220 Arkell Road – Guelph, ON
Environmental Impact Study Addendum

Final Report

April 17, 2023

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Project Number:
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Table of Contents

List of Tables

List of Appendices

Acronyms / Abbreviations

AMSL	Above Mean Sea Level
ANSI	Area of Natural Significance
cm	Centimeter
COSSARO	Committee on the Status of Species at Risk in Ontario
DBH	Diameter at Breast Height
DFO	Fisheries and Oceans Canada
EIR	Environmental Implementation Report
EIS	Environmental Impact Study
ELC	Ecological Land Classification
EOP	End of Pipe
ESA	Endangered Species Act
GRCA	Grand River Conservation Authority
ha	Hectare
LIO	Land Information Ontario
m	Meter
MBCA	Migratory Bird Convention Act
mm	Millimeter
MNR(F)	Ministry of Natural Resources (and Forestry)
NHS	Natural Heritage System
NRSI	Natural Resource Solutions Inc.
OP	Official Plan

PSW	Provincially Significant Wetland
PVC	Polyvinyl chloride
SAR	Species at Risk
SARO	Species at Risk in Ontario
SWH	Significant Wildlife Habitat
SWM	Stormwater Management
TCSS	Torrance Creek Subwatershed Study
VPV	Victoria Park Village

1 Introduction

Stantec Consulting Ltd. (Stantec) was retained by Rockpoint Properties Inc. to prepare an Environmental Impact Study (EIS) in support of a Draft Plan of Subdivision application and a Zoning By-law Amendment application to permit a mixed-use development (single-detached residential and townhouse units; the Project) located at 220 Arkell Road, in Guelph, Ontario (Subject Property). The Subject Property is approximately 7.16 hectares (ha) and is currently occupied by a single residence, manicured lawn, scattered planted trees, hedgerows, a horse pasture, and surrounded by hedgerows and the Torrance Creek Swamp Provincially Significant Wetland (PSW). The Subject Property is located south of the Victoria Park Village (VPV) development, north of the Arkell Meadows subdivision, east of the Torrance Creek Swamp PSW, and west of active agricultural lands. The Subject Property is shown on **Figure 1**, **Appendix A**.

The lands are currently designated Low-Density Greenfield Residential with Significant Natural Areas and Natural Areas under the City of Guelph Official Plan (Schedule 2, February 2022 consolidation). Natural areas on the property are associated with the Torrance Creek Swamp PSW, including Significant Natural Areas and Ecological Linkages (Schedule 4), provincially significant wetlands (also deemed as significant by the City of Guelph) and their associated buffers (Schedule 4A), significant woodlands (Schedule 4C), and significant wildlife habitat (Schedule 4E), which make up the City of Guelph Natural Heritage System (Schedule 4E). In addition to these Official Plan designations, the Torrance Creek Swamp PSW contains a deer wintering area (MNRF, 2022) and the majority of the Subject Property is regulated by the Grand River Conservation Authority (GRCA; **Figure 1**, **Appendix A**).

An Environmental Impact Study (EIS) dated August 28, 2019 presented existing conditions on the Subject Property, which included detailed results of the 2016-2018 field program, and described the significance and sensitivity of the natural features on the Subject Property and in the Study Area (i.e., lands within 120 meters (m) of the Subject Property). The 2019 EIS identified potential impacts of the proposed development on these natural features and recommended appropriate measures to avoid or minimize potential negative impacts.

The purpose of this EIS Addendum is to address City of Guelph comments (see **Appendix B1**) received on the 2019 EIS submission. The response to comments was derived through supplemental discussions, numerous iterations of the site plan and ongoing correspondence (**Appendix B2**) and meetings (minutes found in **Appendix B3**) with City staff to address outstanding water balance issues on the highly constrained Subject Property.

This EIS Addendum is supplemental to responses to City comments provided through the completion of a Comment Matrix (**Appendix C**). Topics that required additional information or clarification are included in sections found in the body of this report. This Addendum does not reiterate information presented in the previously submitted EIS that was not commented on in the City's review. Minor corrections and clarifications are addressed and explained in the Comment Matrix. This approach of utilizing a comment matrix and EIS Addendum was developed through consultation with City of Guelph during a July 6, 2021 meeting and follow-up email correspondence (**Appendix B2**).

To support required updates, the following updated supporting documentation is appended:

- Revised Water Balance Calculations (**Appendix D**)
- Tree Preservation Plan (**Appendix F**)
- Revised Preliminary Servicing, Grading and Stormwater Management Report (**Appendix G**)

1.1 Agency Consultation

1.1.1 Ministry of Environment, Conservation and Parks (MECP)

As detailed in the original EIS, candidate roost habitat to support bat species at risk (SAR) may occur within the Project footprint. To address City comment #10 (**Appendix C1)** and in recognition of correspondence between the MECP and City of Guelph (**Appendix B2**), an Information Gathering Form (IGF) was submitted to the MECP on May 26, 2022 to consult regarding bat SAR requirements for the Project. MECP responded on July 19, 2022, concluding: *Based on the ministry's review of the IGF, the conclusions that neither section 9 (species protection) nor section 10 (habitat protection) of the ESA 2007 will be contravened for SAR bats as long as the proposed mitigation measures are implemented appear reasonable and valid. Therefore, authorization under the ESA 2007 is not required for this project.* This correspondence can be found in **Appendix B4**

1.1.2 City of Guelph

Extensive consultation has occurred with the City of Guelph during the development of the original EIS. Since the August 28, 2019 EIS was submitted, additional meetings, as summarized in **Table 1-1**, have occurred between the City and Stantec. Meeting minutes are in **Appendix B-3**. These additional meetings outline the ongoing iterative process of the proposed development application.

Table 1-1: City of Guelph Meeting Record Post-EIS Submission

Date of Meeting	Meeting Attendees	Meeting Purpose
January 7, 2022	• City of Guelph (Michael Witmer, Leah Lefler) • Stantec Consulting Ltd. (Grant Whitehead, Sean Geddes, Melissa Straus, Kevin Brousseau)	Topics included the following: • Review of updated hydrogeological memo circulated January 6, 2022. • Review of monthly hydrograph. • Water Balance –Infiltration Galleries in Multi-unit Blocks • In situ Testing • Water Balance – Environmental Preliminary Concerns • Water Balance -Environmental No Negative Impact • Water Balance – How much is too much? • LIDs in the Wetland Buffer • Stormwater Management (SWM) – Wet Pond vs Dry Pond in the Ecological Linkage • Parks Consideration • Roads, Emergency Access Considerations

Table 1-1: City of Guelph Meeting Record Post-EIS Submission

Date of Meeting	Meeting Attendees	Meeting Purpose
October 27, 2021	• City of Guelph (Jim Hall, Leah Lefler) • Stantec Consulting Ltd. (Kevin Brousseau, Grant Whitehead, Bryan Weersink, Melissa Straus)	Topics included the following: • Background information • Subject Property in Context of the Sub-watershed • Water Balance – Feature Balance Overview • Water Balance – PSW • Water Balance – Torrance Creek and Torrance Creek Swamp PSW • Major Issues • Water Balance - Woodlot • Existing Site Challenges • Solution – Infiltration gallery capability (<1 m separation)
July 6, 2021	• City of Guelph (Leah Lefler) • Stantec Consulting Ltd. (Melissa Straus)	Comment review for Addendum submission.

1.1.3 Grand River Conservation Authority

The Grand River Conservation Authority (GRCA) reviewed the 2019 EIS and provided comments on stormwater management, grading, erosion and sediment control, as well as items for inclusion in the Environmental Implementation Report (EIR). GRCA recommended consultation with MECP. GRCA comments can be found in **Appendix B5.**

2 Additional Field Investigation Methods

2.1 Methods

To supplement field investigations conducted in 2016, 2017, and 2018, and address City of Guelph comments (specifically Comment #10; **Appendix C1**) additional field studies were conducted in 2021 and 2022. Survey details are provided in Table 2.1, below.

Table 2.1: 2022 Survey Dates, Time and Weather Conditions

Survey Type	Date/Time	Weather				Surveyors
		Temp. (°C)	Wind (Beaufort Scale)	Cloud (%)	PPT / PPT last 24 hours	
Monitoring Well Installation	March 10-11, 2022	-	-	-	-	Aardvark Drilling Inc.
Levelogger Installation	March 31, 2022	-	-	-	-	Stantec hydrogeological staff
Bat Habitat Assessment	April 1, 2022	1	5	100	None/Snow	M. Straus
Spring Surface Water Pooling	April 1, 2022	1	5	100	None/Snow	K. Brousseau B. Weersink G. Whitehead M. Straus
Levelogger Data Download	August 5, 2022 November 10, 2022	-	-	-	-	Stantec hydrogeological staff
Drive-point Piezometer installation	May 25, 2022	-	-	-	-	Stantec hydrogeological staff

2.1.1 Hydrogeological Investigations

To better delineate high groundwater conditions throughout the Subject Property, Stantec coordinated the installation of additional monitoring wells to complement the existing four monitoring wells (i.e., MW01-17 to MW04-17) constructed as part of the previous geotechnical investigation (Stantec, 2017). A total of six boreholes were added in areas of the Subject Property where the construction of post-development infiltration facilities are proposed. Each borehole was equipped with a single monitoring well (i.e., MW101-22 to MW106-22; **Figure 2**, **Appendix A**) containing a Solinst® Levelogger®, and they have been collecting continuous groundwater level measurements on the Subject Property since March 31, 2022.

To better understand the pre-development hydroperiod for the portion of Torrance Creek Swamp that directly lies to the southwest of the Site, Stantec established a transect of three drive-point piezometers downgradient of the future outlet of the proposed SWM facility (i.e., DP101-22 to DP103-22) (**Figure 2, Appendix A**). These drive-point piezometers are designed to track the hydroperiod of the wetland following construction of the SWM facility to assist in evaluating whether post-development stormwater discharge to the wetland could affect the long-term form and function of the wetland ecosystem. Following a walkthrough of the wetland by Stantec personnel on April 1, 2022, the drive-point piezometers were installed in two topographically low areas where standing water was observed (i.e., DP101-22 and DP103-22) and in an area of higher ground containing no standing water (i.e., DP102-22).

Full details can be found in the updated water balance memo in **Appendix D**.

2.1.2 Spring Water Pooling Survey

Stantec staff visited the Subject Property on April 1, 2022 to review existing microtopography and document ephemeral pooling areas in the Torrance Creek Swamp PSW. This included reviewing lower-lying areas for pooling water in proximity to the proposed stormwater pond outlet.

Site access permission was granted from the adjacent landowner to the west at 182 Arkell Rd. Water depth, vegetation, and microtopography were observed during the site visit. The purpose of this site visit was also to inform the placement of the drive-point piezometers by establishing a transect from the proposed SWM outlet through lower topographical areas where water pooling would be anticipated during flooding conditions.

2.1.3 Bat Maternity Roost Survey

Some bat species roost solitarily in trees or tree foliage (e.g., Hoary Bat, Red Bat, Tricolored Bat) while others form maternity colonies (i.e., Big Brown Bat, Little Brown Myotis, Northern Myotis), sometimes with more than one species in a colony. Little Brown Myotis may roost in anthropogenic (e.g., houses, churches, barns) or natural structures (e.g., tree cavities; COSWEIC 2013). Four of Ontario's bat species are designated as Endangered in the province including Tricolored Bat and each of Little Brown, Northern, and Small-footed Myotis, largely due to massive die-offs caused by an exotic fungus referred to as white-nose syndrome.

2.1.3.1 Natural Habitats

Although tree cavity roost characteristics such as tall, large diameter trees with heart rot (Olson and Barclay 2013, Jung *et al.* 2004) found in older stands (Crampton and Barclay 1998) have been well studied, the definitive identification of active roost trees has been proven to be very difficult due to roost switching behaviour and the requirement for less desirable and highly invasive study techniques. For this reason, and in consideration of the protocols provided by MECP in their July 19, 2022 correspondence (**Appendix B4**), suitable maternity roost habitat may occur in treed areas and therefore it is assumed that the PSW provides suitable bat maternity roosting habitat. As tree removal is not proposed within the PSW except for hazard trees that the City of Guelph may require, no further study is required.

Treed hedgerows and other potential habitat areas located within the development footprint were assessed for their suitability to support bat maternity roost habitat (**Figure 2, Appendix A**). This was completed originally in 2017 but due to the age of the data, an updated bat maternity roost habitat assessment was completed in 2022.

Each tree with a diameter at breast height (DBH) larger than 10 cm was assessed per provincial guidance, and the following details were recorded:

- Species
- DBH
- Height
- Presence of loose/peeling bark
- Cavity height (if present)
- Decay class
- Presence of other snags in proximity
- Open canopy

This detailed habitat information was provided to the MECP through the IGF process to facilitate their determination of requirements under the ESA.

2.1.3.2 Anthropogenic Habitats

The proposed development of the Subject Property includes the removal of the existing residence and associated outbuildings. These buildings may support bat roosting habitat.

No additional fieldwork was completed in 2022; however, Stantec continues to propose bat exit surveys at the onsite buildings the summer prior to building demolition. Exit surveys will be undertaken to assess use of these buildings in the appropriate season and avoid potential harm to any bats that may move into these structures after the studies are conducted, but prior to demolition. This approach was included in the submitted IGF and has been approved by the MECP in their July 19, 2022 correspondence (**Appendix B4**).

2.2 Results

1.1.1 Hydrogeological Investigations

Detailed explanations regarding the methods and results of the hydrogeological investigations for the Subject Property are provided in an updated memo entitled *Revised Water Balance Calculations in Response to First Submission Comments Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario* (Stantec 2023) in **Appendix D**.

A pre-development water balance assessment was split into two separate analyses given the surface water divide that exists on the Subject Property. One surface catchment area drains in a north to northeast direction across the Subject Property and neighboring property to the east towards an off-property woodlot. The remainder of the surface subcatchment areas flow in a south to southwest direction towards the Torrance Creek Swamp PSW.

In general, the hydrogeological investigations interpreted that infiltration occurs across the Subject Property under the pre-development conditions (regardless of which surface water catchment that this infiltration occurs) and that recharges the groundwater system which flows to the south and southwest towards Torrance Creek Swamp.

Post-development water balances were calculated for both unmitigated and mitigated scenarios and are discussed further in **Section 5.1.2**.

2.2.1 Spring Water Pooling Survey

The April 1, 2022 site visit identified low-lying areas with pooling water located in the buffer to the PSW, typically in proximity to the stormwater outlet and typically no larger than 10 m in diameter. Of note, the existing agricultural field is lower in topography than the adjacent PSW. A slight berm approximately 5 cm in height was noted along the edge of the agricultural field and is likely associated with repetitive cultivation (Photo 1, **Appendix E**).

An upland knoll of coniferous vegetation was noted west of the Subject Property, adjacent to the VPV development, while the central part of the PSW is comprised almost entirely of silver maple (Photo 2; **Appendix E**). The wetland was relatively dry and free of large, contiguous areas of standing water (Photo 2; **Appendix E**) although soils were saturated (Photo 3; **Appendix E**) and small pockets of water no deeper than 30 cm were observed. Vegetation became much denser in the understorey west of the silver maple swamp portion (Photo 4; **Appendix E**). Frequency of water pooling increased as did the size and depth of pooling water moving to the west.

2.2.2 Bat Maternity Roost Survey

2.2.2.1 Natural Habitats

Results of the 2022 bat roost habitat assessment identified 22 candidate maternity roost trees. Species included common apple, wild black cherry, eastern white pine, silver maple, green ash, white ash and sugar maple. Details of the twenty-two potential bat maternity roost trees are provided below in **Table 2-2** and shown on **Figure 3** (**Appendix A**)**.**

Table 2-2: Potential Bat Maternity Roost Trees within the Subject Property, 2022

Tree Number	Tree Species	Number of Cavities	DBH (cm)	Tree Height (m)	Cavity Height (m)	Bat Maternity Roost Characteristics
1	Silver Maple	1	35	18	2	Exhibits cavities/crevices Peeling bark Open canopy Early stages of decay
2	Silver Maple	1	45	18	12	Exhibits cavities/crevices Cavity/crevice is high up (>10m) Open canopy Early stages of decay To be removed
3	Green Ash	0	44	16	NA	Peeling bark Open canopy Early stages of decay
4	Common Apple	1	44	2	8	Exhibits cavities/crevices Open canopy Early stages of decay
5	Common Apple	1	35	5	3	Exhibits cavities/crevices Open canopy Early stages of decay To be removed
6	White Ash (dead)	1	19	15	2	Exhibits cavities/crevices Peeling bark Open canopy
7	Eastern White Pine	0	30	6	NA	Peeling bark Open canopy
8	Silver Maple	1	24	16	3	Exhibits cavities/crevices Open canopy Early stages of decay
9	Eastern White Pine	0	24	5	NA	Peeling bark Open canopy
10	Wild Black Cherry	0	39	15	NA	Peeling bark Open canopy Early stages of decay Large DBH?
11	Common Apple	1	40	NR	1	Open canopy Early stages of decay
12	Unknown Species (dead)	0	26	10	NA	Peeling bark Open canopy
13	Unknown Species (dead)	1	40	10	5	Exhibits cavities/crevices Open canopy
14	Common Apple	1	42	12	1	Exhibits cavities/crevices Peeling bark Open canopy Early stages of decay

Tree Number	Tree Species	Number of Cavities	DBH (cm)	Tree Height (m)	Cavity Height (m)	Bat Maternity Roost Characteristics
15	Sugar Maple	1	25	10	3	Exhibits cavities/crevices Peeling bark Open canopy
16	White Ash	0	30	16	NA	Peeling bark
17	Common Apple	0	27	8	NA	Peeling bark Two trees, avg DBH
18	Sugar Maple	1	100	20	12	Exhibits cavities/crevices Largest DBH in community Cavity/crevice is high up in three (>10m) Open canopy
19	Sugar Maple	1	45	18	4	Exhibits cavities/crevices Peeling bark Open canopy Early stages of decay
20	White Ash (dead)	0	50	17	NA	Peeling bark Open canopy Early stages of decay
21	Black Cherry	1	37	14	8	Exhibits cavities/crevices Open canopy Early stages of decay
22	White Ash (dead)	1	50	25	14	Exhibits cavities/crevices Cavity/crevice is high up in three (>10m) Open canopy

3 Natural Heritage Features

The results of the original EIS identified the following significant natural heritage features in the Study Area:

- Torrance Creek Swamp PSW (SWD4, SWD7-1)
- Significant woodlands (SWD4, SWD7-1)
- SWH for seasonal concentration areas, specialized habitat for wildlife, habitat for species of conservation concern, and animal movement corridors, specifically:
  - bat maternity colonies (SWD4, SWD7-1)
  - deer yarding areas (SWD4, SWD7-1)
  - deer winter congregation areas (SWD4, SWD7-1)
  - woodland area-sensitive bird breeding habitat (identified by others in the PSW)
  - special concern wildlife species (Eastern Wood-Pewee, SWD4)
  - amphibian movement corridors (designated 50 m wide ecological corridor along northern hedgerow)
  - deer movement corridors (designated 50 m wide ecological corridor along northern hedgerow)

Natural features are shown on **Figure 4** (**Appendix A**).

The subsequent sections on hedgerows, locally significant wildlife habitat, and endangered and threatened species were brought forward from the original EIS as additional analysis and discussion was required. Additional analysis is not required for SWH, including Ecological Linkages, as detailed in the Comment Matrix Comment # 18 (**Appendix C1**). Studies previously conducted by Dougan and Associates (2009) and incorporated into the City's OP had previously determined the significance of the designated ecological corridor. City staff had approved this approach in 2017.

3.1 Hedgerows

To clarify areas referenced in the original EIS, as well as address City comments #5, 7, and 54 (**Appendix C1**), Table 3-1 summarizes the hedgerows identified on the Subject Property consistent with the way they were referenced in the original EIS and includes background information from the Torrance Creek Subwatershed Study (TCSS; Totten Sims Hubicki Associates,1998) where available. Hedgerows on the Subject Property are shown on **Figure 3** *(***Appendix A**) and a detailed inventory of trees contained within each area is provided in the Tree Preservation Plan (TPP; **Appendix F**).

Hedgerows are defined in the OP as: *trees left standing or planted along the edge of a former or existing agricultural field or laneway to create a physical and/or visual barrier. Hedgerows also typically include trees remaining along former fence lines*.

Table 3-1: Hedgerows on the Subject Property

Original EIS Hedgerow Reference	Description	[1]Hedgerow Identifier	[1]Species Composition	[1]Crown Closure (%)	[1]Average Tree Diameter (cm)	[1]Hedgerow Quality	[1]Comments	Dougan and Associates (2009)	City of Guelph Official Plan
Northern hedgerow Northern edge (TPP)	Located along northern boundary of the Subject Property, located within the designated Ecological Linkage.	32	50% basswood 20% black cherry 20% white ash 10% hawthorn	80	22 (frequent mature basswood 50+ cm)	Moderate	All-aged hedgerow provides linkage between wetland on west and woodlot on east; forms southern boundary of golf course; many rocks piled within hedgerow	Ecological Linkage	Ecological Linkage
Southern hedgerow	Located along southern Subject Property boundary, adjacent to Arkell Meadow Subdivision.	33	70% hawthorn 20% common buckthorn 10% Tartarian honeysuckle	50	8	Low	Low quality, discontinuous shrub hedgerow	Not identified as part of the Natural Heritage System (NHS).	Not identified as part of the NHS.
Eastern hedgerow Eastern Edge (TPP)	Located along eastern Subject Property boundary.	34	70% hawthorn 20% sugar maple 10% black cherry	100	12 (occasional larger sugar maple and black cherry)	Moderate	Dense hawthorn hedgerow; provides linkage between hedgerow 32 and 33	Not identified as part of the NHS.	Not identified as part of the NHS.

[1] Excerpted from Table 4.10.1 Torrance Creek Watershed Study Hedgerow Summary, from *Torrance Creek Subwatershed Study* (Totten Sims Hubicki Associates, 1998).

Original EIS Hedgerow Reference	Description	[1]Hedgerow Identifier	[1]Species Composition	[1]Crown Closure (%)	[1]Average Tree Diameter (cm)	[1]Hedgerow Quality	[1]Comments	Dougan and Associates (2009)	City of Guelph Official Plan
North-south hedgerow	Discontinuous hedgerow, along existing driveway (FOCM5) and connects perpendicularly to hedgerow 32.	Not identified in the TCSS; HR1 (northern half) and HR2 (southern half)	N/A	N/A	N/A	N/A	N/A	HR1: Portion contained within the Ecological Linkage. Remaining portion requiring additional studies. HR2: Not identified as part of the NHS.	HR1: Portion contained within Ecological Linkage. Also Significant Woodland. HR2: not identified as part of the NHS.

Based on the analysis provided in the TCSS (Totten Sims Hubicki, 1998), hedgerow 32 was classified as having a moderate hedgerow quality. Subsequent analysis by Dougan and Associates (2009) identified this hedgerow as providing a linkage function between features (including a deer crossing of Victoria Road to the east) and was incorporated into the City's Natural Heritage System (NHS on OP, Schedule 4) as an Ecological Linkage. Additionally, one locally significant plant species, swamp gooseberry, was documented within hedgerow 32 as shown on **Figure 3** (**Appendix A**).

Hedgerow 33 was deemed to provide low quality habitat in the TCSS while 34 was determined to be of moderate quality in the TCSS, potentially providing a linkage between hedgerows 32 and 33. The subsequent analysis undertaken by Dougan and Associates (2009) did not identify either of these hedgerows as part of the NHS. The City's OP does not include these hedgerows as part of their NHS.

Hedgerows HR1 and HR2 were not identified as either a vegetation community or a hedgerow in the TCSS. However, the City of Guelph OP designates Hedgerow HR1 as part of the NHS for the City and identifies it as Significant Woodland on Schedule 4C and therefore part of the Significant Natural Areas identified on Schedule 4. Following a review of the City's definition of hedgerows, (e.g., trees along agricultural edges), designations in the TCSS, the definition of minimum woodlot sizes in the Natural Heritage Reference Manual (e.g., hedgerows are <40 m wide; MNR 2014), and results of the field studies conducted to date, hedgerow HR1 does not meet the criteria for significance.

The analysis provided by Dougan and Associates in 2009 did not identify Hedgerow HR1 as significant woodland or significant wildlife habitat, although this area was recommended for site-specific study for four (4) specific criteria, including:

- 3(d) Other wetlands not in closed depressions (kettles)
- 5(b) Locally Significant Woodland Types ≥0.5 ha
- 8(e) Habitat for Globally, Nationally and Provincially Significant Species (excluding SAR)
- 8(f) Habitat for Locally Significant Wildlife Species

The results of the field studies conducted on the 220 Arkell Subject Property did not identify any of these habitat features within hedgerow HR1.

Despite these conclusions, a portion of the hedgerow will be maintained within the 50 m wide ecological corridor.

In summary, based on the analysis of the identified hedgerows on the Subject Property by the TCSS, by Dougan and Associates (2009) and through the above analysis, only hedgerow 32 was determined to be significant and included in the NHS as an Ecological Linkage. The Ecological Linkage is further discussed in Section 5.3 with policy considerations for hedgerow removal discussed in Section 6.1.2.

3.2 Locally Significant Wildlife Habitat

City of Guelph Official Plan Criteria for Designation of habitat for significant species is defined in Policy 4.1.4.4 (1) as wildlife habitat that:

1. Supports species considered
    a. globally significant;
    b. federally significant;
    c. provincially significant; and/or
    d. locally significant, and;
2. Contributes to the quality and diversity of the Natural Heritage System but not to the extent that it is determined to be Significant Wildlife Habitat or Significant Habitat of Endangered and Threatened Species.

Through studies undertaken as part of the EIS, nine locally significant bird species were identified in the Study Area, including American Redstart, Common Raven, Cooper's Hawk, Baltimore Oriole, Eastern Kingbird, Northern Flicker, as well as three provincially rare species, including Barn Swallow, Eastern Wood-Pewee, and Common Nighthawk as shown on **Figure 3** (**Appendix A**).

Six (6) of these species (American Redstart, Cooper's Hawk, Baltimore Oriole, Eastern Kingbird, Northern Flicker, and Eastern Wood-Pewee) were documented within either the PSW or Ecological Linkage areas already protected by the Natural Heritage System. Therefore, further examination of those six (6) species is not required.

Barn Swallow was reassessed by COSSARO in 2021 where a change in status was recommended, from Threatened to Special Concern. As of January 25, 2023 the SARO List was amended and Barn Swallow is now designated Special Concern and for this report is being considered under habitat for significant species for SOCC and not SAR.

For the Common Nighthawk, Barn Swallow, and Common Raven, an examination under Policy 4.1.4.4 (1) is required.

The observed Common Nighthawk was observed flying over the VPV subdivision which was under development in 2017 when the survey was conducted and is not expected to be breeding on the Subject Property. Significant development has occurred since the 2017 observation, and the Study Area is not expected to provide suitable habitat for this species.

Although Barn Swallows were observed foraging over the residence and lawn communities during both breeding bird surveys, an assessment of the anthropogenic structures on the Subject Property (residence, pool shed, and a small barn) determined that they were not being used for breeding by this species. The Common Raven is a forest bird and was not nesting on the Subject Property but may be nesting within the PSW or surrounding woodlands. As neither of these species were observed breeding on the Subject Property, nor in significant numbers, habitat for significant species is considered absent outside of the designated Natural Heritage System.

3.3 Habitat of Endangered and Threatened Species

Species listed as threatened or endangered in the province are protected under the ESA and covered under the jurisdiction of the MECP. Suitable habitat for one group of species, bat SAR, may occur on the Subject Property, in the PSW and/or in the onsite buildings. Although candidate roost trees were identified in the hedgerows within the Subject Property, current MECP guidelines (e.g., MECP 2022) focus on forested areas as potential bat SAR habitat. Furthermore, as detailed in Section 1.1.1, the removal of candidate bat roost trees within the hedgerows was permitted by the MECP if following removal timelines. To date, the exit surveys have not been completed at the onsite buildings and as such use of these areas has not yet been confirmed.

4 Proposed Development

The Proposed Draft Plan consists of 30 single-family lots on a single road (‘Street A') with 1 multi-family townhouse block, a 0.33 ha park, temporary emergency access, a trail, and a stormwater management (SWM) pond that services only these lands. The described are shown on **Figure 3** and **4** (**Appendix A**).

A trail system is proposed for the Subject Property that is designed to include the existing driveway from Arkell Road to Dawes Avenue with a new trail from Dawes Avenue extending north along the existing driveway, around the SWM pond and connecting to the VPV subdivision, north of the Subject Property. The proposed trail will be comprised of varying widths based on the development block and additional functions required. A 4 m wide hard surface trail will be associated with the SWM facility, doubling as the maintenance access, whereas the off-road portion of the trail will comprise an 8 m corridor consisting of a 3 m wide hard surface flanked by mow strips to allow for grading and drainage on either side. A portion of the trail will be contained within a 10 m wide temporary emergency road allowance, 7 m of which will be restored post-development.

4.1 Stormwater Management

This section outlines the analysis undertaken to assess the existing hydrology for the Subject Property and design a SWM system to meet the City of Guelph criteria using traditional SWM and Low Impact Development (LID) features to achieve the water quantity and water quality targets. Details on the water balance and infiltration details can be found in **Section 5.1.2**, as it forms part of a larger discussion on impacts to features on the Subject Property.

4.1.1 Design Criteria

SWM criteria were established based on the TCSS and the characteristics of the receiving systems. The SWM criteria applied to the site are as follows:

- Water Quality – Provide quality control to meet MECP Enhanced (Level 1) criteria as identified in Table 3.2 of the Stormwater Management Planning and Design Manual (MOE 2003)
- Water Quantity – Control post-development peak flows to pre-development levels for all design events (2- to 100-year events).
- Extended Detention – Provide at least 24 hours of extended detention of the 25 mm event
- Infiltration – Evaluate the infiltration potential of the Subject Property as it relates to the existing water budget and maintain existing infiltration rates on the property where possible. The preliminary infiltration target for this area per section 6.2.2 of the TCSS is 150 mm/yr.
- Temperature – The thermal impacts of stormwater discharge to Torrance Creek be assessed and appropriate mitigation practices implemented
- Erosion and Sediment Control – Provide appropriate erosion and sediment control during construction to protect neighbouring properties and downstream receivers from potential siltation

4.1.2 Residential Development Area

Rear yard soakaway pits infiltrating roof water are proposed for all single-family homes within the subdivision. Similarly, centralized infiltration trenches are proposed for the multi-family block to direct shared roof areas to recharge locations. Rooftop runoff is considered 'clean' and does not require water quality treatment prior to infiltrating. As such, roof leaders from all homes are to be connected to the soakaway pits or centralized trenches via direct connection or via surface flow, with an overflow provided at grade for single family lots or an overflow connection to the storm sewer for the centralized trenches. Specific connection details will be provided at detailed design.

A key constraint to the proposed infiltration measures onsite is the high groundwater table. Based on the proposed grades and the seasonally high groundwater results documented in the *Hydrogeological Assessment* (Stantec 2019) and the updated water balance memo (**Appendix D**), the proposed lot level infiltration trenches are designed to maintain at least one meter of separation from the bottom of the systems to the seasonally high groundwater level. The grading of the site was updated to raise specific areas to ensure 1 m of separation was achieved for the infiltration galleries to function as designed all year round.

4.1.3 Dry Facility

The stormwater management facility was designed in consideration of recommendations made by the City of Guelph during a meeting on March 13, 2017, which included the use of a dry SWM facility to minimize barriers to wildlife movement within the ecological corridor. The dry SWM facility incorporates features to provide the required water quality and quantity control, as well as enhance infiltration to help maintain a water balance.

End-of-pipe (EOP) infiltration in the dry stormwater management facility is proposed through the use of a subsurface storage system (ADS Stormtech SC-160LP chambers) to allow for incorporation of a winter bypass. Previous iterations of the SWM design included a combined dry facility with infiltration out of the main cell; however, the latest design uses offline infiltration to reduce the infiltration of salt laden runoff by shutting the gallery off in the winter months. The EOP facility has also been raised since the previous design to allow for sufficient separation from the high groundwater level, therefore providing infiltration anytime the gallery is opened. The EOP infiltration system is sized to infiltrate the 25 mm runoff volume from the site, after accounting for rooftop infiltration. Previous iterations of the design only provided sufficient infiltration for the 10 mm rainfall event.

To reduce the thermal impact of the development on Torrance Creek, the infiltration measures discussed above will reduce runoff from the site during all events less than 25 mm in the summer months, meaning there will be negligible thermal impact on the downstream Torrance Creek system. The infiltrated water may also return to the downstream Torrance Creek system through interflow and provides a cooling effect by flowing through the cooler ground and potentially interacting with the cooler groundwater.

4.1.4 Temporary Access

In addition to the details outlined above, an assessment was conducted for the addition of a 10 m wide maintenance access path connecting to Dawes Avenue to the south of the site. Details of this assessment are documented within a letter from Stantec to the City of Guelph, sent on November 5, 2018 *Re: 220 Arkell Road – Response to Stormwater Management City comments dated July 19, 2018*, which has also been included in Appendix D of the Preliminary Servicing, Grading and Stormwater Management Report (**Appendix G**) for reference. The maintenance access increases the impervious area slightly within the Subject Property to the south, but this increase was shown to not result in a significant change in the overall water balance nor affect the function of the rear-yard infiltration trench.

Full SWM details are provided in the Preliminary Servicing, Grading, and Stormwater Management Report (**Appendix G**).

5 Potential Impacts of Development and Mitigation Recommendations

Based on City of Guelph comments (**Appendix C**), the following sections are devoted to further describing potential impacts and mitigation measures.

5.1 Torrance Creek swamp Provincially Significant Wetland

The largest natural feature on the Subject Property is the Torrance Creek Swamp PSW. Generic policy, impacts, mitigation, monitoring, were covered in the original EIS with the following sections updated in efforts to address City of Guelph comments and better address potential impacts and demonstrate no negative impacts on the adjacent PSW.

5.1.1 Feature Boundaries

As discussed in the original EIS, the portion of the onsite wetland east of the existing driveway was partially removed as part of the development of the 246 Arkell Road subdivision in 2010. GRCA online mapping has been updated since the EIS was submitted to show this removal; however, LIO mapping continues to show this wetland as part of the PSW (**Figure 1, Appendix A**).

Schedule 4A of the City of Guelph's OP continues to identify upland forest surrounding the PSW as Locally Significant Wetland, including a circular area excluded from the PSW boundary on **Figure 1** (**Appendix A**) and a portion of the adjacent hedgerow (hedgerows 32 and HR1; **Figure 3, Appendix A**). These areas are not wetlands, as determined by the GRCA in 2017 and echoed by provincial LIO mapping. For the purposes of this EIS, these areas have not been considered wetland based on detailed studies as permitted per OP Policy 4.2.1(2).

5.1.2 Water Balance

Since the submission of the original EIS, Stantec has completed a feature-based water balance assessment, found in **Appendix D**. This included a comparison of pre- to post-development runoff and infiltration rates, as well as a comparison between unmitigated and mitigated conditions. Based on the considerations outlined in the previously provided geotechnical investigation (Stantec 2017) and City of Guelph guidelines, the following stormwater management mitigative measures are proposed for the Subject Property:

- rooftop runoff from the single-family lots plus the multi-residential block will be directed to infiltration galleries
- other impervious and pervious surface runoff will be directed to end of pipe infiltration stormwater management facility.

Generalized potential hydrologic and other impacts to the Torrance Creek Swamp PSW were previously discussed in the EIS (e.g., sediment load, sedimentation, invasive species management). This section focuses on the water balance completed since the EIS, summarized in Table 5-1 below.

This section of the EIS presents only the highlights of the analysis completed in the fully detailed updated water balance memo found in **Appendix D**.

5.1.2.1 Pre-development Water Balance

Surface water flows were calculated for two main surface water catchments on the Subject Property: a catchment that flows eastward towards an off-site woodlot, and a series of combined catchments where surface water flows westward to the Torrance Creek Swamp PSW. Under the pre-development condition, the annual volume of pre-development runoff towards the east was calculated to be 4,035 m^3, equivalent to a rate of 163 mm/year. The combined catchments flowing towards the west towards the Torrance Creek Swamp PSW were calculated to generate an annual runoff volume of 10,139 m^3, equating to a rate of 225 mm/year.

Across the Subject Property, infiltration that recharges the groundwater system is interpreted to flow to the south and southwest towards the Torrance Creek Swamp PSW, regardless in which surface water catchment that infiltration occurs. Under the pre-development condition, the annual volume of infiltration occurring throughout the Subject Property is 15,433 m^3, equivalent to a recharge rate of 221 mm/year.

5.1.2.2 Post-development with No Mitigation

Under the post-development condition without mitigating factors such as infiltration galleries or stormwater management controls in place, surface flows westward towards the Torrance Creek Swamp would increase to 26,156 m3 (446 mm/year).

The combined total annual infiltration that would occur throughout the Subject Property is calculated to be 11,366 m^3, which will result in an annual infiltration deficit of 4,067 m^3 under the post-development condition (i.e., 11,366 m^3 - 15,433 m^3 = - 4,067 m^3).

5.1.2.3 Post-development with SWM mitigation

As discussed in Section 4.1, the stormwater management approach will include a variety of infiltration options including the use of infiltration galleries throughout the Subject Property at both lot level and end-of-pipe locations to mitigate the post-development infiltration deficits calculated in the unmitigated scenario. The various approaches are discussed in detail in the updated water balance memo in **Appendix D**.

With the implementation of post-development infiltration augmentation measures, the combined total annual infiltration that will occur throughout the Subject Property is calculated to be 22,786 m^3, which will result in an annual infiltration surplus of 7,353 m^3 at the Subject Property under the post-development condition (i.e., 22,786 m^3 - 15,433 m^3 [pre-development] = 7,353 m^3). The use of augmented infiltration will also reduce the post-development annual runoff surplus to the Torrance Creek Swamp PSW to 6,075 m^3.

The updated water balance was developed through an iterative process with the City of Guelph (see Section 1.1.2) and was focused on reducing an initial surplus runoff that was presented in the original EIS of 17,480 m^3/year. As summarized above and detailed in the updated water balance memo, this has been reduced to a surplus of 6,075 m^3/year. This was accomplished by exploring various solutions while working with other site constraints such as a high groundwater table, a guideline of providing 1.0 m of separation for infiltration galleries from the groundwater table was achieved at the lot level galleries, and reducing the infiltration of chlorides due to salting. The reduction in wetland runoff was achieved by revising site grading to raise the site to provide more areas for infiltration at the lot level and reconfiguring the SWM facility to implement an end of pipe infiltration system.

Changes in infiltration and runoff between pre- and post-development (mitigated and unmitigated) are summarized in Table 5-1.

Table 5-1: Torrance Creek Swamp PSW Water Balance Details

Site Condition	Annual Volumes (m^3/year)	
	Infiltration	**Runoff**
Pre-Development	10,139	8,660
Post-Development (Unmitigated)	8,648	26,156
Surplus/Deficit	-1,491	17,496
Post-Development with Infiltration (Mitigated)	20,068	14,735
Surplus/Deficit	9,930	6,075

5.1.3 Wetland Water Balance Risk Evaluation

In their correspondence of July 6, 2021 (**Appendix B2**), City staff recommended an analysis following the Toronto and Region Conservation Authority (TRCA) *Wetland Water Balance Risk Evaluation* (2017) (hereafter referred to as the Risk Evaluation) to better predict the risk of potential impacts to the Torrance Creek Swamp PSW. City staff suggested that this approach would be consistent with an analysis completed for the proposed development on the adjacent properties at 190-216 Arkell by NRSI (2021).

The first step outlined in the Risk Evaluation is to determine which wetland may be impacted by the proposed development. The subject wetland west of and adjacent to the Subject Property is the Torrance Creek Swamp PSW.

Step 2 requires the determination of the magnitude of potential hydrological change to the subject wetland. A series of criteria are used to determine a high, medium, or low magnitude of impact. **Table 5-2** summarizes the magnitude of potential hydrological change based on engineering input regarding site plan design.

Table 5-2: Evaluation of the Magnitude of Hydrologic Change – Step 2 (TRCA 2017)

Wetland Water Balance Evaluation Criteria and Thresholds				Magnitude of Change for Torrance Creek Swamp PSW	
Criteria	**High Magnitude**	**Medium Magnitude**	**Low Magnitude**	**Evaluation**	**Magnitude**
Impervious cover Score (S) within catchment, as determined using Equation 1[2]	> 25 %	10-25 %	< 10 %	S=39.4	High
Increase or decrease in catchment size	> 25 %	10-25 %	< 10 %	Increase of 29%	High
Water taking or discharge	Dewatering exceeding MOECC EASR limits (> 400,000 L/day) for > 6 months anticipated	Dewatering within MOECC EASR limits (50,000 - 400,000 L/day) for > 6 months anticipated OR Dewatering exceeding MOECC EASR limits (>400,000 L/day) for < 6 months anticipated	Dewatering within MOECC EASR limits (50,000 - 400,000 L/day) for < 6 months anticipated	Although water taking may be required during construction, details on the magnitude of dewatering are not yet available. Dewatering of the shallow groundwater table is not anticipated to impact the PSW hydrology.	N/A
Impact to recharge areas[3]	Impact (e.g. replacement with impervious cover) to >25% of locally significant recharge areas	Impact (e.g. replacement with impervious cover) to 10-25% of locally significant recharge areas	Impact (e.g. replacement with impervious cover) to < 50,000 L/day),	There are no locally significant recharge areas present.	N/A

Based on this analysis, the magnitude of hydrologic change proposed for the 220 Arkell development is high. This analysis, however, assumes a direct impact due to catchment or water input loss, and does not take into consideration the application of mitigation such as stormwater management approaches. Given that two of the categories were not ranked in terms of magnitude due to the category being inapplicable, and that mitigation will be applied, the magnitude of change is more appropriately considered as Medium.

[2] S = $IC \cdot Cdev/\mathrm{C}$ where e S is the impervious cover score, IC is the proportion of impervious cover (as a percentage between 0 and 100) proposed within the area of wetland catchment that is within the proponent's holdings, Cdev is the total development area of the catchment (in ha), and C is the size of the wetland's catchment (in ha). I all cases, the pre-development catchment is used.

[3] As defined in Table 1 of TRCA 2017.

As detailed in Table 3 of the Risk Evaluation, five categories are considered when determining wetland sensitivity, including: vegetation community, fauna species, flora species, significant wildlife habitat for hydrologically sensitive species, and hydrological classification. These categories are then classified into three sensitivities, low, medium, and high. The analysis is detailed in Table 5-3, below.

Table 5-3: Wetland Sensitivity Analysis of the Torrance Creek Swamp PSW (TRCA 2017)

Wetland Water Balance Sensitivity Evaluation Criteria				Wetland Sensitivity for Torrance Creek Swamp PSW	
Category	**High Sensitivity**	**Medium Sensitivity**	**Low Sensitivity**	**Torrance Creek Swamp PSW Conditions**	**PSW Sensitivity**
Vegetation Community (ELC)	Presence of a high sensitivity vegetation community[4]	Presence of a medium sensitivity vegetation community[1]	No high or medium sensitivity criteria satisfied[1]	SWDM4 (on Subject Property), SWDM4-3 and SWD7-1 (in Study Area) documented by Stantec are medium sensitivity. SWD4, SWD3-2, and SWM1-1 documented by NRSI (2021) are medium sensitivity.	Medium
Fauna Species	Presence of a high sensitivity species[5]	Presence of a medium sensitivity species[2]	No high or medium sensitivity criteria satisfied[2]	Four wetland/ranked species observed: 1. American Toad (medium) 2. Green Frog (medium) 3. Wood Frog (high) 4. Mallard (low) See **Appendix I1**. These sensitivities detailed in the Risk Evaluation may not correspond to the City of Guelph. For example, none of these	Medium

[4] Per TRCA 2017 Appendix 2
[5] Per TRCA 2017 Appendix 3

Wetland Water Balance Sensitivity Evaluation Criteria				Wetland Sensitivity for Torrance Creek Swamp PSW	
Category	**High Sensitivity**	**Medium Sensitivity**	**Low Sensitivity**	**Torrance Creek Swamp PSW Conditions**	**PSW Sensitivity**
				species are considered locally significant in the City of Guelph. To account for this difference in jurisdictions, sensitivity was averaged, with high and low offsetting one another and resulting in a medium designation.	
Flora Species	Presence of multiple high sensitivity species[2]	Presence of multiple medium sensitivity species OR Presence of one high sensitivity species[2]	No high or medium sensitivity criteria satisfied[2]	Thirteen wetland/ranked species observed. Low: 2 Medium:10 High: 1 See **Appendix D2.**	Medium
SWH for Hydrologically Sensitive Species	Presence of Significant Wildlife Habitat, as defined by OMNRF (2014), for high sensitivity species[2]	N/A	No high criteria satisfied	SWH for highly sensitive species (e.g., Wood Frog) absent. Although Wood Frog was documented in the movement study, insufficient numbers were documented to constitute SWH.	Low
Hydrological Classification	Isolated/palustrine AND Presence of medium or high sensitivity vegetation communities* OR medium or high sensitivity flora or fauna species[2]	Isolated/palustrine AND no medium or high sensitivity vegetation communities* AND no medium or high sensitivity flora or fauna species** present	Riverine/lacustrine	Isolated/palustrine with multiple flora species of medium sensitivity.	High

Based on the analysis provided in **Table 5-3**, overall, the Torrance Creek Swamp PSW would be characterized as medium sensitivity.

This analysis concurs with that provided in NRSI 2021, which determined that the vegetation composition is moderately sensitive to changes in hydrology and variable anuran sensitivities. Of note, NRSI documented Gray Treefrog (high sensitivity) but did not document Wood Frog (high sensitivity) during their anuran surveys. NRSI also documented American Toads (medium sensitivity) calling from the PSW.

The final step in this analysis is to utilize the results from the previous steps and apply them to a decision tree provided in the Risk Evaluation document to determine the potential risk of impact.

As the magnitude of hydrological change is characterized as medium, and the sensitivity of the wetland is designated as medium, the Torrance Creek Swamp PSW has been assigned to be of medium risk. Based on this risk assignment, monitoring of the wetland post-construction is recommended. This recommendation is included in Section 7. As discussed in Section 2.1.1, drive-point piezometers have already been installed in the PSW to obtain data for the wetland analysis and will be retained in-situ for anticipated future monitoring purposes.

5.1.4 Impact Assessment

The 2019 EIS outlined potential impacts to the PSW as possibly including the following: 1) increases in overland flow, 2) sediment load during development, 3) salt in runoff, 4) biological contamination (e.g., invasive species), 5) direct encroachment, and 6) construction impacts. Mitigation recommendations were provided in that EIS. This EIS Addendum focuses on the analysis of potential impacts associated with increased surface runoff inputs to the Torrance Creek Swamp PSW.

Overall, wetlands are resilient systems with sources of inflow (e.g., precipitation) and outflow (e.g., surface flow outlets) that change over time resulting in a fluctuating hydrology with hydroperiods that vary from year to year (Cherry, 2011). Due to weather variations that occur on a year-to-year basis, wetlands may experience months-long drought conditions in one year, only to be followed by record rainfalls the following year. Wetland systems are not static and are adaptable to such ranges in annual weather conditions which allows them to persist on the landscape.

5.1.4.1 Water Ponding

To assess the potential effects of the runoff surplus on the downstream system, an assessment of the potential increase in ponding depth within the Torrance Creek Swamp PSW caused by the maximum monthly surplus volume of runoff being discharged to this wetland was approximated. As shown on Figure 8 of the water balance memo (**Appendix D**), the portion of the Torrance Creek Swamp basin located downstream of the Subject Property is relatively flat over a 24.3 ha area (i.e., basin perimeter as defined by the 332.5 m AMSL contour) prior to discharging to a more defined and continuous watercourse downstream (i.e., Torrance Creek). Using the maximum monthly runoff surplus of 920 m^3 entering the Torrance Creek Swamp from the Subject Property (greatest monthly surplus observed from pre- to post-development in December, Figure 7**, Appendix D**), this volume of discharge would theoretically result in surface water levels within the previously mentioned basin increasing by less than 5 mm (0.005 m). This rise in the surface water level also assumes that no infiltration is occurring within the wetland; however, based on the Stantec 2019 hydrogeological work, a downward vertical hydraulic gradient is mapped below the PSW, suggesting that the wetland is a groundwater recharge feature. In fact, annual infiltration

rates beneath the wetland are reported to range from 92 mm to 345 mm, indicating that notable infiltration is occurring in the wetland and, subsequently, the 5 mm ponding depths predicted by the modelling are very conservative.

Another reason that this estimate is likely overly conservative is related to the use of contour data versus actual field conditions. Although the GRCA contour data show a flat basin, the basin actually has a fluctuating microtopography with hummocks (see Photo 3, **Appendix E**), low-lying areas that had shallow water pooling, as well as a distinct ridge at the edge of the agricultural field/PSW interface (see Photo 1 **Appendix F**). Discharge from the stormwater management facility will fill the lower lying areas first, which will spill over to the next area, generally moving from east to southwest.

Finally, although post-development runoff will be directed to the Torrance Creek Swamp PSW during those months when runoff under the pre-development condition is low to absent (e.g., May to October), the groundwater table is typically at its lowest elevations during these months. It is reasonable to assume that any ponding of this runoff during these months (i.e., when vegetation is growing) will be limited to non-existent as infiltration will not be impeded by a high groundwater table beneath the wetland. In addition, evapotranspiration processes are maximized during this time when vegetation growth and metabolic processes are at their highest. Losses due to evapotranspiration will also reduce the amount of ground saturation and affect ponding conditions. The greatest discharge of water will occur in the December to March period when the bypass is in operation. During this time of the year, vegetation is dormant, ground conditions are generally frozen and, depending on the month, there may already be a surplus of runoff on the landscape.

The additional runoff that will be delivered to the wetland annually is not anticipated to impact the depth and frequency of ponding that occurs under existing conditions, particularly during the summer growing months. As such, this influx of post-development runoff to the wetland is not expected to detrimentally impact the long-term ecological form of this feature, as discussed further in the following sections.

5.1.4.2 Vegetation Impacts

Drawing on the discussion regarding water ponding in Section 5.1.4.1, the potential impacts to vegetation were reviewed with the following conclusions:

- Wetland vegetation is adaptable and is exposed to changing hydroperiods throughout a typical year (e.g., flooding in spring, dry in summer) which can also change from year to year. Plants exhibit remarkable adaptations to deal with these stressors, including pressurized gas flow, creation of oxidized root zones, and anaerobic respiration, which allow wetland plants to remain productive under variable and otherwise stressful conditions (Cherry, 2011).
- Vegetation is dormant in the winter months, when plant cells cease activity (i.e., photosynthesis) and oxygen is not required (Hendershot, 2008). Therefore, flooding during this time would be the least impactful to a wetland. Conversely, flooding before trees go dormant could reduce the amount of time that tree roots have to store carbohydrates for the winter months (Hendershot, 2008), which would be the most impactful. Based on the monthly water balance under a mitigated scenario, ponding (if any) would be expected in the winter/early spring and the lowest likelihood

of ponding would be in the summer and fall. This timing works with the natural cycle of wetland dormancy and growth such that impacts are reduced through temporal mitigation.

- Although surface water runoff was limited in the summer months pre-construction, ponding is not expected as the recharge function of the wetland is high at that time and, subsequently, runoff is expected to infiltrate quickly. Conversely this increased water input during an isolated thunderstorm could potentially provide some relief from drought conditions in dry years.
- The wetland has been described as having a medium sensitivity to change; however, one of the main species identified in the wetland (silver maple) is known to be tolerant of flooded conditions. Research on silver maple saplings show their adaptability to flooding timing (Kaelke and Dawson, 2003) and this species is known to be able to withstand flooding for several weeks at a time, particularly in the spring (Cregg, 2013).

5.1.4.3 Wildlife

An increase of clean water inputs to the wetland will not negatively impact SWH or wildlife using the Torrance Creek Swamp PSW. For example, movement of white-tailed deer through the PSW would not be affected by water levels. A shift in vegetation is not anticipated (as discussed in Section 5.1.4.2 above) and therefore food sources will not be altered. Coniferous trees, often sought by deer during winter for thermal protection and food (Voigt *et al.*, 1997) will remain post-construction. Based on previous studies by Stantec on the Subject Property and in other parts of the City, there are portions of the Torrance Creek Swamp PSW elsewhere in the City of Guelph that are wetter year-round that those documented at 220 Arkell, and deer movement does not appear to be restricted.

Impacts to small mammals are not anticipated as a shift in vegetation that would affect food sources and general habitat conditions is not expected and there will be no barriers to movement.

Amphibian use of the wetland was limited and did not meet the criteria for SWH, presumably due to a lack of ephemeral ponding in the wetland under existing conditions observed in April 2022 and during field studies conducted in 2017. Increased spring water levels in the PSW may positively affect the amphibian community, particularly if the hydroperiod can be extended to allow sufficient time for breeding. As noted in NRSI (2021), the hydroperiod for both American Toad and Gray Treefrog is a minimum of 4 months of standing water (10-30 cm for American Toad) to allow successful breeding.

Impacts to area-sensitive (or other) breeding birds is not anticipated as changes to vegetation communities are not expected. As requested in Parks and Recreation Comment #20 (**Appendix C3**), trail construction requires the removal of hazard trees, which could reduce roosting bat and nesting bird (e.g., woodpeckers) habitat. However, removal will be timed appropriately, limited, and restricted to the edge of the PSW which is not expected to introduce additional edge effects that could impact area-sensitive or other breeding birds.

Overall, based on the analysis provided above in Sections 5.1.4, the increase in post-development runoff to the wetland is not expected to result in negative effects to the long-term ecological form or function of this feature.

5.2 Offsite Woodlot to the East

An offsite significant woodland occurs within the Study Area, on the adjacent property to the east of the Subject Property. Following a review of the 2019 EIS, City staff requested mapping updates, water balance details, and an impact assessment for this feature which is detailed in this section. General impacts such as sedimentation, invasive species management etc., were previously reported in the first EIS and are not reiterated.

5.2.1 Feature Boundaries

As this woodlot is located outside of the Subject Property, the boundary of this significant woodland has been approximated using the LIO woodlot mapping layer, and is shown on **Figure 4** (**Appendix A**). As this boundary has not been confirmed and the feature is located on property under separate ownership, a 10 m buffer was not illustrated on mapping. However, development on the Subject Property is located well outside of the 10 m minimum buffer required for significant woodlands.

5.2.2 Water Balance

As with the water balance outlined above for the Torrance Creek Swamp PSW, a comparison was made pre- and post-development, mitigation and unmitigated.

See Table 5-4 and for full details please see the water balance memo found in **Appendix D**.

Table 5-4: Water Balance for the Offsite Woodlot to the East

Site Condition	Annual Volumes (m^3/year)	
	Infiltration	**Runoff**
Pre-Development	5,294	4,035
Post-Development (unmitigated)	2,718	1,554
Surplus/Deficit	-2,756	-2,481
Post-Development with Infiltration (mitigated)	2,718	1,554
Surplus/Deficit	-2,756	-2,481

Since post-development infiltration augmentation measures are only proposed for construction in the catchments flowing westward towards the Torrance Creek Swamp PSW, the water balance calculations for flows eastward to the woodlot remain unchanged from the unmitigated scenario.

5.2.3 Impact Assessment

This woodlot is located offsite and a detailed assessment of field conditions was not possible. However, based on air photo interpretation, the woodlot appears to be an upland feature that will be linked to the PSW through the establishment of the proposed Ecological Linkage.

Based on discussions with the City of Guelph on January 7, 2022, and October 27, 2021 (**Appendix B3**), the calculated deficits in infiltration and runoff of 2,576 m^3/year and 2,481 m^3/year, respectively, are acceptable. The woodlot is an upland feature and hydrological impacts are not as consequential as for wetlands. The post-construction changes in surface flows to the woodland to the east fall within the City's general guidelines and no negative impacts are anticipated to the form or function of the woodlot (i.e., vegetation, wildlife, connectivity).

5.3 Ecological Linkage and Wildlife Movement

The City of Guelph OP designates a 50 m Ecological Linkage along the northern edge of the Subject Property, as shown on **Figure 4** (**Appendix A**). As outlined in **Section 3.1**, studies were previously conducted by Dougan and Associates (2009) and incorporated in the City's OP that determined the local significance of this ecological corridor. Additional analysis on significance is not required in this EIS Addendum.

The following components on the Subject Property are proposed within the 50 m Ecological Linkage, as shown on **Figure 4** (**Appendix A**):

- one road crossing associated with the Subject Property
- a portion of a dry SWM facility (sloped so that fencing is not required)
- a primary trail (coincident with SWM facility access).

The trail location is consistent with OP Schedule 6 and the Guelph Trail Master Plan (City of Guelph 2021). Upgrades to the trail were requested by Parks such that the trail meets City standards (3 m wide asphalt with 0.6 m mow strips) as well as SWM access requirements and therefore downgrading to a secondary trail is not permissible. Extending the trail eastward to the road crossing creates a conflict with the fixed trail location on the VPV lands. This would require the developers of VPV to run the trail easterly through existing backyards or encroach into the north edge of the Ecological Linkage to meet the road crossing, thus increasing the footprint of impact on the linkage area. Furthermore, the location of the SWM facility (and associated required access would still be located within the linkage regardless of the trail location. The proposed location is the best solution as it is consistent with previous trail planning, reduces the trail footprint within the Ecological Linkage (and NHS) and reduces an additional crossing by placing the trail coincident with the SWM facility.

5.3.1 Impact Assessment

A detailed assessment on wildlife movement on the Subject Property was included in the original EIS and focused on the results of the corridor movement study conducted in 2017. The analysis concluded that wildlife movement patterns on the Subject Property under existing conditions are complex but ultimately will be redirected to the Ecological Linkage post-construction and preserved. The EIS outlined that unmitigated impacts to amphibians and small mammals may include increased migration distances, greater predation risk and metabolic demand, road mortalities, and indirect impacts to habitat. Detailed mitigation in the original EIS included construction mitigation, buffers to development, fencing, and establishment of the ecological linkage and wildlife culvert to avoid long-term impacts. An analysis of white-tailed deer was also included, and long-term impacts to deer were not anticipated as this species is highly mobile and adaptable in suburban environments (e.g., Alverson *et al.*, 1988; Gaughan and DeStefano, 2005) where limiting factors are absent (e.g., Gaughan and DeStafano, 2002; Patterson *et al.*, 2002

When considering impacts beyond those outlined in the original EIS, it is important to note that the trail has been sited completely outside of natural features and as much as possible outside of feature buffers. Additionally, the coupling of functions of the required trail and SWM facility access is advantageous by reducing the footprint and consequently overall impacts to the Ecological Linkage.

The stormwater pond will encroach into but not bisect the Ecological Linkage. The SWM pond area will become part of the Ecological Linkage thus increasing its breadth. There are opportunities for the SWM pond to add to the ecological diversity of the linkage through appropriate design and planting. The sloping and shaping of the pond has been revised such that fencing is not required.

With the implementation of mitigation measures outlined in the original EIS and those discussed in Section 5.3.2 of this report, along with redirecting movement to the Ecological Linkage, negative impacts on wildlife movement are not anticipated.

5.3.2 Mitigation Measures

A single wildlife culvert is proposed on the Subject Property, within the Ecological Linkage. In this same area, reduced speed limits, signage, and/or traffic calming measures may be implemented to avoid collisions with white-tailed deer.

The following recommendations were included in the original EIS:

- Minimize length and maximize width/height of the culvert (i.e., strive for a high openness ratio)
- Provide as level a crossing as possible
- Consider habitat preferences of species identified during corridor studies and incorporate natural cover, substrate, and if possible, light into the design
- Consider funnel fencing and associated plantings
- Configure fencing approaches to the culvert entrance in a “v” formation (i.e., 45°)

- Foster education through the provisioning of wildlife crossing signage

A structurally diverse planting plan is proposed for the designated Ecological Linkage and includes trees, shrubs, and pollinator-friendly flowers. The planting plan will provide structural habitat variety for wildlife using this corridor between the PSW and significant woodland to the east.

To address Comment #32 (**Appendix C-1**) funnel fencing will be a mandatory component of the culvert design at the detailed design phase and the wildlife culvert will not jointly function as a drainage culvert. In addition, consideration will be given to prefabricated crossing structures, such as the Climate Tunnel KT 500.

6 Policy Conformity

An assessment of the natural heritage features and functions within the Study Area was undertaken to comply with the requirements of the following policy and guidance documents in the original EIS and included a review of:

- Provincial Policy Statement
- City of Guelph Official Plan (OP), Zoning By-law, Urban Forest Management Plan, Tree By-law, Torrance Creek Subwatershed study
- Grand River Conservation Authority Policies and Regulations
- Migratory Birds Convention Act
- Endangered Species Act

The original EIS described these policies and addressed concordance of the previous development site plan. The City of Guelph OP has been updated since the first submission and therefore the February 2022 consolidation was consulted during the preparation of this EIS Addendum. Changes to the development site plan have not changed in a way that would require updates to previously detailed policy considerations, except for some clarifications noted in **Appendix C-1** by City staff.

6.1.1 Test of No Negative Impacts

Updated impact assessments have been completed in detail for water balance impacts to the PSW (**Section 5.1.2**) and offsite woodlot (**Section 5.2**). Impacts to wildlife movement were detailed in the original EIS; however, constraints associated with development proposed within the Ecological Linkage have been further discussed in **Section 5.3.1** with additional mitigation measures for the wildlife crossing discussed in **Section 5.3.2**. Given the discussion of items in these sections of the report, no negative impacts of the proposed development are predicted on these features of the NHS.

This test of no negative impact demonstrated in this EIS Addendum is in accordance with both the Provincial Policy Statement and City of Guelph OP.

6.1.2 Urban Forest Management Plan

The City of Guelph's OP Urban Forest policy (Section 4.1.6) governs hedgerows and individual trees that are not included in the City's Natural Heritage System. Policy 4.1.6.1. encourages the retention of healthy non-invasive trees, although removal may be permitted but would be subject to the requirements of a vegetation compensation plan (per Policy 4.1.6.4).

Policy 4.1.6.3 states that: *Development and site alteration may be permitted to impact hedgerows and individual trees provided it has been demonstrated, to the satisfaction of the City, that the hedgerows and trees cannot be protected or integrated into the urban landscape.*

As detailed in the original EIS, tree preservation will occur along the perimeter of most of the north and eastern boundaries of the Subject Property (e.g., HRs 32 and 34), although tree removal is required to facilitate the road connection to VPV. Stantec considered the retention of the remaining hedgerows (e.g., HR-1-2, HR33), but this was not a viable option due to the following reasons:

- Steep grade differences between the Subject Property and Dawes Avenue to facilitate the trail as well as servicing of the townhouse block preclude retention of the hedgerow along the southern boundary (HR33)
- Grading and servicing requirements and a fixed road connection established by the previously approved VPV development to the north require removal of the northern portion of the north-south hedgerow (HR1).
- Existing cedar hedgerow along the driveway and to the north require removal due to required emergency access turning and provisioning of on-road and off-road trail connections (HR2).

These required removals were discussed through the iterative consultation process with City of Guelph staff.

7 Recommendations for Inclusion in the Environmental Implementation Report (EIR)

To address City Comments #46 (**Appendix C-1**) and #17 (**Appendix C-3**), Stantec recommends that the following tasks be included in the forthcoming EIR submission:

- A landscape/restoration planting plan that will be developed by an accredited landscape architect and that includes the following components/considerations:
  - a restoration plan for Block 20, once access has been converted to trail, that reflects the planting plans approved through the Arkell Meadows subdivision
  - enhances ecological buffers and wildlife corridors and compensates for removed trees
  - includes seeding to restore graded areas within open space areas
  - design of educational/ interpretive and stewardship materials/ signage that will be designed to meet City's accessibility guidelines
  - provide an appropriate mix of native species that will enhance vegetative cover and species diversity
  - demarcation details, consisting of 1.5 m black vinyl chain link fence and/or property markers in accordance with the City's Property Demarcation Policy and specification
  - trail and SWM system.
- Grading and drainage plans showing trail design details such as signage, trail gates, structures, etc. that are consistent with City of Guelph's current trail standards. The trail design will be consistent with Guelph Trail Master Plan standards as appropriate to the site conditions and other City Guidelines (i.e., Facility Accessibility Design Manual and Engineering Development Manual) where applicable. The trail plan, design and construction will comply with relevant regulations applicable to trail management made under the Accessibility for Ontarians with Disabilities Act.
- Hazard tree removal specifications along the trail and residential properties.
- Invasive species management plans.
- Detailed SWM design.
- Detailed monitoring program, building on recommendations in the original EIS and including effectiveness of the installed wildlife culvert (per GRCA recommendations) as well as monitoring of impacts to the PSW.
- Best management practices related to soil stockpiles, particularly those within the Ecological Linkage and buffer areas, to best support restoration plantings and NHS enhancement.
- Dewatering requirements associated with the installation of servicing.

8 Conclusions

The following information is discussed, described, and/or analyzed in this EIS Addendum:

- A PSW (i.e., Torrance Creek Swamp) and Significant Woodland occur adjacent to the Subject Property
- SWH occurs adjacent to the Subject Property:
  - bat maternity colonies (SWD4, SWD7-1)
  - deer yarding areas (SWD4, SWD7-1)
  - deer winter congregation areas (SWD4, SWD7-1)
  - woodland area-sensitive bird breeding habitat (identified by others in the PSW)
  - special concern wildlife species (Eastern Wood-Pewee, SWD4)
- A designated locally significant Ecological Linkage is identified on the Subject Property as a 50 m wide area measured from the northern property boundary
- One locally significant plant species Swamp Gooseberry (*Ribes hirtellum*) was identified on the Subject Property (field fit and/or transplant if required to facilitate the trail)
- A detailed hedgerow analysis was undertaken and determined that only one hedgerow (hedgerow 32, located within the Ecological Linkage) was significant. As discussed through the iterative site plan process, the lack of significance allows that the proposed hedgerow removal be completed in accordance with the Urban Forest Management Plan. A detailed tree inventory of the hedgerows is provided in a Tree Preservation Plan.
- Locally significant bird species were identified in the Study Area within areas scheduled for protection (e.g., American Redstart, Cooper's Hawk, Baltimore Oriole, Eastern Kingbird, Northern Flicker, Eastern Wood-Pewee) while habitat for significant species outside of the NHS including Barn Swallow, Common Nighthawk, and Common Raven was determined to be absent.
- The proposed development consists of 30 single-family lots on a single road ('Street A') with 1 multi-family townhouse block, a 0.33 ha park, temporary emergency access, a trail, and a SWM pond that services only these lands.
- The proposed SWM is comprised of a dry pond to provide water quality, extended detention, flood control of stormwater runoff, and end-of-pipe infiltration. SWM control will be augmented by a reduction in lot grades, the establishment of rear and side yard swales, and discharge of roof leaders to lot level infiltration soakaway pits to promote distributed infiltration.
- With the implementation of the post-development infiltration augmentation measures, the post-development annual runoff surplus to the Torrance Creek Swamp PSW will be reduced to 6,075 m^3 with the greatest monthly runoff surpluses occurring during the winter/spring when the EOP infiltration will be offline. Runoff surpluses in the summer are not expected to cause ponding of appreciable depth or excessive duration given that the PSW is a recharge feature with complex microtopography and extensive vegetation.

- An infiltration deficit of 2,576 m^3/year of runoff deficit of 2,481 m^3/year will occur post-construction for the offsite woodlot to the northeast. This change is considered small and in an acceptable range and will not result in impacts to this upland feature.
- Various recommendations were provided for inclusion in the required Environmental Implementation report (EIR).
- No negative impacts are anticipated to the NHS from the proposed development.

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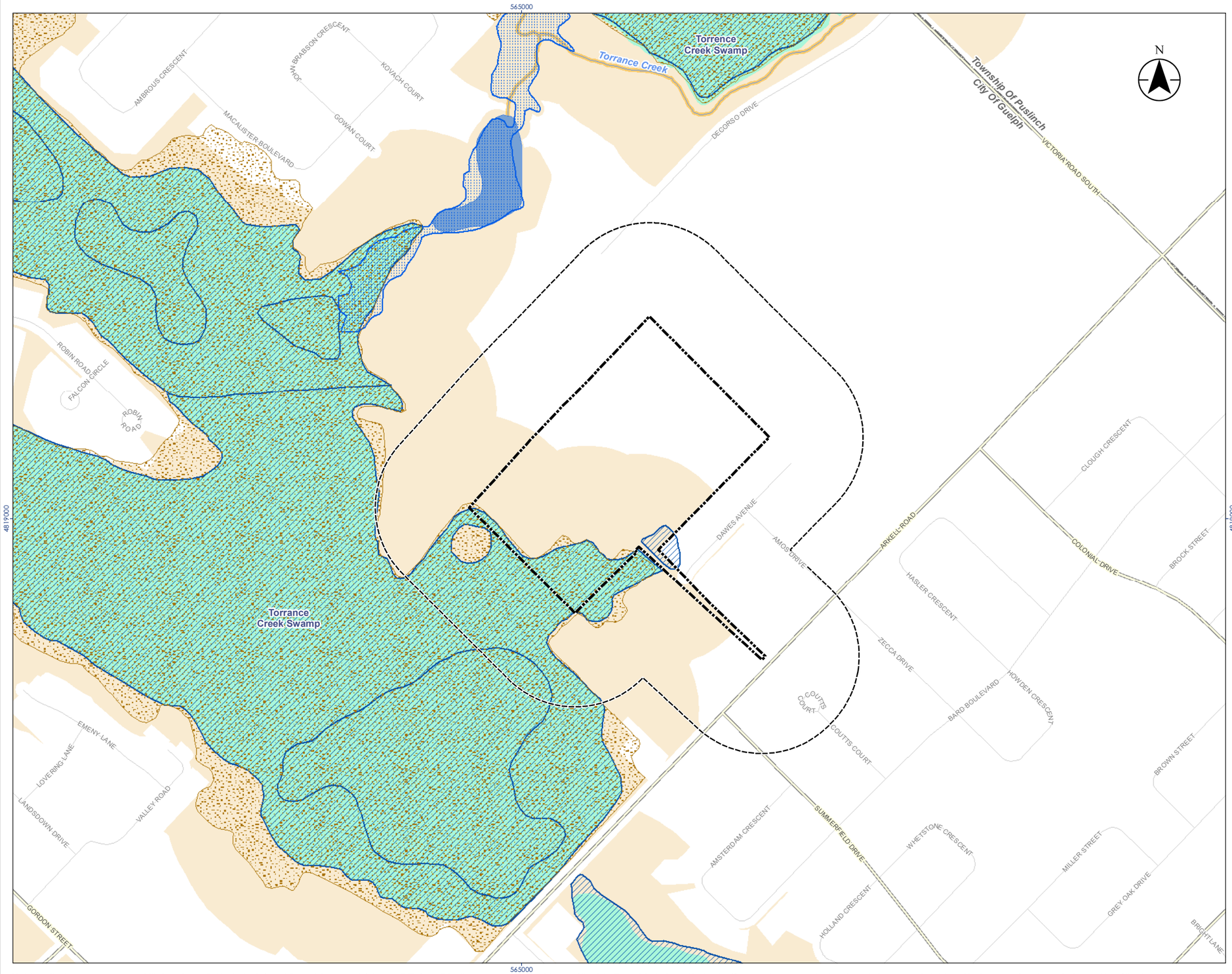
Appendix A Figures



Stantec

- Subject Property
- Study Area
- Major Road
- Minor Road
- Watercourse
- Deer Wintering Area
- Municipal Boundary - Lower Tier
- Regulatory Floodplain (GRCA)
- Regulation Limit (GRCA)
- Waterbody
- Wetland - Evaluated - Provincial (LIO)
- Wetland Boundary (GRCA)

Aquatic Resource Area

- Thermal Regime, Warm
- Thermal Regime, Cold

0 100 200 metres

1:5,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. Contains information made available under Grand River Conservation Authority's Open Data Licence v2.0.

Project Location
Guelph, Ontario

161413338 REVA
Prepared by PRM on 2022-11-17
Technical Review by MS on 2022-11-17

Client/Project
ROCKPOINT HOLDINGS INC.
ENVIRONMENTAL IMPACT STUDY
220 ARKELL ROAD, GUELPH, ONTARIO

Figure No.
1

Title
Subject Property and Environmental Features

Stantec

- Subject Property
- Monitoring Well (Stantec, 2017)
- Monitoring Well (Stantec, 2022)
- Drive-Point Piezometer (Stantec, 2022)
- Drive-Point Piezometer (Stantec, 2017)
- Bat Maternity Roost Search Area

0 50 100 metres

1:2,000 (At original document size of 11x17)

Notes

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Project Location
Guelph, Ontario

161413338 REVA
Prepared by PRM on 2023-02-22
Technical Review by MS on 2023-02-22

Client/Project
ROCKPOINT HOLDINGS INC.
ENVIRONMENTAL IMPACT STUDY
220 ARKELL ROAD, GUELPH, ONTARIO

Figure No.
2

Title
Field Study Locations, 2022

Stantec

- Subject Property
- Study Area
- Potential Bat Maternity Roost Tree

Locally Significant Plant

- Swamp/Smooth Gooseberry

Locally Significant Wildlife

- American Redstart
- Baltimore Oriole
- Common Raven
- Cooper's Hawk
- Eastern Kingbird
- Northern Flickers
- Proposed Subdivision
- Hedgerow
- ELC Boundary

ELC Communities

CUM1-1 (Mowed) - Dry-Moist Old Field Meadow Type

FOCM5 - Hedgerow

FODM11 - Hedgerow

SWD7-1 - White Birch – Poplar Organic Deciduous Swamp Type

SWDM4 - Mineral Deciduous Swamp Ecosite

OAGM1 - Annual Row Crops

OAGM4 - Open Pasture

CVI_1 - Transportation

CVI_3 - Stormwater Pond

CVR_3 - Single Family Residential

CVR_4 - Rural Property

0 100 200 m

1:3,000 (At original document size of 11x17)

Notes

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Project Location
Guelph, Ontario

161413338 REVA
Prepared by PRM on 2023-02-22
Technical Review by MS on 2023-02-22

Client/Project
ROCKPOINT HOLDINGS INC.
ENVIRONMENTAL IMPACT STUDY
220 ARKELL ROAD, GUELPH, ONTARIO

Figure No.
3

Title
Candidate Bat Maternity Roost Trees and Locally Significant Species Observations

Stantec

- Subject Property
- Study Area
- Proposed Subdivision
- Woodland Boundary (Stantec, September 2017)
- Wetland Boundary (Stantec, June 2017)
- Woodland Boundary (NRSI)
- Wetland Boundary (NRSI)
- 10m Buffer to Woodland
- 30m Buffer to Wetland
- Significant Woodland
- Significant Wildlife Habitat
- ELC Boundary

Species at Risk and Special Concern

- Barn Swallow (Threatened)
- Common Nighthawk (Special Concern)
- Eastern Wood-Pewee (Special Concern)

ELC Communities

CUM1-1 (Mowed) - Dry-Moist Old Field Meadow Type

FOCM5 - Hedgerow

FODM11 - Hedgerow

SWD7-1 - White Birch – Poplar Organic Deciduous Swamp Type

SWDM4 - Mineral Deciduous Swamp Ecosite

OAGM1 - Annual Row Crops

OAGM4 - Open Pasture

CVI_1 - Transportation

CVI_3 - Stormwater Pond

CVR_3 - Single Family Residential

CVR_4 - Rural Property

0 50 100 metres

1:3,000 (At original document size of 11x17)

Notes

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3. Orthoimagery from Firstbase Solutions 2022, Imagery data 2021.

Project Location
Guelph, Ontario

161413338 REVA
Prepared by PRM on 2023-02-22
Technical Review by MS on 2023-02-22

Client/Project
ROCKPOINT HOLDINGS INC.
ENVIRONMENTAL IMPACT STUDY
220 ARKELL ROAD, GUELPH, ONTARIO

Figure No.
4

Title
Natural Features

Appendix B Correspondence

B.1 City of Guelph EIS Comments

Internal Memo

Date	November 10, 2020
To	**Michael Witmer**
From	Leah Lefler
Service Area	Infrastructure, Development and Enterprise Services
Department	Planning and Building Services
Subject	**220 Arkell Road Draft Plan of Subdivision and Zoning By-law Amendment Application**

Environmental planning staff offer the following comments, based on the review of the following documents that pertain to the proposed Draft Plan of Subdivision and Zoning By-law Amendment application at 220 Arkell Road:

- Planning Justification Report (BSRD, December 2019);
- Preliminary Servicing, Grading and Stormwater Management Report (Stantec, May 28, 2019);
- Hydrogeological Assessment (Stantec, May 28, 2019);
- Geotechnical Report (Stantec, June 11, 2019);
- Environmental Impact Study (Stantec, August 28, 2019); and
- Tree Preservation Plan (Stantec, May 28, 2019).

Environmental Impact Study

Assessment of natural heritage features and functions

1. On March 13, 2017, Environmental Planning staff provided the following direction on how to address the small wetland pocket located to the east of the laneway: "AL pointed to the various wetland policies including: GRCA, as well as Other and Local in OPA42 and possible complexing with the PSW under Ministry of Natural Resources and Forestry policy. It was recommended that we deal with the GRCA on the small wetland piece and that the proposed detailed vegetation inventory would be required to confirm if any significant species were present in its assessment". Under section 4.2.1 on page 4.2, please note that Grand River Conservation Authority (GRCA) mapping has been updated to exclude the wetland pocket located to the east of the laneway. A portion of that wetland appears to have been filled in to accommodate grading of the approved Arkell Meadows Subdivision. Please clarify if significant species were found in the small wetland pocket.
2. Section 4.4.2.4 Wetland Delineation refers to the wetland boundary determined in the field with GRCA on June 6, 2017; however, Figure 4 also

references a Natural Resource Solutions Inc. (NRSI) wetland boundary flagged on the property to the south. The 30m buffer shown on the PSW on Figure 4 should extend to the NRSI flagged wetland boundary to accurately reflect the extent of natural heritage system on the subject property. Please update both the text and the mapping accordingly.

3. Under Section 5.1 Wetlands, please note that the wetland boundary is identified based on guidance from the provincial government (Ontario Wetland Evaluation System), and not the Ecological Land Classification system. Furthermore, where Locally Significant Wetland is contiguous with Provincially Significant Wetland, Locally Significant Wetland are considered part of the Provincially Significant Wetland, and therefore the minimum buffer applied should be 30m.
4. A detailed characterization of the current hydrology of the wetland (e.g. depth to groundwater, depth of surface water, extent and duration of flooding) should be included in a revised EIS.
5. Pre-consultation comments indicated that there are hedgerows on site which need to be considered under the City's woodland and/or urban forest policies. If the hedgerows do not meet the criteria for designation as significant or cultural woodlands, which are premised on the definition of woodland, consistent with the Official Plan, identify opportunities for protection, enhancement and restoration of trees within the Urban Forest. Demonstrate where preservation is not possible through describing the iterative process between the design team and providing examples of site designs that were not pursued and a rationale as to why not. This analysis should draw on Table 4.10.1 of the Torrance Creek Subwatershed Study, specifically, Hedgerow 32 (Ecological Linkage), Hedgerow 33 (south property line adjacent Arkell Meadows) and Hedgerow 34 (east hedgerow), and should be included in a revised EIS.
6. The EIS says that the woodland limit was determined in the field with the City of Guelph on September 7, 2017. Please include documentation of this site visit in a revised EIS.
7. Section 4.4.2.1, references three main areas: (1) eastern edge of the significant woodland/PSW; (2) northern hedgerow; and (3) eastern edge. Please include a map that illustrates where each of these areas are located. There appear to be four hedgerows in addition to the significant woodland/PSW boundary: northwest boundary (adjacent Victoria Park Village subdivision); northeast boundary (adjacent agricultural lands); southeast boundary (adjacent Arkell Meadows subdivision); and central hedgerow running northwest to southeast through the property.
8. Approximately a third of the site (2.47 ha) drains to the woodland on the adjacent property to the east. The EIS should assess if the change in drainage may impact the adjacent woodland.
9. Section 4.4.3.3 Corridor Studies does not describe the study design. For example, were pitfall traps installed along drift fencing? Please clarify.
10. Section 4.4.3.4 Bat Maternity Roost states that bat exit surveys were not conducted in 2017, and would be conducted the summer prior to tree

removal. This approach appears to assume that bat habitat could be removed, if detected at a later date. Please confirm with the Ministry of Environment, Conservation and Parks that this approach is acceptable, and include correspondence in an updated EIS.

11. Section 4.4.3.5 Breeding Birds refers to Barn Swallow surveys and the fact that no evidence of Barn Swallow nesting was noted within the study area. Please note that the General Habitat Description for Barn Swallow refers to three categories of habitat: (1) nest; (2) the area within 5m of nest; and (3) the area between 5 m and 200 m of nest. Please clarify whether or not any category of Barn Swallow habitat is present within the study area.
12. Section 4.4.3.5, Crepuscular Surveys, states that surveys were completed on June 21, 2017; however, Table 3-11 indicates that surveys were completed on June 12, 2017. Please clarify. Table 3-11 indicates 100% cloud cover on June 12, 2017. Established protocols for surveying crepuscular birds indicate that surveys should be conducted under clear conditions.
13. Under Section 5.5.2 Rare or Specialized Habitat, please confirm whether or not Candidate Significant Wildlife Habitat for area-sensitive breeding birds is present in the Torrance Creek PSW. Conclusions drawn in the sixth paragraph on page 5.4 are unclear and inconclusive.
14. Please clarify if Section 5.5.5 Locally Significant Wildlife Habitat refers to Habitat for Significant Species (i.e., per Official Plan policy 4.1.4.4) or Significant Wildlife Habitat in the form of Habitat for Species of Conservation Concern (i.e., per MNRF's Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E). Text, as currently written, is unclear.
15. Section 5.7 Significant Natural Heritage Features Summary describes the hedgerows and habitat for locally significant species as non-significant. Please include the rationale and supporting analyses for why these features are considered non-significant. For example, is Habitat for Significant Species present, based on the criteria of the Official Plan? If yes, these areas are considered part of the Natural Heritage System as Natural Areas. This section appears to focus on the PPS; however, the OP is equally relevant.
16. Please update the EIS to clearly indicate that Significant Wildlife Habitat for Area-sensitive Breeding Birds is present within the study area and map extent of SWH on Figure 4. The EIS should provide a description of the habitat and the guild of birds that it supports.
17. Please update Figure 4 to show the extent of Deer Wintering Area SWH.
18. Please assess the function of the Ecological Linkage and other hedgerows with respect to amphibian movement and the Criteria Schedules for SWH in Ecoregion 6E. If any of the hedgerows meet the criteria, they would be mapped SWH and protected as part of the natural heritage system.
19. Call surveys did not detect Wood Frog; however, wildlife movement surveys did detect Wood Frog. The EIS should be updated to evaluate the presence of Woodland Amphibian Breeding Habitat SWH within the study area. Further, if the wetland provides a woodland amphibian breeding function, the EIS should address how changes to wetland hydrology may impact this function.

20. Page 10.2 "One plant species identified during studies is considered locally rare in the City of Guelph: Swamp Gooseberry (*Ribes hirtellum*)". Figure 4 maps the location of this species in the footprint of the proposed trail connection to the Victoria Park Village subdivision. The EIS does not address the Habitat for Significant Species policies (4.1.4.4) of the Official Plan. Please update the EIS to include this policy analysis and recommendations.

Policy and analysis

21. Section 5.0 Significant Natural Heritage Features should address federal, provincial and municipal policy requirements (i.e. *Fisheries Act*, *Endangered Species Act*, 2020 Provincial Policy Statement and City of Guelph Official Plan March 2018 Consolidation). Please update accordingly.
22. Section 5.3 Valleylands states that GRCA identifies Significant Valleylands. This statement is incorrect. The City's Official Plan establishes the criteria for identifying Significant Valleylands. Those established criteria rely on GRCA's regulatory floodplain mapping. Please clarify this in text.
23. The City of Guelph's Official Plan Natural Heritage System policy appears to be interpreted incorrectly in a number of areas. On page 8.1, the EIS states that development is not permitted within Significant Natural Areas, except in accordance with the general policies. This is incorrect. Uses in the Natural Heritage System are limited to the general permitted uses; the Natural Heritage system consists of Significant Natural Areas and Natural Areas, and buffers. Feature specific policies may further restrict or expand upon general permitted uses. In other words, development and/or site alteration is restricted in the Natural Heritage System to general permitted uses and feature species uses.
24. The EIS should evaluate the need for established buffer and/or justify the use of minimum buffers.
25. The EIS appears to assume that all permitted uses are a given. Please note that policy related to permitted uses within the natural heritage system are contingent on the demonstration of no negative impact.
26. Grading and the outlet associated with the stormwater management pond is not permitted within the inner 15 m buffer of the PSW. The development concept should be revised to reflect this requirement. Further, it must be demonstrated in the EIS that there will be no negative impacts to the natural heritage system.
27. Locate the trail outside the NHS to the extent possible. The trail is designed as a primary trail, which is not a permitted use within the natural heritage system (i.e., passive recreation, as in a low-impact nature trail, is a general permitted use).

Ecological Linkage

28. The EIS should address the Ecological Linkage policies of the Official Plan (Section 4.1.3.9). For example, the EIS must include an assessment of the Ecological Linkage to confirm the configuration (i.e., location and width) based on the scale at which it is intended to function, the nature of adjacent

land use and the significance, sensitivity and ecological requirements of the species whose movements they are intended to support.

29. Section 8.2.1 City of Guelph Official Plan of the EIS states that the road connection to the Victoria Park Village subdivision was approved. Two road connections are proposed, one on the subject property and one on the adjacent property to the east, and one primary trail connection (within the NHS). The EIS must demonstrate how the site design is compatible with the protection of the Ecological Linkage and its associated function. If it cannot be demonstrated, then a new site design must be prepared that meets the policy requirements.

30. The current development proposal includes two road crossings, a stormwater management facility, and a primary trail bisecting the Ecological Linkage. This is not supportable, as it is not consistent with the protection of Ecological Linkage functions such as wildlife movement. Consistency with Official Plan policy must be demonstrated. For example, stormwater management infrastructure may be permitted in Ecological Linkages subject to certain policy tests. As proposed, the SWM pond appears to reduce the width of the Ecological Linkage to less than 10 m wide. Further, the SWM pond appears to require fencing due to the proposed slopes. A portion of the primary trail also appears to require fencing due to proposed slopes within the Ecological Linkage. This is not compatible with deer movement.

31. The proposed stormwater management pond is a dry pond with slopes that appear to require fencing around much of the perimeter, include its interface with the Ecological Linkage and natural heritage system. This essentially reduces the 50m buffer to less than 10m. The functionality of a 50m open corridor must be maintained. Therefore, a stormwater management facility with shallower slopes and no fencing that extends 10-15m into the linkage may continue to provide this function.

32. Section 7.3.3.3. Ecological Linkage and Wildlife Culvert of the EIS should note that the wildlife culvert is proposed to function as a drainage culvert and a wildlife culvert. This is unacceptable. The Ecological Linkage provides a connection for deer movement from the Torrance Creek PSW to east to the City, and also appears to have an amphibian movement function. Separate wildlife tunnels and funnel fencing are required to mitigate impacts associated with infrastructure crossing the Ecological Linkage. For example, if a road is proposed to cross the Ecological Linkage, mitigation measures to facilitate deer passage must be identified. Separate wildlife tunnels to facilitate safe passage of amphibians, reptiles and small mammals should be provided under each road crossing, and should include exclusion/funnel fencing. These mitigation measures are necessary to maintain the functionality of the linkage.

33. The EIS should note that the landscape/restoration planting plan must consider plantings that provide appropriate moisture for herps, and cover for mammals to move through to maximize the quality of the linkage, to better facilitate animal movement through this corridor.

34. Two roads are proposed, one on the subject property and one on the adjacent property, and a separate primary trail. The two road crossings are

supportable subject to the provision of appropriate mitigation measures outlined in comment 32 above. Options for incorporating the primary trail within the right of way of the westerly road crossing should be explored to reduce the number of crossings from three to two. The EIS must demonstrate that the proposed development is consistent with the Ecological Linkage policies of the Official Plan (i.e., no negative impact on deer movement). The EIS should provide high-level design details on how this would be accomplished.

Stormwater Management

35. Wetland water balance is a major outstanding component of the development application. The stormwater management outlet for the proposed development is a PSW, not a creek. The area drains to Torrance Creek, as in the site is located in the Torrance Creek subwatershed. Stormwater management must consider wetland water balance and hydroperiod. Demonstration of no negative impact to the PSW (feature) and ecological and hydrologic functions must be provided as part of the EIS. The water balance currently presented is a site-based water balance which predicts major increases in runoff and decreases in infiltration. The EIS must evaluate post-development wetland water balance relative to pre-development conditions. If you look at the wetland catchment pre to post-development, what are the results? How has the monthly wetland water balance changed? Where is the outlet? Are impacts to groundwater anticipated? What is the wetland/forest edge like in the vicinity of the outlet? How might it be impacted by the change in hydrology?
36. SWM design needs to consider back to back events. The system currently appears to be designed for the 10mm rainfall event.
37. The SWM pond is proposed as a dry pond. It is located in the portion of the site where groundwater levels are the highest. Will the pond be lined with a clay liner? How will this be compatible with infiltration from the pond?
38. In section 6.1.4 Temporary Access of the EIS, please quantify and/or provide the detailed analysis to substantiate the following statement: "this increase was shown to not result in a significant change in the overall water balance or affect the function of the rear-yard infiltration trench". Please also clarify if this is referring to the rear-yard infiltration trench in the Arkell Meadows subdivision that is proposed to be relocated.
39. In section 8.3 Grand River Conservation Authority of the EIS, it is concluded that a single culvert, that captures drainage from a fraction of the site, will maintain the recharge function of the wetland. Please provide the supporting analysis to demonstrate the accuracy of this statement.
40. The first bullet point on page 8.3 is incorrect. An infiltration deficit of 25% is anticipated, with infiltration-based LID measures incorporated into the design. A 74% increase in runoff is anticipated. What analysis has been completed to determine whether or not these surpluses are considered detrimental? Wetland water balance does not appear to have been completed. It was noted at the pre-consultation stage that "Wetland hydrology should be characterized and a wetland water balance prepared as

part of a Hydrogeological Report to support the EIS". Please include this analysis in a revised EIS.

41. The second paragraph on page 9.3 of the EIS does not appear to address issues related to the predicted infiltration deficit or runoff surplus, or the fact that the outlet is a PSW, not a watercourse. Swamps are adapted to adjust to seasonal fluctuations in groundwater and surface water conditions, based on a seasonal pattern (wet in spring, dry in summer). Impacts proposed by development must consider the natural range of variation. If development results in an increase in ponding of 10cm over an area over an extended period of time, you can expect trees to die off in that portion of swamp and convert to a shallow marsh or meadow marsh. This is the type of analysis we are looking for to determine whether or not the no negative impact test is being met. A shift from swamp to marsh would constitute a negative impact.

Recommendations

42. The EIS should include recommendations for best practices related to soil stock piles, especially for soils to be used in Ecological Linkages and Buffer Areas to best support restoration plantings and enhancement of the NHS.
43. In section 7.3.5.3 Construction Timing of the EIS, note that nest searches must be completed every 48 hrs, not every 7 days. Further, Canadian Wildlife Service (*Migratory Birds Act*) does not recommend this approach in complex habitats. Please update text to reflect these points.
44. Recommended mitigation measures, such as wildlife tunnels and fencing, habitat enhancements, etc. should be outlined in the EIS.
45. The EIS should include a section on what the forthcoming EIR should address in greater detail (e.g. monitoring requirements including monitoring of wildlife tunnels, detailed planting plans, invasive species management plans, details on restoration of Ecological Linkage and buffer areas).
46. Note that the EIR should include a restoration plan for Block 20 once access has been converted to trail, and at minimum should reflect the planting plans approved through the Arkell Meadows subdivision.
47. Dewatering requirements associated with the installation of servicing are not addressed in the EIS. The text should indicate that the EIR will address this component in greater detail when more information is available to complete the assessment. For example, where would the dewatering outlet to?

Minor comments

48. The last sentence of the third paragraph under Introduction reads "(3) recommend appropriate measures to avoid or minimize potential negative impacts." This text should be revised to reflect that the policy test is no negative impact.
49. Under section 2.2.1 Official Plan, note that uses in the natural heritage system are limited to the general permitted uses, but may be further limited or expanded upon in feature specific policies.

50. Under section 2.2.3.1 Tree By-law, note that the tree by-law was created to regulate the destruction and injury of trees, not "prevent damage or destruction".
51. Table 3-2 should be relabeled: Tree Inventory Survey Date.
52. Under section 4.4.1 Geotechnical and Hydrogeological Conditions, it is stated that groundwater is positioned at ground surface at BH01-17 and BH02-17. Groundwater is positioned at ground surface at BH01-17 and BH03-17. Please revise.
53. Under section 4.4.1 Geotechnical and Hydrogeological Conditions, please clarify what is meant by the following statement: "Under the pre-development condition, the predicted annual volume of infiltration provided to the shallow groundwater system by this wetland area represents approximately 3% of the total annual volume of infiltration that occurs across the site."
54. Section 4.4.3.1 Snake Surveys references the north-south hedgerow. It is unclear which hedgerow is being referred to here. Please clarify.
55. Section 4.4.3.2 Amphibian Surveys refers to the temporary SWM facility on the adjacent property. Please note that the stormwater management pond is permanent. Also, this section references Figure 4; however, field study locations are illustrated on Figure 3.
56. Under Section 5.2 Woodlands, the text references two significant woodlands yet Figure 4 illustrates the boundary of only one significant woodland. Please update the map to include the significant woodland boundary and established buffer for the woodland located to the east of the property. An approximate boundary based on airphoto interpretation is acceptable for this purpose.
57. Section 7.2.3 Trail, states (i.e. decreased or concentrate hydrologic input to adjacent wetland). What does this mean?
58. Under section 7.3.3.1 Tree Preservation and Compensation, note that plantings should be designed for a specific function to enhance the NHS.
59. 8.4 Migratory Birds Convention Act describes the window as April 1 to August 25. Section 7.12 describes it as April 15 to August 9. Please revise.

Tree Preservation Plan

60. Section 3.2.1, Trees to be Removed, of the Tree Preservation Plan states that "the development has been designed to maximize the development area which has resulted in minimal opportunity for tree preservation within the interior of the site". This is inconsistent with environmental planning staff direction during the finalization of the EIS terms of reference, where direction was given to assess the site based on the City's woodland and urban forest policies. Please demonstrate how the City's policies have been considered and addressed. Pre-consultation comments, on page 4 of 7, indicated that where preservation is not possible, demonstrate by describing the iterative process between the design team and providing examples of site designs that were not pursued and a rationale as to why not.

61. The tree protection zone should be based on the tree canopy width, per the City's Tree Technical Manual. Please clarify if this was the approach applied in the Tree Preservation Plan.
62. Please update item 3 and 4 to refer to Planning 519-837-5616 (planning@guelph.ca) on drawing L-904: Tree Protection and Removal Notes.
63. On drawing L-905, there appears to be a discrepancy between the Tree Impact Totals summarized in Table 2 and the number of removals indicated in Table 1. Table 2 reports 154 trees removed and 98 trees retained, whereas when you count out the number of "removed" and "retained" trees listed in Table 1, the numbers appear to be 252 and 137 respectively. Please clarify.
64. Please provide details pertaining to which trees require compensation and which trees do not require compensation to support the reported number of compensation trees required. This information is often incorporated into Tables 1 and 2.

Geotechnical Report

65. Text on p. 2 indicates that monitoring wells were installed in all boreholes. This is inconsistent with information presented on drawing No.2. Please clarify.
66. The SWM pond is proposed where groundwater levels are the highest, yet the SWM facility proposed is an infiltration-based facility. Section 8.8.1 of the Geotechnical report states that the proposed bottom of pond elevation ranges from 333.0 to 333.5 m. Table 5-2 indicates that groundwater is at approximately 333.19 m in this area, and data from loggers indicates that 333.36 m is the high-water mark. Will the pond function as a dry pond or an infiltration-based pond? Please clarify how this pond is intended to be designed and function, and update the EIS to address the impacts associated with the refined/clarified design.

Hydrogeological Study

67. Monthly Water Balance calculations have been completed based on 3 subcatchments (A, B, and C). Pre-development conditions are compared to post-development conditions within these catchments on a monthly basis. This analysis does not enable a comparison of pre- to post- development conditions as the site, under pre-development conditions, has a drainage divide, with approximately 2/3rds of drainage going to the wetland and 1/3 going to the woodland on the property to the east. To enable a proper assessment of impacts to wetland hydrology, compare post-development to pre-development conditions for the portion of the subject property located within the wetland's catchment. The analysis in Table 6 shows a 31% decrease (deficit of 4,908 m^3/yr) and a 63% increase (increase of 16,300 m^3/yr) based on a pre-development scenario that the entire site drains to the wetland when in fact it does not. This analysis should be completed and commented on in an updated EIS, including comparison of pre- to post- monthly differences.

68. The EIS should address whether or not the predicted reduction in infiltration would result in decrease base flow in Torrance Creek, or other potential negative impacts to the NHS.

Additional comments on Hydrogeological Study provided on behalf of Scott Cousins, City of Guelph Hydrogeologist

69. Section 6.1 – In previous sections, the author has stated that 80% of the site will be impervious under post-development conditions, however this section now says 39%. Please clarify as to what specifically was meant on page 5.3 and how it differs from the statement made in Section 6.1.
70. Section 6.1 – The author suggests that LID stormwater management could be potentially available, yet later in the section identifies the key constraint (high groundwater table) to implementation of these measures. Has there been a suggestion to increase the site grade in order to achieve the 1m separation between the bottom of the proposed LID measures and the high groundwater table?
71. The author discusses that the wetland is not a notable groundwater recharge area yet suggests water from site be directed to the wetland after treatment (post-development). Has the water balance accounted for the loss in recharge function of the wetland if it is required to be altered as suggested?
72. There has been no discussion provided as it relates to the hydrologic function of the wetland. One mini-piezometer nest has aided in the interpretation of downward gradients present onsite, however the author has not accounted for a water balance of the wetland itself. Please provide this water balance in order to inform whether the wetland has the capacity to convey the proposed direction of storm water to the wetland.

Leah Lefler
Environmental Planner

Infrastructure, Development and Enterprise
Planning and Building Services
Location: City Hall

519-822-1260 extension 2362
leah.lefler@guelph.ca

Copy
Melissa Aldunate, City of Guelph
Chris DeVriendt, City of Guelph
Jim Hall, City of Guelph
Scott Cousins, City of Guelph
Jyoti Pathak, City of Guelph
Fred Natolochny, GRCA
Ashley Rye, GRCA

B.2 City Correspondence

From: Leah Lefler
To: Straus, Melissa
Subject: RE: Resources
Date: Tuesday, July 6, 2021 4:42:40 PM

Thanks Melissa. Thank you for taking notes during our meeting. They look great.

I'll be in touch about the bats/MECP ASAP.

Leah

Leah Lefler (she/her), Environmental Planner
Planning and Building Services, **Infrastructure, Development and Enterprise**
City of Guelph
519-822-1260 extension 2362
leah.lefler@guelph.ca

From: Straus, Melissa <Melissa.Straus@stantec.com>
Sent: Tuesday, July 06, 2021 4:16 PM
To: Leah Lefler <Leah.Lefler@guelph.ca>
Subject: RE: Resources

Thanks Leah,

See attached meeting minutes, if you require any updates just let me know.

Thanks for the links to the resources you provided, much appreciated.

Melissa Straus M.Sc.
Terrestrial Ecologist

Direct: 519 780-8103
Mobile: 226 971-2704
Fax: 519 836-2493
Melissa.Straus@stantec.com

Stantec
1-70 Southgate Drive
Guelph ON N1G 4P5

From: Leah Lefler <Leah.Lefler@guelph.ca>
Sent: Tuesday, July 6, 2021 3:07 PM
To: Straus, Melissa <Melissa.Straus@stantec.com>
Subject: Resources

Hi Melissa,

As promised, here are links to the following documents:

- Guelph Trail Master Plan → refer to Table 3. Trail Classification. Secondary Trail type is the one that would typically be implemented in the buffer of the NHS, like at Bluewater. Design guidelines are flexible to limit impacts to the NHS.
- Gordon Street EA Project File Report and Appendix B – EIS and Tree Inventory.
- Wetland Water Balance Risk Evaluation, Appendix 2 lists wetland community types and hydrological sensitivity (High, Medium, Low).
- I learned a lot from reading TRCA's Water Balance for Protection of Natural Features too.

I will follow up with additional information on bats and MECP.

Leah

Leah Lefler, Environmental Planner
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City of Guelph
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From: Leah Lefler
To: Straus, Melissa
Subject: Info on Bats
Date: Tuesday, July 27, 2021 1:40:11 PM

Hi Melissa,

Please see below for a summary on approach for dealing with bats, bat-related surveys and the MECP. This was provided to me by a consultant and colleague:

I connected with Michelle Karam, who is the bat management biologist with MECP, about what the expected approach is with SAR bats and bat habitat moving forward. Here are the takeaways and what we should now be considering.

- Communication is already required but may vary depending on the project. In general, Southern Ontario will require more discussions and likely an IGF. Northern Ontario may be more along the lines of a 'self-assessment' with the communication of the results.
- Biologists should understand bat behaviour and habitat requirements to make justifiable rational (or all bat questions go to those who do).
- Snag surveys are no longer considered required. If you understand what vegetation communities are habitat, there is no requirement for these surveys.
    - EXEMPTION some cases in Southern Ontario will require snag surveys as habitat is much more restricted, and it really could come down to one tree.
- To document species presence/absence, we are to use the best methods. This means that recorders may not be the best method. MECP strongly supports the use of mist netting for the presence/absence of bat species.
    - Mist netting provides more detail regarding species and individuals. No survey protocol exists (i.e., one night might be suitable).
    - Acoustic recording might be cost-effective or prohibitive depending on the project, hence why there is now another option. If using acoustic recording, place detectors in the best areas, not within woodlands (unless that is the best area), for the best quality recording. There is a template for submitting recording results.
        - I am thrilled there is no more of this 'place in a wooded area' nonsense. Note that there is no guidance on the density of detectors to ensure coverage.
        - In Southern Ontario, it may still be required to place detectors near ideal trees.
        - Detectors should still be deployed in June for ten ideal weather days.

Typically, you can assume the presence of bats, and for areas where habitat is not limited (i.e., northern Ontario) generally, removal of trees will not contravene section 9. As there is plenty of other habitat the removal of a small area of trees outside roosting times is considered avoidance and therefore compliant. The rationale for these cases can be provided to MECP, and they will respond with either next steps or an email detailing agreement.

You can also assume the presence of SAR bats in Southern Ontario and that removal of trees will contravention the ESA (no other habitat for bats to go to). In these cases, an IGF should be provided

to MECP as soon as possible for the next steps/guidance.

Note in both cases, surveys to determine species may be requested, but I would consider these the go-to first steps (caveat, IF there is time) since we should have an understanding of potential SAR on sites/ completing a SAR screening. MECP will not helpful until you have done a good SAR screening and can put together an IGF. I would recommend always deploying detectors during summer surveys for appropriate and accessible Southern Ontario sites if we do not have a response from MECP yet.

Based on the above, MECP should be consulted where there is a potential for SAR bats. MECP's preferred approach is the use of the IGF, ideally based on current fieldwork.

Regarding the development files we discussed a few weeks ago, I would recommend submitting an IGF to MECP as soon as possible so that correspondence and confirmation of approach from MECP can be provided in the EIS addendums.

Leah

Leah Lefler (she/her), Environmental Planner
Planning and Building Services, **Infrastructure, Development and Enterprise**
City of Guelph
519-822-1260 extension 2362
leah.lefler@guelph.ca

October 13, 2016

Nancy Shoemaker, MCIP, RPP
Black, Shoemaker, Robinson & Donaldson Ltd.
351 Speedvale Avenue West
Guelph, Ontario
nancy@brsd.com

Dear Ms. Shoemaker

The City of Guelph would like to thank you for attending the Development Review Committee meeting on **October 5, 2016** to discuss the proposal and complete application requirements for the lands located at 220 Arkell Road.

The proposal is to develop a residential subdivision containing single detached and townhouse dwelling units. It requires both a Zoning By-Law Amendment and draft Plan of Subdivision applications.

Please see the attached form where staff have identified the required planning applications, studies and plans needed to be able to deem your formal application(s) complete under the Planning Act

If there are any questions please contact the undersigned or the specific department staff noted on the attached form.

Chris DeVriendt
Senior Planner
Planning Services
Infrastructure, Development & Enterprise

T 519-822-1260, ext. 2360
F 519-822-4632
E chris.devriendt@guleph.ca

Attachments:

1. Mandatory Pre-consultation Requirement Summary
2. Section 59 form for Source Water Protection
3. GRCA letter

City Hall
1 Carden St
Guelph, ON
Canada
N1H 3A1

T 519-822-1260
TTY 519-826-9771

guelph.ca

Mandatory Pre-Consultation Summary

Site Address: 220 Arkell Road

Existing Official Plan Designation: General Residential and significant natural area.

Conformity with City Official Plan land use designation? YES __X__ NO _____

Existing Zoning: Agicultural

Conformity with existing City's zoning? YES _____ NO ____X__

Application Type:

☒ Plan of Subdivision ☐ Official Plan Amendment

☒ Zoning By-law Amendment ☐ Plan of Condominium

Application Fees:

Application	City of Guelph	GRCA	
Official Plan Amendment			
Zoning By-law Amendment	X	X	
Plan of Subdivision	X		
Plan of Condominium			
Multiple Application Fee			

Separate cheques are required and payable to the City of Guelph and the GRCA.

Submission Requirements **Reports, Studies, Plans** (see Appendix for additional details)			
	Required	Paper Copies	Notes/Staff
Completed Application Form (s)	☒	4	With original Signature
Conceptual Site Plan	☐		
Draft Plan of Subdivision/Condo	☒	12	
Planning Justification Report/Letter	☒	12	*
Draft Proposed Zoning By-law Amendment	☒	2	
Urban Design Brief	☐		
Streetscape Plan	☐		
Building Elevations/Renderings	☐		
Functional Servicing Report	☒	4	
Preliminary Grading Plans	☒	4	
Storm Water Management Report	☒	4	
Landscape Plan	☐		
Lighting Plan/Photometric Plan	☐		
Tree Inventory/Preservation Plan	☒	14	

Traffic/Transportation Impact Study	☒	4	
Truck Turning/Movement Plan	☐		
Hydrology Study	☐		
Geotechnical/Soil Report	☐		
Agricultural Impact Assessment Report	☐		
Commercial Market Impact Study	☐		
Financial Impact Study	☐		
Noise Study	☐		
Vibration Study	☐		
Shadow Analysis	☐		
Heritage Impact Study	☐		
Archaeological Report	☒	4	
Cultural Heritage Impact Assessment	☐		
Wind Impact Study	☐		
Environmental Impact Study (EIS)	☒	14	*
Environmental Implementation Report (EIR)	☐		
Phase I Environmental Site Assessment	☒	4	
Phase II Environmental Site Assessment	☐		
Record of Site Condition Report	☐		
Source Water Protection	☒	1	Section 59 form req'd
Height Survey of Adjacent Buildings	☐		
Digital Submission of all plans/reports PDF	☒	All	
Other (Specify) GRCA	☒		See attached letter

***Additional Staff Comments:**

Planning (Chris DeVriendt):

- Staff noted at the meeting that the planning justification report should include how the site can connect with adjacent lands
- Need for, and location of a park should be considered (see Janet Sperling, Parks Planning for further details)

Environmental Planning (Adele Labbe):

- Portions of the site are identified as a Significant Natural Area in the City's Official Plan – as such an EIS is required to ensure that there are no negative impacts to protected features in relation to the proposed development;
- Consideration needs to be given to unmapped/unknown natural heritage features and areas and an application, including the EIS will need to incorporate and consider all of the City's natural heritage system policies that may apply;
- As a starting point an EIS should include: screening for SAR and SWH, feature delineation, breeding bird surveys, amphibian surveys, floral inventory (three seasons), confirm/update ELC, Tree Inventory, Preservation and Compensation Plan & incidental observations;
- The site is in the Torrance Creek subwatershed and contains portions of the Torrance Creek PSW. The Torrance Creek SWS should be used as Background information.
- Wetland hydrology should be characterized and a wetland water balance prepared as part of a Hydrogeological Report to support the EIS.
- It should be noted that the City's OP does not support development within a PSW or its established buffer, as such the draft concept plan should be revised accordingly.

- The site is also regulated under the City's Tree By-law and any tree removals would require authorization from the City. There are hedgerows on site which need to be considered under the city's woodland and/or urban forest policies.
- If the hedgerows do not meet the criteria for designation as significant or cultural woodlands, which are premised on the definition of woodland, consistent with the City's Official Plan, identify opportunities for protection, enhancement and restoration of trees within the Urban Forest. Demonstrate where preservation is not possible through describing the iterative process between the design team and providing examples of site designs that were not pursued and a rationale as to why not.

Source Water Protection (Kristin Pressey)

- A Section 59 PAR form for Source Water Protection to be completed and submitted with the planning application.

Mandatory Pre-Consultation Notes

1. The purpose of this document is to identify the information required to commence processing a complete application as set out in the *Planning Act*. Pre-consultation does not imply or suggest any decision whatsoever on the part of City staff or the Corporation of the City of Guelph to either support or refuse the application. Comments provided at a pre-consultation are preliminary and solely based on the information submitted for review at that time.

2. The *Planning Act* timelines associated with a formal full application will not begin if that application is submitted without the information identified in the mandatory pre-consultation meeting, and all of the required fees paid.

3. When a full application is made, the cheque for the application fee may be processed immediately; however this does not constitute the application being deemed complete for *Planning Act* purposes.

4. Digital copies of the all the reports/studies are required to be submitted in PDF format as part of the application. Plans are to be submitted in JPEG format.

5. The City of Guelph may require the peer review of a technical report submitted by the applicant. If this is required, the applicant will be advised and will be charged a fee equal to the cost of the peer review.

6. Once an application has been submitted, deemed complete and circulated for comments, it may be determined that additional studies/ reports or information will be required as a result of issues arising during the review of the application. The applicant will be required to provide this at their expense.

7. An application submitted without the requisite information and number of copies identified in the pre-consultation letter will not be considered a complete application.

8. This document and the comments expire 6 months from the day of signing or at the discretion of the Manager of Planning or his/her designate. If after 6 months no applications are received, staff may identify a need for an additional pre-consultation meeting prior to submission.

9. There may also be financial requirements arising from the applications, including, but not limited to, park dedication, development charges, payment of outstanding property taxes, deferred local improvements charges, costs of lifting 0.3 metre reserves, and reimbursement for road widening acquisition or road improvements.

Appendix – Reports and Plans Summary

Archaeological Assessment Report

Required for all applications in or near areas of archaeological potential, as determined by Planning Staff. A report must be completed in accordance with Provincial requirements in or near areas of archaeological potential.

Building Elevations/Renderings

Drawings or Plans which illustrate the exterior design of the building including the proposed building materials. Drawings can be either 2- dimensional or 3 dimensional. Drawing sets in colour are preferred.

Planning Justification Report

A Registered Professional Planner must submit a report providing planning justification for the proposed amendment in light of the principals, objectives and policies of the City's Official Plan and the technical studies accompanying the application. The goal of the report is to document how the proposed departure from the local policies and regulations represents good planning and is in the public interest. There are terms of reference that are to be followed as set out by the City of Guelph.

Conceptual Site Plan Layout

Concept plan showing the proposed development in context of adjacent lands including land. The plan is to show all buildings, land uses, sidewalks, driveways, street trees, street intersections and any other natural or made elements.

Cultural Heritage Impact Assessment Report

A Heritage Impact Assessment demonstrates how new development involving a heritage resource will preserve, protect, improve and/or manage heritage resources.

Draft Official Plan Amendment

The applicant must provide proposed amended Official Plan text and/or map amendments for consideration.

Draft Plan of Subdivision and/or Draft Plan of Condominium

The information required on plans is to be in accordance with the Planning Act and its regulations. All drawings are to be folded approximately to 8.5 x 11.

Stormwater Management Report
Stormwater management reports address howm water runoff is managed. There are terms of reference that are to be followed as set out by the City of Guelph.

Urban Design Brief
Required for all applications where, in the opinion of the Senior Urban Designer. Urban Design Briefs will be required in larger projects and in key areas within the City's urban structure such as the Downtown, Mixed Use Nodes, and Intensification corridors in addition to sensitive infill. The Urban Design Brief is one of the City's tools to ensure that new development has been consciously examined and evaluated on sites, and provided design solutions that are context-sensitive and respond to urban design policy context. It will also help co-ordinate and articulate how the elements of the public and private realm will work together. The Design Brief shall explain and illustrate why the proposed development represents the optimum design. Contact the City Planning department for the terms of reference for the Urban Design brief.

Streetscape Plan
A plan that identifies how the area of the property in the private realm will intergrate with the existing or proposed streetscape design in the public realm. The plan generally needs to identify paving and planting materials.

Functional Servicing Report
Functional servicing studies address how the site will be serviced. There are terms of reference that are to be followed as set out by the City of Guelph Engineering Department.

Tree Inventory and Preservation Study
Required when a site contains woodlots, tree stands or hedgerows. A tree survey must be prepared by a qualified professional, identifying all existing trees, their type, size and condition, those trees proposed to be removed and retained, and the methods to be used to ensure preservation of those trees to be retained.

Traffic/Transportation Impact Study
The purpose of a Traffic Impact Study is to identify the need for modifications to the city's transportation system regarding a new development/redevelopment by estimating the travel demands related to the development and assessing the impacts that the development would have on the present and future transportation system. Transportation Demand Management (TDM), transit and non-motorized modes will all be taken into account in estimating travel demand. . There are terms of reference that are to be followed as set out by the City of Guelph.

Truck Turning/Movement Plan
This plan illustrates how delivery trucks and /or garbage trucks will load and unload materials on the site and the location of travel through the site.

Geotechnical/Soils Report

The purpose of the investigation will be to determine the type of soil, its engineering properties, bearing capacity, soil permeability, location of groundwater, and to verify whether contamination is present. Soil investigation work is to take place after determining the proposed sewer or watermain alignment, so that the required boreholes and test pits follow the same alignment.

Noise and Vibration Study

A noise and/or vibration study determines the impact on adjacent developments and recommends mitigation measures.

Shadow Analysis Plan

Required for all applications where, in the opinion of the Planning and Building Department, the proposal may result in impacts on adjacent properties from sun shadowing.

Heritage Impact Study

Required as determined by Planning Staff for any property designated pursuant to the Ontario Heritage Act, identified on the City's Inventory of Heritage Resources, or for any property located adjacent to a designated or otherwise inventoried property.

Market Impact Study

The purpose of this study is to address the existing market and potential impacts of an application. These studies will be evaluated by the City on the basis of a peer review to be undertaken at the applicant`s expense. A site specific Terms of reference will be provided.

Grand River Conservation Authority
Resource Management Division

400 Clyde Road, P.O. Box 729
Cambridge, Ontario N1R 5W6
Phone: (519) 621-2761 ext.
Fax: (519) 621-4945
E-mail: ngarland@grandriver.ca

City of Guelph:
Development Review Committee, October 5th, 2016

RE: 220 Arkell Road

GRCA COMMENT:

- Environmental Impact Study required
- Stormwater Management Report required (quality and quantity)
- Confirmation of Wetland Boundary
- Site is located within the Torrence Creek Subwatershed and Torrence Creek Subwatershed study should be referenced.

BACKGROUND

The site is located within the Torrence Creek Subwatershed and contains a portion of the Torrence Creek Provincially Significant Wetland. Groundwater levels in the area are typically quite high and near the surface. Adjacent developments have been – Victoria Park Village (North), 246 Arkell Road (South)

Respectfully submitted

Nathan Garland, GRCA Resource Planner

**** These comments are respectfully submitted as advice and reflect resource concerns within the scope and mandate of the Grand River Conservation Authority.***

Section 59 Policy Applicability Review

1. This form is to be prepared by, or on behalf of, an Applicant for a planning development application, building permit, or for an approval by the Committee of Adjustment. The Source Water Protection Program Coordinator is available to assist Applicants in completing this form.

2. The Section 59 Policy Applicability Review form is organized to first provide an initial screening (Part 4). The Source Water Protection Program Coordinator will review the information presented in Part 4 and make a decision as to whether additional information is required for specific activities (Part 4-1 through Part 4-22). In some cases where sufficient background information is available, the Source Water Protection Program Coordinator will request the additional information at the same time as the initial screening component.

3. The completed Section 59 Policy Applicability Review form will provide the basic information necessary to allow the City of Guelph to assess whether policies under Section 59 of the *Clean Water Act*, 2006 apply. he Source Water Protection Program Coordinator or the Risk Management Official may request additional information, conduct a detailed interview or site inspection.

4. The Source Water Protection Program Coordinator will conduct a preliminary review to assess the information to determine whether Section 59 policies apply. The Risk Management Official will review the findings of the Source Water Protection Program Coordinator and make a decision with respect to whether policies of the approved Grand River Source Protection Plan for restricted land use under Section 59 of the *Clean Water Act, 2006* apply.

5. An Application for a planning approval where Section 59 policies apply will not be deemed complete until the Risk Management Official has issued a Notice – Section 59 (2) in accordance with Section 59(2) of the *Clean Water Act, 2006*. Similarly, an application for a building permit where Section 59 policies cannot be approved until the Risk Management Official has issued a Notice – Section 59 (2) in accordance with Section 59(2) of the *Clean Water Act, 2006*. The City of Guelph has established a procedure to identify applications that are for solely residential land use or for other purposes that in the opinion of the Risk Management Official do not have the potential to result in a significant drinking water threat.

Section 59 Policy Applicability Review

Part 1 – Property/Applicant Information:		
Assessment Roll Number:		
Legal Description of Property:		
Property Address:		
Postal Code (Property):		
Applicant:		
Contact Information: Phone:		
E-Mail:		
Property Owner:		
Owner Contact Information: Phone:		
E-Mail:		
Type of Application:	☐ Building Permit ☐ Site Plan Approval ☐ Plan of Subdivision ☐ Plan of Condominium	☐ Minor Variance ☐ Consent/Severance ☐ Zoning By-Law Amendment ☐ Official Plan Amendment
Brief Description (Overview) of Proposed Application for which the Review of Section 59 Policy Applicability is required:		
Has a *Section 59 Policy Applicability Review* been carried out previously for all or part of the property that is the subject of this application?: (Yes/No/Unsure)	Yes ☐ No ☐ Unsure ☐	
Has the Risk Management Official Previously Issued a Notice - S. 59 (2) for all or part of the property that is the subject of this application?: (Yes/No/Unsure)	Yes ☐ No ☐ Unsure ☐	
If a Section 59 Policy Applicability Review has been carried out previously, please identify changes to the proposed activities:		

Section 59 Policy Applicability Review

Part 2. Existing and Proposed Land Use (Check all that apply):

A. Existing Land Use

- ☐ Low Density Residential (single detached and semi-detached)
- ☐ High Density Residential (Including townhouses and apartments)
- ☐ Vacant/Undeveloped
- ☐ Other (Describe):
- ☐ Commercial – Mixed Use (including home businesses)
- ☐ Commercial - Retail
- ☐ Commercial – Food Service
- ☐ Commercial – Warehousing
- ☐ Commercial/Institutional – Office
- ☐ Institutional
- ☐ Industrial
- ☐ Agricultural
- ☐ Parks/Parkettes
- ☐ Conservation lands
- ☐ Roads/Walkways/ Parking Areas

Describe Existing Land Use/Activities:

B. Proposed Land Use

- ☐ Low Density Residential (single detached and semi-detached)
- ☐ High Density Residential (Including townhouses and apartments)
- ☐ Vacant/Undeveloped
- ☐ Other (Describe)
- ☐ Commercial – Mixed Use (including home businesses)
- ☐ Commercial - Retail
- ☐ Commercial – Food Service
- ☐ Commercial – Warehousing
- ☐ Commercial/Institutional – Office
- ☐ Institutional
- ☐ Industrial
- ☐ Agricultural
- ☐ Parks/Parkettes
- ☐ Conservation lands
- ☐ Roads/Walkways/ Parking Areas

Describe Proposed Land Use/Activities:

Provide Sketch or drawing of property to illustrate location of proposed land uses/activities:

Section 59 Policy Applicability Review

Part 3. Information on Water Sources and Vulnerable Areas

Information for Part 3 to be provided by the Source Water Protection Program Coordinator

Nearest Municipal Well(s):										
Vulnerable Areas: ***(Check all that apply)***	**Wellhead Protection Area (WHPA)**							**Intake Protection Zone**		
	A	**B**	**C**	**D**	**E**	**Q1**	**Q2**	**IPZ-1**	**IPZ-2**	**IPZ-3**
Vulnerability Scores: ***(List all that apply)***										
Issue Contributing Area:	☐ Yes ☐ No			**Issue Parameter:**			☐ TCE ☐ NIT			

Part 4. Review of Proposed Activities - Screening

Please describe the proposed Activities that may be considered to be Prescribed Drinking Water Threats under the Clean Water Act, 2006.

A response is required for each of the 21 Prescribed Drinking Water Threat Activities (#1 to 21). Information to assist applicants in filling out this form is provided in Appendix A.

Please respond to the best of your knowledge. If there is potential that one of the described activities may occur, please respond "Not Sure". If an activity may occur (Yes or Not Sure response), the Source Water Protection Program Coordinator, or the Risk Management Official may request additional information to further define the nature of the proposed activities (for each specific threat activity category (1-21). These additional questions will assist the Risk Management Official in identifying the requirement for a Risk Management Plan. Additional information may be requested as part of the negotiation of a Risk Management Plan, if required.

The Risk Management Official will review information provided on this screening and on supplemental forms submitted to described proposed activities and will make a decision regarding whether Section 58 policies apply, based on both the activity and the vulnerable areas/vulnerability scores mapped on the property.

Section 59 Policy Applicability Review

Part 4. Review of Proposed Activities - Screening

	Are any of the following Activities proposed to take place on the property? (Shaded activities may require a RMP)	No	*Yes	*Not Sure
1	The establishment, operation or maintenance of a waste disposal site within the meaning of Part V of the *Environmental Protection Act*. (See Appendix)			
2	The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage.			
3	The application of agricultural source material to land.			
4	The storage of agricultural source material.			
5	The management of agricultural source material.			
6	The application of non-agricultural source material to land.			
7	The handling and storage of non-agricultural source material.			
8	The application of commercial fertilizer to land.			
9	The handling and storage of commercial fertilizer.			
10	The application of pesticide to land.			
11	The handling and storage of pesticide.			
12	The application of road salt.			
13	The handling and storage of road salt.			
14	The storage of snow.			
15	The handling and storage of fuel.			
16	The handling and storage of a dense non-aqueous phase liquid.			
17	The handling and storage of an organic solvent.			
18	The management of runoff that contains chemicals used in the de-icing of aircraft.			
19	An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body.			
20	An activity that reduces the recharge of an aquifer.			
21	The use of land as livestock grazing or pasturing land, an outdoor confinement area, or a farm-animal yard.			
	The use, handling, or storage of liquid chemicals in containers > 1 L.			
	An existing or future Transport Pathway?			

* *Please respond to the best of your knowledge. If there is potential that one of the described activities may occur, please respond "Not Sure". If an activity may occur (Yes or Not Sure response), the Source Water Protection Program Coordinator, or the Risk Management Official, may request additional information on a "Review of Proposed Activities" form for specific threat activity categories (1-21)). These additional questions will form part of the Section 59 Policy Applicability Review and will assist the Risk Management Official in identifying the requirement for a Risk Management Plan. Further information may be requested as part of the negotiation of a Risk Management Plan, if required. Information to assist applicants in filling out this form is provided in Appendix A*

Section 59 Policy Applicability Review

Part 5 – Certification

I (We) confirm that the information presented in Parts 1-4 is accurate and complete to the best of my (our) knowledge. I (We) acknowledge that incomplete or inaccurate information may result in future involvement of the Risk Management Official to confirm that site activities conform to applicable provincial legislation and that the Risk Management Official will have powers to lay charges under Part IV of the *Clean Water Act*, 2006.

I (We) am (are) aware of our rights to appeal the decisions of the City of Guelph Risk Management Official to the Environmental Review Tribunal.

I (We) confirm that I (we) have the authority to bind the corporation that is submitting the application to which this *Section 59 Policy Applicability Review* form applies.

Name: (Please print)	
Position:	
Company:	
☐	**I am the property owner.**
☐	**I represent the property owner.**
Signed:	
Date:	

Pursuant to Section 53(3) of Ontario Regulation 287/07 made under the *Clean Water Act*, 2006, this "*Section 59 Policy Applicability Review*" form, once signed in conjunction with a Section 59 Notice, is a public document. All information received by the City of Guelph for decision-making based on this form is subject to the *Municipal Freedom of Information and Protection of Privacy Act (MFIPPA).*

For Office Use Only:	
Received By:	
Title:	
Signed:	
Date:	

Appendix A

Guidance Information for Responding to Part 4. Review of Proposed Activities - Screening

The following information provides additional information on the 21 prescribed threat activities and is to be used in making a general decision as to whether or not the proposed activity could be a threat to drinking water sources and would be regulated by the policies in the Source Protection Plan. The purpose of this review is to identify activities that may present a threat to drinking water source and thereby are to be managed in accordance with the Source Protection Plan. The Source Water Protection Coordinator or the Risk Management Official will review all submissions and follow-up to confirm that responses are consistent with standard practices for the proposed purposes.

Prescribed Threat Activity #1 - Waste

A *waste disposal site* within the meaning of Part V of the *Environmental Protection Act* (*EPA*) refers to**:**

(a) any land upon, into, in or through which, or building or structure in which, waste is deposited, disposed of, handled, stored, transferred, treated or processed, and

(b) any operation carried out or machinery or equipment used in connection with the depositing, disposal, handling, storage, transfer, treatment or processing referred to in clause (a) *[EPA S.25]*.

Waste includes ashes, garbage, refuse, domestic waste, industrial waste, or municipal refuse and such other materials as are designated in the regulations *[EPA S.25]. Additional definitions are provided in Section 1 of O. Reg. 347*

Waste Management System means any facilities or equipment used in, and any operations carried out for, the management of waste including the collection, handling, transportation, storage, processing or disposal of waste, and may include one or more waste disposal sites *[EPA S.25]*.

The majority of activities that are considered as a ***Waste Disposal Site*** require an ***Environmental Compliance Approval (ECA).*** Activities that are exempt from an *ECA* and not identified in clause (p), (q), (r), (s), (t), or (u) of the definition of hazardous waste will need to be managed by a ***Risk Management Plan***. Exempt activities include waste generators that are registered with the Ontario Hazardous Waste Information Network (HWIN). Other exemptions are listed in Section 3 of O.Reg. 347. Handling and storage of materials listed in clause (p), (q), (r), (s), (t), or (u) of the definition of hazardous waste will be managed via education and outreach.

Hazardous Waste and the activities that are exempt from an ECA are fully defined in O.Reg. 347. The primary definition of Hazardous waste is "A waste that is a,

(a) hazardous industrial waste,

(b) acute hazardous waste chemical,

(c) hazardous waste chemical,

(d) severely toxic waste,

(e) ignitable waste,

(f) corrosive waste,

Appendix A

(g) reactive waste,

(h) radioactive waste, except radioisotope wastes disposed of in a landfilling site in accordance with the written instructions of the Canadian Nuclear Safety Commission,

(i) pathological waste,

(j) leachate toxic waste, or

(k) PCB waste,

but does not include,

(l) hauled sewage,

(m) waste from the operation of a sewage works subject to the *Ontario Water Resources Act* where the works,

(i) is owned by a municipality,

(ii) is owned by the Crown or the Ontario Clean Water Agency, subject to an agreement with a municipality under the *Ontario Water Resources Act*, or

(iii) receives only waste similar in character to the domestic sewage from a household,

(n) domestic waste,

(o) incinerator ash resulting from the incineration of waste that is neither hazardous waste nor liquid industrial waste,

(p) waste that is a hazardous industrial waste, hazardous waste chemical, ignitable waste, corrosive waste, leachate toxic waste or reactive waste and that is produced in any month in an amount less than five kilograms or otherwise accumulated in an amount less than five kilograms,

(q) waste that is an acute hazardous waste chemical and that is produced in any month in an amount less than one kilogram or otherwise accumulated in an amount less than one kilogram,

(r) an empty container or the liner from an empty container that contained hazardous industrial waste, hazardous waste chemical, ignitable waste, corrosive waste, leachate toxic waste or reactive waste,

(s) an empty container of less than twenty litres capacity or one or more liners weighing, in total, less than ten kilograms from empty containers, that contained acute hazardous waste chemical,

(t) the residues or contaminated materials from the clean-up of a spill of less than five kilograms of waste that is a hazardous industrial waste, hazardous waste chemical, ignitable waste, corrosive waste, leachate toxic waste or reactive waste, or

(u) the residues or contaminated materials from the clean-up of a spill of less than one kilogram of waste that is an acute hazardous waste chemical;"

Appendix A

Prescribed Threat Activity #2 - Sewage

Sewage may contain soluble chemicals that can affect the quality of drinking water. Activities that involve the establishment, operation or maintenance of a system that collects, stores, transmits, or disposes of sewage will be managed either by ***Prescribed Instruments*** under the *Ontario Water Resources Act (OWRA)*, planning controls, or education and outreach policies. Sewage systems include facilities for stormwater management, including pipes and low impact development (LID) measures; sanitary sewage pipelines, and private sewage systems.

Prescribed Threat Activity #3 – 5, 8, 21 – Agricultural Activities

Prescribed Drinking Water Threats 3, 4, 5, 8, and 21 apply to agricultural land use. The Risk Management Official must determine whether a Prescribed Instrument under the Nutrient Management Act)is in place and conforms to the Grand River Source Protection Plan. A **Risk Management Plan** will be required for activities not managed by a Prescribed Instrument.

Agricultural Source Material (ASM) refers to material used for land application of nutrients that originate from agricultural activities such as livestock operations. ASM may include manure, livestock bedding, runoff water from animal yards or manure storage and compost (*see Nutrient Management Act, 2002* for full legal description).

Management of ASM includes operations that may generate ASM to be stored temporarily prior to off-site disposal.

Prescribed Threat Activity #6,7– Non-Agricultural Source Material

Non-Agricultural Source Materials (NASM) refers to materials applied to land as nutrients that do not originate from agricultural activities. Includes pulp and paper biosolids, sewage biosolids, non-agricultural compost and any other material capable of being applied to land as a nutrient that is not from an agricultural source (see Nutrient Management Act, 2002 for legal description). The Source Protection Plan policies only apply for NASM materials that are generated from a meat plant or sewage works.

Prescribed Threat Activity #8,9– Commercial Fertilizer

Commercial Fertilizers may contain chemicals, particularly nitrates that are soluble in water and have potential to affect ground water quality. Storage and application of commercial fertilizer are typically managed under the *Nutrient Management Act*. A ***Risk Management Plan*** may be required for storage of more than 2,500 kg of commercial fertilizer within a designated vulnerable area.

Prescribed Threat Activity #10,11 – Pesticide

Pesticides refer to any organism, substance or thing that is manufactured, represented, sold or used as a means of directly or indirectly controlling, preventing, destroying, mitigating, attracting or repelling any pest or of altering the growth, development or characteristics of any plant life that is not a pest and includes any organism, substance or thing registered under the *Pest Control Products Act (Canada). (From Pesticides Act, 1990).*

Appendix A

For the purposes of the *Clean Water Act*, the following pesticides are considered to have potential to be significant drinking water threats:

Pesticides (Active Ingredient) Referenced in the Table of Drinking Water Threats:		
MCPA	2.4-D	Pendimethalin
Mecoprop	Dichloropropene-1,3	Glyphosate
Atrazine	MCPB	Metalochlor or s-Metalochlor
Dicamba	Metalaxyl	

Application of Pesticide will be managed by a Prescribed Instrument or under the *Planning Act*. Handling of Storage of Pesticide may require a ***Risk Management Plan*** depending upon the volume stored and circumstances.

Prescribed Threat Activity #12-14 – Road Salt/Snow Disposal

Use of salt for winter road maintenance can result in release of sodium and chloride, and possibly other chemicals to surface water and groundwater. The application of road salt is currently managed through best management practices and is not regulated by the Source Protection Plan at this time. The handling and storage of more than 5,000 kg of road salt is to be prohibited in sensitive vulnerable areas (Vulnerability Score -= 10).

The storage of snow may include road salt and other contaminants that become concentrated. Snow storage may be managed by a ***Risk Management Plan*** in specific vulnerable areas. The trigger to require a Risk Management Plan is the area used for snow storage.

Prescribed Threat Activity #15– Fuels

Fuels refer to chemical mixtures refined from petroleum hydrocarbons. Fuels are typically slightly soluble in water and are often observed as a separate oil-like phase. Most common fuels are less dense than water and will float upon a water surface. Common fuels include: gasoline, diesel fuel, fuel oil (heating fuel), aviation fuel, and bunker C fuel. Fuel handling and storage may be prohibited in some vulnerable areas and may require a Risk Management Plan under some circumstances, triggered by volume stored and the vulnerability score.

Fuel handling and storage for an activity regulated under the Aggregate Resources Act will be managed via a Prescribed Instrument.

Emergency generators for a municipal facility are exempt from prohibition within WHPA-A.

Prescribed Threat Activity #16 – DNAPL

Dense Non-Aqueous Phase Liquids (DNAPL) are a class of chemicals or chemical mixtures that are slightly soluble in water and are therefore often observed as a separate "oil-like" phase in the subsurface. The oil-like phase is denser than water and as a result, the presence and migration of the DNAPL liquids is

controlled more by gravity and the distribution of permeable and conductive features in the subsurface, rather than by the groundwater flow directions. Common DNAPLs include dry cleaning fluid, industrial degreasers, creosote, For the purposes of the *Clean Water Act* the following chemical constituents of a DNAPL are considered to have potential to be significant drinking water threats:

Tetrachloroethylene/ Perchloroethylene (PCE)	Vinyl Chloride	Dioxane-1,4 (1,4-Dioxane or 1,4D))
Trichloroethylene (TCE)	Polycyclic Aromatic Hydrocarbons (PAH) *[See List in PAH Definition in Appendix B].*	

Activities that involve the handling and storage of a DNAPL are prohibited in WHPA-A and may require a ***Risk Management Plan*** in other vulnerable areas.

Prescribed Threat Activity #17– Organic Solvent

An **Organic Solvent** is considered to be any volatile organic compound that is used as a cleaning agent, dissolver, thinner, or viscosity reducer, or for a similar purpose. (From O.Reg. 153/04 -Record of Site Condition Regulation, under the Environmental Protection Act). For the purposes of the Clean Water Act the organic solvents that are considered to have potential to be significant drinking water threats include:

Carbon Tetrachloride (CT)	Methylene Chloride (MC)	Pentachlorophenol (PCPH)
Chloroform (CFM)		

Activities that involve the handling and storage of an organic solvent are prohibited in WHPA-A and may require a ***Risk Management Plan*** in some other vulnerable areas.

Prescribed Threat Activity #18 – Run-off for Deicing of Aircraft

This activity is specific in relation to water quality that may be associated with facilities constructed to de-ice aircraft. This activity is not anticipated to occur within the City of Guelph.

Prescribed Threat Activity #19,20 – Water Quantity Threats

Water taking and the construction of impervious surfaces or similar measures to divert water can reduce the quantity of water available to a municipal water supply system. Source Protection Plan policies to address significant threats related to water quantity are under development.

Water taking refers to removal of water via wells, or directly pumping from a surface water for use that is not returned to the originating water body.

Recharge can typically be reduced through the construction of impervious surfaces, such as buildings, paved roads, sidewalks, parking lots, swimming pools, etc. Current best management practices typically require diverted recharge to be returned to the subsurface to off-set the impact of the proposed construction.

Appendix A

Prescribed Threat Activity #21 – Livestock

Wastes, such as manure that are associated with livestock grazing have potential to impact groundwater and surface water resources. A ***Risk Management Plan*** may be required for Activities that involve use of land for livestock grazing, etc. where a Nutrient Management Plan or Nutrient Management Strategy (Prescribed Instrument) are not required.

Liquid Chemical Handling and Storage

The prescribed drinking water threat activities provide details regarding the specific chemicals, substances, and circumstances that are a significant drinking water threat. Part 4 – Review of Proposed Activities – Screening provides an opportunity for the applicant to advise the Source Water Protection Coordinator or Risk Management Official of chemical storage that may be associated with the proposed activities. The Source Water Protection Coordinator and Risk Management Official will request an inventory of chemical products to make a determination as to whether or not source protection plan policies will apply.

Transport Pathways

Transport Pathways are defined as "*a condition of land resulting from human activity that increases the vulnerability of a raw water supply of a drinking water system.*" The following questions are intended to identify if Transport Pathways may occur in association with the proposed Activity. In event that a Transport Pathway exists or will be created, the Risk Management Official will take this into consideration in making a determination as to whether Section 59 restrictions apply and will incorporate the findings into the Risk Management Plan or Section 59 Notice.

The following features are examples of typical transport pathways that are to be considered by the Risk Management Official:

- Drinking Water Wells
- Geotechnical boreholes
- Groundwater monitoring wells
- Oil and Gas Wells/Boreholes
- Geothermal Systems
- Man-made ponds
- Foundations > 3 m deep
- Utility Corridors with non-native backfill (sanitary sewers, storm sewers, pipelines, etc.).
- A pit or quarry for removal of soil/sand/gravel or rock
- Alterations to natural grade of more than 3 m

Part 4 – Review of Proposed Activities – Screening provides an opportunity for the applicant to advise the Source Water Protection Coordinator or Risk Management Official of existing or proposed transport pathways associated with the application.

Appendix B

Selected Definitions:

Agricultural Source Material (ASM): Material used for land application of nutrients that originate from agricultural activities such as livestock operations. May include manure, livestock bedding, runoff water from animal yards or manure storage and compost (*see Nutrient Management Act, 2002* for legal description).

Best Management Practices (BMP): Best Management Practices can be defined as those measures intended to provide an on-the-ground practical solution to pollution and other environmental impacts from all sources and sectors.

Biosolids: The by-product of domestic and commercial sewage and wastewater treatment. Also referred to as sludge.

Dense Non-Aqueous Phase Liquid (DNAPL): A class of chemicals that are slightly soluble in water and are therefore often observed as a separate "oil-like" phase in the subsurface. The oil-like phase is denser than water and as a result, the presence and migration of the DNAPL liquids is controlled more by gravity and the distribution of permeable and conductive features in the subsurface, rather than by the groundwater flow directions. For the purposes of the *Clean Water Act* the following chemical constituents of a DNAPL are considered to have potential to be significant drinking water threats.

DNAPLs Referenced in the Table of Drinking Water Threats:		
Tetrachloroethyene/ Perchloroethylene (PCE) and breakdown products	Trichloroethylene (TCE) and breakdown products	Vinyl Chloride
Dioxane-1,4 (1,4-Dioxane or 1,4D) and breakdown products	Polycyclic Aromatic Hydrocarbons (PAH) (*See List in PAH Definition in Appendix B*)	

Drinking Water Issue: A substantiated (through scientific means) condition relating to the quality of water that interferes or is anticipated to soon interfere with the use of a drinking water source by a municipal residential system or designated system (See Technical Rules 114 to 117).

Drinking Water Threat: An activity or condition that adversely affects or has the potential to adversely affect the quality or quantity of any water that is or may be used as a source of drinking water, and includes an activity or condition that is prescribed by the *Clean Water Act* as a drinking water threat.

Hazardous waste: (See O.Reg. 347 for additional information) A waste that is a,

(a) hazardous industrial waste,

(b) acute hazardous waste chemical,

(c) hazardous waste chemical,

(d) severely toxic waste,

(e) ignitable waste,

(f) corrosive waste,

Appendix B

(g) reactive waste,

(h) radioactive waste, except radioisotope wastes disposed of in a landfilling site in accordance with the written instructions of the Canadian Nuclear Safety Commission,

(i) pathological waste,

(j) leachate toxic waste, or

(k) PCB waste,

but does not include,

(l) hauled sewage,

(m) waste from the operation of a sewage works subject to the *Ontario Water Resources Act* where the works,

(i) is owned by a municipality,

(ii) is owned by the Crown or the Ontario Clean Water Agency, subject to an agreement with a municipality under the *Ontario Water Resources Act*, or

(iii) receives only waste similar in character to the domestic sewage from a household,

(n) domestic waste,

(o) incinerator ash resulting from the incineration of waste that is neither hazardous waste nor liquid industrial waste,

(p) waste that is a hazardous industrial waste, hazardous waste chemical, ignitable waste, corrosive waste, leachate toxic waste or reactive waste and that is produced in any month in an amount less than five kilograms or otherwise accumulated in an amount less than five kilograms,

(q) waste that is an acute hazardous waste chemical and that is produced in any month in an amount less than one kilogram or otherwise accumulated in an amount less than one kilogram,

(r) an empty container or the liner from an empty container that contained hazardous industrial waste, hazardous waste chemical, ignitable waste, corrosive waste, leachate toxic waste or reactive waste,

(s) an empty container of less than twenty litres capacity or one or more liners weighing, in total, less than ten kilograms from empty containers, that contained acute hazardous waste chemical,

(t) the residues or contaminated materials from the clean-up of a spill of less than five kilograms of waste that is a hazardous industrial waste, hazardous waste chemical, ignitable waste, corrosive waste, leachate toxic waste or reactive waste, or

(u) the residues or contaminated materials from the clean-up of a spill of less than one kilogram of waste that is an acute hazardous waste chemical;

Issues Contributing Area (ICA): The area within a vulnerable area where activities, conditions that result from past activities, and naturally occurring conditions may contribute to the parameter or pathogen issue (Technical Rule 115(3)).

Appendix B

Non-Agricultural Source Materials (NASM): Used to apply to land as nutrients that do not originate from agricultural activities. Includes pulp and paper biosolids, sewage biosolids, non-agricultural compost and any other material capable of being applied to land as a nutrient that is not from an agricultural source (see Nutrient Management Act, 2002 for legal description).

Non-Aqueous Phase Liquid (NAPL): A group of chemicals that is insoluble in water, including light and dense NAPLs.

Organic Solvent: Any volatile organic compound that is used as a cleaning agent, dissolver, thinner, or viscosity reducer, or for a similar purpose. (From O.Reg. 153/04 -Record of Site Condition Regulation, under the *Environmental Protection Act*). For the purposes of the *Clean Water Act* the following organic solvents are considered to have potential to be significant drinking water threats.

Organic Solvents Referenced in the Table of Drinking Water Threats:		
Carbon Tetrachloride (CT)	Chloroform (CFM)	Methylene Chloride (MC)
Pentachlorophenol		

Pesticide: Any organism, substance or thing that is manufactured, represented, sold or used as a means of directly or indirectly controlling, preventing, destroying, mitigating, attracting or repelling any pest or of altering the growth, development or characteristics of any plant life that is not a pest and includes any organism, substance or thing registered under the *Pest Control Products Act (Canada). (From Pesticides Act, 1990).* For the purposes of the *Clean Water Act*, the following pesticides are considered to have potential to be significant drinking water threats:

Pesticides Referenced in the Table of Drinking Water Threats (Active Ingredient):		
MCPA	2.4-D	Pendimethalin
Mecoprop	Dichloropropene-1,3	Glyphosate
Atrazine	MCPB	Metalochlor or s-Metalochlor
Dicamba	Metalaxyl	

Polycyclic Aromatic Hydrocarbons (PAHs): Hydrocarbons formed from a series of benzene rings. These compounds are components of ancient sediments and crude oils.

Polycyclic Aromatic Hydrocarbon Compounds Referenced in the Table of Drinking Water Threats:		
Acenaphthene	Benzo(b)fluoranthene	Fluoranthene
Acenaphthylene	Benzo(g,h,i)perylene	Indeno(1,2,3-cd)pyrene
Anthracene	Benzo(k)fluoranthene	Naphthalene
Benz(a)anthracene	Benzo(a)phenanthrene	Phenanthrene
Benzo(a)pyrene	Dibenz(a,h)anthracene	Pyrene

Appendix B

Significant Drinking Water Threat: A drinking water threat that, according to risk assessment, poses or has the potential to pose a significant risk.

Technical Rules: The Technical Rules prescribe the information that needs to be included in the Assessment Report to meet the requirements of the *Clean Water Act (Ministry of the Environment, 2009),*

Transport Pathway: A condition of land resulting from human activity that increases the vulnerability of a raw water supply of a drinking water system set out in clause 15(2)(e) of the *Clean Water Act, 2006*.

Vulnerable Area: Under the *Clean Water Act*, *2006* includes:

- significant groundwater recharge areas
- highly vulnerable aquifers
- surface water intake protection zones
- wellhead protection areas

Vulnerability Rating: A value of high, medium, or low vulnerability assigned within a Source Protection Area as per Technical Rules 37 to 41. High vulnerability would indicate that contaminant parameters could move from ground surface down to the water supply aquifer quickly. Low vulnerability indicates that contaminants would move slowly from ground surface down to the water supply aquifer.

Waste Disposal Site within the Meaning of Part V of the Environmental Protection Act:

(a) any land upon, into, in or through which, or building or structure in which, waste is deposited, disposed of, handled, stored, transferred, treated or processed, and

(b) any operation carried out or machinery or equipment used in connection with the depositing, disposal, handling, storage, transfer, treatment or processing referred to in clause (a).

Wellhead Protection Area: An area that is related to a wellhead and within which it is desirable to regulate or monitor drinking water threats.

B.3 Meeting Minutes

Stantec

Meeting Notes

220 Arkell Water Balance Meeting

220 Arkell Road / 161423338

Date/Time:	January 7, 2022 / 10:30 AM
Place:	Virtual
Attendees:	Michael Witmer, City of Guelph Leah Lefler, City of Guelph Jim Hall, City of Guelph Grant Whitehead, Stantec Consulting Ltd. Sean Geddes, Stantec Consulting Ltd. Melissa Straus, Stantec Consulting Ltd. Kevin Brousseau, Stantec Consulting Ltd.

Item:

Review of Updated Hydrogeological Memo, Circulate January 6, 2022

Kevin reviewed the hydrogeological memo highlighting various components, including:

- surplus/deficits, mitigated, unmitigated numbers
- infiltration rate used of 30 mm/hour matches the rate used on the adjacent property to the southwest by MTE which included in situ testing.
- Infiltration – rooftop galleries proposed for only – 28 of 31 as the remaining lots conflict with high groundwater.
- The proposed SWM facility infiltration strategy is an end of pipe system within a confined space. During the winter months – will need a shut off to avoid infiltrating salt laden water. Red line figures showing the proposed layout is included in the provided memo.
- Additional 6800 m^3 of runoff to the wetland was reduced under current plan, reducing from 24,000 m^3 unmitigated, to 18000 m^3 as presented during the last meeting (Oct 2021 memo) using more infiltration measures, down to 11,000 m^3.
- Impacts to the wetland include a potential increase in ponding depth; calculated by using the total area of the wetland (24 ha) and based on a surplus an increase in water levels of no more than 10 mm during maximum monthly situation is anticipated. This is during peak spring period, not continuous, based on when water level is at its highest, i.e., worst case scenario.
- This ponding level assumes no infiltration in the wetland – although it is reasonable to assume that some infiltration will occur in the wetland to reduce that 10 mm. Wetland will act as a groundwater recharge feature. It was also noted that the wetland has an outlet.

Action:

- In situ infiltration testing will be required.

Item:	Action:
Review of monthly hydrograph. • Grant indicated that the GRCA modelling data was used which provided a range of 92-345 mm. Annual infiltration rate of 345 mm – the bulk of which will occur during the summer months. • During frozen months infiltration is none. Influx into wetland in spring, most opportunity for additional infiltration is during the summer months. • City indicated positive feedback and is encouraged by the progress and effort to reduce the runoff surplus.	• N/A
Water Balance –Infiltration Galleries in Multi-unit Blocks • Jim indicated that it appears that the multi-unit blocks cannot achieve the separation (although would need to review further) and that the City strongly recommends that calculations Stantec only account for infiltration using full guidelines required during approval of the draft plan as there won't be much room for flexibility. • The goal is to propose something that is feasible and meets all required guidelines (including separation guidelines). Set specific targets for the blocks so when things change through detailed design those targets can be achieved. Make as feasible as possible. If need to make changes to assumed grade to meet targets that is an option. Set target now based on what is achievable based on guidelines. • Kevin: If proposing galleries in multi-family block they must achieve the required separation (1 m)? • Jim: DEM is very clear that the 1 m separation must be achieved. The City would be open to reviewing where the 1 m is not achieved for stormwater management but not during draft plan where galleries are required in the multi-family block. • Kevin: looking at grades, existing subdivision to the south, Street A, not a lot of options with respect to grading. Could consider shifting the entire multi-family site up 0.7 m but unclear if that can be achieved. May impact vegetation, may make the road steep which is likely undesirable. Something could look at but will be challenging. There is a possibility that these infiltration galleries in conflict with the high water table cannot be put in. • Jim: Agreed maybe infiltration galleries are not included for specific areas in the multi-family block.	• Grading and infiltration strategy to be revisited in the Multi Family Block such to only account for infiltration where the separation can be achieved.
In situ Testing • Jim: Point of clarification: First round of comments provided by the City where Stantec indicated that in situ testing will not be completed until the detailed design stage. The DEM strong recommends that in situ infiltration testing be done as early as possible. • Development to the north (Victoria Park Village) resulted in in situ test results that were significantly different between assumed vs. tested infiltration rates. Strongly encourage in situ testing this spring which will provide stronger footing during draft plan approval stage.	• Stantec to submit EIS Addendum in winter months • In situ testing to commence in spring 2022

Item:	Action:
• What is being presented is conservative and jives with recent data from adjacent development therefore numbers being used are suitable but still could be backed up by in situ testing. • Kevin: would hate to wait until May-June to move forward with resubmission. Stantec has more confidence with numbers used based on what was presented in the MTE report for the adjacent development. Hoping to move forward with submission with testing to follow shortly after. • Jim: Under current calculations unlikely overestimating infiltration as conservative numbers are used. That proposed approach sounds reasonable to confirm numbers in the spring with testing and resubmit prior to that.	
Water Balance – Environmental Preliminary Concerns • Leah: runoff surplus still much higher than what would typically approve. Want to spend some time to look at what has been done to date. Number is still much higher than would like to see. • Kevin: for consideration, the wetland does have an outlet that discharges that excess water, ultimately the water does spill out, not a depression that is stagnant. Depth of ponding taken away, groundwater recharge area. • Leah: have you looked at finer scaled contours where ponding occurs – based on the outlet vs. where groundwater is? • Stacking analysis would typically be helpful to think about potential impacts to the wetland. • Yes, there are some things working in favor for the increased runoff for this particular wetland – recharge wetland. The City would like to spend some time thinking about what has been described. • City is flagging that they still have concern with the volume of excess runoff.	• City to provide additional feedback • Stantec to continue to try and reduce runoff surplus and review stacking impacts
Water Balance -Environmental No Negative Impact • Jim: SWM is not simply an engineering one – haven't seen much on what the ecological impacts are, what are the localized effects. • Unlikely that the volume of pooling water will be 10 mm throughout, likely to have localized effects. • Looking for more detail due to large amount of run-off and localized effects at the outlet. • Still missing part of that discussion – the non-engineering side. Need a better overall picture – test is no negative impact. Conversations need to be had around that. Need to see that before moving forward with the draft plan to show that the proposed plan is feasible. • Sean: background discussion has been ongoing with respect to environmental impacts. Ran through CVC document and came with a similar profile to NRSI in that the wetland has the same level of sensitivity. • Ran through the ELC and species list most came out as medium risk, can tolerate some changes, not high risk which are intolerant. With all coming out as medium – only need 1 medium to tip to a high sensitivity wetland based on the matrix.	• City is reviewing the supporting documentation for the adjacent development • Stantec to provide an analysis similar to that provided by NRSI to look at environmental impacts • Stantec to provide details regarding the mitigation proposed at the SWM outlet due to the volume of runoff

Item:	Action:
• With the ponding taken into account and infiltration rates – probably won't see much of a difference. • Question MTE's 73 mm ponding change needs clarification – unclear currently.	
Water Balance – How much is too much? • Kevin: where does the 1-3000 m3/year come from? • Leah: experience reviewing the developments and monthly inputs and how water behaves. Localized impacts are maintaining surface water contribution to avoid swamps reverting to a marsh. Swamps are more sensitive than a marsh. There is no hard and soft rule. • Leah: the city encourages proponents to match pre- to post- as much as possible. That's where the 1000-3000 m^3/year comes into play. How much is too much is a difficult answer. • Sean: Stantec is wrestling with how to achieve that range, wondering if it can be coupled with wetland ponding analysis, draw down timing, series of factors to look at. • Leah: The easy developments to approve match pre to post. When that is not possible, it requires more work on the proponent's end and analysis to demonstrate no negative impact. If proceeding with this volume of need work to support no negative impact. • Jim: 1000-3000 m^3/year range was only given under duress based on professional opinion when initially didn't want to give a number. • Key is show no negative impact, have a SWM system that works. Torrance creek Sub watershed Study has some targets. Look at all of those together. Because of difficulties on the site – not going to get to meeting all of the targets. City recognizes that. • Target is to show no negative impact not simply an engineering question. Such a variety of outlets to deal with and small sites so you don't have the space like other developments. • Overall is a combination of effects of all factors as the goal is to try to protect natural features and well as develop.	• Stantec to continue to try and reduce runoff surplus • Stantec to collect additional data and provide more detailed analysis of impacts to wetland
LIDs in the Wetland Buffer • Sean – would the City entertain LIDs in the buffer for SWM which can sometimes be considered a buffer system. To assist with reduction of excess runoff. • Leah – SWM infrastructure is OK in the outer 15 m. Nothing that intrudes into the 15 m buffer without an OPA and likely not supported. Also keep in mind the high groundwater in that area. • Kevin: French drain. Gravel bed, earth berm promote water discharging to hit the berm and force ponding over the gravel bed. Anything beyond that would spill over. Long linear gravel bed and promote further infiltration. Shallow system. • Leah: could do in the outer 15. Unless doing scientific research or passive recreation activities. Nothing infrastructure related in the 0-15 m buffer to the wetland.	• N/A

Item:	Action:
Parks Consideration • The City recommends regrouping with Parks as their goals and objectives are different than other departments. Would the pathway that Parks wants be permitted in the 15m? Current paved roadway would not qualify for inclusion in the 0-15 m buffer. Passive recreation is permitted in the Official Plan, which would be more compatible with a smaller foot path. • Conversation to have as Jyoti has left the City. • Encourage Parks to think about this site in particular to design to give a bit more wiggle room. • Pathway is proposed form the northwest corner of site to bottom of Park block. Option could be if the path would be permitted in the 0-15 m buffer than 4 m within the SWM facility to add more infiltration room. Follow up with parks. Would still need vehicle access to the inlet and outlet structures. • Easements have already reduced parkland dedication, no encumbrance on park land and see if there is flexibility there.	• City to provide name of Parks Planning Staff assigned to the file • Stantec to follow up with Parks to discuss opportunities
SWM – Wet Pond vs Dry Pond in the Ecological Linksage • Melissa: Would there be any consideration from the City to allow the portion of the SWM pond in the ecological linkage to become a wet pond? Understand that it was established early on a dry cell would be preferred in the ecological linkage. Cannot recall what the concern was. • Leah: think it had to do with fencing and allowing the linkage to still function • Kevin: above the permanent pool – 5:1 slope regardless of wet or dry pond and therefore fencing can be avoided and therefore not prohibitive to movement within the corridor. • The reason for the ask, changing to a wet pond could allow to be an infiltration cell. As a SWM strategy. • Wondering if the City would have an appetite to allow the SWM pond to hold water within the ecological linkage. • Jim: To the south, dry facility but needed clay dividers to direct water to proper location. Others under design / consideration where wet ponds but with water table nearby would need to line them. Don't like to mix infiltration strategy with main cell of a SWM pond. In some cases, dry can work better with the forebay there is infiltration elements, but if it becomes a wet pond, how maintain with wet pond design and have it infiltrate? But gives you more space to add downstream infiltration. • Kevin: preference to clay line the forebay, that's where the contaminants fall out. Portion sand lined but not the entire pond. Cleaner water as migrates through the feature itself. Portion of the pond. Would have to be further reviewed. • Leah: The ecological linkage still needs to function – incorporate naturalization/ culvert underpass to permit amphibians, cross sections what would this look like to a deer would be helpful to answer this question. And what does it function for?	• City and Stantec to review reasoning behind dry vs. wet pond previously discussed.

Item:	Action:
Roads, Emergency Access Considerations • Michael: from a design perspective there is an ongoing discussion re: roads and emergency access, temporary turning circles, etc. that feeds into the work that will need to be incorporated into the water balance side of thing. Mainly to date this has been occurring with Nancy as well as traffic staff as well. • Kevin: shape of the site, to the east, dead end road, with temporary emergency access. From a water balance perspective shouldn't make much of a difference. • What's the concern on adjacent resident? Proportionally accepting responsibility for the road. Burden goes onto them. Cost sharing responsibility of the frontage.	• N/A
Summary • Proposed surface run off is still a concern seems impossible to get to 3,000 m3/year overland water surplus. Ties back to that ecological impact and then no negative impact. • Kevin – theoretical so that all infiltration galleries are working, would reduce to potentially 7000 m^3/year. Would mean raising the pond, the Multi Family site, could impact position of road and slopes. • Wetland has an outlet and has a recharge feature. • Jim – ecological side of things more work. Reduced and on the right track. More work to be done to get to final goal of no negative impact. • Make sure put forward achievable infiltration targets in multi-family block to avoid frustration during site plan application. Look at grading and how that changes infiltration numbers. • In situ testing look to coordinate in the spring to reinforce numbers presenting to date. • Ecological impacts and what that means, including the ecological linkage. • Still will be stuck above 3000 m^3/year • Leah: worthwhile to speak to parks about flexibility on their elements of the plan. To determine what the options/possibilities are.	• City to provide comments per our discussion further work needs to happen. • Stantec to dive into reducing surplus further and build the story around the ecological impact. • City to provide Parks comments and Stantec to follow up with Parks. • Stantec to initiate in situ testing. • Review previous documentation re: wet vs dry pond.

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Stantec Consulting Ltd.

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Attachment: January 6, 2022 Hydrogeological Memo

c. Attendees

ATTACHMENT A

January 6, 2022 Hydrogeological Memo

Stantec

Memo

To:	Leah Lefler City of Guelph	From:	Grant Whitehead Waterloo ON Office
File:	161423338.101	Date:	January 6, 2022

Reference: Revised Water Balance Calculations in Response to First Submission Comments Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario (DRAFT)

1.0 BACKGROUND

Stantec Consulting Limited (Stantec) prepared a Hydrogeological Assessment report (Stantec, 2019[1]) on behalf of Rockpoint Properties Inc. for the lands located at 220 Arkell Road in the City of Guelph, Ontario (the Site) in support of a Draft Plan Application. As a part of the assessment, a pre- and post-development water balance was completed for the Site. As provided in the City of Guelph's first submission comments memo dated November 10, 2020[2] and titled *220 Arkell Road Draft Plan of Subdivision and Zoning By-law Amendment Application*, Comment No. 67 states the following:

Comment No. 67 *– Monthly Water Balance calculations have been completed based on three subcatchments (A, B, and C). Pre-development conditions are compared to post-development conditions within these catchments on a monthly basis. This analysis does not enable a comparison of pre- to post-development conditions as the site, under pre-development conditions, has a drainage divide, with approximately 2/3rds drainage going to the wetland and 1/3 going to the woodland on the property to the east. To enable a proper assessment of impacts to wetland hydrology, compare post-development to pre-development conditions for the portion of the subject property located within the wetland's catchment.*

To address this previously mentioned comment, Stantec revised the monthly pre- to post-development water balance calculations to account for this drainage divide, utilizing the same Thornthwaite and Mather (1955[3]) methodology to perform the analysis as described in Stantec (2019a).

2.0 WATER BALANCE ANALYSIS RESULTS

2.1 PRE-DEVELOPMENT

The pre-development water balance for the Site was split into two separate analyses to reflect the surface water divide that characterizes the property. Catchment 106 is analyzed as one land unit given that surface water runoff from this catchment is interpreted to flow in a south to southwest direction towards the Torrance Creek Swamp (Figure 1). Similarly, Catchment 110 is analyzed as a separate land unit as surface water runoff is interpreted to flow in a north to northeast direction across this catchment towards an off-Site woodlot (Figure 1).

The Site was broken down into a series of sub-areas based on topographic, soil type, and land cover characteristics. Figure 1 shows the distribution of the sub-areas used in the pre-development water balance analysis. As presented in Tables 1 and 2, the overall infiltration factor (IF) for a sub-area represents the sum

[1] Stantec Consulting Limited. 2019a. Hydrogeological Assessment, 220 Arkell Road, Guelph, ON. May 28, 2019.
[2] City of Guelph Infrastructure, Development and Enterprise Services, Planning and Building Services. 2020. Internal Memo Re: 220 Arkell Road Draft Plan of Subdivision and Zoning By-law Amendment Application, November 10, 2020.
[3] Thornthwaite, C.W. and Mather, J.W. 1955. The water balance. Philadelphia, PA: Drexel Institute of Technology, Climatological Laboratory Publication No.8.

Reference: **Revised Water Balance Calculations in Response to First Submission Comments**
Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario

of infiltration factors assigned to each of the sub-area characteristics (i.e., topography, soil type, land use) based on published values presented by the MECP (2003[4]). The IF is then multiplied against the water surplus (WS) calculated for a given sub-area to provide a calculated value of infiltration (INF). The sum of all sub-area INF volumes associated with each catchment then represents the overall annual pre-development infiltration volume for that catchment.

Topographic conditions across the Site are deemed to be generally rolling to hilly based on calculated slopes ranging from 0.5% to 15%, with the high point situated in the centre of the Site (coinciding with drainage divide). The two main soil types that characterize the Site include glaciofluvial sand and gravel or stone-poor, silty to sandy till (i.e., Port Stanley Till). Land cover throughout the Site, based on the Ecological Land Classification (ELC) mapping prepared by Stantec (2019b[5]), consists of pasture/shrub lands, shallow rooted crops, and urban lawn (associated with the on-Site residence). Based on these parameters, infiltration factors ranged from 0.45 to 0.80 in the sub-areas (where a value of 1.00 indicates that the full WS volume infiltrates). Stantec notes that the IF for the soils in some sub-areas were adjusted to values outside the typical range of factor values as published in MECP (2003) to allow for calculated infiltration and runoff rates in each sub-area to be comparable with annual groundwater recharge rates reported for the Site by the GRCA (2021[6])

The Guelph Arboretum climate station provided long-term monthly average (1971-2000) air temperature and precipitation data for use in the water balance analysis. Located approximately five kilometres to the northwest of the Site, the assumption is that the monthly average precipitation and air temperatures recorded at the station is reflective of the precipitation and air temperature fluctuation trends that have historically occurred at the Site.

2.1.1 Flows Westward to Torrance Creek Swamp

Based on the previously mentioned water balance components, the annual volume of infiltration occurring within Catchment 106 (Figure 1) under the pre-development condition is calculated to be 10,026 m^3, equating to a rate of 260 mm/year (Table 1). The annual volume of pre-development runoff is calculated at 4,733 m^3, equating to a rate of 123 mm/year (Table 1).

Pre-Development Infiltration (INF)	10,026	m^3/yr	260	mm/yr	0.3	L/s
Pre-Development Runoff (R)	4,733	m^3/yr	123	mm/yr	0.1	L/s
Pre-Development Evapotranspiration (ET)	20,759	m^3/yr	539	mm/yr	0.7	L/s
Total = INF + R + ET	35,518	m^3/yr	923	mm/yr	1.1	L/s
Precipitation	35,518	m^3/yr	923	mm/yr	1.1	L/s

As shown in Figure 2, infiltration occurring within Catchment 106 that recharges the groundwater system will flow to the south and southwest towards Torrance Creek Swamp. As documented in Appendix D of Stantec (2019a), downward vertical hydraulic gradients are mapped as occurring beneath Torrance Creek Swamp, which suggests that this wetland is a groundwater recharge feature.

[4] (MECP) Ministry of the Environment, Conservation and Parks (formerly Ministry of the Environment). 2003. Stormwater Management Planning and Design Manual. March 2003.
[5] Stantec Consulting Limited. 2019b. 220 Arkell Road - Guelph, ON, Environmental Impact Study. August 28, 2019.
[6] Grand River Information Network (GRIN). 2021. https://data.grandriver.ca/applications.html.

Reference: **Revised Water Balance Calculations in Response to First Submission Comments**
Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario

2.1.2 Flows Eastward to Off-Site Woodlot

Based on the previously mentioned water balance components, the annual volume of infiltration occurring within Catchment 110 (Figure 1) under the pre-development condition is calculated to be 4,991 m^3, equating to a rate of 202 mm/year (Table 2). The annual volume of pre-development runoff is calculated to be 4,339 m^3, equating to a rate of 176 mm/year (Table 1).

Pre-Development Infiltration (INF)	4,991	m^3/yr	202	mm/yr	0.2	L/s
Pre-Development Runoff (R)	4,339	m^3/yr	176	mm/yr	0.1	L/s
Pre-Development Evapotranspiration (ET)	13,463	m^3/yr	545	mm/yr	0.4	L/s
Total = INF + R + ET	22,793	m^3/yr	923	mm/yr	0.7	L/s
Precipitation	22,793	m^3/yr	923	mm/yr	0.7	L/s

As shown in Figure 2, infiltration occurring within Catchment 110 that recharges the groundwater system is also interpreted to flow to the south and southwest towards Torrance Creek Swamp.

2.2 POST-DEVELOPMENT (UNMITIGATED)

The projected post-development catchments for the Site are presented in Figure 3 and new sub-areas were derived accordingly based on topographic, soil type and land cover characteristics. For the analysis, the rolling to hilly topography and distribution of surficial soils found under the pre-development condition is assumed to remain relatively unchanged under the post-development condition, with the land cover predominantly becoming more representative of developed area having varying degrees of impervious surfaces (e.g., rooftops, concrete/asphalt roadways, and walkways) and urban vegetation cover (e.g., urban lawns). Under the post-development condition, a larger proportion of the Site (i.e., Catchment 200) will drain to the southwest and into the SWM facility (i.e., to Catchment 203), with this water then being slowly discharged to the Torrance Creek Swamp. Runoff occurring in Catchments 202, 204, 205, 206, and 207A/B will flow overland and directly into the wetland (i.e., will not pass through the SWM facility). For Catchment 201, runoff occurring in this portion of the Site will be directed northward towards the off-Site woodlot.

Stantec has assumed that all infiltration occurring in the remaining pervious areas of the Site under the post-development condition that recharges the groundwater system will flow to the south and southwest towards Torrance Creek Swamp.

2.2.1 Flows Westward to Torrance Creek Swamp

Based on the previously mentioned water balance components, the annual volume of infiltration occurring within combined Catchments 200, 202, 203, 204, 205, 206 and 207A/B (Figure 3) under the post-development condition is calculated to be 8,443 m^3, equating to a rate of 161 mm/year (Table 3). The annual volume of surface water runoff projected to occur under the post-development condition within these combined catchments is 23,112 m^3 (439 mm/year) (Table 3). Overall, an infiltration deficit of 1,583 m^3 (i.e., from 10,026 m^3 to 8,443 m^3) is projected to occur in the previously mentioned catchment areas, with surface water runoff volumes increasing by 18,379 m^3 (i.e., from 4,733 m^3 to 23,112 m^3) within this same area (which will be directed to the Torrance Creek Swamp) from the pre- to post-development condition.

Reference: **Revised Water Balance Calculations in Response to First Submission Comments**
Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario

Post-Development Infiltration (INF)	8,443	m^3/yr	161	mm/yr	0.3	L/s
Post-Development Runoff (R)	23,112	m^3/yr	439	mm/yr	0.7	L/s
Post-Development Evapotranspiration (ET)	16,996	m^3/yr	323	mm/yr	0.5	L/s
Total = INF + R + ET	48,551	m^3/yr	923	mm/yr	1.5	L/s
Precipitation	48,551	m^3/yr	923	mm/yr	1.5	L/s

Pre-Development Infiltration	10,026	m^3/yr
Infiltration Deficit	**-1,583**	**m^3/yr**
Pre-Development Runoff	4,733	m^3/yr
Runoff Surplus	**18,379**	**m^3/yr**

2.2.2 Flows Eastward to Off-Site Woodlot

For Catchment 201 (Figure 3), the post-development annual volume of infiltration and surface water runoff occurring within this catchment is estimated at 2,616 m^3 (247 mm/year) and 1,390 m^3 (131 mm/year), respectively (Table 4). These volumes represent a 2,375 m^3 and 2,949 m^3 reduction in infiltration and surface water runoff volumes associated with the catchment areas that directed water to the off-Site woodlot to the northwest under the pre-development condition (i.e., Catchment 110).

Post-Development Infiltration (INF)	2,616	m^3/yr	247	mm/yr	0.1	L/s
Post-Development Runoff (R)	1,390	m^3/yr	131	mm/yr	0.0	L/s
Post-Development Evapotranspiration (ET)	5,755	m^3/yr	544	mm/yr	0.2	L/s
Total = INF + R + ET	9,761	m^3/yr	923	mm/yr	0.3	L/s
Precipitation	9,761	m^3/yr	923	mm/yr	0.3	L/s

Pre-Development Infiltration	4,991	m^3/yr
Infiltration Deficit	**-2,375**	**m^3/yr**
Pre-Development Runoff	4,339	m^3/yr
Runoff Deficit	**-2,949**	**m^3/yr**

2.3 POST-DEVELOPMENT (MITIGATED)

As shown in the above post-development scenario where no infiltration measures in place, the Site produces a large runoff surplus to Torrance Creek Swamp and an overall infiltration deficit across the property. Based on the results of the *Geotechnical Investigation* (Stantec 2019c[7]), Site soils generally consist of a mix of glacial till to sand which are both generally conducive to infiltration practices. The estimated percolation rates for these soils correspond to factored infiltration rates of 5 to 30 mm/hour; however, as per City of Guelph guidelines, the performing of in-situ infiltration tests using the double-ring infiltrometer or the Guelph permeameter will be required at the detailed design stage at the locations and depths of the proposed infiltration trenches to confirm the underlying soil infiltration rates. Since the Site soils appear to be conducive

[7] Stantec Consulting Ltd. 2019c. Geotechnical Investigation Report, 220 Arkell Road Residential Site, Guelph, Ontario. June 11, 2019.

Reference: **Revised Water Balance Calculations in Response to First Submission Comments**
Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario

for infiltration, infiltration galleries are proposed throughout the Site at both lot level and end-of-pipe locations to mitigate the previously mentioned post-development infiltration deficits.

Infiltration galleries receiving rooftop runoff will be designed to infiltrate 25 mm precipitation events from the single-family lots and multi-residential block, where possible. In reviewing the proposed grading design in relation to the observed high groundwater elevations, Stantec estimates that using 1.2 m of cover over a 0.5 m deep stone infiltration gallery will allow rooftop galleries to be potentially constructed in 28 of the 31 single family lots (as shown on Drawing C-400). Although the multi-family block will likely change throughout the site plan process, the current layout was checked to determine the feasibility of rooftop infiltration. Stantec determined that the seasonal high groundwater is within 1.0 m of the bottom of most rooftop infiltration galleries through this area. Although the 1.0 m of separation is not achieved in the multi-block area (potential to change in detail design for the Site), most of the galleries proposed can still be implemented to provide infiltration and mitigate the projected runoff surplus to Torrance Creek Swamp.

The calculated 1.0 m of separation is based on the highest groundwater elevations recorded throughout the year at the Site, with this high groundwater condition typically occurring in the spring. Following this peak, the groundwater table steadily drops throughout the summer before slightly rising again at the end of the year and returning to peak elevation in the spring. Although the exact pattern and magnitude of change is dependent on the precipitation for a given year, the groundwater table generally follows this fluctuation trend annually. As shown on Figure 4, hydrographs for the on-Site monitoring wells (i.e., BH01-17 to BH04-17) all demonstrate these annual fluctuation trends. The annual variation in groundwater level fluctuations observed throughout the Site range from 1.9 to 3.5 m, with the greatest variation coming in the topographically higher (eastern) portion of the Site (BH02-17 and BH04-17) and the lowest variation in those areas closest to the wetland (BH01-17). Variations throughout the year are as follows: BH01-17: 1.89 m (GWL ranges from 0.12 to 2.01 m BGS), BH02-17: 2.80 m (-0.06 to 2.74 m BGS), BH03-17: 2.32 m (0.56 to 2.88 m BGS), and BH04-17: 3.49 m (2.26 to 5.75 m BGS). In general, groundwater elevations drop by approximately 1.0 to 1.5 m from the spring highs (i.e., March to May) to the summer lows between (i.e., June to August) (Figure 4). At this point, 1.0 m of separation between the groundwater level and the bottom of most proposed galleries in the multi-block would be achieved. This is approximated based on the marked up grading plan, Drawing C-400 included in the attached material. In reality, infiltration will occur prior to this full 1.0 m separation but this has not been accounted for in the calculations, lending to the conservative nature of the infiltration gallery design. Only galleries in the south-west corner of the multi-block are proposed to be removed for the two buildings (12 units) that back on to the neighbouring property to the south where 1.0 m of separation does not occur in the summer months. All other multi-block rooftop galleries are proposed to be installed and sized for the 25 mm volume. The rooftop galleries proposed in the multi-block should be designed with overflow pipes to the local storm sewer system or discharge to the adjacent open space lands, to allow for overflow in the case the galleries are full during a rain event.

A similar principle is applied for the end-of-pipe infiltration that is proposed. The proposed SWM Facility is to be constructed in the north-west corner of the Site (i.e., near BH01-17). The high groundwater elevation recorded at this monitoring well is 333.36 m above mean sea level (AMSL) but remains at 333.0 m AMSL for most of the spring months before dropping to approximately 332.0 m AMSL by August. Stantec is proposing that an infiltration chamber system (Stormtech S-160LP) be placed after the outlet structure to infiltrate the remaining impervious runoff from the upstream drainage area during the 10 mm event. This proposed infiltration system will have an invert of 333.1 m AMSL, which will be near the high groundwater elevation for most of the spring but achieves the 1.0 m separation by the summer. Again, infiltration out of this system will likely occur prior to the full 1.0 m separation occurring. During the winter months, there will be a shut-off valve

Reference: **Revised Water Balance Calculations in Response to First Submission Comments**
Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario

placed upstream of this infiltration system to reduce any impacts from salt laden runoff on the groundwater, while during the periods of high groundwater elevations runoff exceeding the system capacity will simply overflow/bypass the system and flow directly downstream into the Torrance Creek Swamp. The SWM Facility drawing (included in the attached material) has been marked up to show the approximate details of this system with further details of the Stormtech design and typical cross-section attached.

To account for periods where 1.0 m of separation between high groundwater and the galleries are not achieved, infiltration from these areas (e.g., multi-block rooftop and end-of-pipe galleries) was not accounted for in the water balance calculations until July. For areas where 1.0 m of separation can be achieved (single family lots), infiltration was accounted for the entire year.

2.3.1 Flows Westward to Torrance Creek Swamp

As mentioned previously, the annual unmitigated infiltration deficit for the catchment areas draining to the Torrance Creek Swamp is calculated at 1,583 m^3, with surface water runoff volumes increasing by 18,379 m^3 from the pre- to post-development condition. The implementation of the additional infiltration measures discussed above will result in an additional 6,882 m^3 of infiltration being returned to the subsurface per year across the Site. Consequently, this additional infiltration will reduce the annual runoff surplus to the Torrance Creek Swamp to 11,497 m^3. As shown in Figure 5, the greatest monthly runoff surpluses will occur during the spring freshet (March to June), with the lowest runoff surpluses occurring in the late fall to early winter. Overall, the monthly runoff surpluses projected for the Site range from 549 m^3 (December) to 1,441 m^3 (May) (Table 3, Figure 5).

Post-Development Infiltration (INF) with Augmentation	15,325	m^3/yr	291	mm/yr	0.5	L/s
Post-Development Runoff (R)	16,230	m^3/yr	309	mm/yr	0.5	L/s
Post-Development Evapotranspiration (ET)	16,996	m^3/yr	323	mm/yr	0.5	L/s
Total = INF + R + ET	48,551	m^3/yr	923	mm/yr	1.5	L/s
Precipitation	48,551	m^3/yr	923	mm/yr	1.5	L/s

Pre-Development Infiltration	10,026	m^3/yr
Infiltration Surplus	**5,298**	**m^3/yr**
Pre-Development Runoff	4,733	m^3/yr
Runoff Surplus	**11,497**	**m^3/yr**

To assess the impact of the runoff surplus on the downstream system, the potential increase in ponding depth within the Torrance Creek Swamp due to the maximum monthly surplus volume of runoff being discharged to this wetland was approximated. As shown on Figure 6, based on topographic contour data obtained from the GRCA (2021[8]), the portion of the Torrance Creek Swamp located downstream of the Site appears to be mostly flat for a 24.3 ha area (i.e., basin perimeter as defined by the 332.5 m AMSL contour) prior to discharging in a more continuous watercourse downstream (i.e., Torrance Creek). Using the maximum monthly runoff surplus of 1,441 m^3 entering the Torrance Creek Swamp from the Site, this volume of discharge would result in surface water levels within the previously mentioned basin increasing by no greater than 10 mm. This rise in the surface water level also assumes that no infiltration is occurring within the

[8] Grand River Conservation Authority. 2021. Grand River Information Network (GRIN) - https://data.grandriver.ca/.

Reference: **Revised Water Balance Calculations in Response to First Submission Comments**
Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario

wetland; however, as shown in Figure 7, this is unlikely given that annual infiltration rates are estimated to range from 92 to 345 mm/year. In addition, although post-development runoff will be directed to the Torrance Creek Swamp during those months when runoff under the pre-development condition is low to absent (e.g., May to October), the groundwater table is typically at its lowest elevations during these months. As such, it is reasonable to assume that any ponding of this runoff during these months (i.e., when the vegetation is not dormant) will be limited as infiltration will not be impeded by a high groundwater table beneath the wetland. As such, this influx of post-development runoff to the wetland is not expected to detrimentally impact the long-term ecological form of this feature.

2.3.2 Flows Eastward to Off-Site Woodlot

Since infiltration measures are only proposed to be installed in the catchments flowing towards the wetland area, the water balance calculations for flows eastward to the woodlot remain unchanged from the unmitigated scenario as presented in Section 2.2.2.

2.3.3 Total Site Infiltration Balance

The overall water balance for the Site shows that the proposed post-development infiltration measures (i.e., rooftop and SWM Facility captured precipitation directed to on-Site infiltration galleries) will lead to an infiltration surplus on the Site. With the rooftop and end-of-pipe galleries, the infiltration surplus for the Site is projected to be 2,924 m³/year. The runoff surplus/deficits to each of the downstream receivers (i.e., Torrance Creek Swamp and the off-Site woodlot) are discussed in the sections above.

Post-Development Infiltration (INF) with Augmentation	17,941	m^3/yr	284	mm/yr	0.6	L/s
Post-Development Runoff (R)	17,620	m^3/yr	279	mm/yr	0.6	L/s
Post-Development Evapotranspiration (ET)	22,751	m^3/yr	360	mm/yr	0.7	L/s
Total = INF + R + ET	58,312	m^3/yr	923	mm/yr	1.8	L/s
Precipitation	58,312	m^3/yr	923	mm/yr	1.8	L/s

Pre-Development Infiltration	15,017	m^3/yr
Infiltration Surplus	**2,924**	**m^3/yr**

3.0 CONCLUSION

Based on the material presented in this memo, the following conclusions are provided:

- Proposed on-Site infiltration measures will enhance groundwater recharge and mitigate excess surface water runoff. The proposed measures include rooftop infiltration galleries on most single-family lots and the multi-block units, which are sized for the 25 mm storm event, as well as an end-of-pipe infiltration system sized for the remaining 10 mm of runoff volume.

- High groundwater levels throughout the Site inhibit infiltration via the proposed lot-level and end-of-pipe infiltration galleries during the spring months but do allow for infiltration over the remainder of the year due to a seasonally lower groundwater table.

Reference: **Revised Water Balance Calculations in Response to First Submission Comments**
Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario

- The Site is projected to experience an annual infiltration volume surplus of 2,924 m^3 from the pre- to post-development condition, with annual runoff volumes to Torrance Creek Swamp increasing by 11,497 m^3. Runoff volumes being directed northward to the off-Site woodlot will decrease by 2,949 m^3.
- The impact of the increase in runoff to the Torrance Creek Swamp is expected to be negligible as the resulting surface water ponding will not exceed 10 mm for a given month. Ponding is also expected to be limited to a short duration as the Torrance Creek Swamp is identified as a groundwater recharge feature.

Regards,

Stantec Consulting Limited

DRAFT

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DRAFT

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Water Resources Engineer
Mobile: (519) 831-6554
bryan.weersink@stantec.com

Attachment: Appendix A: Figures
- Figure 1 - Pre-Development Water Balance
- Figure 2 - Groundwater Flow (May 2017)
- Figure 3 - Post-Development Water Balance
- Figure 4 - Hydrographs – BH01-17 to BH04-17 and DP1-17(S/D)
- Figure 5 - Hydrograph – Monthly Pre- and Post-Development Runoff
- Figure 6 - Torrance Creek Swamp - Runoff Receiving Basin
- Figure 7 - Annual Recharge Rates (GRCA)
- Drawing C-400: Conceptual Grading Plan
- Stormwater Management Facility Drawing

Appendix B: Tables
- Table 1 – Pre-Development Monthly Water Balance Calculations – Lands Draining Westward to Torrance Creek Swamp
- Table 2 – Pre-Development Monthly Water Balance Calculations – Lands Draining Eastward to Woodlot
- Table 3 – Post-Development Monthly Water Balance Calculations – Lands Draining Westward to Torrance Creek Swamp
- Table 4 – Post-Development Monthly Water Balance Calculations – Lands Draining Eastward to Woodlot

c. Melissa Straus, Stantec Consulting Ltd..
Kevin Brousseau, Stantec Consulting Ltd.

APPENDIX A

Figures

565000
565250
4819250
4819000

BH02-17
BH04-17
BH01-17
BH03-17
DP1-17(S/D)
110
2.5 ha
106
3.8 ha
105
0.8 ha
Torrance Creek Swamp
Dawes Avenue
Amos Drive
Zecca Drive
Arkell Road
N

Stantec

Legend

- Site Boundary
- Monitoring Well (Stantec, 2017)
- Drive-Point Piezometer (Stantec, 2017)
- Overland Flow Direction
- Wetland - Evaluated (Provincial)
- Stormwater Catchment (Existing Conditions)

Water Balance Sub-Areas

- Sub-Area A - Rolling, Silty Sand to Sand Till, Urban Lawn
- Sub-Area B - Rolling, Silty Sand to Sand Till, Urban Lawn
- Sub-Area C - Roliing, Sand, Pasture and Shrubs

0 50 100 metres
1:2,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017.
3. Topographic contours presented on site as surveyed by Stantec (2017). Topographic data beyond the site boundaries should be considered approximate and for illustrative purposes only.
4. Orthoimagery © First Base Solutions, 2021. Imagery flown in 2020.

Project Location
Guelph, Ontario

161413338 REVA
Prepared by CMC on 2021-08-17
Technical Review by GW on 2021-08-17

Client/Project
ROCKPOINT PROPERTIES INC.
HYDROGEOLOGICAL ASSESSMENT
220 ARKELL ROAD, GUELPH, ONTARIO

Figure No.
1

Title
Pre-Development Water Balance

Stantec

- Site Boundary
- Monitoring Well (Stantec, 2017)
- Drive-Point Piezometer (Stantec, 2017)
- Proposed Subdivision
- 337.10 Groundwater Elevation (mAMSL)
- Groundwater Contour (mAMSL)
- Interpreted Direction of Groundwater Flow

0 50 100 metres

1:2,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017.
3. Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Project Location
Guelph, Ontario

161413338 REVA
Prepared by CMC on 2019-06-04
Technical Review by GW on 2018-12-03

Client/Project
ROCKPOINT PROPERTIES INC.
HYDROGEOLOGICAL ASSESSMENT
220 ARKELL ROAD, GUELPH, ONTARIO

Figure No.
2

Title
Groundwater Flow - May 2017

Stantec

Legend
- Site Boundary
- Monitoring Well (Stantec, 2017)
- Drive-Point Piezometer (Stantec, 2017)
- Overland Flow Direction
- Wetland - Evaluated (Provincial)
- Catchment Boundary (Existing Conditions)
- Stormwater Catchment (Proposed Conditions)

Water Balance Sub-Areas
- Sub-Area A - Rolling, Silty Sand to Sand Till, Pasture and Shrubs, No Impervious Cover
- Sub-Area C - Rolling, Sand, Pasture and Shrubs, No Impervious Cover
- Sub-Area D - Rolling, Silty Sand to Sand Till, Urban Lawn, 65% Impervious
- Sub-Area E - Rolling, Sand, Urban Lawn, 65% Impervious
- Sub-Area F - Rolling, Silty Sand to Sand Till, Urban Lawn, 40% Impervious
- Sub-Area G - Rolling, Sand, Urban Lawn, 40% Impervious
- Sub-Area H - Rolling, Sand, Pasture and Shrubs, 15% Impervious

0 50 100 metres

1:2,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017.
3. Topographic contours presented on site as surveyed by Stantec (2017). Topographic data beyond the site boundaries should be considered approximate and for illustrative purposes only.
4. Orthoimagery © First Base Solutions, 2021. Imagery flown in 2020.

Project Location
Guelph, Ontario

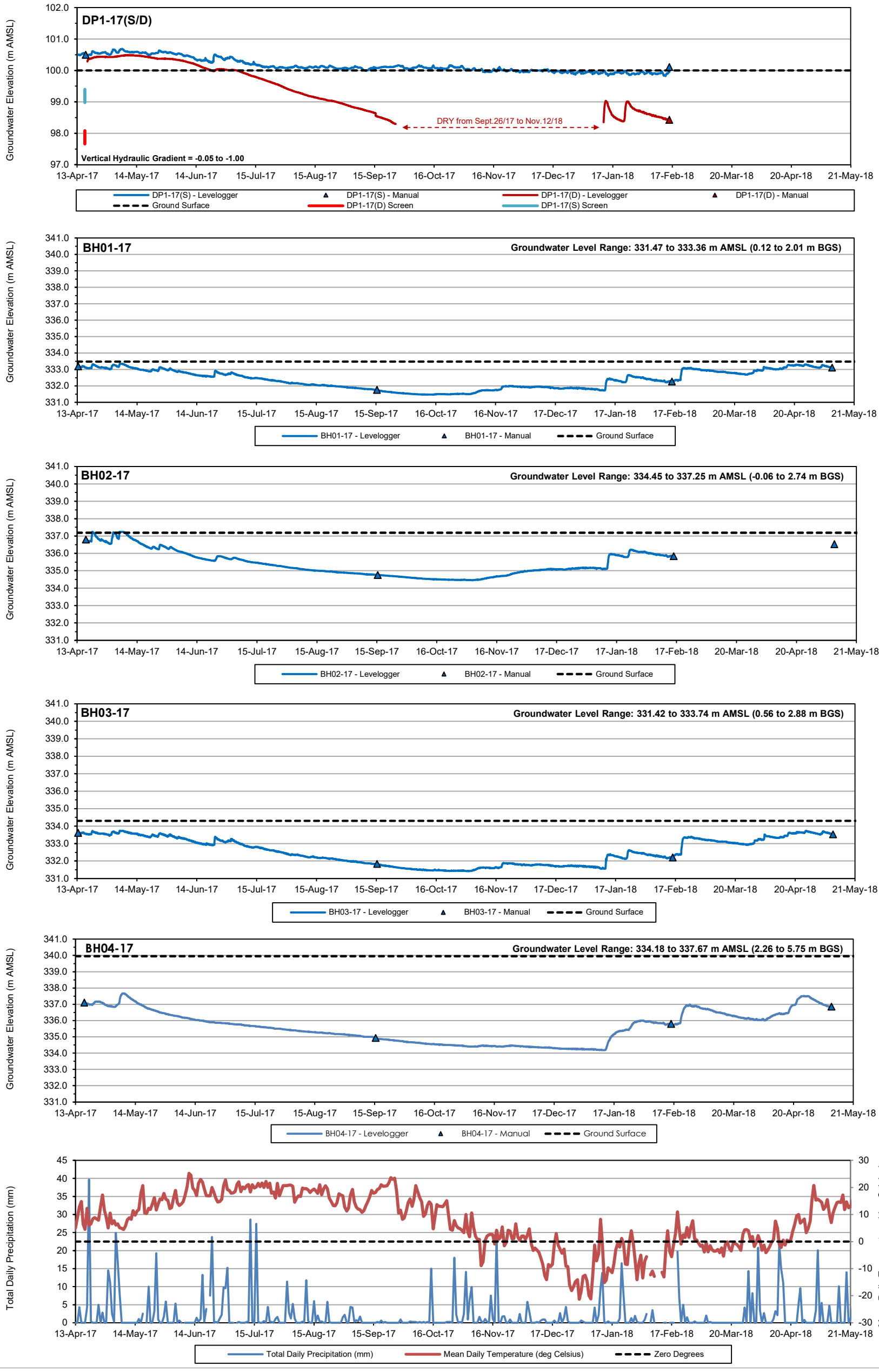
161413338 REVA
Prepared by CMC on 2021-08-17
Technical Review by GW on 2021-08-17

Client/Project
ROCKPOINT PROPERTIES INC.
HYDROGEOLOGICAL ASSESSMENT
220 ARKELL ROAD, GUELPH, ONTARIO

Figure No.
3

Title
Post-Development Water Balance

\\Cd1004-f01\work_group\01614\active\161413338\planning\drawing\GIS\MXD\Hydrogeology\WaterBalance\161413338_HG_Fig02_ProposedCatchments.mxd Revised: 2021-08-17 By: pmoser



Stantec

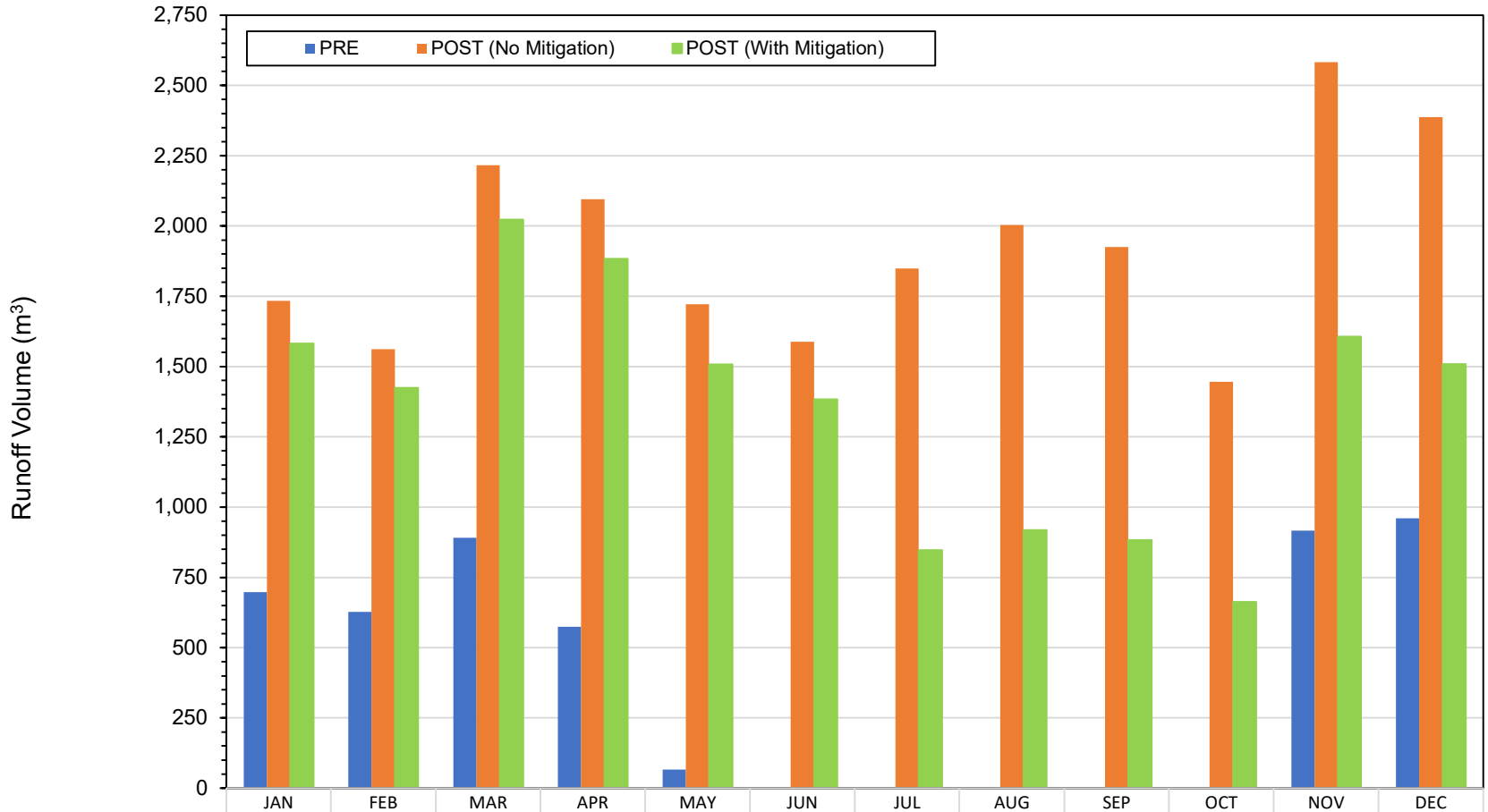
Client/Project

ROCKPOINT PROPERTIES INC.
HYDROGEOLOGICAL ASSESSMENT
220 ARKELL ROAD, GUELPH, ONTARIO

Figure No.

4

Title **HYDROGRAPHS**
BH01-17 to BH04-17 and DP1-17(S/D)



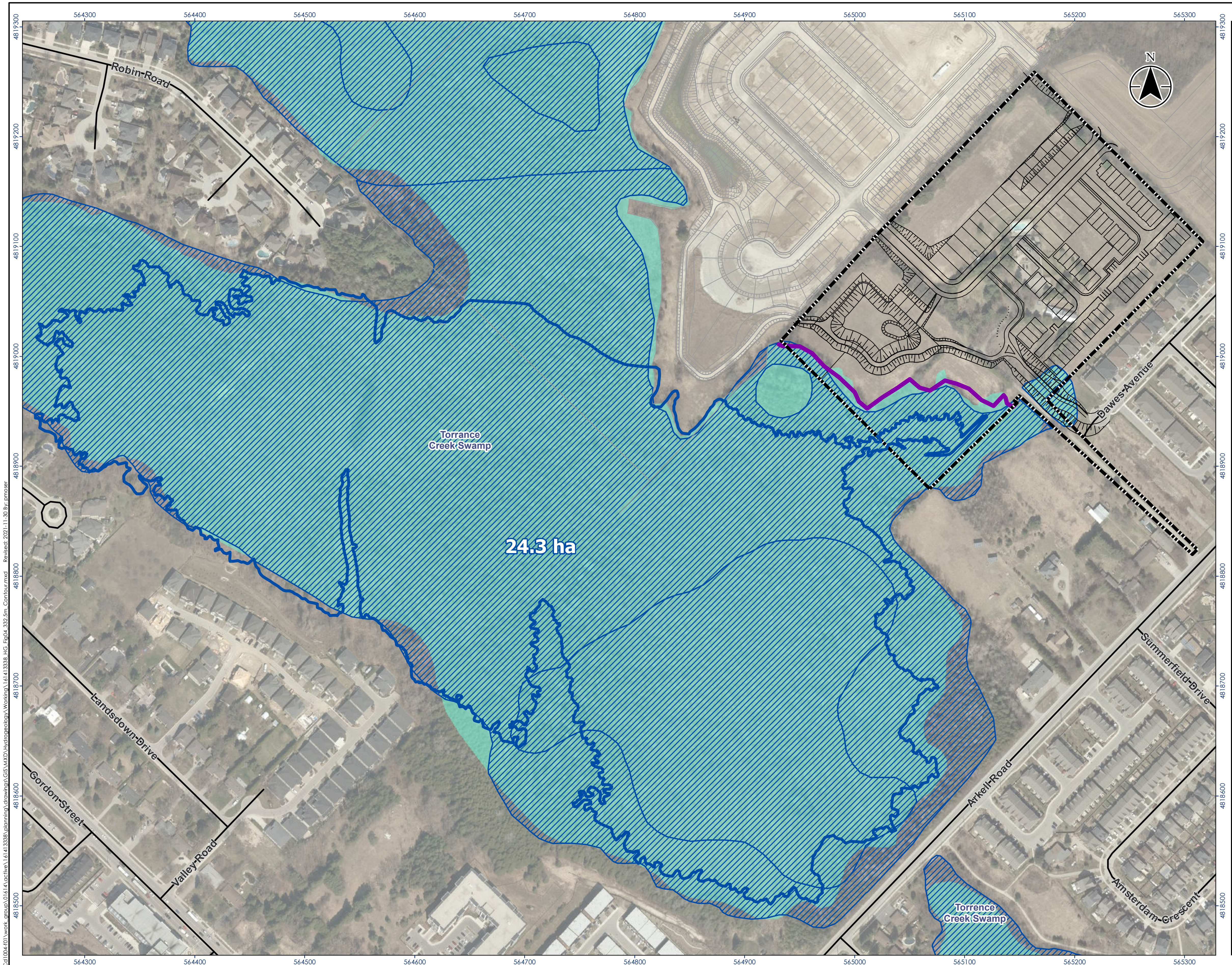
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
PRE	697	628	891	575	66	0	0	0	0	0	916	960
POST (No Mitigation)	1,734	1,562	2,216	2,095	1,722	1,588	1,849	2,004	1,925	1,446	2,583	2,388
POST (With Mitigation)	1,582	1,425	2,023	1,884	1,508	1,384	847	918	882	663	1,606	1,509

Stantec

Project: HYDROGEOLOGICAL ASSESSMENT
220 ARKELL ROAD, GUELPH, ONTARIO

Figure: **5**

Title: **Hydrograph - Monthly Pre- and Post-Development Runoff Flows Westward to Torrance Creek Swamp**



Stantec

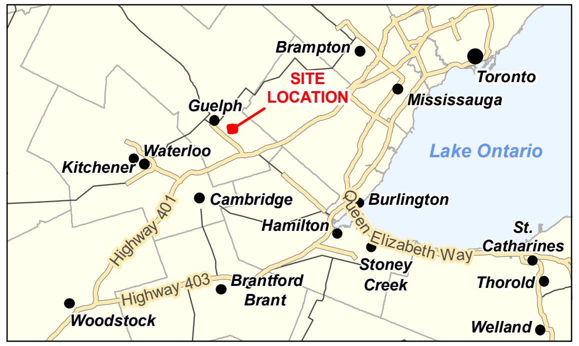
- Site Boundary
- Proposed Subdivision
- Topographic Contour (5 meter Interval)
- Topographic Contour (1 meter Interval)
- Wetland Boundary (Stantec, June 2017)
- Wetland - Evaluated (Provincial)
- Wetland Boundary (GRCA)
- 332.5m Contour

0 50 100 metres

1:3,500 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017.
3. Imagery © Firstbase Solutions 2021, Imagery date 2021.



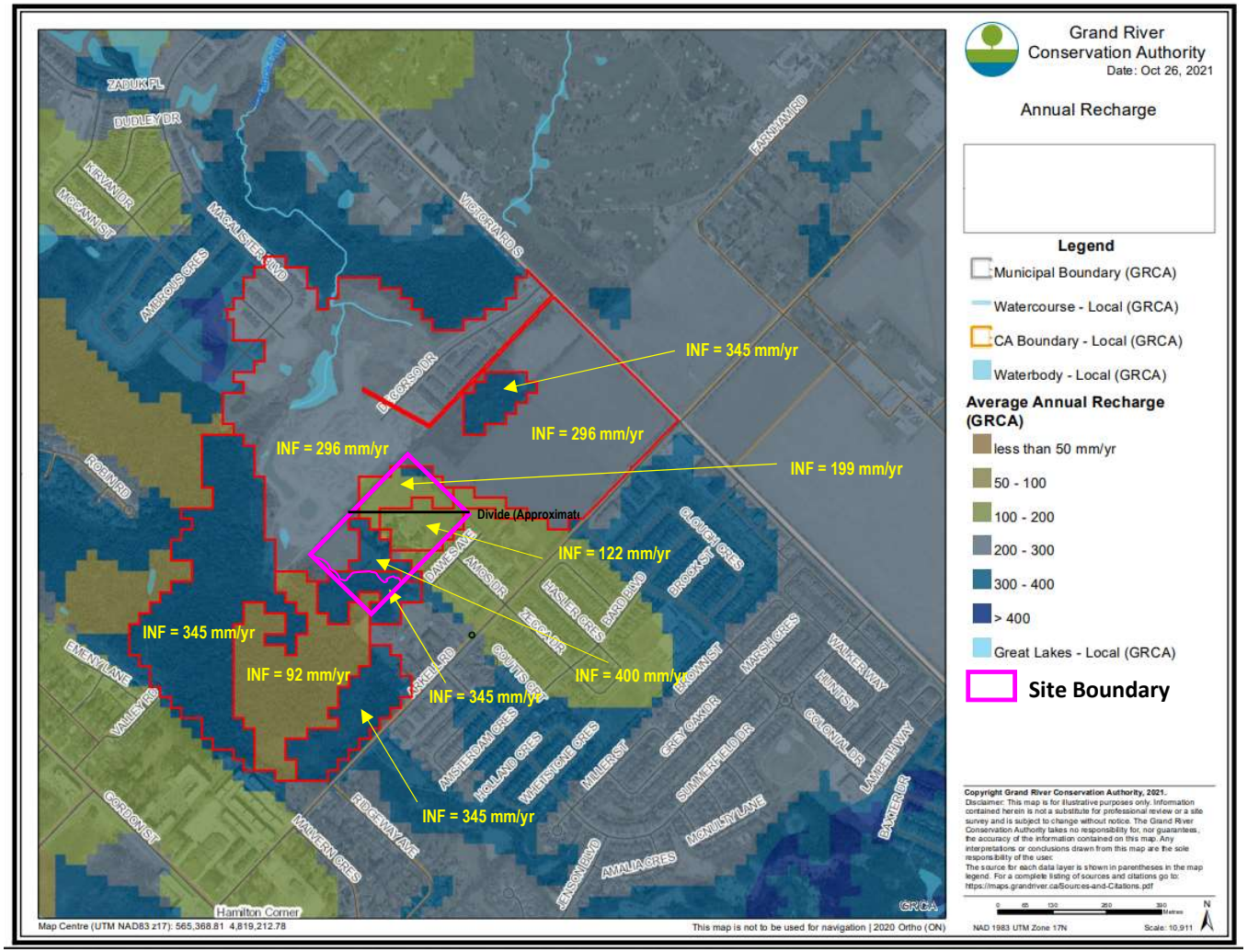
Project Location
Guelph, Ontario

161413338 REVA
Prepared by PRM on 2021-11-30
Technical Review by BW on 2021-11-30

Client/Project
ROCKPOINT PROPERTIES INC.
HYDROGEOLOGICAL ASSESSMENT
220 ARKELL ROAD, GUELPH, ONTARIO

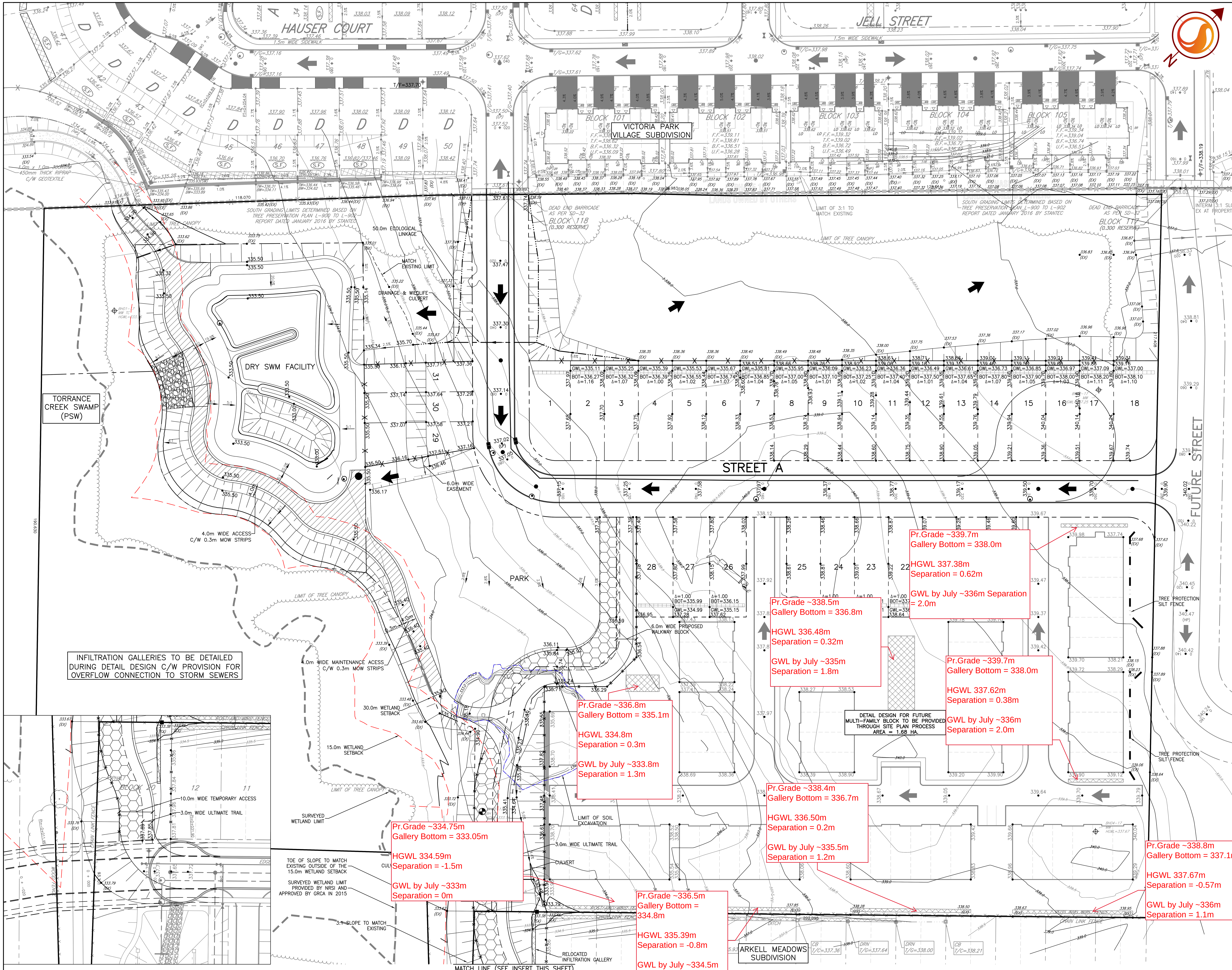
Figure No.
6

Title
Torrance Creek Swamp - Runoff Receiving Basin



Stantec

Project:	HYDROGEOLOGICAL ASSESSMENT 220 ARKELL ROAD, GUELPH, ONTARIO
Figure:	**7**
Title:	**Annual Recharge Rates (GRCA)**



HAUSER COURT
JELL STREET
VICTORIA PARK VILLAGE SUBDIVISION
BLOCK 101
BLOCK 102
BLOCK 103
BLOCK 104
BLOCK 105
BLOCK 118 (0.300 RESERVE)
BLOCK 117 (0.300 RESERVE)
DRY SWM FACILITY
TORRANCE CREEK SWAMP (PSW)
50.0m ECOLOGICAL LINKAGE
DRAINAGE & WILDLIFE CULVERT
STREET A
FUTURE STREET
PARK
6.0m WIDE EASEMENT
6.0m WIDE PROPOSED WALKWAY BLOCK
4.0m WIDE ACCESS C/W 0.3m MOW STRIPS
INFILTRATION GALLERIES TO BE DETAILED DURING DETAIL DESIGN C/W PROVISION FOR OVERFLOW CONNECTION TO STORM SEWERS
30.0m WETLAND SETBACK
15.0m WETLAND SETBACK
LIMIT OF TREE CANOPY
LIMIT OF SOIL EXCAVATION
3.0m WIDE ULTIMATE TRAIL
SURVEYED WETLAND LIMIT
TOE OF SLOPE TO MATCH EXISTING OUTSIDE OF THE 15.0m WETLAND SETBACK
SURVEYED WETLAND LIMIT PROVIDED BY NRSI AND APPROVED BY GRCA IN 2015
3:1 SLOPE TO MATCH EXISTING
RELOCATED INFILTRATION GALLERY
MATCH LINE (SEE INSERT THIS SHEET)
DETAIL DESIGN FOR FUTURE MULTI-FAMILY BLOCK TO BE PROVIDED THROUGH SITE PLAN PROCESS AREA = 1.68 HA.
ARKELL MEADOWS SUBDIVISION
TREE PROTECTION SILT FENCE
10.0m WIDE TEMPORARY ACCESS
3.0m WIDE ULTIMATE TRAIL
Pr.Grade ~339.7m
Gallery Bottom = 338.0m
HGWL 337.38m
Separation = 0.62m
GWL by July ~336m Separation = 2.0m
Pr.Grade ~338.5m
Gallery Bottom = 336.8m
HGWL 336.48m
Separation = 0.32m
GWL by July ~335m
Separation = 1.8m
Pr.Grade ~339.7m
Gallery Bottom = 338.0m
HGWL 337.62m
Separation = 0.38m
GWL by July ~336m
Separation = 2.0m
Pr.Grade ~336.8m
Gallery Bottom = 335.1m
HGWL 334.8m
Separation = 0.3m
GWL by July ~333.8m
Separation = 1.3m
Pr.Grade ~338.4m
Gallery Bottom = 336.7m
HGWL 336.50m
Separation = 0.2m
GWL by July ~335.5m
Separation = 1.2m
Pr.Grade ~334.75m
Gallery Bottom = 333.05m
HGWL 334.59m
Separation = -1.5m
GWL by July ~333m
Separation = 0m
Pr.Grade ~336.5m
Gallery Bottom = 334.8m
HGWL 335.39m
Separation = -0.8m
GWL by July ~334.5m
Separation = 0.3m
Pr.Grade ~338.8m
Gallery Bottom = 337.1m
HGWL 337.67m
Separation = -0.57m
GWL by July ~336m
Separation = 1.1m

Stantec

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Tel. 519.579.4410
www.stantec.com

Notes

1. BENCHMARK:
ND-27 RMW376 3
GUELPH BENCHMARK #392. BENCHMARK PLATE ON TRAFFIC CONTROL BOX LOCATED ON SOUTH WEST CORNER OF THE INTERSECTION OF ARKELL ROAD AND VICTORIA ROAD.
ELEVATION: 336.245m
2. TOPOGRAPHICAL SURVEY BY STANTEC CONSULTING LTD. DATED JULY 2017.
3. LEGAL PLAN PROVIDED BY BLACK, SHOEMAKER, ROBINSON & DONALDSON LIMITED. DATED MARCH 2019.
4. DRAFT PLAN BY BLACK, SHOEMAKER, ROBINSON & DONALDSON LIMITED MARCH, 2019.

Legend

- PHASE LIMIT
- 352.82 ORIGINAL GROUND ELEVATION
- 352.92 PROPOSED ELEVATION
- 351.91 EXISTING ELEVATIONS
- 352.92 FUTURE PROPOSED ELEVATION
- FLOW DIRECTION
- ORIGINAL GROUND CONTOUR
- PROPOSED STORM MANHOLE
- PROPOSED STORM CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED DOUBLE CATCHBASIN
- PROPOSED SANITARY MANHOLE
- PROPOSED VALVE & BOX
- PROPOSED HYDRANT
- EXISTING INTERIM SLOPE (3:1 UNLESS NOTED OTHERWISE)
- PROPOSED SLOPE (3:1 UNLESS NOTED OTHERWISE)
- OVERLAND FLOW DIRECTION
- FUTURE OVERLAND FLOW DIRECTION
- BORE HOLE GROUND WATER LEVEL
- FUTURE RESTORATION
- INFILTRATION GALLERY

Revision	By	Appd.	YY.MM.DD
0. FIRST SUBMISSION	MHH	KRB	19.05.30

File Name: 161413338_C-GP.dwg	Dwn.	Chkd.	Dsgn.	YY.MM.DD
				19.05.31

Permit-Seal

Professional Engineers Ontario
Licensed Engineering Technologist
Name: J. R. K. BROUSSEAU
Number: 100227228
Limitations: Preparation of municipal servicing design and specifications for gravity sanitary sewer, storm sewer watermain layout, site grading, development erosion control and development of local roads.
Association of Professional Engineers of Ontario

Client/Project

ROCKPOINT PROPERTIES INC.

220 ARKELL ROAD

Guelph, ON

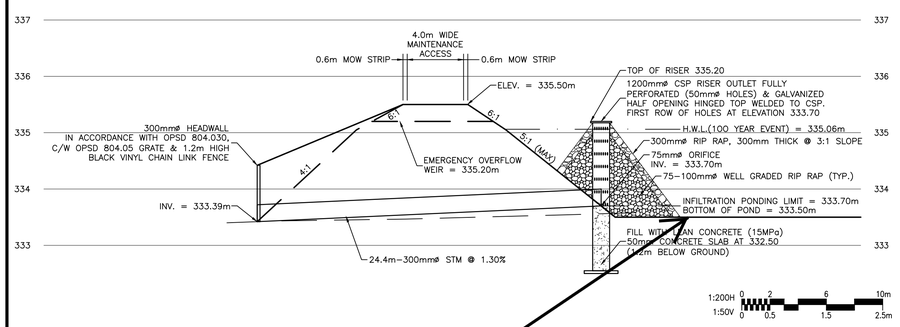
CONCEPTUAL GRADING PLAN

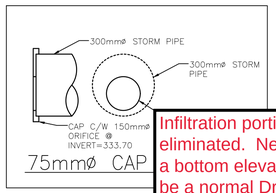
Project No.	Scale
161413338	1:500

Drawing No.	Sheet	Revision
C-400		0

V:\01614\active\161413338\design\drawing\civil\liheet_files\161413338_C-GP.dwg
2021/06/02 2:42 PM By: Huisman, Michael

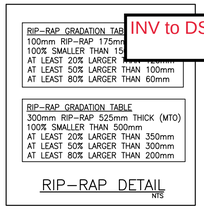
ORIGINAL SHEET - ARCH D





Infiltration portion of pond would be eliminated. New pond would have a bottom elevation of 333.70m and be a normal Drypond with a forebay.

All quantity controls would remain the same.



High GW = 333.36m

333m most of spring

Drops to about 332m by August

331.5m by October

INV to DS = 333.65m

INV to galleries = 333.5m

Stormtech S-160LP

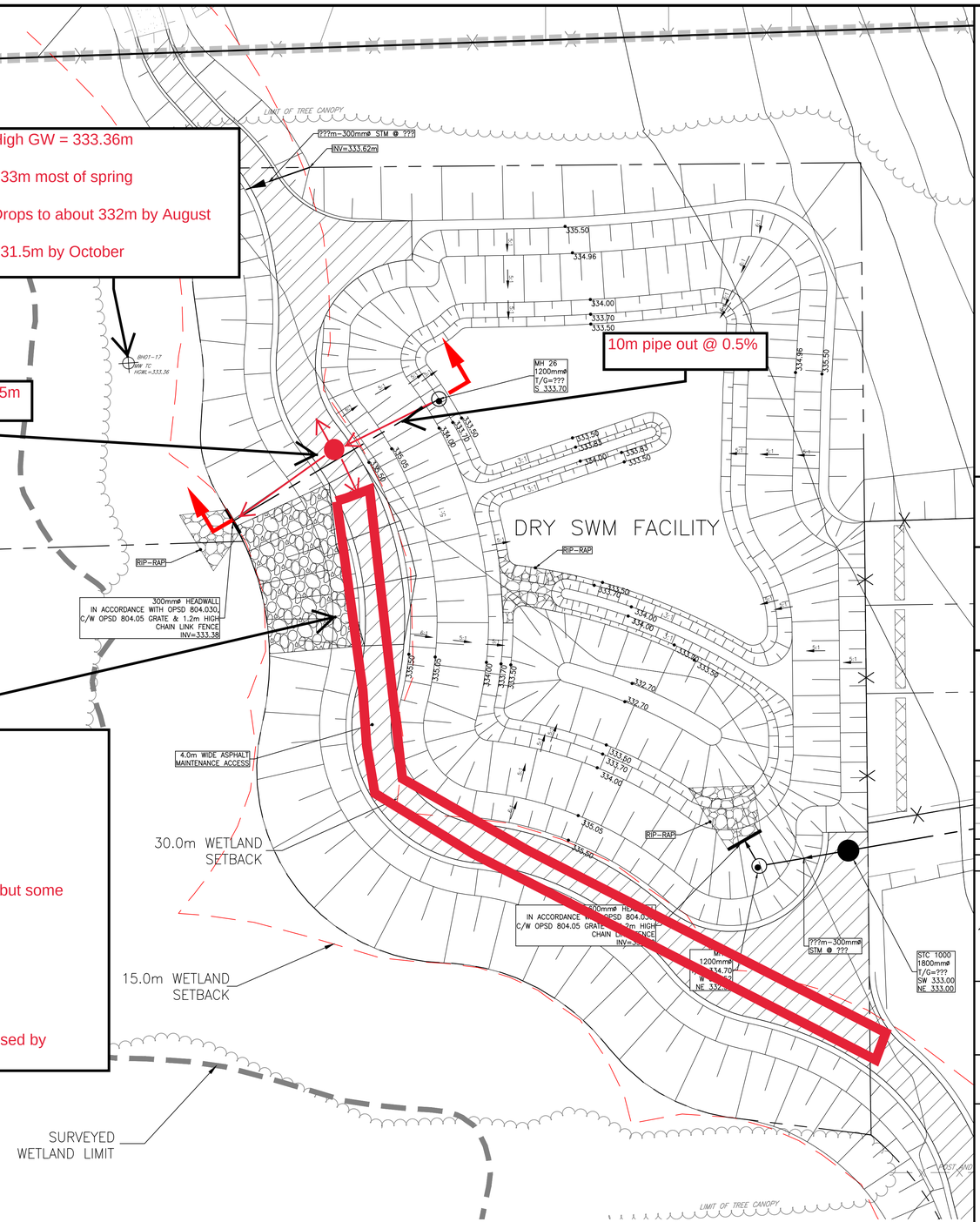
Chamber INV = 333.2m
Stone bottom = 333.1m
Stone Top = 333.65m

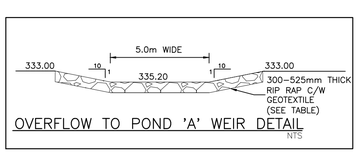
1m GW separation reached by late summer, but some separation earlier in summer/late spring

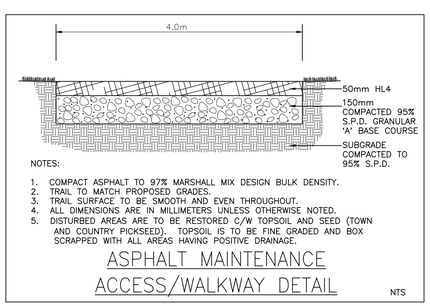
Total Length ~90m
Width = 3.8m

Volume ~100m³ (remaining 10mm volume)

Buoyancy concerns would need to be addressed by manufacturer prior to final design







North:

LEGEND:

ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED.

PIPE SIZES ARE IN MILLIMETRES.

The position of existing above ground and underground utilities and facilities are not necessarily shown on the drawings, and where shown, the accuracy of the position of such utilities and facilities is not guaranteed. Before starting work, the contractor shall confirm the exact location of all existing utilities and facilities, and shall assume all liability for damage to them. Drawings shall not be used for construction unless sealed. All work to be performed in accordance with the Occupational Health & Safety Act 1990.

GENERAL NOTES:

1. BENCHMARK: GUELPH BENCHMARK #91.
   #493 VICTORIA ROAD NORTH
   ELEVATION=351.060m
2. LEGAL INFORMATION TAKEN FROM BLACK, SHOEMAKER, ROBINSON & DONALDSON INC. PROJECT #02-4541-3 DATED FEBRUARY 11, 2003.
3. TOPOGRAPHICAL SURVEY BY STANTEC CONSULTING LTD. DATED MAY 2000. ADDITIONAL TOPOGRAPHICAL SURVEY BY STANTEC CONSULTING LTD. DATED JUNE 2002

SCHEDULE OF REVISIONS

CITY OF Guelph
Making a Difference

ENGINEERING SERVICES

220 ARKELL
SUBDIVISION

DESIGNED BY:	APPROVED BY:

Stantec
300 Hagey Blvd., Suite 100, Waterloo, ON, N2L 0A4
Tel. 519.579.4410
www.stantec.com

SCALES:	CHECKED BY:
1:250	KRB
DATE DRAWN:	CONTRACT No.
OCTOBER 20 / 17	X-XXXX
DRAWN BY:	DRAWING No.
MHH	

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APPENDIX B

Tables

TABLE 1: PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENT 106 (LANDS DRAINING TO TORRANCE CREEK SWAMP)

Pre-Development
Model Type: Thornthwaite and Mather (1955)
Client: Rockpoint Properties Inc.
Location 220 Arkell Road, Guelph, ON - Catchment 106 (Lands Draining to Torrance Creek Swamp)
Total Site Area (ha) 3.85

Land Description Factors (Sub-area descriptions provided below)	**Sub-Area A**	**Sub-Area B**	**Sub-Area C**	**Sub-Area D**	**Sub-Area E**								**Total**
Topography	0.15	0.15	0.15	0.00	0.00								
Soils	0.15	0.30	0.50	0.00	0.00								
Cover	0.15	0.05	0.15	0.00	0.00								
Sum (Infiltration Factor / IF)†	0.45	0.50	0.80	0.00	0.00								
Soil Moisture Capacity (mm)	150	75	100	0	0								
Site area (ha)	0.79	0.63	2.43	0.00	0.00								3.85
Imperviousness Coefficient	0.00	0.00	0.00	0.00	0.00								
Impervious Area (ha)	0.00	0.00	0.00	0.00	0.00								0.00
Percentage of Total Site Area	0.0%	0.0%	0.0%	0.0%	0.0%								0%
Remaining Pervious Area (ha)	0.79	0.63	2.43	0.00	0.00								3.85
Total Pervious Site Area (ha)	0.79	0.63	2.43	0.00	0.00								3.85
Percentage of Total Site Area	20.6%	16.25%	63.0%	0.0%	0.0%								100%

	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Climate Data (Guelph Arboretum Climate Normals, 1971 - 2000)‡													
Average Daily Temperature (°C)	-7.6	-6.9	-1.3	5.9	12.3	16.9	19.7	18.6	14.1	7.9	2.4	-4	**6.5**
Precipitation (mm)	56.4	50.8	72.1	78.3	79.9	76	88.5	95.9	92.1	69.2	86.3	77.7	**923**

Potential Evapotranspiration Analysis for Site	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Heat Index	0.0	0.0	0.0	1.3	3.9	6.3	8.0	7.3	4.8	2.0	0.3	0.0	**34**
Unadjusted Potential Evapotranspiration (mm)	0.0	0.0	0.0	28.4	60.7	84.3	98.8	93.1	69.9	38.4	11.2	0.0	**485**
Potential Evapotranspiration Adjusting Factor for Latitude*	0.77	0.87	0.99	1.12	1.23	1.29	1.26	1.16	1.04	0.92	0.81	0.75	
Adjusted Potential Evapotranspiration (PET)(mm)	0	0	0	32	75	108	124	108	73	35	9	0	**564**
Precipitation - PET (mm)	56	51	72	47	5	-32	-36	-12	19	34	77	78	**359**

Evapotranspiration Analysis													
Sub-Area A	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-32	-68	-81	-51	-9	0	0	
Storage (S)	150	150	150	150	150	121	95	88	107	141	150	150	
Change in Storage	0	0	0	0	0	-29	-26	-8	19	34	9	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	105	114	104	73	35	9	0	**546**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	68	78	**377**
Potential Infiltration (I)	25	23	32	21	2	0	0	0	0	0	31	35	170
Potential Direct Surface Water Runoff (R)	31	28	40	26	3	0	0	0	0	0	37	43	207
Potential Infiltration (mm)	0	0	0	137	2	0	0	0	0	0	31	0	170
Pervious Evapotranspiration (m^3)	0	0	0	252	592	835	907	822	579	280	72	0	4,339
Pervious Runoff (m^3)	246	222	315	204	23	0	0	0	0	0	298	340	**1,648**
Pervious Infiltration (m^3)	0	0	0	1085	19	0	0	0	0	0	244	0	**1,348**
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	56	51	72	78	80	76	89	96	92	69	86	78	923
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

TABLE 1: PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENT 106 (LANDS DRAINING TO TORRANCE CREEK SWAMP)

Evapotranspiration Analysis													
Sub-Area B	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-32	-68	-81	-39	4	0	0	
Storage (S)	75	75	75	75	75	49	30	26	45	79	75	75	
Change in Storage	0	0	0	0	0	-26	-18	-5	19	34	-4	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	102	107	101	73	35	9	0	**533**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	81	78	**390**
Potential Infiltration (I)	28	25	36	23	3	0	0	0	0	0	41	39	195
Potential Direct Surface Water Runoff (R)	28	25	36	23	3	0	0	0	0	0	41	39	195
Potential Infiltration (mm)	0	0	0	152	3	0	0	0	0	0	41	0	195
Pervious Evapotranspiration (m^3)	0	0	0	199	466	640	669	629	456	220	56	0	3,336
Pervious Runoff (m^3)	176	159	226	146	17	0	0	0	0	0	254	243	**1,220**
Pervious Infiltration (m^3)	0	0	0	950	17	0	0	0	0	0	254	0	**1,220**
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	56	51	72	78	80	76	89	96	92	69	86	78	923
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Evapotranspiration Analysis													
Sub-Area C	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-32	-68	-81	-45	-2	0	0	
Storage (S)	100	100	100	100	100	72	51	45	64	98	100	100	
Change in Storage	0	0	0	0	0	-28	-22	-6	19	34	2	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	104	110	102	73	35	9	0	**539**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	75	78	**384**
Potential Infiltration (I)	45	41	58	37	4	0	0	0	0	0	60	62	307
Potential Direct Surface Water Runoff (R)	11	10	14	9	1	0	0	0	0	0	15	16	77
Potential Infiltration (mm)	0	0	0	243	4	0	0	0	0	0	60	0	307
Pervious Evapotranspiration (m^3)	0	0	0	770	1809	2515	2676	2472	1767	855	219	0	13,084
Pervious Runoff (m^3)	274	247	350	226	26	0	0	0	0	0	365	377	**1,864**
Pervious Infiltration (m^3)	0	0	0	5894	104	0	0	0	0	0	1459	0	**7,458**
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	56	51	72	78	80	76	89	96	92	69	86	78	923
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Pre-Development Infiltration (INF)	10,026	m^3/yr	260	mm/yr	0.3	L/s
Pre-Development Runoff (R)	4,733	m^3/yr	123	mm/yr	0.1	L/s
Pre-Development Evapotranspiration (ET)	20,759	m^3/yr	539	mm/yr	0.7	L/s
Total = INF + R + ET	35,518	m^3/yr	923	mm/yr	1.1	L/s
Precipitation	35,518	m^3/yr	923	mm/yr	1.1	L/s
Error	0.000	(m^3/yr)	-0.647	mm/yr	0.000	L/s

Sub-Area Descriptions (topography, soils, cover)	
Sub-Area A	Rolling, Silty Sand to Sand Till, Pasture and Shrubs
Sub-Area B	Rolling, Silty Sand to Sand Till, Urban Lawn
Sub-Area C	Rolling, Sand, Pasture and Shrubs

Notes:

† Infiltration factors after Ontario Ministry of the Environment, 2003. Stormwater Management Planning and Design Manual. March 2003.; and Ontario Ministry of Environment and Energy (MOEE). 1995. MOEE Hydrogeological Technical Information Requirements for Land Development Applications. April 1995.

* PET adjustment factors after Thornthwaite, C.W., and J.R. Mather, 1957. Instructions and Tables for Computing Potential Evapotranspiration and the water balance. Drexel Institute of Technology, Laboratory of Climatology, Publications in Climatology, Volume X, No. 3.

‡ Climate Data after Environment Canada, 2021. Canadian Climate Normals 1971-2000, Guelph Arboretum, Climate ID 6143069. [Online] http://climate.weather.gc.ca/climate_normals/index_e.html. Accessed July 2021.

Assumptions:

[1] The monthly average precipitation collected at the Guelph Arboretum climate station is reflective of the precipitation trends that have historically occurred at the Site.

[2] Surplus water is not available for runoff and recharge during months where water losses from actual evapotranspiration exceed precipitation inputs.

[3] Runoff, infiltration and evapotranspiration do not occur in months where the average daily temperature is below 0°C, which is the case for the months of December through March at the Site.

[4] Precipitation during freezing months (i.e., December to March) is assumed to accumulate as snow and result in additional precipitation in the first month thereafter where the average temperature is greater than 0°C (i.e., April).

[5] Soil moisture capacity is at a maximum in April.

TABLE 2: PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENT 110 (LANDS DRAINING EASTWARD TO WOODLOT)

Pre-Development
Model Type: Thornthwaite and Mather (1955)
Client: Rockpoint Properties Inc.
Location 220 Arkell Road, Guelph, ON - Catchment 110 (Lands Draining Eastward to Woodlot)
Total Site Area (ha) 2.47

Land Description Factors (Sub-area descriptions provided below)	**Sub-Area A**	**Sub-Area B**	**Sub-Area C**	**Sub-Area D**	**Sub-Area E**								**Total**
Topography	0.15	0.15	0.15	0.00	0.00								
Soils	0.20	0.30	0.50	0.00	0.00								
Cover	0.15	0.05	0.15	0.00	0.00								
Sum (Infiltration Factor / IF)†	0.50	0.50	0.80	0.00	0.00								
Soil Moisture Capacity (mm)	150	75	100	0	0								
Site area (ha)	2.19	0.00	0.28	0.00	0.00								2.47
Imperviousness Coefficient	0.00	0.00	0.00	0.00	0.00								
Impervious Area (ha)	0.00	0.00	0.00	0.00	0.00								0.00
Percentage of Total Site Area	0.0%	0.0%	0.0%	0.0%	0.0%								0%
Remaining Pervious Area (ha)	2.19	0.00	0.28	0.00	0.00								2.47
Total Pervious Site Area (ha)	2.19	0.00	0.28	0.00	0.00								2.47
Percentage of Total Site Area	88.5%	0.00%	11.5%	0.0%	0.0%								100%

	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Climate Data (Guelph Arboretum Climate Normals, 1971 - 2000)‡													
Average Daily Temperature (°C)	-7.6	-6.9	-1.3	5.9	12.3	16.9	19.7	18.6	14.1	7.9	2.4	-4	**6.5**
Precipitation (mm)	56.4	50.8	72.1	78.3	79.9	76	88.5	95.9	92.1	69.2	86.3	77.7	**923**

Potential Evapotranspiration Analysis for Site	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Heat Index	0.0	0.0	0.0	1.3	3.9	6.3	8.0	7.3	4.8	2.0	0.3	0.0	**34**
Unadjusted Potential Evapotranspiration (mm)	0.0	0.0	0.0	28.4	60.7	84.3	98.8	93.1	69.9	38.4	11.2	0.0	**485**
Potential Evapotranspiration Adjusting Factor for Latitude*	0.77	0.87	0.99	1.12	1.23	1.29	1.26	1.16	1.04	0.92	0.81	0.75	
Adjusted Potential Evapotranspiration (PET)(mm)	0	0	0	32	75	108	124	108	73	35	9	0	**564**
Precipitation - PET (mm)	56	51	72	47	5	-32	-36	-12	19	34	77	78	**359**

Evapotranspiration Analysis													
Sub-Area A	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-32	-68	-81	-51	-9	0	0	
Storage (S)	150	150	150	150	150	121	95	88	107	141	150	150	
Change in Storage	0	0	0	0	0	-29	-26	-8	19	34	9	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	105	114	104	73	35	9	0	**546**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	68	78	**377**
Potential Infiltration (I)	28	25	36	23	3	0	0	0	0	0	34	39	189
Potential Direct Surface Water Runoff (R)	28	25	36	23	3	0	0	0	0	0	34	39	189
Potential Infiltration (mm)	0	0	0	152	3	0	0	0	0	0	34	0	189
Pervious Evapotranspiration (m^3)	0	0	0	694	1629	2297	2496	2263	1592	770	197	0	11,938
Pervious Runoff (m^3)	616	555	788	509	59	0	0	0	0	0	745	849	**4,121**
Pervious Infiltration (m^3)	0	0	0	3318	59	0	0	0	0	0	745	0	**4,121**
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	56	51	72	78	80	76	89	96	92	69	86	78	923
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

TABLE 2: PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENT 110 (LANDS DRAINING EASTWARD TO WOODLOT)

Evapotranspiration Analysis													
Sub-Area B	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-32	-68	-81	-39	4	0	0	
Storage (S)	75	75	75	75	75	49	30	26	45	79	75	75	
Change in Storage	0	0	0	0	0	-26	-18	-5	19	34	-4	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	102	107	101	73	35	9	0	**533**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	81	78	**390**
Potential Infiltration (I)	28	25	36	23	3	0	0	0	0	0	41	39	195
Potential Direct Surface Water Runoff (R)	28	25	36	23	3	0	0	0	0	0	41	39	195
Potential Infiltration (mm)	0	0	0	152	3	0	0	0	0	0	41	0	195
Pervious Evapotranspiration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	56	51	72	78	80	76	89	96	92	69	86	78	923
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Evapotranspiration Analysis													
Sub-Area C	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-32	-68	-81	-45	-2	0	0	
Storage (S)	100	100	100	100	100	72	51	45	64	98	100	100	
Change in Storage	0	0	0	0	0	-28	-22	-6	19	34	2	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	104	110	102	73	35	9	0	**539**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	75	78	**384**
Potential Infiltration (I)	45	41	58	37	4	0	0	0	0	0	60	62	307
Potential Direct Surface Water Runoff (R)	11	10	14	9	1	0	0	0	0	0	15	16	77
Potential Infiltration (mm)	0	0	0	243	4	0	0	0	0	0	60	0	307
Pervious Evapotranspiration (m^3)	0	0	0	90	211	293	312	288	206	100	26	0	1,525
Pervious Runoff (m^3)	32	29	41	26	3	0	0	0	0	0	43	44	**217**
Pervious Infiltration (m^3)	0	0	0	687	12	0	0	0	0	0	170	0	**869**
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	56	51	72	78	80	76	89	96	92	69	86	78	923
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Pre-Development Infiltration (INF)	4,991	m^3/yr	202	mm/yr	0.2	L/s
Pre-Development Runoff (R)	4,339	m^3/yr	176	mm/yr	0.1	L/s
Pre-Development Evapotranspiration (ET)	13,463	m^3/yr	545	mm/yr	0.4	L/s
Total = INF + R + ET	22,793	m^3/yr	923	mm/yr	0.7	L/s
Precipitation	22,793	m^3/yr	923	mm/yr	0.7	L/s
Error	0.000	(m^3/yr)	-0.411	mm/yr	0.000	L/s

Sub-Area Descriptions (topography, soils, cover)	
Sub-Area A	Rolling, Silty Sand to Sand Till, Pasture and Shrubs
Sub-Area B	Rolling, Silty Sand to Sand Till, Urban Lawn
Sub-Area C	Rolling, Sand, Pasture and Shrubs

Notes:

† Infiltration factors after Ontario Ministry of the Environment, 2003. Stormwater Management Planning and Design Manual. March 2003.; and Ontario Ministry of Environment and Energy (MOEE). 1995. MOEE Hydrogeological Technical Information Requirements for Land Development Applications. April 1995.

* PET adjustment factors after Thornthwaite, C.W., and J.R. Mather, 1957. Instructions and Tables for Computing Potential Evapotranspiration and the water balance. Drexel Institute of Technology, Laboratory of Climatology, Publications in Climatology, Volume X, No. 3. Centerton, New Jersey.

‡ Climate Data after Environment Canada, 2021. Canadian Climate Normals 1971-2000, Guelph Arboretum, Climate ID 6143069. [Online] http://climate.weather.gc.ca/climate_normals/index_e.html. Accessed July 2021.

Assumptions:

[1] The monthly average precipitation collected at the Guelph Arboretum climate station is reflective of the precipitation trends that have historically occurred at the Site.
[2] Surplus water is not available for runoff and recharge during months where water losses from actual evapotranspiration exceed precipitation inputs.
[3] Runoff, infiltration and evapotranspiration do not occur in months where the average daily temperature is below 0°C, which is the case for the months of December through March at the Site.
[4] Precipitation during freezing months (i.e., December to March) is assumed to accumulate as snow and result in additional precipitation in the first month thereafter where the average temperature is greater than 0°C (i.e., April).
[5] Soil moisture capacity is at a maximum in April.

TABLE 3: POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENTS 200, 202, 203, 204, 205, 206, AND 207A/B (LANDS DRAINING WESTWARD TO TORRANCE CREEK SWAMP)

Post-Development
Model Type: Thornthwaite and Mather (1955)
Client: Rockpoint Properties Inc.
Location 220 Arkell Road - Former Catchment 106
Post-Development Catchments 200, 202, 203, 204, 205, 206, AND 207A/B (Lands Draining Westward to Torrance Creek Swamp)
Total Site Area (ha) 5.26

Land Description Factors (Sub-area descriptions provided below)	**Sub-Area A**	**Sub-Area C**	**Sub-Area D**	**Sub-Area E**	**Sub-Area F**	**Sub-Area G**	**Sub-Area H**	**Sub-Area I**	**Sub-Area J**				**Total**
Topography	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.00	0.00				
Soils	0.30	0.50	0.30	0.50	0.30	0.50	0.50	0.00	0.00				
Cover	0.15	0.15	0.05	0.05	0.05	0.05	0.15	0.00	0.00				
Sum (Infiltration Factor)[†]	0.60	0.80	0.50	0.70	0.50	0.70	0.80	0.00	0.00				
Soil Moisture Capacity (mm)	150	100	75	50	75	50	100	0	0				
Site area (ha)	0.05	1.38	2.45	0.34	0.35	0.12	0.56	0.00	0.00				5.26
Imperviousness Coefficient	0.00	0.00	0.65	0.65	0.40	0.40	0.15	0.00	0.00				
Impervious Area (ha)	0.00	0.00	1.59	0.22	0.14	0.05	0.08	0.00	0.00				2.09
Percentage of Total Site Area	0.0%	0.0%	30.2%	4.3%	2.7%	0.9%	1.6%	0.0%	0.0%				39.7%
Remaining Pervious Area (ha)	0.05	1.38	0.86	0.12	0.21	0.07	0.48	0.00	0.00				3.17
Total Pervious Site Area (ha)	0.05	1.38	0.86	0.12	0.21	0.07	0.48	0.00	0.00				3.17
Percentage of Total Site Area	1.0%	26.2%	16.3%	2.3%	4.0%	1.4%	9.1%	0.0%	0.0%				60.3%

	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Climate Data (Guelph Arboretum Climate Normals, 1971 - 2000)[‡]													
Average Daily Temperature (°C)	-7.6	-6.9	-1.3	5.9	12.3	16.9	19.7	18.6	14.1	7.9	2.4	-4	**6.5**
Precipitation (mm)	56.4	50.8	72.1	78.3	79.9	76	88.5	95.9	92.1	69.2	86.3	77.7	**923**

Potential Evapotranspiration Analysis for Site	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Heat Index	0.0	0.0	0.0	1.3	3.9	6.3	8.0	7.3	4.8	2.0	0.3	0.0	**34**
Unadjusted Potential Evapotranspiration (mm)	0.0	0.0	0.0	28.4	60.7	84.3	98.8	93.1	69.9	38.4	11.2	0.0	**485**
Potential Evapotranspiration Adjusting Factor for Latitude*	0.77	0.87	0.99	1.12	1.23	1.29	1.26	1.16	1.04	0.92	0.81	0.75	
Adjusted Potential Evapotranspiration (PET)(mm)	0	0	0	32	75	108	124	108	73	35	9	0	**564**
Precipitation - PET (mm)	56	51	72	47	5	-32	-36	-12	19	34	77	78	**359**

Evapotranspiration Analysis													
Sub-Area A	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-32	-68	-81	-51	-9	0	0	
Storage (S)	150	150	150	150	150	121	95	88	107	141	150	150	
Change in Storage	0	0	0	0	0	-29	-26	-8	19	34	9	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	105	114	104	73	35	9	0	**546**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	68	78	**377**
Potential Infiltration (I)	34	30	43	28	3	0	0	0	0	0	41	47	226
Potential Direct Surface Water Runoff (R)	23	20	29	19	2	0	0	0	0	0	27	31	151
Potential Infiltration (mm)	0	0	0	182	3	0	0	0	0	0	41	0	226
Pervious Evapotranspiration (m^3)	0	0	0	17	40	56	61	55	39	19	5	0	289
Pervious Runoff (m^3)	12	11	15	10	1	0	0	0	0	0	14	16	**80**
Pervious Infiltration (m^3)	0	0	0	97	2	0	0	0	0	0	22	0	**120**
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	56	51	72	78	80	76	89	96	92	69	86	78	923
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

TABLE 3: POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENTS 200, 202, 203, 204, 205, 206, AND 207A/B (LANDS DRAINING WESTWARD TO TORRANCE CREEK SWAMP)

Evapotranspiration Analysis													
Sub-Area C	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-32	-68	-81	-45	-2	0	0	
Storage (S)	100	100	100	100	100	72	51	45	64	98	100	100	
Change in Storage	0	0	0	0	0	-28	-22	-6	19	34	2	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	104	110	102	73	35	9	0	**539**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	75	78	**384**
Potential Infiltration (I)	45	41	58	37	4	0	0	0	0	0	60	62	307
Potential Direct Surface Water Runoff (R)	11	10	14	9	1	0	0	0	0	0	15	16	77
Potential Infiltration (mm)	0	0	0	243	4	0	0	0	0	0	60	0	307
Pervious Evapotranspiration (m^3)	0	0	0	437	1026	1427	1518	1402	1003	485	124	0	7,421
Pervious Runoff (m^3)	155	140	199	128	15	0	0	0	0	0	207	214	**1,058**
Pervious Infiltration (m^3)	0	0	0	3343	59	0	0	0	0	0	828	0	**4,230**
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	56	51	72	78	80	76	89	96	92	69	86	78	923
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Evapotranspiration Analysis													
Sub-Area D	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-32	-68	-81	-39	4	0	0	
Storage (S)	75	75	75	75	75	49	30	26	45	79	75	75	
Change in Storage	0	0	0	0	0	-26	-18	-5	19	34	-4	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	102	107	101	73	35	9	0	**533**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	81	78	**390**
Potential Infiltration (I)	28	25	36	23	3	0	0	0	0	0	41	39	195
Potential Direct Surface Water Runoff (R)	28	25	36	23	3	0	0	0	0	0	41	39	195
Potential Infiltration (mm)	0	0	0	152	3	0	0	0	0	0	41	0	195
Pervious Evapotranspiration (m^3)	0	0	0	272	638	876	917	861	624	302	77	0	4,567
Pervious Runoff (m^3)	242	218	309	199	23	0	0	0	0	0	347	333	**1,671**
Pervious Infiltration (m^3)	0	0	0	1300	23	0	0	0	0	0	347	0	**1,671**
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	56	51	72	78	80	76	89	96	92	69	86	78	923
Impervious Runoff (m^3)	897	808	1147	1246	1271	1209	1408	1526	1465	1101	1373	1236	**14,687**

Evapotranspiration Analysis													
Sub-Area E	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-32	-68	-81	-27	12	0	0	
Storage (S)	50	50	50	50	50	26	13	10	29	63	50	50	
Change in Storage	0	0	0	0	0	-24	-13	-3	19	34	-13	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	100	102	99	73	35	9	0	**524**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	90	78	**399**
Potential Infiltration (I)	39	36	50	33	4	0	0	0	0	0	63	54	280
Potential Direct Surface Water Runoff (R)	17	15	22	14	2	0	0	0	0	0	27	23	120
Potential Infiltration (mm)	0	0	0	212	4	0	0	0	0	0	63	0	280
Pervious Evapotranspiration (m^3)	0	0	0	38	90	120	123	119	88	43	11	0	632
Pervious Runoff (m^3)	20	18	26	17	2	0	0	0	0	0	33	28	**145**
Pervious Infiltration (m^3)	0	0	0	256	5	0	0	0	0	0	76	0	**337**
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	56	51	72	78	80	76	89	96	92	69	86	78	923
Impervious Runoff (m^3)	126	114	162	175	179	170	198	215	206	155	193	174	**2,069**

TABLE 3: POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENTS 200, 202, 203, 204, 205, 206, AND 207A/B (LANDS DRAINING WESTWARD TO TORRANCE CREEK SWAMP)

Evapotranspiration Analysis													
Sub-Area F	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-32	-68	-81	-39	4	0	0	
Storage (S)	75	75	75	75	75	49	30	26	45	79	75	75	
Change in Storage	0	0	0	0	0	-26	-18	-5	19	34	-4	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	102	107	101	73	35	9	0	**533**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	81	78	**390**
Potential Infiltration (I)	28	25	36	23	3	0	0	0	0	0	41	39	195
Potential Direct Surface Water Runoff (R)	28	25	36	23	3	0	0	0	0	0	41	39	195
Potential Infiltration (mm)	0	0	0	152	3	0	0	0	0	0	41	0	195
Pervious Evapotranspiration (m^3)	0	0	0	67	157	216	226	212	154	74	19	0	1,126
Pervious Runoff (m^3)	60	54	76	49	6	0	0	0	0	0	86	82	**412**
Pervious Infiltration (m^3)	0	0	0	321	6	0	0	0	0	0	86	0	**412**
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	56	51	72	78	80	76	89	96	92	69	86	78	923
Impervious Runoff (m^3)	79	72	102	110	113	107	125	135	130	97	122	109	**1,300**

Evapotranspiration Analysis													
Sub-Area G	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-32	-68	-81	-27	12	0	0	
Storage (S)	50	50	50	50	50	26	13	10	29	63	50	50	
Change in Storage	0	0	0	0	0	-24	-13	-3	19	34	-13	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	100	102	99	73	35	9	0	**524**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	90	78	**399**
Potential Infiltration (I)	39	36	50	33	4	0	0	0	0	0	63	54	280
Potential Direct Surface Water Runoff (R)	17	15	22	14	2	0	0	0	0	0	27	23	120
Potential Infiltration (mm)	0	0	0	212	4	0	0	0	0	0	63	0	280
Pervious Evapotranspiration (m^3)	0	0	0	24	56	74	76	74	54	26	7	0	390
Pervious Runoff (m^3)	13	11	16	10	1	0	0	0	0	0	20	17	**89**
Pervious Infiltration (m^3)	0	0	0	158	3	0	0	0	0	0	47	0	**208**
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	56	51	72	78	80	76	89	96	92	69	86	78	923
Impervious Runoff (m^3)	28	25	36	39	40	38	44	48	46	34	43	39	**459**

Evapotranspiration Analysis													
Sub-Area H	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-32	-68	-81	-45	-2	0	0	
Storage (S)	100	100	100	100	100	72	51	45	64	98	100	100	
Change in Storage	0	0	0	0	0	-28	-22	-6	19	34	2	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	104	110	102	73	35	9	0	**539**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	75	78	**384**
Potential Infiltration (I)	45	41	58	37	4	0	0	0	0	0	60	62	307
Potential Direct Surface Water Runoff (R)	11	10	14	9	1	0	0	0	0	0	15	16	77
Potential Infiltration (mm)	0	0	0	243	4	0	0	0	0	0	60	0	307
Pervious Evapotranspiration (m^3)	0	0	0	151	355	494	526	485	347	168	43	0	2,570
Pervious Runoff (m^3)	54	48	69	44	5	0	0	0	0	0	72	74	**366**
Pervious Infiltration (m^3)	0	0	0	1158	20	0	0	0	0	0	287	0	**1,465**
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	56	51	72	78	80	76	89	96	92	69	86	78	923
Impervious Runoff (m^3)	47	43	61	66	67	64	74	81	77	58	73	65	**777**

TABLE 3: POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENTS 200, 202, 203, 204, 205, 206, AND 207A/B (LANDS DRAINING WESTWARD TO TORRANCE CREEK SWAMP)

POST-DEVELOPMENT - WITH NO INFILTRATION AUGMENTATION / MITIGATION MEASURES

Pre-Development to Torrance Creek Swamp (refer to Table 1 for detailed calculations

Monthly Summary (m^3)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Pre-Development Infiltration (INF)	0	0	0	7,929	140	0	0	0	0	0	1,957	0	10,026
Pre-Development Runoff (R)	697	628	891	575	66	0	0	0	0	0	916	960	4,733
Pre-Development Evapotranspiration (ET)	0	0	0	1,221	2,868	3,990	4,253	3,923	2,802	1,356	347	0	20,759
Total = INF + R + ET	697	628	891	9,725	3,074	3,990	4,253	3,923	2,802	1,356	3,220	960	35,518

Post-Development to Torrance Creek Swamp - WITH NO INFILTRATION AUGMENTATION / MITGATION

Monthly Summary - No Augmentation (m^3)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Post-Development Infiltration (INF)	0	0	0	6,633	117	0	0	0	0	0	1,693	0	8,443
Pre- to Post- Infiltration Comparison	0	0	0	-1,296	-23	0	0	0	0	0	-264	0	-1,583
Post-Development Runoff (R)	1,734	1,562	2,216	2,095	1,722	1,588	1,849	2,004	1,925	1,446	2,583	2,388	23,112
Pre- to Post- Runoff Comparison	1,037	934	1,326	1,519	1,656	1,588	1,849	2,004	1,925	1,446	1,666	1,429	18,379
Post-Development Evapotranspiration (ET)	0	0	0	1,006	2,362	3,263	3,446	3,209	2,308	1,117	286	0	16,996
Total = INF + R + ET	1,734	1,562	2,216	9,733	4,202	4,851	5,295	5,213	4,233	2,563	4,561	2,388	48,551

SUMMARY - WITH NO INFILTRATION AUGMENTATION / MITIGATION MEASURES						
Post-Development Infiltration (INF)	8,443	m^3/yr	161	mm/yr	0.3	L/s
Post-Development Runoff (R)	23,112	m^3/yr	439	mm/yr	0.7	L/s
Post-Development Evapotranspiration (ET)	16,996	m^3/yr	323	mm/yr	0.5	L/s
Total = INF + R + ET	48,551	m^3/yr	923	mm/yr	1.5	L/s
Precipitation	48,551	m^3/yr	923	mm/yr	1.5	L/s
Error	0.000	(m^3/yr)	-0.176	mm/yr	0.000	L/s

Pre-Development Infiltration	10,026	m^3/yr
Infiltration Deficit	**-1,583**	**m^3/yr**
Pre-Development Runoff	4,733	m^3/yr
Runoff Surplus	**18,379**	**m^3/yr**

Sub-Area Descriptions (topography, soils, cover)	
Sub-Area A	Rolling, Silty Sand to Sand Till, Pasture and Shrubs, No Impervious Cover
Sub-Area C	Rolling, Sand, Pasture and Shrubs, No Impervious Cover
Sub-Area D	Rolling, Silty Sand to Sand Till, Urban Lawn, 65% Impervious
Sub-Area E	Rolling, Sand, Urban Lawn, 65% Impervious
Sub-Area F	Rolling, Silty Sand to Sand Till, Urban Lawn, 40% Impervious
Sub-Area G	Rolling, Sand, Urban Lawn, 40% Impervious
Sub-Area H	Rolling, Sand, Pasture and Shrubs, 15% Impervious

TABLE 3: POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENTS 200, 202, 203, 204, 205, 206, AND 207A/B (LANDS DRAINING WESTWARD TO TORRANCE CREEK SWAMP)

POST-DEVELOPMENT - WITH INFILTRATION AUGMENTATION / MITIGATION MEASURES

Infiltration Augmentation Sources	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rooftop Recharge - Singles (m^3) *(Note A)*	152	137	194	210	215	204	238	258	248	186	232	209	**2,482**
Rooftop Recharge - Multiblock (m^3) *(Note B)*							340	368	354	266	331	298	**1,957**
SWMF Recharge (m^3) *(Note C)*							424	460	441	332	414	372	**2,443**
													6,882

Notes:
(A) 80% of preciptation for 25mm
(B) 80% of precipitation for 25mm, but only during summer months due to high groundwater condition
(C) Impervious area to SWM, sized for 10mm event, which is approximately 50% of annual precip events, but only during summer months due to high groundwater condition.

Post-Development to Torrance Creek Swamp - with INFILTRATION AUGMENTATION / MITGATION

Monthly Summary - With Augmentation (m^3)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Post-Development Infiltration (INF)	152	137	194	6,843	332	204	1,002	1,086	1,043	783	2,670	880	15,325
Pre- to Post- Infiltration Comparison	152	137	194	-1,086	192	204	1,002	1,086	1,043	783	713	880	5,298
Post-Development Runoff (R)	1,582	1,425	2,023	1,884	1,508	1,384	847	918	882	663	1,606	1,509	16,230
Pre- to Post- Runoff Comparison	885	798	1,132	1,309	1,441	1,384	847	918	882	663	689	549	11,497
Post-Development Evapotranspiration (ET)	0	0	0	1,006	2,362	3,263	3,446	3,209	2,308	1,117	286	0	16,996
Total = INF + R + ET	1,734	1,562	2,216	9,733	4,202	4,851	5,295	5,213	4,233	2,563	4,561	2,388	48,551

SUMMARY - WITH INFILTRATION AUGMENTATION / MITIGATION MEASURES						
Post-Development Infiltration (INF)	15,325	m^3/yr	291	mm/yr	0.5	L/s
Post-Development Runoff (R)	16,230	m^3/yr	309	mm/yr	0.5	L/s
Post-Development Evapotranspiration (ET)	16,996	m^3/yr	323	mm/yr	0.5	L/s
Total = INF + R + ET	48,551	m^3/yr	923	mm/yr	1.5	L/s
Precipitation	48,551	m^3/yr	923	mm/yr	1.5	L/s

Pre-Development Infiltration	10,026	m^3/yr
Infiltration Surplus	**5,298**	**m^3/yr**
Pre-Development Runoff	4,733	m^3/yr
Runoff Surplus	**11,497**	**m^3/yr**

Notes:
† Infiltration factors after Ontario Ministry of the Environment, 2003. Stormwater Management Planning and Design Manual. March 2003.; and Ontario Ministry of Environment and Energy (MOEE). 1995. MOEE Hydrogeological Technical Information Requirements for Land Development Applications. April 1995.

* PET adjustment factors after Thornthwaite, C.W., and J.R. Mather, 1957. Instructions and Tables for Computing Potential Evapotranspiration and the water balance. Drexel Institute of Technology, Laboratory of Climatology, Publications in Climatology, Volume X, No. 3. Centerton, New Jersey.

‡ Climate Data after Environment Canada, 2021. Canadian Climate Normals 1971-2000, Guelph Arboretum, Climate ID 6143069. [Online] http://climate.weather.gc.ca/climate_normals/index_e.html. Accessed July 2021.

Assumptions:
[1] The monthly average precipitation collected at the Guelph Arboretum climate station is reflective of the precipitation trends that have historically occurred at the Site.
[2] Surplus water is not available for runoff and recharge during months where water losses from actual evapotranspiration exceed precipitation inputs.
[3] Runoff, infiltration and evapotranspiration do not occur in months where the average daily temperature is below 0°C, which is the case for the months of December through March at the Site.
[4] Precipitation during freezing months (i.e., December to March) is assumed to accumulate as snow and result in additional precipitation in the first month thereafter where the average temperature is greater than 0°C (i.e., April).
[5] Soil moisture capacity is at a maximum in April.
[6] Rooftop infiltration galleries sized for 25mm rainfall event, which corresponds to approximately 80% of annual precipitation.
[7] EOP infiltration gallery sized for 10mm rainfall event, which corresponds to approximately 50% of annual precipitation.

TABLE 4: POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENT 201 (LANDS DRAINING EASTWARD TO WOODLOT)

Post-Development
Model Type: Thornthwaite and Mather (1955)
Client: Rockpoint Properties Inc.
Location 220 Arkell Road - Former Catchment 110
Post-Development Catchment 201 (Lands Draining Eastward to Woodlot)
Total Site Area (ha) 1.06

Land Description Factors (Sub-area descriptions provided below)	**Sub-Area A**	**Sub-Area C**	Sub-Area D	Sub-Area E	Sub-Area F	Sub-Area G	Sub-Area H	Sub-Area I	Sub-Area J				**Total**
Topography	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.00	0.00				
Soils	0.30	0.50	0.30	0.50	0.30	0.50	0.50	0.00	0.00				
Cover	0.15	0.15	0.05	0.05	0.05	0.05	0.15	0.00	0.00				
Sum (Infiltration Factor)[†]	0.60	0.80	0.50	0.70	0.50	0.70	0.80	0.00	0.00				
Soil Moisture Capacity (mm)	150	100	75	50	75	50	100	0	0				
Site area (ha)	0.78	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00				1.06
Imperviousness Coefficient	0.00	0.00	0.65	0.65	0.40	0.40	0.15	0.00	0.00				
Impervious Area (ha)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				0.00
Percentage of Total Site Area	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				0.0%
Remaining Pervious Area (ha)	0.78	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00				1.06
Total Pervious Site Area (ha)	0.78	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00				1.06
Percentage of Total Site Area	73.8%	26.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				100.0%

	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Climate Data (Guelph Arboretum Climate Normals, 1971 - 2000)[‡]													
Average Daily Temperature (°C)	-7.6	-6.9	-1.3	5.9	12.3	16.9	19.7	18.6	14.1	7.9	2.4	-4	**6.5**
Precipitation (mm)	56.4	50.8	72.1	78.3	79.9	76	88.5	95.9	92.1	69.2	86.3	77.7	**923**

Potential Evapotranspiration Analysis for Site	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Heat Index	0.0	0.0	0.0	1.3	3.9	6.3	8.0	7.3	4.8	2.0	0.3	0.0	**34**
Unadjusted Potential Evapotranspiration (mm)	0.0	0.0	0.0	28.4	60.7	84.3	98.8	93.1	69.9	38.4	11.2	0.0	**485**
Potential Evapotranspiration Adjusting Factor for Latitude*	0.77	0.87	0.99	1.12	1.23	1.29	1.26	1.16	1.04	0.92	0.81	0.75	
Adjusted Potential Evapotranspiration (PET)(mm)	0	0	0	32	75	108	124	108	73	35	9	0	**564**
Precipitation - PET (mm)	56	51	72	47	5	-32	-36	-12	19	34	77	78	**359**

Evapotranspiration Analysis													
Sub-Area A	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-32	-68	-81	-51	-9	0	0	
Storage (S)	150	150	150	150	150	121	95	88	107	141	150	150	
Change in Storage	0	0	0	0	0	-29	-26	-8	19	34	9	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	105	114	104	73	35	9	0	**546**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	68	78	**377**
Potential Infiltration (I)	34	30	43	28	3	0	0	0	0	0	41	47	226
Potential Direct Surface Water Runoff (R)	23	20	29	19	2	0	0	0	0	0	27	31	151
Potential Infiltration (mm)	0	0	0	182	3	0	0	0	0	0	41	0	226
Pervious Evapotranspiration (m^3)	0	0	0	248	582	820	891	808	569	275	70	0	4,264
Pervious Runoff (m^3)	176	159	225	145	17	0	0	0	0	0	213	243	**1,178**
Pervious Infiltration (m^3)	0	0	0	1422	25	0	0	0	0	0	319	0	**1,766**
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	56	51	72	78	80	76	89	96	92	69	86	78	923
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

TABLE 4: POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENT 201 (LANDS DRAINING EASTWARD TO WOODLOT)

Evapotranspiration Analysis													
Sub-Area C	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-32	-68	-81	-45	-2	0	0	
Storage (S)	100	100	100	100	100	72	51	45	64	98	100	100	
Change in Storage	0	0	0	0	0	-28	-22	-6	19	34	2	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	104	110	102	73	35	9	0	**539**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	75	78	**384**
Potential Infiltration (I)	45	41	58	37	4	0	0	0	0	0	60	62	307
Potential Direct Surface Water Runoff (R)	11	10	14	9	1	0	0	0	0	0	15	16	77
Potential Infiltration (mm)	0	0	0	243	4	0	0	0	0	0	60	0	307
Pervious Evapotranspiration (m^3)	0	0	0	88	206	287	305	282	201	97	25	0	1,491
Pervious Runoff (m^3)	31	28	40	26	3	0	0	0	0	0	42	43	**212**
Pervious Infiltration (m^3)	0	0	0	672	12	0	0	0	0	0	166	0	**850**
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	56	51	72	78	80	76	89	96	92	69	86	78	923
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Post-Development Catchment 201 (Lands Draining Eastward to Woodlot)

Post-Development Infiltration (INF)	2,616	m^3/yr	247	mm/yr	0.1	L/s
Post-Development Runoff (R)	1,390	m^3/yr	131	mm/yr	0.0	L/s
Post-Development Evapotranspiration (ET)	5,755	m^3/yr	544	mm/yr	0.2	L/s
Total = INF + R + ET	9,761	m^3/yr	923	mm/yr	0.3	L/s
Precipitation	9,761	m^3/yr	923	mm/yr	0.3	L/s
Error	0.000	(m^3/yr)	0.000	mm/yr	0.000	L/s

Pre-Development Infiltration	4,991	m^3/yr
Infiltration Deficit	**-2,375**	**m^3/yr**
Pre-Development Runoff	4,339	m^3/yr
Runoff Deficit	**-2,949**	**m^3/yr**

Sub-Area Descriptions (topography, soils, cover)	
Sub-Area A	Rolling, Silty Sand to Sand Till, Pasture and Shrubs, No Impervious Cover
Sub-Area C	Rolling, Sand, Pasture and Shrubs, No Impervious Cover

Notes:

† Infiltration factors after Ontario Ministry of the Environment, 2003. Stormwater Management Planning and Design Manual. March 2003.; and Ontario Ministry of Environment and Energy (MOEE). 1995. MOEE Hydrogeological Technical Information Requirements for Land Development Applications. April 1995.

* PET adjustment factors after Thornthwaite, C.W., and J.R. Mather, 1957. Instructions and Tables for Computing Potential Evapotranspiration and the water balance. Drexel Institute of Technology, Laboratory of Climatology, Publications in Climatology, Volume X, No. 3. Centerton, New Jersey.

‡ Climate Data after Environment Canada, 2021. Canadian Climate Normals 1971-2000, Guelph Arboretum, Climate ID 6143069. [Online] http://climate.weather.gc.ca/climate_normals/index_e.html. Accessed July 2021.

Assumptions:

[1] The monthly average precipitation collected at the Guelph Arboretum climate station is reflective of the precipitation trends that have historically occurred at the Site.

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[3] Runoff, infiltration and evapotranspiration do not occur in months where the average daily temperature is below 0°C, which is the case for the months of December through March at the Site.

[4] Precipitation during freezing months (i.e., December to March) is assumed to accumulate as snow and result in additional precipitation in the first month thereafter where the average temperature is greater than 0°C (i.e., April).

[5] Soil moisture capacity is at a maximum in April.

Stantec

Meeting Notes

220 Arkell Road Water Balance

220 Arkell Road / 16143338

Date/Time:	October 27, 2021 / Time
Place:	Virtual
Attendees:	Jim Hall, City of Guelph Leah Lefler, City of Guelph Kevin Brousseau, Stantec Consulting Ltd. Grant Whitehead, Stantec Consulting Ltd. Bryan Weersink, Stantec Consulting Ltd. Melissa Straus, Stantec Consulting Ltd.

Meeting began at 1:00 pm and ended at approximately 2:45 pm. Table 1 is a summary of items discussed.

Table 1: Meeting Minute Summary

Topic	Discussion Points	Decision/Action Items
Background Information	• Round table introductions. • Reviewed air photo of Subject Property. • Kevin provided an overview of the proposed development, including the Stormwater Management (SWM) facility, proposed connection to Dawes Avenue, trail connection to Arkell Road and existing significant grade differences. • Since previous submission, infiltration galleries were previously proposed, but Stantec revisited the grading to provide a greater elevation separation from the high water level and proposed more infiltration galleries.	None
Subject Property in Context of the Sub-watershed	• Stantec (Kevin and Bryan) reviewed the Subwatershed Study to show that Catchments 105, 106, and 110 (33.3 ha) contribute to the Study Area woodlot and that the Subject Property is contributing a fraction of the runoff to that woodlot as well as the Torrance Creek Provincially Significant Woodland (PSW). • City of Guelph indicated that this is often presented as an argument for increased run off, however; the individual catchments should try to match as close as possible to address cumulative impacts.	

Topic	Discussion Points	Decision/Action Items
Water Balance – Feature Balance Overview	• Stantec (Grant) reviewed the updated Water Balance for the Subject Property. • Pre- and post-development catchment areas identified. • Under existing conditions 11% of the Subject Property, of the larger catchment goes towards the woodlot. Post-development – reduced to 5%. • The Study Area woodlot will experience an infiltration deficit 2,300 m^3 and 2900 m^3 run off deficit post-development. • PSW will experience an infiltration deficit of 1,600 m^3 post development. Due to the high groundwater, it is possible that there could be a balance in certain areas but an overall runoff surplus 18,000m^3 directed to PSW. • Hydrographs reviewed at the request of the City (Leah)	• Stantec to consider providing percentages of pervious vs. impervious cover. • Monthly hydrographs.
Water Balance – PSW	• Stantec: most of water going into the wetland post-development will go into the SWM pond, designed so that it will be slowly released into the wetland over time. • Biggest change is during the summer months as don't have pervious surfaces. During the winter months amphibian breeding activity will not be impacted and most of that water run through system. • In the summer, the water could drop below ground surface 1-2 m under the wetland that would allow some additional water to infiltrate. Water that does will evaporate or flow into Torrance Creek PSW. • Kevin: during the summer months – could create more infiltration? Capacity is set, ponding could occur. More storage for water to infiltration – increased water level relative to pre-development. • It is not expected that the wetland will not become a big bathtub. Mechanism going into the subsurface. Flow conveyance. Not a confined basin upon	None

Topic	Discussion Points	Decision/Action Items
	reviewing contours on GRIN. Will not submerge the wetland. • Slope is in a southeasterly direction. • City (Leah) encourages looking at contours and all the tools and information to demonstrate no negative impacts. How much water is too much is the crux of the matter. Difficult to demonstrate no negative impact. Annual changes in runoff broken down monthly. • City (Leah) indicated that back-to-back events may result in extended period of ponding which should be prevented. At what point would the trees start to die, and the wetland change to a marsh. Seen that happen in other developments such as Watson and Eastview Road, trees died, swamp reverts. Wetlands are sensitive. Ponding depth and time are important to understand but it is difficult to determine based on the information we have available. Orange bars are higher than the blue for several months. Otherwise, the ground vegetation will start to shift and change. • Based on the information presented, the City is concerned about the magnitude of change that is shown for May-October. Yes, the soils are compatible but when does the swamp start changing into a marsh. To make sure those impacts don't occur.	
Water Balance – Torrance Creek and Torrance Creek PSW	• For water that doesn't infiltrate – is going to eventually follow a flow path eventually go into Torrance Creek. Life cycle of the water from the site. Spring periods infiltration may not occur and will go into the Creek. • Stantec (Kevin): Victoria Park Village (VPV) to the north of the Subject Property included the realignment of the online pond, taken offline, stream that was constructed. Additional water to wetland to west of 220 – would it not provide further flow down Torrance Creek? • Stantec (Bryan) – don't want to comment without further review, large swamp and GRCA contours	Stantec to review contours for ponding estimates. Stantec to review VPV for details on runoff to the PSW. City to review other developments to provide guidance on demonstrating no negative impact to outlet to a wetland.

Topic	Discussion Points	Decision/Action Items
	show that there isn't a depression. No defined stream from aerial. • Kevin – VPV design drawings, creek realignment, downfall gradient, further promoting movement of water. Unsure if there is a berm, in VPV is continuous fall across the property. Connection from wetland to stream. Question if sending extra runoff into wetland and potentially towards VPV (change of watercourse) and if sending a large quantity a check on that design to make sure won't cause problems what was just designed and built. • City (Leah): in theory, groundwater surface-water interaction. Easier to outlet to a watercourse. Making assumptions and would need further demonstration if water of that volume is discharged from the SWM facility into the swamp. Brainstorm further on how that could be done. What depth expect to pool, no defined depression, water behaves point a – b, this water is going to infiltrate, will pool or evapotranspire what are the anticipated changes. • City (Leah) - This magnitude of change elsewhere – development concept that have a lot pattern, if it cannot be demonstrated, other things can be done, including infiltration galleries, are there other measures that could be incorporated? To try and reduce the projected surplus. Amount shown is concerning to the City – without all of the detail. How do we figure that out, show no negative impact. How? City can help based on other developments in the City. Would be difficult to show no negative impact. • Stantec (Grant): can you share some of the examples? So we can get an idea on what you would like to see. • City (Leah): yes. More and more developments are proposing outlets to wetlands. Tricky as there is no standardized approach. Leah will research and share what we want for the next steps. Helps City staff to be consistent too. Helps everyone. • City (Jim): Civil engineering side of things, lot fabric working with currently, will be very difficult to manage that volume of water and large amount of increase. E.g., if you had more land to work with,	

Topic	Discussion Points	Decision/Action Items
	could increase green space, increase natural infiltration, designed through galleries and what you need to do with a site like this. Don't have a lot of space where the SWM pond is. Other examples – SWM for quality, then infiltration basin, don't have the space and high ground water. Echo what Leah said work with environmental impacts, help through the solution.	
Major Issues	• Stantec (Kevin) asked for the City to narrow down what the major concerns are with the proposed development. • Stantec recap: infiltration deficit. Runoff surplus. Galleries proposed, conceptual in future, maybe additional details during detailed design. Is the biggest concern the surplus? • City (Jim) indicated that they prefer not to look at design by ignoring one issue in favor of the other. The test is no negative impact. Biggest concern at present appears to be the surplus of water but still should consider remaining water balance. The City is willing to work with the proponent on a solution. Small differences (deficits or surpluses) can generally work with, particularly the way the water balance works overall. The City can revisit if all other options have been exhausted. • Stantec (Kevin) indicated that in the City of Kitchener where a deficit occurs there is a cash in lieu process to offset that short fall. What is an acceptable surplus? • City (Jim) indicated that a master plan process is underway but that cash in lieu is not an option currently in the City of Guelph. Understand that Staff will be reasonable on various water balance values once get a solution that shows that close to a balance can be achieved. The City cannot say an x% change is acceptable, instead the goal is as balanced as close as possible.	None

Topic	Discussion Points	Decision/Action Items
Water Balance - Woodlot	• Stantec indicates that the woodlot exhibits a similar situation to the PSA, deficit of runoff and run off. • City (Leah) indicates that the magnitude of change is less compared to that proposed for the PSW. Don't know – is it safe to assume the seasonal differences mimic hydrograph for the wetland? Drier all the time, drier in the summer. Drought? • Stantec (Grant) indicates that the water travels across the open area. Infiltration is 245 mm/yr with runoff pre-development it is reasonable to assume is likely infiltrating before it reaches the woodlot. • City (Leah) is less concerned about the woodlot, also likely a road when the staples property is developed. But would review more. No confirmation of approval, generally less concern with impacts to the woodlot.	None
Existing Site Challenges	• Stantec (Kevin) recapped the challenges on the Subject Property, for context, which is constrained due to various reasons, including: ○ topographic divide ○ ecological linkage ○ respect the elevations and existing road stubs ○ fixed elevation for the position of the road ○ lands to the north do not have capacity for any addition SWM, forcing overland flow to go to south ○ small area to drain into another SWM facility to respect road stub, elevation on other lands ○ high ground water so that the northeast corner had to be raised to allow separation ○ establishes a road grade that goes to the SWM facility based on the road connections, separation from groundwater ○ 2nd SWM facility for the NE corner not possible	None

Topic	Discussion Points	Decision/Action Items
	○ high point is being cut out ○ shed some water and force it to go east, previous foresight to allow that to VPV ○ rear yard galleries, may be larger in family blocks • SWM facility another option is end of pipe, but due to high groundwater no space to accommodate that.	
Solution – Infiltration gallery capability (<1 m separation)	• Stantec (Grant) proposes the infiltration galleries require 1 m of separation in the City of Guelph. Typically, only 1 m separation may be available. • Current conditions: summer month is 2-2.5 m below grade under existing conditions. In the summer, if the City would be open to an infiltration gallery that it's more capable of putting more back in the summer months when you will have 1 m separation, spring months, ground water intercepts, may not be effective. Over the course of a year, may help alleviate some of those runoff volumes. Could that be considered? • Kevin: this approach shaves off the summer peaks, but does not help during winter months. • Leah: so this would be a winter bypass? Operate during summer months not part of SWM design for winter months? • Kevin: turn off anyway during winter, otherwise salt-laden water. Shut off during winter. • Bryan: where 1 m isn't feasible. Can operate June on, etc. Added 6000m^2 of infiltration. Still 12-13K run off surplus. • Leah to Jim – is that something that could be supported? • Jim – appreciates the concept. Don't have experience with that close to seasonal high ground water. With the valid point, way to ensure winter bypass was working, no good experience on implementation side, but concepts of groundwater / water cooling trenches are ok intercepting to help with thermal mitigation. Pond, into infiltration gallery,	Stantec to explore infiltration galleries with winter bypasses, including examples for City review. City to provide additional guidance on how to show no negative impact.

Topic	Discussion Points	Decision/Action Items
	filled, to mix temps, those are conceptual at this point in time. But have been looking at. Infiltration gallery sometimes will have groundwater into it but in drier months groundwater is lower then will operate as a effective infiltration gallery. Interesting – outside of the box thinking – talked about at the city. Not a cookie cutter solution would be open to discuss in more detail. Are there examples in place elsewhere – provide more info on how those operate. At subwatershed master plan end of pipe, tricky, Guelph relying on groundwater, can be a touchy subject. Happy to have conversation and provide examples. • Kevin – examples in Kitchener, e.g., Huron woods, VPV has the cooling trench, manufactured produces with smaller footprint to increase infiltration. Given the grading challenge, mitigate as much as possible with theoretical end of pipe infiltration gallery. • Jim – but what are the impacts, need to show no negative impacts. Cannot assume it will accept the water. Burden of proof. Site design – not equalizing. But what does it look like, and what are the impacts to environment and infrastructure? • Leah – fine tuning our recommended approach. Request some time to review and provide additional guidance. Specific direction on what is expected to show no negative impact.	
Closing Remarks	• Kevin – want City to understand last piece to sort out before our next submission. Jim have had additional discussions in the spring. Currently this is what is stopping the next submission. Once get resolved will make our formal final resubmission. Want to make sure we get it right so we get approval. • Leah – turn around quickly and timelines. Amount of runoff is concerning. Based on other projects, this amount and seasonality has been caused for a re-submission as discussed today. Committing to supporting the team with tools that aware of. Leah to be in touch. Suspect a follow up meeting to discuss. • Thank you for time to discuss.	City of Guelph to follow up with additional guidance.

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Stantec Consulting Ltd.

Melissa Straus M.Sc.
Terrestrial Ecologist

Phone: 519 780 8103
Fax: 519 836 2493
Melissa.Straus@stantec.com

c. Attendees

From: Leah Lefler
To: Straus, Melissa
Subject: RE: Resources
Date: Tuesday, July 6, 2021 4:42:40 PM

Thanks Melissa. Thank you for taking notes during our meeting. They look great.

I'll be in touch about the bats/MECP ASAP.

Leah

Leah Lefler (she/her), Environmental Planner
Planning and Building Services, **Infrastructure, Development and Enterprise**
City of Guelph
519-822-1260 extension 2362
leah.lefler@guelph.ca

From: Straus, Melissa <Melissa.Straus@stantec.com>
Sent: Tuesday, July 06, 2021 4:16 PM
To: Leah Lefler <Leah.Lefler@guelph.ca>
Subject: RE: Resources

Thanks Leah,

See attached meeting minutes, if you require any updates just let me know.

Thanks for the links to the resources you provided, much appreciated.

Melissa Straus M.Sc.
Terrestrial Ecologist

Direct: 519 780-8103
Mobile: 226 971-2704
Fax: 519 836-2493
Melissa.Straus@stantec.com

Stantec
1-70 Southgate Drive
Guelph ON N1G 4P5

From: Leah Lefler <Leah.Lefler@guelph.ca>
Sent: Tuesday, July 6, 2021 3:07 PM
To: Straus, Melissa <Melissa.Straus@stantec.com>
Subject: Resources

Stantec

Meeting Agenda

Meeting Minutes

EIS Comments, 220 Arkell

Virtual: Melissa Straus (Stantec) and Leah Lefler (City of Guelph)

July 6, 2021

Comment Item:	Discussion Points	Action Items
Project Name: 220 Arkell **Stantec file #:** 161413338 **Comments:** Internal memo from Leah Lefler, dated November 10, 2020		
HEDGEROWS • Pre-consultation comments indicated that there are hedgerows on site which need to be considered under the City's woodland and/or urban forest policies. If the hedgerows do not meet the criteria for designation as significant or cultural woodlands, which are premised on the definition of woodland, consistent with the Official Plan, identify opportunities for protection, enhancement and restoration of trees within the Urban Forest. Demonstrate where preservation is not possible through describing the iterative process between the design team and providing examples of site designs that were not pursued and a rationale	• Iterative process can be demonstrated through numerous City meetings (to be provided in comment response) • Designated ecological corridor to be retained •	• Include discussion regarding tree bylaw and urban forest in comment matrix and details on mitigation measures to restore corridor. • Show consideration for OP policy that maintenance was considered, e.g., based on developability of the site. • Discuss Common Raven (significant species identified in the hedgerow) and habitat not present.

as to why not. This analysis should draw on Table 4.10.1 of the Torrance Creek Subwatershed Study, specifically, Hedgerow 32 (Ecological Linkage), Hedgerow 33 (south property line adjacent Arkell Meadows) and Hedgerow 34 (east hedgerow), and should be included in a revised EIS. • Section 5.7 Significant Natural Heritage Features Summary describes the hedgerows and habitat for locally significant species as non-significant. Please include the rationale and supporting analyses for why these features are considered non-significant. For example, is Habitat for Significant Species present, based on the criteria of the Official Plan? If yes, these areas are considered part of the Natural Heritage System as Natural Areas. This section appears to focus on the PPS; however, the OP is equally relevant.		
SPECIES AT RISK • Section 4.4.3.4 Bat Maternity Roost states that bat exit surveys were not conducted in 2017, and would be conducted the summer prior to tree removal. This approach appears to assume that bat habitat could be removed, if detected at a later date. Please	• Have other projects in Guelph provided MECP consultation? • Unknown where Barn Swallows are nesting. • Nesting structure on Victoria Park Village.	• City to look into recent MECP consultation approach with respect to bats. • Include information on foraging in ecological linkage and amenity spaces post-construction.

confirm with the Ministry of Environment, Conservation and Parks that this approach is acceptable, and include correspondence in an updated EIS. • Section 4.4.3.5 Breeding Birds refers to Barn Swallow surveys and the fact that no evidence of Barn Swallow nesting was noted within the study area. Please note that the General Habitat Description for Barn Swallow refers to three categories of habitat: (1) nest; (2) the area within 5m of nest; and (3) the area between 5 m and 200 m of nest. Please clarify whether or not any category of Barn Swallow habitat is present within the study area.		
ECOLOGICAL LINKAGE • Please assess the function of the Ecological Linkage and other hedgerows with respect to amphibian movement and the Criteria Schedules for SWH in Ecoregion 6E. If any of the hedgerows meet the criteria, they would be mapped SWH and protected as part of the natural heritage system. • The EIS should address the Ecological Linkage policies of the Official Plan (Section 4.1.3.9). For example, the EIS must include an assessment of the Ecological	• As per the March 13, 2017 meeting with City staff, an analysis of the function of the ecological linkage was not required as the OP has already determined that the linkage is significant. The goal of the movement corridor studies (i.e., pit falls) was to determine what species are using the Subject Property to inform the wildlife crossings within the linkage. • Previous meetings discussed (and received approval) that roads were essential infrastructure and permitted through the ecological linkage. • Development on adjacent property proposed? • Trail location and type are dictated by OP and Parks?	• For addendum: SWH considered but because not significant for amphibian breeding significant movement corridor cannot occur. • Not habitat for significant amphibian species (e.g., pickerel, chorus, etc.) • Location of the linkage was determined using ecological studies completed as part of OPA 42.

Linkage to confirm the configuration (i.e., location and width) based on the scale at which it is intended to function, the nature of adjacent land use and the significance, sensitivity and ecological requirements of the species whose movements they are intended to support. • Section 8.2.1 City of Guelph Official Plan of the EIS states that the road connection to the Victoria Park Village subdivision was approved. Two road connections are proposed, one on the subject property and one on the adjacent property to the east, and one primary trail connection (within the NHS). The EIS must demonstrate how the site design is compatible with the protection of the Ecological Linkage and its associated function. If it cannot be demonstrated, then a new site design must be prepared that meets the policy requirements.		• A 50 m linkage for white-tailed deer should be sufficient to facilitate deer movement unimpeded. • Follow up with Stantec engineering on what the current SWM facility design. Is grading steep? • Clarify in addendum that 2 roads are proposed but that is an urban design issue. Road crossings for deer will have impacts mitigated by good sight lines, signs and traffic calming measures. Additionally, a wildlife culvert will be provided for amphibians and small mammals. • Review road ecology best practices at EIR stage and recommend this in the EIS.

Stantec

Meeting Notes

220 Arkell / 161413338

Date/Time:	September 10, 2018 / 11:00 am
Place:	City Hall
Attendees:	Jim Hall, City of Guelph Mary Angelo, Engineering, City of Guelph Katie Nasswetter, Planning, City of Guelph Jyoti Pathak, Parks Planning, City of Guelph Leah Lefler, Environmental Planning, City of Guelph Carson Reid, Carson Reid Homes Spencer Reid, Carson Reid Homes Nancy Shoemaker, BSRD Kevin Brousseau, Stantec Consulting Ltd. Melissa Straus, Stantec Consulting Ltd.
Distribution:	Attendees

Background

The purpose of the meeting was to discuss comments received from the City of Guelph on July 19, 2018 regarding a concept submission on May 28, 2018. Kevin Brousseau lead the meeting and reviewed comments that required additional discussion/direction.

Item:	Action:
Original comments provided by the City on Dec. 20, 2017 remain in effect: **Comments 1 and 2:** *Staff scoped our review/discussion to just the temporary emergency road connection to Dawes Avenue and your proposal to use the existing City-owned Open Space Block fronting Dawes Avenue. We did not review the remainder of the plan, the remainder of the trail alignment, and don't feel it appropriate to respond to questions outside of this scope. Those items will need to be reviewed comprehensively with supporting impact assessment(s) as part of a complete submission package.* *It is worth repeating that staff's consideration of this proposal is specific to this area because of the known challenge we will have in extending Dawes outside of the 220 Arkell subdivision and anticipated impacts there, and shouldn't be viewed as something that can be explored at other locations in the City.* Response: Noted. Not discussed during the meeting.	None

Item:	Action:
Comment 3: *At our meeting in October we briefly discussed the length of road permitted with the temporary emergency access in place; we have further discussed internally and provide the following for your consideration: The City of Guelph Development Engineering Manual states that no cul-de-sac can be longer than 150m without an emergency access, which typically is placed at the bulb of the cul-de-sac. The DEM also states that no road can be longer than 300m without dual access. To this end, and based on the sketch provided with your proposal, we would consider permitting no more than 150m of road beyond (to the east of) the temporary emergency access road, including a temporary terminating cul-de-sac. Please note that permitting this would be beyond the intent of the DEM, but would be considered here with provided justification and rationale, due to the specific circumstances at this location at this time.* Response: As discussed during the meeting, the justification for the proposed temporary configuration is due to the timing of development for the adjacent lands to the east. It was also clarified during the meeting that it was understood the proposed temporary configuration will allow for the development of the Multifamily Block.	None
Comment 4: *Staff Support would increase if the road and grading was shifted to the east as much as possible, with leaving a 3 m buffer from lot 12 to the toe of the new slope. This allows the wetland/woodland buffer to be maximized while still considering a temporary road alignment. Please include the approved grading for the Open Space Block, and the adjacent lots of this subdivision, and design the grading/servicing so that the objectives of the adjacent subdivision are not disrupted, and the area (including the Open Space Block and the lands to the north) is adequately and appropriately designed. Please take special note that the current design shows the proposed temporary road crossing an infiltration gallery and related structures; this will have to be redesigned accordingly.* ***Latest proposal does not provide sufficient separation between the existing lot and the toe of 3:1 slope, and does not appear to design for the objectives of the adjacent subdivision (infiltration requirements, drainage patterns, etc.).*** Jim Hall (City) indicated that • insufficient separation and 3:1 slope. • convey drainage along the trail. • Intent is, toe of 3:1m slope should be from 3 m from existing lot line.	Leah to provide wetland boundary for the property to the south west if available. Stantec to update Temporary Emergency access alignment & 3:1 slope to be 3m from Lot Line and minimize disturbance to the west. Stantec to vet infiltration strategy with the City to ensure targets are maintained.

Item:	Action:
• Shift as far east as possible but want separation of 3 m from the lot line. • Would like to see the wetland limit east of the existing driveway on the plans. Kevin (Stantec) indicated that • The intent is to ensure the proposed disturbance is as far as possible from the existing wetland. • Adjustments to the infiltration galleries & existing RLCB will be addressed in the Preliminary SWM Report in support of the Draft Plan. Strategy for maintaining the infiltration targets is to be vetted with the City prior to submission.	
Comment 5: *It should be noted that it is our expectation that the 10 m wide temporary road allowance would be restored to a 3m wide trail surface, at your client's sole expense, once the temporary access is no longer required. The 7 m restoration area should be planned on the west side and closer to the NHS and the restoration should include consideration for an alley of trees along the trail as well as other vegetation to stabilize, etc.* ***Please include a restoration plan to show the ultimate state of these lands once the temporary emergency access has been removed. Keep City standards for pathways and tree planting in mind while completing this design, and ensure that the restoration plan provided for Block 20 should (at a minimum) reflect the street tree plan in terms of number and variety of deciduous/coniferous trees and shrubs. Note that preference is given to indigenous species.*** Kevin (Stantec): requested to provide a restoration plan at the detailed design phase. This could also be included as a draft plan condition. Jim (City): Concerns to get elevation up to Dawes Ave. Plan grading and landscaping now to show what the configuration would look like. This is required so the City can determine if a temporary road can be put through. Kevin: Currently Dawes Avenue is perched in the air. Suggest addressed at detailed design. Jotyi (City): Clearly sees connection as a 6.0m walkway block, however the 6 m is not included in the parkland dedication area. Kevin (Stantec): This is a continuation of the trail network from Victoria Park Village (VPV) which is only 3 m wide trail. As the trail will also be included as a maintenance access for SWM, it is required to be 4 m wide hard surface.	Stantec/BSRD to provide updated sketch showing revised temporary emergency access c/w walkway block and park area layout. Restoration area to be identified on plan.

Item:	Action:
Jim (City): City will look at the block for SWM access. Final width is 4 m for SWM access with mow strips on either side. Didn't look at for SWM during initial review, simply looked at connection itself. Jotyi (City): The walkway block is different than off-road trail. Connects streets to street. OK with off-road being 3 m wide. 6 m for the walkway block section only. Trail is 3 m plus mowing strip. Kevin (Stantec): In summary, a 6 m wide block with 3 m trail, provision for swales and drainage. Jim (City): Would prefer that park and emergency access to be separate blocks. This is such that one doesn't impede the other. Kevin (Stantec): Once the 10 m temporary access is no longer required, the 6 m is incorporated into the walkway block, what do we do with the extra 4 m. Can the 4 m not be parkland? Jotyi (City): The biggest concern is that we don't know the timeline. Leah (City): In consideration of these widths and requirements, the PSW is quite close. How does the trail line up with the limit of the wetland? Kevin (Stantec): Underneath is existing asphalt driveway, max slopes of 5%. Staying on east side of driveway. It has been disturbed already. To accommodate Jim's comment, have to move to within 15 m outside of 30 m. Kevin (Stantec): To wrap up comment 5 in summary, the draft plan will show a 6 m walkway block with a 3 m wide trail. Swales for drainage. SWM 4 m access with mow strips as per City's standard. Could restoration details be deferred to a later time? Jyoti (City): Parks is Ok with that. Leah (City): It would be helpful to be provided an opportunity to review and look at potential impacts in basic detail. More detail will be provided in the EIS. Kevin: What would it look like? We can provide the drawing layer that shows the linework, with a hatched area that will be restored. Acceptable to the City (Leah and Jyoti).	
Comment 6: *The design must include provision for the extension of Dawes Avenue; please show the design under existing conditions (Dawes Ave. cul-de-sac) and with the extension in place. Please note the location of the existing fire hydrant, and the potential relocation of the hydrant when extending Dawes Avenue.* ***This information has not been submitted to date.***	Stantec to provide the temporary access road profile and preliminary grading plan to show interim and ultimate conditions.

Item:	Action:
Kevin: Stantec plans to include more detail at the detailed design phase. Hydrant can be moved. Jim: not just the hydrant. Grading and if Dawes extends or not. What are the various versions in those two different scenarios? Concern is going to the cul-de-sac. How does it connect? How does that impact the design of this road? Curb offsets. Kevin: We can provide the grading sketch for the interim and final conditions. Jim: would like to see more details than what has been provided. Yes, detailed later, but what grades are around turning and curb cuts, grades are really tight. Designing everything to the max. Don't know if lines up height-wise. If extends how does that impact? Kevin: property should be designed to the ultimate, not at curb today. A sketch will be provided to vet the grading details.	
Comment 7: *Given the area constraints, the existing and proposed grades, and the existing design within the 246 Arkell subdivision, please provide additional information on the proposed stormwater management for this area.* ***This information has not been provided to date. Please provide preliminary information on how SWM will be handled for Block 20, how that might differ from the previously approved SWM, and what the impacts are to the previously required SWM conditions.*** Kevin: Prelim SWM, change to hard surface, to achieve water balance. Jim: Block 20 needs to be considered. Existing subdivision set targets and design, if change for 1 block, that development had high infiltration rate, then how will that impact adjacent development. Not sure if Stantec wants to provide this information up front or if want to do it as part of an application. Difficult for City to provide specific feedback without the additional details if temporary access is supported. Kevin: Can we overcompensate on 220 to make up for any changes to 246 development? City hasn't discussed this option yet. Kevin: The temporary access will be a hard surface, water will shed quicker. Can we not compensate for that by throttling back the SWM design for 220? Leah: try to mimic the natural process as much as possible. Same broad location, where the water is discharged, need more time details and	Stantec to provide SWM rational of how the revised surface drainage will be addressed and targets maintained.

Item:	Action:
implication of that switch. Would Stantec have an opportunity to provide justification and rationale in an email? Kevin: Yes.	
Comment 8: *Currently the plan shows a storm sewer pipe located within the proposed park block and within the wetland buffer. All major servicing and utilities must be located outside of the park block and wetland buffer. (Although this comment is on an element outside of our current review scope, we felt it important to note, for your future subdivision design work.)* Kevin: in relation to the wetland the pipe is beyond 15 m setback but within 30 m. With respect to crossing the park, this is OK elsewhere, Sanitary Trunk Sewer along Eramosa River from Victoria Rd to the treatment plant crossing several parks. Jyoti: want full development potential as this is a small park. Don't want to be constrained by putting footings for a play structure. Kevin: 2 options, through park block, or servicing block bisecting the lots, takes away developable frontage and land. Some transition land, position sewer tucked up against the lot line, would that be acceptable to the City? Jyoti: will go back and talk with management about putting against lot lines. Jim: Easement may be required. Kevin: 1:1 slope at toe of the pipe? Mary: 1:1 is what is required. Can be up to face of the building: yes, not ideal. Nancy: Note lotting proposed with 0.6 m side yard setback. Kevin: any overlap with park block would be preferable. Mary: Major flows are going to the conservation easement. Will this be between homes? Kevin: Not between homes. In the ecological linkage. Want longest distance between inlet and outlet structures in SWM facility. Can the City investigate any concessions?	Stantec to provide sketch of proposed storm sewer and easement layout for City review and consideration. Jyoti to follow up with management regarding proposal of pipe placement and easement.
Comment 9: *The proposed temporary access road should be located outside of the proposed neighbourhood park block so as to not have any direct impact on construction timing of either the temporary road or park. To this end, please place the temporary emergency access road within a dedicated block, its width sized to accommodate the temporary road*	Stantec to provide an updated emergency access layout sketch based on items discussed.

Item:	Action:
and offsets to adjacent private property (based on the current layout, the block would be a minimum of 13m wide). The concern of the City is when will it be available?	
Comment 10: *City standard fencing will be required adjacent to the proposed/existing private properties. Additional fencing will be required adjacent to the temporary emergency access road where the grade slopes away from the road greater than 7% (ie. where 3:1 terracing is currently proposed sloping away from the road surface). Details on the required fencing will be discussed at a later stage of your subdivision submission, however please note required fencing on the resubmitted concept plans.* Jim: Looking for an acknowledgement on preliminary plans somewhere noted. Kevin: Yes. Is the City looking for Draft plan wording? Jim: No just on preliminary plans.	Stantec to provide an updated emergency access layout sketch showing locations of fencing.
Comments 11 and 12: *Note that the temporary access and trail alignment that extends beyond Block 20 must be reviewed comprehensively and supported by an Environmental Impact Study in the future (for 220 Arkell Rd subdivision).* *The Provincially Significant Wetland boundary and 30m buffer should be shown in proximity to the proposed temporary access to the bulb of Dawes Ave.* Kevin: Noted.	None
Comment 13: *Please include proposed location of erosion and sediment control measures on future submissions.* Kevin: Will be provided at detailed design. FSR will have commentary but will not be provided on plans. Jim/Mary have seen this approach before but that was when site alt came first.	None
Comment 14: *All grading and other associated works must remain outside the 15m setback from the Provincially Significant Wetland. This must be demonstrated on the grading plan.* Kevin: Yes this is the case.	None
General Summary of Comments and Discussion Kevin summarized action items for each group.	Action items noted above.

Item:	Action:
Leah: Ecological Linkage no pipe proposed within, overland flow will cross linkage to be directed into SWM. Jyoti: Sketch of proposed storm easement for review. Note theoretical pipe with depths, etc. Nancy: Assume this layout works. Can all lots be developed too the farthest east location? Kevin: 150 m beyond the access road to end of temporary cul-de-sac. Looks like can accommodate. Would that allow the multi-family block development? City: Haven't looked at. Traffic considerations. Would be connecting those lots. Mary: Would have to be able to see if can finish side yard of homes. More chance can support if not recreate side yard. Jim: Length of road to be finishing beyond the temporary bulb, show and will consider. Nancy: Put a holding zone on lots temporary impacted by bulb? Katie: likely Easement for the bulb. Holding is fair. Leah to send Melissa an email re: studies to date on the property.	Leah to respond to email from Melissa regarding corridor studies completed to date on the property.

The meeting adjourned at 12:15 PM

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Stantec Consulting Ltd.

Melissa Straus M.Sc.
Terrestrial Ecologist

Phone: (519) 780-8103
Fax: (519) 836-2493
Melissa.Straus@stantec.com

Meeting Notes

220 Arkell Road Land Conveyance

220 Arkell Road / 161413338

Date/Time:	October 10, 2017 / 1:30 PM
Place:	Guelph City Hall, Room 322
Attendees:	Katie Nasswetter, Jim Hall, Chris DeVriendt, Jyoti Pathak, Mary Angelo, City of Guelph Nancy Shoemaker, BSRD John Vleeming, Melissa Straus, Stantec Carson Reid, Spence Reid, Carson Reid Homes
Distribution:	Attendees

Background

Carson Reid has been approached by the Developer to the southwest regarding conveyance of lands which currently serve as the existing driveway on 220 Arkell, south of the proposed Dawes Road connection. The purpose of the meeting was to discuss what this conveyance would mean for the development at 220 Arkell in terms of a variety of topics, including: emergency access, trail connection, encroachment into feature buffers, fill requirements, and timing.

The City is amicable to this conveyance as they would like to see Dawes Avenue proceed through the 220 Arkell property as shown in preliminary designs discussed during the meeting.

Item: Emergency Access

A second access (emergency access) is required if the distance between proposed Jell Street and the termination of the Street "A" is >150m. This would leave very little development available along "Street A" which is therefore not feasible, an emergency access is therefore required. The City indicated that they want to see Dawes Ave. extended, it was then concluded that the connection to Dawes Ave. would be the best solution, if feasible.

Action: An emergency access route is required. City of Guelph to determine width of access required (6 m or 10 m?) looking at past projects for reference to see if existing driveway is sufficient for temporary access.

The location and design of emergency access requires additional investigation both for environmental and engineering concerns, prior to proceeding with the conveyance.

Item: Trails

Parks is open to having an on-road trail connection along Dawes. This would facilitate conveyance and closure of the existing driveway, which is the currently proposed trail route to Arkell.

Based on the proposed location of the park, Parks would prefer the trail be put as close to the wetland edge as possible, noting that Environmental Planning would require consultation. In the past, trails within the outer 15 m of the buffer have been acceptable. That would allow Parks the largest park possible.

Trails would be designed to City Standards, with this connection shown on the Trails Master Plan. Futhermore, to ensure that the trail functions cohesively, Parks would like to see the overall trail plan for that area. Nancy asked, and it was indicated, that this would be a DC trail.

Action: The location and design of the trails requires additional investigation, considering both conveyance and non-conveyance scenarios.

Item: Stormwater Management (SWM) on Adjacent Property

It is unclear how stormwater is going to be managed on the southwest adjacent property. There is a 3-4 m difference in elevation with the SWM facility to the east at 246 Arkell Road. To tie into this, they would likely have to bring up the entire site and retrofit the SWM facility. The existing SWM facility is comprised of a clay liner and clay wall, which would be technically difficult (but possible) to alter.

It was also brought up whether Grand River Conservation Authority (GRCA) would allow significant filling within proximity to a Provincially Significant Wetland.

Road geometrics are a concern on newest concept on adjacent property due to an unusual hitch in the road. Filling would require half of the buffer and it would would need to be sloped into the wetland buffer.

Action: None required, issues on adjacent property to contend with.

Item: Dawes Avenue Connection

Environmental

Environmental Planning was not at the meeting, and as such the encroachments would need to be approved and formalized through the Environmental Impact Study.

Block 20 is the location of a previous wetland that was approved to be removed as part of the 246 Arkell Road development. This left a small remnant on the 220 Arkell Road property.

Stantec indicated that during the onsite wetland boundary delineation with the Grand River Conservation Authority (GRCA) the small wetland remnant was not included in the area delineated. This is not yet reflected in the GRCA website mapping despite Stantec providing the updated wetland layer in spring 2017. Furthermore, while onsite in the fall of 2016 Environmental Planning indicated that the City's wetland policies would need to be addressed to remove the remnant.

Engineering

The most significant challenge with tying into Dawes Avenue is the significant difference in grade. To accommodate appropriate slope for the trail and appropriate emergency access (5%), this would likely require encroaching onto the open space (Block 20) and the small wetland remnant on 220 Arkell.

Timing

The timing of the development would be ideal if they would proceed together. The chance of that occurring is unlikely, therefore care needs to be taken to not inhibit either development. It is

expected that a conveyance with a condition of an easement would be the best way forward for Carson Reid, particularly in the event that the adjacent property is developed first.

Action: Stantec to look at grades and fill requirements to see if possible to make the connection work. Stantec also to review 246 Arkell EIS and further the conversation with required agencies (City, GRCA) on encroachment into Block 20 and wetland remnant.

Item: Victoria Park Village (VPV)

Status of VPV was questioned. To date phase 1 of the Development.

A second sanitary stub is required on the VPV block. The method to proceed that was deemed best was to get a letter to the City from Nancy, with input from J. Vleeming, so that the manner will be in the hands of the City.,

Action: Create drawings, check if water is available under current design, and create letter for City for second sanitary stub.

Item: Potential Road Connection to the East

City indicated that a holding on the last lot (eastern most, see 18 on attached) where a future road is pre-planned would be required. No holding would be required to the south.

The flexibility to build a road in the future on that side is preferred.

Action: Hold lot during sales.

The meeting adjourned at 2:30 PM

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Stantec Consulting Ltd.

Melissa Straus, M.Sc.
Terrestrial Ecologist
Phone: (519) 780-8103
Fax: (519) 836-2493
Melissa.Straus@stantec.com

Attachment: Concept

Cc: Kevin Brousseau, Stantec

From:	Straus, Melissa
To:	"Adele.Labbe@guelph.ca"; Chris.DeVriendt@guelph.ca
Cc:	Brousseau, Kevin; carson@carsonreidhomes.com; Nancy
Subject:	Meeting Minutes for 220 Arkell Road - March 13th
Date:	Thursday, March 16, 2017 10:36:00 AM
Attachments:	20170313_220 Arkell Road_Consultation Meeting Minutes.pdf

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Good morning Adèle and Chris,

Thank you for taking the time to meet with us this week to discuss 220 Arkell Road.

Please find attached the meeting minutes and let me know if you have any edits or updates.

Sincerely,

Melissa Straus, M.Sc.
Terrestrial Ecologist
Stantec
1-70 Southgate Drive, Guelph ON N1G 4P5
Phone: (519) 780-8103
Cell: (226) 971-2704
Fax: (519) 836-2493
Melissa.Straus@stantec.com

B.4 Ministry of Environment, Conservation and Parks Consultation

From:	Species at Risk (MECP)
To:	Straus, Melissa
Subject:	RE: Information Gathering Form for Residential Development in the City of Guelph (220 Arkell)
Date:	Tuesday, July 19, 2022 10:50:21 AM
Attachments:	2022-06_Bat Survey Standards_MECP.pdf 2021_Bats & Buildings_Exit & Roost Surveys_MECP.pdf 2022-06_Bats & Treed Habitats_MaternityRoostSurveys_MECP.pdf

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Hello Melissa,

RE: 220 Arkell Road, Mixed-used Residential Development, City of Guelph, Wellington County and the *Endangered Species Act, 2007*

The Ministry of the Environment, Conservation and Parks (MECP) has reviewed the Information Gathering Form (IGF), provided on behalf of Carson Reid, to assess the potential impacts of the mixed-use residential development project on endangered and threatened species at risk (SAR) protected under the *Endangered Species Act, 2007* (ESA 2007).

Based on the ministry's review of the IGF, the conclusions that neither section 9 (species protection) nor section 10 (habitat protection) of the ESA 2007 will be contravened for SAR bats as long as the proposed mitigation measures are implemented appear reasonable and valid. Therefore, authorization under the ESA 2007 is not required for this project.

Should any of the project activities change from what has been presented to MECP, please notify the ministry immediately (SAROntario@ontario.ca) to obtain guidance on whether the changes require authorization under the ESA 2007 in order to remain in compliance with the Act. Failure to carry out the project as described to MECP could potentially result in contravention of the ESA 2007. The proponent remains responsible for ensuring compliance with the Act and may be subject to prosecution or other enforcement action if activities result in any harm to SAR species and/or habitat.

MECP notes that the proponent has committed to mitigation measures being implemented as part of the project to ensure that unanticipated impacts to SAR bats do not occur. Attached are MECP's current guidance documents for SAR bats, which should be followed for the exit surveys that are planned for this project, but also must be followed for all future applicable projects from Stantec Consulting Ltd.

The ministry's position is based on the information that has been provided on behalf of the proponent. Should information not have been made available and considered in our review, or new information comes to light that changes the conclusions made (i.e. SAR bat observations during exit surveys), or if on-site conditions and circumstances change so as to alter the basis for the conclusions, or if any of the mitigation measures cannot be completed, please contact the ministry (SAROntario@ontario.ca) as soon as possible to discuss next steps.

MECP notes that while it does not appear that an ESA authorization will be required, the proposed activities may be subject to other approvals, such as those issued by local municipalities and conservation authorities. Please be advised that it is the responsibility of the proponent to be aware of and comply with all other relevant provincial or federal requirements, municipal by-laws or required approvals from other agencies. It is also the

responsibility of the proponent to ensure that all required approvals are obtained and relevant policies adhered to.
Regards,

Catherine Stewart
Management Biologist
Permissions Section, Species at Risk Branch
Ministry of the Environment, Conservation and Parks

From: Straus, Melissa <Melissa.Straus@stantec.com>
Sent: May 26, 2022 9:35 PM
To: Species at Risk (MECP) <SAROntario@ontario.ca>
Cc: Brousseau, Kevin <kevin.brousseau@stantec.com>
Subject: Information Gathering Form for Residential Development in the City of Guelph (220 Arkell)

To whom it may concern,

Please find attached an information gathering form for the proposed development located at 220 Arkell Road in the City of Guelph.

Contact me if you have any questions. We look forward to hearing from you.

Regards,

Melissa Straus M.Sc.
Terrestrial Ecologist

Mobile: 226 971-2704
Melissa.Straus@stantec.com

Stantec Consulting Ltd.
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

B.5 GRCA Comments

400 Clyde Road, P.O. Box 729 Cambridge, ON N1R 5W6

Phone: 519.621.2761 **Toll free:** 866.900.4722 **Fax:** 519.621.4844 **Online:** www.grandriver.ca

March 25, 2020

Katie Nasswetter
Senior Development Planner
Infrastructure, Development and Enterprise
City of Guelph
1 Carden Street
Guelph, ON N1H 3A1

Dear Ms. Nasswetter,

Re: Draft Plan of Subdivision and Zoning Bylaw Amendment (OZS19-017)
220 Arkell Road, Guelph, Ontario

Grand River Conservation Authority (GRCA) staff have had the opportunity to review the following information submitted in support of the above noted applications. We can advise that the information submitted is sufficient to address the issues we would review for subject to the comments below.

- 220 Arkell Road- Guelph, ON. Environmental Impact Study, Final Report. Prepared by Stantec Consulting Ltd. Dated, August 28, 2019
- 220 Arkell Road, Guelph. Preliminary Servicing, Grading and Stormwater Management Report. Prepared by Stantec Consulting Ltd. Dated, May 28, 2019.
- 220 Arkell Road, Guelph. Hydrogeological Assessment. Prepared by Stantec Consulting Ltd. May 28, 2019.
- Draft Plan of Subdivision, Prepared by BSR&D, dated December 11, 2019.

The GRCA has no objection to the approval of the Zoning By-law Amendment and would not object to the proposed zoning. The GRCA would not object to the City of Guelph granting draft Plan Conditions for the Draft Plan of Subdivision subject to inclusion of the draft plan conditions noted below.

1. Prior to any grading or construction on the site and prior to registration of the plan, the owners or their agents submit the following plans and reports to the satisfaction of the Grand River Conservation Authority.

   a) A detailed Stormwater Management Report in accordance with the 2003 Ministry of Environment Report entitled, “Stormwater Management Practices Planning and Design Manual” and in keeping with the Preliminary Servicing, Grading and Stormwater Management Report (May 28, 2019) noted above.

   b) A detailed Lot Grading and Drainage Plan showing existing and proposed grades.

   c) An Erosion and Siltation Control Plan in accordance with the Grand River Conservation Authority's Guidelines for sediment and erosion control, indicating the means whereby

erosion will be minimized and silt maintained on-site throughout all phases of grading and construction.

d) An Environmental Implementation Report (EIR) to the satisfaction of the Grand River Conservation Authority in consultation with the City. The EIR should include the above noted reports, as well as the conclusions and recommendations outlined in the Environmental Impact Study, Stantec Consulting Ltd., August 2019.

e) The submission and approval of a Development, Interference with Wetlands and Alterations to Shorelines and Watercourses permit from the GRCA prior to any grading within the regulated area.

Advisory Comments

1. We are in agreement with the proposed Stormwater Management approach for lot-level controls and end-of-pipe treatment.

2. The water balance assessment has been satisfactorily addressed, and initial assessment of infiltration volumes has implemented factors of safety in the rate of infiltration.

3. EIS Section 9.2.5 Other Monitoring, the incorporation of a wildlife tunnel/culvert crossing should be monitored to measure the effectiveness of the mitigation due to the presence of the designated ecological linkage.

Comments to be addressed at Detailed Design:

4. The footprint of the infiltration galleries will need to account for soil infiltration rates and maximum drawdown time, as well as a factor of safety at the detailed design stage.

5. EIS Section 7.3.3.3 Ecological Linkage and Wildlife Culvert, identifies a wildlife culvert is proposed under the road linking this development to the VPV to the north and identifies that funnel fencing and associated plantings should be considered. Please note that wildlife tunnels/culverts are designed to function optimally with supporting fencing, thus fencing should be incorporated at detailed design.

6. EIS Section 8.5 Endangered Species Act, Stantec should consult with ESA staff at the Ministry of Environment, Conservation and Parks on the planned treatment of ESA bat habitat. They should not rely on 2017 treatment recommended by MNRF staff for a different project. This can be addressed at detailed design stage or as part of the Environmental Implementation Report.

The 2019 GRCA Fee Schedule is applicable as the application was filed in 2019. The fee required for the review of draft plan of subdivisions includes a base fee of $2,240 in addition to a fee of $1,165 per net hectare (excluding natural areas). Based on the proposed 4.289 hectares

to be developed, a total fee of $7,236.69 is required. We acknowledge receipt of the full payment with this submission.

Yours truly,

Ashley Rye
Resource Planner
Grand River Conservation Authority

c.c. Nancy Shoemaker; Black, Shoemaker, Robinson and Donaldson Limited (email)

Appendix C Comment Matrix

C.1 Environmental Comment Matrix

Stantec Consulting Ltd.
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

220 Arkell Road, Guelph, Draft Plan of Subdivision Submission
D.P. 23T-19002, ZBA OZS19-017

Tuesday, March 28, 2023

Responses to First Submission Comments received from:

#	C/R	Comment / Response
	City of Guelph - First Submission, Comments dated November 10, 2020 from Leah Lefler Planning and Building Services	
Environmental planning staff offer the following comments, based on the review of the following documents that pertain to the proposed Draft Plan of Subdivision and Zoning By-law Amendment application at 220 Arkell Road: • Planning Justification Report (BSRD, December 2019); • Preliminary Servicing, Grading and Stormwater Management Report (Stantec, May 28, 2019); • Hydrogeological Assessment (Stantec, May 28, 2019); • Geotechnical Report (Stantec, June 11, 2019); • Environmental Impact Study (Stantec, August 28, 2019); and • Tree Preservation Plan (Stantec, May 28, 2019).		
Environmental Impact Study		
Assessment of natural heritage features and functions		
1.0	C	On March 13, 2017, Environmental Planning staff provided the following direction on how to address the small wetland pocket located to the east of the laneway: "AL pointed to the various wetland policies including: GRCA, as well as Other and Local in OPA42 and possible complexing with the PSW under Ministry of Natural Resources and Forestry policy. It was recommended that we deal with the GRCA on the small wetland piece and that the proposed detailed vegetation inventory would be required to confirm if any significant species were present in its assessment". Under section 4.2.1 on page 4.2, please note that Grand River Conservation Authority (GRCA) mapping has been updated to exclude the wetland pocket located to the east of the laneway. A portion of that wetland appears to have been filled in to accommodate grading of the approved Arkell Meadows Subdivision. Please clarify if significant species were found in the small wetland pocket.
	R	The field notes regarding the wetland pocket, which was a swamp thicket inclusion, were included in Appendix G - Field Notes of the EIS Report. The notes are contained on the second last page of the ELC field notes. No significant species were found in the small wetland pocket.
2.0	C	Section 4.4.2.4 Wetland Delineation refers to the wetland boundary determined in the field with GRCA on June 6, 2017; however, Figure 4 also references a Natural Resource Solutions Inc. (NRSI) wetland boundary flagged on the property to the south. The 30m buffer shown on the PSW on Figure 4 should extend to the NRSI flagged wetland boundary to accurately reflect the extent of natural heritage system on the subject property. Please update both the text and the mapping accordingly.
	R	The 30 m buffer to the wetland has been shown on Figure 4 where it occurs on the subject property, the buffer continues to the edge of the subject property boundary coincident with the existing driveway.
3.0	C	Under Section 5.1 Wetlands, please note that the wetland boundary is identified based on guidance from the provincial government (Ontario Wetland Evaluation System), and not the Ecological Land Classification system. Furthermore, where Locally Significant Wetland is contiguous with Provincially Significant Wetland, Locally Significant Wetland are considered part of the Provincially Significant Wetland, and therefore the minimum buffer applied should be 30m.
	R	Noted. The wetland boundary determined with the GRCA on both the subject property and property to the South has been provided on Figure 4 with a 30 m buffer shown on the subject property.
4.0	C	A detailed characterization of the current hydrology of the wetland (e.g. depth to groundwater, depth of surface water, extent and duration of flooding) should be included in a revised EIS.

#	C/R	Comment / Response
	R	Stantec staff visited the onsite Torrance Creek Swamp PSW in April 2022 to characterize existing surface water ponding conditions in the PSW, with a photolog shown in Appendix E of the EIS Addendum. Stantec proceeded to install a transect of three drive-point piezometers in the portion of the PSW located downgradient of the proposed outlet of the future stormwater management facility (SWMF) (see Figure 1, Appendix D of the EIS). The purpose of the drive-point piezometers is to track the pre-construction and post-construction hydroperiod of the PSW to assist in evaluating whether post-development stormwater discharge to the PSW could affect the long-term form and function of the PSW ecosystem. The drive-point piezometers are equipped with data loggers, which have been collecting groundwater and surface water levels in the PSW at these locations since May 2022 (see hydrographs presented in Figure 5, Appendix D of the EIS). A feature-based water balance is also included in Appendix D of the EIS that provides a preliminary analysis of anticipated ponding depths in the PSW from the proposed development under the post-construction condition (only short-term ponding of 0.005 m (5 cm) is estimated to occur in the PSW from post-development runoff entering the PSW during the greatest period monthly runoff surplus generated from the proposed development).
5.0	C	Pre-consultation comments indicated that there are hedgerows on site which need to be considered under the City's woodland and/or urban forest policies. If the hedgerows do not meet the criteria for designation as significant or cultural woodlands, which are premised on the definition of woodland, consistent with the Official Plan, identify opportunities for protection, enhancement and restoration of trees within the Urban Forest. Demonstrate where preservation is not possible through describing the iterative process between the design team and providing examples of site designs that were not pursued and a rationale as to why not. This analysis should draw on Table 4.10.1 of the Torrance Creek Subwatershed Study, specifically, Hedgerow 32 (Ecological Linkage), Hedgerow 33 (south property line adjacent Arkell Meadows) and Hedgerow 34 (east hedgerow), and should be included in a revised EIS.
	R	A new section was added to the Addendum that provided an analysis of significance of the hedgerows present on the subject property. It included the incorporation of Table 4.10.1 from the Torrance Creek Subwatershed Study as well as consideration of Dougan and Associates (2009), the City of Guelph Official Plan, and Stantec survey results. With respect to an iterative process, extensive consultation with City of Guelph staff, including minuted meetings, where various versions of the concept plan was presented and discussed. Including, but not limited to: -Pre-consultation Meeting on October 5, 2016 -Consultation meeting with Adele Labbe and Chris DeVriendt on March 13, 2017 (minutes provided on March 16, 2017) -Planning meeting on October 10, 2017 with Katie Nasswetter, Jim Hall, Chris DeBriendt, Jyoti Pathak, Mary Angelo (minutes drafted, not finalized) -Meeting on September 10, 2018 with Mary Angelo, Katie Nasswetter, Jim Hall, Jyoti Pathak, Leah Lefler Pre-Con(meeting minutes available) -Ongoing consultation with City of Guelph through design iterations via email (e.g., road location in the ecological linkage, November 11, 2016) -Comment review between Melissa Straus and Leah Lefler on July 26, 2021 (minutes in Appendix B3) -Water balance and impacts discussed on October 27, 2021 (minutes in Appendix B3) -Additional water balance discussion on January 7, 2022 (minutes in Appendix B3)
6.0	C	The EIS says that the woodland limit was determined in the field with the City of Guelph on September 7, 2017. Please include documentation of this site visit in a revised EIS.
	R	The woodland limit was determined during a joint field site walk involving Janice Ball of Stantec and Adele Labbe of the City on September 7, 2017. As this was a woodland limits flagging exercise, minutes were not typically taken and as such documentation is not available.
7.0	C	Section 4.4.2.1, references three main areas: (1) eastern edge of the significant woodland/PSW; (2) northern hedgerow; and (3) eastern edge. Please include a map that illustrates where each of these areas are located. There appear to be four hedgerows in addition to the significant woodland/PSW boundary: northwest boundary (adjacent Victoria Park Village subdivision); northeast boundary (adjacent agricultural lands); southeast boundary (adjacent Arkell Meadows subdivision); and central hedgerow running northwest to southeast through the property.
	R	The eastern edge of the Significant Woodland/PSW refers to the area along the west side of the proposed development. The northern hedgerow refers to the Ecological Linkage along the north property line. The eastern edge refers to the hedgerow along the east property boundary. To provide clarity, the hedgerows have been labelled on Figure 3 using the Torrance Creek Subwatershed Study as a guide with additional descriptions provided in the new section on hedgerows.

#	C/R	Comment / Response
8.0	C	Approximately a third of the site (2.47 ha) drains to the woodland on the adjacent property to the east. The EIS should assess if the change in drainage may impact the adjacent woodland.
	R	The offsite woodlot to the east was included in the updated feature-based water balance found in the EIS Addendum Appendix D. The detailed infiltration deficit (2,576 m3/yr) and run off deficit (2,481 m3/yr) were discussed during the October 27, 2021 water balance meeting and determined to be generally in alignment with City expectations in change magnitude (see Appendix B3). The EIS Addendum has been updated to include a section on this woodlot and demonstrates no negative impacts.
9.0	C	Section 4.4.3.3 Corridor Studies does not describe the study design. For example, were pitfall traps installed along drift fencing? Please clarify.
	R	In the original EIS, Section 3.2.3.3 Corridor Studies (within Section 3.0 Data Collection Methods) described the approach to pitfall trap studies. Including: "The pitfall trap study consisted of two sections of buried silt fencing and 18 buckets (9 on either side) sunk into the ground approximately every 20 m. Fencing and buckets were installed on August 10, 2017 at the locations shown on Figure 3 (Appendix A)."
10.0	C	Section 4.4.3.4 Bat Maternity Roost states that bat exit surveys were not conducted in 2017, and would be conducted the summer prior to tree removal. This approach appears to assume that bat habitat could be removed, if detected at a later date. Please confirm with the Ministry of Environment, Conservation and Parks that this approach is acceptable, and include correspondence in an updated EIS.
	R	Consultation through the submission of an Information Gathering Form (IGF) was undertaken with the Ministry of Environment, Conservation and Parks (MECP). The MECP endorsed Stantec's proposed protocol in which impacts are avoided through the use of tree removal timing windows (i.e., no cutting of these trees between April 1 and September 30) for the identified candidate bat roost trees located within the project footprint. Exit surveys will occur at the structures on the property (residence, garage, barn) and additional consultation with MECP will be undertaken, as required. MECP consultation can be found in the EIS Addendum Appendix B4.
11.0	C	Section 4.4.3.5 Breeding Birds refers to Barn Swallow surveys and the fact that no evidence of Barn Swallow nesting was noted within the study area. Please note that the General Habitat Description for Barn Swallow refers to three categories of habitat: (1) nest; (2) the area within 5m of nest; and (3) the area between 5 m and 200 m of nest. Please clarify whether or not any category of Barn Swallow habitat is present within the study area.
	R	No evidence of nesting by Barn Swallows was found on the subject property or Study Area where access permitted. It is unknown, due to a lack of access, if nesting Barn Swallows occurred within 200 m of the subject property; however, Barn Swallows were reassessed by COSSARO in 2021 and their status was changed from Threatened to Special Concern on January 25, 2023. Therefore, the General Habitat Description for the species (under the ESA) does not apply. Barn Swallows have instead been considered under SOCC and/or locally significant in the Addendum.
12.0	C	Section 4.4.3.5, Crepuscular Surveys, states that surveys were completed on June 21, 2017; however, Table 3-11 indicates that surveys were completed on June 12, 2017. Please clarify. Table 3-11 indicates 100% cloud cover on June 12, 2017. Established protocols for surveying crepuscular birds indicate that surveys should be conducted under clear conditions.
	R	The Crepuscular Surveys were conducted on June 7 and June 12, 2017. June 21s is a typographical error. Although we tried to complete surveys during appropriate weather conditions, this was not always possible. As the first visit documented the presence of crepuscular species, cloud cover during the second visit did not impact the overall detectability of crepuscular species in the Study Area.
13.0	C	Under Section 5.5.2 Rare or Specialized Habitat, please confirm whether or not Candidate Significant Wildlife Habitat for area-sensitive breeding birds is present in the Torrance Creek PSW. Conclusions drawn in the sixth paragraph on page 5.4 are unclear and inconclusive.
	R	As noted in Section 5.5.2, SWH for area-sensitive breeding birds was identified in the Torrance Creek Swamp PSW by previous studies, as identified by the City in their May 10, 2017 correspondence. Results of studies conducted by Stantec in 2017 did not detect any area-sensitive breeding species; however; field studies were restricted to the woodlot edge due to a lack of access to off-property areas. Therefore SWH was documented in the PSW by others, not Stantec, but was still considered present. A summary of SWH identified on the subject property and/or Study Area is included in the Addendum.

#	C/R	Comment / Response
14.0	C	Please clarify if Section 5.5.5 Locally Significant Wildlife Habitat refers to Habitat for Significant Species (i.e., per Official Plan policy 4.1.4.4) or Significant Wildlife Habitat in the form of Habitat for Species of Conservation Concern (i.e., per MNRF's Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E). Text, as currently written, is unclear
	R	Section 5.5.5 Locally Significant Wildlife Habitat referred to significant to the local Guelph area. Species of Conservation Concern, as per MNRF's guidance, were discussed in Section 5.5.3, Species of Conservation Concern. Additional analysis on locally significant wildlife is also provided in the Addendum.
15.0	C	Section 5.7 Significant Natural Heritage Features Summary describes the hedgerows and habitat for locally significant species as non-significant. Please include the rationale and supporting analyses for why these features are considered non-significant. For example, is Habitat for Significant Species present, based on the criteria of the Official Plan? If yes, these areas are considered part of the Natural Heritage System as Natural Areas. This section appears to focus on the PPS; however, the OP is equally relevant.
	R	Per Comment Response #5, a new section on hedgerows was included in the EIS Addendum that includes an analysis of significance. Similarly a new section on locally significant wildlife was also included in the EIS Addendum to determine status of significance. Criteria set out in the Official Plan were included in the analysis.
16.0	C	Please update the EIS to clearly indicate that Significant Wildlife Habitat for Area-sensitive Breeding Birds is present within the study area and map extent of SWH on Figure 4. The EIS should provide a description of the habitat and the guild of birds that it supports.
	R	SWH for Area-sensitive Breeding Birds would be associated with the Torrance Creek PSW, which will not be altered by the proposed development. Shading has been provided on Figure 4 to show SWH in relation to this feature; however, it should be noted that it will be protected by retention and provided appropriate buffers.
17.0	C	Please update Figure 4 to show the extent of Deer Wintering Area SWH.
	R	The deer wintering area is associated with the PSW to the west of the subject property and has been shaded/hatched to illustrate SWH. This is coincident with the requested illustration of Area-sensitive Breeding Birds.
18.0	C	Please assess the function of the Ecological Linkage and other hedgerows with respect to amphibian movement and the Criteria Schedules for SWH in Ecoregion 6E. If any of the hedgerows meet the criteria, they would be mapped SWH and protected as part of the natural heritage system.
	R	As per the March 13, 2017, meeting with City staff, an analysis of the function of the ecological linkage was not required as the OP has already determined that the linkage was significant. The goal of the movement corridor studies (i.e., pit falls) was to determine what species are using the subject property to inform the wildlife crossings within the linkage. Furthermore, significant wildlife habitat for amphibians is absent from the Study Area based on the results of the field program and therefore per the Ecoregion Criteria movement corridors are absent.
19.0	C	Call surveys did not detect Wood Frog; however, wildlife movement surveys did detect Wood Frog. The EIS should be updated to evaluate the presence of Woodland Amphibian Breeding Habitat SWH within the study area. Further, if the wetland provides a woodland amphibian breeding function, the EIS should address how changes to wetland hydrology may impact this function.
	R	This is correct, however, a total of 8 wood frogs does not meet the Eco-region criteria of 20 individuals required to constitute significance. The EIS Addendum includes a summary of SWH identified within the Study Area, which does not include SWH for breeding amphibians.

#	C/R	Comment / Response
20.0	C	Page 10.2 “One plant species identified during studies is considered locally rare in the City of Guelph: Swamp Gooseberry (Ribes hirtellum)”. Figure 4 maps the location of this species in the footprint of the proposed trail connection to the Victoria Park Village subdivision. The EIS does not address the Habitat for Significant Species policies (4.1.4.4) of the Official Plan. Please update the EIS to include this policy analysis and recommendations.
	R	In addition to its mention in Section 10.1 (page 10.2) of the original EIS, Swamp Gooseberry was mentioned in Section 5.7 Significant Natural Heritage Features Summary (habitat for locally significant species), and also in Section 7.1.4 Locally Significant Species. As noted in Section 7.1.4, "Swamp gooseberry was recorded within the northern hedgerow, which is to be protected as part of the ecological corridor. Impacts are restricted to accidental removal during invasive species management." Although the trail location is relatively fixed at this point, due to a required connection to the existing trail within the Victoria Park Village development to the north, a field fit may be possible to avoid this plant species. Alternatively, the plant could be transplanted closer to the PSW during construction.
Policy and Analysis		
21.0	C	Section 5.0 Significant Natural Heritage Features should address federal, provincial and municipal policy requirements (i.e. Fisheries Act, Endangered Species Act, 2020 Provincial Policy Statement and City of Guelph Official Plan March 2018 Consolidation). Please update accordingly.
	R	Section 2.0 Policy and Guidance Considerations includes a review of policies that were considered during the preparation of the EIS, including all of the mentioned documents, except for the Fisheries Act (which is not applicable to the subject property). While Section 5.0 does not specifically discuss each of these under conspicuous headings, discussion related to the various acts and policies is contained within the discussion under each of the headings specific to Provincial Policy Statement.
22.0	C	Section 5.3 Valleylands states that GRCA identifies Significant Valleylands. This statement is incorrect. The City’s Official Plan establishes the criteria for identifying Significant Valleylands. Those established criteria rely on GRCA’s regulatory floodplain mapping. Please clarify this in text.
	R	Noted.
23.0	C	The City of Guelph’s Official Plan Natural Heritage System policy appears to be interpreted incorrectly in a number of areas. On page 8.1, the EIS states that development is not permitted within Significant Natural Areas, except in accordance with the general policies. This is incorrect. Uses in the Natural Heritage System are limited to the general permitted uses; the Natural Heritage system consists of Significant Natural Areas and Natural Areas, and buffers. Feature specific policies may further restrict or expand upon general permitted uses. In other words, development and/or site alteration is restricted in the Natural Heritage System to general permitted uses and feature species uses.
	R	Noted.
24.0	C	The EIS should evaluate the need for established buffer and/or justify the use of minimum buffers.
	R	As discussed in Section 7.3.1 the buffers to the significant woodland feature (10 m) and PSW (30 m) are consistent with the Official Plan. Additional discussion on why these buffers are considered adequate was provided in Section 7.3.1.
25.0	C	The EIS appears to assume that all permitted uses are a given. Please note that policy related to permitted uses within the natural heritage system are contingent on the demonstration of no negative impact.
	R	Noted.
26.0	C	Grading and the outlet associated with the stormwater management pond is not permitted within the inner 15 m buffer of the PSW. The development concept should be revised to reflect this requirement. Further, it must be demonstrated in the EIS that there will be no negative impacts to the natural heritage system.
	R	The design of the SWM and outlet configuration has been updated to remove impacts within the inner 15 m buffer of the PSW. This is demonstrated within the FSR Dwg C-410 complete with a cross-section of the outlet configuration to clarify review.

#	C/R	Comment / Response
27.0	C	Locate the trail outside the NHS to the extent possible. The trail is designed as a primary trail, which is not a permitted use within the natural heritage system (i.e., passive recreation, as in a low-impact nature trail, is a general permitted use).
	R	The proposed trail has been located outside of the PSW, significant woodlot, significant woodlot buffer, SWH but a portion does fall within the wetland buffer. We understand that the OP definition includes minimum buffers as part of the NHS although the trail has been located to the extent possible outside the NHS. While it is recognized that a portion of the trail falls within the wetland buffer, the buffer is functioning as intended by protecting the adjacent features. That said, the trail is in accordance with City of Guelph OP Schedule 6, coincident with the SWM infrastructure area to reduce the impact of adding an additional constructed footprint, and was somewhat predetermined such that a continuation of the existing/approved trail to the north is provided.
Ecological Linkage		
28.0	C	The EIS should address the Ecological Linkage policies of the Official Plan (Section 4.1.3.9). For example, the EIS must include an assessment of the Ecological Linkage to confirm the configuration (i.e., location and width) based on the scale at which it is intended to function, the nature of adjacent
	R	Please see the response to Comment 18.0 in which City Staff on March 13, 2017 did not require this analysis as the City has already determined the location and significance of the linkage.
29.0	C	Section 8.2.1 City of Guelph Official Plan of the EIS states that the road connection to the Victoria Park Village subdivision was approved. Two road connections are proposed, one on the subject property and one on the adjacent property to the east, and one primary trail connection (within the NHS). The EIS must demonstrate how the site design is compatible with the protection of the Ecological Linkage and its associated function. If it cannot be demonstrated, then a new site design must be prepared that meets the policy requirements.
	R	It is our understanding that the road connection between this development and the associated Victoria Park Village was approved. 220 Arkell was designed with this road pattern in mind. Consultation with City Staff on January 23, 2017 indicates that the connection through the ecological linkage would meet the definition of essential infrastructure, which is permitted in the policy, as long as justified through the application. Through the application (2017-present), this connection has been included as part of the site design iterative process presented to City staff as detailed in Comment #5.
30.0	C	The current development proposal includes two road crossings, a stormwater management facility, and a primary trail bisecting the Ecological Linkage. This is not supportable, as it is not consistent with the protection of Ecological Linkage functions such as wildlife movement. Consistency with Official Plan policy must be demonstrated. For example, stormwater management infrastructure may be permitted in Ecological Linkages subject to certain policy tests. As proposed, the SWM pond appears to reduce the width of the Ecological Linkage to less than 10 m wide. Further, the SWM pond appears to require fencing due to the proposed slopes. A portion of the primary trail also appears to require fencing due to proposed slopes within the Ecological Linkage. This is not compatible with deer movement.
	R	The development proposal includes only one road crossing associated with the subject property and a trail that will cross the Ecological Linkage. The road crossing has been sited to coincide with a road connection to Victoria Park Village, which was approved. The trail crossing is intended to connect with the existing/approved trail to the north. These design elements were previously discussed with City staff and it was understood that agreement was achieved. The stormwater pond will not bisect the Ecological Linkage, but arguably will add to its ecological diversity through appropriate design and planting. In effect, the SWM pond area will become part of the Ecological Linkage thus increasing its breadth. The sloping and shaping of the pond has been revised such that fencing is not required. Furthermore, provisioning of a wildlife culvert will also mitigate the impacts to the road crossing. A new section on the ecological corridor has been included in the EIS Addendum.
31.0	C	The proposed stormwater management pond is a dry pond with slopes that appear to require fencing around much of the perimeter, include its interface with the Ecological Linkage and natural heritage system. This essentially reduces the 50m buffer to less than 10m. The functionality of a 50m open corridor must be maintained. Therefore, a stormwater management facility with shallower slopes and no fencing that extends 10-15m into the linkage may continue to provide this function.
	R	The pond has been adjusted to no longer require fencing per the DEM guidelines.

#	C/R	Comment / Response
32.0	C	Section 7.3.3.3. Ecological Linkage and Wildlife Culvert of the EIS should note that the wildlife culvert is proposed to function as a drainage culvert and a wildlife culvert. This is unacceptable. The Ecological Linkage provides a connection for deer movement from the Torrance Creek PSW to east to the City, and also appears to have an amphibian movement function. Separate wildlife tunnels and funnel fencing are required to mitigate impacts associated with infrastructure crossing the Ecological Linkage. For example, if a road is proposed to cross the Ecological Linkage, mitigation measures to facilitate deer passage must be identified. Separate wildlife tunnels to facilitate safe passage of amphibians, reptiles and small mammals should be provided under each road crossing, and should include exclusion/funnel fencing. These mitigation measures are necessary to maintain the functionality of the linkage.
	R	Section 7.3.3.3 included recommendations for consideration during detailed design of the wildlife culvert (including funnel fencing) as well as signage and traffic calming recommendations for deer crossing. Section 5.3.2 of the EIS Addendum has added the requirement of the funnel fencing and provided an example wildlife culvert specification for consideration during preparation of the EIR. It is noted that the wildlife culvert will not jointly function as a drainage culvert.
33.0	C	The EIS should note that the landscape/restoration planting plan must consider plantings that provide appropriate moisture for herps, and cover for mammals to move through to maximize the quality of the linkage, to better facilitate animal movement through this corridor.
	R	The Landscape/Restoration Planting Plan will be developed to provide an appropriate mix of native species that will enhance vegetative cover and species diversity. This will be included as a recommended item in the EIR.
34.0	C	Two roads are proposed, one on the subject property and one on the adjacent property, and a separate primary trail. The two road crossings are supportable subject to the provision of appropriate mitigation measures outlined in comment 32 above. Options for incorporating the primary trail within the right of way of the westerly road crossing should be explored to reduce the number of crossings from three to two. The EIS must demonstrate that the proposed development is consistent with the Ecological Linkage policies of the Official Plan (i.e., no negative impact on deer movement). The EIS should provide high-level design details on how this would be accomplished.
	R	The trail location is consistent with OP Schedule 6 and upgrades to the trail were requested by Parks such that the trail meets City standards (3 m wide asphalt with 0.6m mow strips) and well as SWM access requirements. Therefore, downgrading to a secondary trail is not permissible. Extending the trail eastward to the road crossing creates a conflict with the fixed trail location on the VPV lands. This would require the developers of VPV to run the trail easterly through existing backyards or encroach into the north edge of the Ecological Linkage thus increasing the footprint of impact to the linkage area. Furthermore, the location of the SWM facility (and associated required access) would still be located within the linkage regardless of the trail. The proposed location is the best solution as it is consistent with previous trail planning, reduces the trail footprint within the ecological linkage (and NHS) and reduces an additional crossing by placing the trail coincident with the SWM facility. Mitigating impacts of the road crossing will also occur through the provisioning of a wildlife culvert. A new section has been added to the Addendum on the wildlife crossing.

#	C/R	Comment / Response
Stormwater Management		
35.0	C	Wetland water balance is a major outstanding component of the development application. The stormwater management outlet for the proposed development is a PSW, not a creek. The area drains to Torrance Creek, as in the site is located in the Torrance Creek subwatershed. Stormwater management must consider wetland water balance and hydroperiod. Demonstration of no negative impact to the PSW (feature) and ecological and hydrologic functions must be provided as part of the EIS. The water balance currently presented is a site-based water balance which predicts major increases in runoff and decreases in infiltration. The EIS must evaluate post- development wetland water balance relative to pre-development conditions. If you look at the wetland catchment pre to post-development, what are the results? How has the monthly wetland water balance changed? Where is the outlet? Are impacts to groundwater anticipated? What is the wetland/forest edge like in the vicinity of the outlet? How might it be impacted by the change in hydrology?
	R	As discussed in the Stantec (2022) *Revised Water Balance Calculations in Response to First Submission Comments Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario* , the annual pre- to post-development runoff volume directed to the Torrance Creek Swamp from the Site is projected to increase by 6,075 m3. The increase in post-development runoff discharged to the Torrance Creek Swamp is expected to raise surface water ponding within the wetland by no more than 0.005 m (5 mm) for a given month. This ponding is also expected to be temporary (i.e., not cumulative from month to month) as the Torrance Creek Swamp is identified to be a groundwater recharge feature (i.e., the runoff entering the wetland is expected to be infiltrated while present within this natural heritage feature). In addition, pre- to post-development infiltration volumes will be exceeded at the Site under the proposed post-development infiltration strategy (i.e., via proposed rooftop galleries and end of pipe infiltration) and, as such, reduction in groundwater inputs to Torrance Creek Swamp will not be impacted.
36.0	C	SWM design needs to consider back to back events. The system currently appears to be designed for the 10mm rainfall event.
	R	SWM design has been updated. Dry SWMF controls up to 100-yr event with infiltration throughout the site sized for the 25 mm event.
37.0	C	The SWM pond is proposed as a dry pond. It is located in the portion of the site where groundwater levels are the highest. Will the pond be lined with a clay liner? How will this be compatible with infiltration from the pond?
	R	The dry SWMF has been raised since the last submission. The dry portion facility is not proposed to be lined to promote passive infiltration. The wet forebay will likely require lining to prevent contaminants from entering GW as well as maintaining water within the forebay, but design and confirmation of this liner will be performed at detail design.
38.0	C	In section 6.1.4 Temporary Access of the EIS, please quantify and/or provide the detailed analysis to substantiate the following statement: “this increase was shown to not result in a significant change in the overall water balance or affect the function of the rear-yard infiltration trench”. Please also clarify if this is referring to the rear-yard infiltration trench in the Arkell Meadows subdivision that is proposed to be relocated.
	R	Correct, the statement is referring to the rear yard infiltration trench in Arkell Subdivision. Please refer to the letter dated Nov. 5, 2018 responding to City July 2018 comments, included in Appendix D of the Preliminary Servicing Report for details.
39.0	C	In section 8.3 Grand River Conservation Authority of the EIS, it is concluded that a single culvert, that captures drainage from a fraction of the site, will maintain the recharge function of the wetland. Please provide the supporting analysis to demonstrate the accuracy of this statement.
	R	Note response to Comment #38 noted above.
40.0	C	The first bullet point on page 8.3 is incorrect. An infiltration deficit of 25% is anticipated, with infiltration-based LID measures incorporated into the design. A 74% increase in runoff is anticipated. What analysis has been completed to determine whether or not these surpluses are considered detrimental? Wetland water balance does not appear to have been completed. It was noted at the pre-consultation stage that “Wetland hydrology should be characterized and a wetland water balance prepared as part of a Hydrogeological Report to support the EIS”. Please include this analysis in a revised EIS.
	R	Refer to response for Comment #35.

#	C/R	Comment / Response
41.0	C	The second paragraph on page 9.3 of the EIS does not appear to address issues related to the predicted infiltration deficit or runoff surplus, or the fact that the outlet is a PSW, not a watercourse. Swamps are adapted to adjust to seasonal fluctuations in groundwater and surface water conditions, based on a seasonal pattern (wet in spring, dry in summer). Impacts proposed by development must consider the natural range of variation. If development results in an increase in ponding of 10cm over an area over an extended period of time, you can expect trees to die off in that portion of swamp and convert to a shallow marsh or meadow marsh. This is the type of analysis we are looking for to determine whether or not the no negative impact test is being met. A shift from swamp to marsh would constitute a negative impact.
	R	In addition to the response provided above for Comment #35, to address the test of no negative impact, a sensitivity analysis, magnitude of impact, and risk analysis was completed based on guidance provided by the City of Guelph in their July 6, 2022 email (see Appendix B2) which included use of TRCA (2017). A new section is provided in the EIS Addendum.
Recommendations		
42.0	C	The EIS should include recommendations for best practices related to soil stock piles, especially for soils to be used in Ecological Linkages and Buffer Areas to best support restoration plantings and enhancement of the NHS.
	R	Note that the NHS and most of the Ecological Linkage area have been identified as no touch per preliminary grading plans, that said, wording regarding landscape restoration can be included in the EIR.
43.0	C	In section 7.3.5.3 Construction Timing of the EIS, note that nest searches must be completed every 48 hrs, not every 7 days. Further, Canadian Wildlife Service (Migratory Birds Act) does not recommend this approach in complex habitats. Please update text to reflect these points.
	R	Noted.
44.0	C	Recommended mitigation measures, such as wildlife tunnels and fencing, habitat enhancements, etc. should be outlined in the EIS.
	R	All mitigation measures related to habitat enhancements are discussed in Section 7.3.3 Restoration and Enhancement Measures, including wildlife culverts and fencing, discussed in Section 7.3.3.3 Ecological Linkage and Wildlife Culvert; however, additional details are included in the Addendum on the wildlife culvert.
45.0	C	The EIS should include a section on what the forthcoming EIR should address in greater detail (e.g. monitoring requirements including monitoring of wildlife tunnels, detailed planting plans, invasive species management plans, details on restoration of Ecological Linkage and buffer areas).
	R	Noted. Many of these recommendations have been discussed throughout the content of Section 7 and Section 9; however, a dedicated section has been provided in the EIS Addendum.
46.0	C	Note that the EIR should include a restoration plan for Block 20 once access has been converted to trail, and at minimum should reflect the planting plans approved through the Arkell Meadows subdivision.
	R	Noted. Included in the EIR recommendations section.
47.0	C	Dewatering requirements associated with the installation of servicing are not addressed in the EIS. The text should indicate that the EIR will address this component in greater detail when more information is available to complete the assessment. For example, where would the dewatering outlet to?
	R	Noted. The EIR will address the dewatering component in greater detail.

#	C/R	Comment / Response
Minor Comments		
48.0	C	The last sentence of the third paragraph under Introduction reads “(3) recommend appropriate measures to avoid or minimize potential negative impacts.” This text should be revised to reflect that the policy test is no negative impact.
	R	Noted.
49.0	C	Under section 2.2.1 Official Plan, note that uses in the natural heritage system are limited to the general permitted uses, but may be further limited or expanded upon in feature specific policies.
	R	Noted.
50.0	C	Under section 2.2.3.1 Tree By-law, note that the tree by-law was created to regulate the destruction and injury of trees, not “prevent damage or destruction”.
	R	Noted.
51.0	C	Table 3-2 should be relabeled: Tree Inventory Survey Date.
	R	Noted.
52.0	C	Under section 4.4.1 Geotechnical and Hydrogeological Conditions, it is stated that groundwater is positioned at ground surface at BH01-17 and BH02-17. Groundwater is positioned at ground surface at BH01-17 and BH03-17. Please revise.
	R	Noted.
53.0	C	Under section 4.4.1 Geotechnical and Hydrogeological Conditions, please clarify what is meant by the following statement: “Under the pre- development condition, the predicted annual volume of infiltration provided to the shallow groundwater system by this wetland area represents approximately 3% of the total annual volume of infiltration that occurs across the site.”
	R	The 3% accounts for the total volume of infiltration occurring below the portion of the PSW that was previously present within the Site boundary: 
54.0	C	Section 4.4.3.1 Snake Surveys references the north-south hedgerow. It is unclear which hedgerow is being referred to here. Please clarify.
	R	Please refer to the responses to Comments #5 and 7 as well as the new hedgerow section 3.1 in the Addendum and Figure 3 which addresses this confusion.
55.0	C	Section 4.4.3.2 Amphibian Surveys refers to the temporary SWM facility on the adjacent property. Please note that the stormwater management pond is permanent. Also, this section references Figure 4; however, field study locations are illustrated on Figure 3.
	R	Noted.
56.0	C	Under Section 5.2 Woodlands, the text references two significant woodlands yet Figure 4 illustrates the boundary of only one significant woodland. Please update the map to include the significant woodland boundary and established buffer for the woodland located to the east of the property. An approximate boundary based on air photo interpretation is acceptable for this purpose.
	R	Noted. Figure 4 has been updated with an approximate significant woodland boundary for the woodlot to the northeast. A 10 m buffer has not been applied as the boundary has not been approved.

#	C/R	Comment / Response
57.0	C	Section 7.2.3 Trail, states (i.e. decreased or concentrate hydrologic input to adjacent wetland). What does this mean?
	R	This would refer to the potential for a trail to alter the hydrological pathways to an adjacent wetland, by either blocking flow to the wetland or acting like a dam and increasing the period of inundation.
58.0	C	Under section 7.3.3.1 Tree Preservation and Compensation, note that plantings should be designed for a specific function to enhance the NHS.
	R	Noted.

#	C/R	Comment / Response
59.0	C	8.4 Migratory Birds Convention Act describes the window as April 1 to August 25. Section 7.12 describes it as April 15 to August 9. Please revise.
	R	Noted. Section 7.12 was correct, April 15 - August 9.
Tree Preservation Plan		
60.0	C	Section 3.2.1, Trees to be Removed, of the Tree Preservation Plan states that "the development has been designed to maximize the development area which has resulted in minimal opportunity for tree preservation within the interior of the site". This is inconsistent with environmental planning staff direction during the finalization of the EIS terms of reference, where direction was given to assess the site based on the City's woodland and urban forest policies. Please demonstrate how the City's policies have been considered and addressed. Pre-consultation comments, on page 4 of 7, indicated that where preservation is not possible, demonstrate by describing the iterative process between the design team and providing examples of site designs that were not pursued and a rationale as to why not.
	R	This text has been removed from the Tree Preservation Plan. Additionally, the EIS Addendum, as well as the response to Comments #5, includes additional details on hedgerows, the iterative process and the Urban Forest Policy.
61.0	C	The tree protection zone should be based on the tree canopy width, per the City's Tree Technical Manual. Please clarify if this was the approach applied in the Tree Preservation Plan.
	R	Tree protection zones are based on the dripline estimation recorded in the field. The revised Report clarifies this.
62.0	C	Please update item 3 and 4 to refer to Planning 519-837-5616 (planning@guelph.ca) on drawing L-904: Tree Protection and Removal Notes.
	R	This has been updated.
63.0	C	On drawing L-905, there appears to be a discrepancy between the Tree Impact Totals summarized in Table 2 and the number of removals indicated in Table 1. Table 2 reports 154 trees removed and 98 trees retained, whereas when you count out the number of "removed" and "retained" trees listed in Table 1, the numbers appear to be 252 and 137 respectively. Please clarify.
	R	This has been clarified.
64.0	C	Please provide details pertaining to which trees require compensation and which trees do not require compensation to support the reported number of compensation trees required. This information is often incorporated into Tables 1 and 2.
	R	This information has been included in an updated chart.
Geotechnical Report		
65.0	C	Text on p. 2 indicates that monitoring wells were installed in all boreholes. This is inconsistent with information presented on drawing No.2. Please clarify.
	R	Correct, monitoring wells were installed in 3 of the 4 boreholes installed in 2017. Since this 2019 Geotechnical report an additional 6 monitoring wells were installed in 2022. This typo has no impact to the results presented.
66.0	C	The SWM pond is proposed where groundwater levels are the highest, yet the SWM facility proposed is an infiltration-based facility. Section 8.8.1 of the Geotechnical report states that the proposed bottom of pond elevation ranges from 333.0 to 333.5 m. Table 5-2 indicates that groundwater is at approximately 333.19 m in this area, and data from loggers indicates that 333.36 m is the high-water mark. Will the pond function as a dry pond or an infiltration-based pond? Please clarify how this pond is intended to be designed and function, and update the EIS to address the impacts associated with the refined/clarified design.
	R	The pond has been updated/raised with the dry cell elevation at 335.00 m and the forebay bottom at 334.00 m. The forebay will likely be lined to maintain a permanent pool and prevent contaminants from infiltrating, but this will be determined and designed at detail design.

#	C/R	Comment / Response
Hydrogeological Study		
67.0	C	Monthly Water Balance calculations have been completed based on 3 subcatchments (A, B, and C). Pre-development conditions are compared to post-development conditions within these catchments on a monthly basis. This analysis does not enable a comparison of pre- to post- development conditions as the site, under pre-development conditions, has a drainage divide, with approximately 2/3rds of drainage going to the wetland and 1/3 going to the woodland on the property to the east. To enable a proper assessment of impacts to wetland hydrology, compare post-development to pre-development conditions for the portion of the subject property located within the wetland's catchment. The analysis in Table 6 shows a 31% decrease (deficit of 4,908 m3/yr) and a 63% increase (increase of 16,300 m3/yr) based on a pre-development scenario that the entire site drains to the wetland when in fact it does not. This analysis should be completed and commented on in an updated EIS, including comparison of pre- to post- monthly differences.
	R	Please refer to revised water balance calculations presented in the Stantec (2022*) Revised Water Balance Calculations in Response to First Submission Comments, Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario*
68.0	C	The EIS should address whether or not the predicted reduction in infiltration would result in decrease base flow in Torrance Creek, or other potential negative impacts to the NHS.
	R	Please refer to revised water balance calculations presented in the *Stantec (2022) Revised Water Balance Calculations in Response to First Submission Comments, Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario.* Pre- to Post-development infiltration volumes will be exceeded at the Site under the proposed post-development infiltration strategy (i.e., via proposed rooftop galleries and end of pipe infiltration) and, as such, reduction in groundwater inputs to Torrance Creek Swamp will not be impacted. Note that all infiltration occurring across the site that reaches the groundwater table flows towards Torrance Creek Swamp.
Additional comments on Hydrogeological Study provided on behalf of Scott Cousins, City of Guelph Hydrogeologist		
69.0	C	Section 6.1 – In previous sections, the author has stated that 80% of the site will be impervious under post-development conditions, however this section now says 39%. Please clarify as to what specifically was meant on page 5.3 and how it differs from the statement made in Section 6.1.
	R	The 80% value is somewhat misleading and should be disregarded, with the total area (hectares) expected to become impervious cover under the post-development condition being reported instead. As shown in Table 6 (Appendix B), approximately 10% of Sub-Area B will be converted to impervious surfaces (0.22 of 2.31 ha), with 65% of Sub-Area C (2.60 of 4.01 ha) being converted to impervious surfaces. Sub-Area A will remain unchanged (i.e., no impervious cover). Overall, 2.82 ha of 7.16 ha (39% of Total Site Area) will be converted to impervious surfaces under the post-development condition. 2) Note that the pre- and post-development water balance analysis has notably changed from the calculations presented in the Stantec (2019) *Hydrogeological Assessment* report. Please refer to the Stantec (2022) *Revised Water Balance Calculations in Response to First Submission Comments, Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario* for the updated analysis.
70.0	C	Section 6.1 – The author suggests that LID stormwater management could be potentially available, yet later in the section identifies the key constraint (high groundwater table) to implementation of these measures. Has there been a suggestion to increase the site grade in order to achieve the 1m separation between the bottom of the proposed LID measures and the high groundwater table?
	R	LID stormwater management features have been considered and implemented where feasible and where separation from the high groundwater table is achieved. The site has been raised where possible to further support this strategy but is somewhat limited based on grading restrictions along the perimeter of the site including road tie in elevations at Hutchison Road at the northwest corner of the site, achieving a low point to convey majors to the SWM Facility (SWMF) while maximum the Park Block and trail slopes within acceptable tolerances, and raising back up to match the future extension of Pool Street along the west side of the Site. All this while maintaining similar drainage patterns from existing to proposed conditions and well as working towards an overall earth cut/fill balance. Through these restrictions, raising the site has allowed for implementation of rooftop infiltration galleries as well as an infiltration gallery in the SWMF while maintaining separation from the high groundwater table.

#	C/R	Comment / Response
71.0	C	The author discusses that the wetland is not a notable groundwater recharge area yet suggests water from site be directed to the wetland after treatment (post-development). Has the water balance accounted for the loss in recharge function of the wetland if it is required to be altered as suggested?
	R	1) The wetland piece instrumented with the drive-point piezometer (i.e., DP1-17) (currently positioned in Sub-Area B) is to be removed post-development. In the statement that "water from site be directed to the wetland after treatment", Stantec is referring to the greater Torrance Creek Swamp located outside the western limits of the Site, which will not be disturbed post-development. The water balance calculations have accounted for the loss of groundwater recharge volumes for the entire Site, of which this wetland piece was included. The loss of groundwater recharge function provided by this wetland piece is expected to be replaced via the LID infiltration strategy implemented across the Site under the post-development condition. 2) Note that the pre- and post-development water balance analysis has notably changed from the calculations presented in the Stantec (2019) *Hydrogeological Assessment* report. Please refer to the Stantec (2022) *Revised Water Balance Calculations in Response to First Submission Comments, Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario* for the updated analysis.
72.0	C	There has been no discussion provided as it relates to the hydrologic function of the wetland. One mini-piezometer nest has aided in the interpretation of downward gradients present onsite, however the author has not accounted for a water balance of the wetland itself. Please provide this water balance in order to inform whether the wetland has the capacity to convey the proposed direction of storm water to the wetland.
	R	Please refer to response Comment 71 response. The wetland piece discussed will be removed post-development and will not be receiving post-development surface water flows from the Site. Please also refer to Comment #53 response regarding the capability of the greater PSW to receive post-development runoff volumes from the Site.

C.2 Engineering Comment Matrix

Stantec Consulting Ltd.
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220 Arkell Road, Guelph, Draft Plan of Subdivision Submission
D.P. 23T-19002, ZBA OZS19-017

Friday, March 31, 2023

Responses to First Submission Comments received from:

#	C/R	Comment / Response
	City of Guelph - First Submission, Comments dated December 2, 2020 from Jim Hall	
The following comments are provided based on the 1st submission for the above-noted application as it relates to the following document(s) received February 4, 2020: Plans • Draft Plan of Subdivision, prepared by Black, Shoemaker, Robinson and Donaldson Limited, Project No. 16-14-118-00-B, dated December 11, 2019		
Reports • Preliminary Servicing, Grading and Stormwater Management Report, prepared by Stantec Consulting Ltd., Project No. 161423338, dated May 28, 2019 • 2020 Arkell Road, Guelph, ON [Geotechnical Investigation Report], prepared by Stantec Consulting Ltd., Project No. 161423338.801, dated June 11, 2019 • Hydrogeological Assessment, prepared by Stantec Consulting Ltd., Project No. 161423338, dated May 28, 2019 • Transportation Impact Study, prepared by Paradigm Transportation Solutions Limited, Project No. 180099, dated April 2019		
General		
1.0	C	Some comments provided during pre-application discussions (approximately Dec. 2017 – Jan. 2019) remain outstanding, and do not appear to have been addressed in the application submission package. Please review these comments, and include relevant detail as part of the design detail provided in the next submission.
	R	Note the following summary of comments and responses to the email provided by Jim Hall on January 23, 2019
Email City staff have reviewed the resubmitted documents in support of the proposed temporary emergency access road south from the lands, through Block 20 (part of the Arkell Meadows subdivision) to Dawes Avenue. We want to thank you for the time taken to prepare the information, as it has helped us as we considered this request. Although we feel we don't have all of the information necessary to decide (see outstanding comments below), we recommend that you proceed with an application for Draft Plan of Subdivision, should that be the course of action desired by Carson Reid Homes. We strongly feel that, based on the comments we provided and the information you have provided to date, this is the best course of action that will help move this forward and put us in a position to give you a definitive answer. Some of the information we are looking for is better suited to the more detailed reports and plans that would typically accompany a draft plan application, and some of the discussions around the proposed temporary emergency access road would benefit from some of the higher-level review and discussions for the proposed subdivision. To that end, I have appended an updated version of the preliminary comments previously provided, updated to reflect the most recent submission. Please use these as the various documents and plans are prepared for the draft plan application. If you have any questions about the comments, please feel free to contact me directly.		
Following up on your resubmission dated November 6, 2018, City staff met to discuss the revised concept, and we offer the following for your future consideration as you prepare your application for Draft Plan of Subdivision: *The following comments, originally sent December 2017, remain in effect:*		
1.1	C	Staff scoped our review/discussion to just the temporary emergency road connection to Dawes Avenue and your proposal to use the existing City-owned Open Space Block fronting Dawes Avenue. We did not review the remainder of the plan, the remainder of the trail alignment, and don't feel it appropriate to respond to questions outside of this scope. Those items will need to be reviewed comprehensively with supporting impact assessment(s) as part of a complete submission package. Any comments provided outside of this scope are provided for your convenience, and are subject to further review during the application stage.
	R	Note, we are currently in the Application Stage now.

#	C/R	Comment / Response
1.2	C	Staff Support would increase if the road and grading was shifted to the east as much as possible, with leaving a 3 m buffer from lot 12 to the toe of the new slope. This allows the wetland/woodland buffer to be maximized while still considering a temporary road alignment. Please include the approved grading for the Open Space Block, and the adjacent lots of this subdivision, and design the grading/servicing so that the objectives of the adjacent subdivision are not disrupted, and the area (including the Open Space Block and the lands to the north) is adequately and appropriately designed. Please take special note that the current design shows the proposed temporary road crossing an infiltration gallery and related structures; this will have to be redesigned accordingly. Latest proposal does not appear to design for the objectives of the adjacent subdivision (infiltration requirements, drainage patterns, etc.). Additional details are required before staff can support the proposed temporary emergency access road.
	R	As shown on Figure 2 included in the May 2019 Preliminary Servicing Report and revised 2023 Report, the trail alignment was adjusted to the east such that the toe of slope/grading disturbance is 3 m from the Lot 12 property line. The original objective to the grading of the open space was to direct drainage from the front of the Block to the rear where the surface drainage contributed to a rear yard infiltration gallery. This drainage pattern has been preserved, including reorientating the infiltration gallery such to function in the same manner.
1.3	C	It should be noted that it is our expectation that the 10 m wide temporary road allowance would be restored to a 3m wide trail surface, at your client's sole expense, once the temporary access is no longer required. The 7 m restoration area should be planned on the west side and closer to the NHS and the restoration should include consideration for an alley of trees along the trail as well as other vegetation to stabilize, etc. Please include a restoration plan to show the ultimate state of these lands once the temporary emergency access has been removed. Keep City standards for pathways and tree planting in mind while completing this design, and ensure that the restoration plan provided for Block 20 should (at a minimum) reflect the street tree plan for Arkell Meadows Subdivision in terms of number and variety of deciduous/coniferous trees and shrubs. Note that preference is given to indigenous species.
	R	Detailed Restoration Plans to be provided during detail design and a condition of Draft Plan Approval.
1.4	C	The design must include provision for the extension of Dawes Avenue; please show the design under existing conditions (Dawes Ave. cul-de-sac) and with the extension in place. Please note the location of the existing fire hydrant, and the potential relocation of the hydrant when extending Dawes Avenue. This information has not been submitted to date; please include these details in the Draft Plan application package.
	R	Details showing the profile under interim conditions and ultimate conditions of the Dawes Ave extension has been illustrated in the May 2019 Preliminary Servicing Report and revised 2023 Report. These details are shown on Figures 2 and 3. The final placement for the relocation of the existing hydrant to be determined during detail design and coordinated with the adjacent development due to timing.
1.5	C	Given the area constraints, the existing and proposed grades, and the existing design within the 246 Arkell subdivision, please provide additional information on the proposed stormwater management for this area. Preliminary information has been provided, but further details are required before staff can support the proposed temporary emergency access road. Please provide these details in the Draft Plan application package.
	R	The SWM strategy for the subject area is outlined in the May 2019 Preliminary Servicing Report, as well as Revised 2023 Report and identified within proposed Catchment Area #208-1. Details outlining how drainage surface water is managed to the adjacent PSW is outlined in Section 5.6.3 of the aforementioned 2019 Report, now Section 5.7.5 in the 2023 Report.

#	C/R	Comment / Response
The following comments, originally sent July 2018, remain in effect:		
1.6	C	Currently the plan shows a storm sewer pipe located within the proposed park block and within the wetland buffer. All major servicing and utilities must be located outside of the park block and wetland buffer. (Although this comment is on an element outside of our current review scope, we felt it important to note, for your future subdivision design work.) Parks staff have reconfirmed that, in accordance with Section C (ii) of the Local Servicing Policy, the park block must be free and clear of all encumbrances, and Parks would not support including an easement within the park block.
	R	As shown on our Conceptual Servicing Plan C-100 included in our May 2019 Preliminary Servicing Report, the storm sewer has been positioned adjacent to Lot 29 and outside of the area identified for parkland use. The location of the SWM outlet features is a permitted use within the outer 15-30 m wetland buffer.
1.7	C	The proposed temporary access road should be located outside of the proposed neighborhood park block so as to not have any direct impact on construction timing of either the temporary road or park. To this end, please place the temporary emergency access road within a dedicated block, its width sized to accommodate the temporary road and offsets to adjacent private property (based on the current layout, the block would be a minimum of 13m wide). Resubmitted plans show this; comment remains as a reminder as you prepare the draft plan.
	R	The temporary road block has been revised to be 13 m wide as requested.
1.8	C	City standard fencing will be required adjacent to the proposed/existing private properties. Additional fencing will be required adjacent to the temporary emergency access road where the grade slopes away from the road greater than 7% (i.e.. where 3:1 terracing is currently proposed sloping away from the road surface). Details on the required fencing will be discussed at a later stage of your subdivision submission, however please note required fencing on the resubmitted concept plans. Further details of the required fencing will be discussed during engineering review of the application package.
	R	Fencing has been shown on the aforementioned reports figures and drawings. Details regarding the limits of fencing to be finalized during detail design and locations clarified in Draft Plan Conditions.
1.9	C	Note that the temporary access and trail alignment that extends beyond Block 20 must be reviewed comprehensively and supported by an Environmental Impact Study in the future (for 220 Arkell Rd subdivision). Note that the EIS must include a policy analysis to demonstrate conformity with Official Plan policies.
	R	Noted
1.10	C	All grading and other associated works must remain outside the 15m setback from the Provincially Significant Wetland. This must be demonstrated on the grading plan. The level of detail provided in the conceptual grading plan is insufficient to determine whether or not the proposed temporary access road can be constructed without impinging upon the 15m buffer. For example, at the northwest corner of Lot 20, it appears that grading is proposed right up to the 15m buffer and possibly extends into the 15m buffer. It is essential that adequate detail be provided to enable a proper assessment. If it is not possible to achieve the temporary access road outside of the 15m buffer, an Official Plan Amendment would be required.
	R	As outlined in the aforementioned report drawings and figures, the toe of slope proposed for the grading of the temporary access road is designed to match existing grade outside of the inner 15 m wetland setback.
1.11	C	Note that the temporary access and trail alignment that extends beyond Block 20 must be reviewed comprehensively and supported by an Environmental Impact Study in the future (for 220 Arkell Rd subdivision). Environmental planning staff emphasize that the proposed temporary access and trail alignment extending beyond Block 20 must be reviewed comprehensively and supported by an Environmental Impact Study as part of a future 220 Arkell Road subdivision application. At a cursory level, environmental planning staff are concerned with the extent of development and site alteration proposed within the minimum buffer of the Provincially Significant Wetland. Please review permitted use policies 4.1.2.1 and 4.1.3.4.6 in the Official Plan.

#	C/R	Comment / Response
	R	Noted.
The following additional comments are provided based on our review of the resubmitted material:		
1.12	C	Other Wetlands - City staff requested that the limit of the small wetland pocket located to the east of the existing driveway be shown on the plans (refer to Comment 4 of September 10, 2018 meeting notes). Please revise the plans to include this information
	R	The wetland previously situated east of the existing driveway was removed as part of the adjacent Dawes Ave development and was assessed as part of the field program. The GRCA approval excluded this feature as part of the wetland delineation and have since updated their online mapping to exclude this feature as a wetland; therefore, a boundary has not been applied to the current plans.
1.13	C	Future Road Connection to Dawes Avenue - Section B-B should include the Provincially Significant Wetland limit, minimum 30m buffer and 15m buffer to enable a preliminary assessment of potential environmental impacts.
	R	Section B-B included in the Stantec e-mail dated November 6, 2018 was showing the profile of the Storm Sewer outlet to the SWM Facility (SWMF) such to justify the easement width requirements and not relevant to the Future Draws Ave connection.
1.14	C	Changes to Water Balance and Wetland Hydrology - The response to storm water management comments raised by City staff (July 19, 2018) states that a runoff increase of 1 mm/year (4%) is anticipated (i.e. increased from 24 mm/year under current conditions to 25 mm/year under proposed conditions). Environmental planning staff note that the pre-development runoff rate was 17 mm/year. Therefore, a 47% increase in runoff from pre-development conditions is anticipated. Please provide an assessment of potential impacts to wetland hydrology. The response to stormwater management comments raised by City staff states that in the event of overflows from the Arkell Meadows Subdivision, a culvert under the temporary access road would convey water away from the existing subdivision and towards the wetland. Environmental planning are concerned that this may result in a negative impact to the natural heritage system and hydrologic function of the Provincially Significant Wetland. Additional information is required to enable a proper assessment.
	R	1) Refer to Comment No.1.5 response above (reverse culvert to control outlet flows to pre-development and promote ponding/infiltration). 2) As discussed in the *Stantec (2023) Revised Water Balance Calculations in Response to First Submission Comments Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario* , the annual pre- to post-development runoff volume directed to the Torrance Creek Swamp from the Site is projected to increase by 6,075 m^3. The increase in post-development runoff discharged to the Torrance Creek Swamp is expected to raise surface water ponding within the wetland by no more than 0.005 m (5 mm) for a given month. This ponding is also expected to be temporary (i.e., not cumulative from month to month) as the Torrance Creek Swamp is identified to be a groundwater recharge feature (i.e., the runoff entering the wetland is expected to be infiltrated while present within this natural heritage feature). 3) Additional analysis is provided in the EIS Addendum that includes an assessment of wetland sensitivity and a detailed impact analysis.
1.15	C	The design and construction of the trail shall meet the accessibility criteria outlined in the City's Facility Accessibility Design Manual (FADM). The criteria includes maximum running slope on trails to be 5% and the maximum cross slope on trails to be 2%. The trails need to be designed to include minimum 0.6 m. wide mowed grass strips, having a cross slope of 2% away from the trail, longitudinally along both sides of the trail surface. Section 4.5.2 OUTDOOR RECREATIONAL FACILITIES of the FADM outlines the accessibility guidelines for trails. This document can be viewed at the following link: http://guelph.ca/wpcontent/uploads/Guelph_FADM_2015-06-30-FINAL.pdf
	R	The Temporary Road has been designed at slope less than 5%, with a 2% cross slope with 0.6 m mow strip, as shown on the aforementioned plans. Details outlining of the final access and trail grading to be completed during detail design and a condition of Draft Plan Approval.

#	C/R	Comment / Response
1.16	C	Conceptual Park Block Grading - Currently park block grades include slopes ranging between 3.6% – 4.9%. City's Official Plan Policy 7.3.2.4 (v) outlines a criterion that the neighborhood park site contain sufficient table land (approximately 80 per cent of site). Park block layout and grading would need to be revised to be consistent with the policy 7.3.2.4 (v) of the Official Plan regarding table land for a neighborhood park to be 80% of the site and the local service policy as mentioned above.
	R	As shown on the plans included in the aforementioned report, the Park grading has been revised to be less than 3%.
2.0	C	In several sections of the report there are erroneous descriptions of the proposed connection between Street A and Dawes Avenue (through the walkway block and Block 20 in Arkell Meadows Subdivision. Please update the descriptions and assumptions cited: the connection between Street A and Dawes Avenue is not intended nor shall be used as interim, construction or maintenance access to the site from Dawes Avenue. Discussion between the City and the Applicant prior to the formal submission of this application discussed (but did not confirm or approve) use of this area for a temporary emergency access route and walkway block, along with a portion of it as maintenance access to the SWMF, with restoration to a standard walkway block once the eastern road access is connected.
	R	References to the access have been clarified to maintain the terminology as "Temporary Emergency Access Road".
Transportation Planning		
3.0	C	Base year traffic volumes: As per City's Traffic Impact Study guidelines, the 2016 traffic counts used in the TIS study are considered outdated as they were collected over two years ago. City has 2018 traffic counts at the intersection of Arkell Road and Victoria Road that could be used for the base year scenario. Other intersections should be adjusted and smoothed based on these 2018 counts. Please contact City staff (Munshif Muccaram) for details on how to acquire these 2018 counts.
	R	Pre-consultation request submitted to the City on April 18, 2018, suggested the use of 2016 counts for City's Approval. There was no direction against using 2016 counts or to conduct new traffic counts. The 2016 counts were used for consistency, because these counts had been collected at the same time (Oct 5/6, 2016) for all the study area intersections; and they were also used in the background development traffic studies included in this subject (220 Arkell) TIS. Also, Paradigm conducted 2018 (April) traffic counts only at Arkell Road & Victoria Road for a different Client and TIS report. A comparison of 2016 and 2018 Counts at Victoria/Arkell indicates the respective TMCs are very close, with 2016 counts marginally higher for a number of TMCs.
4.0	C	Victoria Park Village Road: This proposed east-west local road is not part of the area road network and it should not be assumed in the study. The subject development could access Victoria Road via Decorso Drive.
	R	What is identified in the TIS as Victoria Park Village Road is in fact Decorso Drive, which is the access connection to Victoria Road for the Victoria Park Village (VPV) Development (former Victoria Park West Golf Club). As can be seen in traffic figures in Section 3 and Section 5, development traffic from both VPV and the subject development (220 Arkell Rd) are assigned to the same Victoria Road connection (i.e. Decorso Drive).
5.0	C	Road widening on Victoria Road from 3 lanes to 4 lanes between MacAlister Boulevard and Clair Road: The TIS study indicates this road widening was identified in the 2018 "Guelph Development Charges Background Study" which is an incorrect interpretation. City has not allocated any capital money for the road widening for this segment of Victoria Road before the year 2031. Victoria Road between MacAlister Boulevard and Clair Road should be assumed to have one northbound through lane under the 2031 future scenario. The traffic simulation and signal warrant analysis must be adjusted accordingly.
	R	DC misinterpretation error is noted and regretted.

#	C/R	Comment / Response
6.0	C	EB dual left-turn lanes at the intersection of Arkell Road and Victoria Road: Transportation Services staff do not support the dual eastbound left-turn lanes at this intersection for the following reasons.
		a) There is only one receiving lane on Victoria Road in the northbound direction for all future scenarios.
		b) The dual eastbound left-turning traffic would require a fully protected signal phasing plan in the eastbound direction on Arkell Road. Moreover, the increased walking distance on Arkell Road as a result of widened pavement would require longer walk time for pedestrians to cross the west leg. These adjustments to the signal timing plan would result in less green time being allocated for traffic flows on Victoria Road, thus impeding the mobility on Victoria Road. The intersection would experience prolonged delays and traffic queues in the north-south direction on Victoria Road.
		c) The increased walk distance on Arkell Road is a safety concerns for pedestrians (especially for students) who want to reach the commercial plaza and bus stops on the south side of Arkell Road.
		d) The TIS recommends a raised center median on Arkell Road to delineate the dual left-turn lanes. This median would force the existing full access to become right- in/right-out only for the commercial plaza.
		e) The road geometry would have to be altered on the east leg of the intersection so as to align with the dual left-turn lane configuration. Road widening would be required from within the Township.
	R	The improvements identified in Section 4 of the TIS for the Victoria/Arkell intersection are suggestions for the City's consideration to address operational issues under existing and future background traffic conditions, independent of the subject development. Based on its own traffic impacts (Section 5 of the TIS), the subject development does not require any external road system modifications.
7.0	C	New traffic signal lights at Decorso Drive and Victoria Road: The signalization at this intersection will be determined upon the full build out of developments in the surrounding area.
	R	Noted.
8.0	C	New traffic lights at the high school driveway and Victoria Road: The signalization at this intersection is required as per the City’s letter to the same consultant with regard to the high school development, dated December 8, 2017.
	R	Noted.
9.0	C	New traffic lights at Colonial Drive and Arkell Road: The signalization at this intersection will be determined upon the full build out of developments in the surrounding area.
	R	Noted.
10.0	C	Synchro simulation: Synchro simulation was carried out with 7 seconds as the minimum green time for Arkell Road in its through and right movement. However, the side street minimum green should be as 10 seconds as per city’s signal timing plan.
	R	Noted.

#	C/R	Comment / Response
Sustainable Transportation		
11.0	C	To increase the pedestrian usability of this subdivision, please consider a 20m ROW with sidewalks on both sides of the street.
	R	Current standard has been proposed and continuation of existing road structure from development lands to the north and matches existing Draft Plan approved road stub. The proposed 17.0 m ROW further minimizes the impact to the Ecological linkage by 3 m vs the 20 m ROW suggested.
12.0	C	Please explore options for connecting the future walkway to the private laneway in Block 32, and for providing a non-vehicle connection from Block 32 to the future ROW to the east.
	R	There is a 3 m grade change from the walkway to the anticipated road network within Block 32. To create a trail connection the slope would be too steep. Preference is to avoid perimeter walkway connections to prevent neighborhood short cutting through private condo developments. Site layout can be updated to support a possible road connection to the east should a future road be extended. It is suggested further details of this Future Multi-Family Block be considered during the Site Plan process.
13.0	C	Ensure Active Transportation connections to adjacent developments are maintained: this can be shown as part of the Draft Plan details with dotted lines and annotations noting proposed and future connections. Additional details can be provided through detail design of the subdivision and during future site plan applications.
	R	Active Transportation connections is not typically shown on Draft Plans. This linework has been added to our Conceptual Lot Grading Plan.
Environmental Assessment		
14.0	C	The qualified person (QP) must submit a “Reliance Letter” to indicate that despite any limitations or qualifications included in the reports, the City is authorized to rely on all information and opinion provided in the reports submitted to the City.
	R	Updated Phase I and II Reports along with a reliance letter has been provided with this submission for your use.
Source Water Protection		
15.0	C	The property is located in a WHPA-B with a vulnerability score of 8. The property is not located in an Issue Contributing Area. Please contact the Project Coordinator to complete a Policy Applicability Review at 226-820-3520 or abby.spielmacher@guelph.ca (http://guelph.ca/wp-content/uploads/SWP_Section59ReviewRequest.docx)
	R	Note that Section 6.4 of Stantec's (2019) *Hydrogeological Assessment* report provides a discussion of Source Water Protection policies as it pertains to the Site. A Section 59 Review has been completed and will be submitted to the Project Coordinator along with this submission to the City.
16.0	C	Note: Ensure that any private water supply or monitoring wells that are no longer in use are abandoned in accordance with O. Reg. 903. In accordance with Grand River Source Protection Policy CG-CW-37, the applicant will need to indicate what DNAPL (if any) or other potentially significant drinking water threats will be stored and/or handled on the property. A Risk Management Plan may need to be developed.
	R	All private water supply and monitoring wells will be decommissioned prior to area grading in accordance with Ministry requirements.

#	C/R	Comment / Response
Waste Water Operations		
17.0	C	Due to high ground water elevation, please wrap all MH's in water proof membrane.
	R	Item to be addressed as part of detailed design, please provide spec to follow or reference in Development Manual. Note most structures are designed with a gasket seal
18.0	C	Add property line MHs to Block 32 and ensure gravity flows to proposed City sewers.
	R	Additional property line MH's have been added for Block 32 on the conceptual plans and will be identified during detail design.
Functional Servicing and Stormwater Management Report		
Water Servicing		
19.0	C	The current water servicing design calls for a single-feed watermain to service the entire subdivision (currently 91 units) until such time as the adjacent lands are developed and watermain looping is available.
	R	Correct. Based on our current analysis
20.0	C	Please note that, based on our review of the city's existing watermain modeling, there is potential for marginal water supply pressures in proposed development under certain conditions such as peak hour demand scenario at locations with elevation greater than 346 m height above mean sea level (AMSL) and average day demand (ADD) scenario at locations with elevation greater than 339 m height AMSL in the existing water system.
	R	The proposed development grades range up to +/-339.8. Concerns to be reviewed with City as this will result in a marginal shortage in psi, (0.7m=1.0 psi) during the average day demand.
21.0	C	Drawing C-100 does not show storm sewers servicing Lots 16-18 and 29-31: what is the servicing strategy for these lots?
	R	As discussed with the City storm service laterals are not proposed similar to development strategy to the north such to avoid filling the site an additional 1.5 m to provide a gravity outlet. Sump pumps will discharge to grade. Section 6.0 of the Revised FSR has been updated to clarify this.
22.0	C	Storm sewers do not have the required depth of cover, as per the DEM. Please update the design.
	R	See response to Comment #21 above.
Stormwater Management		
23.0	C	It appears that the Torrance Creek Sub watershed Study criteria are not being met under the current design. The following are some items noted in the TCSWS:
		a) The site is located within sub watershed drainage areas 105, 106 and 110, in Zone 2.
	R	Agreed, this is noted in the report.
	C	b) An infiltration target of 150 to 200 mm/year is suggested for Zone 2.
	R	Water balance calculations presented in the *Revised Water Balance Calculations in Response to First Submission Comments, Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario* (Stantec, 2023) indicated that the annual pre-development infiltration volume occurring at the Site is 15,433 m^3, for an equivalent recharge rate of 221 mm/year.
	C	c) Existing infiltration levels are to be maintained as part of a stormwater management plan for future development to protect groundwater resources and maintain current hydrologic functions.

#	C/R	Comment / Response
	R	Existing infiltration levels are exceeded on-Site through proposed rooftop galleries and end of pipe infiltration.
	C	d) Preliminary infiltration targets are summarized in Table 6.2.3 of the sub watershed study. These targets should be refined during the development of stormwater management plans through infiltration testing and analysis. Arkell Road to Torrance Creek = 150 to 200 mm/year.
	R	This target has been refined as per the pre-development monthly water balance (*refer to Stantec's (2023) Revised Water Balance Calculations in Response to First Submission Comments, Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario*), which resulted in a 221 mm/yr target for the catchments contributing to the Torrance Creek Swamp.
	C	e) Peak flow control for all design events (post to pre, 2 to 100 year events)
	R	As per Table 5 in the FSR, quantity control is provided for the 2,5, and 100yr events. Any events between (i.e. 10, 25, and 50) are also assumed to meet the target.
	C	f) 24 hour extended detention for 25 mm rainfall event, if necessary (given infiltration levels and water quality requirements)
	R	25 mm, 4 hr Chicago Event has been used to size infiltration faculties as well as confirm drawdown for erosion control requirements. From the latest analysis, the 25 mm event drawdown time is ~30 hrs; therefore meeting the >24 hour requirement. This assumes no infiltration, so in reality most or all of the 25 mm event runoff will be infiltrated.
	C	g) Catchment 106 – flow controlled to pre-development levels for 1:100 – 780m3/ha (volume control)
	R	This value is from the controlled scenario in the original TCSS, which also states that these values "must be confirmed when the actual design procedures are conducted". The design of the proposed SWM pond has been performed to meet the target of controlling flow to pre-development levels. Back calculating for this unit volume control value using the active storage volume during the 100-yr storm divided by the drainage area leads to 825 m³/ha, which is in the same range as the 780 m³/ha outlined in the subwatershed study.
	C	h) Catchment 110 – flow controlled to pre-development levels for 1:100 – 730m3/ha (volume control)
	R	See response to comment above.
	C	i) New development should provide controls against temperature increases.
	R	Infiltration measures on site will reduce temperature as significant portion of runoff to be infiltrated. Thermal impacts are driven by small events (<10mm) and therefore infiltrating the 25mm event (larger volume) will reduce the downstream impact. FSR text has been updated to reflect this.
24.0	C	The dry SWMF is not designed as per DEM or MECP design standards. Please review the design and update accordingly. Some of the design elements that need to be reviewed include (but are not limited to):
	C	a) SWMF design as proposed appears to be a cross between a dry pond and an infiltration basin. The pond should be designed as an infiltration basin (if soil and groundwater conditions permit), or the detention and infiltration elements should be separated.
	R	SWMF has been updated to meet design requirements for a dry SWMF.
	C	b) Report generally lacks the level of SWMF design detail expected at this stage.
	R	Additional details on the SWMF design have been included in the updated FSR and are provided on a stand alone Drawing No. C-410.
	C	c) Forebay design inconsistent with MECP design guidance in Sections 4.62 and 4.65 (not separated from detention cell, too shallow), and design details do not appear to be included in the report (settling, dispersion, width, etc.)
	R	Forebay sizing details have been included in latest submission to meet MECP guidelines.

#	C/R	Comment / Response
	C	d) Forbay bottom elevation is below the indicated seasonal high groundwater table: does the forbay require a clay lining, and would there be buoyancy concerns?
	R	SWMF has been raised and the new forebay bottom is now above the high groundwater table. Provision for a clay liner has been identified for the forebay. The thickness of the liner will be determined during detail design based on soils available and to address buoyancy concerns.
	C	e) Very long drain-down times are anticipated: what is the impact when back-to-back storm events occur?
	R	SWMF design has been updated with drawdown times now more reasonable. Refer to Revised FSR.
25.0	C	The water balance shows an infiltration deficit and a runoff exceedance, but there does not appear to be any discussion of the impacts due to less infiltration (and timing of that infiltration due to the high groundwater), or the capacity of the receiving system to handle the extra runoff without negative effects.
	R	The infiltration strategy and water balance has been updated. There is now an infiltration surplus through rooftop infiltration as well as an end of pipe infiltration gallery. Refer to Stantec's (2023) updated *FSR* and *Revised Water Balance Calculations in Response to First Submission Comments Draft Plan Application - 220 Arkell Road, City of Guelph, Ontario* memo for details on water balance and infiltration strategy, including discussion on reduced post-development runoff surplus to the wetland.
26.0	C	The SWMF outlet design does not appear to have taken into account the type of receiver: as the receiving system is a swamp, and not a creek, drain or other similar system, special care is needed in the design of outflow. See additional comments from Environmental Planning on this matter. Coordination is required between the civil and environmental consultants to ensure the SWMF (and SWM throughout the site) are designed with the receiving system in mind.
	R	Most flows (runoff events up to and including the 25mm event) will be infiltrated when the infiltration gallery is open (non-winter months) and therefore little runoff will be anticipated during these times. Additionally, a surface spreader swale is proposed at the outlet of the SWMF to distribute the runoff in a sheet flow pattern to mimic existing conditions and reduce concentrated flow to the wetland that can cause scour and create channelized flow.
27.0	C	The majority of the intended infiltration for this site has yet to be determined feasible (currently identified in Section 5.7 as to be detailed later). Additional development of the overall site infiltration design and feasibility is required at this time, to ensure SWM criteria can be met. For example, proposed infiltration rates appear to be based on infiltration galleries as shown (in every lot and in many locations within Block 32), however some of these areas will not have adequate separation to the ground water.
	R	Lot Infiltration galleries have all been checked and grades raised where required to ensure 1m separation to groundwater. Details are included in the latest FSR and Conceptual Grading Plan C-400.
28.0	C	The stated SWM criteria includes assessing thermal impacts, but this does not appear to have been considered as part of this study. This will need to be considered now, as mitigating thermal impacts may require SWMF design changes and/or additional lands to accommodate additional infrastructure.
	R	Wording has been added to the FSR. Thermal impacts will be mitigated through the EOP infiltration.
29.0	C	In Section 5.5.1.2, in the description of Catchment 206, it is written “This area accounts for the 10 m wide access to the site from Dawes Avenue, which will eventually be reduced to just a 3 m wide pathway.” Please update the language used here, as the current language could imply more than is intended. We suggest something along the lines of “This area accounts for a portion of the walkway block between Street A and Dawes Avenue.”
	R	Report text updated.

#	C/R	Comment / Response
30.0	C	Section 5.6.1, please clarify the intended SWMF design, as the 2nd paragraph indicates the forebay is designed to achieve enhanced water quality targets, and the 4th paragraph indicates the SWMF will only achieve 60% TSS removal.
	R	SWMF Design and Report has been updated. Dry SWMF will achieve 60% TSS removal as per MECP Guidance.
31.0	C	Section 5.6.1: OGS design discussion indicates that the OGS will be designed to achieve 60% TSS removal. Please review the OGS selection and design to ensure the maximum possible TSS removal based on that technology under ETS testing protocols and anticipated surface loading for the 25mm storm, and apply the anticipated TSS removal or 50%, whichever is lower.
	R	OGS design has been updated to provide 70% TTS removal per ETV particle distribution and testing; however, the lower 50% removal rate was used in overall determination.
32.0	C	To assist with the review, please include a table of inlet/outlet flow rates at key transition points in the SWMF design under various storms. For example, flow at inlet to OGS, inlet of forebay, inlet to detention pond, inlet and outlet of the orifice (outlet of detention pond), at outlet of overflow weir, etc.
	R	Flow has been provided into and out of the SWMF for the various design storms in the FSR, with more detailed flows present in the modelling files included in the appended material. The flow into the forebay and into the main pond will be the same. Flow through the OGS will be the same as flow into the SWMF for up to the 5-yr event, while all storms greater than the storm sewer capacity will flow into the forebay/SWMF via overland flow.
33.0	C	Please add the 25mm storm to Table 5.
	R	25 mm event has been added to Analysis and Report.
34.0	C	Table 5, line item 1 shows a footnote, but this footnote is not found in the report.
	R	The footnote label is shown as an error, there should be no footnote. Report updated.
35.0	C	In Section 5.6.3 and on Figure 10, it is suggested that there is an existing culvert along the rear property line of Block 20, Arkell Meadows Subdivision, with a reverse slope, and the subsequent drainage design for this area is based on this premise. Our records show a CB in this location with a CB lead along the rear property line to infiltration galleries. Please verify. Additional detail is needed for this area, including additional detail on the servicing and grading plans.
	R	Previously noted as Figure 10, now Figure 9 and the remaining plans have been updated to reflect only one proposed culvert to convey drainage east of the proposed Temporary Access to the wetland to the west. The inverts of this culvert remain the same such to promote ponding above the infiltration CB within Block 20 of the adjacent development, but allowing an opportunity to spill to the wetland as required. It was confirmed that there is no existing culvert in this location.
36.0	C	Section 5.7.3: why was a 10mm storm event chosen for extended detention and infiltration? As noted above, Torrance Creek Sub watershed Study criteria identify minimum infiltration targets, and also specifies maintaining pre-development infiltration rates, plus the extended detention of the 25mm storm event.
	R	The 10 mm event was previously used for infiltration sizing in the EOP facility and thermal mitigation. The design has since been updated to use the 25 mm event to design infiltration as well as erosion control (extended detention drawdown).

#	C/R	Comment / Response
37.0	C	In-situ infiltration testing is required, as per the DEM. Infiltration rates cannot be determined based on laboratory or particle size distribution results. Please perform in- situ testing as per the DEM and update the findings accordingly.
	R	In-situ infiltration testing is anticipated to be performed at design depth at the infiltration gallery locations to confirm infiltration rates during detail design. Note that in-situ infiltration testing of surficial soils (~0.55 m BGS) completed near MW101-22, MW102-22, MW103-22, MW104-22, MW105-22, and MW106-22 was completed in May 2022 and noted in the water balance assessment to justify our proposed infiltration strategy.
Drawing C-400 Conceptual Grading Plan		
38.0	C	Is a culvert needed under the pathway at the northwest side of the SWMF? Drainage arrows and information in the report indicate the area north of the pond drains to the west, but the conceptual grading information indicates it will not get there, but will spill into the lots to the north.
	R	Culvert and drainage slopes added to clarify drainage pattern
39.0	C	Please label the slope within the SWMF differently than the other 3:1 indicated slopes (based on other submitted information indicating the SWMF slope sides are shallower).
	R	Pond sloping has been adjusted per City of Guelph DEM, labels provided on Grading Plan
40.0	C	Please note that the combined maintenance access and public pathway must be design as per the current DEM; please update the design accordingly
	R	The maintenance access / public pathway has been adjusted to provide 6:1 slope on both sides of the pathway and 0.6 m mow strip per the DEM
41.0	C	Report and plans show the majority of Block 33 draining to the northeast, however the conceptual servicing and grading plans show this block has no drainage outlet. How is this drainage being managed?
	R	Future outlet configuration has been added.
Hydrogeological Assessment		
42.0	C	Engineering echoes comments provided by Environmental Planning for this report.
	R	Noted.
Geotechnical Investigation		
43.0	C	Groundwater levels were monitored in 2017 and 2018; please include an update to at least December 2020 as part of the next submission.
	R	Groundwater level monitoring data is only available for BH02-17 and BH04-17 from April 13, 2017 to May 9, 2018 as presented in the Hydrogeological Assessment report (dated May 28, 2019). For BH01-17 and BH03-17, groundwater level monitoring data is available up to April 10, 2019. However, the data collected to date covers two spring freshet periods at BH02-17 and BH04-17 (i.e., 2017 and 2018), and three spring freshet periods at BH01-17 and BH03-17 (2017, 2018, and 2019). We also note additional monitoring wells were installed in May 2022 to support our Water Balance assessment complete with updated hydrographs. As such, Stantec is confident that the high groundwater table condition has been captured / established at the Site for detail design purposes.

C.3 Parks and Recreation Comment Matrix

Stantec Consulting Ltd.
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

220 Arkell Road, Guelph, Draft Plan of Subdivision Submission
D.P. 23T-19002, ZBA OZS19-017

Thursday, March 16, 2023

Responses to First Submission Comments received from:

#	C/R	Comment / Response
		City of Guelph - First Submission, Comments dated August 19, 2020 from Jyoit Pathak **Parks and Recreation**
Parks and Open Space Planning has reviewed the following documents submitted in support of the above noted proposed Draft Plan of Subdivision circulated on February 4, 2020		
• Notice of Complete Application dated February 4, 2020, • Proposed Draft Plan of Subdivision dated December 11, 2019 • Environmental Impact Study dated August 28, 2019, • Tree Preservation Plan dated May 28, 2019 • Preliminary Servicing, Grading and Stormwater Management Report dated May 28, 2019, and offer the following comments:		
Site Location		
1.0	C	The development site is located in southeast Guelph on Arkell Road between Victoria Road South and Gordon Street, south of the Victoria Park Village development currently under construction, north of the recently constructed 246 Arkell Road subdivision, east of the Torrance Creek Swamp Provincially Significant Wetland and west of active agricultural lands. The subject property is approximately 7.16 ha (17.69 acres) in area.
	R	Noted
Proposed Draft Plan of Subdivision:		
Parkland Dedication		
Parkland dedication is required for the proposed subdivision according to the Official Plan Policy 7.3.5.1. The OP policy states the following:		
2.0	C	The City will require parkland dedication as a condition of development, consent or subdivision proposals in an amount up to: ii) 5% of the land or one hectare for each 300 dwelling units for residential purposes
	R	Parkland dedication is provided based on 5% of the land included in the subdivision, exclusive of natural heritage features such as open space and ecological linkages that are to be conveyed to the City for conservation purposes. It has also been agreed to by the City staff that the driveway providing a walkway connection between Dawes Avenue and Arkell Road will be conveyed to the City and will not be included in the calculation for parkland dedication. As a result of Bill 23, the alternative rate for parkland dedication is now 1 ha/600 units. Since the City will chose to implement the greater of the two calculations, the parkland required for this subdivision application is 0.22 ha based on a development area of 4.41 ha.

#	C/R	Comment / Response
3.0	C	The current draft plan of proposed subdivision includes an area of 7.015 hectares and the proposal includes development of 31 single-detached houses and 60 cluster town homes. In accordance with the Official Plan policy 7.3.5.1 a park block of 0.35 ha is required. The proposed draft plan includes a park block 36 of 0.313 ha and the proposal to restore part of the adjacent emergency access/ walkway block as sodded area to be added to the park block for park use. The amount of parkland dedication, including park block 36 and the future 4.0 metre wide block of the block 35 provided on the proposed Draft Plan of Subdivision is satisfactory to Open Space Planning.
	R	The staff comment that this subdivision requires a park land dedication of 0.35 hectares of land is incorrect. The subject lands includes 7.151 hectares of lands of which Block 37, the Open Space and associated buffers, includes 1.435 hectares of land and Blocks 32 & 33, the Ecological Linkage, includes 1.305 hectares of land. According to the City's Parkland Dedication By-law (2019) - 20366 as amended by By-law (2019)-20380, By-Law (2020)-20531 and By-Law (2021)-20573; the definition of "land" specifically excludes any hazard lands, natural heritage features, or ecological buffers identified in the City's Official Plan, an approved Secondary Plan, or through an environmental impact study accepted by the City. Blocks 32, 33 and 37 are identified as Natural Heritage Features in the City's Official Plan as well as by an Environmental Impact Study. In addition, the by-law defines "development" as the construction, erection or placing of one or more buildings on land or the making of an addition or alteration to a building that has the effect of substantially increasing the size or usability thereof by increasing the Gross Floor Area of the building by forty-percent (40%) or more, the addition of one or more new Dwelling Unit(s), or a conversion to a different use. Blocks 32, 33 and 37 do not meet the definition of development. With this information, the calculations of the area required for parkland dedication must exclude Blocks 32, 33 and 37 from the calculation. On this basis, the area to be used when calculating the 5% land dedication is 4.41 hectares. The parkland required for this project therefore is 0.22 hectares as noted in Response #2 above.
Park Block Frontage:		
4.0	C	The current draft plan of proposed subdivision has identified approximately 50.49 meters of Lot Frontage for a 0.313 ha park block. Open Space Planning requires a minimum of 50 meters or 1 metre of frontage for every 100 square meters of park area whichever is greater as identified in Section 9.2 of the Zoning Bylaw. The amount of proposed Lot Frontage of 50.49 meters is satisfactory to Open Space Planning.
	R	Note the revised Draft Plan Shows 50 m of linear frontage.
Park Block Location:		
The Draft plan of subdivision identifies a neighborhood park block location adjacent to a stormwater management pond and an emergency access/walkway block. According to the Official Plan policy 7.3.2.4, following criteria has been considered in the provision of the neighborhood park:		
5.0	C	1.0 - that the site is located within a five to ten-minute walk from the residential area served (service radius of about 500 meters) and is unobstructed by major barriers;
	R	Noted
6.0	C	2.0 - that the site contains adequate street frontage for visibility and safety;
	R	Noted
7.0	C	3.0 - that the site is linked to the trail network;
	R	Noted
8.0	C	4.0 - that the site contains enough table land (approximately 80 percent of site) and is well drained;
	R	Noted
The proposed park block location is currently satisfactory to Open Space Planning and meets all the above location objectives.		

#	C/R	Comment / Response
Basic Park Development:		
The developer will be responsible for the Basic park development. The basic park development will include clearing, grubbing, site grading, storm water drainage, site servicing, topsoil and sodding of the Park block. The costs of the following items shall be direct developer responsibilities as a local service: Base parkland development of lands conveyed to the City in connection with development including, but not limited to, the following: •clearing and grubbing; •topsoil or any fill or soils shall not be stockpiled on parkland; •parkland shall be free of any contaminated soil or subsoil; •servicing – water, hydro, stormwater, sanitary, electrical, catch basins as per City's requirements. rough grading (pre-grading) and the supply of topsoil to the required depth as per City's requirements; •Seek City approval of the structural fill material if park requires filling. •parkland shall not be mined for engineering fill and replaced with fill or topsoil; •parkland shall be conveyed free and clear of all encumbrances; all parks are to be developed to the locally accepted "basic park development" standard which includes all aspects up to fine grade, topsoil and sod; which is to be maintained up to park acceptance. •The park block shall be graded to meet approved parkland grade, including any associated infrastructure requirements (retaining walls, drainage, etc.) and sodded to minimize erosion and dust. •Temporary fencing may also be required where there is no permanent fence to prevent illegal dumping; temporary park sign advising future residents that the site is a future park. Perimeter fencing of parkland to the City's standard located on the public property side of the property line adjacent land uses (residential or non- residential) as required by the City, or other approval authority.		
Trail Network:		
The Official Plan – Schedule 8 'Trail Network' includes a proposed off-road secondary trail route along eastern edge of the Torrance Creek provincially significant wetlands through the subject property that connects to the Victoria Park Village subdivision to the north and Arkell Road to the south.		
9.0	C	The proposed alignment for the trail connection included on the Draft Plan subdivision from the northern property line through the stormwater management block where it meets the proposed emergency access is satisfactory, however it would need to be refined further to ensure the trail layout and design meets City's current standards.
	R	Noted
10.0	C	The proposed trail within the stormwater management block #37 needs to be modified to meet City's current standards. Revise the trail alignment on Draft plan of subdivision, Grading and Drainage plans and other plans as applicable to demonstrate that the trail can be built to the current City standards as follows: The trail within the stormwater management pond to be minimum 3 metre wide with asphalt surfacing.
	R	A 3.0 m wide asphalt trail has been proposed and enlarged to 4.0 m wide within the SWM Block where it acts as a maintenance access for the facility.
11.0	C	The design and construction of the trail shall meet the accessibility criteria outlined in the City's Facility Accessibility Design Manual (FADM). The criteria include maximum running slope on trails to be 5% and the maximum cross slope on trails to be 2%, provision of rest areas at regular intervals, information and directional signage etc. Section 4.5.2 OUTDOOR RECREATIONAL FACILITIES of the FADM outlines the accessibility guidelines for trails. This document can be viewed at the following link: http://guelph.ca/wpcontent/uploads/Guelph_FADM_2015-06-30-FINAL.pdf
	R	Noted
12.0	C	Provide minimum 0.6 metre wide mowed grass strips longitudinally along both sides of the trail surface at a cross slope of 2% away from the trail.
	R	The trail layout and grade has respected the City criteria.

#	C/R	Comment / Response
13.0	C	Provide sodded drainage swales and culverts at appropriate locations if the adjacent ground is higher to the trail surfacing levels
	R	Swales and culverts have been implemented as required.
14.0	C	Based on the location of the trails within corridors between wetlands and storm water management facilities it would be advisable to implement the trails at the same time as other area features (storm water management areas, planting, demarcation, etc.). This would consolidate timing of construction activity close to sensitive habitats and avoid re-disturbance of regenerating buffer areas. It would also avoid home buyer concerns and related further delay in trail installation typically associated with later trail development.
	R	Noted
15.0	C	Hazard tree removal near trails, must be reviewed on site and approved by City prior to implementation. Parks and Open Space Planning recommends Developer build trail connection from the northern property line to the temporary emergency access road and reimbursing the cost of trail construction to the Developer upon acceptance of the completed trail.
	R	Noted
Open Space Works and Restoration:		
16.0	C	Provide planting to enhance ecological buffers and wildlife corridors and compensation for removed trees, etc. and detailed planting plans will be provided with the Environmental Implementation Report. Provide seeding to restore graded areas within the open space
	R	Noted
Environmental Implementation Report:		
17.0	C	An environmental implementation report (EIR) will be required to address the recommendations provided through the final approved Environmental Impact Study including Open Space Works and restoration, detailed landscape plans (by an accredited landscape architect); detailed design and mitigation plans to support the trail and detailed trail design. The EIR will address the recommendations related to trail system, stormwater management area and natural open space system, including detail design of the trail system; preparation of Landscape Plans and details to address demarcation, removal of hazard trees along the trail system and residential properties; clean-up of debris and waste; restoration; compensation and enhancement planting for buffers; invasive species management; design of educational/ interpretive and stewardship materials/ signage. Detailed trail layout, grading and drainage plans showing trail design details such as signage, trail gates, structures, etc. will be provided in the Environmental Implementation Report consistent with City of Guelph's current trail standards. The trail design will be consistent with Guelph Trail Master Plan (GTMP) standards as appropriate to the site conditions and other City Guidelines i.e. Facility Accessibility Design Manual and Engineering Development Manual where applicable. The trail plan, design and construction will comply with all relevant regulations applicable to trail management made under the Accessibility for Ontarians with Disabilities Act.
	R	Noted
Emergency Access / Walkway Block:		
18.0	C	the developer would be responsible for restoration of the emergency access to the 6 metre wide permanent walkway block and 4 metre wide block as parkland
	R	Noted

#	C/R	Comment / Response
Open Space Dedication:		
19.0	C	Parks and Open Space Planning requires conveyance of natural open space Block 38 to City.
	R	Noted
Tree Preservation and Removal of Invasive Species and Hazard Trees:		
20.0	C	Schedule removal of the common buckthorn within the trail corridor prior to trail construction. A review of hazard trees will be conducted at the time of vegetation removal by a qualified arborist. Identify all dead and hazardous trees along the trail route in consultation with Parks staff for removal prior to start of trail construction.
	R	Noted
Environmental Education:		
21.0	C	The environmental education signage is proposed to be provided along the trail in the subdivision to provide resident education on the area's environmental features and address the common resident impact items including dumping of yard waste, encroachments, pet waste, etc. The signage will be designed to meet City's accessibility guidelines and the details of the signage will be provided in the EIR- trail and landscape plans.
	R	Noted
Demarcation:		
22.0	C	The property demarcation will consist of 1.5 m black vinyl Chain Link fence and/or property markers in accordance with the City's Property Demarcation Policy and specification. City requires demarcation of the existing City owned lands and the lands to be transferred to the City as part of the proposed development. The final configuration of the fence and markers will be determined during the detailed design stage and shown on the 'Landscape Plans' and presented in the Environmental Implementation Report which will include a demarcation plan.
	R	Noted
Stormwater Management Facility Signage:		
23.0	C	City's standard stormwater management area educational and rules sign will be required for the proposed stormwater management facility and its location will be shown on the EIR landscape and trail plans.
	R	Noted
Preliminary Servicing and Stormwater Management Report		
Preliminary Park Block Grading:		
24.0	C	It appears that the park block can be designed to meet City standards for park block development. However, the park block grading needs to be refined at the Environmental Implementation Report stage to be consistent with City of Guelph Official Plan regarding recommended table land for a neighborhood park (80%).
	R	Noted

#	C/R		Comment / Response
Preliminary Stormwater Management Facility Grading:			
25.0	C		It appears that the stormwater management facility and open space grading and drainage can be designed to meet current City standards for trail development and "Development Engineering Manual". However, the plans need to be refined at the Environmental Implementation Report stage to be consistent with City's current trail standards and accessibility guidelines.
	R		The SWM Facility has been reshaped based on Engineering comments and trail/maintenance access designed to follow the City Standards.
Draft Plan			
Phasing Plan:			
26.0	C		Parks and Open Space Planning recommends that the park block, open space and storm water management blocks be included in the first phase of the plan of the subdivision so park and trail development can take place at an early stage of the subdivision development.
	R		Noted
Proposed Zoning:			
			Parks and Open Space Planning supports the following proposed zoning for park and open space block(s):
27.0	C		1.0 - Block 36 - P.2 "Neighbourhood Park".
	R		Noted, now Block 35
28.0	C		2.0 - Block 38 - P.1 "Conservation Land".
	R		Noted, now Block 37
Conditions for Subdivision Development Agreement:			
			Parks and Open Space Planning recommend the following subdivision approval conditions:
			<u>Conditions to be met prior to Execution of Subdivision Agreement</u>
29.0	C	1.0	The Developer shall be responsible for the cost of design and development of the Basic Park Development as per the City of Guelph current "Specifications for Parkland Development", which includes clearing, grubbing, topsoiling, grading, sodding and any required servicing including water, storm, sanitary and hydro for any phase containing a Park block to the satisfaction of the Deputy CAO of Public Services. The Developer shall provide the City with cash or letter of credit to cover the City approved estimate for the cost of development of the Basic Park Development for the Park Block to the satisfaction of the Deputy CAO of Public Services.
	R		Noted
30.0	C	2.0	The Developer shall be responsible for the cost of design and development of the demarcation of all lands conveyed to the City in accordance with the City of Guelph Property Demarcation Policy. This shall include the submission of drawings and the administration of the construction contract up to the end of the warrantee period completed by an Ontario Association of Landscape Architect (OALA) member for approval to the satisfaction of the Deputy CAO of Public Services. The Developer shall provide the City with cash or letter of credit to cover the City approved estimate for the cost of development of the demarcation for the City lands to the satisfaction of the Deputy CAO of Public Services.
	R		Noted

#	C/R	Comment / Response	
31.0	C	3.0	The Developer shall be responsible for the cost of design and implementation of the Open Space Works and Restoration in accordance with the "Environmental Implementation Report" to the satisfaction of the Deputy CAO of Public Services. This shall include the submission of drawings and the administration of the construction contract up to the end of the warrantee period completed by an Ontario Association of Landscape Architects (OALA) member for approval to the satisfaction of the Deputy CAO of Public Services. The Developer shall provide the City with cash or letter of credit to cover the City approved estimate for the cost of the Open Space works and restoration for the City lands to the satisfaction of the Deputy CAO of Public Services.
	R		Noted
32.0	C	4.0	The Developer shall design and develop the Storm Water Management Facility Landscaping in accordance with the City of Guelph's current 'Development Engineering Manual' to the satisfaction of the Deputy CAO of Public Services. This shall include the submission of drawings for City approval and the administration of the construction contract up to the end of two-year warrantee period completed by an Ontario Association of Landscape Architects (OALA) full member with seal to the satisfaction of the Deputy CAO of Public Services. The Developer shall provide the City with cash or letter of credit to cover the City approved estimate for the cost of development of the Storm Water Management Facility Landscaping for the City lands to the satisfaction of the Deputy CAO of Public Services.
	R		Noted
33.0	C	5.0	The Developer shall be responsible for the detailed design of the Pedestrian Trail System for the Stormwater Management area and Open Space Blocks according to City's current trail standards to the satisfaction of the Deputy CAO of Public Services. This shall include identifying the trail system, detailed layout, grading and drainage, planting design including interpretative and educational signage and submitting drawings completed by a full member (with seal) of the Ontario Association of Landscape Architects (OALA) for City approval to the satisfaction of the Deputy CAO of Public Services.
	R		Noted
34.0	C	6.0	The Developer shall be responsible for the costs of construction of the Pedestrian Trail system according to the City of Guelph's current trail standards, to the satisfaction of the Deputy CAO of Public Services. The Developer shall provide the City with cash or letter of credit to cover the City approved estimate for the cost of construction of the Trail to the satisfaction of the Deputy CAO of Public Services. The Developer and the City will enter into a cost sharing agreement and City shall reimburse the Developer the costs of trail construction according to the cost sharing agreement.
	R		Noted, to be included as a Draft Plan Condition
35.0	C	7.0	The Developer shall provide Public Services with digital files in AutoCAD - DWG format and PDF format containing the following final approved information: parcel fabric, street network, grades/contours and landscaping of the park, open space and storm water management blocks.
	R		Noted
36.0	C	8.0	The Developer shall install, at no cost to the City, 1.5 m high black vinyl chain link fencing, adjacent to Blocks 32 and Lots 1 through 18, 28, 29, 30 and 31. The Developer further agrees that the fencing will be installed following grading operations of the subdivision in accordance with the current standards and specification of the City and to the satisfaction of the. Further, all property lines must be accurately surveyed and clearly marked in the field prior to establishing all fence line locations. Fences shall be erected directly adjacent to the established property line within the City owned lands.
	R		Suggest fencing implementation should occur once finished grading is completed on the lots and certified to ensure the fencing is positioned at the correct elevation.

#	C/R	Comment / Response	
		Conditions to be met prior to Registration of the Plan	
37.0	C	9.0	The Developer shall place the following notifications in all offers of purchase and sale for all lots and/or dwelling units and agrees that these same notifications shall be placed in the City's subdivision agreement to be registered on title:
			•"Purchasers and/or tenants of all lots or units abutting City owned lands are advised that abutting City owned lands may be fenced in accordance with the current standards and specifications of the City".
			•"Purchasers and/or tenants of all lots or units abutting City owned lands are advised that private gates will not be allowed into Blocks 33, 34, 35, 36, 37, 38 and 39 and Lots 1 through 18, 28, 29, 30 and 31 that abut these Blocks".
			•"Purchasers and/or tenants of all lots or units are advised that a public trail or walkway will be installed or exists abutting or in close proximity to Blocks 32, 34, 35, 36, 37 and 39 and Lots 28 and 29 and that public access to this trail will occur between Blocks 32 and 38 and Block 36 and lots 28 and 29".
			•"Purchasers and/or tenants of all lots are advised that the Stormwater Management Block has been vegetated to create a natural setting. Be advised that the City will not carry out routine maintenance such as grass cutting. Some maintenance may occur in the areas that are developed by the City for public walkways, bikeways and trails."
			•"Purchasers and/or tenants of all lots are advised that the Open Space Block has been retained in its natural condition. Be advised that the City will not carry out regular maintenance such as grass cutting. Periodic maintenance may occur from time to time to support the open space function and public trail system."
			•"Purchasers and/or tenants of all lots are advised that the Park Block has been designed for active public use and may include sports fields, playgrounds, trails and other park amenities. Be advised that the City may carry out regular maintenance such as grass cutting. Periodic maintenance may also occur from time to time to support the park functions."
			•"Purchasers and/or tenants of all lots or units are advised that the boundaries of the open space, stormwater management and park blocks will be demarcated in accordance with the City of Guelph Property Demarcation Policy. This demarcation will consist of 1.5 m high black vinyl chain link fence adjacent to lot numbers 1 through 18, 28, 29, 30 and 31 and Block 32." The Developer shall also send written notification of proposed demarcation types to any existing homeowners in lots adjacent to walkway, open space, stormwater management and park blocks.
	R		Note reference to final Lot and Block #'s to be based on Revised Draft Plan.
38.0	C	10.0	The Developer agrees to provide temporary signage describing the proposed park, open space, asphalt trail and fencing on all entrance signs for the development, at the street frontage of park block 36 and open space block 38, and entrance/exit of trails, to the satisfaction of the Deputy CAO of Public Services. The signage shall:
			• advise prospective purchasers of dwellings in the area of the type of park, open space and asphalt trail and level of maintenance of these parcels of land by the City;
			• clearly state that the maintenance of the park block and trail are the responsibility of the Developer until such time as the City accepts the park and trail, and
			• clearly state that all questions relating to the maintenance of the park block and trail shall be directed to the Developer.
			The signage shall be erected when rough grading on and adjacent to the building lots has begun and must be maintained by the Developer until acceptance of the Blocks by the City. The Developer further agrees that the proposed park block, open space block(s), trails and type of fencing be identified on any marketing or promotional materials.
	R		Noted

#	C/R		Comment / Response
39.0	C	11.0	The Developer shall convey Block 36 for neighborhood park (P.2 Zone) purpose in accordance with the City's Official Plan Policies.
	R		Noted, now Block 35
40.0	C	12.0	The Developer shall convey Block 38 to the City as Conservation Open Space (P.1 Zone).
	R		Noted, now Block 37
		Conditions to be met prior to Basic Parkland Development acceptance by the City	
41.0	C	13.0	Prior to Basic Parkland Development acceptance by the City, the Developer shall submit a Geotechnical Investigations Report, prepared by a geotechnical engineer certifying that all fill placed on the Parkland has adequate structural capacity to support play structures, swings, pathways, paved courts, sun shelter and other park elements that require footings and foundations, to the satisfaction of the Deputy CAO of Public Services. This report shall include the following information; block number, locations of boreholes, soil profile including depths of topsoil, fill etc. and top elevations of fill.
	R		Noted
42.0	C	14.0	Prior to Basic Parkland Development acceptance by the City, the Developer shall submit a report prepared by a professional engineer certifying that the parkland grading and site servicing have been constructed in accordance with the approved Grading, Drainage and Servicing Plan and Parks Planning Specifications including property demarcation and sodding and are functioning as designed. This report shall be accompanied by as-built Grading drainage and Servicing Plan stamped by the Engineer. The Developer shall also submit the as-built grading, drainage and servicing plan in AutoCAD format to the satisfaction of the Deputy CAO of Public Services.
	R		Noted
43.0	C	15.0	Prior to Basic Parkland Development acceptance by the City, the Developer shall provide a written Topsoil Test Report from a recognized laboratory confirming topsoil compliance with the Parks Planning specifications. The testing shall include, but is not limited to nutrient levels, organic content, heavy metals and pesticides/herbicides (such as Atrazine).
	R		Noted
44.0	C	16.0	Prior to Basic Parkland Development acceptance by the City, the Developer shall submit a report prepared by a registered Landscape Architect (full member of OALA) certifying that the landscape works and property demarcation work have been constructed in accordance with the approved Landscape Plans and Parks Planning Specifications. This report shall be accompanied by 'As Built' Landscape Plans stamped by the registered OALA full member. The Developer shall also submit the as-built Landscape Plans in AutoCAD format to the satisfaction of the Deputy CAO of Public Services.
	R		Noted
45.0	C	17.0	The Developer shall provide a digital file in AutoCAD - DWG format containing the as built information: parcel fabric, street network, grades and contours and landscaping of the park, trails, open space and storm water management blocks.
	R		Noted
Summary:			

Parks and Open Space Planning supports the above application, based on the current information provided, subject to the conditions outlined above.

Appendix D Revised Water Balance Calculations

Under Separate Cover

Appendix E Photographic Log

Photo 1: Wetland edge, showing an increase in topography from farm field to wetland

Photo 2: Silver/Freeman Maple area of the PSW, standing water absent

Photo 3: Micro-topography in the PSW, maple trees on hummocks

Photo 4: Vegetation dividing line in the PSW, more shrubs and water to the west

Appendix F Tree Protection Plan

Under Separate Cover

Appendix G Functional Servicing Report

Under Separate Cover

Appendix H Species List

H.1 Plant List

Family[1]	Scientific Name[1]	Common Name[1]	Species Code[3,4]	Establishment Means[1]	Coefficient of Conservatism[3]	Wetness Index[3]	Wetland Plant Species[3]	Weediness Index[3]	Provincial Status[2,4]	SARO Status[2]	COSEWIC Status[3]	Global Status[2]	LOCAL STATUS WELL/ DUFF[3]	Sensitivity per TRCA 2017
Dryopteridaceae	*Dryopteris carthusiana*	spinulose wood fern	DRYCART	native	5	-2	T		S5			G5	X	M
Equisetaceae	*Equisetum arvense*	field horsetail	EQUARVE	native	0	0	T		S5			G5	X	NR
Cupressaceae	*Thuja occidentalis*	eastern white cedar	THUOCCI	native	4	-3	T		S5			G5	X	M
Pinaceae	*Abies balsamea*	balsam fir	ABIBALS	native	5	-3	T		S5			G5	X	M
Pinaceae	*Picea abies*	Norway spruce	PICABIE	introduced		5		-1	SE3			G5		NR
Pinaceae	*Pinus strobus*	eastern white pine	PINSTRO	native	4	3	T		S5			G5	X	NR
Adoxaceae	*Viburnum opulus americanum*	highbush cranberry	VIBOPUL	native		0		-1	-?	-?		-?	X	M
Adoxaceae	*Viburnum opulus opulus*	cranberry viburnum	VIBOPUL	introduced		0		-1	-?	-?		-?	X	M
Anacardiaceae	*Rhus typhina*	staghorn sumac	RHUTYPH	native	1	5			S5			G5	X	NR
Apocynaceae	*Asclepias syriaca*	common milkweed	ASCSYRI	native	0	5			S5			G5	X	NR
Asteraceae	*Arctium minus*	common burdock	ARCMINU	introduced		5		-2	SE5			GNR	X	NR
Asteraceae	*Cirsium vulgare*	bull thistle	CIRVULG	introduced		4		-1	SE5			GNR	X	NR
Asteraceae	*Erigeron annuus*	annual fleabane	ERIANNU	native	0	1			S5			G5		NR
Asteraceae	*Eutrochium maculatum maculatum*	spotted Joe Pye weed	EUTMAMA	native	3	-5	I		-?	-?		-?	X	L
Asteraceae	*Leucanthemum vulgare*	oxeye daisy	LEUVULG	introduced		5		-1	SE5			GNR	X	NR
Asteraceae	*Pilosella aurantiaca*	orange hawkweed	-?	introduced	-?	-?	-?	-?	SE5		?	GNR	-?	NR
Asteraceae	*Solidago altissima altissima*	tall goldenrod	SOLALTI	native	1	3			-?	-?		-?	R 4	NR
Asteraceae	*Solidago canadensis canadensis*	Canada goldenrod	SOLCANA	native	1	3			-?	-?		-?	X	NR
Asteraceae	*Solidago flexicaulis*	zigzag goldenrod	SOLFLEX	native	6	3			S5			G5	X	NR
Asteraceae	*Symphyotrichum lateriflorum lateriflorum*	calico aster	SYMLATE	native	3	-2	T		S5			G5	X	NR

Family[1]	Scientific Name[1]	Common Name[1]	Species Code[3,4]	Establishment Means[1]	Coefficient of Conservatism[3]	Wetness Index[3]	Wetland Plant Species[3]	Weediness Index[3]	Provincial Status[2,4]	SARO Status[2]	COSEWIC Status[3]	Global Status[2]	LOCAL STATUS WELL/ DUFF[3]	Sensitivity per TRCA 2017
Asteraceae	*Symphyotrichum novae-angliae*	New England aster	SYMNOVA	native	2	-3			S5			G5	X	NR
Asteraceae	*Symphyotrichum sp.*													NR
Asteraceae	*Taraxacum officinale*	common dandelion	TAROFFI	introduced		3		-2	SE5			G5	X	NR
Betulaceae	*Betula papyrifera*	paper birch	BETPAPY	native		2	T		S5			G5	X	NR
Boraginaceae	*Hydrophyllum virginianum virginianum*	Virginia waterleaf	HYDVIRG	native	6	-2			S5			G5	X	NR
Brassicaceae	*Alliaria petiolata*	garlic mustard	ALLPETI	introduced		0		-3	SE5			GNR	X	NR
Caprifoliaceae	*Lonicera tatarica*	Tartarian honeysuckle	LONTATA	introduced		3		-3	SE5			GNR	X	NR
Caryophyllaceae	*Silene vulgaris*	bladder campion	SILLATI	introduced		-?			SE5			GNR	X	NR
Cornaceae	*Cornus alternifolia*	alternate-leaved dogwood	CORALTE	native	6	5			S5			G5	X	NR
Cornaceae	*Cornus racemosa*	grey dogwood	CORNFOR	native	-?	-?	-?	-?	S5		?	G5?	-?	NR
Cornaceae	*Cornus stolonifera*	red-osier dogwood	CORSERI	native	2	-3	I*		S5			G5	X	NR
Cucurbitaceae	*Echinocystis lobata*	wild cucumber	ECHLOBA	native	3	-2	T		S5			G5	X	NR
Fabaceae	*Lotus corniculatus*	garden bird's-foot trefoil	LOTCORN	introduced		1		-2	SE5			GNR	X	NR
Fabaceae	*Trifolium hybridum*	alsike clover	TRIHYBR	introduced		1		-1	SE5			GNR	X	NR
Fabaceae	*Trifolium pratense*	red clover	TRIPRAT	introduced		2		-2	SE5			GNR	X	NR
Fabaceae	*Vicia cracca*	tufted vetch	VICCRAC	introduced		5		-1	SE5			GNR	X	NR
Geraniaceae	*Geranium robertianum*	herb-Robert	GERROBE	native		5		-2	S5			G5	X	NR
Grossulariaceae	*Ribes cynosbati*	eastern prickly gooseberry	RIBCYNO	native	4	5			S5			G5	X	NR
Grossulariaceae	*Ribes hirtellum*	swamp gooseberry	RIBHIRT	native	6	-3	I		S5			G5	X	NR

Family[1]	Scientific Name[1]	Common Name[1]	Species Code[3,4]	Establishment Means[1]	Coefficient of Conservatism[3]	Wetness Index[3]	Wetland Plant Species[3]	Weediness Index[3]	Provincial Status[2,4]	SARO Status[2]	COSEWIC Status[3]	Global Status[2]	LOCAL STATUS WELL/ DUFF[3]	Sensitivity per TRCA 2017
Grossulariaceae	*Ribes hudsonianum hudsonianum*	northern black currant	RIBHUDS	native	8	-5	I		S5			G5	R 2	H
Hypericaceae	*Hypericum perforatum perforatum*	common St. John's-wort	HYPPERF	introduced		5		-3	SE5			GNR	X	NR
Lamiaceae	*Clinopodium vulgare*	wild basil	CLIVULG	native	4	5			S5			G5	X	NR
Lamiaceae	*Lycopus americanus*	American water-horehound	LYCAMER	native	4	-5	I		S5			G5	X	M
Lamiaceae	*Lycopus uniflorus*	northern water-horehound	LYCUNIF	native	5	-5	I		S5			G5	X	M
Lamiaceae	*Prunella vulgaris lanceolata*	lance-leaved self-heal	PRUVULA	native	5	5	T		-?	-?		-?		NR
Malvaceae	*Tilia americana*	basswood	TILAMER	native	4	3			S5			G5	X	NR
Oleaceae	*Fraxinus americana*	white ash	FRAAMER	native	4	3			S4			G5	X	NR
Oleaceae	*Fraxinus nigra*	black ash	FRANIGR	native	7	-4	I		S4			G5	X	M
Oleaceae	*Fraxinus pennsylvanica*	red ash	FRAPENN	native	3	-3	T		S4			G5	X	NR
Oleaceae	*Ligustrum vulgare*	European privet	LIGVULG	introduced		1		-2	SE5			GNR	X	NR
Onagraceae	*Circaea canadensis canadensis*	Canada enchanter's nightshade	CIRCANA	native	3	3			S5			G5T5	X	NR
Plantaginaceae	*Plantago lanceolata*	English plantain	PLALANC	introduced		0		-1	SE5			G5	X	NR
Ranunculaceae	*Ranunculus acris*	common buttercup	RANACRI	introduced		-?	T	-2	SE5			G5	X	NR
Ranunculaceae	*Thalictrum pubescens*	tall meadow-rue	THAPUBE	native	5	-2	T		S5			G5	X	NR
Rhamnaceae	*Frangula alnus*	glossy buckthorn	RHAFRAN	introduced		-1	T	-3	SE5			GNR	X	NR
Rhamnaceae	*Rhamnus cathartica*	European buckthorn	RHACATH	introduced		3	T	-3	SE5			GNR	X	NR
Rosaceae	*Agrimonia gryposepala*	hooked agrimony	AGRGRYP	native	2	2			S5			G5	X	NR
Rosaceae	*Fragaria vesca americana*	American woodland strawberry	FRAVESC	native	4	4			S5			G5	X	NR

Family[1]	Scientific Name[1]	Common Name[1]	Species Code[3,4]	Establishment Means[1]	Coefficient of Conservatism[3]	Wetness Index[3]	Wetland Plant Species[3]	Weediness Index[3]	Provincial Status[2,4]	SARO Status[2]	COSEWIC Status[3]	Global Status[2]	LOCAL STATUS WELL/ DUFF[3]	Sensitivity per TRCA 2017
Rosaceae	*Geum aleppicum*	yellow avens	GEUALEP	native	2	-1	T		S5			G5	X	NR
Rosaceae	*Geum sp.*													NR
Rosaceae	*Potentilla recta*	sulphur cinquefoil	POTRECT	introduced		5		-2	SE5			GNR	X	NR
Rosaceae	*Prunus serotina serotina*	black cherry	PRUSERO	native	3	3			S5			G5	X	NR
Rosaceae	*Prunus virginiana virginiana*	chokecherry	PRUVIRG	native	2	1			S5			G5	X	NR
Rosaceae	*Rubus ×jacens*	spreading dewberry	-?	native	-?	-?	-?	-?	-?	-?	-?	-?	-?	NR
Rosaceae	*Rubus idaeus strigosus*	American red raspberry	RUBUIDI	native	-?	-?	-?	-?	SNA	-?	-?	-?	-?	NR
Rubiaceae	*Galium palustre*	common marsh bedstraw	GALPALU	native	5	-5	I		S5			G5	X	M
Salicaceae	*Populus balsamifera*	balsam poplar	POPBALS	native	4	-3	T		S5			G5	X	NR
Salicaceae	*Populus tremuloides*	trembling aspen	POPTREM	native		0	T		S5			G5	X	NR
Sapindaceae	*Acer ×freemanii*	Freeman maple	-?	native	-?	-?	-?	-?	-?	-?	-?	-?	-?	NR
Sapindaceae	*Acer platanoides*	Norway maple	ACEPLAT	introduced		5		-3	SE5			GNR	X	NR
Ulmaceae	*Ulmus americana*	white elm	ULMAMER	native	3	-2	T		S5			G5?	X	NR
Urticaceae	*Urtica dioica dioica*	European stinging nettle	URTDIDI	introduced		-1		-1	-?	-?		-?		NR
Violaceae	*Viola sp.*													NR
Vitaceae	*Parthenocissus quinquefolia*	Virginia creeper	PARQUIN	native	6	1			S4?			G5	R 1	NR
Vitaceae	*Vitis riparia*	riverbank grape	VITRIPA	native	0	-2			S5			G5	X	NR
Asparagaceae	*Maianthemum stellatum*	star-flowered false Solomon's seal	MAISTEL	native	6	1			S5			G5	X	NR
Cyperaceae	*Carex arcta*	northern clustered sedge	CARARCT	native		-?	I		S4S 5			G5	R 1	NR

Family[1]	Scientific Name[1]	Common Name[1]	Species Code[3,4]	Establishment Means[1]	Coefficient of Conservatism[3]	Wetness Index[3]	Wetland Plant Species[3]	Weediness Index[3]	Provincial Status[2,4]	SARO Status[2]	COSEWIC Status[3]	Global Status[2]	LOCAL STATUS WELL/ DUFF[3]	Sensitivity per TRCA 2017
Cyperaceae	*Carex bebbii*	Bebb's sedge	CARBEBB	native	3	-5	I		S5			G5	X	NR
Cyperaceae	*Carex intumescens*	bladder sedge	CARINTU	native	6	-4	I		S5			G5	X	M
Cyperaceae	*Carex spicata*	spiked sedge	CARSPIC	introduced		5		-1	SE5			GNR	X	NR
Cyperaceae	*Scirpus pendulus*	hanging bulrush	SCIPEND	native	3	-5	I		S5			G5	X	L
Cyperaceae	*Scirpus sp.*													NR
Liliaceae	*Erythronium americanum americanum*	yellow trout lily	ERYAMER	native	5	5			S5			G5	X	NR
Orchidaceae	*Epipactis helleborine*	broad-leaved helleborine	EPIHELL	introduced		5		-2	SE5			GNR	X	NR
Poaceae	*Bromus inermis*	smooth brome	BROINER	introduced		5		-3	SE5			G5T NR	X	NR
Poaceae	*Dactylis glomerata*	orchard grass	DACGLOM	introduced		3		-1	SE5			GNR	X	NR
Poaceae	*Glyceria striata*	ridged mannagrass	GLYSTRI	native	3	-5	I		S5			G5	X	NR
Poaceae	*Phalaris arundinacea arundinacea*	reed canarygrass	PHAARUN	native	0	-4	T		S5			G5	X	NR
Poaceae	*Phleum pratense pratense*	common timothy	PHLPRAT	introduced		3		-1	SE5			GNR	X	NR
Poaceae	*Poa pratensis pratensis*	Kentucky bluegrass	POAPRPR	introduced	0	1			-?	-?		-?	X	NR

1 Brouillet L, Desmet P, Coursol F, Meades SJ, Favreau M, Anions M, Bélisle P, Gendreau C, Shorthouse D, and contributors (2010+). Database of Vascular Plants of Canada (VASCAN). Online at http://data.canadensys.net/vascan and http://www.gbif.org/dataset/3f8a1297-3259-4700-91fc-acc4170b27ce, released on 2010-12-10. Version [xx]. GBIF key: 3f8a1297-3259-4700-91fc-acc4170b27ce. Data paper ID: doi: http://doi.org/10.3897/phytokeys.25.3100 [accessed on April 18, 2016]

2 Ontario Ministry of Natural Resources and Forestry. 2015. Ontario Vascular Plants. Online at from https://www.ontario.ca/page/get-natural-heritage-information. Accessed on May 3, 2016.

3 Newmaster, S. G., A. Lehela, Peter W. C. Uhlig, Sean McMurray and Michael J. Oldham. 1998. Ontario Plant List. Forest Research Information Paper No. 123, Ontario Forest Research Institute, Ontario Ministry of Natural Resources, Sault Ste. Marie, Ontario

4 Bradley, David J. 2013. Southern Ontario Vascular Plant Ppecies List, 3rd Edition. Ontario Ministry of Natural Resources and Forestry Southern Science & Information Section. Peterborough, Ontario.

Summary

Species Diversity

Vascular Plants Listed:	**90**
Identified to species or ssp/var	**86**
Identified to Genus (not included in calculations below)	**4**

Provincial Status		**Total Number**	**Percentage**
S1-S3 Species:	*rare in Ontario*	0	0%
S4 Species:	*uncommon in Ontario*	5	6%
S5 Species:	*common in Ontario*	44	51%
Other:		27	31%
Not listed:		0	0%
Not defined ("-?"):		10	12%

Means of Establishment

Native Species:	57	66%
Introduced Species:	29	34%
Not listed:	0	0%
Not defined ("-?"):	0	0%

Co-efficient of Conservatism (C) and Floristic Quality Index(FQI)

C 0 to 3	*lowest sensitivity*	24	28%
C 4 to 6	*moderate sensitivity*	23	27%
C 7 to 8	*high sensitivity*	2	2%
C 9 to 10	*highest sensitivity*	0	0%
Not listed:		32	37%
Not defined ("-?"):		5	6%
Average C		***3.5***	
FQI		***45.6***	

Presence of Weedy & Invasive Species

weediness = 0	*Not invasive*	0	0%
weediness = -1	*low potential invasiveness*	12	14%
weediness = -2	*moderate potential invasiveness*	9	10%
weediness = -3	*high potential invasiveness*	7	8%
Not listed:		53	62%
Not defined ("-?"):		5	6%
Average weediness		***-1.8***	

Wetness Index

upland	*W of 5*	18	21%
facultative upland	*W of 4, 3 or 2*	18	21%
facultative	*W of 1, 0 or -1*	17	20%
facultative wetland	*W of -2, -3 or -4*	17	20%
obligate wetland	*W of -5*	8	9%
Not listed:		0	0%
Not defined ("-?"):		8	9%
Average wetness value		***0.8***	

Presence of Wetland (W) Species

Total Wetland Tolerant (T) Plant Species as identified in OWES Manual	19	22%
Total Wetland Indicator (I) Plant Species as identified in OWES Manual	13	15%
Not listed:	49	57%
Not defined ("-?"):	5	6%

H.2 Wildlife List

COMMON NAME	SCIENTIFIC NAME	ONTARIO STATUS	GLOBAL STATUS	SARO	SARA	Guelph - Locally Singnificant Species	Species Sensitivity per TRCA 2017
BUTTERFLIES							
Least Skipper	*Ancyloxypha numitor*	S5	G5				Not ranked
Cabbage White	*Pieris rapae*	SNA	G5				Not ranked
AMPHIBIANS							
American Toad	*Anaxyrus americanus*	S5	G5				Medium
Northern Green Frog	*Lithobates clamitans*	S5	G5				Medium
Wood Frog	*Lithobates sylvatica*	S5	G5				High
REPTILES							
Eastern Gartersnake	*Thamnophis sirtalis*	S5	G5				Not ranked
BIRDS							
Mallard	*Anas platyrhynchos*	S5	G5				Low
Mourning Dove	*Zenaida macroura*	S5	G5				Not ranked
Common Nighthawk	*Chordeiles minor*	S4B	G5	SC	THR	X	Not ranked
Killdeer	*Charadrius vociferus*	S5B, S5N	G5				Not ranked
American Woodcock	*Scolopax minor*	S4B	G5				Not ranked
Cooper's Hawk	*Accipiter cooperii*	S4	G5	NAR	NAR	X	Not ranked
Red-tailed Hawk	*Buteo jamaicensis*	S5	G5	NAR	NAR		Not ranked
Downy Woodpecker	*Dryobates pubescens*	S5	G5				Not ranked
Northern Flicker	*Colaptes auratus*	S4B	G5			X	Not ranked
Eastern Wood-Pewee	*Contopus virens*	S4B	G5	SC	SC	X	Not ranked
Eastern Phoebe	*Sayornis phoebe*	S5B	G5				Not ranked
Great Crested Flycatcher	*Myiarchus crinitus*	S4B	G5				Not ranked
Eastern Kingbird	*Tyrannus tyrannus*	S4B	G5			X	Not ranked
Red-eyed Vireo	*Vireo olivaceus*	S5B	G5				Not ranked
Blue Jay	*Cyanocitta cristata*	S5	G5				Not ranked
American Crow	*Corvus brachyrhynchos*	S5B	G5				Not ranked
Common Raven	*Corvus corax*	S5	G5			X	Not ranked
Tree Swallow	*Tachycineta bicolor*	S4B	G5				Not ranked
Barn Swallow	*Hirundo rustica*	S4B	G5	THR	THR	X	Not ranked
Black-capped Chickadee	*Poecile atricapillus*	S5	G5				Not ranked
European Starling	*Sturnus vulgaris*	SNA	G5				Not ranked
Cedar Waxwing	*Bombycilla cedrorum*	S5B	G5				Not ranked
Purple Finch	*Haemorhous purpureus*	S4B	G5				Not ranked
American Goldfinch	*Spinus tristis*	S5B	G5				Not ranked
Chipping Sparrow	*Spizella passerina*	S5B	G5				Not ranked
Song Sparrow	*Melospiza melodia*	S5B	G5				Not ranked
Baltimore Oriole	*Icterus galbula*	S4B	G5			X	Not ranked
Brown-headed Cowbird	*Molothrus ater*	S4B	G5				Not ranked
Common Grackle	*Quiscalus quiscula*	S5B	G5				Not ranked
American Redstart	*Setophaga ruticilla*	S5B	G5			X	Not ranked
Yellow Warbler	*Setophaga petechia*	S5B	G5				Not ranked
Northern Cardinal	*Cardinalis cardinalis*	S5	G5				Not ranked
Indigo Bunting	*Passerina cyanea*	S4B	G5				Not ranked
MAMMALS							

Virginia Opossum	*Didelphis virginiana*	S4	G5				Not ranked
Northern Short-tailed Shrew	*Blarina brevicauda*	S5	G5				Not ranked
Eastern Cottontail	*Sylvilagus floridanus*	S5	G5				Not ranked
Grey Squirrel	*Sciurus carolinensis*	S5	G5				Not ranked
Red Squirrel	*Tamiasciurus hudsonicus*	S5	G5				Not ranked
Mouse sp.	*Peromyscus sp.*	S5	G5				Not ranked
Meadow Vole	*Microtus pennsylvanicus*	S5	G5				Not ranked
Meadow Jumping Mouse	*Zapus hudsonicus*	S5	G5				Not ranked
Coyote	*Canis latrans*	S5	G5				Not ranked
Red Fox	*Vulpes vulpes*	S5	G5				Not ranked
Raccoon	*Procyon lotor*	S5	G5				Not ranked
Striped Skunk	*Mephitis mephitis*	S5	G5				Not ranked
White-tailed Deer	*Odocoileus virginianus*	S5	G5				Not ranked
SUMMARY							
Total Butterflies:	2						
Total Amphibians:	3						
Total Reptiles:	1						
Total Birds:	33						
Total Breeding Birds:	30						
Total Mammals:	13						
SIGNIFICANT SPECIES							
Global:	0						
National:	3						
Provincial:	3						
Regional:	-						
Local:	9						
Explanation of Status and Acronymns							
COSSARO: Committee on the Status of Species at Risk in Ontario							
COSEWIC: Committee on the Status of Endangered Wildlife in Canada							
REGION: Rare in a Site Region							
S1: Critically Imperiled—Critically imperiled in the province (often 5 or fewer occurrences)							
S2: Imperiled—Imperiled in the province, very few populations (often 20 or fewer),							
S3: Vulnerable—Vulnerable in the province, relatively few populations (often 80 or fewer)							
S4: Apparently Secure—Uncommon but not rare							
S5: Secure—Common, widespread, and abundant in the province							
SX: Presumed extirpated							
SH: Possibly Extirpated (Historical)							
SNR: Unranked							
SU: Unrankable—Currently unrankable due to lack of information							
SNA: Not applicable—A conservation status rank is not applicable because the species is not a suitable target for conservation activi							
S#S#: Range Rank—A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of th							
S#B- Breeding status rank							
S#N- Non Breeding status rank							
?: Indicates uncertainty in the assigned rank							
G1: Extremely rare globally; usually fewer than 5 occurrences in the overall range							

G1G2: Extremely rare to very rare globally
G2: Very rare globally; usually between 5-10 occurrences in the overall range
G2G3: Very rare to uncommon globally
G3: Rare to uncommon globally; usually between 20-100 occurrences
G3G4: Rare to common globally
G4: Common globally; usually more than 100 occurrences in the overall range
G4G5: Common to very common globally
G5: Very common globally; demonstrably secure
GU: Status uncertain, often because of low search effort or cryptic nature of the species; more data needed.
GNR: Unranked—Global rank not yet assessed.
END: Endangered
THR: Threatened
SC: Special Concern
2, 3 or NS after a COSEWIC ranking indicates the species is either on Schedule 2, Schedule 3 or No Schedule of the Spe
NAR: Not At Risk
Area: Minimum patch size for area-sensitive species (ha)
LATEST STATUS UPDATE
Butterflies: Jan 2018
Amphibans: Jan 2018
Reptiles: Jan 2018
Birds: August 2018
Mammals: May 2018
S and G ranks and explanations: December 2011
NOTE
All rankings for birds refer to breeding birds unless the ranking is followed by N
REFERENCES
COSSARO Status
Endangered Species Act, 2007 (Bill 184). Species at Risk in Ontario List.
COSEWIC Status
COSEWIC. 2007. Canadian Species at Risk. Committee on the Status of Endangered Wildlife in Canada.
Local Status
Locally Significant Species List - City of Guelph (2012)