
To:	Ron Stroh	From:	Cameron Irvine
	Strohvest Ontario Inc.		Stantec Consulting Ltd.
	6770 86 Line		100-300 Hagey Boulevard
	Elmira, ON N3B 2Z2		Waterloo, ON N2L 0A4
File:	161413217	Date:	October 5, 2021

Reference: Strohvest Subdivision, Gerber Road, Township of Wellesley, Chloride Impact Assessment

1.0 INTRODUCTION

In accordance with the Region of Waterloo's requirements, a chloride impact assessment has been completed for the proposed Strohvest Subdivision (Site). The Site is located in the Township of Wellesley in the Region of Waterloo (Region) and is bounded by single detached dwelling lots fronting Lawrence Street to the east, and Gerber Road to the south (Conceptual Draft Plan, attached). The total of lands owned by Strohvest Ontario Inc. have an area of approximately 16.4 ha and the area proposed to be developed is approximately 10.19 ha. For purposes of Storm Water Management design, the drainage area being considered includes some agricultural lands to the west resulting in a total drainage area of 22.7 ha as seen in the Proposed Drainage Area Plan (attached). The site contains two areas of development, the south portion of the site which is to be 10.19 ha, and proposed development details can be seen in the Conceptual Draft Plan (attached). Future development to the north of an additional 6.5 ha has also be included and considered for the purpose of this Chloride Impact Assessment.

The Ministry of the Environment, Conservation and Parks (MECP) has determined that storage and application of road salt is a drinking water threat, as sodium chloride can readily infiltrate the subsurface into the groundwater system. This threat is especially significant in the Region of Waterloo, which is dependent on groundwater for drinking water. To ensure that road salt is applied in an environmentally responsible manner, this chloride impact assessment was completed to establish appropriate salt-loading rates.

2.0 STORMWATER MANAGEMENT DESIGN

The proposed stormwater management (SWM) strategy for the Strohvest Lands Subdivision incorporates minor system conveyance via storm sewer networks to the proposed Storm Water Management Facility (SWMF) for water quality and quantity control while major storm runoff is generally conveyed via overland flow through the road rights-of-way. The SWM strategy has been developed in accordance with the objectives and criteria listed within the *Strohvest Subdivision, Gerber Road, Township of Wellesley, Preliminary Stormwater Management Report* (Stantec, 2021).

2.1 SWM FACILITY DESIGN

Runoff from the majority of the proposed development and external agricultural lands to the west of the development, will drain to the proposed wet pond stormwater management facility (SWMF) located immediately north of Gerber Road on the south-east portion of the site. The proposed SWMF is designed to provide water quantity and quality control for approximately 22.7 ha of land including 16.4 ha of proposed/future development as well as 6.3 ha of external agricultural land. As outlined in the preliminary criteria, the SWMF is required to provide 'enhanced' water quality treatment (80% TSS removal) prior to discharging downstream.

Reference: **Strohvest Subdivision, Gerber Road, Township of Wellesley, Chloride Impact Assessment**

The stormwater management strategy includes:

- Minor system conveyance via storm sewer networks to the proposed SWMF, while major storm runoff is generally conveyed via overland flow through the rights-of-way;
- A constructed wet pond SWMF will provide water quality and quantity control for approximately 22.7 ha of land area which includes 6.4 ha of external agricultural drainage (i.e. lands not owned by Strohvest Ontario Inc.);
- The proposed SWMF will be drained by a multi-stage outlet consisting of an inverted pipe, ditch inlet catchbasin (DICB) and overflow weir;
- Low flows will discharge through the inverted pipe that will provide temperature mitigation by drawing cooler water near the bottom of the pond;
- Lot-level infiltration of rooftop runoff to front and rear-yard soakaway pits sized to accept 25 mm of runoff will be implemented where possible.

3.0 SOURCE WATER PROTECTION

As of July 1, 2016, development within the Region of Waterloo requires compliance with the approved Source Protection Plan (SPP) for the Grand River Source Protection Area. The Region of Waterloo uses groundwater for drinking water purposes and therefore it is important to understand how potential contaminants may impact the groundwater system. In the Grand River SPP, policy mapping has been used to determine the Wellhead Protection Areas (WHPA) and an assigned vulnerability score. The vulnerability score represents how vulnerable the subject area is to contaminants based on the existing hydrogeological regime. The vulnerability score of an area can range from 0-10, with 10 representing a high probability of contaminants reaching the drinking-water source. WHPAs are given a designation between A and E. A WHPA-A designation represents the area surrounding the well head that has the highest potential for groundwater contamination, whereas a WHPA-E designation represents a low potential.

The SPP outlines best management practices specific to the handling and management of salt on-site. An update of the Grand River SPP came into effect February 3, 2021. The SPP policies that are relevant to chloride impacts are attached for reference.

As shown in the Township of Wellesley Source Water Protection Map (attached), a majority of the Site is located within the Wellhead Protection Area B (WHPA-B), with a vulnerability score of 6. There are small portions in the southwest corner of the site that are within WHPA-C and WHPA-D as well. For the purpose of this memo, policies related to WHPA-B will be applied to the entire site. Therefore, waste disposal, sewage systems and dense non-aqueous phase liquids (DNAPLs) are not permitted within the area. Given the Site's intended use for residential, parkland and open space purposes, little to no contaminant risk is anticipated. Further, the site is not located within an Intake Protection Zone (IPZ). To view this mapping, please refer to the attached material.

4.0 CHLORIDE MANAGEMENT

The primary parameter of concern with regard to groundwater quality as it relates to potential for human impact, is that of chlorides associated with typical urban road salting practices. The majority of other contaminants are either not conservative within groundwater flow or not present in residential runoff at

Reference: **Strohvest Subdivision, Gerber Road, Township of Wellesley, Chloride Impact Assessment**

concentrations that would represent a concern. Elevated chloride levels in surface water are also of concern, in that increased concentrations can cause ecological impacts.

As part of related salt management work, Stantec has undertaken several chloride reduction/management studies for the Region including the *Road Salt Management and Chloride Reduction Strategies Phase 1: Road Salt Management Study Final* Kitchener, ON. (Stantec, 2002), the *Road Salt Management and Chloride Reduction Study Phase 2: Evaluation of Chloride Reduction Options – Impacts to Groundwater Quality due to Winter Road Salting, Kitchener, ON* (Stantec, 2005), and the *Upper Blair Creek Functional Drainage Study, Final Report* (Stantec, 2009).

In an effort to quantify potential chloride impacts to groundwater, the MECP's Reasonable Use Concept (RUC) approach was adopted. The RUC provides a framework for assessing impacts to groundwater and is also protective of impacts to surface water. Given the Ontario Drinking Water Standard for chloride is 250 mg/L and an assumed background chloride concentration in groundwater of 15 mg/L (typical of the ambient chloride levels in groundwater from southern Ontario), the RUC suggests that the maximum concentration of chloride in groundwater should not exceed 133 mg/L. However, this value does not take into account private applications of salt within the developed area. Therefore, with an uncertainty factor of 10% for the subdivision development, the resulting RUC target for developments is set at 120 mg/L. By maintaining a groundwater chloride concentration of 120 mg/L or less, the RUC suggests that the level of impact would have no appreciable effect on adjacent properties that may rely on groundwater as a potable water source.

5.0 CHLORIDE IMPACT RESULTS

A mass balance spreadsheet analysis was completed to determine the estimated impact of road salting within the study area (Table 1, attached). The Site is proposed to include lot level soakaway pits to infiltrate clean water from rooftops before the runoff has a chance to uptake any chloride, thus reducing the overall amount of infiltrated chloride. Design assumptions incorporated into the analysis include the following:

- Recharge volumes used in the mass balance were those calculated in the water balance of the *Strohvest Ontario Inc. – Village of Wellesley Stormwater Management Report* (Stantec, 2021). It is assumed that 30% of chloride infiltrates from incidental roadside runoff from local roads and other impervious surfaces (trail and walkways).
- The calculation assumed that the total mass of road salt applied to primary roads was 2.2 tonnes/2-ln-km for local roads. This loading rate was based on previous studies completed by Stantec using information from the Region of Waterloo.
- A salt application rate for the trail and walkways (Blocks 14, 15 and 16) were assumed to be equal to the salt application rate for multi-block development of 11-14 tonnes/ha/year, in accordance with Region of Waterloo guidelines. This analysis conservatively assumed that the trail and walkway blocks will apply at the high-end of the typical salt application rates and a salt application rate of 14 tonnes/ha/year was applied to Block 14, 15 and 16 salting areas. This, however, is not the recommended application rate of salt on these surfaces, but rather should be much lower and determined by the Township of Wellesley.
- All townhouses within the site will front directly onto local roads and will not have visitor parking spaces or private roadways and will not require additional salt application.

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- The total mass of chloride infiltrated together with the total groundwater recharge was used to determine the average chloride concentration in groundwater.
- The input of runoff from the adjacent agricultural area was not considered in the mass balance in order to develop conservative chloride concentration values. In reality, runoff from the agricultural areas will likely further dilute actual groundwater chloride concentrations.
- The future development area to the north was assumed to have a road layout as shown in the Proposed Area Drainage Plan (attached) and the future development was assumed to contain a similar layout to the current development consisting of a mix of single-family, semis, and townhome units. The areas to be salted include the roadways as shown in the drawing and the trail on the west side of the property was assumed to extend into the future development portion of the site.

6.0 CONCLUSION

The results of the assessment for the proposed conditions are attached. It is estimated that the chloride concentration in groundwater due to salt application to local roads is 17 mg/L, and the chloride concentration in total for the site is 43 mg/L (refer to Table 1 attached). Therefore, taking into account both the modified multi-block salt application rate for the trail and walkways and the local road salt application rate, the resulting concentration of chloride in groundwater on the Site would meet the RUC criteria of 120 mg/L.

From the results of this assessment, it can be concluded that the application of road salt at the current loading rates with the implementation of directing all rooftop runoff to infiltration galleries represents a low overall risk of chloride contribution to groundwater quality for the Site.

Sincerely,

STANTEC CONSULTING LTD.



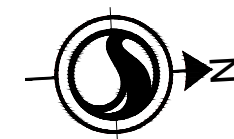
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Environmental Analyst and Field Coordinator
Phone: 519-585-7260
Cameron.Irvine@stantec.com



Bryan Weersink P. Eng.
Water Resources Engineer
Phone: 519-569-4333
Bryan.Weersink@stantec.com

Attachments: Conceptual Draft Plan (DP-1)
Proposed Drainage Area Plan
MECP Source Protection Area Mapping
Grand River Source Protection Plan Section 10 Policies
Table 1 - Chloride Impacts to Groundwater

c. Trevor Heywood, Grand River Conservation Authority
Greg Romanick, Stantec Consulting Ltd.

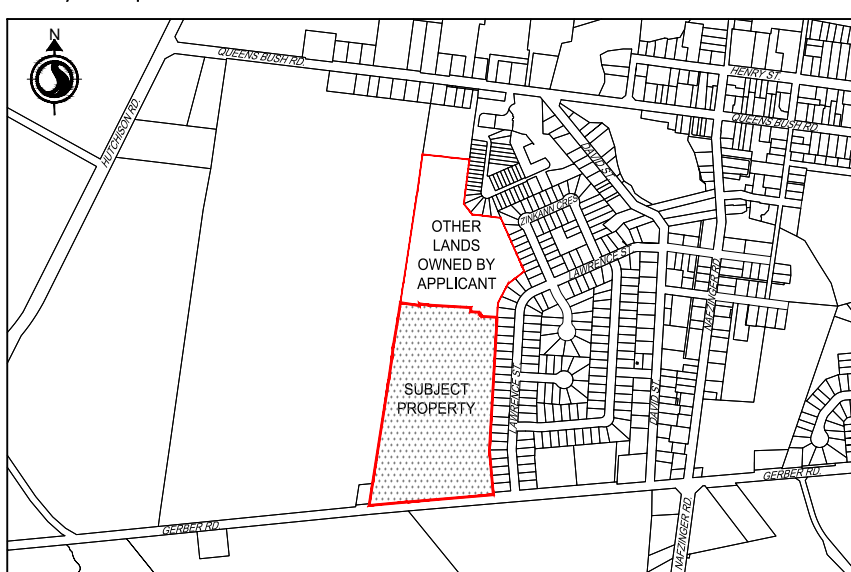


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- any errors or omissions shall be reported to Stantec without delay.
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Key Map NTS.



Legal Description

Plan 1148, Part Lot 80,
Registered Plan 58R-3548, Part 1,
Township of Wellesley,
Regional Municipality of Waterloo

Information Required

Under Section 51(17) of the Planning Act,
R.S.O. 1990 c.P.13 as Amended
a) - As Shown
b) - As Shown
c) - As Shown
d) - As Listed Below
e) - As Shown
f) - As Shown
g) - As Shown
h) - Municipal Water
i) - As Shown
j) - Municipal Sanitary and Storm Sewers
k) - Name

Surveyor's Certificate

I hereby certify the boundaries of the subject lands and their relationship to the adjoining lands have been accurately and correctly shown.

Signed _____
O.L.S. Name
Company Name

Date _____

Owner's Certificate

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

Signed _____
Owner Name
Company Name

Date _____

Land Use Schedule

Lots/Blocks	Land Use	Area (ha)	# of Units
Lots 1-20, 25-63, 74-76, 80-83	Single Detached	2.915	66
Lots 21-24, 64-73, 77-79	Semi Detached	1.047	34
Blocks 1-12	Townhouse	1.596	66
Block 13	Park	0.518	
Block 14	6.0m Trail	0.270	
Blocks 15-16	6.0m Walkway	0.039	
Block 17	Stormwater Management	1.087	
Blocks 18-19	Road Widening	0.133	
Roads		2.582	
TOTAL		10.187	166 Units

Issued for Client Review JJ GR 2021.04.22

Revision By Appd YYYY.MM.DD

File Name: 161413217_R-OP_2 JJ JJ GR 2021.04.21

Dwn. Dsgn. Chkd. YYYY.MM.DD

Permit-Seal

APPROVED: DATE:

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

Client/Project
STROHVEST ONTARIO INC.

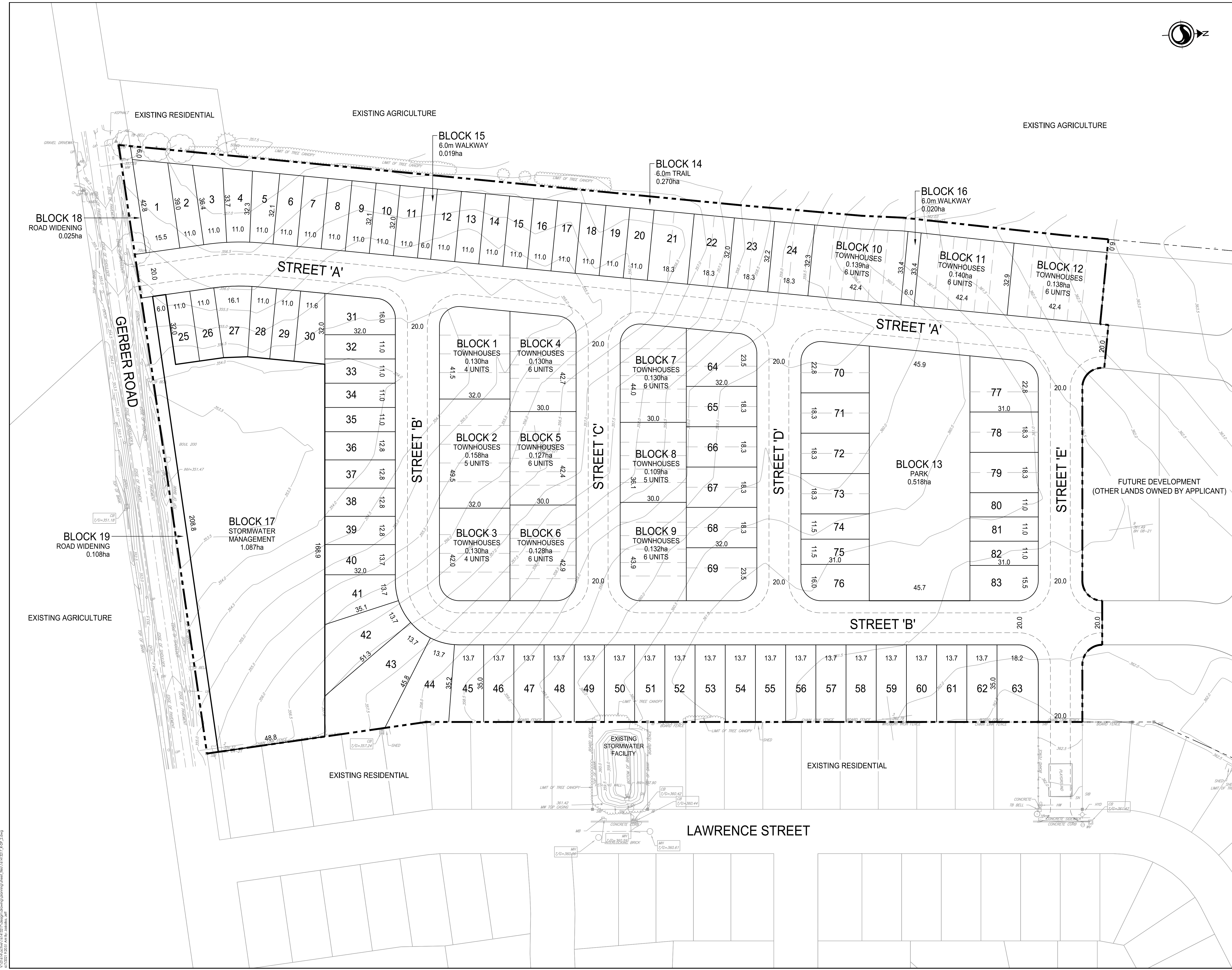
WELLESLEY PROPERTY
GERBER ROAD
TOWNSHIP OF WELLESLEY, ON

Title
CONCEPTUAL
DRAFT PLAN OF SUBDIVISION

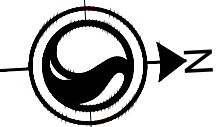
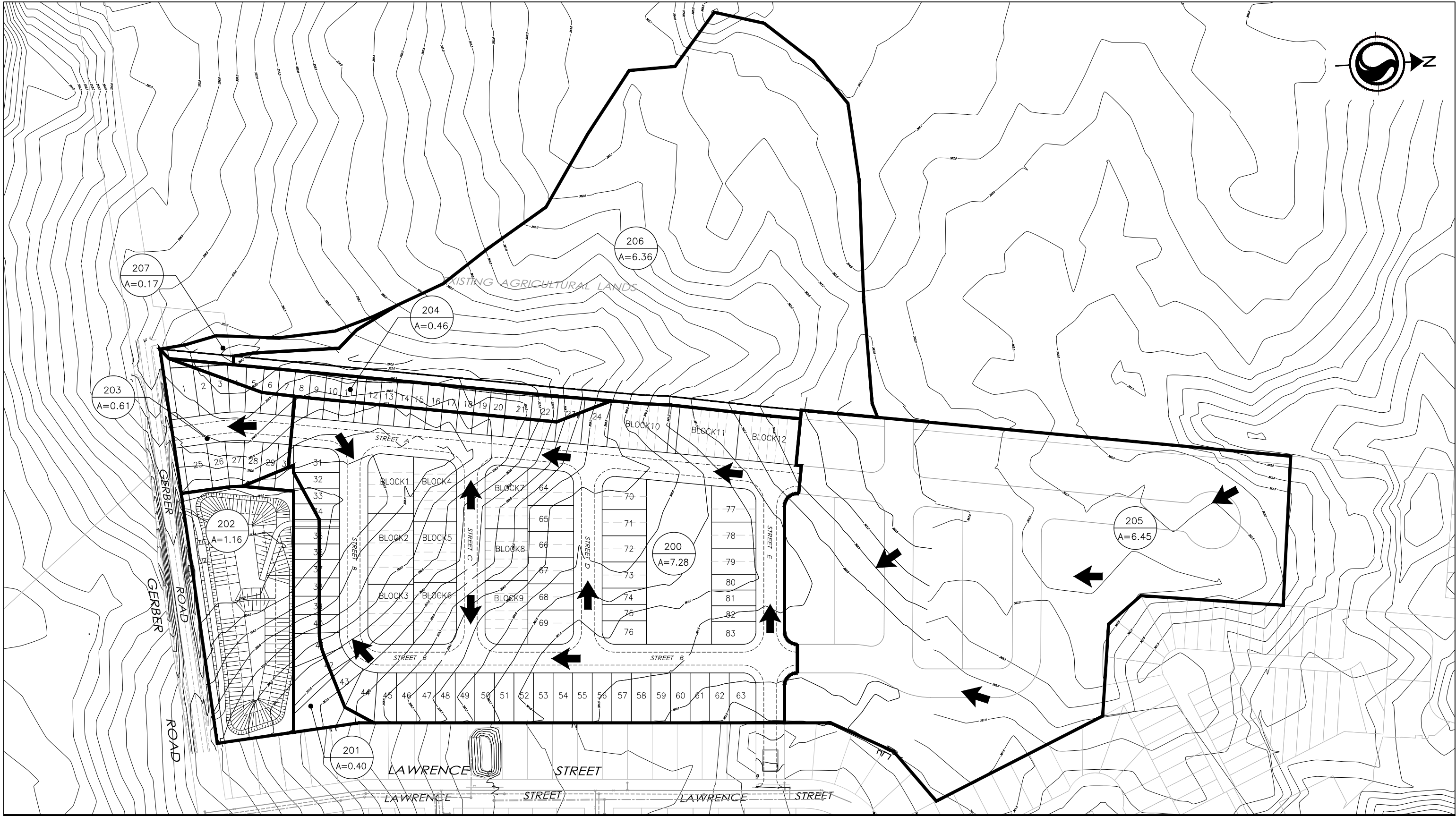
Project No. 161413217 Scale 0 7.5 22.5 37.5m

Revision Sheet 0 1 of 1 Drawing No.

DP-1



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Tel: (519) 579-4410
www.stantec.com

Notes

100 CATCHMENT ID
A=1.57 CONTRIBUTING AREA (ha)

➔ MAJOR OVERLAND FLOOD ROUTE
— PROPOSED DRAINAGE BOUNDARY

Scale



Client/Project

STROHVEST ONTARIO INC.
WELLESLEY PROPERTY

GERBER ROAD, WELLESLEY
TOWNSHIP OF WELLESLEY, ON

Project No.

161413217

Title

PROPOSED DRAINAGE
AREA PLAN

Revision

Reference Sheet

Date

2021.07.07

Figure No.

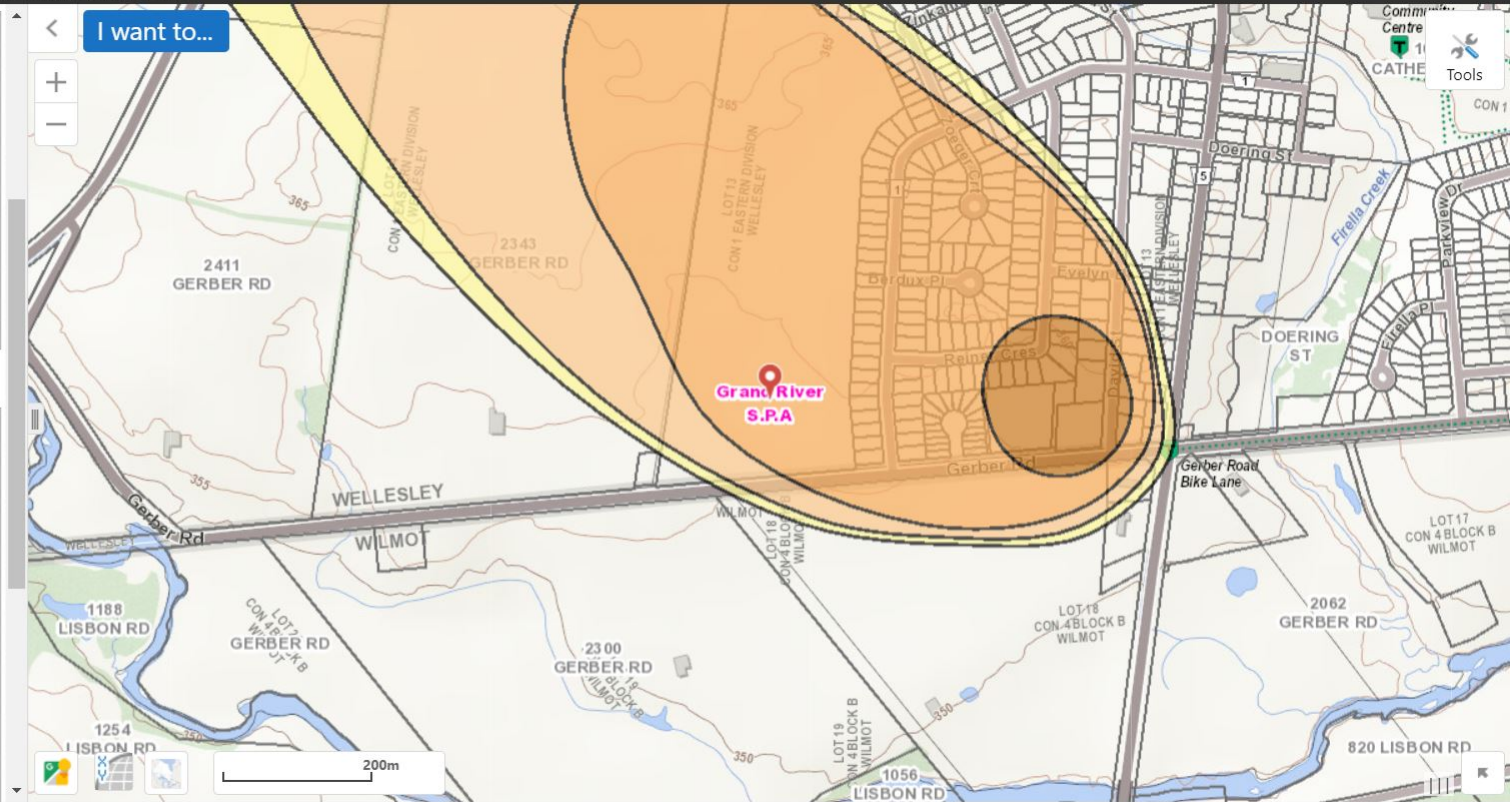
3

Latitude: **43.47063** Longitude: **-80.77219**
UTM Zone: **17** Easting: **518426.1** Northing: **4813104.31**
Upper Tier Municipality: **REGIONAL MUNICIPALITY OF WATERLOO**
Lower/Single Tier Municipality: **TOWNSHIP OF WELLESLEY**
Township Concession and Lot: **WELLESLEY CON 1 EASTERN DIVISION, LOT 13**
Assessment Parcel Address: **N/A**
Assessment Roll #: **30240100013720000000**
MECP District: **Guelph**
MECP Region: **West Central**

Source Protection Details for Location

Source Protection Area: **Grand River**
Wellhead Protection Area: **B** ; score is **6**
Wellhead Protection Area E (GUDI): **No**
Intake Protection Zone: **No**
Issue Contributing Area: **No**
Significant Groundwater Recharge Area: **No**
Highly Vulnerable Aquifer: **No**
Event Based Area: **No**
Wellhead Protection Area Q1: **No**
Wellhead Protection Area Q2: **No**
Intake Protection Zone Q: **No**

Significant Drinking Water Threats at this location:
Threats list by zone can be found at this [link](#).



Policy Number	Policies Addressing Prescribed Drinking Water Threats within the Regional Municipality of Waterloo
	<p>b. Future:</p> <ul style="list-style-type: none"> i. Application; <ul style="list-style-type: none"> i. In Wellhead Protection Area B where the vulnerability is equal to ten (10); ii. In Wellhead Protection Area E where the vulnerability is greater than eight (8). ii. Handling and Storage; <ul style="list-style-type: none"> i. In Wellhead Protection Area B where the vulnerability is equal to ten (10).
<p>RW-CW-33</p> <p><i>Existing/Future</i> <i>a)Incentive</i> <i>b)Education&Outreach</i></p>	<p>To promote best management practices and to provide guidance about the importance of source water protection:</p> <ul style="list-style-type: none"> a. The Regional Municipality of Waterloo shall develop and implement an incentive program for persons engaging in the activity of the existing application and storage of pesticide in the following areas: <ul style="list-style-type: none"> i. In Wellhead Protection Areas A and B where the vulnerability is equal to ten (10); ii. In Intake Protection Zone One (1); In Wellhead Protection Area E where the vulnerability is greater than eight (8). b. The Regional Municipality of Waterloo shall develop and implement an education and outreach program for persons engaging in existing and new application and storage of pesticide in the following areas: <ul style="list-style-type: none"> i. In Intake Protection Zones Two (2) and Three (3) where the vulnerability is greater than eight (8);
<p>12. The Application of Road Salt 13. The Handling and Storage of Road Salt</p>	
<p>RW-CW-34</p> <p><i>Future</i> <i>Part IV-Prohibit</i></p>	<p>To ensure the new application of road salt does not become a significant drinking water threat where this activity would be a significant threat, this activity is designated for the purpose of Section 57 of the <i>Clean Water Act, 2006</i> and is prohibited within the following vulnerable areas and for the following activities:</p> <ul style="list-style-type: none"> a. Future: <ul style="list-style-type: none"> i. Application of salt on roadways related to the development of new roads that would occur as the result of the approval of a <i>Planning Act</i> or <i>Condominium Act</i> application; <ul style="list-style-type: none"> i. In Wellhead Protection Area A; ii. In Intake Protection Zone One (1). ii. Application of salt on new parking lots that would occur as the result of the approval of a <i>Planning Act</i>, <i>Condominium Act</i> or Ontario Building Code application; <ul style="list-style-type: none"> i. In Wellhead Protection Area A, for large parking lots; ii. In Intake Protection Zone One (1), for medium and large parking lots.

Policy Number	Policies Addressing Prescribed Drinking Water Threats within the Regional Municipality of Waterloo
RW-CW-34.1 <i>Existing/Future Part IV-Prohibit</i>	<p>To ensure the existing and future handling and storage of road salt ceases to be or does not become a significant drinking water threat where this activity is or would be a significant threat, this activity is designated in accordance with Section 57 of the <i>Clean Water Act, 2006</i> and is prohibited within the following vulnerable areas and for the following activities:</p> <p>a. Existing:</p> <ul style="list-style-type: none"> i. In Wellhead Protection Area A where the vulnerability is equal to ten (10), for any uncovered storage of any amount and covered for amounts greater than or equal to one (1) tonne of salt or greater than or equal to one thousand (1000) liters of brine ; ii. In Intake Protection Zone One (1), for any uncovered storage of any amount and covered for amounts greater than or equal to one (1) tonne of salt or greater than or equal to one thousand (1000) liters of brine; iii. Where a Chloride and/or Sodium Issue has been identified, in all Wellhead Protection Areas, for any uncovered storage of any amount. <p>b. Future:</p> <ul style="list-style-type: none"> i. In Wellhead Protection Areas A and B where the vulnerability is equal to ten (10), for any uncovered storage of any amount and covered for amounts greater than or equal to one (1) tonne of salt or greater than or equal to one thousand (1000) liters of brine; ii. In Intake Protection Zone One (1) for any uncovered storage of any amount and covered for amounts greater than or equal to one (1) tonne of salt or greater than or equal to one thousand (1000) liters of brine; iii. Where a Chloride and/or Sodium Issue has been identified, in all Wellhead Protection Areas, for any uncovered storage of any amount.
RW-CW-35 <i>Existing/Future Part IV-RMP</i>	<p>To ensure the existing and/or future application of road salt does not become or ceases to be a significant drinking water threat where this activity is or would be a significant threat, this activity shall be designated for the purpose of Section 58 of the <i>Clean Water Act, 2006</i> and a Risk Management Plan shall be required within the following areas and for the following activities:</p> <p>a. Existing:</p> <ul style="list-style-type: none"> i. Application of Salt on Roadways; <ul style="list-style-type: none"> i. In Wellhead Protection Areas A and B where the vulnerability is equal to ten (10); ii. Where a Chloride and/or Sodium Issue has been identified, in all Wellhead Protection Areas ii. Application on Parking Lots; <ul style="list-style-type: none"> i. In Wellhead Protection Areas A and B where the vulnerability is equal to ten (10), for medium or large parking lots; ii. In Intake Protection Zone One (1), for medium and large parking lots; iii. Where a Chloride and/or Sodium Issue has been identified, in all Wellhead Protection Areas, for medium and large parking lots. iv. . <p>b. Future:</p>

Policy Number	Policies Addressing Prescribed Drinking Water Threats within the Regional Municipality of Waterloo
	<ul style="list-style-type: none"> i. Application of Salt on Roadways that would occur as the result of the approval of a <i>Planning Act</i>, <i>Condominium Act</i>, or Ontario Building Code application or upon completion of an Environmental Assessment in accordance with the Environmental Assessment Act; <ul style="list-style-type: none"> i. In Wellhead Protection Area B where the vulnerability is equal to ten (10); ii. Where a Chloride and/or Sodium Issue has been identified, in all Wellhead Protection Areas except for Wellhead Protection Area A. ii. Application on Parking Lots that would occur as the result of the approval of a <i>Planning Act</i>, <i>Condominium Act</i> or Ontario Building Code application; <ul style="list-style-type: none"> i. In Wellhead Protection Area A, for medium parking lots; ii. In Wellhead Protection Area B where the vulnerability is equal to ten (10), for medium or large parking lots; iii. Where a Chloride and/or Sodium Issue has been identified, in all Wellhead Protection Areas except for Wellhead Protection Area A, for medium and large parking lots. <p>The Risk Management Plan for application of salt on large and medium parking lots shall contain, as a minimum, management practices that achieve a performance standard equivalent to that of an accredited site under the Smart About Salt program to reduce the impact of de-icing activities and for new parking lots include design considerations for driving areas and sidewalks to reduce impacts to drinking water sources.</p> <p>The Risk Management Plan for application of salt on roadways shall include, as a minimum, measures to ensure application rate, timing and location reduce the potential for surface water runoff and groundwater infiltration and meet the objectives of Environment Canada's Code of Practice for Environmental Management of Road Salts including identification of areas where significant threats can occur as Vulnerable Areas and management practices in these areas.</p>
RW-CW-35.1 <i>Existing/Future Part IV-RMP</i>	<p>To ensure that the storage of road salt does not become or ceases to be a significant drinking water threat where this activity is or would be a significant threat, this activity shall be designated for the purpose of Section 58 of the <i>Clean Water Act</i>, 2006 and a Risk Management Plan shall be required within the following areas and for the following activities:</p> <ul style="list-style-type: none"> a. Existing: <ul style="list-style-type: none"> i. Storage; <ul style="list-style-type: none"> i. In Wellhead Protection Area A where the vulnerability is equal to ten (10) for covered storage in amounts less than one (1) tonne of salt or less than one thousand (1000) L of brine; ii. In Wellhead Protection Areas B where the vulnerability is equal to ten (10), for any uncovered storage of any amount and covered for amounts greater than or equal to one (1) tonne of salt or greater than or equal to one thousand (1000) liters of brine; iii. Where a Chloride and/or Sodium Issue has been identified, in all Wellhead Protection Areas except Wellhead Protection Area A, for covered storage in amounts greater than or equal to one (1) tonne of salt or greater than one thousand (1000) L of brine;

Policy Number	Policies Addressing Prescribed Drinking Water Threats within the Regional Municipality of Waterloo
	<p>b. Future:</p> <ul style="list-style-type: none"> i. Storage; <ul style="list-style-type: none"> i. In Wellhead Protection Area A where the vulnerability is equal to ten (10) for covered storage in amounts less than one (1) tonne of salt or less than one thousand (1000) L of brine; ii. Where a Chloride and/or Sodium Issue has been identified, in all Wellhead Protection Areas except Wellhead Protection Area A, , for covered storage in amounts greater than or equal to one (1) tonne of salt or greater than one thousand (1000) L of brine. <p>The Risk Management Plan for the handling and storage of salt or brine shall contain, as a minimum, management practices that achieve a performance standard equivalent to that of an accredited site under the Smart About Salt program to reduce the impact of de-icing activities and for new parking lots include design considerations for roads and sidewalks to reduce the impact.</p>
RW-MC-36 <i>Future Land Use Planning</i>	<p>The Regional Municipality of Waterloo and Area Municipalities shall amend their Official Plans to state that <i>Planning Act</i> and <i>Condominium Act</i> applications proposing new roads as part of a subdivision and condominium applications where salt could be applied may be permitted subject to study in accordance with the Regional Implementation Guideline for Source Water Protection Studies and a Regional Salt Impact Assessment to the satisfaction of the Regional Municipality of Waterloo:</p> <ul style="list-style-type: none"> i. In Wellhead Protection Area B where the vulnerability is equal to ten (10); ii. Where a Chloride and/or Sodium Issue has been identified, in all Wellhead Protection Areas except Wellhead Protection Area A..
RW-CW-37 <i>Existing/Future a)Incentive b)Education&Outreach</i>	<p>To provide guidance about the importance of source water protection and to promote best management practices:</p> <ul style="list-style-type: none"> a. The Regional Municipality of Waterloo shall develop and implement an incentive program for persons engaging in the following existing activities in the following areas: <ul style="list-style-type: none"> i. Application of salt on large or medium-sized parking lots: <ul style="list-style-type: none"> i. In Wellhead Protection Areas A and B where the vulnerability is equal to ten (10); ii. In Intake Protection Zone One (1); iii. Where a Chloride and/or Sodium issue has been identified, in all Wellhead Protection Areas.; ii. Storage of salt: <ul style="list-style-type: none"> i. In Wellhead Protection Areas A and B where the vulnerability is equal to ten (10); ii. Where a Chloride and/or Sodium issue has been identified, in all Wellhead Protection Areasfor storage in amounts greater than or equal to one (1) tonne of salt or greater than one thousand (1000) liters of brine <p>The incentive program shall encourage the implementation of the best management practices that form the core of the Smart About Salt program to reduce the impact of winter de-icing activities.</p>

Policy Number	Policies Addressing Prescribed Drinking Water Threats within the Regional Municipality of Waterloo
	<p>b. The Regional Municipality of Waterloo shall develop and implement an education and outreach program for persons involved in the existing and new application and handling and storage of salt in the following areas:</p> <ul style="list-style-type: none"> i. Application of salt on large or medium-sized parking lots: <ul style="list-style-type: none"> i. In Wellhead Protection Areas A and B where the vulnerability is equal to ten (10); ii. In Intake Protection Zone One (1); iii. Where a Chloride and/or Sodium issue has been identified, in all Wellhead Protection Areas.; ii. Storage of salt: <ul style="list-style-type: none"> i. In Wellhead Protection Areas A and B where the vulnerability is equal to ten (10); ii. Where a Chloride and/or Sodium Issue has been identified, in all Wellhead Protection Areas. iii. Application of salt on small parking lots and on roadways: <ul style="list-style-type: none"> i. Where a Chloride and/or Sodium issue has been identified, in all Wellhead Protection Areas; ii. In Intake Protection Zone One (1). <p>The education and outreach programs shall encourage the implementation of the best management practices that form the core of the Smart About Salt program to reduce the impact of winter de-icing activities.</p> <p>c. The Area Municipalities, in conjunction with the Regional Municipality of Waterloo, shall develop and implement an education and outreach program for persons involved in the application and storage of salt in the following areas:</p> <ul style="list-style-type: none"> i. Where a Chloride and/or Sodium Issue has been identified, in all Wellhead Protection Areas. <p>The education and outreach program shall include messages about best salt management practices to protect drinking water in their winter maintenance bylaw promotion.</p>
RW-CW-39 <i>Existing Specify Action</i>	Where a Chloride and/or Sodium Issue has been identified, the Regional Municipality of Waterloo and Area Municipalities shall review and, if necessary, revise their Salt Management Plans for the application of salt on roadways in all Wellhead Protection Areas. The Salt Management Plan shall include, as a minimum, measures to ensure application rate, timing and location reduce the potential for salt-related surface water run-off and groundwater infiltration and meet the objectives of Environment Canada's Code of Practice for Environmental Management of Road Salts including the salt vulnerable area mapping to include areas where significant threats can occur.
RW-NB-39.1 <i>Existing Specify Action</i>	Where a Chloride and/or Sodium Issue has been identified, the Ontario Ministry of Transportation should review and, if necessary, revise their Salt Management Plans for the application of salt on roadways in all Wellhead Protection Areas. The Salt Management Plan should include, as a minimum, measures to ensure application rate, timing and location reduce the potential for salt-related surface water run-off and groundwater infiltration and meet the objectives of Environment Canada's Code of Practice for Environmental Management of Road Salts including the salt vulnerable area mapping to include areas where significant threats can occur.

Policy Number	Policies Addressing Prescribed Drinking Water Threats within the Regional Municipality of Waterloo
RW-CW/NB-40 <i>Existing/Future Specify Action</i>	<p>The Regional Municipality of Waterloo and Area Municipalities and the Ontario Ministry of Transportation shall enhance road design measures in Environmental Assessments to modify, widen or expand existing roads and/or design/develop new roads to minimize the impact from any application of salt on roadways related to the development of new roads in the following area:</p> <ul style="list-style-type: none"> i. In Wellhead Protection Area B where the vulnerability is equal to ten (10); ii. Where a Chloride and/or Sodium Issue has been identified, in all Wellhead Protection Areas. The assessment should make recommendation for enhanced measures to protect drinking water sources to be carried through detailed design and construction of the road.
14. The Storage of Snow	
RW-CW-41 <i>Existing/Future Part IV-Prohibit</i>	<p>To ensure the existing and/or future storage of snow ceases to be or does not become a significant drinking water threat where this activity is or would be a significant threat, the activity is designated for the purpose of Section 57 of the <i>Clean Water Act, 2006</i> and is prohibited within the following vulnerable areas and for the following activities:</p> <ul style="list-style-type: none"> a. Existing: <ul style="list-style-type: none"> i. Storage; <ul style="list-style-type: none"> i. In Wellhead Protection Areas A and B where the vulnerability is equal to ten (10); ii. In Intake Protection Zone One (1); iii. In Intake Protection Zones Two (2) and Three (3) and Wellhead Protection Area E where the vulnerability is equal to nine (9); iv. Where a Chloride, Sodium and/or Nitrate Issue has been identified, in all Issue Contributing Areas where the vulnerability is greater than or equal to six (6), with an area greater than or equal to 0.5 hectares. b. Future: <ul style="list-style-type: none"> i. Storage; <ul style="list-style-type: none"> i. In Wellhead Protection Areas A and B where the vulnerability is equal to ten (10); ii. In Intake Protection Zone One (1); iii. In Intake Protection Zones Two (2) and Three (3) and Wellhead Protection Area E where the vulnerability is equal to nine (9); iv. Where a Chloride, Sodium and/or Nitrate Issue has been identified, in all Issue Contributing Areas where the vulnerability is greater than or equal to six (6), with an area greater than or equal to 0.5 hectares.
RW-CW-42 <i>Existing/Future Part IV-RMP</i>	<p>To ensure the existing and/or future storage of snow does not become or ceases to be a significant drinking water threat where this activity is or would be a significant threat, this activity shall be designated for the purpose of Section 58 of the <i>Clean Water Act, 2006</i> and a Risk Management Plan shall be required in the following areas and for the following activities:</p> <ul style="list-style-type: none"> a. Existing:

10.6 Schedule B: Region of Waterloo Groundwater Systems: Map A

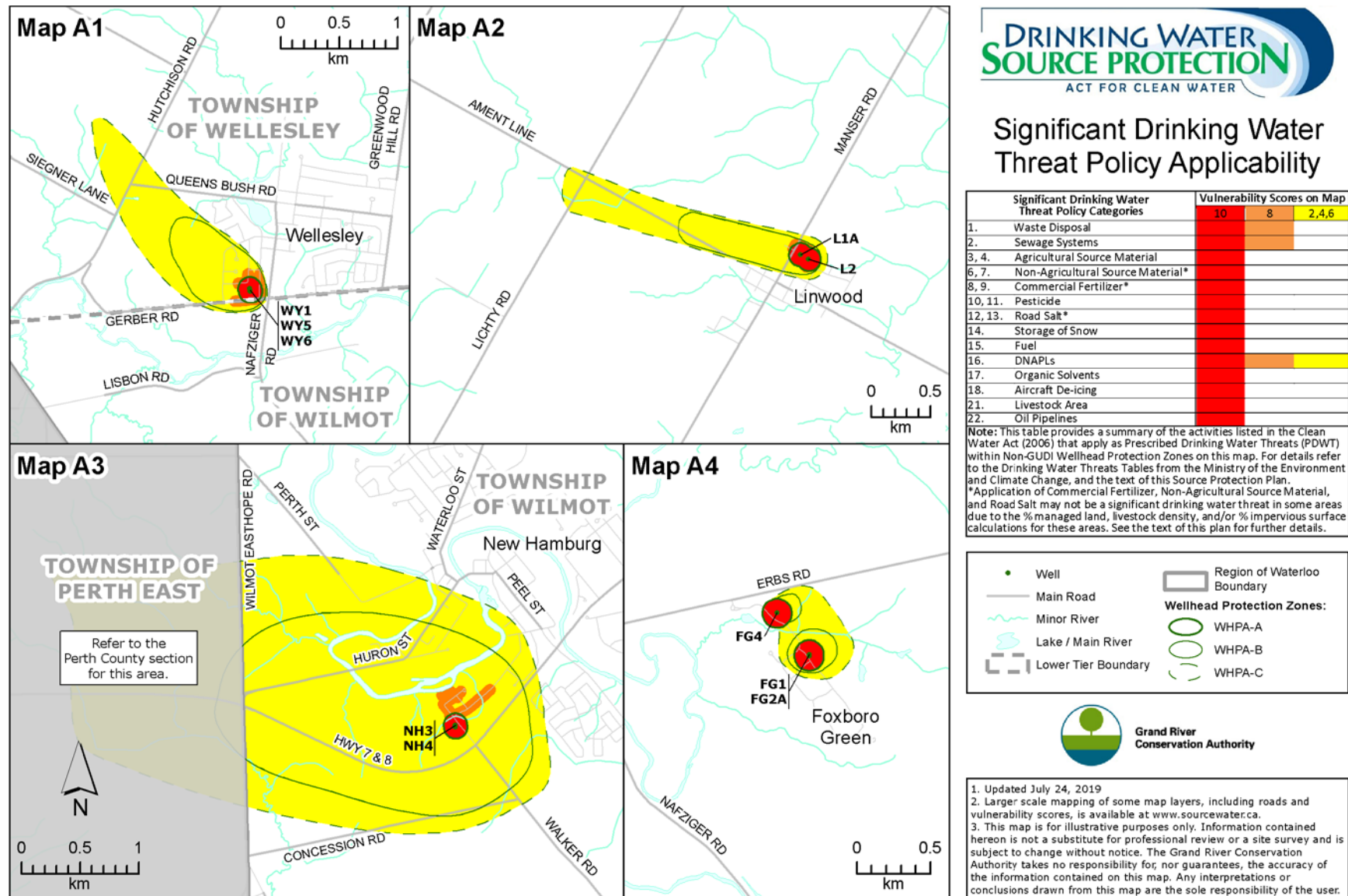


Table 1: Chloride Impacts to Groundwater - Strohvest Subdivision - Gerber Road, Township of Wellesley

	Area (ha)	Local Road length (2lane-km)	Salt Application Area (ha)	Road Salt Applied to Road (tonnes/yr)	Road Salt Applied to Other Impervious (tonnes/yr)	Chloride Application To Impervious Area (tonnes/yr)	Percentage of Chloride Infiltrated (%)	Total Chloride Infiltrated (tonnes/yr)	Total Recharge (mm/yr)	Volume Infiltrated (L/yr)	Groundwater Chloride Concentration (mg/L)
	A	B1	B2	C1	C2	D	E	F	G	H	I
Local Roads Trails & Walkways	22.0 0.7	2.1 - Note 1	- 0.6 Note 2	4.6 -	- 7.7	3.0 5.0	30 30	0.9 1.5	243 243	53,479,440 1,681,560	17 890
Total	22.7						Total	2.4		55,161,000	Average groundwater concentration 43 mg/L

Notes:

1. Total road salt applied assumes an application rate of 2.2 tonnes / 2-In-km for local roads (provided by Region of Waterloo, 2012)
2. Salt application area assumes maximum salt application for multi-blocks of 14 tonnes/ha/yr (provided by Region of Waterloo, 2012)

Column Descriptions

A	From Conceptual Draft Plan of Subdivision (DP-1)
B1	From Conceptual Draft Plan of Subdivision (DP-1)
B2	Assumes all townhouse units will directly front the local roads and trails and walkways are salted according to Note 2
C1	Assumes Region of Waterloo application rate for local roads of 2.2 tonnes / 2-In-km
C2	See B2
D	Total road salt (C) * percentage of Chloride in salt (0.648)
E	Assuming 30% incidental infiltration along roadsides and other pervious surfaces
F	Total Chloride applied (D) * percentage infiltrated (E)
G	From Post Development Waterbalance Calculations - Functional Servicing and Stormwater Management Report (Stantec, 2021)
H	Total recharge (G) * total catchment area (A)
I	Total chloride infiltrated (F) / total volume of water infiltrated (H)