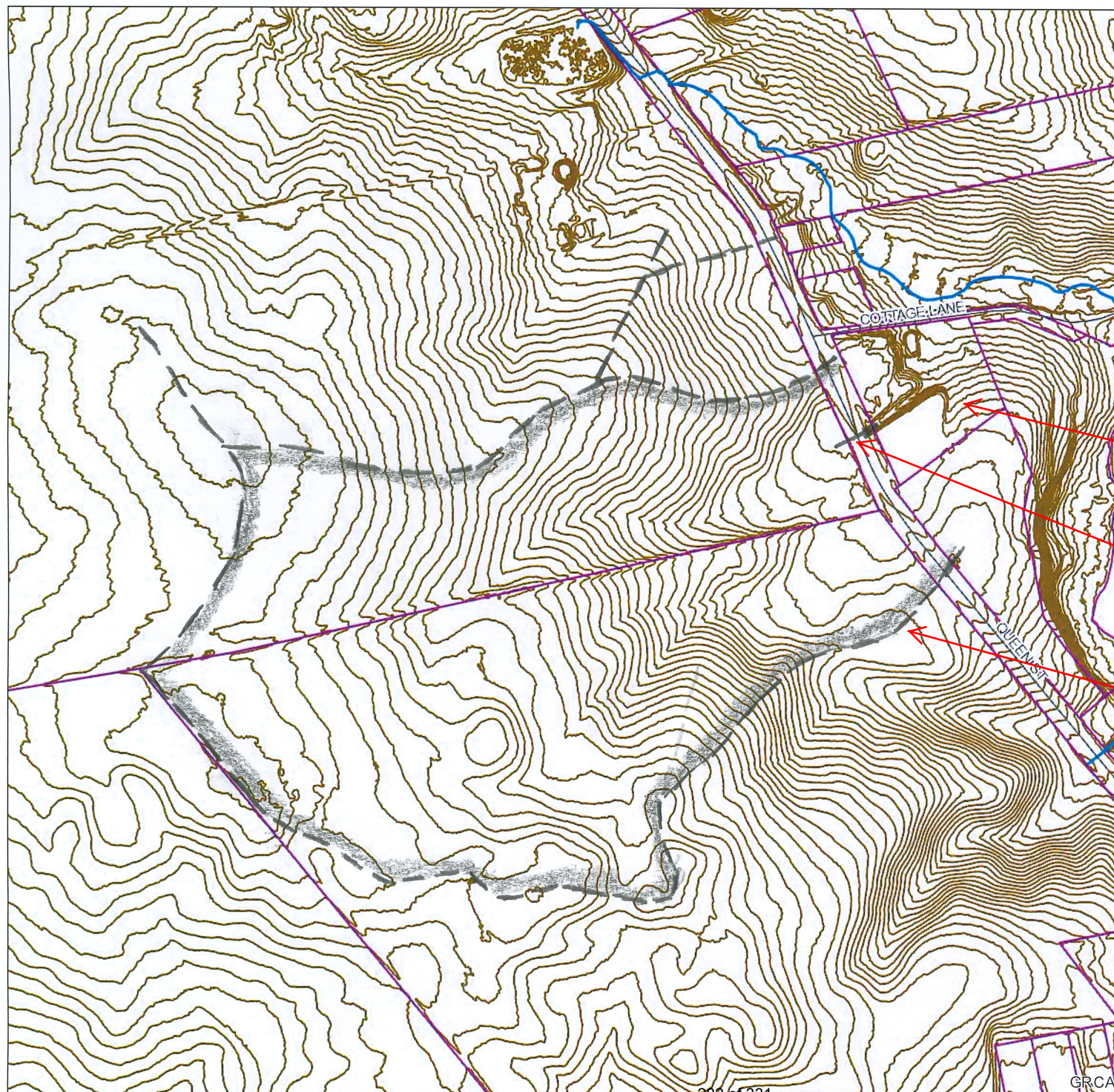
Legend

- Regulated Watercourse (GRCA)
- Parcel - Assessment Public (MPAC/MNRF)
- Contour CGVD2013 - Local (GRCA)

Parcel proposed
for development

Queen Street culvert

Watershed area for
Queen Street culvert





INFORMATION AND LEGISLATIVE SERVICES *Staff Report*

REPORT NO: ILS 2021-23

TO: Council

SUBMITTED BY: Dawn Mittelholtz, Director of Information and Legislative Services /
Municipal Clerk

PREPARED BY: Tracey Murray, Manager of Information and Legislative Services /
Deputy Clerk

REVIEWED BY: Sandy Jackson, Interim CAO

DATE: June 14, 2021

SUBJECT: **Encroachment Agreement**
EJ's Tavern
39 Snyder's Road West, Baden
Township of Wilmot

RECOMMENDATION:

THAT the Township of Wilmot enter into an encroachment agreement with EJ's Tavern located at 39 Snyder's Road West, Baden regarding an existing balcony / fire escape and the construction of a new barrier free ramp and stairs encroaching onto the road allowance of Mill Street, subject to the owner / applicant bearing all costs associated with the registration, Township fees, deposit and design and survey of such agreement; and further,

THAT the Mayor and Clerk be authorized to execute all associated documentation.

SUMMARY:

The Council of the Township of Wilmot is being asked to consider entering into an Encroachment Agreement allowing the applicant, EJ's Tavern to construct a barrier free ramp

This information is available in accessible formats upon request

and stairs that will encroach onto the road allowance of Mill Street. There is an existing second floor balcony / fire escape that already encroaches without an encroachment agreement. Through this process an updated agreement is proposed to also include the aerial encroachment.

BACKGROUND:

Witzel Dyce Engineering Inc., on behalf of EJ's Tavern owners Abhay Patel and Mohan Patel approached staff regarding the need for an encroachment agreement to construct a barrier free ramp and stairs for their property at 39 Snyder's Road West, Baden. The building is presently under renovation and a building permit has been applied for to create a barrier free entrance to the restaurant.

REPORT:

The attached documentation shows the detailed drawing identifying the barrier free entrance encroachment request. The documentation has been reviewed by staff and all costs associated with the registration, Township fees, deposit, and design and survey of the Agreement will be borne by the applicants. A subsequent drawing will be provided regarding the aerial encroachment and reviewed by staff.

ALIGNMENT WITH THE TOWNSHIP OF WILMOT STRATEGIC PLAN:

Through the encroachment agreement, the goal of Economic Prosperity through Economic Development and the Quality of Life through Accessibility and Inclusivity are achieved.

FINANCIAL CONSIDERATIONS:

All costs associated with this encroachment agreement shall be borne by the applicant.

ATTACHMENTS:

Marked up survey and permit drawings

CONSTRUCTION NOTES:

A. GENERAL

1. ALL WORK SHALL CONFORM TO THE ONTARIO BUILDING CODE AND ALL STANDARDS REFERENCED WITHIN, LOCAL REGULATIONS AND BYLAWS, AND THE OCCUPATIONAL HEALTH AND SAFETY ACT FOR CONSTRUCTION PROJECTS. THE LATEST VERSIONS OF STANDARDS SHALL APPLY.
2. READ THESE DRAWINGS IN CONJUNCTION WITH ALL RELATED CONTRACT DOCUMENTS AND CONSULTANT DRAWINGS.
3. THE CONTRACTOR SHALL VISIT THE SITE AND FAMILIARIZE THEMSELVES WITH ALL CONDITIONS WHICH MAY ADVERSELY AFFECT THE PROPER COMPLETION OF THE PROJECT. THE CONTRACTOR SHALL CHECK ALL DIMENSIONS IN RELATION TO THE DRAWINGS AND NOTIFY THE ENGINEER TO ALL DISCREPANCIES PRIOR TO PROCEEDING WITH THE WORK.
4. DRAWINGS ARE NOT TO BE SCALED.
5. THE DESIGN DOCUMENTS ARE PREPARED SOLELY FOR THE USE WITH THE PARTY WHOM THE ENGINEER HAS ENTERED INTO CONTRACT. THERE ARE NO REPRESENTATIONS MADE TO ANY PARTY WITH WHOM THE ENGINEER HAS NOT ENTERED INTO CONTRACT.
6. THE CONTRACTOR SHALL RETAIN AN INDEPENDENT TESTING AND INSPECTION COMPANY TO ENSURE THAT THE WORK IS DONE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS INCLUDING COMPACTION TESTING, REINFORCING STEEL PLACEMENT, CONCRETE TESTING AND STRUCTURAL STEEL.
7. THE ENGINEER SHALL BE GIVEN MINIMUM 24 HOURS NOTICE BY THE CONTRACTOR FOR ALL CONSTRUCTION REVIEWS. SITE VISITS AND REVIEWS BY THE ENGINEER OR HIS REPRESENTATIVE ARE INTENDED FOR THE SOLE PURPOSE OF ASCERTAINING CONFORMANCE WITH THE GENERAL DESIGN CONCEPT. THE REVIEWS SHALL NOT MEAN THAT THE ENGINEER HAS SEEN ALL CONSTRUCTION PROCEDURES. REVIEW BY THE ENGINEER SHALL NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY FOR ERRORS AND OMISSIONS AND FOR MEETING ALL THE REQUIREMENTS OF THE CONSTRUCTION AND CONTRACT DOCUMENTS.
8. THE CONTRACTOR SHALL MAKE ADEQUATE PROVISIONS FOR CONSTRUCTION LOADS AND TEMPORARY BRACING TO ENSURE THE BUILDING IS PLUMB AND IN TRUE ALIGNMENT AT ALL PHASES OF CONSTRUCTION AS PER O REG 213/91. ALL BRACING MEMBERS SHOWN ON THE DRAWINGS ARE DESIGNED FOR THE FINISHED STRUCTURE AND MAY NOT BE SUFFICIENT FOR ERECTION PURPOSES. THE CONTRACTOR SHALL RETAIN AN ENGINEER AS REQUIRED.
9. NO SUBSTITUTIONS FROM THE SPECIFIED PRODUCTS AND MATERIALS ARE PERMITTED WITHOUT THE APPROVAL OF THE ENGINEER.

TESTING REQUIREMENTS

TEST	COMMENTS
SOIL BEARING CAPACITY	BY GEOTECH.
SOIL COMPACTION	BY GEOTECH.
REINFORCING STEEL PLACEMENT	FINAL PLACEMENT
CONCRETE COMPRESSIVE TESTS	MIN. 2 SETS PER 100 m³
CONCRETE SLUMP	
STRUCTURAL STEEL CONNECTIONS	INSPECT ALL FIELD WELDS
ALL TESTING TO BE COMPLETED BY A CERTIFIED INDEPENDENT TESTING AND INSPECTION COMPANY. COPIES OF ALL REPORTS ARE TO BE FORWARDED TO THE ENGINEER FOR REVIEW.	

B. FOUNDATIONS

1. FOUNDATIONS ARE TO BEAR DIRECTLY ON UNDISTURBED SOIL OR COMPACTED FILL WITH A MINIMUM BEARING CAPACITY OF 150 kPa SLS AND 225 kPa ULS.
2. SLABS ON GRADE SHALL BEAR ON MATERIALS SUITABLE FOR 25 kPa (500 PSF) BEARING PRESSURES WITHOUT SETTLEMENT RELATIVE TO THE BUILDING FOUNDATIONS.
3. REFER TO THE SOIL REPORT FOR MINIMUM FOUNDATION DEPTHS.
4. REMOVE ALL TOP SOIL, ORGANIC MATERIAL, LOOSE FILL AND OTHER DELETERIOUS MATERIAL FROM THE BUILDING AREA PRIOR TO CONSTRUCTION.
5. PROOF ROLL EXISTING FILL MATERIALS. SOFT AREAS UNCOVERED DURING EXCAVATION SHALL BE SUB-EXCAVATED TO SOUND MATERIAL AND REPLACED WITH CLEAN, FREE DRAINING FILL COMPACTED TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD).
6. COMPACTED FILL BENEATH FOOTINGS AND FLOOR SLABS SHALL BE COMPACTED IN MAXIMUM 150mm (6") LAYERS.
7. PLACE ALL FOOTINGS EXPOSED TO FREEZING WEATHER MINIMUM 1200mm (4'-0") BELOW GRADE UNLESS OTHERWISE PROTECTED. PROTECT SOIL BELOW AND ADJACENT TO ALL FOOTINGS FROM FREEZING DURING CONSTRUCTION.
8. NECESSARY PRECAUTIONS SHALL BE TAKEN TO ENSURE EXISTING FOOTINGS ARE NOT DISTURBED OR UNDERMINED DURING CONSTRUCTION.
9. BACKFILL AGAINST FOUNDATION WALLS IN SUCH A MANNER THAT THE LEVEL OF BACKFILLING ON ONE SIDE OF THE WALL IS NEVER MORE THAN 500mm (20") HIGHER THAN THE LEVEL ON THE LOWER SIDE OF THE WALL EXCEPT WHERE TEMPORARY SUPPORT FOR THE WALL IS PROVIDED OR THE WALLS ARE DESIGNED FOR SUCH UNEVEN PRESSURES.
10. LOCATE ALL PIERS AND FOOTINGS CONCENTRIC UNDER COLUMNS AND WALLS UNLESS OTHERWISE NOTED.
11. HORIZONTAL CONSTRUCTION JOINTS SHALL NOT OCCUR IN CONCRETE WALLS UNLESS APPROVED BY THE ENGINEER.

C. CONCRETE

1. CONCRETE WORK SHALL CONFORM TO CAN/CSA-A23.1, A23.2 AND A23.3.
2. CONCRETE PROPERTIES: (MINIMUM COMPRESSIVE STRENGTH MEASURED AT 28 DAYS UNLESS NOTED)
 - a. ALL CONCRETE UNLESS NOTED OTHERWISE - 20 MPaSEE CHART FOR CONCRETE TYPES

CONCRETE PROPERTIES

LOCATION	CSA CLASS	28 DAY COMP. STRENGTH MPa	MAX. W/C RATIO	AIR CONTENT %	MAX. AGGREGATE mm	SLUMP mm
FOOTINGS	N	20	NA	NA	20	80 ±30
CONCRETE IN AN UNSATURATED CONDITION EXPOSED TO FREEZING AND THAWING, BUT NOT CHLORIDES (EXTERIOR PIERS AND WALLS)	F-2	25	0.55	4-7	20	80 ±30
NON-STRUCTURALLY REINFORCED CONCRETE EXPOSED TO CHLORIDES AND FREEZING AND THAWING (SIDEWALKS, UNREINFORCED EXTERIOR CONCRETE SLABS)	C-2	32	0.45	5-8	20	80 ±30
STRUCTURALLY REINFORCED CONCRETE EXPOSED TO CHLORIDES WITH OR WITHOUT FREEZING AND THAWING (EXTERIOR SLABS, EXTERIOR WALLS AND PIER ADJACENT ADJACENT TO SURFACES EXPECTED TO BE SALTED, PARKING GARAGE STRUCTURES)	C-1	35	0.40	5-8	20	80 ±30

3. CONCRETE DESIGN IS BASED ON COMPRESSIVE STRENGTH. PHYSICAL PROPERTIES (SLUMP, AGGREGATE SIZE, ETC.) TO SUIT INSTALLATION (BY OTHERS) NOT TO AFFECT STRENGTH SPECIFIED.
4. ALL CONCRETE SHALL BE TESTED BY A CSA CERTIFIED CONCRETE TESTING LABORATORY. CONTRACTOR TO PROVIDE COPIES OF TESTING REPORTS TO THE ENGINEER. NOT LESS THAN ONE TEST SHALL BE MADE FOR EACH 100m³ OF CONCRETE WITH AT LEAST ONE TEST FOR EACH CLASS OF CONCRETE USED. A MINIMUM OF THREE TESTS IS REQUIRED FOR EACH CLASS.
5. SLUMP OF CONCRETE TO BE 80mm +/- 30mm PRIOR TO SUPER PLASTICIZERS BEING ADDED.
6. ALL CONCRETE FORMS ARE TO BE WET THOROUGHLY PRIOR TO PLACING CONCRETE. WATER CURING OF CONCRETE IS RECOMMENDED.
7. DO NOT ADD WATER TO THE CONCRETE.
8. ALL CONCRETE EXCEPT FOR CONCRETE SLABS 150mm (6") OR LESS SHALL BE MECHANICALLY VIBRATED.
9. CONTROL JOINTS IN CONCRETE SLABS ON GRADE ARE TO BE SPACED AT MAXIMUM 30 TIMES THE SLAB THICKNESS NOT TO EXCEED 4500mm (15'-0") AND A DEPTH OF 1/4 THE THICKNESS OF THE SLAB. CUT 50% OF THE REINFORCING STEEL AT CONTROL JOINT LOCATIONS.
10. REINFORCING STEEL SHALL CONFORM TO CAN/CSA-G30.18. REINFORCING BARS SHALL BE DEFORMED, GRADE 400 MPa.
 - a. 75mm (3") FOR CONCRETE CAST AGAINST EARTH.
 - b. 38mm (1 1/2") FOR CONCRETE CAST AGAINST FORMWORK.
 - c. 64mm (2 1/2") FOR CONCRETE EXPOSED TO DE-ICING CHEMICALS.
12. ALL REINFORCING STEEL, DOWELS AND ANCHOR BOLTS ARE TO BE CLEAN AND FREE OF RUST, DIRT, FORM RELEASE AGENT, ETC. PRIOR TO POURING CONCRETE.
13. LAP REINFORCING STEEL MINIMUM 36 TIMES THE BAR DIAMETER. LAP ALL HORIZONTAL BARS AT CORNERS WITH BENT DOWELS MEETING THE MINIMUM LAP REQUIREMENTS IN BOTH DIRECTIONS. SHOP FABRICATE ALL REINFORCING STEEL TO INCLUDE HOOKS AND BENDS.
14. REINFORCING STEEL, DOWELS AND ANCHOR BOLTS ARE TO BE SECURELY TIED PRIOR TO PLACING CONCRETE. REINFORCING STEEL CHAIRS AND SUPPORTS SHALL BE MADE OF CONCRETE BLOCKS, PLASTIC OR WIRE.
15. DOWELS SHALL MATCH REINFORCING UNLESS NOTED OTHERWISE.

D. MASONRY

1. MASONRY TO CONFORM TO CAN/CSA-S304.1 AND CSA A371.
2. TYPE 'N' MORTAR SHALL BE USED FOR BRICK AND DECORATIVE BLOCK.
3. ALL MASONRY WALLS SHALL BE CONSTRUCTED WITH FULL MORTAR JOINTS.
4. VERTICAL CONTROL JOINTS SHALL BE INSTALLED AT 6000mm (20'-0") SPACING MAXIMUM. REINFORCING SHALL NOT CROSS A CONTROL JOINT. PROVIDE FOAM BACKING ROD AND CAULKING AT CONTROL JOINTS AND ENSURE MORTAR DOES NOT FILL THE JOINT.
5. REINFORCE ALL MASONRY WITH HOT DIP GALVANIZED NO. 8 TRUSS TYPE WIRE REINFORCING AT 400mm (16") PROVIDE FULL OVERLAP AT ALL INTERSECTIONS AND CORNERS.

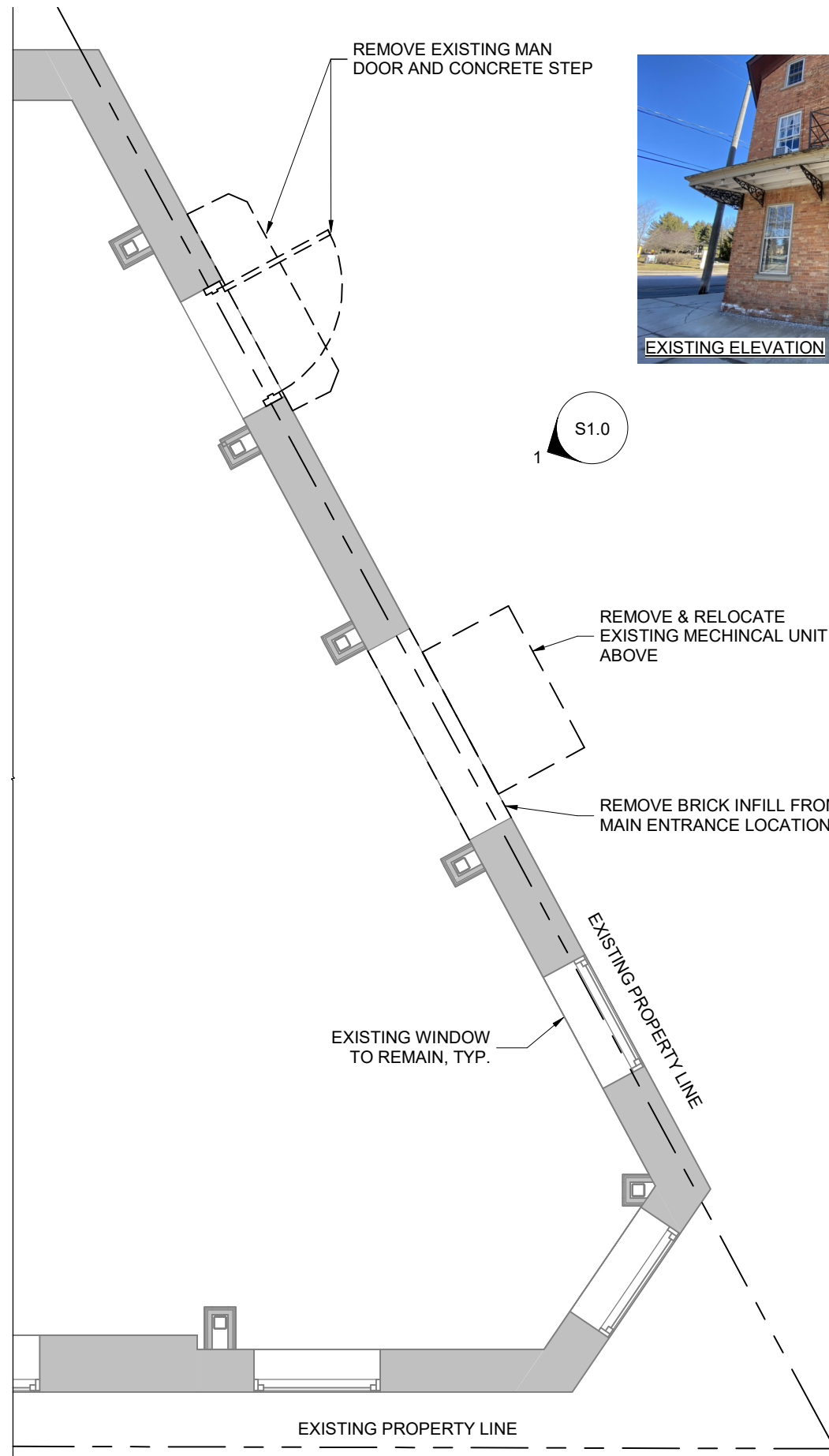
E. STRUCTURAL STEEL

1. STRUCTURAL STEEL SHALL CONFORM TO CAN/CSA-S16-14 AND THE CISC CODE OF STANDARD PRACTICE.
2. STRUCTURAL STEEL SHALL CONFORM TO CAN/CSA G40-20-04, G40-21-04 GRADE 350W CLASS C FOR H.S.S., G40-21-04 GRADE 350W FOR W SHAPE SECTIONS AND G40-21-04 GRADE 300W FOR CHANNELS, ANGLES AND MISCELLANEOUS METAL.
3. BOLTED CONNECTIONS SHALL USE GRADE A325 BOLTS.
4. ANCHOR BOLTS SHALL BE FABRICATED USING STEEL ROD CONFORMING TO CSA G40-21 GRADE 300W.
5. WELDING SHALL CONFORM TO CSA W59 AND CSA W47 DIVISION 1 OR DIVISION 2.1 BY THE CANADIAN WELDING BUREAU. WELDING SHALL BE COMPLETED BY CWB CERTIFIED FABRICATOR AND ERECTOR TO THE CSA STANDARDS W178.1 AND W178.2.
6. STRUCTURAL STEEL MEMBERS SHALL NOT BE SPRUED WITHOUT THE APPROVAL OF THE ENGINEER.
7. ALL STRUCTURAL STEEL IS TO BE SHOP PRIME PAINTED UNLESS NOTED OTHERWISE. STRUCTURAL STEEL WHICH IS TO BE PROTECTED WITH SPRAY APPLIED FIREPROOFING IS TO BE KEPT CLEAN AND UNCOATED. STRUCTURAL STEEL EXPOSED TO WEATHER IS TO BE HOT DIP GALVANIZED CONFORMING TO CAN/CSA-G164. ALL COATINGS ARE TO BE TOUCHED UP ON SITE WITH APPROVED PAINT FOR PRIMED STEEL AND ZINC RICH PAINT FOR GALVANIZED STEEL.

SHOP DRAWINGS REQUIRED

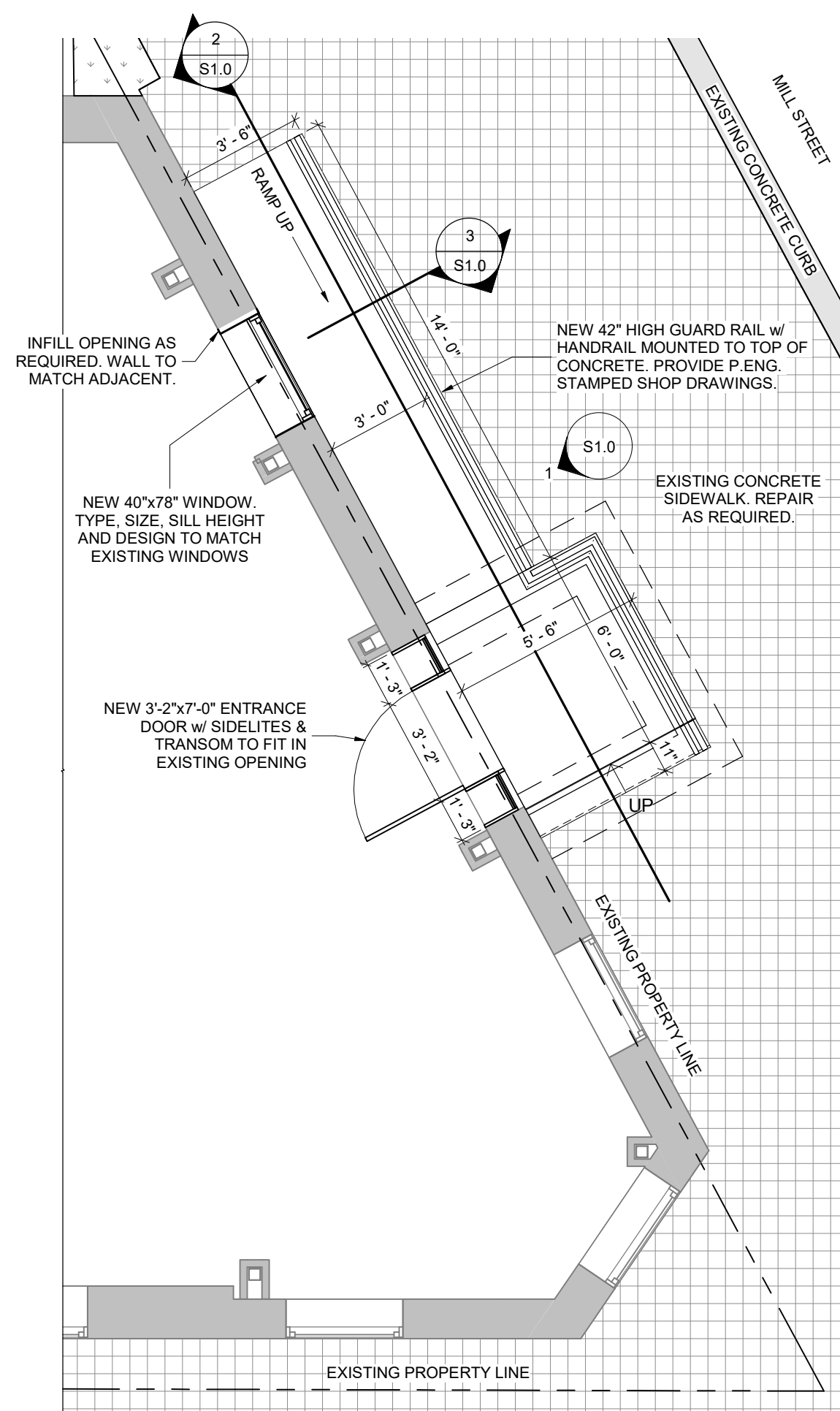
NAME	P.ENG. STAMP	MINIMUM CERTIFICATION REQUIREMENTS:
MISCELLANEOUS STEEL	YES	GUARDS

SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO FABRICATION. SHOP DRAWINGS MUST BE REVIEWED AND STAMPED BY THE GENERAL CONTRACTOR PRIOR TO ISSUING TO THE ENGINEER FOR REVIEW.



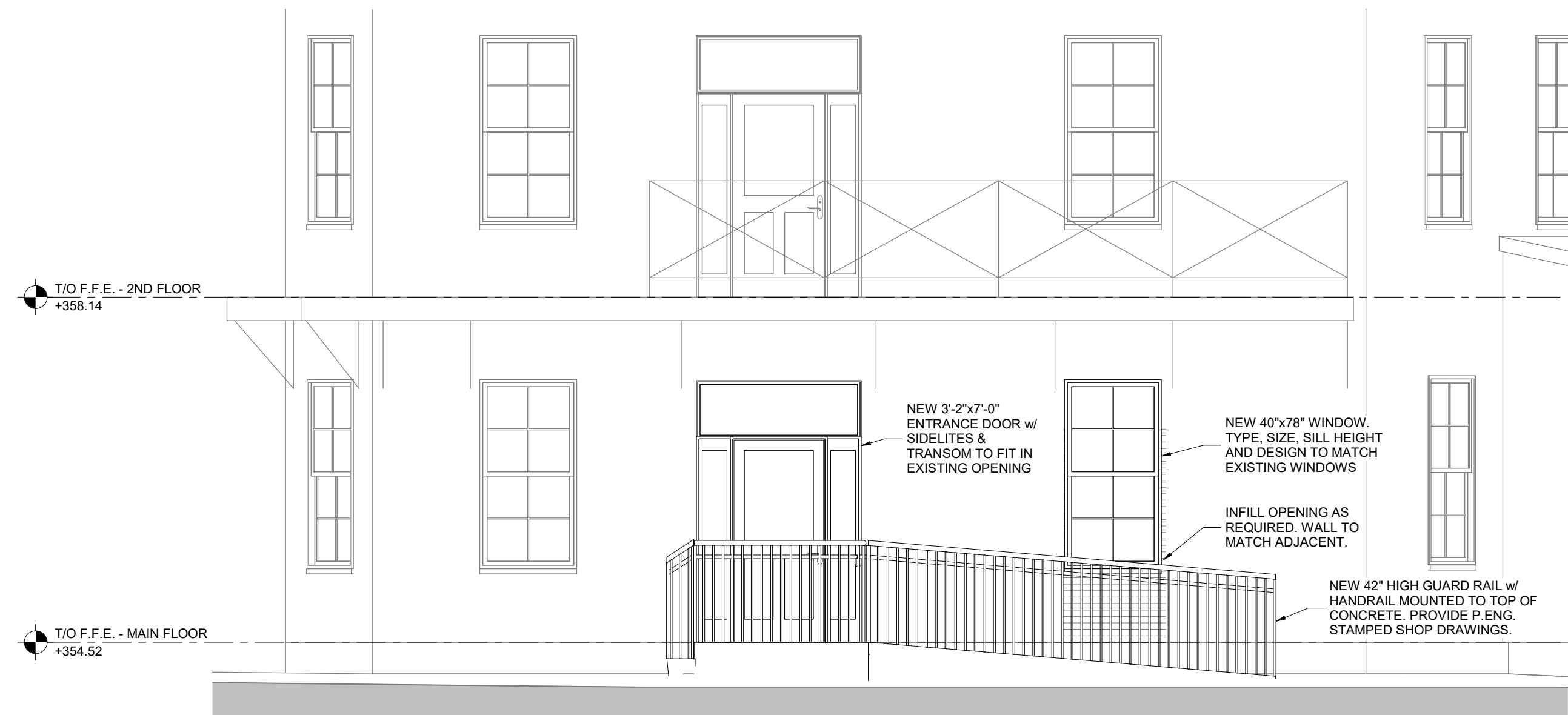
DEMOLITION PLAN

1/4" = 1'-0"



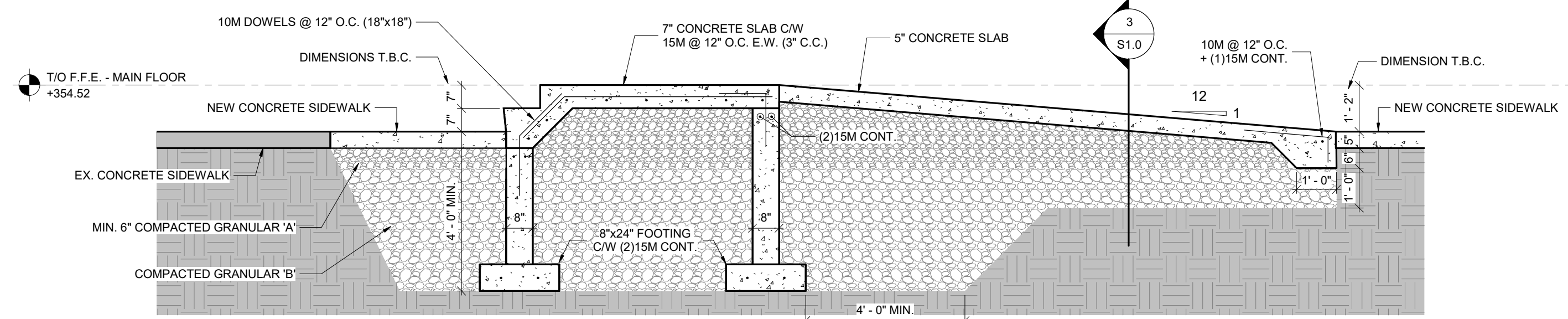
PROPOSED PLAN

1/4" = 1'-0"



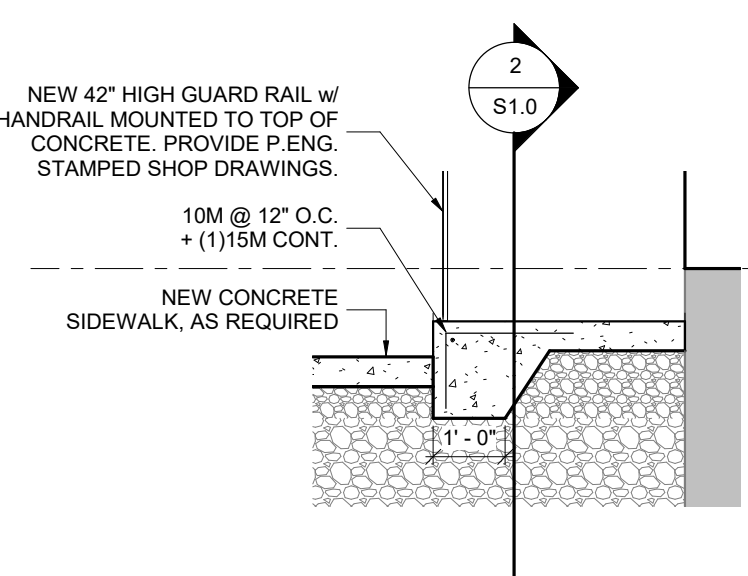
1 ELEVATION
S1.0 PROPOSED

1/4" = 1'-0"



2 SECTION
S1.0 RAMP CROSS SECTION

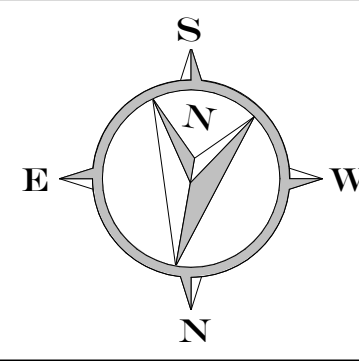
3/8" = 1'-0"



3 SECTION
S1.0 RAMP

3/8" = 1'-0"

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KEY PLAN

1	2021.05.07	ISSUED FOR PERMIT
NO.	DATE	REVISION

WitzelDyce
ENGINEERING INC.
826 King Street North, Unit 20
Waterloo, Ontario, N2J 4G8
www.witzeldyce.com



PROJECT
EJ'S BADEN B.F. ENTRANCE
39 SNYDER'S ROAD W BADEN

DRAWING
PLANS, SECTIONS & GENERAL NOTES

DESIGNER HHL	PROJECT NO. 12080-104
DRAWN CJF	DRAWING NO.
DATE MAY 2021	S1.0
SCALE AS NOTED	



CORPORATE SERVICES

Staff Report

REPORT NO: COR 2021-023

TO: Council

SUBMITTED BY: Ashton Romany, CPA Manager of Finance / Deputy Treasurer
Sustainability Working Group

PREPARED BY: Ashton Romany, CPA Manager of Finance / Deputy Treasurer

REVIEWED BY: Sandy Jackson, Interim CAO

DATE: June 14, 2021

SUBJECT: Sustainability Working Group – Annual Report

RECOMMENDATION:

THAT the annual report COR 2021-023, from the Sustainability Working Group be received for information purposes.

SUMMARY:

This report outlines activities conducted by the Sustainability Working Group since the last report to Council (August 24, 2020).

BACKGROUND:

The Township is a member with Sustainable Waterloo Region (SWR). SWR is a dedicated team, motivated by a shared passion for progress towards sustainability across Waterloo Region. Their shared vision is an environmentally and economically resilient community that prioritizes the well-being of current and future generations. The SWR mission is to foster collaborations that enable local organizations to convert their sustainability interest into action.

In 2019, the Sustainability Working Group (SWG) was formed broadening the representation to include two (2) community members with expertise in this field, a member of Council and the executive director from Sustainable Waterloo Region (SWR).

This information is available in accessible formats upon request

The SWG acts in a supportive/consultative manner; supporting and bringing recommendations regarding initiatives that fit municipal goals in relation to sustainability.

The SWG reports on an annual basis to Council on sustainability activities and successes. Best efforts are made for this report to coincide with a Council meeting involving members of SWR and/or ClimateActionWR.

REPORT:

Sustainability Working Group (SWG) Composition

The committee currently includes the following members:

- Ashton Romany, Manager of Finance / Deputy Treasurer (Chair);
- Leslie Nanibush, Asset Management Coordinator;
- Bruce Baechler, HVAC Technician;
- Harold O’Krafka, Director of Development Services;
- Jeff Molenhuis, Director of Public Works and Engineering;
- Jennifer Pfenning, Ward 4 Councillor;
- John Jordan, Expert Community Member;
- Dean Peachey, Expert Community Member; and
- Tova Davidson, Executive Director, Sustainable Waterloo Region;

Projects and Initiatives

The SWG provided input and feedback on sustainability-focused projects proposed for inclusion in municipal budgets for Council consideration.

These projects will generate cost savings and align well with the Township’s Strategic Plan goal of Environmental Protection. Some examples include the following:

- Continued tracking of Green House Gas emissions (GHG) with a reduction target of 25%
- Participation in ClimateActionWR’s 80 x 50 Project
- Green Bin Implementation/Usage at the Administration Complex

In addition, the SWG continues to work on several other initiatives including, but not limited to the following:

- Carbon budgeting
- Development of education materials for facility rentals (e.g. single use plastic education)
- Installation of EV Charging Stations
- Other Energy Efficiency Measures (e.g. replacement of aged HVAC, Alternate Energy Sources)
- Community Engagement

Carbon Accounting Tool (CAT)

The SWG alongside Corporate Services staff continue to utilize the Carbon Accounting Tool (CAT), provided via membership with SWR. This tool tracks utility statistics that are populated by staff to allow for modelling and tracking of reductions year-over-year. As such, this information allows staff to monitor progress towards the Township's target outlined below.

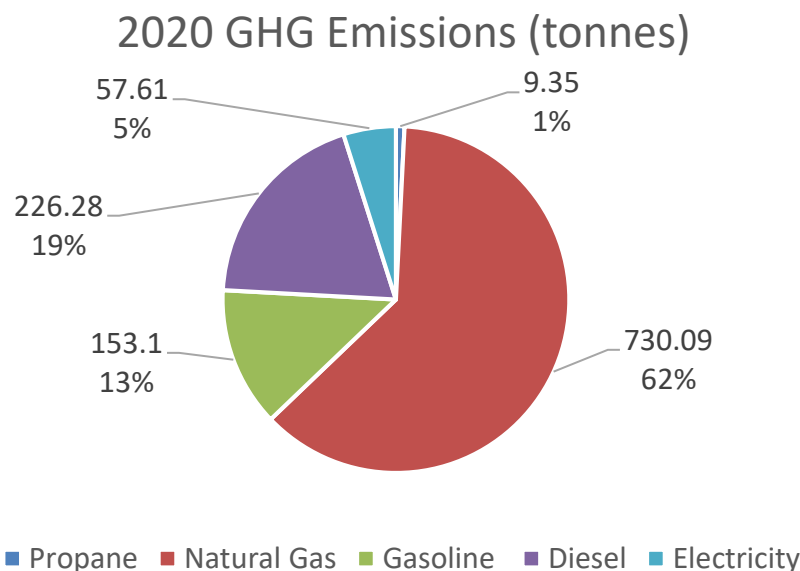
Green House Gas (GHG) Reduction Target

In late 2017, Council approved a 25% absolute reduction target by the year 2027 with a 2012 base year. This was a significant step for the municipality, showing leadership in the sustainability movement amongst peers and the business community.

At the time of approval, the Township had already achieved a 19.4% reduction from 2012 to 2016 (target of 903 tonnes). However, at the time, due to data gaps, fuel and water usage were not initially included within the model. With the inclusion of fuel and water in 2019, the target was updated to 1261 tonnes.

The Township's target is absolute, meaning that the reduction target is not re-adjusted with any square footage growth the corporation may observe. This is unique across target setting within the region.

Annually, the committee reviews the data. This year, fuel consumption and natural gas remain the primary drivers. Fuel and natural gas consumption accounted for approximately 95% of the Township's GHG emissions in 2020. Focus in these areas continues to be a priority for the SWG. Below is a breakdown of our tracked emissions:

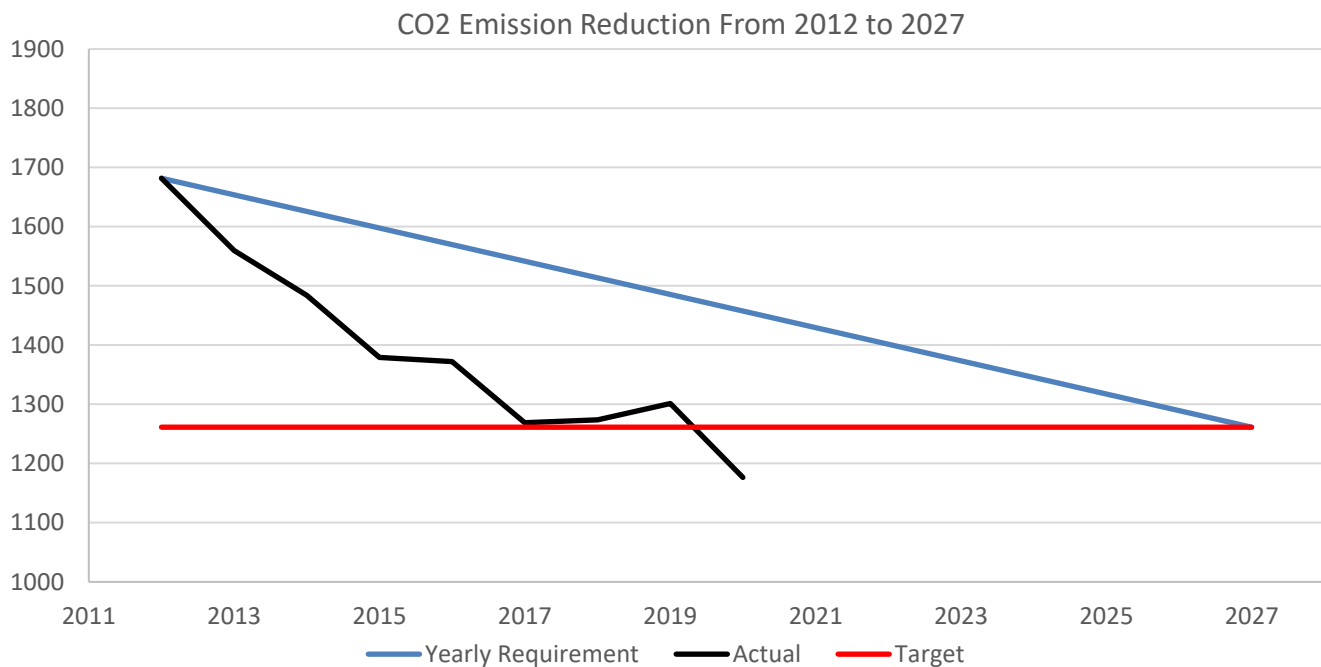


Including the 2020 emissions into our progress towards the corporate target, the Township achieved a 30.0% reduction in emissions by the end of 2020 (total emissions of 1,174 tonnes).

As such, the Township achieved our 25.0% target, and have now surpassed it by 5.0%. While this is a significant achievement, COVID-19 has certainly influenced the amount of fuel and natural gas consumption throughout 2020. Operating factors such as facility closures and reduced fleet usage at certain points in the year attributed to reduced overall emissions.

The Sustainability Working Group will be further discussing potential options regarding the corporate target during the remainder of 2021.

Below includes a chart outlining the Township's progress:



ALIGNMENT WITH THE TOWNSHIP OF WILMOT STRATEGIC PLAN:

This report is aligned with the Strategic Plan goal of Environmental Protection.

FINANCIAL CONSIDERATIONS:

The annual membership fees to Sustainable Waterloo Region, approximately \$3,950 are included within the Council operating budget. Any sustainable projects listed above are funded through departmental capital and operating budgets.

ATTACHMENTS: None



PARKS, FACILITIES AND RECREATION SERVICES

Staff Report

REPORT NO: PFRS 2021-010

TO: Council

PREPARED BY: Manuela Jones, Manager of Customer Service and Community Development

REVIEWED BY: Sandy Jackson, Interim CAO; Director Parks, Facilities & Recreation Services

DATE: June 16, 2021

SUBJECT: **Artificial Turf Field License Agreement**

RECOMMENDATION:

THAT the ten (10) year agreement between the Township of Wilmot and the Waterloo Region District School Board (WRDSB) for operation of the artificial turf field at Waterloo Oxford District Secondary School (WODSS) be endorsed.

SUMMARY:

The Township and the WRDSB have been working collaboratively to create an Artificial Turf License Agreement which outlines the terms to which both parties have agreed would govern the financial arrangements, maintenance and use by both the WRDSB and the various rental groups of the Township for the field and track. The document has been reviewed by Legal Counsel for both the Township and WRDSB.

BACKGROUND:

The Township and the WRDSB began discussions regarding the construction of the Artificial Turf Field on WODSS property as a joint venture almost a decade ago. Council has previously approved this project as a part of the 2017 - 2021 Capital Budgets.

The field is entering the final stages of construction with the first use being anticipated in June as provincial covid restrictions permit.

REPORT:

There are multiple anticipated uses and benefits to the community for the field by each of the parties. Artificial turf fields have an extended season in comparison to natural fields so play can begin earlier in the season and extend later. This will also benefit the WODSS students as it increases the number of week's they can utilize the outdoor amenity during the school year.

For Township rentals, it is anticipated that programming can be increased for local soccer, rugby, and lacrosse groups. There has also been interest expressed from other sporting groups within Waterloo Region. Programming options are further expanded as this is the only lit field in the township.

The Agreement represents discussions that have taken place between Township staff and representatives of WRDSB over the past several months and addresses:

-
- Financial Arrangements
 - Maintenance
 - Liability Insurance
 - Designated times of use and scheduling for each party
 - Fees and Charges
 - Future Replacement of Turf
 - Renewal or Termination of the Agreement
-

The detailed Agreement outlines Township responsibilities for daily maintenance of the field including inspecting, grooming and repairs as required. Grooming equipment will be stored on site at WODSS and operated only for this field to ensure no cross contamination on the artificial turf (i.e. tracked mud etc.).

All use of the field will be by rental permit and booked through the Township booking staff for use Monday through Friday 6pm – 11pm and all-day Saturday and Sunday throughout the season. When the field is not in use it will be secured to prevent public access and deter vandalism. In the fall of 2021 or for the 2022 season, depending on COVID-19 restrictions, consideration for public access times to use the track and field at no cost will be explored. This is not anticipated to commence in summer of 2021.

ALIGNMENT WITH THE TOWNSHIP OF WILMOT STRATEGIC PLAN:

FINANCIAL CONSIDERATIONS:

The Township contributed \$925,000 to the construction of the artificial turf field. The ongoing operating costs have been built into the 2021 operating budget. Operating costs will be shared equally between the Township and the WRDSB as outlined in the License Agreement and are currently established at \$20,000 per year. This fee will be reviewed annually to ensure it is an accurate reflection of the actual operating costs. The License

Agreement also requires each party to create a reserve fund to save 50% of the replacement cost of the turf, which is expected to have a ten-year useful life.

ATTACHMENTS:

Ten (10) Year License

LICENSE AND JOINT USE AGREEMENT

DATED this 8th day of June, 2021

BETWEEN:

THE WATERLOO REGION DISTRICT SCHOOL BOARD

– and –

THE CORPORATION OF THE TOWNSHIP OF WILMOT

WHEREAS:

- A. The Waterloo Region District School Board (the “**Board**”) is the registered owner of the property municipally described as 1206 Snyder’s Road West, Baden, Ontario, which is the site of Waterloo-Oxford District Secondary School (the “**School Site**”).
- B. The Township of Wilmot (the “**Township**”) has agreed to license and use part of the School Site, which includes the artificial turf sports field, the 6-lane asphalt track and the storage units, more particularly described in **Schedule “A”** (the “**Sports Field**”), to be used by both the Board and the Township jointly, on the terms and conditions hereinafter set out.
- C. The Township and the Board (the “**Parties**”) are entitled and authorized to enter into agreements with each other and to do all things necessary to aid and cooperate in providing adequate facilities for both school and community-based public athletic and recreational programs.
- D. It is in the best interests of both Parties to provide the best sports facilities possible with the least expenditure of public funds.
- E. This Agreement supersedes any prior agreements, understandings or assignments entered into or suggested by the Parties regarding the Sports Field.

NOW THEREFORE THIS AGREEMENT WITNESSETH that in consideration of the mutual benefits, covenants and agreements herein contained and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties do hereby covenant and agree as follows:

ARTICLE 1 – RECITALS

1.1 Recitals: The Recitals set out above are true and accurate in substance and in fact, and are hereby incorporated into and form an integral part of this Agreement.

ARTICLE 2 – DEFINITIONS AND INTERPRETATION

2.1 Definitions: Capitalized terms not otherwise defined in this Agreement shall have the following meanings:

- (a) **"Agreement"** means this License and Joint Use Agreement between the Board and the Township, all exhibits or appendices or schedules attached, any valid amendments or restatements, and any supplementary agreements and succeeding amendments thereto.
- (b) **"Board"** means the Waterloo Region District School Board and includes all of its employees, officers, directors, trustees and agents, as applicable.
- (c) **"Business Day"** means a day other than (i) a Saturday, Sunday or any other day which is a statutory holiday under the laws of Canada or the Province of Ontario; and (ii) any day between December 27 and 31, inclusive.
- (d) **"Parking Area"** means the entire parking lot for the School Site, more particularly outlined in **Schedule "A"**.
- (e) **"Party"** means either the Board or the Township, and "Parties" means both of them.
- (f) **"Season"** means the months in the calendar year in which the Sports Field is in use. This typically means April 1 through October 31, inclusive, of each year.
- (g) **"School Day"** means the days in the calendar year in which the school is in operation. This typically means Monday through Friday, inclusive, September 1 through to June 30 of each year, inclusive.
- (h) **"School Hours"** means the hours in which the school is operating. From 8:00 a.m. until 6:00 p.m.
- (i) **"Township"** means The Corporation of the Township of Wilmot and includes all of its employees, officers, directors, councillors and agents, as applicable.

2.2 Interpretation: In this Agreement, except where expressly otherwise provided:

- (a) the singular includes the plural and vice versa and any gender includes any other gender;
- (b) except where the content requires otherwise, references to Sections, Articles, clauses, paragraphs, subparagraphs, Schedules and other divisions of this Agreement are references to such Sections, Articles, clauses, paragraphs or subparagraphs of, Schedules to, or divisions of this Agreement, and the terms "Article", "Section", "paragraph", or "subparagraph" are used interchangeably and are synonymous;
- (c) the Schedules to this Agreement are an integral part of the Agreement and a reference to the Agreement includes a reference to the Schedules. All references in the Agreement to a Schedule shall be to a Schedule of the Agreement;
- (d) all usage of the words "hereof", "herein", "hereto", "hereinafter", and other terms of like import are not limited in applicability to the specific provision within which such references are set forth, but instead refer to the Agreement taken as a whole;
- (e) all usage of the word "including" or the phrases "such as", "inter alia", and "e.g." shall mean "including, without limitation";

- (f) the division of this Agreement into separate articles, sections, paragraphs, exhibits and Schedules, the provision of a table of contents and the insertion of headings is for convenience of reference only and shall not affect the construction or interpretation of this Agreement;
- (g) words or abbreviations not otherwise defined that have well known or trade meanings are used in accordance with their recognized meanings; and,
- (h) all references to currency means lawful money of Canada.

2.3 Schedules: The Schedules listed below which are attached to this Agreement are incorporated herein by reference and shall be deemed to be an integral part of this Agreement:

- (a) Schedule "A" – Diagram of School Site
- (b) Schedule "B" – Sports Field Rental Rates

ARTICLE 3 – GRANT AND LICENSE

- 3.1** The Board hereby grants to the Township, and its authorized contractors, the exclusive right to issue permits and charge fees for the right, privilege and license to enter upon, to use, and occupy the Sports Field, as hereinafter provided, for the purpose of sporting activities for both school and community-related sports programs and events (the "**License**").
- 3.2** The Sports Field is located on part of the School Site where the Board operates and intends to continue to operate a secondary school and activities that relate to that use. Notwithstanding anything elsewhere set out herein, the Board shall continue to be the exclusive owner of the School Site.
- 3.3** The rights granted to the Township hereunder are a License only, and are not under any circumstances intended to constitute a franchise, partnership, joint venture, lease, sublease, license coupled with an interest or any arrangement other than the grant of a license, and nothing contained in this Agreement shall give the Township any estate or interest whatsoever in the Sports Field, whether as tenant or otherwise. The Township may not register this Agreement or any notice of this Agreement on title to the School Site, or permit anyone acting on the Township's behalf to register it on title to the School Site.

ARTICLE 4 – TERM

- 4.1** The term of this Agreement shall commence on June 15, 2021 (the "**Commencement Date**"), last for a period of ten (10) years and terminate on June 14, 2031 (the "**Termination Date**") (the "**Term**"), with the option to renew.
- 4.2** At the end of the Term, this Agreement shall automatically be renewed and continue in full force and effect from year-to-year thereafter unless either of the Parties gives written notice to the other Party of its intention to terminate this Agreement at the end of any subsequent calendar year after the end of the Term. Notice of such termination must be given no later than six (6) months prior to the end of the year in which termination of this Agreement is to occur.

ARTICLE 5 – LOCATION OF THE SPORTS FIELD

- 5.1** The location of the Sports Field is outlined in **Schedule “A”** annexed hereto.

ARTICLE 6– MAINTENANCE

- 6.1** The Township shall be responsible for maintaining the Sports Field in accordance with manufacturer’s maintenance standards using qualified personnel and or a competent contractor or contractors. The Board will be informed regarding any procurement process as well as the name of the successful bidder. The Township agrees to assume and accept all costs and liabilities relating to, or resulting from, the procurement process.
- 6.2** Notwithstanding any other provision of this Agreement, the Board shall be responsible for all grass-cutting in relation to the Sports Field and any costs associated therewith.
- 6.3** The Township shall be solely responsible for the costs and maintenance associated with its owned assets which may include portable washrooms and storage units. The Board and its students shall not have access to, or use of, the Township’s owned assets.
- 6.4** The Township’s regular maintenance obligations shall including daily inspections on weekdays, light bulb/fixture replacement, turf inspection, as well as artificial turf and track vacuuming, disinfecting, balancing and distributing of synthetic aggregates, removal of debris, and necessary repairs.
- 6.5** The Township shall be responsible for the collection and disposal of accumulated refuse and garbage from the Sports Field from evening and weekend use. The Board shall be responsible for the collection and disposal of accumulated refuse and garbage from the Sports Field arising from use by the Board during school hours (8:00 am to 6:00 pm) or for special events hosted by the Board outside normal hours.
- 6.6** Should a scoreboard(s) be installed at the Sports Field in the future, all installation, maintenance, and repair costs shall be the sole responsibility of the Board.
- 6.7** The cost of maintaining the Sports Field shall be borne equally by the Township and the Board. The method of cost sharing has been more particularly described below:
- (a) Prior to July 15th of each calendar year during the Term, the Board shall provide to the Township twenty thousand dollars (\$20,000) towards the annual maintenance costs of the Sports Field, which is estimated to be at least \$40,000 annually. All costs over and above the \$20,000 initially provided by the Board to the Township shall be shared equally by the Parties.
 - (b) The Township shall invoice the Board for \$20,000 prior to July 15th of each calendar year during the Term.
 - (c) Prior to the 2023 Season, both Parties shall review the annual maintenance costs for the Sports Field and adjust the \$20,000 annual installment accordingly, while considering inflationary impacts over the remainder of the term of the Agreement.

- 6.8** The cost to repair any damage to the Sports Field as the result of improper or negligent use of the Sports Field shall be borne by the Party whose use was responsible for causing such damage. However, the Township shall repair any damage to the Sports Field immediately to avoid injury or closure of the Sports Field and the Township may seek repayment, as necessary or applicable.
- 6.9** The Parties may, from time to time, during the Term of this Agreement, or any extension thereof, agree to make enhancements, improve amenities or provide additional facilities to those presently available on the Sports Field. In the event that any such additional facilities, enhancements or amenities are constructed or provided, the terms of this Agreement shall be applicable in all respects as if those facilities, enhancements and amenities had existed on the Sports Field at the time of the Commencement Date.
- 6.10** Prior to March 31st of each year during the Term, the Township shall provide to the Board a report detailing the expenses incurred by the Township in the previous calendar year for maintaining the Sports Field.

ARTICLE 7 – FEES, CHARGES AND EXPENSES

- 7.1** Commencing on the Commencement Date and throughout the Term, the Township shall have the right to use the Sports Field at no charge from the Board. However, use of the Sports Field by the Board or any third party authorized by the Township will be subject to the payment of fees to the Township, as set out in **Schedule “B”** of this Agreement.
- 7.2** Notwithstanding any other provision of this Agreement, the Board shall be responsible for all water supply costs related to the operation of the Sports Field.
- 7.3** The Township shall, for the duration of this Agreement, be responsible for all hydrocosts related to the operation of the Sports Field, which is recorded by hydro meter no. R4018 600 066.
- 7.4** The Township shall, for the duration of this Agreement, be responsible for scheduling, booking and collecting all fees and charges associated with renting out the Sports Field.
- 7.5** By June 15, 2031 each Party shall contribute 50% of the estimated replacement cost of the Sports Field to their respective reserve funds in order to cover the cost of replacing or refurbishing the Sports Field approximately ten (10) years from the Commencement Date. The estimated replacement cost shall be provided by the installation contractor on or before the Commencement Date of this Agreement. If the Term of the Agreement is terminated by either of the Parties before June 15, 2031, the estimated replacement cost will be pro-rated for the period of time that the Township used the Sports Field.
- 7.6** At the time of replacement or refurbishment of the Sports Field, or any part thereof, all monies in each reserve fund designated for the replacement or refurbishment of the Sports Field shall be used to cover the cost of such replacement or refurbishment. Any shortfall shall be shared equally between the Parties.
- 7.7** Should this Agreement be terminated, during the Term or during any extension thereof by the Board, each Party shall retain 100 percent of the monies held in their respective reserve funds designated for the replacement or refurbishment of the Sports Field at the date of such termination.

ARTICLE 8 – FIXTURES AND SIGNS

- 8.1** Neither Party shall without first obtaining the written consent of the other Party, use or install any fixtures, equipment, cabling, wiring or signs on the Sports Field except those furnished or approved by the Board for the Township's use in relation to the Sports Field. Any fixtures, equipment, cabling, wiring or signs which may be furnished by the Board shall remain the property of the Board and shall be kept in good repair and operating order by the Township.
- 8.2** Both Parties agree that they shall not display their name (or any other name) in or about the Sports Field, except on such sign(s) and in such location(s) as agreed upon by both Parties prior to any such display.
- 8.3** The Board will permit the Township to be identified on the directory erected by the Board, if any, and signs located at the entrances to the Sports Field.

ARTICLE 9 – SERVICES

- 9.1** The Board agrees to provide the following:
- (a) Access to the Sports Field, at all times, to permit the Township to maintain the Sports Field, provided it does not interfere with the operation of the school. To the extent possible, such maintenance and repair activities will be scheduled between 6:00 a.m. and 8:00 a.m. Monday through Friday; should the Township require access during school hours for regular maintenance, the Township will coordinate a maintenance schedule with the school;
 - (i) In the case of unforeseen or major maintenance, the Township shall provide prior notice, when possible, of the date(s) and time(s) and coordinate these activities with the Board and the school;
 - (b) Keys or access code for fencing and lighting controls;
 - (c) The non-exclusive shared use of the Parking Area at the School Site; and
 - (d) A minimum of 14 days advance notice in writing to the Township of any planned major events which could impact the non-exclusive shared use of the Parking Area at the School Site.
- 9.2** The Board shall use its best efforts to make adequate free parking available for groups using the Sports Field in the Parking Area.
- 9.3** The Board shall have the sole responsibility to maintain and perform any required capital improvements to the Parking Area. All such maintenance and capital improvements shall be at the Board's sole cost.

ARTICLE 10 – PROPERTY LOSS OR DAMAGE

- 10.1** The Township and the Board shall, at all times, except as otherwise provided in this Agreement, have joint access to, and control of, the equipment, supplies and other property located on the Sports Field.

- 10.2** The Township acknowledges and agrees that its equipment and other property on the Sports Field may be subject to damage or loss by reason of normal wear and tear, natural or other hazards, including, but not limited to, theft, fire, water leakage, flooding or power failure, accidents and vandalism. The Township further acknowledges and agrees that it shall be solely responsible for its own equipment, supplies and other property on the Sports Field and shall assume the entire risk of damage to or loss of the same resulting from any hazard or from any cause not attributable to the gross negligence of the Board or its employees and agents.
- 10.3** The Parties will make all reasonable efforts to keep the Sports Field free of foulings or contaminants, the latter of which includes soils and aggregate.
- 10.4** Each Party agrees to report damage or contamination to the other Party on the same day it is discovered in order to ensure health and safety issues are addressed immediately and before the next user group enters the Sports Field. Each Party shall provide the name of one point of contact person for maintenance issues and a back-up contact person in case of absence or emergency.
- 10.5** Where a fouling or contamination occurs that includes bodily fluids that could cause the spread of infectious disease, the Township and the Board shall follow an agreed upon cleaning and sanitizing process prior to the next scheduled use of the Sports Field. Cleaning and sanitizing shall be executed based on Region of Waterloo Public Health cleaning protocols.
- 10.6** Each Party shall be responsible for disinfecting and making clean all surfaces of the Sports Field that are affected by vomit and blood, urine, feces, etc. to ensure that contamination is not transmittable. Should cancellations for the use of the Sports Field be required to ensure the health and safety of the users, the Party using the field shall immediately inform the other Party to allow time to inform scheduled users of the Sports Field. Third party cleaning services may be retained to handle cleaning involving biohazards. Should a third-party cleaning service be required, the cost thereof shall be borne by the Party using the Sports Field or Track at the time of the incident that caused the contamination.
- 10.7** It is fully understood and agreed that both Parties will follow all required procedures and protocols stipulated by both of the Parties and that appropriate training will be provided to their respective staff or contractors for the cleaning of organic and other substances that are deposited on the Sports Field. The Parties agree that only trained personnel will deal with those occurrences swiftly and completely.
- 10.8** Neither Party shall be responsible for the loss of, or damage to, equipment or personal property of any third-party that is left on the Sports Field once the third-party's respective time of use is ended.

ARTICLE 11 – INSURANCE

- 11.1** Each Party shall obtain and maintain, at its own expense, at all times during the Term, or any extension thereof comprehensive general liability insurance coverage in an amount of not less than Five Million Dollars (\$5,000,000) in relation to the Sports Field. Such coverage shall name the other Party as additional insured, shall be endorsed to include the

contractual obligation of each Party as contained in this Agreement, and shall be non-cancellable except after thirty (30) days' written notice to the other Party.

- 11.2** Each Party to this Agreement shall furnish certificates of such insurance to the other Party prior to the execution of this Agreement. A renewal certificate, as required, shall be provided at least ten (10) days prior to the expiration of the policy. Such certificates shall state that the insurer will provide to both Parties thirty (30) days' prior written notice in the event that such insurance coverage is terminated or changed in any material manner.
- 11.3** The Township shall obtain and maintain, at its expense, and at all times during the Term, property insurance on all of its equipment, supplies and other property on the Sports Field for full replacement value thereof.
- 11.4** In addition to each Party providing the requisite insurance as required by this Agreement, the Township shall ensure that any third-party user groups which secure rental space at the Sports Field will obtain third-party general liability insurance, naming each of the Board and the Township as additional named insureds in the amount of at least Two Million Dollars (\$2,000,000.00). The Township shall establish a program which facilitates the obtaining of such insurance for such third-party user groups.

ARTICLE 12- ASSIGNMENT AND SUBLEASING

- 12.1** This Agreement shall not be assigned or transferred by the Township in any manner whatsoever, whether voluntarily, involuntarily, or by operation of law, and the Township shall not grant any sublicense or other right of use, occupation or possession of any nature, without the prior written consent of the Board, which consent may, despite any legislation or rule of law to the contrary, be arbitrarily or unreasonably withheld.
- 12.2** No such assignment transfer or right of use or occupation shall be effective and no assignee, transferee or other Party shall acquire any rights whatsoever under this Agreement or in the License granted hereunder or in the Sports Field and associated facilities, unless the prior written consent referred to in subparagraph 12.1 is granted.
- 12.3** The Township agrees that any consent as aforesaid shall not release it from any or all of the covenants or obligations contained in this Agreement and further agrees that any such consent shall not constitute a waiver or release of the necessity of obtaining the Board's consent to any further assignment or sublicensing.

ARTICLE 13 – COMPLIANCE WITH LAWS

- 13.1** The Township agrees that it shall strictly abide by and conform with all applicable present and future laws, ordinances, rules, regulations and directions of any federal, provincial or local government or agency thereof having direct or indirect jurisdiction over the Sports Field and the services offered herein by the Township.
- 13.2** Without limiting the obligations in subparagraph 13.1, the Township shall comply with all licensing and registration requirements, keep all records and pay all taxes and fees including, without limitation, sales, use, gross receipts, excise and any other taxes and fees prescribed by any applicable law and owing and collected by the Township in relation to any activity or for the conduct of any business at the Sports Field.

- 13.3** The Township shall be responsible to provide security services and other personnel or instruction for users appropriate to the events or occasions scheduled by it for the Sports Field.

ARTICLE 14 – TERMINATION

- 14.1** Upon the occurrence of any damage to, or destruction of, the Sports Field by fire, flood or other casualty, the Board shall have the exclusive right to determine the most acceptable method for the continued operation or termination of this Agreement.
- 14.2** The Parties agree that the Board shall have the right to terminate this Agreement in its entirety and revoke the License after giving fourteen (14) days' written notice to the Township if the Township is in default of performing or observing any of the terms, covenants, warranties or conditions of this Agreement (except as otherwise expressly listed in this subparagraph 15.3) and the Township's subsequent failure to cure any such default within seven (7) days after the receipt of notice thereof.
- 14.3** The Township may immediately terminate this Agreement or withhold any services pursuant to this Agreement at any time, should the Board be in default of any payment obligation hereunder or in default of any other provision of this Agreement.
- 15.4** Either Party may terminate this Agreement, for any reason and at any time, on 180 days prior written notice to the other Party.

ARTICLE 15 – REMOVAL AT THE END OF TERM

- 15.1** At least ten (10) days prior to the end of the Term or any renewal thereof, the Township shall remove all of its equipment, supplies and other property from the Sports Field, and shall leave the Sports Field in a good condition.
- 15.2** In the event of any default by the Township in the performance of its obligation to leave the Sports Field in good order and condition, the Township hereby agrees that the Board may repair or remedy any damage or deficiency at the cost and expense of the Township, and the Township agrees to pay to the Board, upon demand, the cost and expenses so incurred by the Board. In the event of any default by the Township in removing all of its equipment, supplies and other property, the Board may cause the same to be removed to a place of storage selected by the Board, and the Township shall, upon demand, reimburse the Board for any and all costs incurred by the Board by reason of such removal and storage. The Township agrees that it will remain fully responsible for all such equipment, supplies and other property during such removal and storage, and hereby releases the Board from any and all liability for any damages or losses to such equipment, supplies and other property howsoever and by whomever caused.

ARTICLE 16 – USE AND SCHEDULING

- 16.1** The Township acknowledges that school properties are intended primarily to be used for school purposes during School Days and therefore agrees that in planning activities and programs and in scheduling the use of the Sports Field by the Township, that the stated primary purpose remain paramount.

- 16.2** The Township acknowledges that its use of the Sports Field shall be in accordance with the codes of conduct, policies, protocols and procedures of the Board with respect to the ownership, operation and use of its school sites and related facilities. In addition, all persons using the Sports Field shall be required to abide by the policies, protocols, codes of conduct, and rules and regulations established and posted or otherwise communicated by the Board. The Board shall have the right to change any such policies, protocols, codes, rules and regulations from time to time and such changes shall be effective ten (10) days after written notice thereof is provided to the Township.
- 16.3** Subject to the provisions of subparagraph 16.1 hereof, the Parties agree to engage in a cooperative scheduling of the use, repair and maintenance of the Sports Field so that the availability of the Sports Field is maximized.
- 16.4** Unless otherwise agreed, the Board shall have the exclusive use of the Sports Field and associated facilities, from 8:00 a.m. until 6:00 p.m. Monday through Friday (to be coordinated by both Parties), inclusive, September 1 through to June 30 of each year, inclusive. Subject to the provisions of sub-paragraphs 16.1 and 16.2 hereof, the Township shall be entitled to use the Sports Field outside of the stated times of exclusive use by the Board.
- 16.5** By March 31st each year the Board will submit any permit requests for the Season for use after 6:00 pm and weekends to the Township. Those requests will be considered by the Township before any other permit requests are considered. The Board will be charged the prevailing discounted rate as per Schedule "B" of the Agreement.
- 16.6** The Board and the Township shall each designate one (1) person who shall be responsible to coordinate the scheduling, booking and use of the Sports Field and to address any issues that arise from their use by either Party.
- 16.7** The Parties agree that they are each responsible for ensuring that its users abide by all applicable laws, policies, protocols, rules and regulations relating to use of the Sports Field.
- 16.8** Either Party has the right, acting reasonably to deny access to the Sports Field for any use to any person, group or association that has demonstrated disregard for the laws, rules or policies established for the Sports Field. Should a person, group or association be denied use of those facilities, the Party shall promptly inform the other Party of such denial and the reasons therefor.
- 16.9** The Board shall have the right, upon notice to the Township, to temporarily suspend (for no more than 24 hours) the use of the Sports Field, or any part thereof, in the case of an emergency at the school or on the School Site.
- 16.10** In the case where damage occurs to the Sports Field, the Party using the Sports Field must report the damage immediately to the other Party and determine a course of action to repair said damage in a timely manner so as not to affect future bookings where possible.

ARTICLE 17 – NOTICES

- 17.1** Any notices required or permitted to be provided hereunder shall be in writing and shall be deemed to have been received five (5) business days after the post-marked date thereof if sent by registered mail, the next business day following transmission if sent by fax or by

electronic mail, or at the time of delivery if hand-delivered, and shall be addressed as follows:

To the Township: Township of Wilmot
60 Snyder's Road West Baden, Ontario
N3A 1A1
Attention: Director Parks, Facilities & Recreation Services

To the Board: Waterloo Region District School Board
51 Ardel Avenue
Kitchener, Ontario N2C 2R5
Attention: Controller of Facility Services

17.2 Either the Township or the Board may change its address by notice in writing to the other.

ARTICLE 18 – STRICT PERFORMANCE

18.1 The failure of the Board to seek redress for any violation of or to insist upon the strict performance of any of the terms, covenants or conditions of this Agreement or any of the rules and regulations from time to time issued by the Board, shall not prevent a subsequent act, which would have originally constituted a violation, from having all of the force and effect of an original violation. No waiver of any provision of this Agreement shall constitute a waiver of any other provision or breach of this Agreement unless expressly provided otherwise.

18.2 The Board's remedies under this Agreement shall be cumulative, and the exercise of any remedy shall not preclude the exercise of any other remedy or remedies.

ARTICLE 19 – FORCE MAJEURE

19.1 Neither the Township nor the Board shall be responsible for any loss, damage, delay or non-performance caused by accidents, labour difficulties, acts of God, governmental action or by any other cause which is unavoidable or beyond its reasonable control (an "**Event of Force Majeure**"). The Party whose performance of this Agreement is or may reasonably be expected to be affected by an Event of *Force Majeure* shall promptly notify the other Party of the existence of such circumstances and shall use commercially reasonable efforts to resume and complete performance. Whenever either Party is reasonably certain that such an Event of *Force Majeure* is likely to occur, it shall notify and consult with the other Party as soon as practicable. All time periods for the performance of obligations hereunder shall be extended by a period corresponding to the time period of any delay caused by the occurrence of an Event of *Force Majeure*. This provision shall not excuse the Board from the payment of any monies or payments required hereunder.

ARTICLE 20 - MISCELLANEOUS

- 20.1** Entire Agreement: This Agreement comprises the entire understanding between the Parties relating to the subject matter hereof. No amendment to this Agreement shall be valid unless in writing and signed by each of the Parties hereto.
- 20.2** Authority: The Board represents and warrants that it has the full right and authority to grant to the Township the License and rights contained in this Agreement. The Township represents and warrants to the Board that it has full right and authority to enter into this Agreement.
- 20.3** Severability: Every provision of this Agreement is intended to be severable. If all or any part of any term or provision hereof is illegal, invalid or unenforceable for any reason, such illegality, invalidity or unenforceability shall not affect the validity or enforceability of the remainder of this Agreement.
- 20.4** No Waiver: No omission or delay by either Party in exercising any right, power or privilege hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of such right, power or privilege preclude any other or further exercise thereof or of any other right, power or privilege. The rights and remedies herein provided are in addition to and not exclusive of any rights or remedies provided by law.
- 20.5** License Only: The Board and the Township acknowledge and agree that the relationship between them is solely that of licensor and licensee as independent contractors, and nothing herein shall be construed to constitute the Parties as partners, joint venturers, co-owners, or otherwise as participants in a joint or common undertaking. Neither Party, nor its employees, agents or representatives shall have any right, power or authority to act or create any obligation, express or implied, on behalf of the other.
- 20.6** Enurement: This Agreement shall enure to the benefit of and be binding upon each of the Parties hereto and their respective successors and permitted assigns.
- 20.7** Further Assurances: The Parties agree that each of them shall, upon the reasonable request of the other, do or cause to be done all further lawful acts, deeds and assurances that may be necessary or desirable for the better performance of the terms and conditions of the Agreement.
- 20.8** Time: Time shall be of the essence of this Agreement.
- 20.9** Dispute Resolution: Any dispute between the Parties arising out of or relevant to this Agreement which cannot be resolved by the Parties shall be referred to mediation. A single mediator shall be selected from the list of approved mediators of the Superior Court of Justice, Regional Municipality of Waterloo, and mediation will take place within thirty (30) days following selection of the mediator. Any dispute between the Parties which cannot be resolved by such mediation shall be settled and determined by binding arbitration pursuant to the *Arbitration Act* of Ontario (the “**Act**”), in which case, the following provisions shall apply. Either Party may at any time give written notice (the “**Arbitration Notice**”) to the other Party of its desire to submit a dispute to arbitration stating with reasonable particularity the subject matter of such dispute. Within ten (10) business days after receipt of the Arbitration Notice, the Parties shall appoint a single arbitrator with appropriate experience to determine the dispute identified in the Arbitration Notice. If the Parties fail to appoint an arbitrator, either Party may apply to a Judge of the Superior Court of Justice to

appoint an arbitrator. The costs of arbitration shall be paid by the unsuccessful Party or, as determined by the arbitrator. The award of the arbitrator shall be final and binding upon the Parties. Judgment upon the award rendered by the arbitrator may be entered in any court having jurisdiction and enforced in the normal course.

20.10 Records: The Township shall keep and maintain proper financial records and books of account relating to the Sports Field including, without limitation, the records and back-up documentation, as applicable.

20.11 Counterparts: This Agreement and any amendment may be executed and delivered in any number of counterparts, each of which when executed and delivered is an original but all of which when taken together constitute one and the same instrument. Counterparts may be executed either in original or faxed form and the Parties agree to adopt any signatures received by a receiving fax machine as original signatures of the Parties.

[Signature Page Follows]

IN WITNESS WHEREOF the Parties have signed this Agreement by their respective proper signing officers as of the date first written above.

Waterloo Region District School Board

Per: 

Name:

Matthew Gerard

Title: Coordinating Superintendent, Business Services and Treasurer of the Board

I have the authority to bind the Board.

The Corporation of the Township of Wilmot

Per: _____

Name: Les Armstrong Title: Mayor

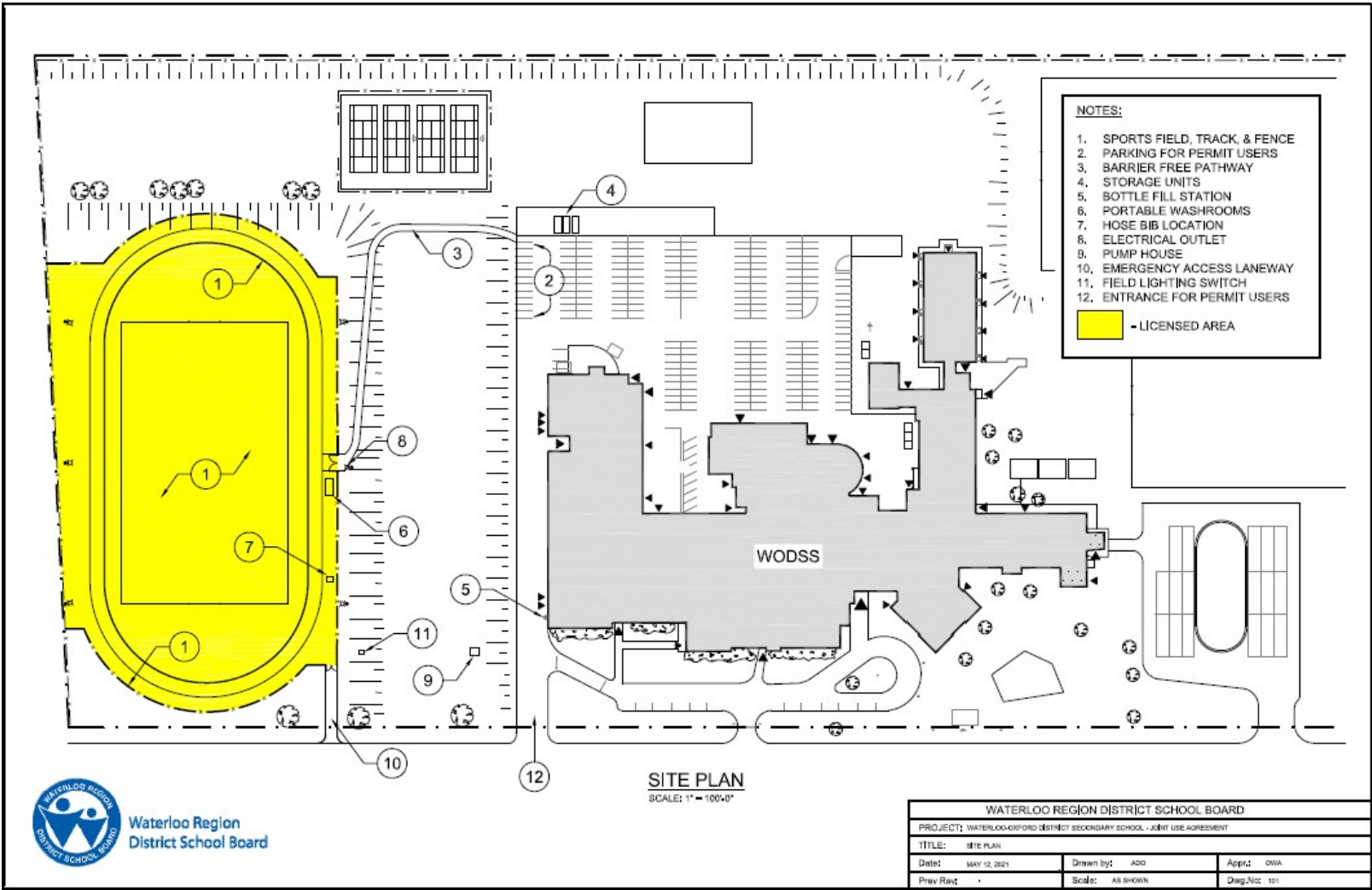
Per: _____

Name: Dawn Mittelholtz

Title: Director of Information and Legislative Services
/ Municipal Clerk

We have the authority to bind the Township.

SCHEDULE “A” DIAGRAM OF SCHOOL SITE



SCHEDULE “B” SPORTS FIELD RENTAL RATES

The Township shall establish by by-law the applicable fees and charges for using the Sports Field on an annual basis.

The proposed fee for the first year of this Agreement is: \$90/hour – private/adult rate

For the usage of the Sports Field by the Board, the Board shall receive the Township-approved affiliated discount – currently 35% off the private/adult rate. The Board shall be granted, free of charge, a minimum of five (5) bookings/uses outside of School Hours.

Rates are subject to change and to Council approval.

**THE CORPORATION OF THE TOWNSHIP OF WILMOT
BY-LAW NO. 2021-31**

**BY-LAW TO AUTHORIZE THE EXECUTION OF AN AGREEMENT WITH
THE WATERLOO REGION DISTRICT SCHOOL BOARD FOR THE ARTIFICIAL TURF
FIELD AT WATERLOO-OXFORD DISTRICT SECONDARY SCHOOL.**

WHEREAS the Municipal Council of the Corporation of the Township of Wilmot is desirous of entering into an Agreement, which forms Schedule "A" to this By-law.

**THEREFORE THE MUNICIPAL COUNCIL OF THE CORPORATION OF
THE TOWNSHIP OF WILMOT ENACTS AS FOLLOWS:**

1. That the Agreement which forms Schedule "A" to this By-law is hereby accepted as approved.

2. That the Mayor and Clerk are hereby authorized to execute under seal the said Agreement and all other documents and papers relating to this transaction.

READ a first and second time this 14th day of June, 2021.

READ a third time and finally passed in Open Council this 14th day of June, 2021.

Mayor

Clerk

PUBLIC WORKS AND ENGINEERING

Staff Report

REPORT NO: PW 2021-013

TO: Council

SUBMITTED BY: Jeff Molenhuis, P.Eng., Director of Public Works & Engineering

PREPARED BY: Mark Jeffery C.E.T., Senior Engineering Technologist

REVIEWED BY: Sandy Jackson, Interim CAO

DATE: June 14, 2021

SUBJECT: **Wilmot-Kitchener Boundary Road Maintenance Agreement**

RECOMMENDATION:

THAT Council approve and enter into an agreement with the City of Kitchener for the maintenance and repair services for two segments of road; a portion of Trussler Road and the entire segment of Waldau Crescent; and further,

THAT the Mayor and Clerk be authorized to execute all associated documentation.

SUMMARY:

The purpose of this report is to obtain Council approval for the Boundary Road Maintenance Agreement, which has been negotiated with the City of Kitchener and reviewed by the Township's Solicitor, whereby the City of Kitchener agrees to provide the maintenance and repair services for the sections of Trussler Road between Snyder's Road East/Highland Road West and Highview Drive and Waldau Crescent from Trussler Road to the west limit of Waldau Crescent.

This Agreement will allow for the maintenance and repair of Trussler Road and Waldau Crescent to be undertaken in accordance with the terms and conditions of the Agreement for a period of five (5) years, set to expire on December 31st, 2025.

BACKGROUND:

At present there is no formal agreement between the Township of Wilmot and the City of Kitchener, although the City of Kitchener has been providing the maintenance and repair services for these roadways for an extended period. This section of Trussler Road is a boundary road between Wilmot and Kitchener, whereas Waldau Crescent is entirely under the jurisdiction of Wilmot. Historically, winter maintenance activities on these segments have been performed by Kitchener as a result of proximity to existing Kitchener winter control routes, thereby being the most logical resource and cost-effective approach for maintenance.

The Township of Wilmot and the City of Kitchener recognize the need to define roles and responsibilities, payment, and contract terms between the two municipalities by way of a formal agreement.

REPORT:

The attached Boundary Road Maintenance Agreement outlines the routine maintenance and repair services the City of Kitchener will perform on the sections of Trussler Road between Snyder's Road East/Highland Road West and Highview Drive and winter maintenance services for Waldau Crescent from Trussler Road to the west limit of Waldau Crescent, on behalf of Wilmot.

The Agreement also establishes terms related to capital improvements for Trussler Road, where each municipality will share equally in these costs, however no capital improvement of any kind will be undertaken unless the improvements have been jointly approved by the Council of the Township of Wilmot and the City of Kitchener. All capital improvements and expenditures for Waldau Crescent will be entirely at Wilmot's expense.

The Township of Wilmot and City of Kitchener have agreed to a 5-year term with the opportunity to renew the Agreement at the end of the term with a revised pricing schedule and upon mutual consent of both parties. The Agreement may be terminated by either the Township of Wilmot or City of Kitchener by providing six (6) months written notice.

Payment to the City of Kitchener to provide the maintenance and repair services for these two sections of road is in-line with costs received by the Township of Wilmot from Oxford County and the Township of Wellesley to undertake similar maintenance and repair services on shared boundary roads segments.

The attached Agreement has been prepared and reviewed by staff and solicitors from both the City of Kitchener and Township of Wilmot. Both parties are agreeable to the terms and conditions and payment schedule contained within the attached Agreement.

ALIGNMENT WITH THE TOWNSHIP OF WILMOT STRATEGIC PLAN:

This initiative supports the goals and strategies of enhancing:

- Responsible Governance through Active Communications, Fiscal Responsibility, and Infrastructure Investments.

FINANCIAL CONSIDERATIONS:

The annual fee payable to the City of Kitchener for undertaking the maintenance and repair services as identified in the Agreement is as follows:

2021 - \$4,410
2022 - \$4,499
2023 - \$4,589
2024 - \$4,680
2025 - \$4,774

The historical costs have been included annually in the Roads Department operating budget submissions to Council. These historical costs are generally in line with the cost schedule listed above. The annual costs above represent marginal and reasonable cost increases over the term of the agreement

ATTACHMENTS:

Attachment 1: Boundary Road Maintenance Agreement

Attachment 1

This AGREEMENT made in duplicate this day of , 2021

BETWEEN:

THE CORPORATION OF THE CITY OF KITCHENER
(hereinafter called the “City”)

OF THE FIRST PART,

-and-

THE CORPORATION OF THE TOWNSHIP OF WILMOT
(hereinafter called the “Township”)

OF THE SECOND PART,

WHEREAS the City and the Township are adjoining municipalities and are desirous of entering into an agreement pursuant to section 29.1 of the *Municipal Act, 2001*, S.O. 2001, c. 25 (the “**Act**”), dealing with the maintenance and repair of a boundary line highway, namely Trussler Road, more particularly described in **Schedule “A”**;

AND WHEREAS the parties hereto additionally agree that the City shall provide specific winter maintenance services on a non-boundary line highway, namely Waldau Crescent, as more particularly described in **Schedule “A”**, which is owned by the Township and over which only the Township has jurisdiction;

NOW THEREFORE in consideration of the mutual covenants and the provision of other good and valuable consideration by each party hereto to the other, the receipt and sufficiency of which is hereby acknowledged, the parties have agreed as follows:

1.0 Scope of Service

- (a) The City agrees to provide certain highway maintenance and repair services, as more particularly described in Table 1, below, for those highways outlined in section 1.0(b) of this Agreement.
- (b) This Agreement relates to maintenance and repair services for that part of Trussler Road between Snyder’s Road East/Highland Road West and Highview Drive and Waldau Crescent from Trussler Road to the west limit of Waldau Crescent, and as more particularly described in **Schedule “A”**, attached (the “**Highways**”).
- (c) The City agrees to maintain Trussler Road, at all times, in accordance with Ontario Regulation 239/02 (Minimum Maintenance Standards for Municipal Highways), as may be amended, revised or replaced from time to time (the “**MMS**”).

- (d) The Township acknowledges and agrees that the City shall only maintain and repair Waldau Crescent in accordance with Table 1, below, and in accordance with the MMS for plowing (snow accumulation) and salting (ice formation). The City shall not be liable for any other MMS related to, or associated with, road repair or maintenance on Waldau Crescent .

TABLE 1	
WALDAU CRESCENT – SERVICES PERFORMED BY THE CITY	TRUSSLER ROAD – SERVICES PERFORMED BY THE CITY
• Plowing	• Plowing
• Salting and sanding	• Salting and sanding
• Pavement Marking – Stop Bar	• Pot holes
• Sign Maintenance – Stop Sign	• Crack sealing
	• Utility cut maintenance
	• Line painting
	• Road patrol (i.e. defect patrol)
	• Debris pick-up
	• Sign maintenance
WALDAU CRESCENT – SERVICES FOR WHICH THE CITY IS NOT RESPONSIBLE	TRUSSLER ROAD – SERVICES FOR WHICH THE CITY IS NOT RESPONSIBLE
• Sidewalks	• Sidewalks (Township portion)
• Curb and gutter repair	• Curb and gutter repair(Township portion)
• Boulevards	• Boulevards
• Winter patrol route	• Ditching
• Pot holes	
• Crack Sealing	
• Utility cut maintenance	
• Line painting – excluding Stop Bar	
• Road patrol (ie. defect patrol)	
• Debris pick up	
• Sign maintenance – excluding Stop Sign	

1.1 Emergency Repairs – Trussler Road

In the event that emergency repairs are required to comply with the MMS for Trussler Road, the City shall inform the Township as soon as reasonably practicable, and the City shall be responsible for performing such emergency repairs. The parties agree that each party is equally responsible for the cost of any such emergency repairs. For greater clarity, the City shall not perform, or be responsible for, emergency road repairs for Waldau Crescent.

2.0 Capital Improvements – Trussler Road

The City and the Township shall equally share in all capital improvement costs in relation to Trussler Road, being those costs that are required for works that fall beyond regular maintenance and repair.

No capital improvement work of any kind shall be undertaken for Trussler Road unless such capital improvement work has first been jointly approved by the City and the Township. A

municipality whose Council has not approved the capital improvement work for Trussler Road will not be responsible for the payment of any costs to the other municipality on account of such work being performed.

3.0 Term of Agreement

The term of this Agreement shall be effective commencing on **1st day of January, 2021**, and shall remain in effect until the **31st day of December, 2025**, unless terminated earlier by either party on six (6) months' written notice. This Agreement may also be renewed by mutual consent of the parties for a further five (5) year term, subject to mutual agreement on revised pricing schedule at then current rates.

4.0 Payment

The Township shall pay to the City the following amounts for the services provided in this Agreement and all pricing below shall be subject to HST:

January 1, 2021 - \$4,410

January 1, 2022 - \$4,499

January 1, 2023 - \$4,589

January 1, 2024 - \$4,680

January 1, 2025 - \$4,774

The Township shall pay the above-noted amounts within:

- (a) 30 days of the commencement of this Agreement in relation to the first payment; and
- (b) within 30 days of January 1 for each subsequent year, as described above.

5.0 Dispute Resolution

Any dispute, difference or disagreement between the parties shall be resolved as efficiently and effectively as possible.

6.0 Previous Agreements

This Agreement supersedes all previous arrangements or understandings between the parties whether written or oral in connection with or incidental to this Agreement.

7.0 Indemnification / Insurance

7.1 Indemnification

The City, both during and after the term of this Agreement, shall release, indemnify and hold harmless the Township, its officers, employees, volunteers, agents, and their respective heirs, administrators, executors, successors and assigns from any and all losses, damages (including, but not limited to, incidental, indirect, special and consequential damages, or any loss of use, revenue or profit by any person, organization or entity), fines, penalties and surcharges, liabilities (including, but not limited to, any and all liability for damages to property and injury to persons, including death), judgments, claims, demands, causes of action, contracts, suits, actions or other proceedings of any kind (including, but not limited to, proceedings of a criminal, administrative or quasi-criminal nature) and expenses (including, but not limited to, legal fees on a substantial indemnity basis) which the

indemnified persons or person may suffer or incur, howsoever caused, arising out of or in connection with, in any way related to, or as a result of acts or omissions, whether negligent or otherwise, of the City, its officers, employees, agents and permitted successors and assigns in regard to the maintenance and repair services required by, or carried out under, section 1.0 of this Agreement.

The Township, both during and after the term of this Agreement, shall release, indemnify and hold harmless the City, its elected officials, officers, employees, volunteers, agents, and their respective heirs, administrators, executors, successors and assigns from any and all losses, damages (including, but not limited to, incidental, indirect, special and consequential damages, or any loss of use, revenue or profit by any person, organization or entity), fines, penalties and surcharges, liabilities (including, but not limited to, any and all liability for damages to property and injury to persons, including death), judgments, claims, demands, causes of action, contracts, suits, actions or other proceedings of any kind (including, but not limited to, proceedings of a criminal, administrative or quasi-criminal nature) and expenses (including, but not limited to, legal fees on a substantial indemnity basis) which the indemnified persons or person may suffer or incur, howsoever caused, arising out of or in connection with, in any way related to, or as a result of acts or omissions, whether negligent or otherwise, of the Township, its officers, employees, agents and permitted successors and assigns in regard to: (a) the design and construction of Waldau Crescent; and (b) maintenance, repair or other works not covered by this Agreement.

7.2 Comprehensive General Liability Insurance

Each party shall purchase and maintain third party liability insurance acceptable to the other throughout the term of this Agreement. Coverage shall consist of a comprehensive policy of public liability and property damage insurance in an amount not less than \$10,000,000 per occurrence and such insurance shall name the other as an additional insured thereunder. Such insurance shall be extended to include the following additional endorsements: Products and Completed Operations; Owners and Local Municipalities (Service Providers) Protective Liability; Contingent Employers Liability; Personal Injury; Contractual Liability; Non-Owned Automobile Liability and Cross Liability with a Severability of Interest Clause.

Each party's insurance shall state that coverage shall not be suspended, voided, cancelled, reduced in coverage or in limits except after thirty (30) days prior written notice by certified mail to the other. Any deductibles or self-insured retention must be declared to and approved by the other and any such deductible or self-insured retention shall be the sole responsibility of the respective party in the event of a claim.

7.3 Automobile Liability Insurance

Each party shall purchase and maintain automobile liability insurance in a form acceptable to the other, to a limit of \$10,000,000 inclusive for bodily injury, death and damage to property. Coverage is required for all automobiles owned, leased, hired, or borrowed by the party, for the direct or indirect use of the party in the performance of its duties under this Agreement.

Each party shall forward to the other a "Certificate of Insurance" from their insurer completed in accordance with these stated provisions.

8.0 General

- (a) This Agreement may be amended only by written agreement between the parties. No amendment of any of the terms or provisions of this Agreement shall be deemed valid unless it is in writing by all parties.
- (b) Any notice or other document to be given under this Agreement shall be sufficiently given if delivered by hand, courier, email, or if sent by prepaid first class mail and addressed,

to Wilmot at:

The Corporation of the Township of Wilmot
60 Snyder's Road West
Baden, ON N3A 1A1
Attention: Director Public Works & Engineering
Email: publicworks@wilmot.ca

to Kitchener at:

The Corporation of the City of Kitchener
200 King Street West
Kitchener, ON N2G 4G7
Attention: Director of Operations
Email: _Roslyn.Lusk@kitchener.ca_____

Receipt of notice shall be deemed to have occurred on the earlier of the date of delivery or five (5) days following the date of mailing of the notice. Either party may change its address for notice by giving notice of change of address pursuant to this section.

- (c) This Agreement shall be construed and interpreted according to the laws of Ontario and the laws of Canada applicable therein.
- (d) No party shall assign any of its rights or obligations under this Agreement to any third party without the express written permission of the other party.
- (e) No waiver of any breach of this Agreement shall operate as a waiver of any subsequent breach or of the breach of any other provision of this Agreement. No provision of this Agreement shall be deemed to be waived, and no breach excused, unless such waiver or the consent excusing the breach is in writing and signed by the part that is purported to have given such a waiver or consent.
- (f) Either party may, at its own cost, register this Agreement, and any by-law authorizing this Agreement, in the proper land registry office for the area in which Trussler Road is located and the other party shall execute such necessary documents and take such other necessary actions to carry out the registration. This Agreement shall extend to, be binding upon and enure to the benefit of the parties and their respective successors and permitted assigns.
- (g) This Agreement may be executed in counterparts, in writing or by electronic signature, and delivered by mail, facsimile or other electronic means, no one copy of which need be executed by all of the parties, and all such counterparts together shall constitute one agreement and shall be a valid and binding agreement among the parties hereto as of the date first above written.

IN WITNESS WHEREOF the parties hereto have duly executed this Agreement under the hands of their respective authorized signing officers as of the date first written above.

THE CORPORATION OF THE CITY OF KITCHENER

MAYOR

CLERK

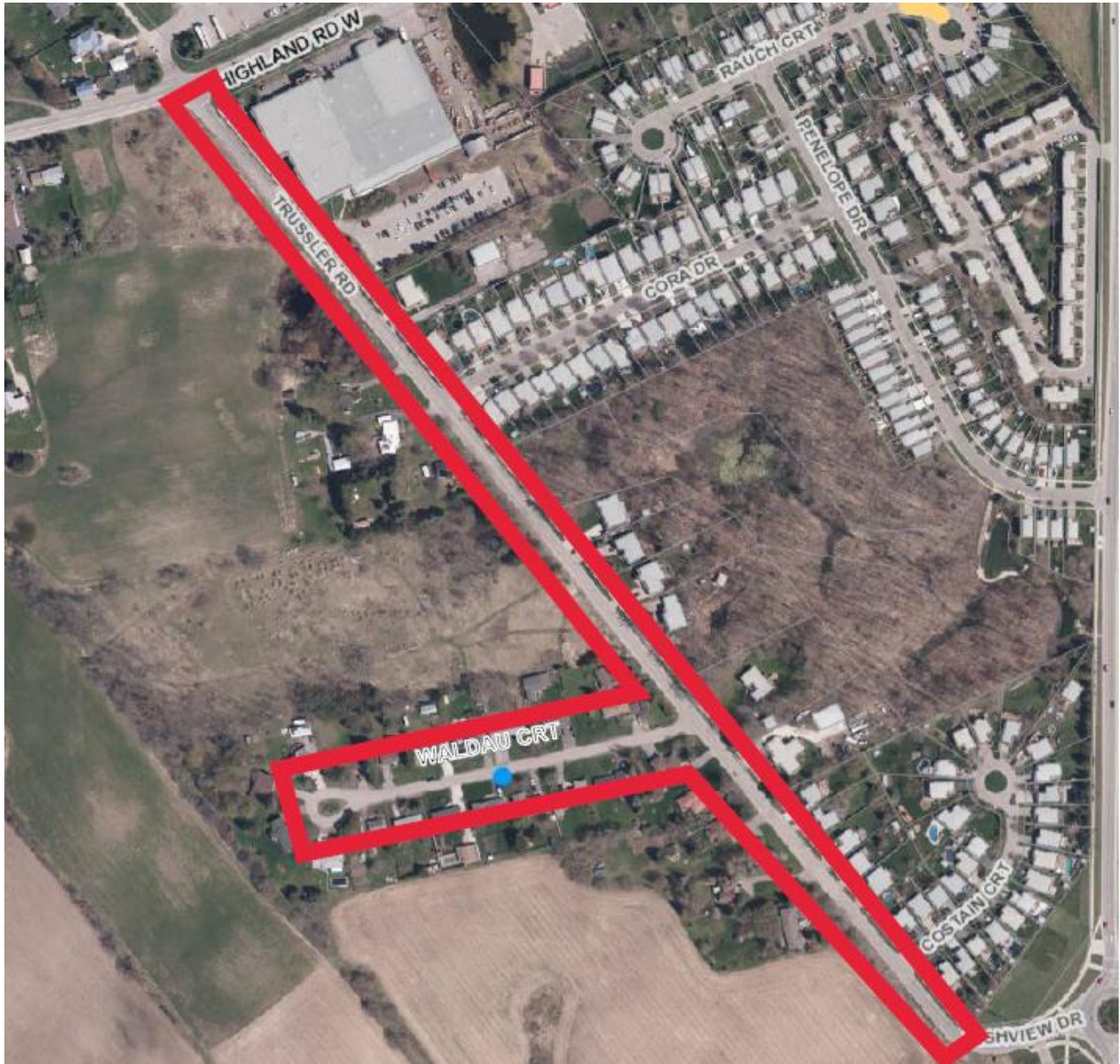
THE CORPORATION OF THE TOWNSHIP OF WILMOT

MAYOR

CLERK

SCHEDULE "A"

MAP OF HIGHWAY LOCATIONS



Report IC2021 - 02
to the Council of the Township of Wilmot
in relation to an investigation under the
Code of Conduct for Members of Council related to
Council Code of Conduct Inquiry 2021-02

=====

Robert J. Williams, Ph.D.
Integrity Commissioner
Township of Wilmot
June 3, 2021

Summary

1. Report IC2021-02 of the Township of Wilmot Integrity Commissioner dated June 3, 2021 advises Wilmot Township Council that an investigation of the Township of Wilmot's Code of Conduct for Council as a result of an application for an investigation under the Code (Inquiry 2021-02) concludes that no contravention has occurred.

A. Context

2. Amendments to the *Municipal Act, 2001* passed in 2006 added a new part to the Act entitled "Accountability and Transparency" which authorized municipalities to establish codes of conduct for members of the council and to appoint an Integrity Commissioner. The Township of Wilmot adopted a Code of Conduct for Elected Officials on November 19, 2007.

3. The Township of Wilmot retained me in January 2014 to serve as its Integrity Commissioner under the terms of what are now section 223.3 of the Ontario *Municipal Act, 2001*. Under that section, the Integrity Commissioner is responsible for performing in an independent manner the functions assigned by the municipality including "the application of the code of conduct for members of council" and "the application of any procedures, rules and policies of the municipality ... governing the ethical behaviour of members of council."

B. The Request for an Investigation

4. A married couple who are residents of Wilmot Township filed an application for an investigation in accordance with the proper procedure for the submission of a formal complaint under the Township of Wilmot Code of Conduct for Elected Officials.

5. The submission states that the couple (both of whom signed a statement appended to the Request for an Inquiry) were attending a Region of Waterloo public forum on the expansion of the safe water zone and saw Mayor Armstrong sitting by himself. As they chatted with him, they mentioned the proposed application for a gravel pit on Witmer Road and their concern about it. The applicants state that the Mayor's next comment was "It's a done deal."

6. The applicants contend that Mayor Les Armstrong's reply "shows that he is close minded and shows an absolute pre-judgement of the outcome" and that he is indicating that "the outcome is a foregone conclusion." As such, the request alleges that Mayor Armstrong has violated the section of Code of Conduct for Elected Officials (included in the submission with the second sentence in bold and underlined) that states: "A conflict exists when an individual is, or could be, influenced, or appear to be influenced by a personal interest, financial (pecuniary) or

otherwise, when carrying out their public duty. Personal interest can include direct or indirect pecuniary interest, bias, prejudgement, close mindedness or undue influence.”

7. This conversation occurred on March 26, 2019. The application only refers to the involvement of the three people just noted (the Mayor and the two residents) in the conversation, although they report seeing a neighbour in attendance. That person filed a request for an inquiry separately based on a similar allegation (see IC Report 2021-01) that made no mention of other residents in conversation with Mayor Armstrong.

A Note on Confidentiality:

8. The *Municipal Act, 2001* (s.223.6 (2)) directs that an Integrity Commissioner shall only disclose “such matters as in the Commissioner’s opinion are necessary for the purposes of the report.” In keeping with the responsibility of the Integrity Commissioner to respect confidentiality during the conduct of an inquiry, I will continue to hold the name of the appellants in confidence in this report.

C. Background

9. I spoke with the appellants by phone to clarify some of the matters raised in their submission. They confirmed that, at the time of the reported conversation, all they knew about the proposed pit had come from a neighbour. It was not until May 2019 that they received a letter from the owner of the proposed pit and later met with him to discuss his intentions for his farm. They received formal notification from Wilmot Township about a zone change application to permit a gravel pit operation in a letter dated November 7, 2019.

10. Research conducted originally in relation to request 2020-01 confirms that an application for a licence to extract aggregate from a site on Witmer Road was not filed under the *Aggregate Resources Act* until November 2019. As of the date when Inquiry 2021-02 was filed with me (and the preparation of this report), the licence has not been granted and the Township has not approved a Zone Change Application filed under the *Planning Act*. The application has undergone a mandatory comprehensive review that has involved, among other entities, the Ministry of Natural Resources and Forestry, the Region of Waterloo and the Grand River Conservation Authority, as well as being the subject of a statutory public meeting in January 2020. The full extent of the process is outlined among the development applications listed on the Township’s website:

11. In the period since an application was filed for a Zone Change, there has been strenuous organized and individual opposition to the zoning change including numerous presentations to Wilmot Township Council in early March 2021. My understanding is that the individuals who co-signed the statement appended to the Request for an Inquiry are among those who oppose the zoning change application but we did not discuss any role they have played in relation to the application.

12. An eventual resolution of the Zone Change application will be made by Wilmot Township Council and will follow the presentation of a staff recommendation based on the professional assessment of a number of licensed specialists in subjects such as hydrology, geology, archaeology, transportation and agriculture. A comment – informal or otherwise - from any member of Council would in no way impact the staff process. When a recommendation is placed before Council, each member will have one vote and the outcome can be appealed to the Local Planning Appeal Tribunal.

13. Information posted on the Township website as of May 17, 2021 (see paragraph 10), does not indicate that a date has been set for Council to consider the Zone Change application. Further research on the matter with Township staff confirms that Council will likely not be asked to vote on the matter until the fall of 2021.

D. The Evaluation

14. There are a number of similarities between this application for an investigation and the one that prompted IC Report 2021-01. As such, some of the same observations and interpretations will be found in this report.

15. The first question to address is whether the reported conversation justifies an inquiry under the Township Code of Conduct for Elected Officials. The applicants allege that Mayor Armstrong's response to them "shows an absolute pre-judgement of the outcome" and that "pre-judgement" constitutes a violation of the Code of Conduct.

16. There is no reference in this application to a pecuniary interest on the part of Mayor Armstrong but instead there is reliance on the language in the Wilmot Code

The allegation rests on the belief that the statement “It’s a done deal” constitutes prejudgement and that the Mayor’s statement should therefore be seen as a violation of the Code.

17. In my assessment, “pre-judgement” in and of itself does not constitute grounds for an inquiry under the Code of Conduct nor does the personal opinion of any elected member of Council – even the Mayor – expressed in a private conversation necessarily mean, in the words of the applicants, that “the outcome is a foregone conclusion.”

18. There are several complications related to the allegation that contributed to this assessment.

First, the reference to “prejudgment” is found in a section of the Wilmot Code that sets out the responsibility of elected members to understand and abide by the provisions of the *Municipal Conflict of Interest Act*, in particular the obligation to identify a conflict of interest. The *Act* addresses situations in which an elected official has a “pecuniary interest, direct or indirect” in “any matter “in which the council is concerned.” (MCIA, section 2) The Wilmot Code, however, goes further by directing elected officials to “resolve any conflict or incompatibility between their personal interests and the impartial performance of their public or professional duties in accordance with statutory requirements” (which I take to mean the provisions in the *Municipal Conflict of Interest Act*).

In other words, the reference to prejudgement is included in the Code to provide interpretive direction as to the meaning of “personal interest” that the Code directs elected officials to “resolve” in the performance of their duties as an elected official. As written into the Code, it is not a provision that can itself serve as the basis for an inquiry.

19. There are also several problems with the allegation submitted in Inquiry 2021-02:

- it appears to assume that the Mayor’s remark is an endorsement of a particular outcome on a zoning change application that has still not been presented to Council;
- the submission offers no evidence in support of the specific claim that the comment shows that the Mayor has not “remained impartial and at arm’s length”;
- if the zoning change application conforms to policy and has met the external approvals, the Mayor has confirmed to me that he is well aware that his “personal” views on the application (whatever they may be) do not enter into his vote. In his experience, a vote on a matter of this kind must rest on “the science” presented through a staff report;

- consultation with Township staff also affirms that any application that has met all of the legislated requirements cannot be impeded by the personal interests of members of Council. The decision will need to be made on the basis of the professional assessments accompanying the recommendation; moreover, the decision can be appealed to the Local Planning Appeal Tribunal, potentially based on whether there are any suggestions that Council's decision has been influenced by personal interests or bias.

20. If there is no evidence presented that the Mayor's comment was based on a "personal interest," it is not subject to the Code of Conduct and cannot be deemed a violation. In my view, a Code of Conduct inquiry authorized under the *Municipal Act, 2001*, requires a clear connection to provisions of the Code and verifiable evidence to back it up. In sum, Inquiry 2021-02 did not provide me with grounds for taking an investigation any further.

21. As I observed in IC Report 2021-01, it is plausible to view the Mayor's response as dismissive or possibly impolite but, as noted above, his personal views on the application have no bearing on the staff review that will eventually be presented to Council and the recommendation that Council will be asked to approve. It is primarily at that point where the conflict of interest section of the Code of Conduct applies, not in a private conversation before the Township was formally involved. However, given that there have been other inquiries that I have dealt with that were prompted by comments made by Mayor Armstrong, I suggest that he may want to consider the possible impact of his responses before speaking – even in what he may regard as private or casual conversations.

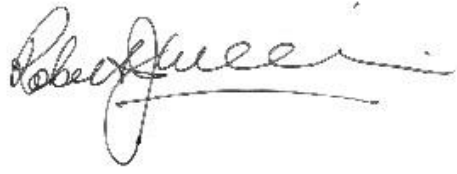
22. Finally, if indeed the applicants perceive the conversation as a violation of the Code, why was this request filed two years after the event? The applicants offer no rationale for the delay in submitting the request nor any explanation for why the conversation should be considered an infraction of the Code in 2021 when it was not apparently viewed that way in 2019. They did tell me that they were "uneasy" about the Mayor's response and that it had been in the back of their minds for the two years since the conversation took place, but could offer no explanation for the delay in filing this request.

23. Based on the foregoing, I find that Mayor Armstrong has not violated the Township of Wilmot Code of Conduct for Elected Officials. The application is dismissed.

Recommendation

That Council receive for information the Integrity Commissioner's Report 2021 – 02 dated June

3, 2021.

A handwritten signature in dark ink, appearing to read "Robert J. Williams". The signature is fluid and cursive, with a long horizontal stroke at the end.

Robert J. Williams, Ph.D.
Integrity Commissioner, Township of Wilmot

TOWNSHIP OF WILMOT

BY-LAW NO. 2021-030

**BEING A BY-LAW TO CONFIRM THE ESTABLISHMENT OF A HIGHWAY IN THE TOWNSHIP
OF WILMOT.**

WHEREAS pursuant to Section 31(2) of the *Municipal Act, 2001*, S.O. 2001, c. 25, as amended, after January 1, 2003, land may only become a highway by virtue of a by-law establishing the highway and not by the activities of the municipality or any other person in relation to the land, including the spending of public money;

AND WHEREAS The Corporation of the Township of Wilmot acquired the lands herein described for the purpose of a highway;

AND WHEREAS the lands hereinafter described will be used and form part of a public highway known as Heritage Drive in the Township of Wilmot;

**NOW THEREFORE THE MUNICIPAL COUNCIL OF THE CORPORATION OF THE
TOWNSHIP OF WILMOT ENACTS AS FOLLOWS:**

1. That the lands hereinafter described be, and the same are, established and laid out as a public highway to be known as Heritage Drive within the Township of Wilmot:

All and singular that certain parcel or tract of land and premises known as:

PT 1 FT RESERVE A PL 1450 WILMOT AS IN 640174 LYING S OF PT 3, 58R7762;
WILMOT (PIN 222020142) and,

PT 1 FT RESERVE A PL 1450 WILMOT AS IN 640174, LYING N OF PT 3, 58R7762,
EXCEPT 1239470; WILMOT (PIN 222020136)

READ a first and second time on the 14th day of **June, 2021**.

READ a third time and finally passed in Open Council on the 14th day of **June, 2021**.

MAYOR

CLERK

**THE CORPORATION OF THE TOWNSHIP OF WILMOT
BY-LAW NO. 2021-32**

**BY-LAW TO AUTHORIZE THE EXECUTION OF AN AGREEMENT WITH
THE CORPORATION OF THE CITY OF KITCHENER**

WHEREAS the Municipal Council of the Corporation of the Township of Wilmot is desirous of entering into an Agreement, which forms Schedule "A" to this By-law.

**THEREFORE, THE MUNICIPAL COUNCIL OF THE CORPORATION OF
THE TOWNSHIP OF WILMOT ENACTS AS FOLLOWS:**

1. That the Agreement which forms Schedule "A" to this By-law is hereby accepted as approved.

2. That the Mayor and Clerk are hereby authorized to execute under seal the said Agreement and all other documents and papers relating to this transaction.

READ a first and second time this 14th day of June.

READ a third time and finally passed in Open Council this 14th day of June.

Mayor

Clerk

**THE CORPORATION OF THE TOWNSHIP OF WILMOT
BY-LAW NO. 2021-32**

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Mayor

Clerk