1242, 1250, 1260, 1270 Gordon Street and 9 Valley Road, Guelph, ON – Environmental Impact Study Addendum Version 2

Final Report

June 17, 2022
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Prepared for:

Tricar Developments Inc.
3800 Colonel Talbot Rd.
London, ON N6P 1H5

Prepared by:

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

1242, 1250, 1260, 1270 GORDON STREET AND 9 VALLEY ROAD, GUELPH, ON – ENVIRONMENTAL IMPACT STUDY ADDENDUM VERSION 2

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Melissa Straus
Date: 2022.06.20
16:41:06 -04'00'

Prepared by ____
(signature)

Melissa Straus, M.Sc.
Terrestrial Ecologist

Daniel Eusebi
Date: 2022.06.20
16:42:16 -04'00'

Reviewed by ____
(signature)

Daniel Eusebi, BES, MCIP, RPP
Senior Environmental Planner

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Abbreviations

AMSL	Above Mean Sea Level
ANSI	Significant Areas of Natural and Scientific Interest
CC	Coefficient of Conservatism
cm	Centimeter
DBH	Diameter at Breast Height
ECCC	Environment and Climate Change Canada
EIR	Environmental Implementation Report
EIS	Environmental Impact Study
ELC	Ecological Land Classification
ESA	*Endangered Species Act*
FSR	Functional Servicing Report
GRCA	Grand River Conservation Authority
ha	Hectare
LID	Low Impact Development
LIO	Land Information Ontario

m	Meter
MBCA	*Migratory Bird Convention Act*
MECP	Ministry of the Environment, Conservation and Parks
mm	Millimeter
MNRF	Ministry of Natural Resources and Forestry
NHIC	Natural Heritage Information Centre
NHS	Natural Heritage System
NRSI	Natural Resource Solutions Inc.
OP	Official Plan
PPS	Provincial Policy Statement
PSW	Provincially Significant Wetland
SAR	Species at Risk
SARO	Species at Risk in Ontario
SWH	Significant Wildlife Habitat
SWM	Stormwater Management
TPP	Tree Preservation Plan

1.0 INTRODUCTION

The Subject Property is approximately 3.3 hectares (ha) in size and is comprised of five properties located at 1242,1250, 1260, and 1270 Gordon Street and 9 Valley Road in the City of Guelph, Ontario (**Figure 1**, **Appendix A**). At the time this report was written 1270 Gordon (formerly Montes Place) is currently an occupied residence and the remaining residential properties (1242, 1250, and 1260 Gordon Street, 9 Valley Road) have been demolished in accordance with a demolition permit.

Surrounding the Subject Property is a 120-metre (m) Study Area boundary, as shown on **Figure 1** (**Appendix A**), which is comprised of single-family residential lots to the northeast and newly constructed apartments to the east and west. Forest and wetland features associated with the Torrance Creek Swamp Provincially Significant Wetland (PSW) borders the Subject Property at the northeast with the Hanlon Creek PSW located west of Gordon Street.

Stantec Consulting Ltd. (Stantec) was retained by Tricar Developments Inc. (Tricar) to complete an Environmental Impact Study (EIS) in support of a Draft Plan of Subdivision, Official Plan Amendment and Zoning By-law Amendment to accommodate the proposed development of two 10-storey apartment buildings with surface and below grade parking. Following approval, the development will proceed to detailed design and subdivision registration.

An EIS, dated May 4, 2020, was submitted to the City of Guelph and presented results of the 2018 and 2019 field program with an analysis of concordance of the proposed development with existing provincial and municipal policy. The purpose of the EIS was to characterize the significance and sensitivity of existing natural features in the Study Area, identify potential impacts of the project on these natural features, and recommend appropriate measures to avoid or minimize potential negative impacts and demonstrate no negative impact.

An EIS Addendum, dated August 31, 2021 (Version 1), was prepared and submitted to the City of Guelph, the purpose of which was to address City comments received on the original EIS submission (see **Appendix B1)** and update the originally submitted site plan. Since the first EIS submission, the Addendum included building heights that were reduced from 12-storeys to 10-storeys and an additional property to the south (1270 Gordon Street, formerly Montes Place) was added to the Subject Property, as shown on **Figure 1** (**Appendix A**).

The EIS Addendum was based on responses to City comments through the completion of a Comment Matrix (**Appendix C1**) and where topics required additional information or clarification are included in sections found in the body of this report. The Addendum did not reiterate information presented in the original EIS that was not commented on in the City's review. Minor corrections and clarifications were addressed and explained in the Comment Matrix. This approach was developed through consultation with City of Guelph during a July 6, 2021 meeting and follow-up email correspondence (**Appendix B2**).

Subsequent comments received to date on the August 31, 2021 EIS Addendum from City staff can be found in **Appendix B3**. As these comments did not require major conceptual changes to the EIS Addendum, this EIS Addendum (referred to as Version 2) is an update and replaces the August 31, 2021 EIS Addendum. The Comment Matrix found in **Appendix C2** addresses comments received on the EIS Addendum and forms the basis for this EIS Addendum (Version 2).

The only exception to the above noted process is regarding the proposed trail on the Subject Property. This iteration of the EIS Addendum does explore the proposed trail in more detail and discusses comments received on the originally submitted EIS with respect to the trail (see **Appendix B1**, dated August 13, 2021).

To address required updates, the following supporting documentation, all of which required updating from Version 1 except for the Tree Preservation Plan, is appended and include:

- Tree Preservation Plan (Appendix D)
- Hydrogeological Investigation (Appendix E)
- Butternut Health Assessment and Tree Permit Application (Appendix G)
- Functional Servicing Report (Appendix H)
- Grading Plan (Appendix I)
- Erosion and Sediment Control Plan (Appendix I)
- Landscape Plan (Appendix J)

2.0 POLICY CONSIDERATIONS

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, Tree By-law, Subwatershed studies
- Grand River Conservation Authority Policies and Regulations
- *Migratory Bird 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 June 2021 consolidation was consulted during the preparation of this EIS Addendum where required. Both the PPS and City of Guelph OP require the test of no negative impact, which is addressed in **Section 8.0**, below.

As the proposed City trail was not addressed in the previous version of the EIS and addendum, two City guidance documents have since been reviewed with key components highlighted in the sections below.

2.1 ACTIVE TRANSPORTATION NETWORK STUDY, 2017

The Guelph Active Transportation Study (ATS; City of Guelph 2017) was initiated with the goal to provide a viable active transportation network in the City of Guelph to promote active and healthy lifestyles by encouraging people to cycle, walk, and use public transport. The portion of the proposed trail on the Subject Property located within the woodland was included as part of the City's active transportation network.

The study provides design guidelines for trails within their network. Relevant recommendations to the proposed development of the Subject Property include:

- A preferred trail width is 3.0 m, which can be reduced to a minimum of 2.5 m in constrained locations or to minimize impact to the adjacent landscape (i.e., in natural heritage areas)

- A minimum horizontal clear zone of 0.6 m from the edge of the trail to obstructions (e.g., signposts, utility poles, gates, fences, steep slopes etc.).

- Figure 4.6 of the Study outlines considerations for trail surfacing, which includes the recommendation for soft surfaces (e.g., limestone screening) for trails within wooded areas and designated natural heritages areas.

2.2 GUELPH TRAIL MASTER PLAN, 2021

The City of Guelph updated their 2005 Guelph Trail Master Plan (GTMP) in 2021, aiming to reflect changes in their strategic plan and incorporate new approaches, legislation and guidelines in trail planning.

The Guelph Trail Master Plan proposes large north/south trail from Arkell Road to Kortright as well as a local east-west connection on the Subject Property.

Chapter 5 of the GTMP provides design guidelines based on a number of considerations, including:

- Trail classification
  - primary trails those included as part of the active transportation network and are designed to accommodate high volumes of users
  - neighborhood connector trails are designed to support high volumes of local transportation and recreational users to connect components of the neighbourhood
  - secondary trails are primarily for recreational users and typically comprised of a granular surface material
  - stormwater management trails are typically paved and have a specific set of maintenance standards
- Surface treatment options
  - Hard surfaces, typically asphalt, are predominantly used for primary (particularly those in the active transportation network), neighbourhood connector, and stormwater trails
  - Soft surface, stonedust, woodchips, gravel, etc., typically for secondary trails
- Trail drainage and erosion control

Although the north/south portion of the trail proposed on the Subject Property is located within the active transportation network, and as such should meet the criteria for a primary trail (e.g., asphalt, 10 m preferred corridor (8-15 m range)), the master plan includes considerations for areas where trails are built within or beside important natural and culture features. Trail design, among other things, may consider reducing or increasing the recommended trail width by exceeding or reducing requirements in order to accommodate specific uses or constraints.

A neighbourhood connector trail is also proposed as part of the development, which based on the master plan would require a trail corridor of 5-10 m (preferably 10m).

Overall, the GTMP: *recognize[s] that nature trails and passive recreational uses are often compatible with the preservation and protection of natural features. While trails through some particularly sensitive areas are not permitted under these policies and provincial regulations, there are other areas within the NHS where trails can be built as long as they are designed to mitigate potential damage to the natural environment.*

3.0 ADDITIONAL FIELD INVESTIGATIONS

To supplement field investigations conducted in 2018 and 2019, address City of Guelph comments (specifically Comment 120; **Appendix B**) and accommodate the addition of the parcel of land to the south (formerly Monte's place) additional field studies were conducted in 2021. Survey details are provided in Table 3.1, below.

Table 3.1: 2021 Survey Dates, Time and Weather Conditions

Survey Type	Date/Time	Weather				Surveyors
		Temp. (°C)	**Wind (Beaufort Scale)**	**Cloud (%)**	**PPT / PPT last 24 hours**	
Tree Inventory (1270 Gordon)	May 21, 2021	N/A	N/A	N/A	N/A	Natural Resources Solutions Inc. (NRSI)
Breeding Bird (Early)	June 2, 2021 05:30-08:00	7°C	0	0	None	Melissa Straus
Ecological Land Classification and Botanical Inventory (1270 Gordon)	June 2, 2021 07:15-08:00	7°C	0	0	None	Melissa Straus
Infiltration Trench Testing	June 10, 2021 June 11, 2021	N/A	N/A	N/A	N/A	D&J Lockhart Excavators Ltd.
Bat Exit Survey #1 (1270 Gordon)	June 10, 2021 21:01-22:31	21°C	3	0	None	Melissa Straus
Bat Exit Survey #2 (1270 Gordon)	June 28, 2021 21:05-22:35	26°C	2	20	None	Melissa Straus

3.1 VEGETATION

A site visit was completed in 2021 to confirm ELC and complete a botanical inventory of the property to the south (1270 Gordon) which had been surveyed previously from the property boundary (Lee et al. 1998).

Plant species status were considered and evaluated using the Rare Vascular Plants of Ontario, Fourth Edition (Oldham and Brinker 2009) for provincial significance; provincial and federal status is based on Species at Risk in Ontario. Identification of potentially sensitive native plant species will be determined based on their assigned coefficient of conservatism (CC) value, as determined by Oldham et al. (1995). CC values range from 0 (low) to 10 (high) considering a species' tolerance of disturbance and fidelity to a specific natural habitat. Species with a high CC value of 9 or 10 generally exhibit a high degree of fidelity to a narrow range of habitat parameters. Locally significant species were based on *Locally Significant Species List – City of Guelph 2012.*

3.2 TREE INVENTORY

An updated Tree Preservation Plan (TPP) was completed by NRSI to incorporate the property to the south (1270 Gordon Street) and provide a detailed assessment of the City's primarily trail and associated trail connection across the Subject Property.

The following information was recorded for each tree:

- species
- DBH
- crown radius (metres)
- general health (excellent, good, fair, poor, very poor, dead)
- potential for structural failure (improbable, possible, probable, imminent)
- tree location (on-site/boundary/off-site)
- general comments (i.e., disease, aesthetic quality, development constraints, sensitivity to development)

Full details on methods can be found in the TPP in **Appendix D**.

3.3 BAT EXIT SURVEYS

The property to the south (1270 Gordon) has an existing building on the property that will require removal to facilitate the proposed development. To determine if bats (including bat Species at Risk; SAR) are using this building, bat exit surveys were conducted in accordance with *Surveying for the presence of Little Brown Myotis and Northern Myotis* (MNR 2013). This consisted of observers watching the identified building looking for signs of bats exiting or entering the buildings using binoculars and flashlights, as well as use of an acoustic monitoring device to record bat calls for species identification. Surveys started 30 minutes before sunset and finished 60 minutes after sunset.

3.4 BREEDING BIRD SURVEYS

One breeding bird survey was conducted on the Subject Property in June 2021 in accordance with the Breeding Bird Atlas (Cadman et al., 2007) to compliment surveys completed in previous years. Fieldwork commenced approximately 15 minutes prior to sunrise and concluded at 08:00 under favorable weather conditions.

The survey consisted of recording all species of birds that were seen or heard within each habitat while traversing the Subject Property. A conservative approach to determining breeding status was taken, birds seen or heard in appropriate habitat during the breeding season were assumed to be breeding.

4.0 EXISTING CONDITIONS

4.1 HYDROGEOLOGY

Existing hydrogeological conditions on the Subject Property were summarized in the first EIS submission and the revised Hydrogeological Assessment report can be found in **Appendix E**.

4.2 TERRESTRIAL RESOURCES

Results of the terrestrial field investigations are summarized in the sections below, with available field notes provided in **Appendix F.**

4.2.1 Vegetation Communities

The vegetation communities identified in the Study Area are shown on **Figures 2-4, Appendix A**. All communities identified are considered common in southern Ontario.

During the botanical inventory conducted in June 2021 at 1270 Gordon, staff concluded that no changes were required to ELC community boundaries. An update to the cultural meadow community description to include a more detailed description of 1270 Gordon is provided below in **Table 4.1**.

Table 4.1: Ecological Land Classification (ELC) Vegetation Types

ELC Type	Community Description
Cultural (CU)	
CUM1 Mineral Cultural Meadow	Centralized disturbed meadow, dominated by orchard grass, common Timothy and goldenrod in the ground layer, with common buckthorn and Tartarian honeysuckle in the understory and scattered white elm in the canopy. A small cultural meadow pocket located behind 1242 Gordon consists of predominantly maintained lawn and a few fruit trees. The eastern portion of the cultural meadow, located behind 1270 Gordon, is open with regenerating black walnut and poplars (<10 % canopy coverage) and dominated by grasses (e.g., awnless brome [*Bromus inermus*]) with goldenrods present.

4.2.2 Vascular Plant Species

A few vegetation species not previously observed were identified on the Subject Property during the botanical inventory in 2021, none of which are at risk or rare. New observations included large-tooth aspen (*Populus Grandidentata),* common hawkweed (*Hieracium vulgatum),* and highbush cranberry (*Viburnum opulus americanum)*.

SAR and rare plants as reported in the original EIS can be found on **Figure 4 (Appendix A).**

4.2.3 Tree Preservation Plan

A total of 867 trees of 40 species were inventoried by NRSI during the preparation of the Tree Preservation Plan. Of the trees assessed, 641 (74%) are native species and 226 (26%) are non-native.

The Tree Preservation Plan can be found in **Appendix D.**

4.2.4 Bat Exit Surveys

Two bat exit surveys were conducted in June 2021 at the existing residence located at 1270 Gordon. No bats, including SAR, were observed entering or exiting the building. Foraging bats were documented during the survey, identified using software to analyzed calls recorded on hand-held bat detectors to be Big Brown Bats, Red Bats, and Hoary Bats. In some cases, the calls cannot be distinguished due to the quality of the call and as such both species are reported. In two cases, two faint calls were recorded on June 28, 2021 from the northwest corner of the building that appeared to be Little Brown Myotis (Endangered provincially).

The number of bat calls does not provide an indication as to the number of individuals present, as a single bat can result in multiple recorded calls by making several passes over a detector. However, the number of calls can generally be used as an index of bat activity. The bat station locations and number of bat calls recorded are presented in **Table 4.2**.

Table 4.2: Bat Survey Results by Station at 1270 Gordon (formerly Montes Place)

Date	Detector ID	Detector Location	Species / Guild	Number of Bat Calls Identified
June 10, 2021	SM4-I	Southeast side of building	None	-
	SM4-N	Northernmost corner of building	Big Brown Bat	2
	SM4-O	North side of building	Big Brown Bat/ Silver-haired Bat	36
			Big Brown Bat	82
	SM4-S	Southernmost corner of building	Big Brown Bat/ Silver-haired Bat	1
			Big Brown Bat	2
June 28, 2021	ETK	Northwest corner of building	Big Brown Bat/ Silver-haired Bat	52
			Big Brown Bat	26
			Little Brown Bat	2
	ETL	Southeast corner of building	Big Brown Bat/ Silver-haired Bat	1
			Hoary Bat	5

4.2.5 Breeding Bird Surveys

During breeding bird surveys conducted in June 2021, Stantec observed eight species not recorded during field investigations in 2018. These were Canada Goose, Mourning Dove, Eastern Kingbird, American Crow, Cedar Waxwing, Brown-headed Cowbird, Baltimore Oriole and Northern Waterthrush. Of these eight species, all but the American Crow and Canada Goose were observed displaying breeding evidence.

Three species Northern Flicker, Eastern Kingbird and Baltimore Oriole are locally significant in the City of Guelph. Eastern Kingbird and Baltimore Oriole were observed within the meadow section of the Subject Property and the Northern Flicker was observed in the deciduous woodlot to the northeast. These species, in addition to SAR and locally significant bird species identified previously in the Study Area are shown on **Figure 4** (**Appendix A**).

4.2.6 Snake Habitat Assessment

Snake habitat and presence was recorded during all surveys conducted on the Subject Property. Hibernacula features such as house foundations, cracks and crevices and stone piles were assessed for access to below ground. Suitable habitat to support snake hibernacula was not identified on the Subject Property.

Snakes were recorded incidentally during surveys conducted on the Subject Property, including one DeKay’s Brown Snake, several Eastern Gartersnakes and one Red-bellied Snake during an onsite visit with the City of Guelph during favorable weather conditions on May 16, 2019.

5.0 SIGNIFICANT NATURAL HERITAGE FEATURES

5.1 HABITAT OF ENDANGERED AND THREATENED SPECIES

Four (4) species protected under the ESA were identified on the Subject Property and/or in the Study Area and include:

- Butternut
- Barn Swallow
- Bat SAR (Little Brown Myotis and Northern Myotis)

Barn Swallow was observed flying over the Subject Property and as such not expected to be breeding. No evidence of Barn Swallow nesting was observed on site. Butternut and bat SAR are described below, with species occurrences are provided in **Figure 4** (**Appendix A**).

5.1.1 Butternut

Six butternut trees were originally identified on the Subject Property by NRSI during the tree inventory, as shown on **Figure 4** (**Appendix A**). Butternut is provincially ranked S3? (possibly-vulnerable); and is considered endangered provincially and federally. Butternut is afforded habitat protection under the ESA (2007), which includes a 25 m buffer to protect the tree from root damage.

A Notice of Activity was submitted to MECP to facilitate the removal of one Butternut, one Butternut hybrid, and the harm of another Butternut. A tree permit was obtained from the City of Guelph to remove the two Butternuts, which occurred in December 2020. The necessary compensation plantings for these Butternuts as required under the *Endangered Species Act* were installed in the Fall of 2020, consisting of 40 butternuts and 40 companion trees of sugar maple, black cherry, and red oak. The butternut tree removal permit application and butternut health assessment completed by NRSI is provided in **Appendix G**.

5.1.2 Bat SAR

Bat SAR were documented in 2018 within the significant woodland during field studies, and at a distance from the building at 1270 Gordon in 2021, however, bat exit surveys were completed of the residences and snag trees in the development footprint revealed no evidence of SAR bat roosts in the surveyed locations. Although impacts to SAR bats are not anticipated, an Information Gathering Form will be submitted to the Ministry of the Environment, Conservation and Parks (MECP) to confirm the required approach for these species.

5.2 PROVINCIAL-LEVEL ANALYSIS OF SIGNIFICANCE

An analysis of feature significance was included in the original EIS submission. For clarity, this section has been divided into jurisdiction (provincial vs. City of Guelph) with additional details provided on Significant Wildlife Habitat (SWH) and the OP, as requested in City of Guelph comments #124-127 (**Appendix C1**).

The analysis of significance based on the Natural Heritage Policy (Section 2.1) of the PPS (OMAH 2014) was completed in the original EIS, identifying significant wetlands (Torrance Creek and Hanlon Creek PSW Complexes), significant woodland, in the Study Area and various types of Significant Wildlife Habitat (SWH) based on criteria set out in *Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E* (MNRF 2015). Tables 5.1-5.4 detail this SWH analysis with candidate or confirmed SWH and mapped where identified on **Figures 2a,b,c and 3** (**Appendix A**).

Table 5.1: Summary of Seasonal Concentrations Areas within the Subject Property and Study Area

Habitat Type	Habitat Features	Presence / Absence within the Subject Property and Study Area
Waterfowl stopover and staging areas	Field with evidence of annual spring flooding from meltwater or runoff; aquatic habitats such as ponds, marshes, lakes, bays, and watercourses used during migration, including large marshy wetlands	Absent
Shorebird migratory stopover area	Beaches and un-vegetated shorelines of lakes, rivers, and wetlands	Absent
Raptor wintering areas	Combination of fields and woodland (>20 ha)	Absent
Bat hibernacula	Abandoned mine shafts, underground foundations, caves, and crevices	Absent
Bat maternity colonies	Mixed and deciduous forests and swamps with large diameter dead or dying trees with cavities	Candidate SWH present in Study Area
Turtle wintering area	Permanent waterbodies and large wetlands with sufficient dissolved oxygen	Candidate SWH present in Study Area
Reptile hibernacula	Rock piles or slopes, stone fences, crumbling foundations	Absent
Colonially – nesting bird breeding habitat (bank and cliff)	Eroding banks, sandy hills, steep slopes, rock faces or piles	Absent
Colonially – nesting bird breeding habitat (trees/shrubs)	Dead trees in large marshes and lakes, flooded timber, and shrubs, with nests of Great Blue Heron, Great Egret, Green Heron, or Black-crowned Night-Heron	Absent
Colonially – nesting bird breeding habitat (ground)	Rock islands and peninsulas in a lake or large river	Absent

Habitat Type	Habitat Features	Presence / Absence within the Subject Property and Study Area
Migratory butterfly stopover area	Fields and forests that are a minimum of 10 ha and are located within 5 km of Lake Erie or Lake Ontario	Absent
Landbird migratory stopover area	Woodlands of a minimum size located within 5 km of Lake Erie or Lake Ontario	Absent
Deer wintering congregation areas	Deer yards are mapped by MNRF	Confirmed SWH present in Study Area.

Table 5.2: Summary of Rare or Specialized Habitat within the Subject Property and Study Area

Habitat Type	Habitat Features	Presence / Absence within the Subject Property and Study Area
Rare Vegetation Communities		
Sand barren, alvar, cliffs and talus slopes	Sand barren, Alvar, Cliff and Talus ELC Community Classes, and other areas of exposed bed rock and patchy soil development, near vertical exposed bedrock and slopes of rock rubble	Absent
Prairie and savannah	Open canopy habitats (tree cover < 60%) dominated by prairie species	Absent
Old growth forest	Relatively undisturbed, structurally complex; dominant trees > 100 years' old	Absent
Other rare vegetation communities	Vegetation communities ranked S1-S3 by the NHIC	Absent
Specialized Habitats		
Waterfowl nesting areas	Upland habitats adjacent to wetlands (within 120 m)	Absent
Bald Eagle and Osprey nesting, foraging and perching habitat	Treed communities adjacent to rivers, lakes, ponds, and other wetlands with stick nests of Bald Eagle or Osprey	Absent
Woodland raptor nesting habitat	Forested ELC communities >30ha with 10 ha of interior habitat	Candidate SWH present in the Study Area
Turtle nesting areas	Exposed soil, including sand and gravel in open sunny areas in proximity to wetlands	Absent
Seeps and springs	Any forested area with groundwater at surface within the headwaters of a stream or river system	Candidate SWH present in the Study Area
Amphibian breeding habitat (woodland and wetland)	Treed uplands with vernal pools, and wetland ecosites	Absent
Woodland area sensitive breeding bird habitat	Large mature forest stands, woodlots >30 ha	Candidate SWH present in the Study Area

Table 5.3: Summary of Habitat for Species of Conservation Concern within the Subject Property

Habitat Type	Habitat Features	Presence / Absence of Rare or Specialized Habitat within the Subject Property and Study Area
Open country bird breeding habitat	Large grasslands and fields (>30 ha)	Absent
Shrub/early successional bird breeding habitat	Large shrub and thicket habitats (>10 ha)	Absent
Marsh bird breeding habitat	Wetlands with shallow water with emergent aquatic vegetation	Absent
Terrestrial Crayfish	Wet meadows and edges of shallow marshes	Candidate SWH present in the Study Area
Special Concern and provincially rare wildlife (as identified in Table 3-1)	Habitat for Special Concern species:	Confirmed SWH.
	1. Common Nighthawk: Open habitats with gravel substrate	Absent
	2. Eastern Wood-Pewee: Deciduous and mixed forests	Confirmed SWH present in Study Area
	3. Red-headed Woodpecker: Deciduous and riparian forests, orchards, parks, grasslands	Absent
	4. Snapping Turtle: Ponds, sloughs, streams, rivers, and shallow bays	Candidate SWH present within Study Area.
	5. Wood Thrush: Deciduous and mixed forests	Absent
	6. Monarch: Milkweed and wildflowers	Absent

Table 5.4: Summary of Wildlife Movement Corridors

Habitat Type	Habitat Feature	Presence / Absence of Wildlife Movement Corridors within the Subject Property
Deer movement corridors	Associated with confirmed deer wintering habitat/area	Absent
Amphibian movement corridors	Associated with confirmed amphibian breeding habitat	Absent

5.3 CITY OF GUELPH ANALYSIS OF SIGNIFICANCE

The City of Guelph's Natural Heritage System (NHS) as defined in Section 4.1.1 of the OP is comprised of:

- Significant Natural Areas
  - Significant Areas of Natural and Scientific Interest (ANSI)
  - Significant Habitat for Provincially Endangered and Threatened Species
  - Significant Wetlands
  - Surface Water Features and Fish Habitat
  - Significant Woodlands
  - Significant Valleylands
  - Significant Landform
  - Significant Wildlife Habitat (SWH; including Ecological Linkages)
  - Restoration Areas
  - Minimum or Established buffers (where applicable)
- Natural Areas
  - Other Wetlands
  - Cultural Woodlands
  - Habitat of Significant Species
  - Established buffers (where applicable)

The City of Guelph OP identifies components of the Natural Heritage System within the Study Area on Schedule 4, including:

- locally and provincially significant wetlands (Schedule 4A)
- significant woodlands (Schedule 4C)
- significant wildlife habitat (Schedule 4E)
- deer crossing and ecological linkage (Schedule 4).

Wetlands (PSWs) and SWH were previously discussed in Section 5.1 above while the recommendation to update the locally significant wetland boundary that overlaps with FOC2-2 was previously provided in the original EIS and are not further discussed.

Significant woodlands, deer crossing and ecological linkage, as well as locally significant species (not identified in the OP) are discussed in more detail in the sections below.

5.3.1 Significant Woodlands

Significant Woodlands in the City of Guelph are identified on Schedule 4C of the OP and are defined in Section 4.1.3.6 of the Official Plan:

- woodlands ≥1ha not identified as cultural woodlands or plantations
- woodlands ≥0.5ha consisting of Dry-Fresh Sugar Maple Deciduous Forest

- any woodlands ranked S1-S3 by the NHIC.
- Include a 10 m buffer

The forested portion associated with the Torrance Creek PSW (i.e., FOC2-2 and SWM3-2; **Figure 3**, **Appendix A**), adjacent deciduous forest (FOD5-6), two contiguous plantations (CUP3 and CUP3-3) are designed as Significant Woodland on Schedule 4C of the City's Official Plan. The significant woodland boundary was delineated in the field by NRSI with the City of Guelph in 2014 and 2017, which appears to follow the OP designation, as shown on **Figure 4**, **Appendix A**.

No other woodlands in the Study Area are designated significant by the City in their OP.

5.3.2 Cultural Woodlands

One deciduous woodland (WODM4-4), comprised of regenerating black walnut, is present on the Subject Property and was excluded from the Significant Woodland as delineated by the City of Guelph and NRSI.

Cultural Woodlands are defined in the OP as:

i) equal to or greater than 1 hectare in size, and

ii) not dominated by non-indigenous, invasive species.

WODM4-4 does not meet the minimum size criteria to be classified as a cultural woodland, which is supported by the lack of cultural woodlands identified on the Subject Property or in the Study Area on Schedule 4C of the OP.

5.3.3 Deer Crossing and Ecological Linkage

Section 7.1.4 of the original EIS provides a detailed analysis of the two deer crossing locations identified in the Study Area on the City of Guelph OP. The results of the analysis concluded that the southern crossing, Crossing A; **Figure 5**, **Appendix A** is the primary crossing and favoured post-development. In addition to being noted as a deer crossing location, this area was also designated as an ecological linkage by the City of Guelph in their OP. The field survey data and analysis identify crossing A as the NHS linkage as depicted on **Figure 5** (**Appendix A**).

5.3.4 Habitat of Significant Species

As per the City's OP Section 4.1.4.4, *Significant Natural Areas are intended to provide habitat for the majority of the significant species known to occur in the city. However, some significant species occupy habitat outside the designated Significant Natural Areas. The City requires that this habitat be considered through the development approvals process to help support the maintenance of biodiversity.*

As detailed in Policy 4.1.1.5 (i), Significant Natural Areas are comprised of:

a. ANSIs

b. Significant Habitat for Provincially Endangered and Threatened Species

c. Significant Wetlands

d. Surface Water Features and Fish Habitat

e. Significant Woodlands

f. Significant Valleylands

g. Significant Landforms

h. SWH (including Ecological Linkages)

i. Restoration Areas

j. Minimum or established buffers.

Therefore, significant species (described below) occurring within the Significant Woodland and/or the associated established buffer (i.e., Significant Natural Area) on the Subject Property will inherently be protected and therefore detailed analysis is not required under Policy 4.1.4.4.

To determine what constitutes habitat for significant wildlife species, the following habitat must meet the following criteria:

i. supports species considered:

  a. globally significant

  b. federally significant

  c. provincially significant; and/or

  d. locally significant, and;

ii. contributes to the quality and diversity of the Natural Heritage System but not to the extent that is determined to be Significant Wildlife Habitat or Significant Habitat of Endangered and Threatened Species.

As with candidate significant species contained within Significant Natural Areas, candidate significant species already designated as SWH or habitat for Endangered and Threatened Species do not require analysis.

Finally, habitats for plant species shall be included only where the species is growing naturally in the wild.

Eight locally significant wildlife species were identified within the Study Area during field studies undertaken on the Subject Property in 2018 and 2021:

- Eight bird species: Barn Swallow, Baltimore Oriole, Eastern Wood-Pewee, Eastern Kingbird, Hairy Woodpecker, Northern Flicker, Pileated Woodpecker, Yellow-billed Cuckoo
- One reptile: Red-bellied Snake
- One butterfly (Monarch)

The locations of these species, and the two locally significant plant species, are shown on **Figure 4** (**Appendix A**).

Of these, Barn Swallow, Eastern Kingbird, Eastern Wood-Pewee, Hairy Woodpecker, Northern Flicker, Pileated Woodpecker, and Monarch are located within the NHS (significant woodland or minimum established buffer) and will inherently be protected and do not require analysis under OP Policy 4.1.4.4.

The location of the Yellow-billed Cuckoo and Baltimore Oriole are generalized locations based on auditory field observations with location details coincident with the abutting NHS (Significant Woodland plus 10 m buffer). Yellow-billed Cuckoo was not observed during any of the three (3) breeding bird surveys but was instead observed incidentally in 2018 during ELC surveys. It is possible that this species was just moving through the Subject Property. Baltimore Oriole is a common (S4B; apparently secure during the breeding season) bird of woodland edges, open deciduous woodlands, hedgerows, parks, and residential areas (Rising and Flood 2020). The buffer, woodlot edge, proposed park will provide suitable habitat for this species. Overall, Yellow-billed Cuckoo and Baltimore Oriole observations are understood to be pertinent to the protected NHS.

Three tree species are shown on Figure 4 (**Appendix A**). As butternut is a provincially listed Endangered Species, and further discussed in Section 8.4, additional consideration is not required for butternut as a locally significant species. Additionally, the honey locust is expected to be planted based on the location of the tree along Valley Road and at a property boundary, also not requiring analysis.

Black maple is considered locally significant by the City of Guelph, ranked S4? (rank uncertain; apparently secure) in the province. Four trees were documented in a small pocket within FOCM5, associated with a hedgerow at the back of 1260 Gordon Street. It is unclear if these were planted but the tree plan authored by NRSI (**Appendix D**) identified the black maples on the Subject Property in poor health. Regardless, in accordance with OP policy 4.1.4.4 (4ii), all reasonable efforts have been made to protect the habitat in situ which is not feasible in the context of the proposed development. To offset this removal of 4 black maples (5 trunks), 5 black maples have been included in the planting plan (**Appendix J**).

Overall, habitat of significant species was not identified on the Subject Property outside of the NHS. This was determined based on generalized locations during studies completed to date (e.g., Monarch, Eastern Kingbird, etc.), species status considered under other policies (e.g., ESA, butternut), suspected introduction by planting (e.g., honey locust) as well as poor condition and an inability to avoid (e.g., black maple).

5.4 SIGNIFICANT NATURAL HERITAGE FEATURES SUMMARY

Significant natural heritage features identified on the Subject Property and/or Study Area are shown on **Figures 2a,b,c, 3, and 4** (**Appendix A**), and include:

- Hanlon Creek and Torrance Creek PSW (MAS2-1, SWM3-2)
- Significant Woodlands (SWM3-2, FODM6-5, CUP3, CUP3-S4?3)
- habitat of Endangered and Threatened Species (butternut, bat SAR)
- Significant Wildlife Habitat
    - Confirmed SWH (Figure 3, **Appendix A**)
        - Seasonal Concentration Areas of Animals (deer wintering area; SWM3-2, FOC2-2)
        - Habitat for Species of Conservation Concern (Eastern Wood-Pewee; SWM3-2, FOC2-2)
    - Candidate SWH
        - Seasonal Concentration Areas of Animals (Figure 2b, **Appendix A**)
            - bat maternity colonies (SWM3-2, FOD5-6, FOC2-2)
            - turtle wintering area (SWM3-2)
            - woodland raptor nesting habitat (SWM3-2)
        - Habitat for Species of Conservation Concern (Figure 2a, **Appendix A**)
            - terrestrial crayfish
            - Snapping Turtle
        - Specialized Habitat for Wildlife (Figure 2c, **Appendix A**)
            - seeps and springs (SWM3-2)
            - woodland area sensitive breeding bird habitat (SWM3-2)

        - Animal Movement Corridors
            - Deer Movement Corridors

- provincially rare plants (honey locust; planted)
- Locally Significant Features
    - locally significant wetland (City of Guelph OP)
    - deer crossing and ecological corridor Crossing A; (City of Guelph OP and Stantec EIS analysis of corridor potential and use)
    - habitat for locally significant wildlife within the NHS (Barn Swallow, Baltimore Oriole, Eastern Kingbird, Eastern Wood-Pewee, Northern Flicker, Hairy Woodpecker, Pileated Woodpecker, Yellow-billed Cuckoo, Red-bellied Snake, Monarch)
    - locally significant plants where removal is permitted (butternut, black maple)

6.0 PROPOSED DEVELOPMENT

Tricar is proposing to construct two 10-storey residential buildings, one fronting on Gordon Street and one adjacent to the southwest boundary of the Subject Property, as shown on **Figure 5** (**Appendix A**). Surface and underground parking, stormwater management infiltration galleries, and internal roadways are proposed to service the development. A park block and primary trail is also included in the proposed development.

6.1 STORMWATER MANAGEMENT

The Functional Servicing Report (FSR; Appendix H) outlines the stormwater management strategy for the proposed development and includes:

- Sanitary service is provided by the proposed upgrade to the municipal system located on Gordon Street just west of the site access.
- Water service is provided from the existing 400 mm watermain on Gordon Street.
- Enhanced (Level 1) water quality control will be provided for the Subject Property by a combination of an Oil Grit Separate (OGS) unit and Isolator Row Plus®.
- Adequate water quality volumes will be provided to meet the Ministry of Environment Conservation and Parks water quality requirements associated with infiltration facilities.
- The proposed rooftop storage and infiltration facility storage will control the 2- to 100-year peak flows to predevelopment levels prior to discharge to Gordon Street.

6.1.1 Water Quantity and Treatment

Water quantity control of stormwater will be achieved by a combination of rooftop controls (both buildings), infiltration gallery and subsurface stormwater detention facility (Gordon Street outlet). Rooftops will be controlled to industry standard 42 L/s/ha during the 100-year event, through the use of Zurn Control Flo Roof Drain (sized per manufacturer’s recommendations).

The rooftop runoff on the East Building will connect into an on-site infiltration trench with overflow outletting east to the Torrance Creek PSW. The roof runoff of the West Building will connect to a StormTech® infiltration gallery and a StormTech® subsurface stormwater detention facility>the Permavoid infiltration system with overflow directed into the additional Permavoid storage. This storage will also collect runoff from the on-site parking area, including total flows from the south parking area and minor flows from the north parking area. A 75 mm orifice control will be provided on the downstream end, prior to discharge to the Gordon Street storm sewer.

The StormTech® subsurface stormwater detention facility has been sized such that the post-development runoff flow rates to Gordon Street are attenuated to pre-development flow rates.

6.1.2 Infiltration Trenches

As discussed in the *Functional Servicing Report* (Stantec, 2022), the post-development LID infiltration strategy proposed for the Subject Property will involve the construction of two infiltration facilities referred to as the East Infiltration Trench and South Infiltration Trench.

The East Infiltration Trench is sized to capture and infiltrate the 25 mm event over the east building (Building 2) roof area. The total controlled area is 2,400 m^2 of rooftop. This infiltration trench will be located along the east portion of the development, and trench is sized to drawdown within 48 hours.

The south StormTech® infiltration chamber is sized to capture and infiltrate the 25 mm event over parking areas and the west building (Building 1). The total controlled area is 2,400 m^2 of rooftop and 6,300 m^2 of parking area. This infiltration chamber will be located along the south portion of the development and is sized to drawdown within 48 hours after rooftop ponding.

As parking lot infiltration is required to meet water balance targets, salt application is prohibited on site and salt alternatives will be required to perform winter maintenance.

6.1.3 Infiltration Testing and Mounding Assessment

As requested by the City, an assessment of the magnitude of groundwater mounding that could potentially occur beneath the infiltration trenches described above (east and south trenches) was undertaken to determine the ability to support stormwater infiltration strategies proposed for the Subject Property under the post-development conditions.

Based on the input parameters utilized, the maximum groundwater mounding predicted to occur beneath the center of the East Infiltration Trench after a 25 mm event is 0.4 m, equating to an elevation of 339.9 m AMSL based on the seasonally high groundwater elevation. The rise in the groundwater table does not exceed 0.1 m beyond 12 m from the trench center point after a 25 mm storm event.

Maximum groundwater mounding predicted to occur beneath the center of the South Infiltration Trench after a 25 mm event is 0.7 m, equating to an elevation of 340.6 m AMSL based on the seasonally high groundwater elevation. The 25 mm storm event induced mounding will temporarily raise groundwater elevations beneath the underground parking area of the development by 0.1 m along southern limits of this structure, with the mound disappearing once reaching the underside of Building 2.

Since the building and underground parking foundations will be constructed as watertight structures (sealed with a water impermeable membrane) to resist the hydrostatic pressure exerted by the groundwater. As such, no permanent drainage system / dewatering will be required for these structures. The predicted groundwater mound is also not expected to intercept the residential buildings located on the adjacent property immediately to the southeast of the Subject Property.

The Design Infiltration Rate for each infiltration facility as per the approach outlined by the CVC/TRCA (2010). The calculated infiltration rate used in the design of the East and South Infiltration Trenches is 32 mm/hour and 23 mm/hour, respectively, indicating that both trenches will maintain or enhance pre-development infiltration volumes to the subwatershed under the post-development condition.

Further details on the infiltration testing and mounding assessment can be found in the hydrogeological investigations provided in **Appendix E**.

6.1.4 Water Balance and Infiltration

Under the post-development condition, impervious surfaces in the former Catchment 101 (lands draining to the Upper Hanlon Creek Subwatershed) are expected to cover approximately 85% of the post-development catchment areas (1.36 ha of 1.60 ha), resulting in a projected infiltration volume deficit of 2,767 m^3/year (i.e., from 3,234 m^3/year to 467 m^3/year). For the former Catchment 102 (lands draining to the Torrance Creek Subwatershed), impervious surfaces will cover approximately 11% of the post-development catchment areas (0.19 ha of 1.73 ha), resulting in a projected infiltration volume deficit of 534 m^3/year (i.e., from 3993 m^3/year to 3,459 m^3/year). Overall, the total volume of infiltration at the Subject Property will be reduced from 6,760 m^3/year to 3,926 m^3/year (infiltration deficit of 2,834 m^3/year) from the pre- to post-development condition.

The East Infiltration Trench is designed return infiltration volumes lost from the pre- to post-development condition within the portion of the Subject Property located within the Torrance Creek Subwatershed. To address the infiltration deficit of 534 m^3 projected to occur in this area of the Subject Property under the post-development condition, rooftop runoff captured by Building 2 will be discharged to this infiltration facility. Building 2 is projected to annually capture 1,741 m^3 of precipitation, which will subsequently reach the East Infiltration Trench and result in an annual infiltration surplus of 1,207 m^3 being added to the subsurface and recharging the local groundwater system post-development (with this groundwater flowing to the northeast towards Torrance Creek Swamp).

The South Infiltration Trench is designed return infiltration volumes lost from the pre- to post-development condition within the portion of the Site located within the Upper Hanlon Creek Subwatershed. To address the infiltration deficit of 2,767 m^3 projected to occur in this area of the Site under the post-development condition, rooftop runoff captured by Building 1 and parking areas will be discharged to this infiltration facility. These previously mentioned areas are projected to annually capture 6,406 m^3 of precipitation, which will subsequently reach the South Infiltration Trench and result in an annual infiltration surplus of 3,638 m^3 being added to the subsurface and recharging the local groundwater system post-development (with this groundwater flowing off-Site to the southwest towards the Hanlon Creek Swamp).

For the area of the Site located within Upper Hanlon Creek Subwatershed, 85% of these lands under the post-development condition will be converted to impervious surfaces, resulting in the generation of 13,062 m^3 of stormwater runoff per year and an annual runoff surplus of 9,581 m^3. However, under the post development condition, the annual runoff volume generated by Building 2 (of which 62% of this rooftop area covers these lands) will be directed to the East Infiltration Trench, removing approximately

1,079 m^3 (1,741 m^3 x 0.62 = 1,079 m^3) of this stormwater from the Upper Hanlon Creek Subwatershed lands and reduce the runoff surplus to 8,242 m^3 (9,581 m^3 - 1,079 m^3 = 8,242 m^3). As mentioned previously, approximately 6,406 m^3 of the annual stormwater runoff generated from these previously mentioned areas will be directed to the South Infiltration Gallery. Consequently, the infiltration of this runoff will result in the unmitigated runoff surplus of 8,242 m^3 being reduced further to a volume of 1,836 m^3 (8,242 m^3 – 6,406 m^3 = 1,836 m^3). The annual runoff of volume of 1,836 m^3 flowing off-Site will travel southeast along Gordon Street via a drainage ditch and ultimately discharge to a downstream stormwater management facility located near Vaughan Street.

Further details pertaining to the pre- and post-development water balance analyses are presented in the Hydrogeological Assessment Report in **Appendix E**.

6.2 CITY OF GUELPH TRAIL

The proposed trail on the Subject Property is comprised of two sections, a north/south portion within the forested area east of the proposed building envelope and is designated as an Active Transportation Route as well as an east/west local or community connection to this route from Valley Drive through the proposed open space/park block. Both sections of the trail are shown on **Figure 4** (**Appendix A**).

In accordance with guidance provided in the Guelph Trail Master Plan (City of Guelph 2021), the Active Transportation Network Study (City of Guelph 2017) as well as City of Guelph comments (**Appendix B1**), the following design of the trail is described below.

- a 2.5 m wide trail
- the east/west trail will connect the proposed park to the City trail to the east
- meet accessibility criteria outlined in the FADM
- maximum running slope of 5%
- maximum cross slope of 2%
- include rest areas at regular intervals
- have signs
- have sodded drainage swales and culverts where required
- be comprised of a soft surface such as, stonedust, woodchips, gravel, etc. where located within the natural heritage system
- support the requirement for Park Operations vehicular access to both the park block and the north/south trail to the east for maintenance and operational purposes.

Further detail on the trail can also be found in the Landscape Plan in **Appendix J**.

7.0 POTENTIAL IMPACTS OF DEVELOPMENT AND MITIGATION RECOMMENDATIONS

To address City comments #139 and #141, potential impacts and mitigation measures associated with grading, lighting, bird strike, and water balance impacts to the wetland are described below.

7.1 GRADING

To facilitate the proposed development, the grading plan provided in **Appendix I** will require the removal of onsite vegetation including trees as detailed in the TPP (**Appendix D**). The identified NHS components (significant woodland, wetland, etc.) as shown on **Figure 5** (**Appendix A**), including associated buffers, are outside of the proposed areas of grading.

To protect the NHS during grading, tree protection fencing (**Appendix D**) and erosion and sediment control measures (**Appendix I**) will be implemented. With the implementation of these mitigation measures, in addition to those previously discussed in the original EIS, potential impacts are not anticipated to the NHS resulting from grading.

7.2 LIGHTING AND BIRD STRIKES

Impacts of the proposed development on wildlife may occur through bird-building collisions and disturbance due to light intrusion can be mitigated through the implementation of specific design details for both the building and associated lighting.

The City of Guelph's Bird-friendly Design Guideline (2021) and Lighting Guidelines for Lighting Plans (2019) provides guidance on these items and include:

- visual markers where a building faces the natural heritage system (e.g., fritted, etched, or fenestration patterns)
    - applied to the first 16 m of the height of the building
    - markers are to be maximum 5 cm apart and minimum of 0.5 cm in diameter
    - applied a minimum of 85% of exterior glazing that faces natural heritage system
- directing external lights downward
- limit glare

Bird-building collisions are further mitigated by the reduction of building heights from 12- to 10-storeys as well as the location of the Subject Property away from the confluence of migration pathways and the Great Lakes, two factors that make the City of Toronto a high-risk area for these types of collisions (City of Toronto 2016).

Effects of artificial lighting on wildlife may result in changes to:

- movement patterns through attraction or repulsion
- orientation
- interspecies interactions
- communication
- reproduction
- and mortality rates (Longcore and Rich; 2004)

Properly planned lighting can mitigation these potential impacts which, according to Gaston et al., (2012) includes the following considerations:

i) *prevent areas from being artificially lit*

ii) *limit the duration of lighting*

iii) *reduce the ‘trespass’ of lighting into areas that are not intended to be lit (including the night sky)*

iv) *change the intensity of lighting*

v) *change the spectral composition of lighting*

7.3 HYDROLOGIC IMPACTS TO THE WETLANDS

Typical hydrologic impacts include an increase in overland flow for any given storm event and a reduction in infiltration rates results post-development due to the introduction of impervious ground surfaces. The proposed stormwater management strategy detailed in **Section 6.1** includes LID infiltration trenches designed to match or exceed pre-development infiltration volumes for the Torrance Creek and Upper Hanlon subwatershed. Salt use is prohibited onsite as infiltration is required for the parking lot to meet targets and avoid negative impacts to the NHS.

As detailed in the FSR (**Appendix H**), post-development flows to the Torrance Creek watershed are proposed to have a minor increase over the pre-development flow rates during the modeled storm events. Based on the hydrologic modeling the increase in flows is primarily a result of uncontrolled runoff from Catchments 205 (Future Park Block) and 206 (landscaped area on the east portion of the site) and the result of shorter flow paths than under pre-development conditions. It is not expected that this minor increase in flows (30 L/s in the 100-year storm event) under inundated conditions will have an impact on the downstream Torrance Creek Swamp or downstream infrastructure (which will be buffered by the Torrance Creek Swamp).

No hydrologic impacts to the Torrance Creek PSW are anticipated post-development.

7.4 MINIMUM BUFFERS

The minimum buffers set out in the City of Guelph's OP (2021) Table 6.1 were assessed for their appropriateness in consideration of site conditions and wildlife movement and applied to the proposed development such that development is set back at least 10 m from the Significant Woodlot boundary and at least 30 m from the PSW boundary. Based on the shape of the features onsite, buffers to the building edge range from approximately 13 to 69 m from the significant woodland and 127 m to the PSW.

As defined in the Glossary of the OP, [e]*stablished Buffers means: the buffers established and approved by the City following the adjacent lands analysis carried out through the required site specific study (e.g. EIS or EA).* This may (or may not) coincide with the established minimum buffers set out in the OP.

A detailed buffer analysis was undertaken by Dougan & Associates in 2009 during the development of the City of Guelph's Natural Heritage Strategy. They determined that a minimum of 30 m around a PSW was conservative based on science reviewed (e.g., Azous and Horner 2000) and precedents in other jurisdictions at the time (e.g., City of Pickering, City of Hamilton). Of note, both the City of Pickering (2018) and City of Hamilton (2009) still have the same 30 m setback, with nearby municipalities such as the City of Waterloo (2012) and City of Cambridge (2018) requiring a minimum 10 m setback, although the City of Cambridge indicates that a 30 m setback to a PSW "may" be required. A minimum buffer of 10 m from the drip line of significant woodlands is consistent with the City of Waterloo, the City of Guelph, and the City of Pickering.

Based on the analysis undertaken by Dougan & Associates during the development of the NHS for the City of Guelph as well as the precedents in nearby jurisdictions for setbacks to PSWs (30 m) and significant woodlands (10 m), the buffers applied on the Subject Property (ranging from 13-69 m for the edge of building to woodlot boundary and 127 m to the PSW) are considered adequate to mitigation impacts of the proposed development.

7.5 CITY TRAIL

Three candidate trail alignments were reviewed in the field by Stantec and NRSI on March 29, 2022. The preferred route (referred to as Alignment 3 in the TPP; **Appendix D**) will enter the Subject Property from proposed Street A, traverse through the park block on an alignment to be confirmed as part of the park block design being undertaken by the City, continue easterly adjacent and across the significant woodlot buffer and then enters into the NHS to join the north-south active transportation portion of the trail. Trail alignments north and south of the Subject Property site have been designed and approved through the development review process and as such this portion of the trail, the north-south active transportation link, is predetermined and is based on the alignment provided by the City of Guelph in 2014. This section of the trail occurs adjacent and within the significant woodlot boundary, which is a permitted use (i.e., passive recreation) within the NHS according to the City's OP General Permitted Uses (Section 4.1.2).

The requirement to provide a trail alignment that connects the Park block to the City's active transportation link provides the following potential benefits for path users:

- Environmental educational opportunities
- Wildlife viewing
- Nature appreciation
- Connection to nature
- Mental health benefits
- Increase use of active transportation network to reduce road traffic
- Physical fitness
- Sense of community

However, some potential impacts of the trail may include:

- Creation of ad-hoc trails
- Refuse
- Garden waste dumping
- Spread/introduction of invasive/exotic species
- Creating a new edge within the NHS (e.g., altered wind, light regime)
- Vegetation impacts and removal (including butternut, discussed below)
- Buffer reduction
- Disturbance to wildlife by cats and off-leash dogs (discussed below)
- Attraction of nuisance wildlife (e.g., raccoons, skunks)

7.5.1 Vegetation

As outlined in the TPP (**Appendix D**), a total of 191 trees were inventoried in the trail vicinity, with 85 trees anticipated to be impacted to facilitate the installation of the two trails. Of the 191 trees inventoried, 188 are native trees and 3 are non-native trees. Most trees were in fair health and were primarily Eastern White Cedar, American Basswood, and Black Cherry.

Construction works will also occur within the protection zones of some of the compensation Butternuts planted onsite and will further encroach into the protection zone for an existing butternut (JUG-003; see the TPP). The trail will be field fit to avoid encroachment into the protective zones as much as feasible, favoring encroachment on the planted trees which have smaller root zones as opposed to the more mature JUG-003. Butternut is an endangered tree species occurring on the Subject Property with plantings undertaken in the fall of 2020 to compensate for the removal of two (2) butternuts the same year. As detailed in the TPP, it is expected that the root zones of the recently planted butternuts will not be impacted during trail construction, however further correspondence with the MECP has been initiated to ensure that trial alignment is not considered as a contravention of the ESA. A response from the MECP has not yet been received at the time of this submission.

7.5.2 Wildlife

As outlined in Section 5.2, bat species at risk, a deer wintering area, and habitat for Eastern Wood-Pewee occur within the significant woodlot in proximity to where the trail is proposed.

Use of the trail, which includes cats and dogs, may create the following impacts:

- Increased stress to animals due to disturbance
- Alteration of movement patterns, particularly during daylight hours when trails are more heavily used
- Destruction of bird and turtle nests as unpaved trails may promote nesting by snapping turtles
- Mortality to songbirds and small mammals by cats and dogs
- Habitat degradation

Deer movement is not expected to be impacted as this species is more active at dusk and dawn which is a time of expected low activity on the trails. As noted in the original EIS:

- Deer are highly mobile animals (e.g., Alverson et al., 1988; Gaughan and DeStefano, 2005, etc.) and as such are not expected to be at risk of fragmentation effects nor direct impact during construction.
- Gordon Street is a 4-lane transportation artery in the City of Guelph with existing impacts to local deer populations. These impacts include disturbance to the species due to high volumes and continuous traffic on Gordon Street and the potential for direct impacts through road mortalities.
- The anticipated reduced traffic flow from 6 pm until 6 am on Gordon Street corresponds to when deer movement across the Subject Property was highest. White-tailed deer are crepuscular, browsing mainly at dawn and dusk), placing them at lower risk of traffic impact and disturbance.
- As southern populations of deer are known to conditionally migrate (Sabine et al., 2002), it is possible that deer in proximity to the Subject Property are conditionally migratory due to a more temperate climate than elsewhere in its range. Therefore, a resident population of deer in the PSW may exist year-round, increasing to some degree in winter, but a mass migration of deer between the Torrance Creek and Hanlon Creek PSW is likely not occurring pre (or post) construction.
- The primary limiting factor for deer in the northeastern part of their range in North America is density dependent foraging competition (Messier 1991; Post and Stenseth, 1998; Dumont et al., 2000; Patterson and Power 2002; as cited in Patterson et al., 2002), which is not expected to change post-construction. Shrubby edge vegetation will persist, with the potential for additional plantings (i.e., food) to be provided post-construction.

- No impact is expected to the function of the woodland or PSW and therefore the quality of the overwintering deer habitat will not change post-construction. Maintenance of this habitat is important to the life cycle processes of deer utilizing the Subject Property and Study Area.

7.5.3 Mitigation

Overall, impacts of the proposed trail may be offset by the benefits as well as mitigating human behaviour through signage and education (e.g., homeowner brochure, educational trail signage) which could address issues such as keeping your cat inside, keeping your dog on a leash, and the negative impacts of dumping garden waste. Provisioning of garbage receptacles will also help protect the natural heritage system. The trail provides the opportunity for interaction between nature and recreational users for a variety of benefits in controlled and unobtrusive environment where motorized vehicles will be prohibited.

8.0 POLICY COMPLIANCE

This addendum report addresses the natural heritage features defined in the PPS, City of Guelph OP, GRCA Regulation 150/06 and the *ESA*, and demonstrates that the recommendations and intent of the relevant provincial and municipal policies have been incorporated in the proposed development.

8.1 PROVINCIAL POLICY STATEMENT

Development is sited outside of the Torrance and Hanlon Creek PSW, consistent with the PPS which does not allow development within significant wetlands. Development is also cited outside of SWH features, with the PPS allowing development in or adjacent to SWH if no negative impacts are anticipated. Although we anticipate redirecting of deer movement around the Subject Property post-development, significant negative impacts to deer and the other identified SWH in the Study Area are not anticipated with the implementation of the avoidance and mitigation recommendations.

Development and site alteration is not permitted within habitat of threatened or endangered species, except in accordance with provincial and federal requirements. Considerations for bat SAR and butternut are discussed under **Section 8.4**

8.2 CITY OF GUELPH OFFICIAL PLAN

The City's OP permits development on lands adjacent to Significant Natural Areas or within Natural Areas if an EIS can demonstrate no negative impacts on the features or on their associated ecological functions. Grading is not proposed within the 10 m buffer adjacent to the significant woodland boundary and at the time of this report, tree plantings have been undertaken in the buffer in accordance with requirements of Section 23.7 of Ontario Regulation 242/08 of the ESA (**Appendix G**). Eighty seedlings (40 butternut and 40 additional trees, referred to as companion trees in **Appendix G**) have been planted which will be supplemented with additional plantings to be detailed in an updated Landscape Plan submitted as part of the EIR. The concept plan is developed to maintain the ecological function of the buffer, attenuation of noise, air, and visual influences on the feature and is consistent with the buffer guideline of the OP. No negative impacts are anticipated from the development with the implementation of the avoidance and mitigation recommendations include in the original EIS and this addendum (e.g., dripline and root zone avoidance, fencing, monitoring). Therefore, the proposed development is in compliance with the polices of the OP. The buffers inclusion in the apartment block zoning will have no negative impacts to the natural heritage features given the aforementioned concept plan, established land use and plantings, and additional initiatives that will be implemented and subject to conditions of Site Plan Approval.

Minimum setbacks required in the OP have been respected by the proposed development (i.e., 30 to PSW, 10 to significant woodland). As detailed in Section 7.4, these minimum buffers are expected to be sufficient to avoid negative impacts to the NHS.

According to the City of Guelph OP, passive recreation includes:

a range of outdoor activities and passive uses compatible with protecting the Natural Heritage features and areas including, but not limited to, wildlife habitat, wetlands and woodlands. Activities and uses include bird watching, hiking, photography, snowshoeing, and may require the construction of a trail, benches or boardwalks in accordance with the Guelph Trail Master Plan or are integral to the scientific, educational or passive recreational use of a property.

Under general permitted uses (Section 4.1.2. of the OP) passive recreation (i.e., the proposed trail) is permissible.

8.3 GRAND RIVER CONSERVATION AUTHORITY

The proposed development is located within the GRCA's regulated area within the area of interference (i.e., 120 m) of the Torrance Creek PSW.

The development is consistent with GRCA policy as the Hydrogeological Assessment Report provided in **Appendix E** indicated that the hydrogeological function of the Torrance Creek PSW to the northeast of the Subject Property will not be impacted by the proposed development. The planned post-development LID infiltration strategy is designed to maintain existing/pre-development groundwater flow volumes towards this PSW.

8.4 ENDANGERED SPECIES ACT

Bat SAR and butternut may be impacted by the proposed development.

A notice of assessment to impact (i.e., remove, construct within 25 m) butternut trees was made under Ontario Regulation 242/08 Section 23.7. A replanting plan has been implemented in accordance with the Regulation.

Although bat exit surveys did not confirm use at any of the identified candidate roost trees located within the hedgerows and residential areas, bat SAR were documented during surveys conducted in 2018 and 2021. An Information Gathering Form will be submitted to MECP to determine requirements under the ESA.

9.0 REPORT SUMMARY

This EIS Addendum documented the following:

- Results of the background records review identified the following features on the Subject Property and/or in the Study Area
  - Hanlon Creek and Torrance Creek PSW
  - deer wintering habitat
  - locally and provincially significant wetlands (City of Guelph OP Schedule 4A)
  - significant woodlands (OP, Schedule 4C)
  - significant wildlife habitat (OP, Schedule 4E)
  - deer crossing and ecological linkage (OP, Schedule 4).
- Results of the field programs conducted in 2018 and 2021 identified the following features, as shown on **Figures 3** and **4** (**Appendix A**):
  - habitat of Endangered and Threatened Species (butternut, bat SAR)
  - Significant Wildlife Habitat
    - Confirmed SWH
      - Seasonal Concentration Areas of Animals (deer wintering area; SWM3-2, FOC2-2)
      - Habitat for Species of Conservation Concern (Eastern Wood-Pewee; SWM3-2, FOC2-2)
    - Candidate SWH
      - Seasonal Concentration Areas of Animals
        - bat maternity colonies (SWM3-2, FOD5-6)
        - turtle wintering area (SWM3-2)
        - woodland raptor nesting habitat (SWM3-2)
      - Habitat for Species of Conservation Concern
        - terrestrial crayfish

        - Snapping Turtle
    - Specialized Habitat for Wildlife
        - seeps and springs (SWM3-2)
        - woodland area sensitive breeding bird habitat (SWM3-2)

- One provincially rare plant (honey locust) was documented on the Subject Property but is proposed to be retained. It is possible this tree was planted based on the location along property boundaries.

- The two (2) deer crossings identified in the City of Guelph OP were assessed as part of movement studies and analysis of significance. Crossing A, as shown on **Figure 5** (**Appendix A**) is included as part of the NHS for deer crossing and ecological corridor as addressed in the EIS.

- Locally significant species (Barn Swallow, Baltimore Oriole, Eastern Kingbird, Eastern Wood-Pewee, Hairy Woodpecker, Northern Flicker, Pileated Woodpecker, Yellow-billed Cuckoo, Red-bellied Snake) and plants (butternut, black maple) were identified, predominantly outside of the proposed project footprint.

- The proposed development consists of two 10-storey residential buildings, one fronting on Gordon Street and one adjacent to the southwest boundary of the Subject Property. Surface and underground parking, stormwater management infiltration galleries, and internal roadways are proposed to service the proposed development. A park block is also included in the proposed development however the details of which are to be designed by the City in the future.

- Stormwater quantity control by a combination of rooftop controls over both the west and east building and subsurface storage. Two on-site infiltration systems are proposed to promote infiltration of the rooftop and parking lot runoff to the groundwater system, with overflows out-letting to the Gordon Street storm sewer, controlled to the pre-development flow rate. The infiltration galleries are designed to at least maintain pre-development infiltration volumes occurring in the catchment that provides groundwater flow to the Torrance Creek PSW and in the catchment that provides groundwater flow to Hanlon Creek under the post-development condition. Infiltration testing and groundwater mounding calculations were completed to assess the feasibility of the proposed stormwater management infiltration trenches.

- Potential impacts of the proposed development and associated mitigation measures were detailed in the previously submitted EIS. This Addendum detailed grading, lighting, recreational trial, and hydrologic impacts to the wetland and mitigation measures such that no negative impacts on the NHS are anticipated as a result of the proposed development. This is in accordance with the PPS, City of Guelph OP, and GRCA policies.

10.0 RECOMMENDATIONS FOR THE ENVIRONMENTAL IMPLEMENTATION REPORT

It is our understanding that an Environmental Implementation Report (EIR) will be required to provide guidance on how to address recommendations contained within the original EIS and this EIS Addendum. The following topics are recommended for inclusion in the EIR:

- Demonstrate how policies and the conditions of approval have been met
- Demonstrate how municipal infrastructure servicing will be undertaken in a manner that will protect significant natural heritage features and their ecological functions
- Additional details on the landscape plans for the buffer areas and stormwater management facility will be prepared. These plans will be completed by an accredited Landscape Architect and include:
    - compensation plantings of native species for trees being removed
    - tree protection fencing
    - demarcation
    - signage
    - educational/interpretive and stewardship materials
- A detailed Erosion and Sediment Control Plan
- Detailed guidance on bird-friendly building design to be incorporated as part of detailed design.
- Provide additional details on the proposed post-construction monitoring plan provided in the EIS
- Include a Groundwater Dewatering Assessment and recommendations for monitoring and best practice.
- Invasive species management, monitoring, and removal plan
- Hazard tree management
- Recommendations contained within the TPP for inclusion in the EIR:
    - Polygon A should be inventoried individually to quantify the number of trees to be removed and retained
    - Tree retention within the park block should be reassessed based on City needs and trail design

- Compensation requirements should be updated to reflect the above items
- The compensation plan should be developed by, or reviewed and approved by a Certified Arborist
- Include hardy, native tree species where feasible that are known to thrive in more urban conditions (i.e. compacted soil, drought, high salt tolerance)
- Include a diversity of trees from several genus to increase disease and pest tolerance and discourage monocultures (no more than 30% from a single genus, 10% from a single species)
- Include a watering and monitoring plan for 2 years following planting
- Be replaced if they are documented to have died within the 2-year monitoring plan
- Be spaced so as to allow material to reach its ultimate size and form
- Be provided with appropriate soil types and soil volumes
- Avoid ash species due to the risk of the emerald ash borer (*Agrilus planipennis*)
- Avoid ‘messy trees’, such as fruiting trees or poplars (Populus spp.) where plantings occur in close proximity to driveways and roadways
- Spacing of plant material should account for the ultimate size and form of the selected species and also the purpose of the planting, whether it be for screening, shade, naturalizing, rehabilitation, etc.
- Special attention to location and height of trees in proximity to utilities.

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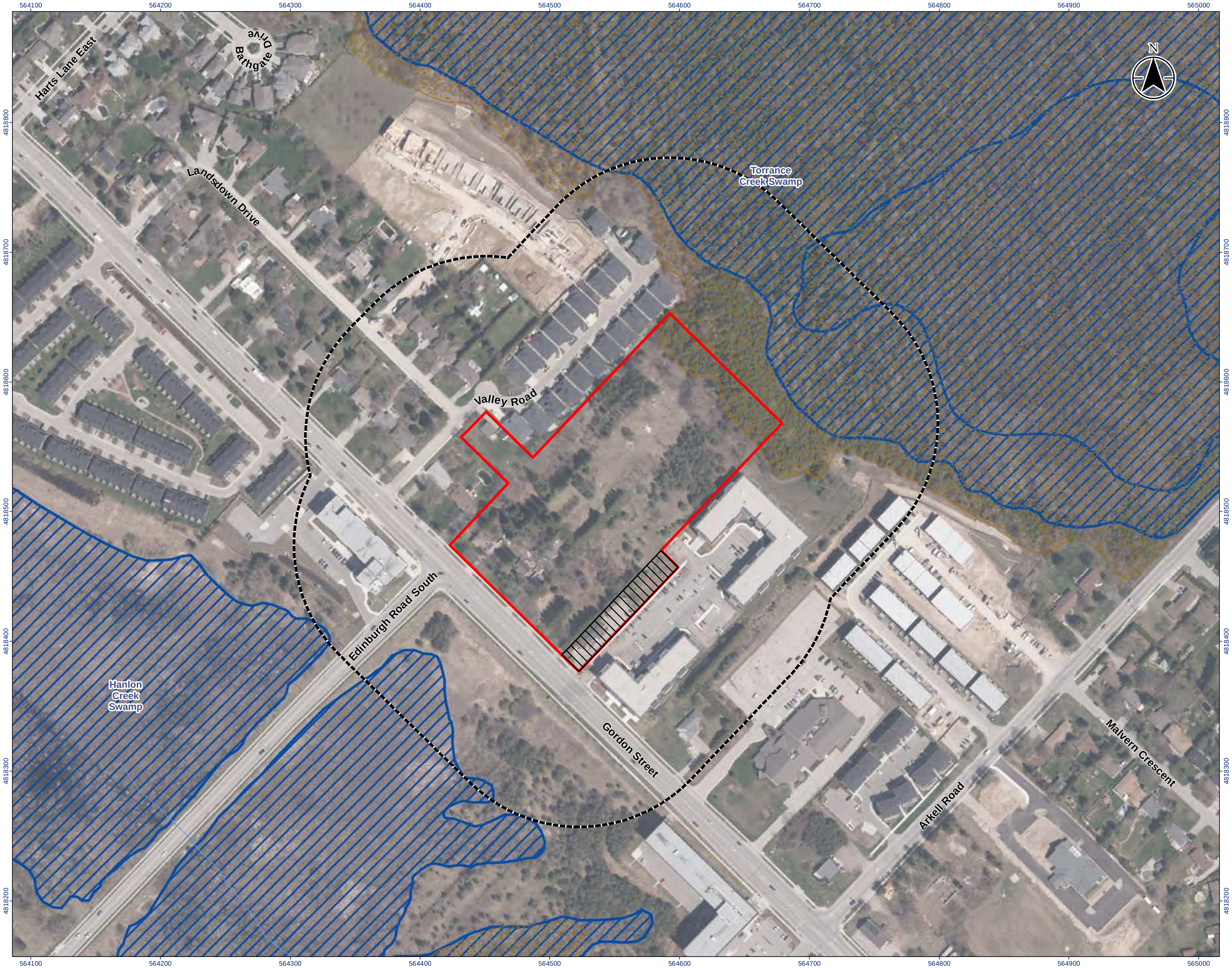
APPENDIX A
FIGURES



Stantec

Legend

- ⬚ Study Area (120 m)
- 🟥 Subject Property
- — Watercourse (Permanent)
- ▨ 1270 Gordon St. (Formerly Monte's Place)
- ▦ Deer Wintering Area (LIO)
- ▨ Wetland, Provincially Significant (LIO)

0 25 50
Metres

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

Notes
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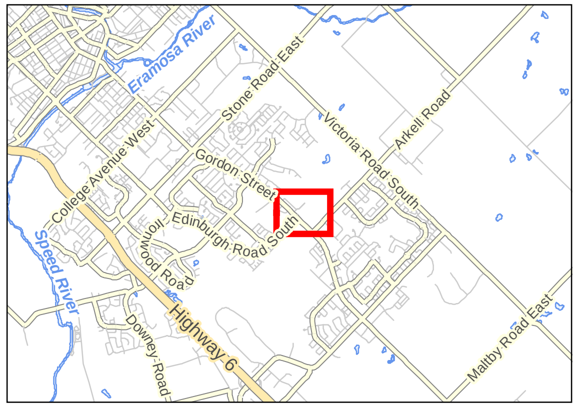

Project Location
City of Guelph

161413684
Prepared by DH on 2022-06-08

Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260, 1270 GORDON STREET AND 9 VALLEY ROAD
EIS ADDENDUM

Figure No.
1

Title
Study Area

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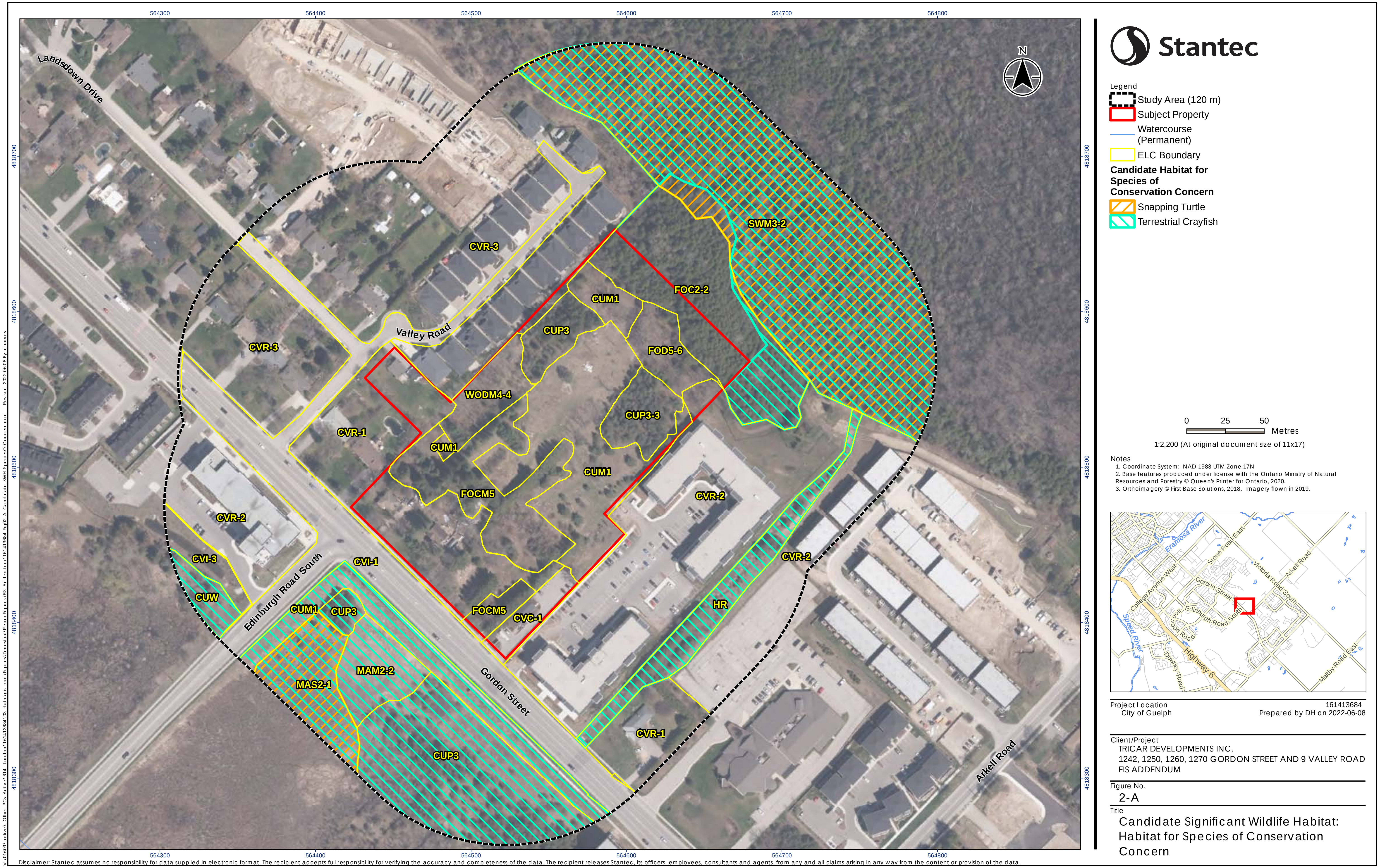

Stantec

Legend

- ⬚ Study Area (120 m)
- 🟥 Subject Property
- Watercourse (Permanent)
- 🟨 ELC Boundary

Candidate Habitat for Species of Conservation Concern

- ▨ Snapping Turtle
- ▨ Terrestrial Crayfish

0 25 50 Metres

1:2,200 (At original document size of 11x17)

Notes

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EIS ADDENDUM

Figure No.
2-A

Title
Candidate Significant Wildlife Habitat: Habitat for Species of Conservation Concern

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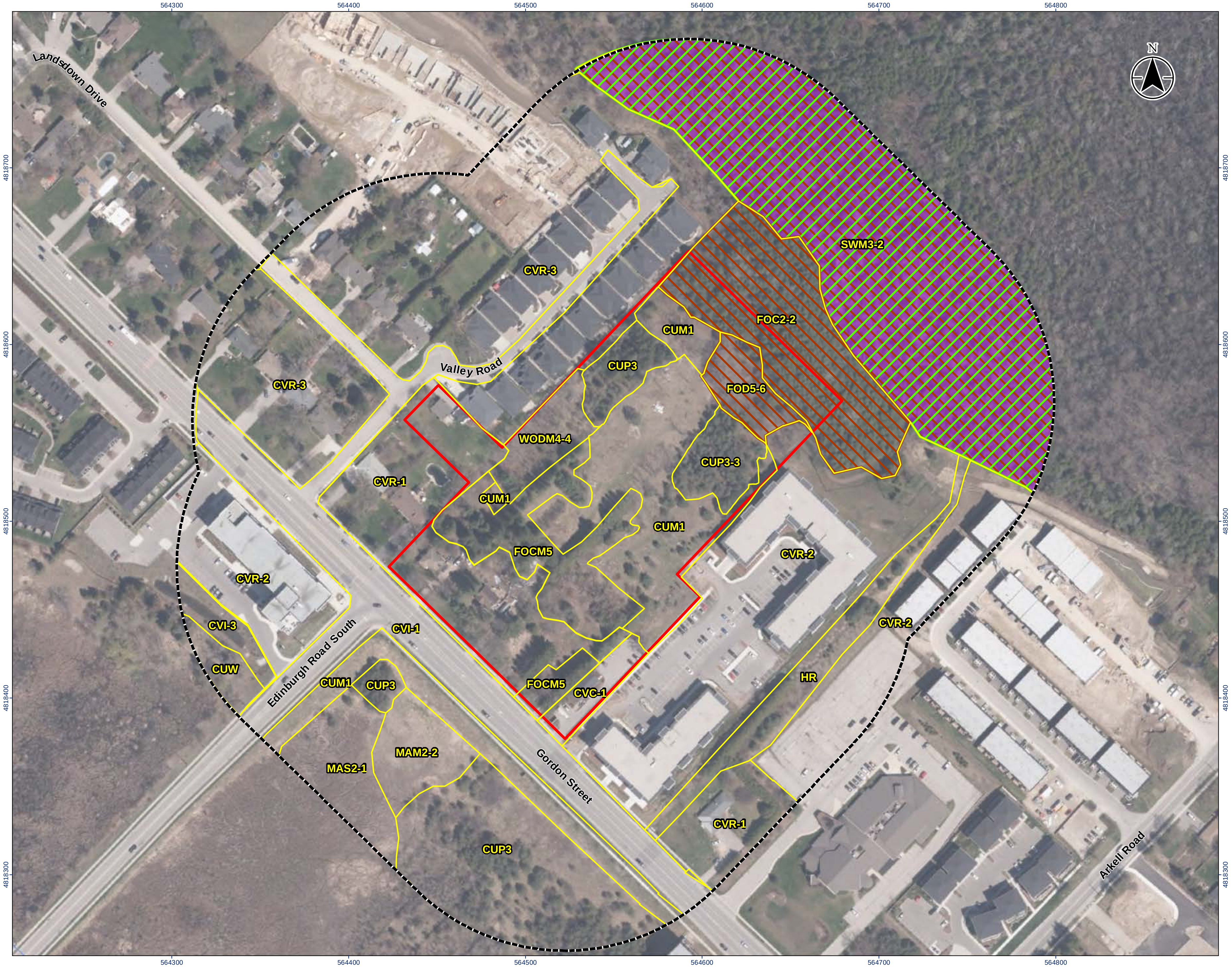

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Stantec

Legend

- ▭ Study Area (120 m)
- 🟥 Subject Property
- — Watercourse (Permanent)
- 🟨 ELC Boundary

Candidate Habitat: Seasonal Concentration of Animals

- ▨ Bat Maternity Colonies
- ▨ Turtle Wintering Area
- 🟪 Woodland Raptor Nesting

0 25 50 Metres

1:2,200 (At original document size of 11x17)

Notes

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1242, 1250, 1260, 1270 GORDON STREET AND 9 VALLEY ROAD
EIS ADDENDUM

Figure No.
2b

Title
Candidate Significant Wildlife Habitat: Seasonal Concentration Areas of Animals

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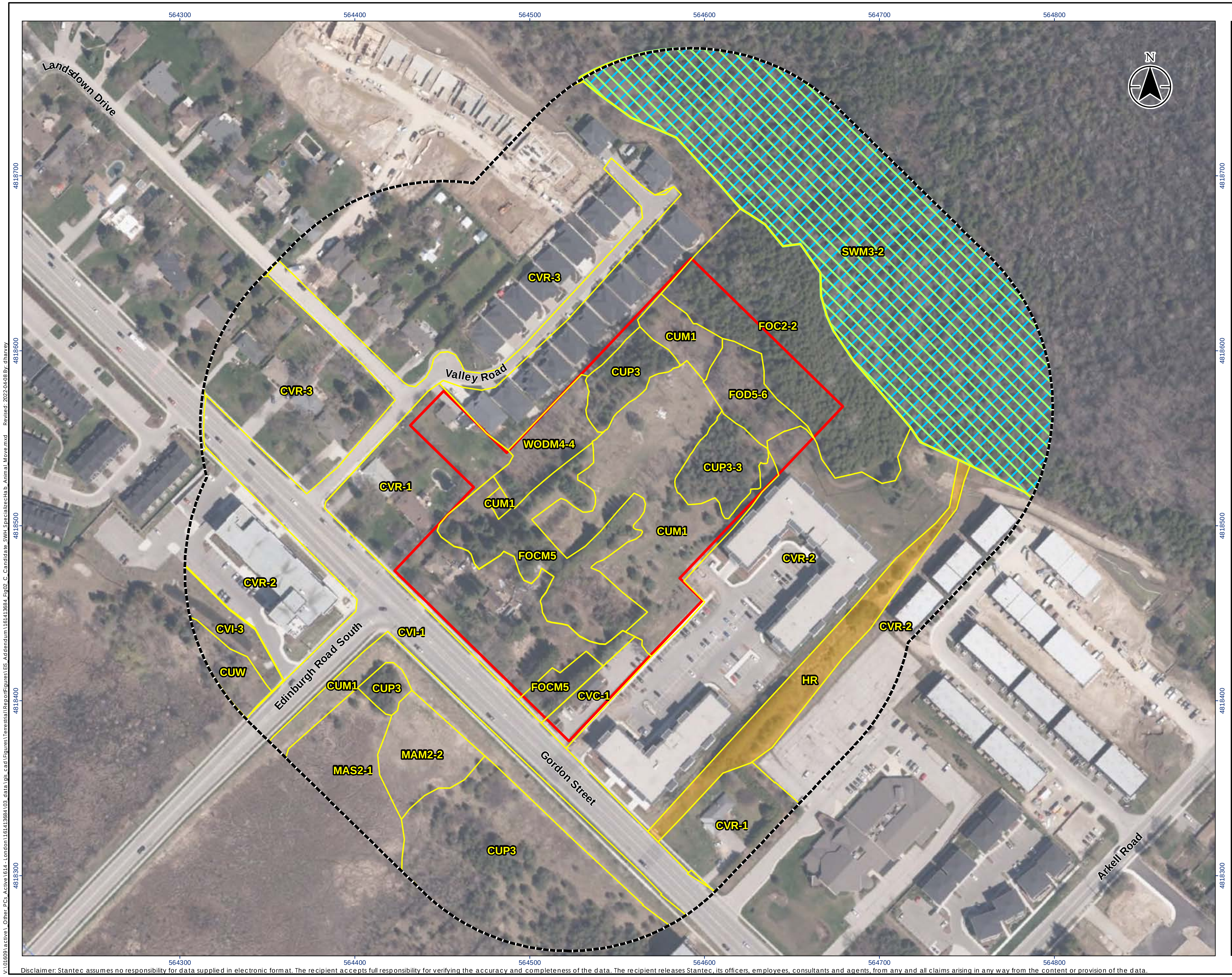

Stantec

Legend

- Study Area (120 m)
- Subject Property
- Watercourse (Permanent)
- ELC Boundary

Candidate Habitat: Specialized Habitat for Wildlife

- Seeps and Springs
- Woodland Area Sensitive Breeding Bird Habitat

Candidate Habitat Animal Movement Corridor

- Deer Movment Corridor

0 25 50 Metres

1:2,200 (At original document size of 11x17)

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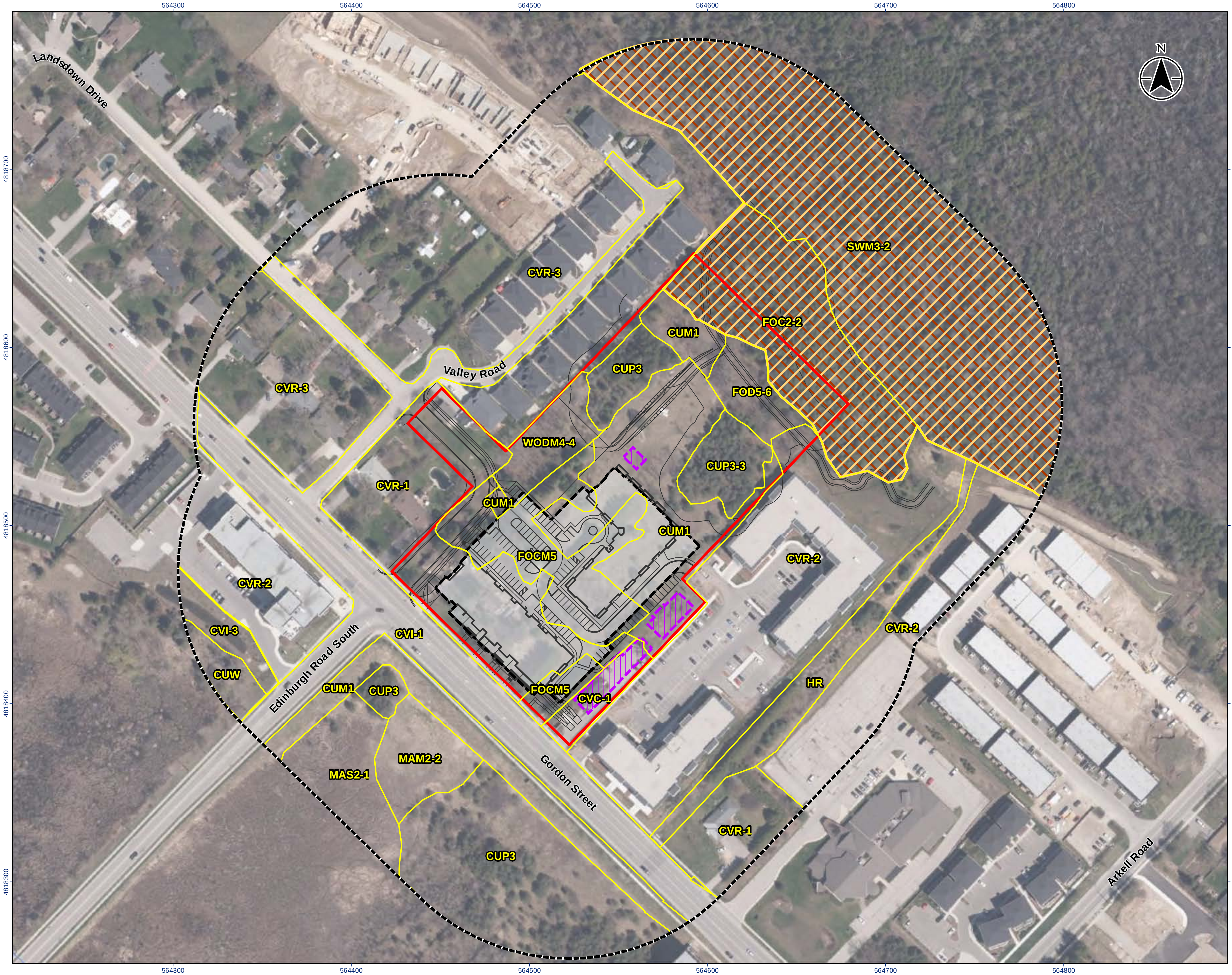
1242, 1250, 1260, 1270 GORDON STREET AND 9 VALLEY ROAD
EIS ADDENDUM

Figure No.
2c

Title
Candidate Significant Wildlife Habitat:
Specialized Habitat for Wildlife and
Animal Movment Corridors



Stantec

Legend

▭ Study Area (120 m)

🟥 Subject Property

— Watercourse (Permanent)

▭ ELC Boundary

Development Plan

— Proposed Building

- - Proposed Building (Underground)

— Proposed Development Plan

▭ Proposed Extent of Underground Parking

▨ Proposed Stormwater Management

Habitat for Species of Conservation Concern

▨ Eastern Wood-Pewee

Seasonal Concentration Areas of Animals

▨ Deer Wintering Area

0 25 50 Metres

1:2,200 (At original document size of 11x17)

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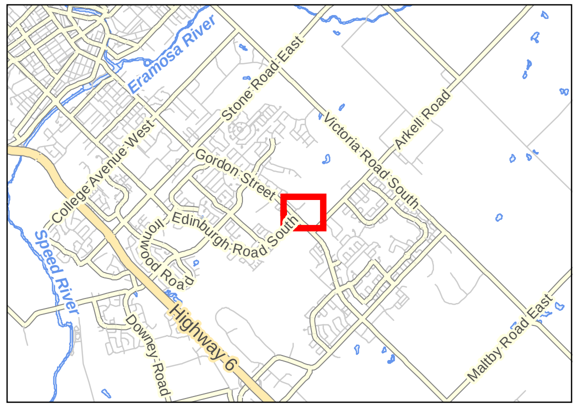

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1242, 1250, 1260, 1270 GORDON STREET AND 9 VALLEY ROAD
EIS ADDENDUM

Figure No.
3

Title
Confirmed Significant Wildlife Habitat

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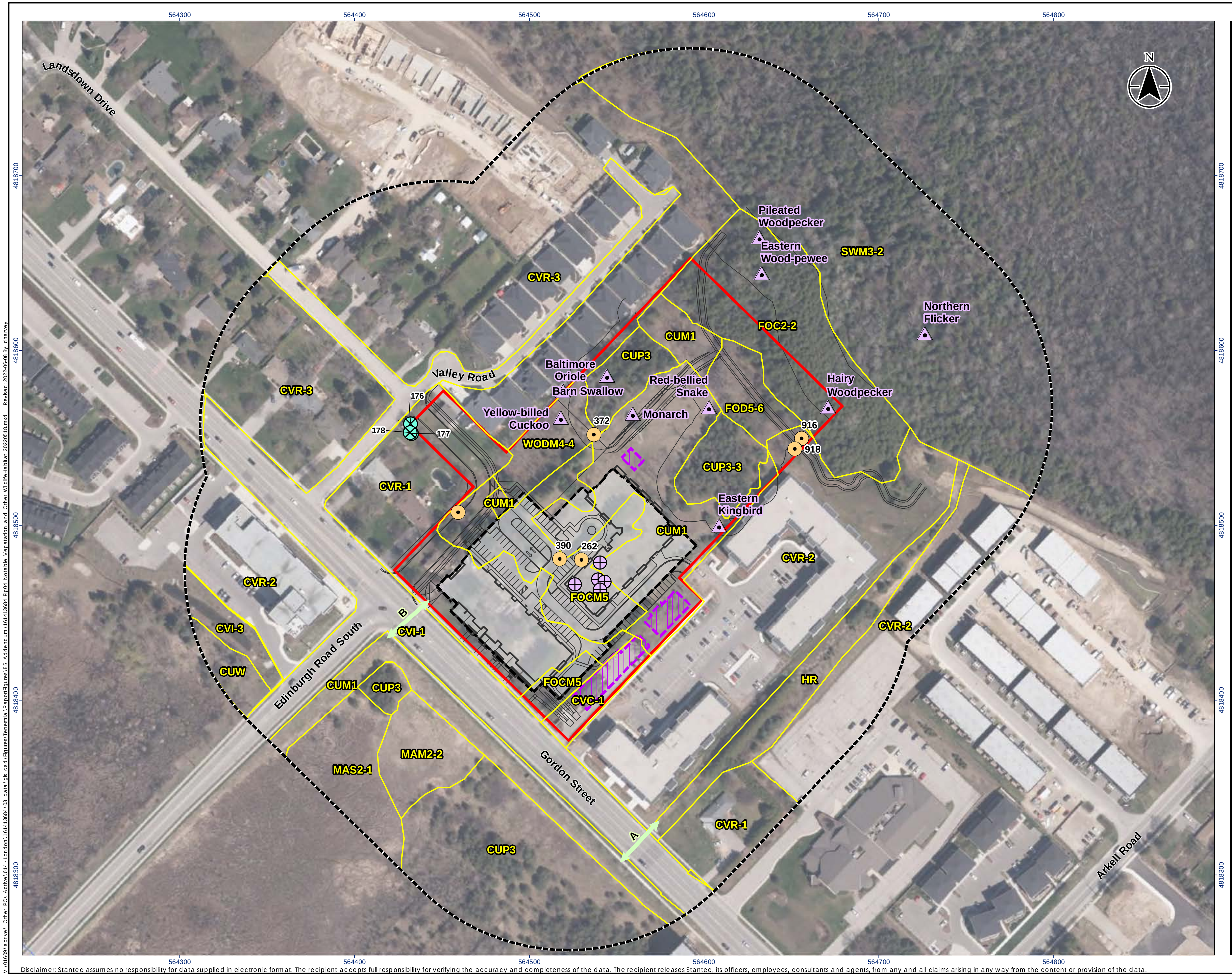

Stantec

Legend

⬚ Study Area (120 m)
🟥 Subject Property
Watercourse (Permanent)
🟨 ELC Boundary

Development Plan

— Proposed Building
- - - Proposed Building (Underground)
— Proposed Development Plan
▭ Proposed Extent of Underground Parking
▨ Proposed Stormwater Management

Notable Vegetation

⊙ Species at Risk Plant Species - Butternut
⊗ Provincally Rare Plant Species - Honey Locust (Planted)
⊕ Locally Significant Plant Species - Black Maple

Other Wildlife Habitat

△ Locally Significant Species Observation
↔ Deer Crossing (City of Guelph OP Schedule 4)

0 25 50 Metres

1:2,200 (At original document size of 11x17)

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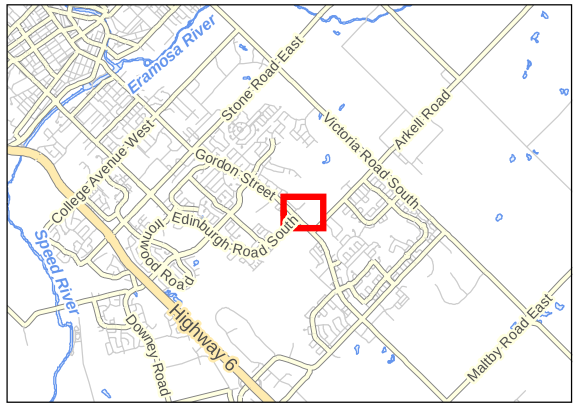

Project Location
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Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260, 1270 GORDON STREET AND 9 VALLEY ROAD
EIS ADDENDUM

Figure No.
4

Title
Notable Vegetation and Locally Significant Wildlife Observations

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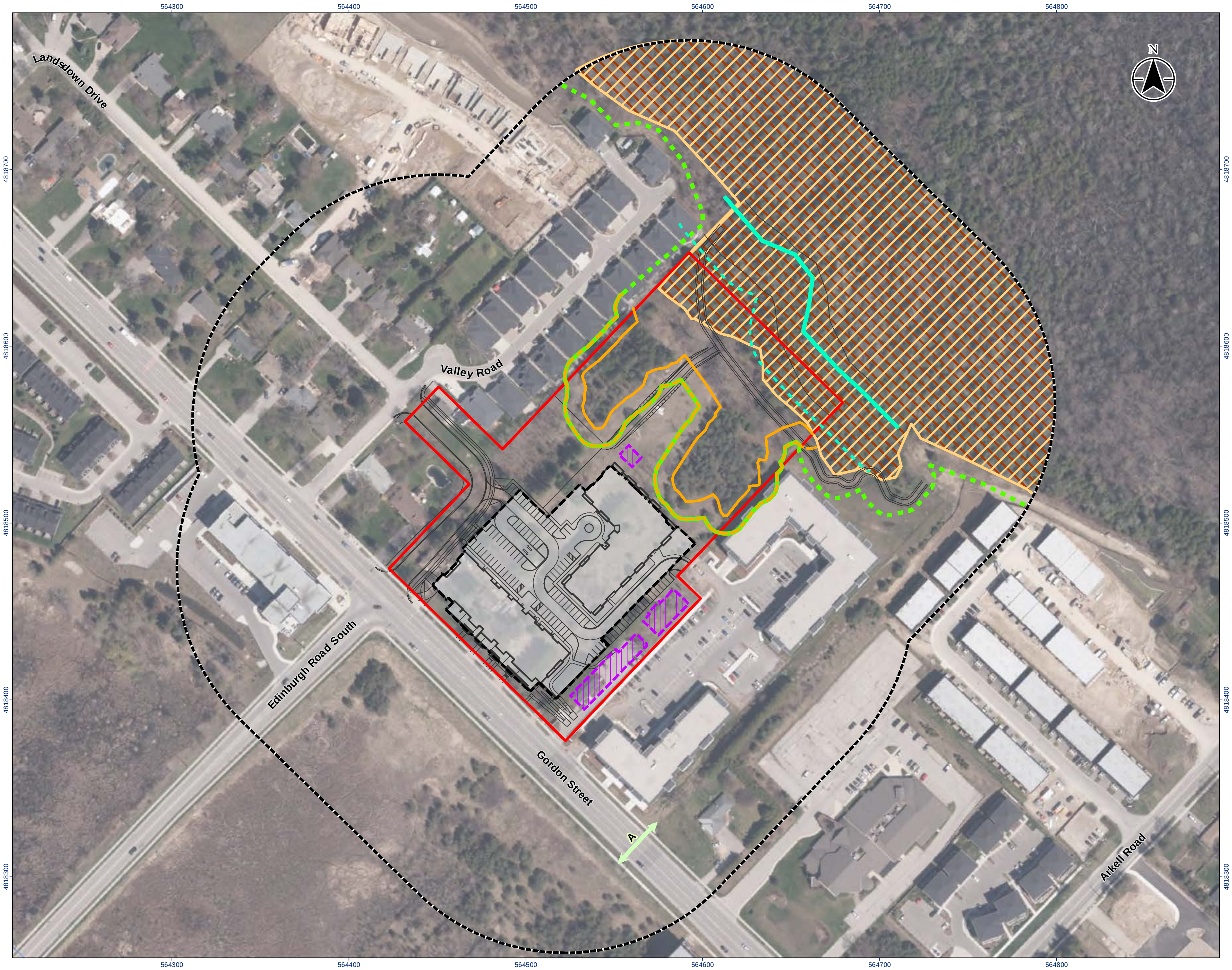

Stantec

Legend

- ⬚ Study Area (120 m)
- 🟥 Subject Property
- — Watercourse (Permanent)

Development Plan

- — Proposed Building
- - - Proposed Building (Underground)
- — Proposed Development Plan
- ▭ Proposed Extent of Underground Parking
- ▨ Proposed Stormwater Management

Natural Heritage System

- — Limit of Natural Heritage System
- - - Inferred Limit of Natural Heritage System

- — Wetland Boundary (approved by GRCA, 2019)
- - - Wetland Setback (30 m)
- ↔ Deer Crossing (City of Guelph OP Schedule 4 and EIS Analysis)
- — Significant Woodland Boundary (approved by the City of Guelph, 2017)
- - - Significant Woodland Setback (10 m)

Habitat for Species of Conservation Concern

- ▨ Eastern Wood-Pewee

Seasonal Concentration Areas of Animals

- ▨ Deer Wintering Area

0 25 50
Metres

1:2,200 (At original document size of 11x17)

Notes

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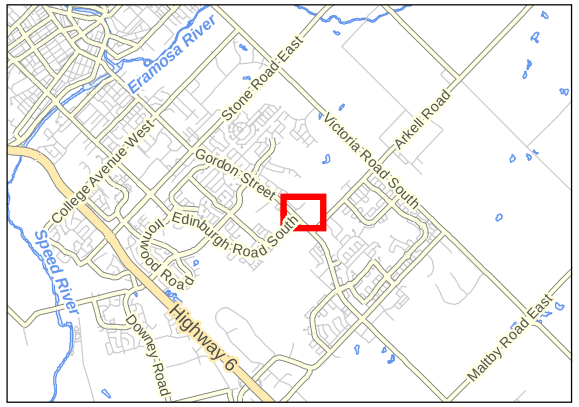

Project Location
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161413684
Prepared by DH on 2022-06-08

Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260, 1270 GORDON STREET AND 9 VALLEY ROAD
EIS ADDENDUM

Figure No.
5

Title
Natural Heritage System

V:\01609\active_Other_PCs_Active\614 - London\161413684\03_data\gis_cad\Figures\Terrestrial\ReportFigures\EIS_Addendum\161413684_Fig05_Limit_of_Natural_Heritage_System_20220518.mxd Revised: 2022-06-08 By: dharvey

APPENDIX B
CITY CONSULTATION

APPENDIX B.1
CITY OF GUELPH EIS COMMENTS

Internal Memo

Date	December 8, 2020
To	**Lindsay Sulatycki, Senior Development Planner**
From	Leah Lefler, Environmental Planner
Service Area	Infrastructure, Development and Enterprise Services
Department	Planning and Building Services
Subject	**1242-1260 Gordon Street and 9 Valley Road** **Draft Plan of Subdivision, Official Plan Amendment and Zoning By-law Amendment** **Environmental Planning Comments on First Submission**

Environmental Planning reviewed the following documents that pertain to the proposed Draft Plan of Subdivision, Official Plan Amendment and Zoning By-law Amendment at 1242-1260 Gordon Street and 9 Valley Road:

Environmental Impact Study, Stantec, May 2020
Functional Servicing Report, Stantec, April 2020
Geotechnical Report, CMT Engineering Inc., April 2018
Hydrogeological Assessment, Stantec, May 2020
Landscape Concept, Stantec, March 2020
Planning Justification Report – May 2020
Tree Inventory and Preservation Plan – March 2020

Based on the review of the materials listed above, Environmental Planning staff offer the following comments at this time:

Environmental Impact Study

1. In the Introduction, please note that the planning approval sought by the applicant is a Draft Plan of Subdivision, Official Plan Amendment and Zoning By-law Amendment. Following approval, the development will proceed to detailed design and subdivision registration. Text in the third paragraph should be updated accordingly.
2. Under 1.1 Agency Consultation, reference is made to a Hydrology Report. Please revise this to Hydrogeological Assessment.
3. Under 2.2.1 Official Plan, it is stated that “Natural Areas where development may be permitted provided an EIS can demonstrate that there will be no negative impacts to the natural heritage features or their ecological function”. This statement is incorrect. General Permitted uses and feature specific policies apply to Significant Natural Areas and Natural Areas alike. Permitted uses may be more permissive in Natural Areas in comparison to Significant Natural Areas,

but not necessarily. If a feature does not meet criteria for protection, development may be permitted. Conversely, if a feature meets criteria for protection, the general permitted use policies and feature-specific policies apply. Please clarify this.

4. The last sentence on page 2.2 states that "The Natural Heritage System also incorporates hazard lands including steep slopes, erosion hazard lands and unstable soils that are under the jurisdiction of the GRCA". This statement is incorrect. Criteria for designating Significant Valleylands (a Significant Natural Area included in the NHS) includes undeveloped portions of the regulatory floodplain. Hazard lands are not outright included in the NHS. Please correct this.
5. Under 2.2.3 Tree By-law, it is stated that the "Tree By-law was created to prevent damage or destruction to trees". This statement is incorrect. The Tree By-law 'regulates' the destruction or injuring of trees and enables the City of Guelph to require a tree permit prior to the injury/destruction of a regulated tree, and compensation. The Tree By-law helps protect and enhance the tree canopy cover in the City. Please revise accordingly.
6. Under 3.2 Field Investigations on page 3.8, please include bat acoustic surveys as well as bat exit surveys in the list of targeted field surveys.
7. Under 3.2.8.2 Bat Exit Surveys on page 3.14, please include the type of device used for acoustic monitoring. For example, was a hand-held unit used, a song meter or both?
8. Under 3.2.9.1 Diurnal Surveys on page 3.15, it is stated that "fieldwork was conducted at, or within, half an hour of sunrise". This statement does not match dates and times listed in Table 3.7. Best results are achieved within half an hour of sunrise, especially in noisy urban environments, and especially in forested ecosystems. The first breeding bird survey was completed on June 12, 2018, which is very late for a first visit. Based on timing of field surveys, data should be interpreted accordingly (i.e. lack of record does not indicate absence). Please update the text, as appropriate.
9. Under 3.2.9.2 Crepuscular Surveys on page 3.16, mention of moon phase is not made. Were conditions appropriate for surveying crepuscular birds during site visits completed for bats? Refer to MNRF's 'Eastern Whip-poor-will and Common Nighthawk Survey Protocol' for guidance.
10. Under 4.4.6 Amphibian Survey and Habitat Assessment on page 4.6, it is stated that suitable habitat for amphibian breeding was not present. This seems odd, given that the Torrance Creek PSW is located within the Study Area, which is known to provide woodland amphibian breeding habitat. Snow melt and a high groundwater table result in seasonal ponding within this wetland complex. Please clarify.
11. Under 4.4.14 Incidental Wildlife Observations, the DeKay's Brownsnake observation from May 16, 2019 should be added to the list of incidental wildlife. This species was observed, along with several Eastern Gartersnake and a Red-bellied Snake during the feature staking exercise, with City staff. Further, please assess the significance of the snake records recorded with respect to

significant wildlife habitat and the potential for snake hibernacula to occur in the vicinity of the subject property.

12. Section 5.0 Significant Natural Heritage Features should be based on the natural heritage and water resources policies of the City of Guelph Official Plan (March 2018 Consolidation), in addition to the policies of the Provincial Policy Statement. Please update this section to address Official Plan policy.
13. Section 5.2 Significant Woodlands includes the following statement: “notwithstanding the criteria denoted in the OP excluding plantations”. This statement is incorrect. *Plantations* is a defined term in the Official Plan. Cultural Plantation, per ELC, is not the same thing as *plantation* in the Official Plan. A cultural plantation unit must meet the Official Plan’s definition of *plantation* to be excluded from the assessment of significant woodland. Please clarify this.
14. Section 5.2.1 Other Woodlands refers to a deciduous woodland and claims that it was excluded from Significant Woodland due to composition, origin and size. Please provide the analysis to support this. Do the Cultural Woodlands criteria of the Official Plan to this deciduous woodland? This assessment should also be included in a revised EIS.
15. What does the bolded text indicate in Table 5.1? For clarity, please uses bolded text consistently within each Table, and among Tables 5.1 through 5.4. Also, please update Tables 5.1 through 5.4 to accurately assess field data collected against MNRF’s Ecoregion 6E Criteria to determine whether or not Candidate or Confirmed SWH is present within the Study Area and/or Subject Property.
16. Section 5.3.5 Locally Significant Species should be updated to include the names of the two locally significant plant species. Also, the list of locally significant bird species should be updated to include Northern Flicker. A total of six locally significant bird species were documented, based on field records.
17. Section 5.4.1 Butternut should be updated to indicate that an ‘authorization’ under the *Endangered Species Act* is sought. The EIS should be updated with information from the MECP and Natural Resource Solutions Inc. to reflect the current status of Butternut, ESA requirements and compensation plantings. Correspondence and supporting documentation should be included as an Appendix.
18. Section 5.4.3 Bat SAR, please provide a map showing the extent of bat species at risk habitat (roosting habitat, foraging habitat). Please also provide correspondence with MECP confirming support of the proposed approach.
19. Section 5.5 Significant Natural Heritage Features Summary, on page 5.8, please update the bullet list to include bat species at risk, and to note that honey locust is a planted specimen. Also, the statement “unable to confirm presence/absence” is incorrect. The field surveys were designed to enable an assessment of SWH. For example, breeding bird survey results in fact confirm the woodland as Woodland Area Sensitive Breeding Bird Habitat. Based on results of field surveys, it may or may not be possible to confirm SWH. Unconfirmed SWH would remain Candidate SWH in areas meeting the criteria of the schedules for 6E. Please clarify this in the text.
20. Section 5.5 Significant Natural Heritage Features Summary, on page 5.9, includes other woodlands (WODM4-4). Based on the ELC figure, the WODM4-4

vegetation community appears to be contiguous with an FOCM5 vegetation community. As per comment 14 above, please assess this woodland against the Official Plan's criteria for Cultural Woodland and update the text on page 5.9 accordingly.

21. Section 6.1 Stormwater Management should reference stormwater targets prescribed in the Torrance Creek Subwatershed Study for infiltration rates. A portion of the site is located in Catchment 102, where the following targets apply:

    - infiltrate to enhance baseflow in Torrance Creek: 150mm/yr to 200mm/year or match pre- to post-
    - pre- to post- peak flow control for all design events (2 to 100-year events)
    - 24-hour extended detention for 25mm rainfall event
    - minimum 80% TSS removal

    Similarly, the Stormwater targets prescribed in the Hanlon Creek Subwatershed Study should be referenced in this section, as a portion of the site is located within the Hanlon Creek Subwatershed. The proposed stormwater outlet drains to Tributary D, where the following targets apply:

    - match pre- to post- peak flows for all storm events
    - implement infiltration best practice to the great extent feasible

22. The Functional Servicing Report (FSR)and Engineering Plans indicate that parking lot water as well as rooftop water will be directed to the infiltration trench. Further, stormwater management does not appear to be provided for a portion of the site, including drainage from the extension of Edinburgh Road. Lastly, sufficient capacity to accommodate flows from the proposed development is not available in the receiving stormwater management pond. Section 6.1 should be updated to provide an accurate and detailed description of the proposed stormwater management system so that all potential impacts can be identified in Section 7.0.

23. The first paragraph on page 6.2 states that "the total flow to Gordon Street (inclusive of rooftop-controlled flow) meets the predevelopment target rates". Please provide supporting documentation or provide reference to specific values and/or sections of the FSR.

24. On page 6.2, a description of the infiltration trench is provided. Based on this description, it is unclear how groundwater levels factored into the design of the facility. For example, has 1m separation distance from the high-water level mark been factored in?

25. Section 6.1.2 Trail, references the Guelph Trail Master Plan and a proposed connection through the subject property. A recommendation is provided that the trail be completed as part of a broader trail design approach, to be completed by the City at a future date. This recommendation conflicts with the requirements set out in the Terms of Reference, which included an assessment of the trail route, recommendation for trail alignment consistent with Official Plan policy (i.e., consistent with permitted uses within the natural heritage system, demonstration of no negative impact, etc.) and identification of best management practices to provide the basis for basic trail design, which is to be

completed as part of the Environmental Implementation Report (refer to pages 18 and 20 of the approved TOR). The Active Transportation Network Study maps the portion of trail through the subject property as a desired Active Transportation route (i.e. for cycling). The feasibility of accommodating an Active Transportation route through the subject project is to be assessed based on Official Plan policy in the EIS. Lastly, a trail connection from the Park Block to the trail network is desired and should be assessed and evaluated through the EIS to inform the design.

26. Section 7.0 Potential Impacts of Development and Mitigation Recommendations, reference is made to “net environmental impact assessment”. This is not appropriate as the policy test is “no negative impact”. Please revise this statement and confirm that the analysis provided is based on the “no negative impact” test.

27. Section 7.1 Impacts on Significant Natural Features, given that two 12 storey buildings are proposed, the EIS should evaluate the potential for bird strike impacts, and inform the design, as appropriate. Lighting impacts may also result from the proposal; the EIS should make recommendations for lighting adjacent to the natural heritage system based on best management practices. Lastly, grading impacts should be assessed in the EIS. An analysis of the grading plan should be provided in the context of permitted uses within the natural heritage system. Please update section 7.1 accordingly.

28. In Section 7.1.1 Significant Wetlands, it is stated that “incidental runoff impacts associated with sediments, dust, as well as nutrient loads will be reduced by the natural polishing function of the vegetative zone between the feature ad development”. It is unclear what this statement means. The Stormwater system is designed to infiltrate the 25mm storm event via an infiltration trench. Surplus runoff will fill a storage tank and then outlet to the storm sewer on Gordon Street, which outlets to a stormwater pond, which discharges to the Hanlon Creek PSW. Further, the last sentence of the first paragraph in this section states that “all surface runoff from the proposed development is directed to the existing storm sewer on Gordon Street”. This statement is not consistent with section 6.1 of the EIS or the FSR. Please clarify.

29. Also in Section 7.1.1 Significant Wetlands, please demonstrate that infiltration rates and volumes have been matched, pre- to post- in the Torrance Creek and Hanlon Creek Subwatersheds. This section notes that infiltration will “match and likely notably exceed pre-development infiltration volumes” in the catchment that directs flows to Torrance Creek. Torrance PSW has both a recharge and discharge function, depending on the time of year. During periods of an elevated water table and an upward hydraulic gradient, are impacts associated with the infiltration trench anticipated? For example, if infiltration cannot occur due to a high-water table, surplus will fill the storage tank and discharge to Hanlon PSW, likely resulting in a negative impact to both PSWs. Please include an in-depth analysis of stormwater impacts on the natural heritage system’s features and functions.

30. On page 7.2, discussion is provided on the predicted impacts associated with reduced infiltration to the Hanlon Creek Subwatershed, with a conclusion of no negative impact drawn. Please provide the supporting analysis to support this

claim. For example, what is the difference in pre- to post- infiltration volumes and rates? If infiltration is reduced, is the potential for baseflow impacts in Hanlon Creek? If infiltration is reduced, will more runoff be directed to Hanlon PSW? In addition, the FSR indicates that this runoff would be directed to the storm sewer on Gordon. The EIS fails to address Stormwater impacts associated with unattenuated/untreated runoff from the catchment containing the extension of Valley Road/Edinburgh.

31. The Torrance Creek PSW has a recharge and discharge function. What impact does the proposed stormwater management system have on the recharge/discharge function of the wetland? Please update the EIS to include a comparison of pre- to post- monthly differences in vertical hydraulic gradients, infiltration, runoff, etc. Note that this is required to demonstrate no negative impact the PSW.

32. Section 7.1.5 Significant Habitat of Endangered and Threatened Species, please provide documentation of correspondence with MECP confirming the proposed mitigation measures for bat species at risk are acceptable. Please also update the Butternut paragraph to include details from NRSI, as requested above.

33. Section 7.1.6 Locally Significant Species, please clarify where the Yellow-billed Cuckoo was heard. The text appears to indicate that the Yellow-billed Cuckoo was heard singing from the development area of the site. Please provide an assessment based on the Official Plan’s policy on Habitat for Significant Species to establish whether or not this Natura Area designation applies.

34. In section 7.3.1.3 Wildlife Friendly Building Design, please note that the EIR should include more detailed guidance on bird-friendly building design to inform detailed design.

35. Environmental planning staff are supportive of the timing recommendations made for the removal of debris and woodchip piles to protect snakes. Consider including a recommendation to incorporate snake hibernacula and/or gestation site habitat structures in the buffer portion of the natural heritage system. The Environmental Implementation Report would then provide further information on location, design, etc. to assist with detailed design and implementation.

36. In section 7.3.4 on page 7.8, please update the paragraph on Butternut to reflect the outcome of the Butternut Health Assessment and authorization. NRSI should be contacted for this information.

37. The details included in the post-construction monitoring program are acceptable for the EIS; however, please note that a requirement of the forthcoming EIR will be to provide a detailed post-construction monitoring plan. Similarly, additional detail on vegetation plantings will also need to be provided in the EIR. Please update the EIS to include a summary section on EIR requirements and a proposed outline for the future report. Please note that this was included within the approved Terms of Reference.

38. The following major topics were omitted from the EIS and should be assessed in detail in a revised EIS as part of the next submission:

    - assessment of bat species at risk habitat and supporting documentation from MECP;
    - Butternut assessment details and supporting documentation from MECP;

    - assessment of Habitat for Significant Species;
    - assessment of Cultural Woodland;
    - assessment of the need for Established Buffers;
    - assessment of grading impacts;
    - assessment of wetland water balance, based on assessment of monthly differences, pre- to post-development, for lands draining to the Torrance PSW and Hanlon PSW, to determine whether or not ecological and/or hydrologic impacts resulting from the proposed development are anticipated; and
    - recommended scope for EIR.

39. Section 9.0 Policy Compliance should focus on the consistency of the proposal with the “no negative impact test”. As written, the focus appears to be on establishing feature-based constraints to development. This is not consistent with the PPS, and the natural heritage system’s approach to protecting, enhancing and restoring natural heritage in Ontario.

40. Section 10.1 Report Summary, please update the bullet on SWH to indicate Candidate vs Confirmed. Further, the bullet on the proposed stormwater management plan indicates that parking lot runoff will be infiltrated. This detail was not included in the description of the stormwater management system presented earlier in the EIS. Please ensure that all statements are consistent and coordinated with the engineering plans prepared for the proposed development. Please note that infiltration of parking lot water is not supported by the City. Lastly, the report summary should include changes to wetland hydrology and ecology, and removal of accessory habitat to list of potential impacts associated with the proposed development.

41. Please update section 10.2 Recommendations to include the erection of Tree Protection Fencing prior to the commencement of site alteration/construction.

42. Please update mapping provided in Appendix A to include the following:
    - established wetland buffer;
    - Ecological Land Classification vegetation community information for polygon adjacent to FOD5-6;
    - extent and type of Significant Wildlife Habitat features;
    - limit of the Natural Heritage System; and
    - Cultural Woodland and/or Habitat for Significant Species, as appropriate, based on the criteria-based assessment requested above.

Hydrogeological Assessment

43. In section 4.2.4.1, pre-treatment for TSS is suggested to eliminate a number of sediment-bound metals in the discharge effluent. City staff agree that the proposed pre-treatment approach would likely reduce these concentrations; however, please note that samples would still be required to be collected to confirm this assumption, prior to the discharge being authorized to City sewers.

44. Please update section 4.2.4.1 to clarify whether or not VOCs were sampled to confirm presence/absence. The City’s Sewer Use By-law prohibits discharge of VOC-impacted. Please note that VOC sampling may be required under a future discharge agreement with the City’s Wastewater Division.

45. The post-development water balance provided in section 5.3 does not appear to account for the lands fronting on Valley Road (0.27ha catchment shown on Figure 15). Please explain why this area was excluded from water balance calculations, or update the water balance to include this catchment. Further, the size of the catchment draining to Torrance provided in the water balance assessment is 1.73ha, which does not match the catchment area of 1.44 ha in the hydrologic model. Please update the calculations ensuring that consistent catchment areas are applied.

46. The EIS should refer to Section 6.0 Groundwater Dewatering Assessment and include recommendations for monitoring and best practice. This could be included as an item for the future EIR.

47. Section 6.1 – It appears that a safety factor was not considered in the calculations of dewatering volume estimation, nor was any basal seepage considered. Although the site typically has observed downward gradients, the hydrological assessment indicates that upward gradients are present. Please add a factor of safety to the calculations and account for basal seepage, or provide text to explain why these elements were not considered in the calculations.

48. An infiltration (rock) trench is proposed to address the infiltration deficit. The infiltration (rock) trench is located within the Torrance Creek Subwatershed. Please include an analysis of the post-development water balance per watershed. For example, with LID measures in place, the water balance should demonstrate that the infiltration rate/volume should roughly match pre- to post-rates/volumes within each Subwatershed (i.e. Torrance and Hanlon). A stormwater management design and supporting analysis demonstrate no negative impact to the receiving natural heritage system is required. This is typically achieved by demonstrating that the proposed development and stormwater management system matches pre- to post- monthly infiltration rates/volumes and monthly runoff rates/volumes. Hydrographs depicting monthly differences in runoff volumes and infiltration volumes are helpful in demonstrating consistency with the natural heritage system “no negative impact” policy test.

49. In Section 7.2 construction proximity to the nearby municipal well is accounted for; however, there is no discussion provided as to private residential wells in the area. During the filing of an application for PTTW or registration under the EASR, it is recommended that the proponent assess potential impacts to private residential wells.

Tree Preservation Plan

50. Please update the Tree Preservation Plan to include recommendations for the EIR and detailed design.

51. Environmental planning is generally supportive of using a polygon approach in certain situations; however, based on data provided in Appendix 1 Tree Inventory Data, it is unclear how the stem count column relates to the Polygon. For example, 1 stem is reported from each of Polygons A, B, C, E and F. Given the brief description provided on page 4 of the plan: “If trees were present in monoculture hedgerow features, a polygon method was used”. Based on this description, >1 stem per polygon would be expected. Please clarify.

52. Please update Map 2 of the Tree Inventory and Preservation Plan to show Tree Protection Fencing around the perimeter of the natural heritage system.

Functional Servicing Report

53. Please update section 5.1.2 Torrance Creek Subwatershed Study to accurately reflect recommended infiltration rates, which in the case of the proposed development is between 150mm/yr to 200 mm/yr.

54. The FSR indicates that the area outletting to Gordon Street (Hanlon Creek Subwatershed) will increase, post-development. The infiltration trench is proposed in the Torrance Creek Subwatershed, which means the majority of stormwater originating from the Hanlon Creek catching will be generated as runoff. Please clarify that the receiving stormwater pond has capacity to control the runoff volumes generated by the proposed development. Please note that surcharge of this facility is directed to the Hanlon PSW. Runoff volumes should match pre- to post- per the Hanlon Creek Subwatershed recommendations.

55. The description of Catchment 202 provided at the bottom of 5.6 indicates that roof-top water will be directed the storm sewer on Gordon Street, with the 25mm event being directed to the infiltration trench. Please clarify that up to and including the 25mm is intended to be directed to the infiltration trench. Events in excess of 25mm or when back to back events occur prior to draw-down would be directed to the storage tank, eventually draining to the storm sewer when capacity is reached. Environmental planning strongly encourages infiltration of ‘clean’ water to maintain infiltration and baseflow in Hanlon Creek to the greatest extent feasible. Please consider this comment when updating the FSR.

56. The EIS should include an analysis of the findings presented on page 5.8 which relate to pre- to post- differences in runoff and infiltration being directed to the Torrance and Hanlon Subwatersheds under the post-development scenario. Based on the analysis provided in the FSR, the EIS should provide an assessment as to whether or not impacts to the ecology or hydrology of the wetlands are anticipated.

57. How would the infiltration trench function in the event of back-to-back storms? Please clarify whether or not a safety factor was incorporated into the sizing and design of the infiltration trench.

58. In section 5.6 On-site Infiltration, on page 5.9, it is stated that “The infiltration gallery should only be intercepted by groundwater in spring-time”. How was this detail factored into the water balance? The EIS should provide an analysis of potential impacts arising from the proposed stormwater design. For example, if groundwater intercepts the infiltration trench during the spring, infiltration will not occur which would result in more runoff being directed to Hanlon Subwatershed. This is unacceptable and should be addressed in the next submission.

59. Please note that in situ permeameter testing is required to demonstrate that the proposed infiltration trench will function as anticipated. Please provide this information in the next submission.

60. Drawing SSP-2 Storm Drainage Area Plan – It is unclear how the Area IDs relate to the Catchments described in the FSR and Hydrological Investigation report's water balance calculations. Please ensure that this is clarified and coordinated among studies and drawings in the next submission.

61. Drawing GP-1 Grading Plan indicates that extensive grading is required adjacent to the natural heritage system. Please provide additional detail on grading requirements (e.g. spot elevations) to enable a proper assessment of consistency with Official Plan policy. Please note that a cross-section can be helpful in demonstrating how the required grading relates to the protection of the natural heritage system. At a minimum, please update GP-1 to show differences in grade adjacent to the natural heritage system, and slope, particularly at the southeast end of the site.

62. It is unclear how the proposed erosion and sediment control plan has been coordinated with the proposed grading plan. For example, tree protection fencing and silt fencing is proposed in an area identified for extensive grading on GP-1. Please clarify.

Landscape Concept

63. The Landscape Concept proposes the planting of coniferous and deciduous trees on top of the infiltration facility. Guelph's Engineering Development Manual specifies a minimum 1m offset of plant material from infiltration galleries. Please relocate the proposed trees outside of the infiltration gallery area.

Summary

A revised EIS is required to address the comments provided above. Revisions to the supporting studies, including the Tree Preservation Plan, Hydrological Assessment, Functional Servicing Report and Landscape Plan are required. Environmental planning encourages the applicant to meet with City staff to discuss the comments provided, prior to providing a second submission. Substantial work remains outstanding to adequately demonstrate no negative impact to the natural heritage system's ecological and hydrologic features and functions.

Please note that comments provided by Scott Cousins, City of Guelph Hydrologist, are incorporated into the comments provided under the Hydrogeological Assessment heading above.

Leah Lefler, Environmental Planner
Planning and Building Services, **Infrastructure, Development and Enterprise**
Location: City Hall
519-822-1260 extension 2362
leah.lefler@guelph.ca

Copy: Mohsin Talpur, Jyoti Pathak, Scott Cousins

INTERNAL MEMO

CITY OF Guelph
Making a Difference

DATE December 18, 2020

TO **Lindsay Sulatycki**

FROM Jyoti Pathak
DIVISION Parks and Recreation
DEPARTMENT Public Services

SUBJECT **1242-1260 Gordon Street and 9 Valley Road- proposed Draft Plan of Subdivision, Official Plan Amendment and a Zoning By-law Amendment (OZS20-004)**

Parks have reviewed the following documents submitted in support of the above noted proposed Draft Plan of Subdivision, Official Plan Amendment and a Zoning By-law Amendment, circulated on July 9, 2020

- **Notice of Complete Applications – July 2020**
- **Notice of Public Meeting – September 2020**
- **Draft Plan of Subdivision – February 2020**
- **Angular Plane Diagrams – April 2020**
- **Boundary Survey – January 2015**
- **Conceptual Site Plan – May 2020**
- **Draft Official Plan Amendment – May 2020**
- **Draft Plan – Parking Level 2 – February 2020**
- **Draft Plan – Parking Plan Level 1 – February 2020**
- **Draft Plan of Subdivision with Concept – February 2020**
- **Draft Zoning By-law – May 2020**
- **Engineering Plans – April 2020**
- **Environmental Impact Study – May 2020**
- **Functional Servicing Report – April 2020**
- **Geotechnical Report – April 2018**
- **Landscape Concept – March 2020**
- **Planning Justification Report – May 2020**
- **Renderings – March 2020**
- **Tree Inventory and Preservation Plan – March 2020**
- **Urban Design Brief – April 2020**

Parks offer the following comments:

Proposed Draft Plan of Subdivision:
A residential subdivision is proposed on the subject lands which are approximately 3.12 hectares in size and include developable area and natural heritage system. The applicant is proposing a residential block with two, 12-storey apartment buildings with a total of 377 apartment units, a municipal park block and an open space block.

Planning Justification Report:
Revise the parkland dedication information on page 4 of the Planning Justification report to reflect current alternative rate (1 ha per 300 dwelling units for parkland conveyance and 1 ha per 500 dwelling units for payment in lieu of conveyance) for parkland dedication requirement under s.51.1 of the Planning Act and City’s Official Plan Policy 7.3.5.1.

Parkland Dedication:
Parkland dedication is required for the proposed subdivision according to the Official Plan (OP) Policy 7.3.5.1. The OP policy states the following:

> 1. 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

The current draft plan of proposed subdivision includes an area of 3.12 hectares and the proposal includes development of 377 apartment units. In accordance with the Official Plan policy 7.3.5.1 at an alternative rate a park block of 1.25 ha is required. However due to the size of the development parcel Parkland dedication will be required as a combination of parkland and payment in lieu of conveyance for the proposed draft plan.

Park Block Location:
Generally, the park location is satisfactory however City requires parkland to be conveyed free and clear of all encumbrances. The proposed park block is encumbered due to its proposed location on top of an underground parking structure. The park block currently includes a tree protection zone and this impacts usability, functionality and accessibility of this very small park. Park would encourage achieving 0.2 ha park size outside of the tree protection zone.

We intend to provide pedestrian access to the park along the Edinburgh Road extension from Gordon Street and along Landsdown Drive/ boulevard trail/ sidewalk from north and trees would have to be cleared if blocking this access.

Generally, City requires park blocks to meet City's Zoning Bylaw, plans, policies, and guidelines and the following criteria:

- The site provides a critical public trail connection to the proposed Citywide trail/ ATN route west of Torrance Creek PSW from Gordon Street along Edinburgh Road extension through the proposed park block. **GTMP and OP Policy 7.3.5.5 (ii) (Parkland Dedication)**

- The site satisfies the development criteria for a neighbourhood park; **OP Policy 7.3.5.5 (Parkland Dedication)**

- The park should contain both active and passive recreational activities (i.e. children's play equipment, shade structure, seating, site furniture and planting etc.). **OP Policy 7.3.2 (Park Hierarchy)**

- The park should be connected to public sidewalks and should be designed as an accessible and barrier free space. **Facility Accessibility Design Manual – 2015**

- The park should be mostly flat (i.e. 80% table land with 2-3% slopes). **OP Policy 7.3.2.4 (Park Hierarchy)**

- The park should contain adequate public street frontage for high visibility and surveillance and for adequate public and operational access as identified in **Zoning Bylaw Table 9.2 (Row 3)** as follows: A minimum of 50 metres or 1 metre of street frontage for every 100 square metres of park area whichever is greater as identified in Section 9.2 of the City of Guelph's Zoning Bylaw.

- The park should be completely outside of natural heritage features. Natural heritage features and natural hazard lands as outlined in the City of Guelph's Official Plan will not be accepted as parkland dedication. **OP Policy 7.3.5.3 (Parkland Dedication)**

- parkland shall be conveyed free and clear of all encumbrances. **Development Charges background study Appendix E- Local Service Policy (basic park development - PAGES E-2 and E-3)**

- The park site should be well drained and have access to water, sanitary and storm water drainage servicing. **OP Policy 7.3.2.4 (Park Hierarchy), Development Charges background study Appendix E- Local Service Policy (basic park development - PAGES E-2 and E-3)**

Park Block Lot Frontage and park access

Park Operations require vehicular access to the park block and to the proposed trail to the east for maintenance and operational purpose. Provide options for review for achieving vehicular access.

Basic Park Development:

The developer is directly responsible for the basic park development according to the Development Charges background study - Appendix E- Local Service Policy (basic park development - PAGES E-2 and E-3):

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.

The developer will be responsible for the Basic park development and City would require a cost estimate and security in the form of cash or a letter of credit based on the City approved estimated costs prior to the registration of the subdivision.

Trail Network:

The Official Plan – Schedule 8 'Trail Network' includes a proposed off-road secondary trail route along western edge of the Torrance Creek provincially significant wetlands through the subject property that connects to the approved proposed trail west of Valley Road condominium to the north and west of 1280 Gordon Street to the south.

Please note that the trail alignments north and south of the subject site have been designed and approved through the development review process and the developer is responsible to identify the trail alignment and preliminary trail design on the subject site as included in the terms of reference for the EIS.

Local trail connection:

Provide a local accessible trail connection, 2.5 m wide, to connect the proposed park to the proposed Citywide trail at the back of the property. This trail connection is to be designed and developed as part of the Landscaping works on the subject site.

Provide conceptual trail alignment for City's review of the following connections:

- North-south Citywide trail connection
- East-west local trail connection

Provide preliminary grading and Drainage plans and other plans as applicable to demonstrate that the trail can be built to the current City standards as follows:

1. 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

2. 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.

3. Provide sodded drainage swales and culverts at appropriate locations if the adjacent ground is higher to the trail surfacing levels.

Environmental Implementation Report:
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.

The EIR will address the recommendations related to trail system and natural open space system, including detail design of the trail system; preparation of Landscape Plans and details to address demarcation, removal of invasive species, 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, structures, etc. will be provided in the Environmental Implementation Report consistent with City of Guelph's current trail standards 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.

Open Space Works and Restoration:

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

Tree Preservation and removal of invasive species and hazard trees:
Schedule removal of the common buckthorn within the trail corridor prior to trail construction.

A review of hazard trees (e. g. dead, partially dead or dying trees) along the trail route will be conducted at the time of vegetation removal by a qualified arborist. Identify all hazardous trees along the trail route in consultation with Parks staff for removal prior to start of trail construction.

Hazard trees only would be removed within striking distance of the trail.

Environmental Education:
The environmental education/ interpretive 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.

Open Space Dedication:
Parks recommends conveyance of natural open space block to City for the purpose of the protection of natural heritage system and trail construction.

Demarcation:
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 and City approved demarcation plan will be included in EIR.

Summary:
Parks does not support the proposed development based on the current information provided. Parks needs revised documents which reflect the comments provided above for our further review and comments. Draft conditions would be provided upon receiving satisfactory proposal.

Regards,

Jyoti Pathak, Parks Planner
Parks
Public Services
T 519-822-1260 x 2431
E Jyoti.pathak@guelph.ca

APPENDIX B.2
CITY OF GUELPH CONSULTATION

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

[EXTERNAL EMAIL] Do not click links or attachments unless you recognize the sender and know the content is safe.

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, 3 files: **1250 Gordon**

Virtual: Melissa Straus (Stantec) and Leah Lefler (City of Guelph)
July 6, 2021

Other Development Files Discussed Removed from Meeting Minutes

<table>
<tr><td colspan="3">Project Name: 1242-1250 Gordon Street and 9 Valley Road
Stantec file #: 161413684
Comments: EIS comments</td></tr>
<tr><td>Species at Risk
• Section 5.4.3 Bat SAR, please provide a map showing the extent of bat species at risk habitat (roosting habitat, foraging habitat). Please also provide correspondence with MECP confirming support of the proposed approach.</td><td>• Roosting habitat unconfirmed
• Foraging habitat?</td><td>• City to look into recent MECP consultation approach with respect to bats.</td></tr>
<tr><td>Species of Conservation Concern
• Under 3.2.9.2 Crepuscular Surveys on page 3.16, mention of moon phase is not made. Were conditions appropriate for surveying crepuscular birds during site visits completed for bats? Refer to MNRF's 'Eastern Whip-poor-will and Common Nighthawk Survey Protocol' for guidance.</td><td>• Conducted incidentally.</td><td>• Conducted incidentally as species could occur but unlikely therefore specific surveys not conducted.</td></tr>
</table>

Wetland Impacts • The EIS should include an analysis of the findings presented on page 5.8 which relate to pre- to post- differences in runoff and infiltration being directed to the Torrance and Hanlon Subwatersheds under the post-development scenario. Based on the analysis provided in the FSR, the EIS should provide an assessment as to whether or not impacts to the ecology or hydrology of the wetlands are anticipated.	• Does the City provide guidelines, reference studies, or have input on what type of impact details they are looking for? • Applies generally to all 3 projects.	• Consider percent increase/decrease, will receiving vegetation be required to change? • Hydrographs, does it match hydroperiod as per under pre-development conditions? • Look at topography and contours, what depth or area will water cover. Is the receiving vegetation be impacted? • Stacking of events, tied to SWM. • City to provide TRCA/GRCA sensitivity tool to assist.
Deer crossings	•	• City to provide Gordon Street EA to reference recommendations.

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
Planning and Building Services, **Infrastructure, Development and Enterprise**
City of Guelph
519-822-1260 extension 2362
leah.lefler@guelph.ca

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From: Leah Lefler
To: Straus, Melissa
Subject: RE: EIS resubmissions confirmation
Date: Monday, July 26, 2021 11:39:45 AM

Hi Melissa,

Thanks for confirming your approach. Please submit an EIS Addendum for 220 Arkell, 1250 Gordon and MacAlister/Victoria. The approach outlined in your email below is appropriate.

Regards,
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: Monday, July 19, 2021 3:25 PM
To: Leah Lefler <Leah.Lefler@guelph.ca>
Subject: EIS resubmissions confirmation

Hi Leah,

I know we discussed this but just wanted to make sure I was completely clear on the expectations.

For resubmission of 220 Arkell, Victoria Road at MacAlistar and 1250 Gordon you had indicated that an addendum was appropriate. To me, an addendum contains a comment matrix and only discusses bigger issues brought up in comments. It’s not an update of previous version of the reports. So for example, there wouldn’t be a repetition of the policy section if comments on that section were minor (grammatical, clarification points only). But if the analysis on say SWH was questioned, that section would be included in the addendum and updated.

Feel free to give me a call on my cell if you’d like to discuss.

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
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

APPENDIX B.3
CITY OF GUELPH ADDENDUM COMMENTS

INTERNAL MEMO

DATE December 14, 2021 File No. 16.152.369

TO **Lindsay Sulatycki**

FROM Mohsin Talpur
DIVISION Engineering Services
DEPARTMENT Infrastructure, Development and Enterprise Services

SUBJECT **1242-1260 Gordon Street and 9 Valley Road – Draft Plan of Subdivision, Official Plan Amendment and Zoning By-law Amendment Revised Submission.**

We have reviewed the following plans and reports that were submitted in support of the 1242-1260 Gordon Street and 9 Valley Road Draft Plan of Subdivision, Official Plan Amendment and Zoning By-law Amendment:

- a) *Report, Re, Functional Servicing Report for Gordon Street, Guelph ON; dated August 11, 2021; prepared by Stantec;*
- b) *Report, Re, Hydrogeological Assessment Version 2, 1242, 1250, 1260 Gordon Street, City of Guelph ON; dated August 11, 2021; prepared by Stantec;*
- c) *Report, Re, Noise Impact Study, 1250 Gordon Street, Guelph ON; dated August 23, 2021; prepared by J.E. Coulter Associates Limited;*
- d) *Engineering Plans; dated August 24, 2021; prepared by Stantec;*
- e) *Report, Re, Phase I Environmental Site Assessment 9 Valley Road and 1242, 1250, 1260, and 1270 Gordon Street, Guelph, Ontario; dated July 5, 2021; prepared by XCG Consulting Limited;*
- f) *Draft Plan of Subdivision 1242, 1250, 1260,1270 Gordon Street and 9 Valley Road (23T-20001); dated August 27, 2021; prepared by Astrid J. Clos Planning Consultants;*
- g) *Report, Re, 1242, 1250, 1260 Gordon Street and 9 Valley Road, Traffic Impact Study; dated August 12, 2021; prepared by Stantec.; and*

And offer the following comments:

Functional Servicing Report

1. In our previous comment #4, we had asked about the email correspondence from City regarding sanitary capacity. The revised report suggests the correspondence is attached in Appendix A. However, the Appendix A includes Stormceptor EF report. Please provide the correspondence for review.

2. The section 3 is not updated based on our previous comments about a ‘H’ (holding) be placed on the property until such time a new sewer is installed. Please include the information in the text of the section 3 of the FSR report.
3. The Section 4 of the report had not been updated regarding City’s water supply pressures for the proposed development as per our previous comment#3. Please update the section as per our previous comments.
4. The previous comment#6 regarding Steep gradient of Street ‘A’ over 6% has not been addressed. Please revise the gradient accordingly.
5. In our previous comment#7, it was requested to provide a typical cross-section of Street ‘A’, and label for centerline radius. The typical cross-section and the centerline radius on engineering drawings are still missing. Please provide requested information for review.
6. It appears that sidewalk is provided on one side. We had requested to update the drawings in our previous comment#8, but the plan has not been updated as requested. Please show the sidewalk on both sides of Street ‘A’ plan and provide a typical cross-section for review.
7. In section 5.1.4 of FSR, the design criteria for the site are discussed. The Torrance Creek Subwatershed infiltration criteria of 150mm/year were adopted for the site. However, the GRCA mapping for the site (Tributary D of HCWS) shows a recharge of 122-199mm/year, which are consistent with pre-development water balance analysis recharge rates for the Site ranges from 192mm/year to 222mm/year. Therefore, it is recommended to update recharge criteria of the Site.
8. The requested information of traffic geometric plan showing large moving trucks to /from the site was requested in our previous comment#8 had not been provided. Please provide the requested information.
9. The Street ‘A’ ROW area has not been included in the proposed storm drainage conditions in Drawing No. 2 and the Section 5.5 of FSR report. This deficiency was identified in our previous comment #7 as well. Please update the report accordingly.
10. The catchment areas numbering on Storm Drainage Plan are not consistent with the FSR brief including notes provided in the drawing no. SSP-2. Please be consistent with numbering and update the documents accordingly.
11. Please update the Section 5.5 of FSR that states two 10-storey apartment buildings, one with one level of underground parking and one with one level of underground parking. It seems contradicting the proposed two levels of parking for the buildings. Please update the text.
12. It appears that the major overland flows from the site discharging uncontrolled to the Gordon Street including proposed Street ‘A’. The City

criteria states that post-development flows shall be controlled to pre-development (existing) levels for the 2 year through 100year storm events. The proposed site impervious cover is changed over 90% that may cause flooding on Gordon Street at significant events. Please provide onsite storage for all peak flows (2year to 100year) to pre-development rates.

13. A 3.5m high acoustic barrier is proposed at the south west corner of the site. The proposed overland flows through southern amenity areas discharge to the Gordon Street will be intercepted by the proposed acoustic barrier walls. The noise barrier walls are not designed to withstand the overland flow pressures and are not designed to pass flows through it. Please provide details of overland flow routes showing controlled flows discharging safely without any obstructions for review.
14. The MUDUSS model comment line mentions 1250 Gordon Street. Please update to 1242-1260 Gordon and 9 Valley to be consistent with the proposed application.
15. The MIDUSS model shows duration of 180 minutes (3 hours) for all storms including 2year, 5year and 100year storms, which is not appropriate. Please use 5minute duration time for 2year and 5year storm events as per City standards and update the model calculations accordingly.
16. The Street ‘A’ Catchment area (i.e., A18 - 0.29 ha) has not been included in both existing and proposed conditions of MIDUSS. Please incorporate the area and propose quality and quantity control for the Catchment A-18 and submit updated hydrological model and drawings for review.
17. There are no calculations provided for the sizing of sewers. It seems the sewers are designed based on 180-minutes duration, which is not acceptable. Please provide design sheet in excel format for 5year storm event for review.
18. The proposed approach for the rooftop storage to attenuate up to 25mm rainfall events using 75mm diameter orifice, connected through downspout system into on-site infiltration trenches seems reasonable. However, we had concerns on proposed active storage of 136 m^3 for West building rooftop and 138 m^3 of active storage on East Building rooftop during 100year storm event. The rooftop storage at 100year storm event including number of Catchment areas discharging uncontrolled to Gordon Street should be directed to a storage facility and release runoff to Gordon Street at pre-development rate. The City prefers using open surface SWM facility to control all flows 2year to 100year at pre-development rates. Please adjust grading and explore options for out-letting controlled flows to the Gordon Street.
19. The Proposed Permavoid infiltration gallery having 90% voids seems challenging product to be allowed for the infiltration galleries within the City. The City does not accept sizing of the galleries that include infiltration from

the sides of the gallery, only bottom footprints should be considered for infiltration gallery sizing. The calculations provided are not legible. Therefore, provide detailed calculations in excel format with supporting documentation for review and recommended to use conventional stone gallery for infiltrating West building rooftop runoff as well.

20. It appears that the Permavoid system is proposed for both quantity control and infiltration located into the southern amenity area. The proposed Permavoid infiltration system will mix the clean rooftop runoff from western building, with runoff from parking, and laneway areas to infiltrate. Based on City's Source Water Protection infiltration policy only clean rooftop runoff can infiltrate. The runoff generated from parking and laneways areas that contains contaminants including road salts during the Winter seasons with suspended sediments should be separated from rooftop runoff and directed to storage tank and release at pre-development rates. Please demonstrate a separate clean rooftop runoff to infiltrate and provide a separate storage for major and minor flows providing quality control and to release flows at pre-development rates.
21. A Pemavoid storage system is proposed just downstream of southern infiltration gallery. The underground perforated system will allow runoff to infiltrate contaminants collected from parking and laneways areas into the ground, which is not acceptable. Please demonstrate that all runoff generated from the site is stored and released at pre-development rates by providing an open surface storage.
22. The proposed East infiltration gallery bottom elevation is 340.06m. The seasonal high groundwater elevation at MW5-18 measured is 340.7m, which is located at about 30m from proposed gallery; the horizontal hydraulic gradient calculated is 0.04 m/m towards Torrance Creek Swamp. Thus, the groundwater elevation estimated at bottom of the infiltration gallery is 339.5m with 0.56m separation from bottom of the gallery, which does not meet the minimum 1.0m separation requirements. In addition, Section 6.1 of Hydrogeological assessment report also mentions that the eastern gallery is approximately 0.8m above projected seasonal high groundwater table. Please demonstrate with detailed calculations and ensure gallery bottom had minimum 1.0 m separation from seasonal high groundwater table.
23. For quality control a Stormceptor EF4 unit is proposed upstream of Permavoid storage system to maintain 80% TSS removal. However, the Street 'A' runoff is discharging uncontrol without any quality control. Please provide appropriate size Stormceptor EF unit for the Street 'A'.

Hydrogeological Assessment Report

24. The meteorological data (precipitation and temperatures) used for hydrographs belongs to Waterloo Airport Station that does not reflect trends comparable with measured groundwater elevations provided for the site. It is recommended to use the local meteorological data from Guelph Arboretum Station for the hydrographs and update the Figures 9 and 10 accordingly
25. It appears that the lands fronting Valley Road within the northeastern portion of the Site (i.e., Street 'A' area) not included in the pre- and post-development water balance calculations. The rational provided that these lands are to come under the ownership of the City and, subsequently, will no longer be the responsibility of Tricar. The water balance calculations (pre- and post-development scenario) must include entire area irrespective of future ownership. Please revise the calculations and update the water balance analysis and provide excel sheet for review.
26. The meteorological data used in water balance analysis is from Waterloo Welling ton A Climate Stations that is located approximately 15 km from the site. As mentioned in the report that the climate normal from 1971 to 2000 are available from Guelph Arboretum Climate Station. We prefer using Guelph Arboretum Climate Station for the consistencies in development applications as the Arboretum data will be most representative for the site that is located about 1.5km. Please use the Arboretum data in the updated version.
27. The total infiltration deficits calculated are 2,279 m^3 using water balance methodology by deducting evapotranspiration, soil storage losses etc. from the rainfall. However, groundwater recharge impacts and mitigation calculations provided in Section 8 are in complete isolation of water balance methodology. The evapotranspiration is generally 60% of the rainfall. Calculating volume of rooftop under 25mm or less event does not account for evaporation from the building roofs. The simple arithmetic sums with assumptions for frequency of rainfall events for mitigation purposes are not reasonable. Please update the pre-development, post-development without mitigation measures scenarios and include additional post-development scenario with mitigation measures and provide digital copies in excel format for review.
28. The groundwater mounding was estimated using Hantush equation spread sheet prepared by USGS for both east and south infiltration galleries for 25mm event. However, the mounding calculations for the proposed Permavoid storage tank having capacity for storage of greater than 25mm storm was not conducted. Please estimate mounding impacts of Permavoid storage tank for 5year storm storage on adjacent properties.
29. In Section 7.1.3, it is mentioned that there will be no permanent drainage system / dewatering planned for the underground parking area due to

construction of waterproof base. Generally, drainage is provided at the bottom of every foundations. We need a written confirmation from building professionals/Architects that there will be no drainage/sump pumps provided for the waterproofed underground parking structures. The building professionals/Architects should quote the supporting Ontario Building Code (OBC) sections that identify that the drainage including weeping tiles, sump pumps are not required for the waterproofed basements. In case of failure in providing supporting information from the OBC, we will consider possibility of permanent dewatering at the Site.

Noise Impact Study

30. Section 3.1 Table 1B, page 2: As the ventilation and building component discussion is outlined below, it would be better if this table was consistent with the MECP's sound level limits for OLAs only. I understand the concept, but including POW values here, in this context, is technically incorrect. They could be correctly stated in a table if a table is used to summarize the ventilation and building component description.

31. Section 3.1, page 2: If using a separate table to summarize the ventilation and building component review requirements, please note that NPC-300 includes bedrooms and living/dining rooms in both day and nighttime periods (and by extension, evening time periods for stationary noise). The "type of space" would be better described as outside the plane of window, without identifying the type of use inside (or include bedrooms and living/dining rooms in the description). Please note that this type of description (bedrooms at night, living/dining rooms in day) should be corrected throughout this report, most notably Sections 10 & 12).

32. Section 3.1, Page 2: Please update Appendix D based on changes made in the body of the report.

33. Sections 3.4-3.6: Please update references to the criteria table(s).

34. Section 3.6, pages 3-4: Is there a copy/paste error in this section? Not sure why we’re talking about STEAM concepts.

35. Section 3.7, page 4: Not sure why this section is here, as the details are more specifically/correctly spelled out in the preceding sections.

36. Section 3.8 paragraph 1, page 4: Technically, the stationary noise criteria is based on the worst-case scenario for the affected site; while is this often at the point of time of lowest ambient roadway traffic, that isn't always the case, and is not the way NPC-300 defines it.

37. Section 3.8 paragraph 3, page 4: Please update based on Class 2 Area.

38. Section 3.8 paragraph 4, page 4: Details of the traffic volumes, assumptions and calculations used to set the stationary sound guidelines have not been

included in the submitted study; please provide as part of the next submission.

39. Section 4.0: Less traffic data is provided in Appendix B then was provided in the 1st submission; please provide all of the traffic data that was used to determine the volumes used for this study, and include summary page(s) showing how the final values were obtained.

40. Section 4.0 Table 2, page 5: Even if existing heavy truck % is zero, why is projected heavy truck % zero? Only valid if road has heavy truck limits (verified to remain in place to horizon year).

41. Section 6.0 paragraph 1, page 7: AC is not a noise control feature. See NPC-300 Section C7.8.

42. Section 6.0 paragraph 2, page 7: What is the feasibility of mitigating at these locations? Are there options for the developer to consider during future detailed designs?

43. Section 6.1 paragraph 2, page 8: The proposed noise barrier height is not consistent with the GNCG specifications for noise barriers.

44. Section 6.1 paragraph 2, page 8: The OLA at location 12 has geometric features (mostly in the form of grade changes) that may cause the proposed barrier to become ineffective at some locations within the OLA (for example, only a few meters further back the elevation is 3m higher, and there is the potential for "bright zone" exposure). Please review, and provide some additional context to ensure the final proposed mitigation will provide the required protection throughout the OLA space.

45. Section 7.0 paragraph 1, page 8 & Appendix A, Figure 6: The site extents shown in Figure 6 do not match those on the concept/draft plan.

46. Section 7.0 paragraph 2 (and list that follows), pages 8 & 9: If CadnaA provides the highest sound level point along each facade of the buildings, is there a reason to call out three specific analysis points that are not at the highest sound level locations on the buildings??

47. Section 7.0 paragraph 3, page 9: Please review the wording of this section (and refer to past comments on this), as this description is not technically correct as per NPC-300. This report should analyze the stationary noise based on either the exclusion limits or the worst case impact (or both, and compare the results). Please update the report based on the chosen method, the correct noise criteria and correct time periods, for all appropriate receptors. If ambient noise levels "from the quietest hour" are being used, the calculations used to determine the values must be fully detailed in the report and Appendix, as appropriate.

48. Section 7.0 Table 6, page 10: Why are the OLAs only analyzed during evening? Please update for day and evening time periods. The noise criteria used is incorrect: NPC-300 lists the exclusion limit value for OLAs in Class 2 Areas during evening time period as 45 dBA.

49. Section 8.0: Provide details of the HVAC equipment assumptions made for these calculations, along with justification of these assumptions for buildings of this type and size. Verify that there are no planned sources of noise at any location on/at/around these proposed buildings other than the roof areas: other elements that may be missing from this analysis include (but not limited to) blowers/exhaust from the underground parking, emergency generators, HVAC equipment on lower roof levels, etc.

50. Section 8.0 paragraph 2 (list), page 10: Section 2.0 of this report identifies these buildings (1280 Gordon Street and 1284 Gordon Street) as 6-storey.

51. Section 8.0 paragraph 3, page 10: Please update this section based on Class 2 Area, and comments above.

52. Section 10.0 paragraph 1, page 12: See comment re: Section 3.1 Table 1B above.

53. Section 10.0 paragraph 1, page 12: More information is needed as to the assumptions made for the BPN-56 calculations (can be provided in that section of the Appendix.) There is also no discussion of what STC values are anticipated under standard OBC requirements for this building, so there is no comparison provided between the STC values obtained from the BPN-56 calculations and the statements made in this section.

54. Section 10.0 paragraph 2, page 12: This statement is confusing, please review and revise/clarify. Please also state assumptions for window/door-to-floor areas as part of this statement (and in the recommendations section) as was done for the unit calculations above. See also comments above regarding assumptions of anticipated STC values under standard OBC.

55. Section 12.0 recommendation #3, page 13: See comment re: Section 3.1 Table 1B above.

56. Section 12.0 recommendation #4, page 13: Please update the figure reference.

57. Section 12.0 recommendation #6, page 13: Please include requirement for barriers to meet GNCG requirements (this will also be a condition of approval).

58. Appendix B: Please label the STAMSON output pages according to the receiver locations as listed in Figure 3.

59. Appendix B: All distances used in the STAMSON calculations appear to be off by ~3m when compared to the building placement shown on the submitted engineering drawings.
60. Appendix B: Please note that when including a barrier, the three elevation values need to be used. For a feasibility study if unknown and other conservative factors were included, they can remain 0 (but helpful to indicate method used in the report or appendix). For a detailed study, the correct values need to be used.
61. Appendix B, filename “b_nw.te”: It is unclear which receiver point is being calculated for with this output. The filename suggests Location 8, but the distances used suggests Location 11, but with incorrect values. Please review/clarify.
62. Appendix B, filename “b_se.te”: Why was an "elevated" topography type used here? If this location meets the definition as per ORNAMENT, please complete the calculation correctly and include additional items (cross section drawing, etc.) to show how and why this was used.
63. Appendix B, filename “b_nw2.te”: It is unclear which receiver point is being calculated for with this output. The filename/description suggests Location 8 but with incorrect barrier-receiver distance. Please review/clarify.
64. Appendix B, filename “ola_b2.te”: Please update this calculation to be consistent with the others in this report. (use of single segment, no use of house rows, etc.)
65. Appendix B, BPN-56 Calculations: Please provide more information on the assumptions used for these calculations (all BPN-56 calculations). As per previous comments, NPC-300 no longer assumes time of day for type of interior use: to be conservative (for this feasibility noise study) an intermediate room absorption should be the maximum assumed. If assumptions are made for percentage of operable glazing, this needs to be stated in the body of the report also.

Please do not hesitate to contact me if you have any questions regarding my comments.
Thanks,

Mohsin Ali Talpur, M.Eng., P.Eng.
Development - Environmental Engineer

Internal Memo

Date	December 15, 2021
To	**Lindsay Sulatycki, Senior Development Planner**
From	Leah Lefler, Environmental Planner
Service Area	Infrastructure, Development and Enterprise Services
Department	Planning and Building Services
Subject	**1242-1270 Gordon Street and 9 Valley Road** **Draft Plan of Subdivision, Official Plan Amendment and Zoning By-law Amendment** **Second Submission Comments**

Environmental Planning reviewed the following documents and plans that pertain to the proposed Draft Plan of Subdivision, Official Plan Amendment and Zoning By-law Amendment at 1242-1270 Gordon Street and 9 Valley Road:

- Environmental Impact Study Addendum, Stantec, August 2021
- Functional Servicing Report, Stantec, August 2021
- Hydrogeological Assessment, Stantec, August 2021
- Landscape Plans, Stantec, August 2021
- Tree Preservation Plan, Natural Resource Solutions Inc., September 2021
- Draft Plan of Subdivision with Concept, August 2021
- Engineering Plans, August 2021

Based on the review of the materials listed above, Environmental Planning staff offer the following comments:

Environmental Impact Study

1. Please note that, as of October 2021, the City of Guelph has a Bird-friendly Design Guideline.
2. Is Habitat for Significant Species present on the subject property? Please provide an assessment of Official Plan policy 4.1.4.4. Habitat for Significant Species to determine if protection is required. If protection is required, please map Habitat for Significant Species as Natural Areas, within the Natural Heritage System.
3. Per Official Plan policy 4.1.2 and 4.1.3.9, development and site alteration are prohibited in Significant Wildlife Habitat. Figure 2 maps Candidate Significant Wildlife Habitat for Species of Conservation. The Environmental Impact Study must demonstrate that areas of Significant Wildlife Habitat do not overlap with proposed development or site alteration. Areas of Candidate Significant Wildlife Habitat that do not meet the criteria for Confirmed Significant Wildlife Habitat should be removed from mapping within the developable portion of the subject

property. Please update Maps 2 and 3 to show the extent of each type of Confirmed Significant Wildlife Habitat as separate layers.

4. Please assess the Cultural Woodland (WODM4-4) mapped on Figure 4 against the criteria of the Official Plan for protection of Significant Woodland (4.1.3.6) and Cultural Woodland (4.1.4.3). Based on the text provided in the EIS Addendum and mapping provided on Figure 4, it is unclear if this vegetation community warrants protection. If the Cultural Woodland does not meet the criteria for protection, please remove it from mapping.

5. Please update the Figure 5 legend and mapping to reflect the following:
   - Significant Woodland boundary, as approved by the City;
   - Significant Wetland boundary, as approved by GRCA;
   - 10 m Significant Woodland buffer;
   - extent of Confirmed Significant Wildlife Habitat; and
   - Natural Heritage System limit (inclusive of buffers).

6. Please provide correspondence from the Ministry of Environment, Conservation and Parks confirming the approach proposed for addressing Species at Risk bats.

7. Official Plan policy prescribes minimum buffers per feature type, and policy requiring an assessment of the need for an established buffer. The EIS should assess the need for an established buffer.

8. The EIS must demonstrate no negative impact to the Natural Heritage System by demonstrating a feature-based water balance. Please provide monthly comparisons of pre- to post-development conditions in runoff and infiltration, per catchment.

9. Stormwater runoff from parking lots is proposed to be infiltrated. As stated in previous comments provided in December 2020, infiltration of parking lot water is not supported by the City. Stormwater quality measures do not treat road salt.

10. To permit development on lands adjacent to the Natural Heritage System, the EIS must demonstrate that the entire development does not have a negative impact. Please update the FSR and planning for stormwater management to include the Valley Road parcel.

Functional Servicing Report

11. Section 5.1.4 of the Functional Servicing Report outlines the stormwater management criteria for the proposed development, which includes an infiltration criterion of 150 mm/year for the site, consistent with the Torrance Creek Subwatershed Study. The Hanlon Creek Subwatershed Study recommends a recharge of 122-199 mm/year for Tributary D, which is consistent with pre-development water balance analysis recharge rates provided in the Hydrogeological Assessment (i.e., 192 mm/year to 222 mm/year) and GRCA mapping for the site. Therefore, it is recommended that the recharge target be updated.

Hydrogeological Assessment

12. The proposed east infiltration trench appears to maintain a separation of 0.56 m from the seasonal high groundwater level. Per the City's Development Engineering Manual, infiltration gallery designs must demonstrate a minimum 1.0 m separation from the seasonal high groundwater level. Please provide a design that demonstrates a minimum 1.0 m separation from the seasonal high groundwater table.
13. Please update Section 6.3 Impact to Natural Heritage Features to include an assessment of impact resulting from the south infiltration trench.
14. Please provide a monthly comparison of pre- to post-development runoff and infiltration per catchment in tabular and/or graph form. This information is required to provide an assessment of impact to the Natural Heritage System in the EIS.
15. Water balance pre-development conditions shown on Figure 15 include four sub areas. Water balance post-development conditions shown on Figure 16 include three sub areas, with sub-area C and D combined. What is the purpose and effect of basing the water balance on different sub-areas?
16. Section 8 refers to two 12-storey towers. Heights have been reduced to two 10-storey buildings.
17. Figure 12 Groundwater Flow includes "Proposed Monitoring Well (Stantec, 2021)". Please provide a description of the proposed monitoring wells, including what they are intended for.
18. In Section 4.2.1, it is stated that there is no marked response from notable precipitation events however in December 2019/January 2020 there was an event of 45mm that has a quick response. Please clarity the statement with respect to this anomaly.
19. Is the station referenced in the last paragraph of Section 5.1 the closest station?

Tree Preservation Plan

20. Please update the Tree Preservation Plan to exclude removals from the park block. No removals are to occur within the park block, unless they pose a hazard or are in striking distance of an adjacent property.
21. Please add a column to the tree table to indicate which trees require compensation and which do not.
22. Please update the compensation requirements to exclude removals from the park block. Private trees requiring compensation per the City's private tree protection by-law will be addressed through a vegetation compensation plan, as part of the Environmental Implementation Report. Public trees, such as City-owned street trees, are to be addressed with Urban Forestry staff generally through a Street Tree Planting Plan at site plan.

Landscape Plans

23. Please verify that trees and shrubs are located a minimum of 1.0 m away from infiltration galleries. Please include a note specifying that trees and shrubs are to be planted a minimum of 1.0 m away from infiltration galleries.

Engineering Plans

24. Relocate ESC fencing to the location of the Tree Protection Fencing. Please include a note that no work or stockpiling of materials should occur in the park block or Natural Heritage System.

Draft Plan of Subdivision

25. Common amenity areas and park blocks cannot overlap with the Natural Heritage System, including buffers.
26. The Draft Plan of Subdivision should be revised to reflect the boundaries of the Natural Heritage System, including buffers, determined through the Environmental Impact Study.

Summary

An EIS addendum is required and dependent upon revisions to the supporting documents and plans. Environmental planning encourages the applicant to meet with City staff to discuss the comments provided, prior to providing a third submission.

Please note that comments provided by Scott Cousins, City of Guelph Hydrogeologist, are included in comments provided under the Hydrogeological Assessment heading above.

Leah Lefler, Environmental Planner
Planning and Building Services, **Infrastructure, Development and Enterprise**
Location: City Hall
519-822-1260 extension 2362
leah.lefler@guelph.ca

Copy: Mohsin Talpur, Scott Cousins

INTERNAL MEMO

DATE	November 23, 2021
TO	**Lindsay Sulatycki**
FROM	Jyoti Pathak
DIVISION	Parks and Recreation
DEPARTMENT	Public Services
SUBJECT	**1242-1270 Gordon Street and 9 Valley Road- proposed Draft Plan of Subdivision, Official Plan Amendment and a Zoning By-law Amendment (OZS20-004) – Second submission**

Parks have reviewed the following documents submitted in support of the above noted proposed Draft Plan of Subdivision, Official Plan Amendment and a Zoning By-law Amendment, circulated on September 21, 2021.

- **Notice of Revised Submission – October 2021**
- **Draft Plan-August 2021**
- **Draft Plan with Concept-August 2021**
- **Environment Impact Study Addendum-August 2021**
- **Engineering Plans-August 2021**
- **Environment Site Assessment Phase I-July 2021**
- **Functioning Servicing Report-August 2021**
- **Hydrogeological Assessment-August 2021**
- **Landscape Plans-August 2021**
- **Noise Study-August 2021**
- **Pedestrian Wind Study-July 2021**
- **Planning Report-August 2021**
- **Reliance Letter-July 2021**
- **Traffic Impact Study-August 2021**
- **Tree Preservation Plan-September 2021**
- **Underground Parking Level 1-August 2021**
- **Underground Parking Level 2-August 2021**
- **Urban Design Brief-August 2021**

Parks offer the following comments:

Proposed Draft Plan of Subdivision:
A residential subdivision is proposed on the subject lands which are approximately 3.12 hectares in size and include developable area and natural heritage system. The applicant is proposing a residential block with two, 10-storey apartment buildings with a total of 325 apartment units, a municipal park block and an open space block.

Planning Justification Report:
Revise the parkland dedication information on page 4 of the Planning Justification report to reflect current alternative rate (1 ha per 300 dwelling units for parkland conveyance and 1 ha per 500 dwelling units for payment in lieu of conveyance) for parkland dedication requirement under s.51.1 of the Planning Act and City’s Official Plan Policy 7.3.5.1.

Parkland Dedication:

Parkland dedication is required for the proposed subdivision according to the Official Plan (OP) Policy 7.3.5.1. The OP policy states the following:

> 1. 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

The current proposed draft plan of subdivision includes an area of **3.323** hectares and development of **325** dwelling units. The proposed draft plan includes a park block of **0.247** hectares which accounts for 74 dwelling units at the rate of 1 ha per 300 dwelling units. Parkland dedication for the remaining 251 dwelling units would be required as payment in lieu of conveyance for the proposed draft plan.

Park Block Location:
Generally, the park location is satisfactory.

We intend to provide pedestrian access to the park along the Edinburgh Road extension from Gordon Street and along Landsdown Drive/ boulevard trail/ sidewalk from north and trees would have to be cleared if blocking this access. The park block currently includes a tree protection zone.

Generally, City requires park blocks to meet City’s Zoning Bylaw, plans, policies, and guidelines and the following criteria:

- The site provides a critical public trail connection to the proposed Citywide trail/ ATN route west of Torrance Creek PSW from Gordon Street along Edinburgh Road extension through the proposed park block. **GTMP and OP Policy 7.3.5.5 (ii) (Parkland Dedication)**

- The site satisfies the development criteria for a neighbourhood park; **OP Policy 7.3.5.5 (Parkland Dedication)**

- The park should contain both active and passive recreational activities (i.e. children’s play equipment, shade structure, seating, site furniture and planting etc.). **OP Policy 7.3.2 (Park Hierarchy)**

- The park should be connected to public sidewalks and should be designed as an accessible and barrier free space. **Facility Accessibility Design Manual – 2015**

- The park should be mostly flat (i.e. 80% table land with 2-3% slopes). **OP Policy 7.3.2.4 (Park Hierarchy)**

- The park should contain adequate public street frontage for high visibility and surveillance and for adequate public and operational access as identified in **Zoning Bylaw Table 9.2 (Row 3)** as follows: A minimum of 50 metres or 1 metre of street frontage for every 100 square metres of park area whichever is greater as identified in Section 9.2 of the City of Guelph’s Zoning Bylaw.

- The park should be completely outside of natural heritage features. Natural heritage features and natural hazard lands as outlined in the City of Guelph's Official Plan will not be accepted as parkland dedication. **OP Policy 7.3.5.3 (Parkland Dedication)**

- parkland shall be conveyed free and clear of all encumbrances. **Development Charges background study Appendix E- Local Service Policy (basic park development - PAGES E-2 and E-3)**

- The park site should be well drained and have access to water, sanitary and storm water drainage servicing. **OP Policy 7.3.2.4 (Park Hierarchy), Development Charges background study Appendix E- Local Service Policy (basic park development - PAGES E-2 and E-3)**

Park Block Lot Frontage and park access

Park Operations require vehicular access to the park block and to the proposed trail to the east for maintenance and operational purpose. Provide options for review for achieving vehicular access.

Basic Park Development:

The developer is directly responsible for the basic park development according to the Development Charges background study - Appendix E- Local Service Policy (basic park development - PAGES E-2 and E-3):

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.

The developer will be responsible for the Basic park development and City would require a cost estimate and security in the form of cash or a letter of credit based on the City approved estimated costs prior to the registration of the subdivision.

Trail Network:

The City of Guelph Trail Master Plan - 'Trail Network' includes a proposed off-road secondary trail route along western edge of the Torrance Creek provincially significant wetlands through the subject property that connects to the approved proposed trail west of Valley Road condominium to the north and west of 1280 Gordon Street to the south.

Please note that the trail alignments north and south of the subject site have been designed and approved through the development review process and the developer is responsible to identify the trail alignment and preliminary trail design on the subject site as included in the terms of reference for the EIS.

Local trail connection:

Provide a local accessible trail connection, 2.5 m wide, to connect the Gordon Street/ proposed park to the proposed Citywide trail at the back of the property. This trail connection is to be designed as part of the proposed Landscaping works on the subject site.

Provide conceptual trail alignment for City's review of the following connections:

- North-south Citywide trail connection
- East-west local trail connection

Provide preliminary grading and Drainage plans and other plans as applicable to demonstrate that the trail can be built to the current City standards as follows:

1. 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

2. 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.

3. Provide sodded drainage swales and culverts at appropriate locations if the adjacent ground is higher to the trail surfacing levels.

Environmental Implementation Report:
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.

The EIR will address the recommendations related to trail system and natural open space system, including detail design of the trail system; preparation of Landscape Plans and details to address demarcation, removal of invasive species, 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, structures, etc. will be provided in the Environmental Implementation Report consistent with City of Guelph's current trail standards 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.

Open Space Works and Restoration:
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

Tree Preservation and removal of invasive species and hazard trees:
Schedule removal of the common buckthorn within the trail corridor prior to trail construction.

A review of hazard trees (e. g. dead, partially dead or dying trees) on the park block and along the trail route will be conducted at the time of vegetation removal by a qualified arborist. Identify all hazardous trees along the trail route in consultation with Parks staff for removal by the developer.

Hazard trees only would be removed within striking distance of the trail.

Environmental Education:
The environmental education/ interpretive 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.

Open Space Dedication:
Parks recommends conveyance of natural open space block to City for the purpose of the protection of natural heritage system and trail construction.

Demarcation:
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 and City approved demarcation plan will be included in EIR.

Summary:
Parks does not support the proposed development based on the current information provided. Parks needs revised documents which reflect the comments provided above for our further review and comments. Draft conditions would be provided upon receiving satisfactory proposal.

Regards,

Jyoti Pathak, Park Planner
Park and Trail Development, Parks
Public Services
T 519-822-1260 x 2431
E Jyoti.pathak@guelph.ca

P:\PS\Parks\ParkTrailDevelopment\PLANNING\CITY\Subdivisions\1242 -1260 Gordon and 9 Valley\OZS20-004\Resubmission_Sept 2021\Comments\20211123 1242-1270 Gordon 9 Valley -Parks memo.doc

APPENDIX B.4
MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS CORRESPONDENCE

From: Straus, Melissa
To: Species at Risk (MECP)
Cc: Bendig, Brandie; Hendriksen, Chris (Vancouver)
Subject: Information Gathering Form for Residential Development in the City of Guelph (1242, 1250, 1260, 1270 Gordon Street South and 9 Valley Road)
Date: Friday, March 25, 2022 4:18:00 PM
Attachments: igf-mecp-1250 Gordon_161413684_20220325.pdf

Good afternoon,

Please find attached an information gathering form for the proposed development located at 1242, 1250, 1260, 1270 Gordon Street South and 9 Valley Road.

Please contact me if you have any questions.

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

APPENDIX C
COMMENT MATRIX

APPENDIX C.1

COMMENT MATRIX FOR FIRST EIS SUBMISSION

1242 – 1260 Gordon Street and 9 Valley Road, Guelph
Comment Matrix for First Submission
Draft Plan of Subdivision, Official Plan and Zoning By-law Amendment
Last updated January 14, 2021
Leah Lefler, Environmental Planner 519-822-1260 extension 2362
leah.lefler@guelph.ca **December 8, 2020**

113	**Environmental Impact Study** 1. In the Introduction, please note that the planning approval sought by the applicant is a Draft Plan of Subdivision, Official Plan Amendment and Zoning By-law Amendment. Following approval, the development will proceed to detailed design and subdivision registration. Text in the third paragraph should be updated accordingly.	Acknowledged, updated in Addendum.
114	2. Under 1.1 Agency Consultation, reference is made to a Hydrology Report. Please revise this to Hydrogeological Assessment.	Acknowledged, additional details not required in Addendum.
115	3. Under 2.2.1 Official Plan, it is stated that “Natural Areas where development may be permitted provided an EIS can demonstrate that there will be no negative impacts to the natural heritage features or their ecological function”. This statement is incorrect. General Permitted uses and feature specific policies apply to Significant Natural Areas and Natural Areas alike. Permitted uses may be more permissive in Natural Areas in comparison to Significant Natural Areas, but not necessarily. If a feature does not meet criteria for protection, development may be permitted. Conversely, if a feature meets criteria for protection, the general permitted use policies and feature-specific policies apply. Please clarify this.	Acknowledged, additional details not required in Addendum.
116	4. The last sentence on page 2.2 states that “The Natural Heritage System also incorporates hazard lands including steep slopes, erosion hazard lands and unstable soils that are under the jurisdiction of the GRCA”. This statement is incorrect. Criteria for designating Significant Valleylands (a Significant Natural Area included in the NHS) includes undeveloped portions of the regulatory floodplain. Hazard lands are not outright included in the NHS. Please correct this.	Acknowledged, additional details not required in Addendum.
117	5. Under 2.2.3 Tree By-law, it is stated that the “Tree By-law was created to prevent damage or destruction to trees”. This statement is incorrect. The Tree By-law ‘regulates’ the destruction or injuring of trees and enables the City of Guelph to require a tree permit prior to the injury/destruction of a regulated tree, and compensation. The Tree By-law helps protect and enhance the tree canopy cover in the City. Please revise accordingly.	Acknowledged, additional details not required in Addendum.

118	6. Under 3.2 Field Investigations on page 3.8, please include bat acoustic surveys as well as bat exit surveys in the list of targeted field surveys.	Additional studies conducted in 2021 and detailed in addendum.
119	7. Under 3.2.8.2 Bat Exit Surveys on page 3.14, please include the type of device used for acoustic monitoring. For example, was a hand-held unit used, a song meter or both?	Additional studies conducted in 2021 and detailed in addendum.
120	8. Under 3.2.9.1 Diurnal Surveys on page 3.15, it is stated that “fieldwork was conducted at, or within, half an hour of sunrise”. This statement does not match dates and times listed in Table 3.7. Best results are achieved within half an hour of sunrise, especially in noisy urban environments, and especially in forested ecosystems. The first breeding bird survey was completed on June 12, 2018, which is very late for a first visit. Based on timing of field surveys, data should be interpreted accordingly (i.e. lack of record does not indicate absence). Please update the text, as appropriate.	While June 12 is within the acceptable timing window of breeding bird surveys, we have conducted an additional survey on June 2, 2021 and have included the results in the addendum accordingly.
121	9. Under 3.2.9.2 Crepuscular Surveys on page 3.16, mention of moon phase is not made. Were conditions appropriate for surveying crepuscular birds during site visits completed for bats? Refer to MNRF’s ‘Eastern Whip-poor-will and Common Nighthawk Survey Protocol’ for guidance.	Crepuscular surveys were conducted as per the approved ToR, incidentally in conjunction with bat exit surveys in June during clear evenings. However, surveys were completed between June 12 and June 26, 2018. Full moon dates were on May 29 and June 27, 2018 and therefore at least 3 surveys were conducted 1 week prior to the full moon with two having clear conditions, in accordance with MNRF’s protocol. No additional details provided in the Addendum.
122	10. Under 4.4.6 Amphibian Survey and Habitat Assessment on page 4.6, it is stated that suitable habitat for amphibian breeding was not present. This seems odd, given that the Torrance Creek PSW is located within the Study Area, which is known to provide woodland amphibian breeding habitat. Snow melt and a high groundwater table result in seasonal ponding within this wetland complex. Please clarify.	Based on conducted amphibian surveys, suitable habitat for amphibian breeding is not present within the study area. This includes a May 28, 2018 search for vernal pools (as shown on Figure 2) that did not find any pooling areas and

		therefore breeding amphibian habitat is absent. No additional details provided in the Addendum.
123	11. Under 4.4.14 Incidental Wildlife Observations, the DeKay's Brown123) observation from May 16, 2019 should be added to the list of incidental wildlife. This species was observed, along with several Eastern Gartersnake and a Red-bellied Snake during the feature staking exercise, with City staff. Further, please assess the significance of the snake records recorded with respect to significant wildlife habitat and the potential for snake hibernacula to occur in the vicinity of the subject property.	Updated wildlife list and additional discussion on snake hibernacula provided in the Addendum.
124	12. Section 5.0 Significant Natural Heritage Features should be based on the natural heritage and water resources policies of the City of Guelph Official Plan (March 2018 Consolidation), in addition to the policies of the Provincial Policy Statement. Please update this section to address Official Plan policy.	Analysis included in Addendum.
125	13.Section 5.2 Significant Woodlands includes the following statement: "notwithstanding the criteria denoted in the OP excluding plantations". This statement is incorrect. *Plantations* is a defined term in the Official Plan. Cultural Plantation, per ELC, is not the same thing as *plantation* in the Official Plan. A cultural plantation unit must meet the Official Plan's definition of *plantation* to be excluded from the assessment of significant woodland. Please clarify this.	Acknowledged, additional details not required in Addendum.
126	14.Section 5.2.1 Other Woodlands refers to a deciduous woodland and claims that it was excluded from Significant Woodland due to composition, origin and size. Please provide the analysis to support this. Do the Cultural Woodlands criteria of the Official Plan to this deciduous woodland? This assessment should also be included in a revised EIS.	Analysis included in Addendum.
127	15.What does the bolded text indicate in Table 5.1? For clarity, please uses bolded text consistently within each Table, and among Tables 5.1 through 5.4. Also, please update Tables 5.1 through 5.4 to accurately assess field data collected against MNRF's Ecoregion 6E Criteria to determine whether or not Candidate or Confirmed SWH is present within the Study Area and/or Subject Property.	Bolded text is removed and Tables 5.1-5.4 are reiterated and updated in the Addendum.
128	16.Section 5.3.5 Locally Significant Species should be updated to include the names of the two locally significant plant species. Also, the list of locally	Acknowledged, reiterated in the Addendum.

	significant bird species should be updated to include Northern Flicker. A total of six locally significant bird species were documented, based on field records.	
129	17.Section 5.4.1 Butternut should be updated to indicate that an ‘authorization’ under the *Endangered Species Act* is sought. The EIS should be updated with information from the MECP and Natural Resource Solutions Inc. to reflect the current status of Butternut, ESA requirements and compensation plantings. Correspondence and supporting documentation should be included as an Appendix.	NRSI supporting documentation for Butternut provided in Addendum Appendix G.
130	18.Section 5.4.3 Bat SAR, please provide a map showing the extent of bat species at risk habitat (roosting habitat, foraging habitat). Please also provide correspondence with MECP confirming support of the proposed approach.	As per City of Guelph consultation with MECP, project-specific consultation is required. An Information Gathering Form (IGF) will be submitted to MECP. Habitat mapping is not provided and additional details are not required in Addendum.
131	19.Section 5.5 Significant Natural Heritage Features Summary, on page 5.8, please update the bullet list to include bat species at risk, and to note that honey locust is a planted specimen. Also, the statement “unable to confirm presence/absence” is incorrect. The field surveys were designed to enable an assessment of SWH. For example, breeding bird survey results in fact confirm the woodland as Woodland Area Sensitive Breeding Bird Habitat. Based on results of field surveys, it may or may not be possible to confirm SWH. Unconfirmed SWH would remain Candidate SWH in areas meeting the criteria of the schedules for 6E. Please clarify this in the text.	Summary of natural heritage features will be reiterated in the Addendum.
132	20.Section 5.5 Significant Natural Heritage Features Summary, on page 5.9, includes other woodlands (WODM4-4). Based on the ELC figure, the WODM4-4 vegetation community appears to be contiguous with an FOCM5 vegetation community. As per comment 14 above, please assess this woodland against the Official Plan’s criteria for Cultural Woodland and update the text on page 5.9 accordingly.	Analysis included in Addendum.
133	21.Section 6.1 Stormwater Management should reference stormwater targets prescribed in the Torrance Creek Subwatershed Study for infiltration rates. A portion of the site is located in Catchment 102, where the following targets apply: − infiltrate to enhance baseflow in Torrance Creek: 150mm/yr to 200mm/year or match pre- to post-	The Stormwater Management (SWM) strategy has been revised to have an LID/rain garden feature at the east portion of property to provide recharge to Torrance Creek subwatershed and a new

	− pre- to post- peak flow control for all design events (2 to 100-year events) − 24-hour extended detention for 25mm rainfall event − minimum 80% TSS removal Similarly, the Stormwater targets prescribed in the Hanlon Creek Subwatershed Study should be referenced in this section, as a portion of the site is located within the Hanlon Creek Subwatershed. The proposed stormwater outlet drains to Tributary D, where the following targets apply: − match pre- to post- peak flows for all storm events − implement infiltration best practice to the great extent feasible	gallery in the newly acquired south piece of the site to provide recharge to Hanlon Creek subwatershed. Additional details provided on Stormwater Management in Addendum.
137	25.Section 6.1.2 Trail, references the Guelph Trail Master Plan and a proposed connection through the subject property. A recommendation is provided that the trail be completed as part of a broader trail design approach, to be completed by the City at a future date. This recommendation conflicts with the requirements set out in the Terms of Reference, which included an assessment of the trail route, recommendation for trail alignment consistent with Official Plan policy (i.e., consistent with permitted uses within the natural heritage system, demonstration of no negative impact, etc.) and identification of best management practices to provide the basis for basic trail design, which is to be completed as part of the Environmental Implementation Report (refer to pages 18 and 20 of the approved TOR). The Active Transportation Network Study maps the portion of trail through the subject property as a desired Active Transportation route (i.e. for cycling). The feasibility of accommodating an Active Transportation route through the subject project is to be assessed based on Official Plan policy in the EIS. Lastly, a trail connection from the Park Block to the trail network is desired and should be assessed and evaluated through the EIS to inform the design.	Tricar is deferring trail design and analysis, including potential impacts and compatibility with the Official Plan, to the City of Guelph. This approach allows the City flexibility to complete the trails to their specifications and concordance as determined by City staff. Additional details not included in Addendum.
138	26.Section 7.0 Potential Impacts of Development and Mitigation Recommendations, reference is made to “net environmental impact assessment”. This is not appropriate as the policy test is “no negative impact”. Please revise this statement and confirm that the analysis provided is based on the “no negative impact” test.	Acknowledged, additional details not required in Addendum.

139	27.Section 7.1 Impacts on Significant Natural Features, given that two 12 storey buildings are proposed, the EIS should evaluate the potential for bird strike impacts, and inform the design, as appropriate. Lighting impacts may also result from the proposal; the EIS should make recommendations for lighting adjacent to the natural heritage system based on best management practices. Lastly, grading impacts should be assessed in the EIS. An analysis of the grading plan should be provided in the context of permitted uses within the natural heritage system. Please update section 7.1 accordingly.	The updated site plan has changed both buildings to 10 storeys. Bird strikes mitigation and lighting is included in Section 7.3.1.3. Based on updated grading, as shown on Figure 1, Appendix A, grading is located outside of the buffer and as such an analysis is not required.
140	28.In Section 7.1.1 Significant Wetlands, it is stated that “incidental runoff impacts associated with sediments, dust, as well as nutrient loads will be reduced by the natural polishing function of the vegetative zone between the feature ad development”. It is unclear what this statement means. The Stormwater system is designed to infiltrate the 25mm storm event via an infiltration trench. Surplus runoff will fill a storage tank and then outlet to the storm sewer on Gordon Street, which outlets to a stormwater pond, which discharges to the Hanlon Creek PSW. Further, the last sentence of the first paragraph in this section states that “all surface runoff from the proposed development is directed to the existing storm sewer on Gordon Street”. This statement is not consistent with section 6.1 of the EIS or the FSR. Please clarify.	Understood, strike quoted sentences and defer to updated FSR. Additional details not required in Addendum
141	29.Also in Section 7.1.1 Significant Wetlands, please demonstrate that infiltration rates and volumes have been matched, pre- to post- in the Torrance Creek and Hanlon Creek Subwatersheds. This section notes that infiltration will “match and likely notably exceed pre-development infiltration volumes” in the catchment that directs flows to Torrance Creek. Torrance PSW has both a recharge and discharge function, depending on the time of year. During periods of an elevated water table and an upward hydraulic gradient, are impacts associated with the infiltration trench anticipated? For example, if infiltration cannot occur due to a high-water table, surplus will fill the storage tank and discharge to Hanlon PSW, likely resulting in a negative impact to both PSWs. Please include an in-depth analysis of stormwater impacts on the natural heritage system’s features and functions.	Engineering strategy for the site has been updated and is described in supporting documents (FSR, Appendix H; Hydrogeological report, Appendix E). There is no conflict with the high ground water table for the east infiltration gallery as the design of the gallery has been revised and the depth reduced. Also note the storage tank in the underground parking garage has been removed as the stormwater management strategy has been revised such that surplus water will be directed overland to the Torrence Creek Watershed.

		Pre- and post-development water balances are matched as described in the Hydrogeological Report. Addendum updated.
142	30.On page 7.2, discussion is provided on the predicted impacts associated with reduced infiltration to the Hanlon Creek Subwatershed, with a conclusion of no negative impact drawn. Please provide the supporting analysis to support this claim. For example, what is the difference in pre- to post-infiltration volumes and rates? If infiltration is reduced, is the potential for baseflow impacts in Hanlon Creek? If infiltration is reduced, will more runoff be directed to Hanlon PSW? In addition, the FSR indicates that this runoff would be directed to the storm sewer on Gordon. The EIS fails to address Stormwater impacts associated with unattenuated/untreated runoff from the catchment containing the extension of Valley Road/Edinburgh.	See above. In regard to stormwater at Valley Road and Edinburgh, these are municipal streets and should be treated by existing downstream facilities. Infrastructure within the right of way is to be provided in accordance with municipal standards.
143	31.The Torrance Creek PSW has a recharge and discharge function. What impact does the proposed stormwater management system have on the recharge/discharge function of the wetland? Please update the EIS to include a comparison of pre- to post- monthly differences in vertical hydraulic gradients, infiltration, runoff, etc. Note that this is required to demonstrate no negative impact the PSW.	Pre- and post-development water balances are matched as described in the Hydrogeological Report and included in the Addendum.
144	32.Section 7.1.5 Significant Habitat of Endangered and Threatened Species, please provide documentation of correspondence with MECP confirming the proposed mitigation measures for bat species at risk are acceptable. Please also update the Butternut paragraph to include details from NRSI, as requested above.	Information Gathering Form to be prepared for bat species at risk. Butternut information provided as Appendix G.
145	33.Section 7.1.6 Locally Significant Species, please clarify where the Yellow-billed Cuckoo was heard. The text appears to indicate that the Yellow-billed Cuckoo was heard singing from the development area of the site. Please provide an assessment based on the Official Plan’s policy on Habitat for Significant Species to establish whether or not this Natura Area designation applies.	Location of Yellow-billed Cuckoo shown on Figure 4. Upon further inspection, it appears that the observation was within the buffer area of the significant woodland (outside development area). However, the single observation of a Yellow-billed Cuckoo (not observed in 2021) does not constitute habitat for significant species.

		Included in Addendum.
146	34.In section 7.3.1.3 Wildlife Friendly Building Design, please note that the EIR should include more detailed guidance on bird-friendly building design to inform detailed design.	Acknowledged. Additional details not required in Addendum.
147	35.Environmental planning staff are supportive of the timing recommendations made for the removal of debris and woodchip piles to protect snakes. Consider including a recommendation to incorporate snake hibernacula and/or gestation site habitat structures in the buffer portion of the natural heritage system. The Environmental Implementation Report would then provide further information on location, design, etc. to assist with detailed design and implementation.	Acknowledged. Additional details not required in Addendum.
148	36.In section 7.3.4 on page 7.8, please update the paragraph on Butternut to reflect the outcome of the Butternut Health Assessment and authorization. NRSI should be contacted for this information.	Butternut information provided in Appendix G of the Addendum.
149	37.The details included in the post-construction monitoring program are acceptable for the EIS; however, please note that a requirement of the forthcoming EIR will be to provide a detailed post-construction monitoring plan. Similarly, additional detail on vegetation plantings will also need to be provided in the EIR. Please update the EIS to include a summary section on EIR requirements and a proposed outline for the future report. Please note that this was included within the approved Terms of Reference.	EIR requirements included in Addendum.
150	38.The following major topics were omitted from the EIS and should be assessed in detail in a revised EIS as part of the next submission: − assessment of bat species at risk habitat and supporting documentation from MECP; − Butternut assessment details and supporting documentation from MECP; - assessment of Habitat for Significant Species; − assessment of Cultural Woodland; − assessment of the need for Established Buffers; − assessment of grading impacts; − assessment of wetland water balance, based on assessment of monthly differences, pre- to post-development, for lands draining to the Torrance PSW and Hanlon PSW, to determine whether or not ecological and/or hydrologic impacts resulting from the proposed development are anticipated; and − recommended scope for EIR.	Established buffers are set out in the Official Plan and therefore the analysis required and determined need for those buffers has already been completed during Official Plan Amendment 42 and is therefore not re-examined. An assessment of bat species at risk habitat is not required based on follow up consultation between the City and MECP. However, an Information Gathering Form will be submitted concurrently with this EIS Addendum and follow up documentation will

		be provided to the City when received. The remaining bulleted items will be addressed in the Addendum.
151	39.Section 9.0 Policy Compliance should focus on the consistency of the proposal with the “no negative impact test”. As written, the focus appears to be on establishing feature-based constraints to development. This is not consistent with the PPS, and the natural heritage system’s approach to protecting, enhancing and restoring natural heritage in Ontario.	Acknowledged, policy compliance updated in Addendum.
152	40.Section 10.1 Report Summary, please update the bullet on SWH to indicate Candidate vs Confirmed. Further, the bullet on the proposed stormwater management plan indicates that parking lot runoff will be infiltrated. This detail was not included in the description of the stormwater management system presented earlier in the EIS. Please ensure that all statements are consistent and coordinated with the engineering plans prepared for the proposed development. Please note that infiltration of parking lot water is not supported by the City. Lastly, the report summary should include changes to wetland hydrology and ecology, and removal of accessory habitat to list of potential impacts associated with the proposed development.	Stormwater management section of the EIS addendum has been updated to reflect the revised SWM design and are consistent. Parking lot water will be infiltrated. To comply with the City of Guelph ‘treatment train’ recommendation, an Oil-Grit Separator Unit (Stormceptor EF4) was sized also upstream of the Permavoid storage tank, to treat runoff produced over the parking area (Catchment 204 and 208). In addition, catchbasin shields will be provided on-site. As the Stormceptor EF 4 will provide approximately 90% TSS removal to contributing runoff, this approach will incorporate redundancy into the water quality system and it can be expected that the entire site will have approximately 80% TSS removal. Updated summary of candidate vs. confirmed SWH to be included in Addendum.
153	41.Please update section 10.2 Recommendations to include the erection of Tree Protection Fencing prior to the commencement of site alteration/construction.	Acknowledged, additional details not required in Addendum.
154	42.Please update mapping provided in Appendix A to include the following: − established wetland buffer;	Updated mapping provided in Appendix A.

	− Ecological Land Classification vegetation community information for polygon adjacent to FOD5-6; − extent and type of Significant Wildlife Habitat features; − limit of the Natural Heritage System; and − Cultural Woodland and/or Habitat for Significant Species, as appropriate, based on the criteria-based assessment requested above.	
155	**Hydrogeological Assessment** 43.In section 4.2.4.1, pre-treatment for TSS is suggested to eliminate a number of sediment-bound metals in the discharge effluent. City staff agree that the proposed pre-treatment approach would likely reduce these concentrations; however, please note that samples would still be required to be collected to confirm this assumption, prior to the discharge being authorized to City sewers.	Acknowledged.
156	44.Please update section 4.2.4.1 to clarify whether or not VOCs were sampled to confirm presence/absence. The City's Sewer Use By-law prohibits discharge of VOC-impacted. Please note that VOC sampling may be required under a future discharge agreement with the City's Wastewater Division.	The testing for volatile organic compounds (VOCs) was not completed for the groundwater samples collected from selected on-Site monitoring wells in September 2018. Tricar acknowledges that the testing for VOCs may be required under a future discharge agreement with the City's Wastewater Division.
157	45.The post-development water balance provided in section 5.3 does not appear to account for the lands fronting on Valley Road (0.27ha catchment shown on Figure 15). Please explain why this area was excluded from water balance calculations, or update the water balance to include this catchment. Further, the size of the catchment draining to Torrance provided in the water balance assessment is 1.73ha, which does not match the catchment area of 1.44 ha in the hydrologic model. Please update the calculations ensuring that consistent catchment areas are applied.	As stated under Section 5.0 (Page 5.3) of the Stantec (2020) Hydrogeological Assessment report, "…the lands fronting Valley Road within the northeastern portion of the Site are not included in the pre- and post-development water balance calculations, given that these lands are to come under the ownership of the City and, subsequently, will no longer be the responsibility of Tricar." Note that under the initial water balance analysis, this 0.27 ha catchment remains unchanged from the pre- to post-development condition, making the inclusion of this

		land parcel in the analysis unnecessary. As requested, the pre- to post-development water balance calculations have been updated to account for the specified area discrepancy (1.73 ha vs. 1.44 ha). Please refer to the attached Infiltration and Groundwater Mounding Assessment Technical Memorandum (Stantec, 2021) for further details.
158	46.The EIS should refer to Section 6.0 Groundwater Dewatering Assessment and include recommendations for monitoring and best practice. This could be included as an item for the future EIR.	Acknowledged, will be included in EIR recommendations in Addendum.
159	47.Section 6.1 – It appears that a safety factor was not considered in the calculations of dewatering volume estimation, nor was any basal seepage considered. Although the site typically has observed downward gradients, the hydrological assessment indicates that upward gradients are present. Please add a factor of safety to the calculations and account for basal seepage, or provide text to explain why these elements were not considered in the calculations.	Factor of safety will be added to calculations in the Hydrogeology Report.
160	48.An infiltration (rock) trench is proposed to address the infiltration deficit. The infiltration (rock) trench is located within the Torrance Creek Subwatershed. Please include an analysis of the post-development water balance per watershed. For example, with LID measures in place, the water balance should demonstrate that the infiltration rate/volume should roughly match pre- to post- rates/volumes within each Subwatershed (i.e. Torrance and Hanlon). A stormwater management design and supporting analysis demonstrate no negative impact to the receiving natural heritage system is required. This is typically achieved by demonstrating that the proposed development and stormwater management system matches pre- to post- monthly infiltration rates/volumes and monthly runoff rates/volumes. Hydrographs depicting monthly differences in runoff volumes and infiltration volumes are helpful in demonstrating consistency with the natural heritage system “no negative impact” policy test.	Updated water balance calculations based on the revised SWM approach included in Addendum. Pre- and post-development infiltration and runoff rates are matched.

161	49.In Section 7.2 construction proximity to the nearby municipal well is accounted for; however, there is no discussion provided as to private residential wells in the area. During the filing of an application for PTTW or registration under the EASR, it is recommended that the proponent assess potential impacts to private residential wells.	Acknowledged.
162	**Tree Preservation Plan** 50.Please update the Tree Preservation Plan to include recommendations for the EIR and detailed design.	Recommendations for the EIR and detailed design stage have been included in the TPP in Section 6.4.
163	51.Environmental planning is generally supportive of using a polygon approach in certain situations; however, based on data provided in Appendix 1 Tree Inventory Data, it is unclear how the stem count column relates to the Polygon. For example, 1 stem is reported from each of Polygons A, B, C, E and F. Given the brief description provided on page 4 of the plan: “If trees were present in monoculture hedgerow features, a polygon method was used”. Based on this description, >1 stem per polygon would be expected. Please clarify.	The tree tables in Appendix I have been updated to include the accurate number of trees for each tree polygon.
164	52.Please update Map 2 of the Tree Inventory and Preservation Plan to show Tree Protection Fencing around the perimeter of the natural heritage system.	Updated Tree Preservation Plan provided. Map 2 in the TPP has been updated to show the Tree Protection Fencing around the perimeter of the Natural Heritage System, at the 10m Significant Woodland buffer.
165	**Functional Servicing Report** 53.Please update section 5.1.2 Torrance Creek Subwatershed Study to accurately reflect recommended infiltration rates, which in the case of the proposed development is between 150mm/yr to 200 mm/yr.	Updated in revised FSR.
166	54.The FSR indicates that the area outletting to Gordon Street (Hanlon Creek Subwatershed) will increase, post-development. The infiltration trench is proposed in the Torrance Creek Subwatershed, which means the majority of stormwater originating from the Hanlon Creek catching will be generated as runoff. Please clarify that the receiving stormwater pond has capacity to control the runoff volumes generated by the proposed development. Please note that surcharge of this facility is directed to the Hanlon PSW. Runoff volumes should match pre- to post- per the Hanlon Creek Subwatershed recommendations.	Revised SWM strategy to match the pre and post Torrence Creek and Hanlon Creek subwatershed water balance.

167	55.The description of Catchment 202 provided at the bottom of 5.6 indicates that roof-top water will be directed the storm sewer on Gordon Street, with the 25mm event being directed to the infiltration trench. Please clarify that up to and including the 25mm is intended to be directed to the infiltration trench. Events in excess of 25mm or when back to back events occur prior to draw-down would be directed to the storage tank, eventually draining to the storm sewer when capacity is reached. Environmental planning strongly encourages infiltration of 'clean' water to maintain infiltration and baseflow in Hanlon Creek to the greatest extent feasible. Please consider this comment when updating the FSR.	SWM strategy has been revised.
168	56.The EIS should include an analysis of the findings presented on page 5.8 which relate to pre- to post-differences in runoff and infiltration being directed to the Torrance and Hanlon Subwatersheds under the post-development scenario. Based on the analysis provided in the FSR, the EIS should provide an assessment as to whether or not impacts to the ecology or hydrology of the wetlands are anticipated.	Updated water balance calculations based on the revised SWM approach included in Addendum. Pre- and post-development infiltration and runoff rates are matched.
169	57.How would the infiltration trench function in the event of back-to-back storms? Please clarify whether or not a safety factor was incorporated into the sizing and design of the infiltration trench.	A safety factor has been incorporated (2.5 for the South trench, and 3.5 for the East trench). The system is equipped with an overflow and the site designed with an overland flow route to direct major event flow toward the Gordon Street right-of-way.
170	58.In section 5.6 On-site Infiltration, on page 5.9, it is stated that "The infiltration gallery should only be intercepted by groundwater in spring-time". How was this detail factored into the water balance? The EIS should provide an analysis of potential impacts arising from the proposed stormwater design. For example, if groundwater intercepts the infiltration trench during the spring, infiltration will not occur which would result in more runoff being directed to Hanlon Subwatershed. This is unacceptable and should be addressed in the next submission.	The SWM strategy has been revised to incorporate an infiltration gallery (south) while changing the previous eastern infiltration gallery to a rain garden LID feature. The LID feature maintains a separation of 1 m from the high ground water table recorded as 340.3m. Added monitoring wells within the footprint of the LID feature will confirm the high groundwater table and confirm separation.
171	59.Please note that in situ permeameter testing is required to demonstrate that the proposed infiltration trench will function as anticipated. Please provide this information in the next submission.	Onsite testing to be completed in June and is incorporated into the Hydrogeological Report.

172	60.Drawing SSP-2 Storm Drainage Area Plan – It is unclear how the Area IDs relate to the Catchments described in the FSR and Hydrological Investigation report's water balance calculations. Please ensure that this is clarified and coordinated among studies and drawings in the next submission.	Inconsistencies remedied in revised FSR.
173	61.Drawing GP-1 Grading Plan indicates that extensive grading is required adjacent to the natural heritage system. Please provide additional detail on grading requirements (e.g. spot elevations) to enable a proper assessment of consistency with Official Plan policy. Please note that a cross-section can be helpful in demonstrating how the required grading relates to the protection of the natural heritage system. At a minimum, please update GP-1 to show differences in grade adjacent to the natural heritage system, and slope, particularly at the southeast end of the site.	Grading is no longer proposed within established buffers.
174	62.It is unclear how the proposed erosion and sediment control plan has been coordinated with the proposed grading plan. For example, tree protection fencing and silt fencing is proposed in an area identified for extensive grading on GP-1. Please clarify.	Inconsistencies have been rectified in updated plans included in the Addendum.
175	**Landscape Concept** 63.The Landscape Concept proposes the planting of coniferous and deciduous trees on top of the infiltration facility. Guelph's Engineering Development Manual specifies a minimum 1m offset of plant material from infiltration galleries. Please relocate the proposed trees outside of the infiltration gallery area.	Landscape concept have been revised to not include tree plantings on the infiltration galleries.
176	**Summary** A revised EIS is required to address the comments provided above. Revisions to the supporting studies, including the Tree Preservation Plan, Hydrological Assessment, Functional Servicing Report and Landscape Plan are required. Environmental planning encourages the applicant to meet with City staff to discuss the comments provided, prior to providing a second submission. Substantial work remains outstanding to adequately demonstrate no negative impact to the natural heritage system's ecological and hydrologic features and functions.	Acknowledged, supporting documentation provided.

Jyoti Pathak, Parks and Recreation 519-822-1260 x 2431 Jyoti.pathak@guelph.ca **December 18, 2020**		
184	**Trail Network:**  The Official Plan – Schedule 8 ‘Trail Network’ includes a proposed off-road secondary trail route along western edge of the Torrance Creek provincially significant wetlands through the subject property that connects to the approved proposed trail west of Valley Road condominium to the north and west of 1280 Gordon Street to the south.	See response to #137
185	Please note that the trail alignments north and south of the subject site have been designed and approved through the development review process and the developer is responsible to identify the trail alignment and preliminary trail design on the subject site as included in the terms of reference for the EIS.	See response to #137
186	**Local trail connection:** Provide a local accessible trail connection, 2.5 m wide, to connect the proposed park to the proposed Citywide trail at the back of the property. This trail connection is to be designed and developed as part of the Landscaping works on the subject site.	See response to #137
187	Provide conceptual trail alignment for City’s review of the following connections: • North-south Citywide trail connection • East-west local trail connection	See response to #137
189	**Environmental Implementation Report:** 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	Acknowledged. Recommendations for the EIR are included in the Addendum.

	architect); detailed design and mitigation plans to support the trail. The EIR will address the recommendations related to trail system and natural open space system, including detail design of the trail system; preparation of Landscape Plans and details to address demarcation, removal of invasive species, 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, structures, etc. will be provided in the Environmental Implementation Report consistent with City of Guelph's current trail standards 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.	
190	**Open Space Works and Restoration:** 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	Acknowledged. No additional detail required in Addendum.
191	**Tree Preservation and removal of invasive species and hazard trees:** Schedule removal of the common buckthorn within the trail corridor prior to trail construction. A review of hazard trees (e. g. dead, partially dead or dying trees) along the trail route will be conducted at the time of vegetation removal by a qualified arborist. Identify all hazardous trees along the trail route in consultation with Parks staff for removal prior to start of trail construction. Hazard trees only would be removed within striking distance of the trail.	Acknowledged. No additional detail required in Addendum.
195	**Summary:** Parks does not support the proposed development based on the current information provided. Parks needs revised documents which reflect the comments provided above for our further review and comments. Draft conditions would be provided upon receiving satisfactory proposal.	Acknowledged. No additional detail required in Addendum.

APPENDIX C.2
COMMENT MATRIX FOR ADDENDUM VERSION 1 SUBMISSION

Comment Matrix for Second Submission
OZS20-004,
Draft Plan of Subdivision, Official Plan and Zoning By-law Amendment
1242 – 1270 Gordon Street and 9 Valley Road, Guelph

Last updated June 17, 2022

Mohsin Ali Talpur, M.Eng., P.Eng. Development - Environmental Engineer, Engineering Services, Guelph December 14, 2021		
#	Comment related to second submission	How comment has been addressed
1	**Functional Servicing Report** 1. In our previous comment#4, we had asked about the email correspondence from City regarding sanitary capacity. The revised report suggests the correspondence is attached in Appendix A. However, the Appendix A includes Stormceptor EF report. Please provide the correspondence for review.	Email correspondence is included.
2	2. The section 3 is not updated based on our previous comments about a 'H' (holding) be placed on the property until such time a new sewer is installed. Please include the information in the text of the section 3 of the FSR report.	Report has been updated to include reference to staff recommendation for an H to be applied.
3	3. The Section 4 of the report had not been updated regarding City's water supply pressures for the proposed development as per our previous comment #3. Please update the section as per our previous comments.	Report has been updated
4	4. The previous comment #6 regarding Steep gradient of Street 'A' over 6% has not been addressed. Please revise the gradient accordingly.	The Street A profile has been revised to be 6% or less.
5	5. In our previous comment #7, it was requested to provide a typical cross-section of Street 'A', and label for centerline radius. The typical cross-section and the centerline radius on engineering drawings are still missing. Please provide requested information for review.	The typical cross section is City of Guelph standard drawing 5-48a of the City of Guelph Linear Infrastructure Standards 2021. This detail drawing is easily referenced and has not been included on the drawing set. The centreline radius is 18m and has been labelled.
6	6. It appears that sidewalk is provided on one side. We had requested to update the drawings in our previous comment #8, but the plan has not been updated as requested. Please show the sidewalk on both sides of Street 'A' plan and provide a typical cross-section for review.	Sidewalk is provided on one side as per the typical cross section City of Guelph standard drawing 5-48a of the City of Guelph Linear Infrastructure Standards 2021. The sidewalk is on

		thedevelopment side of Street A. Due to alignment and lane configuration considerations, the Street A right-of-way would require future expansion on the north side to accommodate a 2nd sidewalk. This widening could be obtained in the event adjacent lands are the subject of a redevelopment application similar to the creation of Street A as part of this application. The lane alignment of Edinburg St across Gordon Street is currently skewed and further adjustment to provide sufficient boulevard for a second sidewalk would make the traffic movement unsafe. Furthermore, the sidewalk on the development side of the street will provide direct access to the future park without creating potential conflicts with pedestrians finding themselves needing to cross Street A on a bend
7	7. In section 5.1.4 of FSR, the design criteria for the site are discussed. The Torrance Creek Subwatershed infiltration criteria of 150mm/year were adopted for the site. However, the GRCA mapping for the site (Tributary D of HCWS) shows a recharge of 122-199mm/year, which are consistent with predevelopment water balance analysis recharge rates for the Site ranges from 192mm/year to 222mm/year. Therefore, it is recommended to update recharge criteria of the Site.	Based on the Pre-Development Water Balance calculations, the infiltration volumes predicted for the portions of the Site located to the northeast of the flow divide (Torrance Creek Subwatershed) and southwest of the divide

		(Hanlon Creek Subwatershed) add up to 7,227 m^3.
8	8. The requested information of traffic geometric plan showing large moving trucks to /from the site was requested in our previous comment #8 had not been provided. Please provide the requested information.	Updated geometric plans are included in the TIS memo.
9	9. The Street ‘A’ ROW area has not been included in the proposed storm drainage conditions in Drawing No. 2 and the Section 5.5 of FSR report. This deficiency was identified in our previous comment #7 as well. Please update the report accordingly.	Street A has now been included.
10	10.The catchment areas numbering on Storm Drainage Plan are not consistent with the FSR brief including notes provided in the drawing no. SSP-2. Please be consistent with numbering and update the documents accordingly.	Catchment numbers have been updated.
11	11.Please update the Section 5.5 of FSR that states two 10-storey apartment buildings, one with one level of underground parking and one with one level of underground parking. It seems contradicting the proposed two levels of parking for the buildings. Please update the text.	Report has been updated
12	12.It appears that the major overland flows from the site discharging uncontrolled to the Gordon Street including proposed Street ‘A’. The City criteria states that post-development flows shall be controlled to predevelopment (existing) levels for the 2 year through 100year storm events. The proposed site impervious cover is changed over 90% that may cause flooding on Gordon Street at significant events. Please provide onsite storage for all peak flows (2year to 100year) to pre-development rates.	Water quantity controls have been provided for the subject Site. Street A is a municipal street and external to the Site with quantity controls being provided by existing infrastructure downstream.
13	13.A 3.5m high acoustic barrier is proposed at the south west corner of the site. The proposed overland flows through southern amenity areas discharge to the Gordon Street will be intercepted by the proposed acoustic barrier walls. The noise barrier walls are not designed to withstand the overland flow pressures and are not designed to pass flows through it. Please provide details of overland flow routes showing controlled flows discharging safely without any obstructions for review.	Southern noise barrier has been removed to account for the account for the accessible ramp. A swale has been added to the south side of the property to direct overland flow to the Gordon Street right-of-way. Refer to revised civil drawings.
14	14.The MUDUSS model comment line mentions 1250 Gordon Street. Please update to 1242-1260 Gordon and 9 Valley to be consistent with the proposed application.	Revised
15	15.The MIDUSS model shows duration of 180 minutes (3 hours) for all storms including 2year, 5year and 100year storms, which is not appropriate. Please use 5 minute duration time for 2 year and 5 year storm events as per City standards and update the model calculations accordingly.	Revised

16	16.The Street ‘A’ Catchment area (i.e., A18 - 0.29 ha) has not been included in both existing and proposed conditions of MIDUSS. Please incorporate the area and propose quality and quantity control for the Catchment A-18 and submit updated hydrological model and drawings for review.	Water quantity controls have been provided for the subject Site. Street A is a municipal street and external to the Site with quantity controls being provided by existing infrastructure downstream.
17	17.There are no calculations provided for the sizing of sewers. It seems the sewers are designed based on 180-minutes duration, which is not acceptable. Please provide design sheet in excel format for 5year storm event for review.	A design sheet supporting sewer sizing has been provided.
18	18.The proposed approach for the rooftop storage to attenuate up to 25mm rainfall events using 75mm diameter orifice, connected through downspout system into on-site infiltration trenches seems reasonable. However, we had concerns on proposed active storage of 136 m3 for West building rooftop and 138 m3 of active storage on East Building rooftop during 100year storm event. The rooftop storage at 100year storm event including number of Catchment areas discharging uncontrolled to Gordon Street should be directed to a storage facility and release runoff to Gordon Street at predevelopment rate. The City prefers using open surface SWM facility to control all flows 2year to 100year at pre-development rates. Please adjust grading and explore options for out-letting controlled flows to the Gordon Street.	Rooftop controls have been revised to include industry standard roof drains 100-year controlled to 42 L/s/ha. Due to grading constraints, an open surface SWM facility was not feasible.
19	19.The Proposed Permavoid infiltration gallery having 90% voids seems challenging product to be allowed for the infiltration galleries within the City. The City does not accept sizing of the galleries that include infiltration from the sides of the gallery, only bottom footprints should be considered for infiltration gallery sizing. The calculations provided are not legible. Therefore, provide detailed calculations in excel format with supporting documentation for review and recommended to use conventional stone gallery for infiltrating West building rooftop runoff as well.	Infiltration calculations consider the bottom area of the gallery for infiltration and does not include sides. See revised calculations attached to the FSR.
20	20.It appears that the Permavoid system is proposed for both quantity control and infiltration located into the southern amenity area. The proposed Permavoid infiltration system will mix the clean rooftop runoff from western building, with runoff from parking, and laneway areas to infiltrate. Based on City’s Source Water Protection infiltration policy only clean rooftop runoff can infiltrate. The runoff generated from parking and laneways areas that contains contaminants including road salts during the Winter seasons with suspended sediments should be separated from rooftop runoff and directed to storage tank and release at pre-development rates. Please demonstrate a separate clean rooftop runoff to infiltrate and	To meet water balance targets, the infiltration of parking lot runoff is required. Salt application will be prohibited on site, and salt alternatives will be required for winter maintenance.

	provide a separate storage for major and minor flows providing quality control and to release flows at predevelopment rates.	
21	21.A Pemavoid storage system is proposed just downstream of southern infiltration gallery. The underground perforated system will allow runoff to infiltrate contaminants collected from parking and laneways areas into the ground, which is not acceptable. Please demonstrate that all runoff generated from the site is stored and released at pre-development rates by providing an open surface storage.	The subsurface retention facility will be lined with an impermeable liner.
22	22.The proposed East infiltration gallery bottom elevation is 340.06m. The seasonal high groundwater elevation at MW5-18 measured is 340.7m, which is located at about 30m from proposed gallery; the horizontal hydraulic gradient calculated is 0.04 m/m towards Torrance Creek Swamp. Thus, the groundwater elevation estimated at bottom of the infiltration gallery is 339.5m with 0.56m separation from bottom of the gallery, which does not meet the minimum 1.0m separation requirements. In addition, Section 6.1 of Hydrogeological assessment report also mentions that the eastern gallery is approximately 0.8m above projected seasonal high groundwater table. Please demonstrate with detailed calculations and ensure gallery bottom had minimum 1.0 m separation from seasonal high groundwater table.	The gallery has been sited such that 1 m of separation has been provided from the high groundwater elevation.
23	23.For quality control a Stormceptor EF4 unit is proposed upstream of Permavoid storage system to maintain 80% TSS removal. However, the Street ‘A’ runoff is discharging uncontrol without any quality control. Please provide appropriate size Stormceptor EF unit for the Street ‘A’.	Oil/Grit separators have been provided for parking lot runoff and for Street A.
24	**Hydrogeological Assessment Report** 24.The meteorological data (precipitation and temperatures) used for hydrographs belongs to Waterloo Airport Station that does not reflect trends comparable with measured groundwater elevations provided for the site. It is recommended to use the local meteorological data from Guelph Arboretum Station for the hydrographs and update the Figures 9 and 10 accordingly	Daily air temperature and precipitation data is only available online from the Guelph Arboretum Station to August 1997. The Region of Waterloo Int’l Airport climate station (16 km from Site) is the closest station that provides precipitation and air temperature data over the period of groundwater level monitoring presented in the Hydrogeological Assessment report (July 2018 to June 2020).
25	25.It appears that the lands fronting Valley Road within the northeastern portion of the Site (i.e., Street ‘A’ area) not	These lands are now included in the pre- and

	included in the pre- and post development water balance calculations. The rational provided that these lands are to come under the ownership of the City and, subsequently, will no longer be the responsibility of Tricar. The water balance calculations (pre and post-development scenario) must include entire area irrespective of future ownership. Please revise the calculations and update the water balance analysis and provide excel sheet for review.	post-development water balance calculations.
26	26.The meteorological data used in water balance analysis is from Waterloo Wellington A Climate Stations that is located approximately 15 km from the site. As mentioned in the report that the climate normal from 1971 to 2000 are available from Guelph Arboretum Climate Station. We prefer using Guelph Arboretum Climate Station for the consistencies in development applications as the Arboretum data will be most representative for the site that is located about 1.5km. Please use the Arboretum data in the updated version.	The pre- and post-development water balance have been updated to the climate normal (1971-2000) from the Guelph Arboretum Climate Station.
27	27.The total infiltration deficits calculated are 2,279 m3 using water balance methodology by deducting evapotranspiration, soil storage losses etc. from the rainfall. However, groundwater recharge impacts and mitigation calculations provided in Section 8 are in complete isolation of water balance methodology. The evapotranspiration is generally 60% of the rainfall. Calculating volume of rooftop under 25mm or less event does not account for evaporation from the building roofs. The simple arithmetic sums with assumptions for frequency of rainfall events for mitigation purposes are not reasonable. Please update the pre-development, post-development without mitigation measures scenarios and include additional post-development scenario with mitigation measures and provide digital copies in excel format for review.	The analysis method has been adjusted to calculate the annual volume of precipitation captured by rooftops for discharge to the East and South Infiltration Trenches
28	28.The groundwater mounding was estimated using Hantush equation spread sheet prepared by USGS for both east and south infiltration galleries for 25mm event. However, the mounding calculations for the proposed Permavoid storage tank having capacity for storage of greater than 25mm storm was not conducted. Please estimate mounding impacts of Permavoid storage tank for 5 year storm storage on adjacent properties.	The infiltration galleries have been re-designed. Only the South Infiltration Trench is now equipped with a Stormtech storage tank, which will be wrapped in an impermeable liner (no infiltration can occur).
29	29.In Section 7.1.3, it is mentioned that there will be no permanent drainage system / dewatering planned for the underground parking area due to construction of waterproof base. Generally, drainage is provided at the bottom of every foundations. We need a written confirmation from building professionals/Architects that there will be no drainage/sump pumps provided for the waterproofed underground parking structures. The building professionals/Architects should quote	This will be addressed further with detailed design of the building however the building foundation is intended to be waterproofed and permanent dewatering

	the supporting Ontario Building Code (OBC) sections that identify that the drainage including weeping tiles, sump pumps are not required for the waterproofed basements. In case of failure in providing supporting information from the OBC, we will consider possibility of permanent dewatering at the Site.	is not anticipated to be required.
30	**Noise Impact Study** 30.Section 3.1 Table 1B, page 2: As the ventilation and building component discussion is outlined below, it would be better if this table was consistent with the MECP's sound level limits for OLAs only. I understand the concept, but including POW values here, in this context, is technically incorrect. They could be correctly stated in a table if a table is used to summarize the ventilation and building component description.	Report has been adjusted.
31	31.Section 3.1, page 2: If using a separate table to summarize the ventilation and building component review requirements, please note that NPC-300 includes bedrooms and living/dining rooms in both day and nighttime periods (and by extension, evening time periods for stationary noise). The "type of space" would be better described as outside the plane of window, without identifying the type of use inside (or include bedrooms and living/dining rooms in the description). Please note that this type of description (bedrooms at night, living/dining rooms in day) should be corrected throughout this report, most notably Sections 10 & 12).	Report has been adjusted.
32	32.Section 3.1, Page 2: Please update Appendix D based on changes made in the body of the report.	Report has been adjusted.
33	33.Sections 3.4-3.6: Please update references to the criteria table(s).	Report has been adjusted.
34	34.Section 3.6, pages 3-4: Is there a copy/paste error in this section? Not sure why we're talking about STEAM concepts.	Report has been adjusted.
35	35.Section 3.7, page 4: Not sure why this section is here, as the details are more specifically/correctly spelled out in the preceding sections.	Report has been adjusted.
36	36.Section 3.8 paragraph 1, page 4: Technically, the stationary noise criteria is based on the worst-case scenario for the affected site; while is this often at the point of time of lowest ambient roadway traffic, that isn't always the case, and is not the way NPC-300 defines it.	The calculations were conducted using the highest sound level (100% duty) during the quietest time of the day when the equipment is operating provided the largest difference between the two. As per MECP's NPC-300 guideline as the greatest noise impact relative to the limit in any hour.

37	37.Section 3.8 paragraph 3, page 4: Please update based on Class 2 Area.	Report has been adjusted.
38	38.Section 3.8 paragraph 4, page 4: Details of the traffic volumes, assumptions and calculations used to set the stationary sound guidelines have not been included in the submitted study; please provide as part of the next submission.	Report includes detailed traffic data provided by the City.
39	39.Section 4.0: Less traffic data is provided in Appendix B then was provided in the 1st submission; please provide all of the traffic data that was used to determine the volumes used for this study, and include summary page(s) showing how the final values were obtained.	Updated traffic counts were provided by the City and the calculations updated.
40	40.Section 4.0 Table 2, page 5: Even if existing heavy truck % is zero, why is projected heavy truck % zero? Only valid if road has heavy truck limits (verified to remain in place to horizon year).	Updated traffic counts were provided by the City and the calculations updated.
41	41.Section 6.0 paragraph 1, page 7: AC is not a noise control feature. See NPC300 Section C7.8.	Report has been adjusted.
42	42.Section 6.0 paragraph 2, page 7: What is the feasibility of mitigating at these locations? Are there options for the developer to consider during future detailed designs?	Solid railings (at least 1.1m high) may be considered. This would be reviewed during the final design stage.
43	43.Section 6.1 paragraph 2, page 8: The proposed noise barrier height is not consistent with the GNCG specifications for noise barriers.	Site design and report have been modified where acoustic fencing is not required.
44	44.Section 6.1 paragraph 2, page 8: The OLA at location 12 has geometric features (mostly in the form of grade changes) that may cause the proposed barrier to become ineffective at some locations within the OLA (for example, only a few meters further back the elevation is 3m higher, and there is the potential for "bright zone" exposure). Please review, and provide some additional context to ensure the final proposed mitigation will provide the required protection throughout the OLA space.	Site design and report have been modified where acoustic fencing is not required.
45	45.Section 7.0 paragraph 1, page 8 & Appendix A, Figure 6: The site extents shown in Figure 6 do not match those on the concept/draft plan.	Report has been adjusted.
46	46.Section 7.0 paragraph 2 (and list that follows), pages 8 & 9: If CadnaA provides the highest sound level point along each facade of the buildings, is there a reason to call out three specific analysis points that are not at the highest sound level locations on the buildings?	It is not clear what the reviewer is referring to. The sound levels from CadnaA show the highest sound level at each façade (i.e., 48 dB at south facade). A single point was selected (at the highest sound level at 48 dBA) in order to extract from

		CadnaA, the details of all sources at that particular point of reception.
47	47.Section 7.0 paragraph 3, page 9: Please review the wording of this section (and refer to past comments on this), as this description is not technically correct as per NPC-300. This report should analyze the stationary noise based on either the exclusion limits or the worst case impact (or both, and compare the results). Please update the report based on the chosen method, the correct noise criteria and correct time periods, for all appropriate receptors. If ambient noise levels "from the quietest hour" are being used, the calculations used to determine the values must be fully detailed in the report and Appendix, as appropriate.	Updated traffic counts were provided by the City and the calculations updated to reflect the hourly sound levels to determine the quietest hour. Hour by hour calculations were conducted (shown in Appendix B) based on a Class 2 Area designation. Where the calculated hourly sound level is greater than the MECP's exclusion limit (45 or 50 dB as applicable), this higher value is used. It is assumed, for example, that the all mechanical ventilation equipment is operating at a 100% duty cycle during the day (the highest sound level) compared to the quietest hour sound level (i.e., the greater change between the source and the ambient sound level).
48	48.Section 7.0 Table 6, page 10: Why are the OLAs only analyzed during evening? Please update for day and evening time periods. The noise criteria used is incorrect: NPC-300 lists the exclusion limit value for OLAs in Class 2 Areas during evening time period as 45 dBA.	Report has been adjusted.
49	49.Section 8.0: Provide details of the HVAC equipment assumptions made for these calculations, along with justification of these assumptions for buildings of this type and size. Verify that there are no planned sources of noise at any location on/at/around these proposed buildings other than the roof areas: other elements that may be missing from this analysis include (but not limited to) blowers/exhaust from the underground parking, emergency generators, HVAC equipment on lower roof levels, etc.	Based on a data from similar building developed by Tricar, the preliminary rooftop sound levels have been calculated. This includes a cooling tower (Sound Power Level: 96 dB) and MUA unit (Sound Power Level: 81 dBA).

50	50.Section 8.0 paragraph 2 (list), page 10: Section 2.0 of this report identifies these buildings (1280 Gordon Street and 1284 Gordon Street) as 6-storey.	This is not correct. The report states the building heights as 5 storeys which is correct.
51	51. Section 8.0 paragraph 3, page 10: Please update this section based on Class 2 Area, and comments above.	Report has been adjusted.
52	52. Section 10.0 paragraph 1, page 12: See comment re: Section 3.1 Table 1B above.	Report has been adjusted.
53	53. Section 10.0 paragraph 1, page 12: More information is needed as to the assumptions made for the BPN-56 calculations (can be provided in that section of the Appendix.) There is also no discussion of what STC values are anticipated under standard OBC requirements for this building, so there is no comparison provided between the STC values obtained from the BPN-56 calculations and the statements made in this section.	Report has been updated including BPN56 outputs.
54	54. Section 10.0 paragraph 2, page 12: This statement is confusing, please review and revise/clarify. Please also state assumptions for window/door-to floor areas as part of this statement (and in the recommendations section) as was done for the unit calculations above. See also comments above regarding assumptions of anticipated STC values under standard OBC.	The text has been revised and includes assumptions used for window area to floor area ratios and STC rating assumed.
55	55. Section 12.0 recommendation #3, page 13: See comment re: Section 3.1 Table 1B above.	Report has been adjusted.
56	56. Section 12.0 recommendation #4, page 13: Please update the figure reference.	Report has been adjusted.
57	57. Section 12.0 recommendation #6, page 13: Please include requirement for barriers to meet GNCG requirements (this will also be a condition of approval).	Report has been adjusted; barriers not required.
58	58. Appendix B: Please label the STAMSON output pages according to the receiver locations as listed in Figure 3.	Report has been adjusted.
59	59. Appendix B: All distances used in the STAMSON calculations appear to be off by ~3m when compared to the building placement shown on the submitted engineering drawings.	Any differences were found to be typically less than 1m and acoustically insignificant. All calculations have been updated.
60	60. Appendix B: Please note that when including a barrier, the three elevation values need to be used. For a feasibility study if unknown and other conservative factors were included, they can remain 0 (but helpful to indicate method used in the report or appendix). For a detailed study, the correct values need to be used.	If barriers are considered in the final noise study, the calculations are always use 3 points in determining the barrier effect between the source and receiver.
61	61. Appendix B, filename “b_nw.te”: It is unclear which receiver point is being calculated for with this output. The	The calculation is for the NW facade of the

	filename suggests Location 8, but the distances used suggests Location 11, but with incorrect values. Please review/clarify.	east/west leg of Building B (Location 11). The distance to Gordon Street is correct (77.3m) for Location 11. There was no error found in the STAMSON file. File b_nw2.te is Location 8 (Distance: 123m).
62	62.Appendix B, filename “b_se.te”: Why was an "elevated" topography type used here? If this location meets the definition as per ORNAMENT, please complete the calculation correctly and include additional items (cross section drawing, etc.) to show how and why this was used.	The use of an elevated topography (3) has no bearing on the result because a reflective ground surface (2) was used. There is no ground effect used in the calculation because of the height of the receiver (30m). In all cases, there is no ground effect. The calculation now shows Topography 1.
63	63.Appendix B, filename “b_nw2.te”: It is unclear which receiver point is being calculated for with this output. The filename/description suggests Location 8 but with incorrect barrier-receiver distance. Please review/clarify.	The calculation is correct (distance, partial exposure to Gordon St. and receiver elevation). The calculation is demonstrating the sound level at the NW facade of building B, similar to all of the other points of reception outlined in the report.
64	64.Appendix B, filename “ola_b2.te”: Please update this calculation to be consistent with the others in this report. (use of single segment, no use of house rows, etc.)	It would be technically incorrect not to use the row of housing for grade level receptors and they remain as part of the calculation. The row of housing was not used for the top floors of the buildings (worst case) as the row of housing would have no acoustic benefit for these areas because of the elevated receivers.

65	65.Appendix B, BPN-56 Calculations: Please provide more information on the assumptions used for these calculations (all BPN-56 calculations). As per previous comments, NPC-300 no longer assumes time of day for type of interior use: to be conservative (for this feasibility noise study) an intermediate room absorption should be the maximum assumed. If assumptions are made for percentage of operable glazing, this needs to be stated in the body of the report also.	BPN-56 allows the use of hard (kitchen), intermediate (living room) and soft (bedrooms) for the calculations. Given that no special measures are expected in any case, changing to an intermediate absorptive is not likely to result in any change to the exterior façade requirements.
Leah Lefler, Environmental Planner, Guelph **519-822-1260 extension 2362 leah.lefler@guelph.ca** **December 15, 2021**		
66	**Environmental Impact Study** 1. Please note that, as of October 2021, the City of Guelph has a Bird-friendly Design Guideline.	Section 7.2 was updated using this reference and removing the City of Toronto guidelines. Bird fritted pattern has been applied and shown on elevations according to the City of Guelph's Bird-friendly Design Guideline.
67	2. Is Habitat for Significant Species present on the subject property? Please provide an assessment of Official Plan policy 4.1.4.4. Habitat for Significant Species to determine if protection is required. If protection is required, please map Habitat for Significant Species as Natural Areas, within the Natural Heritage System.	Updated Section 5.3.4 to include an analysis under Official Plan Policy 4.1.4.4.
68	3. Per Official Plan policy 4.1.2 and 4.1.3.9, development and site alteration are prohibited in Significant Wildlife Habitat. Figure 2 maps Candidate Significant Wildlife Habitat for Species of Conservation. The Environmental Impact Study must demonstrate that areas of Significant Wildlife Habitat do not overlap with proposed development or site alteration. Areas of Candidate Significant Wildlife Habitat that do not meet the criteria for Confirmed Significant Wildlife Habitat should be removed from mapping within the developable portion of the subject property. Please update Maps 2 and 3 to show the extent of each type of Confirmed Significant Wildlife Habitat as separate layers.	Figure 2 (candidate Significant Wildlife Habitat; SWH) was updated to show individual SWH types, as opposed to the grouping used in version 1. Divided now into Figures 2a, b, c for clarity. Figure 3 (confirmed SWH) was also updated to show individual SWH types.

		Two (2) types of SWH were documented on the Subject Property/Study Area, Deer Wintering Area and Habitat for Species of Conservation Concern for Eastern Wood-Pewee, neither of which are included within the development area.
69	4. Please assess the Cultural Woodland (WODM4-4) mapped on Figure 4 against the criteria of the Official Plan for protection of Significant Woodland (4.1.3.6) and Cultural Woodland (4.1.4.3). Based on the text provided in the EIS Addendum and mapping provided on Figure 4, it is unclear if this vegetation community warrants protection. If the Cultural Woodland does not meet the criteria for protection, please remove it from mapping.	WODM4-4 does not meet the minimum size criteria for cultural woodland designation outlined in Official Plan Policy 4.1.3.4 as detailed in Section 5.3.2 of the EIS Addendum. Figure 4 was updated to concur with this assessment.
70	5. Please update the Figure 5 legend and mapping to reflect the following: • Significant Woodland boundary, as approved by the City; • Significant Wetland boundary, as approved by GRCA; • 10 m Significant Woodland buffer; • extent of Confirmed Significant Wildlife Habitat; and • Natural Heritage System limit (inclusive of buffers).	Figure 5 was updated as requested
71	6. Please provide correspondence from the Ministry of Environment, Conservation and Parks confirming the approach proposed for addressing Species at Risk bats.	An Information Gathering Form (IGF) was submitted on March 25, 2022 to outline studies completed to date on the Subject Property with respect to bat Species at Risk as well as proposed mitigation strategies to avoid impacts during construction. Correspondence received from MECP will be forwarded to the City of Guelph upon receipt.

72	7. Official Plan policy prescribes minimum buffers per feature type, and policy requiring an assessment of the need for an established buffer. The EIS should assess the need for an established buffer.	Section 7.4 added to discuss minimum and established buffers for the Subject Property.
73	8. The EIS must demonstrate no negative impact to the Natural Heritage System by demonstrating a feature-based water balance. Please provide monthly comparisons of pre- to post-development conditions in runoff and infiltration, per catchment.	Section 6.1.4 provides details on the water balance while 7.3 outlines hydrogeological impacts. No negative impacts are anticipated on the NHS based on the results of the catchment-based water balance.
74	9. Stormwater runoff from parking lots is proposed to be infiltrated. As stated in previous comments provided in December 2020, infiltration of parking lot water is not supported by the City. Stormwater quality measures do not treat road salt.	A non-chloride based solution is proposed for winter maintenance, which in conjunction with the proposed quality treatment infrastructure, will allow parking lot water to be infiltrated.
75	10.To permit development on lands adjacent to the Natural Heritage System, the EIS must demonstrate that the entire development does not have a negative impact. Please update the FSR and planning for stormwater management to include the Valley Road parcel.	Section 8.2 of the EIS provides details on the negative impact test. The EIS has been updated to include the Valley Road parcel. The Valley Road parcel has been included in the calculations for water balance
76	**Functional Servicing Report** 11.Section 5.1.4 of the Functional Servicing Report outlines the stormwater management criteria for the proposed development, which includes an infiltration criterion of 150 mm/year for the site, consistent with the Torrance Creek Subwatershed Study. The Hanlon Creek Subwatershed Study recommends a recharge of 122-199 mm/year for Tributary D, which is consistent with pre-development water balance analysis recharge rates provided in the Hydrogeological Assessment (i.e., 192 mm/year to 222 mm/year) and GRCA mapping for the site. Therefore, it is recommended that the recharge target be updated.	Report has been revised
77	**Hydrogeological Assessment**	Proposed infrastructure design has been

	12.The proposed east infiltration trench appears to maintain a separation of 0.56 m from the seasonal high groundwater level. Per the City's Development Engineering Manual, infiltration gallery designs must demonstrate a minimum 1.0 m separation from the seasonal high groundwater level. Please provide a design that demonstrates a minimum 1.0 m separation from the seasonal high groundwater table.	revised to provide the 1.0 m separation from high groundwater.
78	13.Please update Section 6.3 Impact to Natural Heritage Features to include an assessment of impact resulting from the south infiltration trench.	Updated
79	14.Please provide a monthly comparison of pre- to post-development runoff and infiltration per catchment in tabular and/or graph form. This information is required to provide an assessment of impact to the Natural Heritage System in the EIS.	Updated
80	15.Water balance pre-development conditions shown on Figure 15 include four sub areas. Water balance post-development conditions shown on Figure 16 include three sub areas, with sub-area C and D combined. What is the purpose and effect of basing the water balance on different sub-areas?	Post-development water balance catchment areas have changed, and water balance calculations have subsequently been re-done / updated. A series of new Sub-Areas have been created and/or revised to reflect post-development land use changes and the introduction of various impervious surface coverages associated with each catchment.
81	16.Section 8 refers to two 12-storey towers. Heights have been reduced to two 10- storey buildings.	Updated
82	17.Figure 12 Groundwater Flow includes "Proposed Monitoring Well (Stantec, 2021)". Please provide a description of the proposed monitoring wells, including what they are intended for.	Please refer to Section 3.1 of Hydrogeological Assessment Report (Version 3). New monitoring wells installed to confirm groundwater table depth below proposed post-development infiltration galleries and provide additional data to better construct groundwater elevation contour mapping and interpret flow direction(s) (Figure 12).

83	18.In Section 4.2.1, it is stated that there is no marked response from notable precipitation events however in December 2019/January 2020 there was an event of 45mm that has a quick response. Please clarify the statement with respect to this anomaly.	The report reflects our interpretation of the data processed for the site.
84	19.Is the station referenced in the last paragraph of Section 5.1 the closest station?	Yes. The Region of Waterloo Int'l Airport climate station (16 km from Site) is the closest station that provides precipitation and air temperature data over the period of groundwater level monitoring presented in the Hydrogeological Assessment report (July 2018 to June 2020).
85	**Tree Preservation Plan** 20.Please update the Tree Preservation Plan to exclude removals from the park block. No removals are to occur within the park block, unless they pose a hazard or are in striking distance of an adjacent property.	The TPP has been updated to exclude removals in the park block, except for hazard trees that are within a striking distance of an adjacent property.
86	21.Please add a column to the tree table to indicate which trees require compensation and which do not.	The table in Appendix I of the TPP now includes a column for whether compensation is required.
87	22.Please update the compensation requirements to exclude removals from the park block. Private trees requiring compensation per the City's private tree protection by-law will be addressed through a vegetation compensation plan, as part of the Environmental Implementation Report. Public trees, such as City owned street trees, are to be addressed with Urban Forestry staff generally through a Street Tree Planting Plan at site plan.	Trees within the park block have been noted as not requiring compensation.
88	**Landscape Plans** 23.Please verify that trees and shrubs are located a minimum of 1.0 m away from infiltration galleries. Please include a note specifying that trees and shrubs are to be planted a minimum of 1.0 m away from infiltration galleries. Engineering Plans	Note added to sheet L-1 on Landscape Plans.
89	24.Relocate ESC fencing to the location of the Tree Protection Fencing. Please include a note that no work or stockpiling of materials should occur in the park block or Natural Heritage System.	Note has been added

90	**Draft Plan of Subdivision** 25.Common amenity areas and park blocks cannot overlap with the Natural Heritage System, including buffers.	The Draft Plan of Subdivision has been amended to ensure that common amenity areas and park blocks do not overlap with the Natural Heritage System including buffers.
91	26.The Draft Plan of Subdivision should be revised to reflect the boundaries of the Natural Heritage System, including buffers, determined through the Environmental Impact Study.	The Draft Plan of Subdivision has been amended to reflect the boundaries of the Natural Heritage System, including buffers.
92	**Summary** An EIS addendum is required and dependent upon revisions to the supporting documents and plans. Environmental planning encourages the applicant to meet with City staff to discuss the comments provided, prior to providing a third submission. Please note that comments provided by Scott Cousins, City of Guelph Hydrogeologist, are included in comments provided under the Hydrogeological Assessment heading above.	Noted
Gwen Zhang, P.Eng., Transportation Planning Engineer Guelph **519-822-1260 x 2638 Gwen.Zhang@guelph.ca** **November 17, 2021**		
93	Staff are generally in agreement with the study findings and conclusions that the subject development can be accommodated by the area road network with some improvements to Gordon Street, including a new east approach at the Edinburgh Road intersection, a centre left-turn lane along Gordon Street, and an exclusive northbound right-turn lane at the Arkell Road intersection. These improvements are in line with recommendations in the Gordon Street Improvements Study (2020).	Noted.
94	Staff suggest a technical memorandum be submitted to update some part of the study. 1. Acknowledge the improvements recommended in the Gordon Street Improvements Study and their impacts on traffic operations. Only descriptive assessments are required. a. a new east approach at the Edinburgh Road intersection. b. a centre left-turn lane along Gordon Street. c. off-road bike facilities along Gordon Street. d. an exclusive northbound right-turn lane combined with a northbound queue pass-by lane for buses at the Arkell Road intersection. e. a road closure of Valley Road at Gordon Street.	All these improvements are acknowledged in the memo and the descriptive assessments on their impacts to traffic operations have been added.

95	2. Update the sightline assessment as a result of road closure of Valley Road at Gordon Street.	The sightline assessment is updated.
96	3. Revise Figure 2 and Figure 23 by modifying the lane configurations on Gordon Street to reflect recommendations in the Gordon Street Improvements study. In Figure 23, correct the pavement marking symbol for the southbound left-turn lane at Edinburgh Road. In the new east approach, consider including a bike box design.	Both figures are updated.
97	4. Provide traffic geometric plans for northbound trucks turning right from Gordon Street to Street A.	All traffic geometric plans are updated by adding northbound right turn paths.
98	5. Add traffic geometric plans for heavy single-unit trucks.	This new geometric plan has been added.
99	Transportation Demand Management related comments are offered below. 1. Please expand the TDM section. This development is located within a very sustainable transportation friendly corridor, which is well served by transit and will be receiving significant cycling infrastructure upgrades within the next 5-10 years. A number of measures to consider include the followings. a. Unbundled vehicular parking for residents. b. Meeting but not exceeding the provision of vehicular parking. c. Provision of a community carshare vehicle on-site. d. Wayfinding/travel times to nearby amenities by foot, bike, and transit. e. High quality cycling and pedestrian connections between the Gordon Street ROW and apartment buildings. f. A bicycle repair station on site.	These TDM measures are added in the memo including the bike repair station that is located on parking level 1 and parking level 2 of the revised parking plans from Kasian.
100	2. Table 14 of the study indicates that 358 bicycle parking spaces are recommended, and 521 are being provided. Is this correct? Staff would prefer to see a variety of high quality long-term bicycle parking spaces (for instance, horizontal lift-assist racks, over-sized bike parking for cargo bikes/recumbents/bikes with trailers, regular floor-mounted racks etc.) rather than an over-supply of vertical wall mounted racks which can be inconvenient and challenging for many users.	Bicycle Parking has been reduced to 358 as per recommended. Regular size and oversized bicycle parking have been provided on site.
101	3. Please ensure the majority of bike parking is located on the first floor of underground structures, to maximize convenience and safety for cyclists.	Majority of the bicycle parking have been relocated to P1. 274 bike parking spaces are within Parking Level 1 and 84 bike parking spaces within Parking Level 2.
102	4. Per previous comments, staff would like to see a 3.0m wide shared pathway along the south side of development,	An accessible pathway is proposed in the

	for pedestrians and cyclists connecting the Gordon Street ROW with Building 2. The current pedestrian route requires residents living in Building 2 to take a circuitous route using Street A in order to travel southbound. Stronger active transportation connections support trips by foot and bike, by shortening travel times.	latest site plan at the southwest corner and is addressed in the response memo. A passageway has been introduced to provide connection between Gordon Street and Res 2.
Kyle VanderMeer, P. Eng., Environmental Engineer Engineering **519-822-1260 x 3892 kyle.vandermeer@guelph.ca** **October 7, 2021**		
103	**COMMENTS** 1. The former use of the property at 1270 Gordon Street as “Montes Place” flower shop meets the definition of commercial use in Ontario Regulation (O. Reg.) 153/04 (as amended), particularly “any use of land or a building on the property for an enterprise or activity involving the exchange of goods or services”. Therefore a Record of Site Condition (RSC) is a mandatory requirement for the Site development at 1270 Gordon Street if agricultural, parkland, residential, or institutional property use is intended for the property.	XCG Consulting Limited is preparing the RSC.
104	2. XCG identified concentrations of xylenes greater than the associated MECP Table 2 Site Condition Standard in surface soils where retail-sized containers of diesel fuel conditioner were observed around a burn pit on-Site at 1260 Gordon Street. XCG does not interpret the soil impacts detected in the vicinity of the burn pile to represent a source of significant environmental concern, with the caveat that the detected soil impacts could be addressed through excavation and appropriate off-site disposal during future site development activities.	XCG Consulting Limited is preparing the RSC.
105	**RECOMMENDATION** Engineering will support the Official Plan Amendment, Zone Change Application and/or Draft Plan of Subdivision from an environmental impact perspective. However, it should be noted the Owner/Developer will be required to fulfill the following conditions: 1. For the 1270 Gordon Street property: a. Proof of RSC filling and acknowledgement must be submitted to the City prior to Site Plan approval; Or, b. A QP must provide a letter report prior to Site Plan approval that states the planned use of the property will not be agricultural, parkland, residential, or institutional property use, as defined in O. Reg. 153/04 (as amended).	XCG Consulting Limited is preparing the RSC.
106	2. A stamped plan and/or drawing(s) for the excavation and disposal of the xylene impacted surface soil identified by XCG at 1260 Gordon Street in the vicinity of the former burn pile must be submitted to the City **prior to Site Plan approval**.	Noted.

<table>
<tr><td>107</td><td>CLOSURE
It should be noted that staff’s review pertains to whether the report was conducted in a manner consistent with the Act (EPA), the Regulations (O. Reg. 154/03, as amended) or CSA Standard, and associated guidance documents. Although majority of the information included in the report were looked at during the review process, the City Staff does not independently verify information and data, the quality of which are solely the responsibility of the QP who prepared the report.</td><td>Noted.</td></tr>
<tr><td colspan="3">Jyoti Pathak, Park Planner Park and Trail Development, Parks Public Services
519-822-1260 x 2431 Jyoti.pathak@guelph.ca
November 23, 2021</td></tr>
<tr><td>108</td><td>Proposed Draft Plan of Subdivision:
A residential subdivision is proposed on the subject lands which are approximately 3.12 hectares in size and include developable area and natural heritage system. The applicant is proposing a residential block with two, 10-storey apartment buildings with a total of 325 apartment units, a municipal park block and an open space block.</td><td>Noted.</td></tr>
<tr><td>109</td><td>Planning Justification Report: Revise the parkland dedication information on page 4 of the Planning Justification report to reflect current alternative rate (1 ha per 300 dwelling units for parkland conveyance and 1 ha per 500 dwelling units for payment in lieu of conveyance) for parkland dedication requirement under s.51.1 of the Planning Act and City’s Official Plan Policy 7.3.5.1.</td><td>The addendum to the PJR indicates that parkland requirements will be satisfied in accordance with the legal requirements in effect at the relevant timeframe.</td></tr>
<tr><td>110</td><td>Parkland Dedication:
Parkland dedication is required for the proposed subdivision according to the Official Plan (OP) Policy 7.3.5.1. The OP policy states the following:
1. 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</td><td>Noted.</td></tr>
<tr><td>111</td><td>The current proposed draft plan of subdivision includes an area of 3.323 hectares and development of 325 dwelling units. The proposed draft plan includes a park block of 0.247 hectares which accounts for 74 dwelling units at the rate of 1 ha per 300 dwelling units. Parkland dedication for the remaining 251 dwelling units would be required as payment in lieu of conveyance for the proposed draft plan.</td><td>The addendum to the PJR indicates that parkland requirements will be satisfied in accordance with the legal requirements in effect at the relevant timeframe.</td></tr>
<tr><td>112</td><td>Park Block Location: Generally, the park location is satisfactory.</td><td>Noted.</td></tr>
<tr><td>113</td><td>We intend to provide pedestrian access to the park along the Edinburgh Road extension from Gordon Street and along Landsdown Drive/ boulevard trail/ sidewalk from north and</td><td>The Park Block has been modified.</td></tr>
</table>

	trees would have to be cleared if blocking this access. The park block currently includes a tree protection zone.	
114	**Generally, City requires park blocks to meet City's Zoning Bylaw, plans, policies, and guidelines and the following criteria:** • The site provides a critical public trail connection to the proposed Citywide trail/ ATN route west of Torrance Creek PSW from Gordon Street along Edinburgh Road extension through the proposed park block. GTMP and OP Policy 7.3.5.5 (ii) (Parkland Dedication)	Draft Plan has been modified to include a trail block where identified in the EIS.
115	• The site satisfies the development criteria for a neighbourhood park; OP Policy 7.3.5.5 (Parkland Dedication)	Noted.
116	The park should contain both active and passive recreational activities (i.e. children's play equipment, shade structure, seating, site furniture and planting etc.). OP Policy 7.3.2 (Park Hierarchy)	Noted. City to design municipal park.
117	• The park should be connected to public sidewalks and should be designed as an accessible and barrier free space. Facility Accessibility Design Manual – 2015	Noted. City to design municipal park.
118	• The park should be mostly flat (i.e. 80% table land with 2-3% slopes). OP Policy 7.3.2.4 (Park Hierarchy)	The park is being retained in its current state and future grading can be addressed by the park design. Existing average slope is about 5%.
119	• The park should contain adequate public street frontage for high visibility and surveillance and for adequate public and operational access as identified in Zoning Bylaw Table 9.2 (Row 3) as follows: A minimum of 50 metres or 1 metre of street frontage for every 100 square metres of park area whichever is greater as identified in Section 9.2 of the City of Guelph's Zoning Bylaw.	The park has adequate street frontage.
120	• The park should be completely outside of natural heritage features. Natural heritage features and natural hazard lands as outlined in the City of Guelph's Official Plan will not be accepted as parkland dedication. OP Policy 7.3.5.3 (Parkland Dedication)	The Draft Plan has been revised so that the park is completely outside of natural heritage features.
121	• parkland shall be conveyed free and clear of all encumbrances. Development Charges background study Appendix E- Local Service Policy (basic park development - PAGES E-2 and E-3)	Noted.
122	• The park site should be well drained and have access to water, sanitary and storm water drainage servicing. OP Policy 7.3.2.4 (Park Hierarchy), Development Charges background study Appendix E- Local Service Policy (basic park development - PAGES E-2 and E-3)	The park design is to be completed by the City at a future date and basic park development requirements would be premature as part of

		this application. If determined to be warranted, municipal services can be extended along Street A with detailed design.
123	Park Block Lot Frontage and park access Park Operations require vehicular access to the park block and to the proposed trail to the east for maintenance and operational purpose. Provide options for review for achieving vehicular access.	A vehicular access has been shown
124	Basic Park Development: The developer is directly responsible for the basic park development according to the Development Charges background study - Appendix E- Local Service Policy (basic park development - PAGES E-2 and E-3): 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	The park design is to be completed by the City at a future date and basic park development requirements would be premature as part of this application.

	uses (residential or non-residential) as required by the City, or other approval authority.	
125	The developer will be responsible for the Basic park development and City would require a cost estimate and security in the form of cash or a letter of credit based on the City approved estimated costs prior to the registration of the subdivision.	Noted.
126	Trail Network: 	This trail network has been provided in the revised submisison.
127	The City of Guelph Trail Master Plan - ‘Trail Network’ includes a proposed off-road secondary trail route along western edge of the Torrance Creek provincially significant wetlands through the subject property that connects to the approved proposed trail west of Valley Road condominium to the north and west of 1280 Gordon Street to the south.	Noted.
128	Please note that the trail alignments north and south of the subject site have been designed and approved through the development review process and the developer is responsible to identify the trail alignment and preliminary trail design on the subject site as included in the terms of reference for the EIS.	Trail design has been included in this submission
129	**Local trail connection:** Provide a local accessible trail connection, 2.5 m wide, to connect the Gordon Street/ proposed park to the proposed Citywide trail at the back of the property. This trail connection is to be designed as part of the proposed Landscaping works on the subject site.	Trail design has been included in this submission
130	Provide conceptual trail alignment for City’s review of the following connections: • North-south Citywide trail connection • East-west local trail connection	Trail design has been included in this submission
131	**Provide preliminary grading and Drainage plans and other plans as applicable to demonstrate that the trail can be built to the current City standards as follows:**	Preliminary design information is provided on the included civil drawing set

	1. 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	
132	2. 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.	This has been provided
133	3. Provide sodded drainage swales and culverts at appropriate locations if the adjacent ground is higher to the trail surfacing levels.	Addressed
134	**Environmental Implementation Report**: 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.	Noted.
135	The **EIR** will address the recommendations related to trail system and natural open space system, including detail design of the trail system; preparation of Landscape Plans and details to address demarcation, removal of invasive species, 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.	Noted.
136	Detailed trail layout, grading and drainage plans showing trail design details such as signage, structures, etc. will be provided in the **Environmental Implementation Report** consistent with City of Guelph's current trail standards 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.	Noted.
137	Open Space Works and Restoration: 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	Noted.
138	Tree Preservation and removal of invasive species and hazard trees: **Schedule removal of the common buckthorn within the trail corridor prior to trail construction**.	Noted.

139	A **review of hazard trees** (e. g. dead, partially dead or dying trees) on the park block and along the trail route will be conducted at the time of vegetation removal by a qualified arborist. Identify all hazardous trees along the trail route in consultation with Parks staff for removal by the developer. Hazard trees only would be removed within striking distance of the trail.	Noted.
140	Environmental Education: The environmental education/ **interpretive 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.	Noted.
141	Open Space Dedication: Parks recommends **conveyance of natural open space block to City** for the purpose of the protection of natural heritage system and trail construction.	Noted.
142	Demarcation: 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 and City approved demarcation plan will be included in EIR.	Noted.
143	Summary: Parks does not support the proposed development based on the current information provided. Parks needs revised documents which reflect the comments provided above for our further review and comments. Draft conditions would be provided upon receiving satisfactory proposal.	Updated documents addressing the above have been provided.
David de Groot, Senior Urban Designer **519.822.1260 ext. 2358 David.deGroot@guelph.ca** **January 18, 2022**		
144	Through this process, staff has concentrated on a number of key issues which have been positively addressed by the applicant including: • Improving the interface with Gordon Street (e.g. 6m setback, new entrance at the corner, multiple building entrances located at regular intervals etc.) • The inclusion of 1270 Gordon creates an opportunity to create a stronger landscape and integrated open space system. Further direction regarding development of this area should be developed. See further discussion below. • Urban Design Staff are still strongly supportive of the inclusion of the new public road and park. Staff support the extension of an accessible street grid to improve connectivity for all travel modes. • The reduction in building height. • Better building articulation along Gordon Street including marking the corner of Edinburgh/Gordon Street and the multiple stepbacks.	Noted.
145	**Urban Design Brief Comments**	

	2.1.3 Amenity Facilities • Please revise approach to Residence 1 Common Amenity Area to avoid the need for a large noise wall. Rather an at-street level space should consider a design that embraces the opportunity to meet the noise study requirements, such as a passive, walk-through only space, filled with plantings, perhaps a sculptural element for viewing, etc., that also provides adequate space for a transitioning zone (i.e. terraced and planted area) to a Common Amenity Area further into the site, perhaps is a better option to explore. On the higher common amenity area, noise study requirements might be easier to meet with the use of low earth berming and planting, permitting more activities to occur such as sitting, tables and programs such as kicking a ball or a dog run area. To permit an adequate transition zone from lower common amenity area to higher, please explore the configuration of the underground garage. Opportunities for a gentler step back through terraced walls and landscaping, void of high guards and railings, would provide a better solution rather than seeing the abrupt 5m high wall of the parking garage wall.	Sound wall has been eliminated and replaced with an accessible ramp to provide access to Res 2 from Gordon Street and create sound barrier for amenity area behind ramp.
146	• Urban design staff is not supportive of a noise mitigation wall as this could be an aesthetically unpleasing feature along the right of way at 3.5m high. It would also create a tight, unusable and uncomfortable space between itself and the proposed underground parking garage wall when exiting/entering the indoor common amenity	Noise wall is not longer included.
147	• Please suggest further direction for programming along the southern property link such as: o Raised Community Garden Plots that are barrier-free o An off-leash dog area (consider fencing to define this space). o Treed sitting area with informal, moveable chairs (for reading a book or socializing).	Notes and pictures added to Landscape Plans for possible future design considerations.
148	2.1.4 Transitions • Staff have concerns with the proposed angular planes. Please see further comments under “Comments on Submitted Design Concept”.	The current angular plane at the Gordon Street and Street A corner is at 53.4 degrees. However, 67% of the elevation along Gordon Street are recessed on the 9th and 10th floor. The angular plane at the recessed portion is meeting 50 degrees angular plane requirement as agreed in our meeting with the City.

		The angular plane from the property line at the residentials on Valley Road has been updated to satisfy City's requirements at 30 degrees by setting back the 9th and 10th floor on the elevation facing the park.
149	2.1.7 Access, accessibility, circulation, loading storage. • The pedestrian circulation should be further developed. Please see further comments under "Comments on Submitted Design Concept".	Additional pedestrian pathways is provided for Res 2 residents to have easier access to Gordon Street at the south of site.
150	2.1.8 Materials • The material choices of the building along Gordon Street should reflect the importance of this street. Staff support the use of real masonry products within building base rather than replica materials. Pre-cast panels or replica materials (such as pre-cast concrete panels made to look like stone) should only be shown above the podium along Gordon Street.	The podium level has been updated to have all masonry materials along Gordon Street. We have also looked at the suggestion from the city to look at buff bricks for the development. We updated the elevations to use buff bricks for the lighter brick and changed the dark grey brick to a dark brown brick to compliment the buff brick.
151	2.1.11 High Density Development • Staff are supportive of the building entrances located at regular intervals. Staff are also supportive of the general stepback at floor 2 and 5 along Gordon Street in order to break up the massing. Marking the corner of Edinburgh and Gordon is supported.	Noted. Stepbacks are provided a several locations on floor 2 and 5 along Gordon Street.
152	• Given, policy 8.9 and 9.3.1.1 of the Official Plan. Staff feel that Zoning Bylaw should include the following: o Restricting building length; o Ensuring adequate spacing between buildings; o Only allowing a 53.35 degree angular plane at the intersection of Edinburgh and Road 'A' with a reduced angular plane for the balance of the building. Please provide the angular plan for the balance of the building (e.g. approximately 27m south of the intersection); o Ensuring adequate spacing between buildings; o Limiting the amount of surface parking. and, o Ensuring building floorplates are limited.	Noted.

153	• **See further discussion below.** 2.1.11.3 Shadows • See comments below for comments on the Shadow Study.	Noted.
154	2.1.11.4 Wind • See comments below for comments on the Pedestrian Wind Study.	Noted.
155	2.2 Interaction with Public Realm • Urban design staff appreciate the introduction of an outdoor space at the corner of Gordon and Street 'A'. The design and layout of this plaza will be further explored during **the Site Plan Review** process to enhance its function and connection to the ROW, however its general location is supported by staff.	Noted.
156	2.2.1 Integration with the Streetscape • Ensure to add not only a visual connection, but that there will be physical connections to the street via proposed doors (as shown on the Gordon Street Elevation).	Physical connections and doors are proposed along Gordon Street Elevation from the amenity areas.
157	Shadow Study Comments • Can you please include a **concluding statement** as to whether the proposed development form has met the criteria of the City of Guelph Sun and Shadow Study Terms of Reference? Please also show the location of the pool on the adjacent property (swimming pools are specifically mentioned in criteria 1).	A concluding statement is provided in a letter format that the proposed development has met the criteria of the City of Guelph Sun and Shadow Study ToR.
158	Pedestrian-level Wind Study Comments • No comments on the wind study itself. • The Landscape Plan does not appear to be responding to the recommendations of the study – suggesting coniferous trees be used along the north and west façades of Residence 1 to mitigate uncomfortable conditions during winter months. Opportunities to adjust proposed landscaping and parking layout to accommodate these recommendations is to be explored.	Marcescent deciduous trees have been added along the NW frontage of Building 1 per Wind Study recommendations.
159	**Comments on the Submitted Development Concept** **a. Comments on the Site Plan** • Please ensure to show the full extent of the required buffer along the easterly edge of the proposed development. Ensure Common Amenity Spaces are shown and calculated outside the required buffers.	The Draft Plan has been revised.
160	• Please ensure to provide adequate landscape buffer and setback to ground floor units facing the at-grade parking lot. Ensure sidewalks running perpendicular, at the head of parking stalls, are a minimum 2m wide.	The proposed design balances the needs of landscape space (buffers between buildings and hard surfaces), pedestrian circulation, and parking. Accessibility requirements are met

		without providing excess hard surfaces that would further limit landscaping opportunities.
161	• Please look at removing parking stalls 64/65 to improve pedestrian circulation.	Parking stalls 64/65 have been removed to improve pedestrian circulation.
162	• Providing greater opportunity for trees and/or a grouping of trees within the at-grade parking lot that would be consistent with the Urban Design Brief's goal of managing heat island effect of hard surfaces (Landscaping 2.1.2). Please explore further opportunities to include planting islands – especially along the east elevation of Residence 1.	Adjustments to the parking layout have been made north of building 2 to improve opportunities for tree planting.
163	• Further development of 1270 Gordon Street lands to allow for pedestrian circulation and landscaping should be shown. See comments provided above.	Notes and pictures added to Landscape Plans for possible future design considerations.
164	The proposed storm water tank along the south property is very shallow (400-1000mm deep), leading landscape staff to believe this area won't be viable for tree planting. However, given the extent of proposed tree removals and the need to restore canopy on the site, alternative tank configurations need to be considered to optimize plantable spaces.	Tank configuration can be explored further with detailed design. Tree planting is currently proposed around the perimeter of the amenity space, creating a central open space at the south end of the development
165	Further discussion regarding sustainable site design that integrates LID measures, green/white roofs, should be explored.	Refer to the Urban Design Brief for the full list of sustainable initiatives being considered with this project.
166	**b. Comments on Elevations and Massing** • **Building 1:** • Staff are also supportive of the general stepback at floor 2 and 5 along Gordon Street in order to break up the massing. Marking the corner of Edinburgh and Gordon is supported.	Noted.
167	• Staff still have concern about the proposed angular planes and resulting massing. The Official Plan Policies for high-rise buildings (e.g. Official Plan Policy 8.9) discusses limiting the floor plate sizes above the 5th storey, adequate tower spacing and ensuring building massing addresses impacts to the surrounding neighbourhood. Please look at reducing the angular plane in the area indicated below the 53.5 degrees shown at the corner.	The current angular plane at the Gordon Street and Street A corner is at 53.4 degrees. However, 67% of the elevation along Gordon Street are recessed on the 9th and 10th floor. The

<table>
<tr><td></td><td></td><td>angular plane at the recessed portion is meeting 50 degrees angular plane requirement as agreed in our meeting with the City.</td></tr>
<tr><td>168</td><td colspan="2">This area to meet a lower angular plane than 53.5 degrees from the centre line of Gordon Street.


• The podium along Gordon Street is to include real masonry veneer rather than precast.


Real stone on podium
Plans are updated to show masonry on podium level along Gordon Street.</td></tr>
<tr><td>169</td><td>• Please refine the details regarding the cornice line dividing the middle from the top especially along the north and south elevations.</td><td>Updated on elevations.</td></tr>
<tr><td>170</td><td>• Building 2
• Can you add a stepback here facing the Park to achieve a 30 degree angular plan measured from the rear lot line of the existing houses along Valley Road?
Introduce a stepback here?</td><td>A new stepback has been introduced on the 9 th and 10th floor of Building 2 facing the park to achieve a 30 degree angular plane</td></tr>
</table>

	 Introduce a stepback here? RES 2_WEST ELEVATION SCALE 1 : 200	
171	• Please look at upgrading the elevations facing the new public park given the visibility of this elevation. See redline.	Elevations have been updated to introduced a masonry addition in the lower middle section to break down the verticality of the building face.

	 2 A-202 RES 1&2_NORTH ELEVATION1 SCALE: 1 : 200	
172	• Please refine the details regarding the cornice line dividing the middle from the top especially along the north and south elevations.	Updated on elevations.
173	**Site Plan Issues** As part of the **site plan process** further detailed comments will be discussed including: • Developing the elevations including materials and colours. The use of real masonry products within base of the buildings should be used rather than replica materials along the Gordon Street podium in particular. • Adequate soil volumes for trees over the underground parking is critical. Consideration of alternative technologies (Silva Cell) to achieve soil volumes, especially in areas where there is competing need for hard pavement, is strongly encouraged. • Provide a detail for pedestrian level lighting and street lighting for the internal streets. • Street furniture such as bicycle parking, benches etc. • Keep in mind bird-friendliness strategies in the design of the elevations. • Rooftop mechanical screening details. • Architectural details. • Continued encouragement of green roofs and LID systems.	Noted.
174	**Next Steps**	

	The Urban Design Brief Addendum and concept plan should be revised based on the above comments.	These revisions have been made.
175	Urban design suggest that the following be considered for inclusion in the Zoning Bylaw: • Minimum tower separation between buildings (e.g. 25m); • Consider requiring a 30 degree angular plane measured from the rear lot line of the existing houses along Valley Road; • Revision to the centreline angular plane requirement from Gordon Street to have a steeper angular plane and the corner and a lower angular plane to the south of the intersection. • Include maximum building length; and floorplates maximum for upper storeys should also be considered; and, • Limit the amount of surface parking.	Noted.
Lindsay Sulatycki, MCIP, RPP Senior Development Planner **(T) 519-822-1260 x 3313** Lindsay.Sulatycki@guelph.ca **January 21, 2022**		
176	Planning comments to be addressed through next submission: Draft Plan • The Draft Plan of Subdivision should be revised to reflect the boundaries of the Natural Heritage System including buffers. The current draft plan shows the residential block and common amenity area within part of the buffer.	The Draft Plan has been amended.
177	• Common amenity space, as per the Zoning Bylaw, is not a permitted use within the Natural Heritage System, including buffers. Please ensure that common amenity space is provided outside of the Natural Heritage System.	The Draft Plan has been amended.
178	A revised submission will be required to address staff comments on the 2nd submission prior to scheduling a Council date. Please let me know if you have any questions or would like to set up a meeting with any commenting staff.	Noted.

APPENDIX D
TREE PRESERVATION PLAN

9 Valley Road, 1242, 1250, 1260, and 1270 Gordon Street, Guelph

Tree Preservation Plan

Prepared for:

Tricar Developments Inc.
3800 Colonel Talbot Road,
London, ON N6P 1H5

Project No. 2347A | May 2022

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

9 Valley Road, 1242, 1250, 1260, and 1270 Gordon Street, Guelph

Tree Preservation Plan

Project Team

David Stephenson	Senior Biologist, Project Advisor
Laura Hockley	Environmental Analyst, Project Manager
Jeremy Bannon	Terrestrial & Wetland Biologist, Certified Arborist
Sophia Muñoz	Terrestrial & Wetland Biologist, Certified Arborist

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Laura Hockley

Laura Hockley, B.E.S
Environmental Analyst

Jeremy Bann

Jeremy Bannon, B.E.S.
Certified Arborist ON-1921A
Terrestrial and Wetland Biologist

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1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was previously retained in 2014 by the previous landowner to complete a variety of natural heritage studies in support of a development proposal. As part of these studies, NRSI completed a tree inventory of the subject property. Before the development proposal was realized, the property was sold to Tricar Developments Inc. This Tree Preservation Plan represents updated information incorporating the original inventory data with more recent inventory data provided by Stantec Consulting (Stantec Consulting 2020).

NRSI was retained again in October 2019 by Tricar Developments Inc. to complete a Tree Preservation Plan (TPP) for a proposed residential development located at 9 Valley Road, 1242, 1250, 1260, and 1270 Gordon Street, in the City of Guelph. This TPP has been updated to align with recent changes to the site plan and grading plan (Stantec 2022), including the acquisition of an adjacent lot to the south (1270 Gordon Street), which will provide lands for an additional infiltration trench. The major updates to this plan are as follows:

- An assessment of three trail connection alternatives;
- An updated tree inventory for the City trail and the preferred trail connection alternative;
- An updated analysis of the park block to align with comments received by the City;
- An updated discussion regarding potential impacts to Butternut (*Juglans cinerea*);
- The omission of trees previously removed in accordance with acquired building permits; and
- Other minor edits as requested by the City, largely regarding compensation.

The subject property is approximately 3.32ha in area and contains empty lots (previously containing single-dwelling homes), driveways, cultural meadows, cultural plantations, and other planted and naturally regenerating trees. The subject property is bound by Gordon Street to the west, residential dwellings fronting Valley Road to the north, the Torrence Creek Swamp Provincially Significant Wetland Complex to the east, and the Liberty Square apartment complex to the south. Mostly rectangular in shape, the subject property includes an additional lot extending north to Valley Road, and an additional property acquired to the south in 2021 (Map 1).

The Tree Preservation Plan was conducted in accordance with the City of Guelph By-law (2010)-19058. This by-law states that if an owner wishes to destroy or injure a regulated tree and if none of the exemptions set out in this by-law are applicable, then the owner shall submit the information required in Part 5 of the by-law, including a Landscaping, Replanting and Replacement Plan. Within the By-law, a regulated tree is defined as

> "*a specimen of any species of deciduous or coniferous growing woody perennial plant, supported by a single root system, which has reached, or could have reached a height at least 4.5m from the ground at physiological maturity, is located on a lot that is greater than 0.2 hectares (0.5 acres) in size and has a [Diameter at Breast Height] (DBH) of at least 10cm".*

According to the By-law, the destruction or injury of a regulated tree is exempt from the requirement for a permit if the regulated tree is:

> *"A tree on lands used for Institution, golf course, commercial or industrial purposes, provided that a Tree Management Plan has been submitted to, and approved, by an Inspector, subject to such as the Inspector may have considered necessary"* [Part 4, section (k)].

The City of Guelph's Official Plan (City of Guelph 2022) also requires that a Tree Inventory and Preservation Plan be required for the replacement of all healthy indigenous trees measuring over 10cm DBH.

Section 4.2.4 Tree Inventory and Tree Preservation Plan within the Official Plan notes:

1. *"Tree Inventory and Tree Preservation Plans shall as a minimum include:*
    - *i)* *A Tree Inventory measuring all trees over 10cm diameter at breast height [DBH], including the size, species composition and health, and indigenous shrubs in accordance with the City's tree inventory guidelines,*
    - *ii)* *A Tree Preservation Plan identifying healthy indigenous and non-invasive trees to be protected, including those that may be transplanted (e.g. small specimens),*
    - *iii)* *The protective measures required for tree protection during construction, and*
    - iv) *Measures for avoiding disturbance to any breeding birds during* construction"

This report provides the findings of all tree inventories, an analysis of grading, servicing and site plans against the overall health and the potential for structural failure of trees, protection measures for trees to be retained, and recommended mitigation and compensation measures. The tree data and mapping has been compared to the layout of the proposed site plan and trail alignment. Map 2 shows the tree inventory data overlaying the proposed site plan. This plan shows the proposed building layout, and trees inventoried. Avoidance, mitigation, and protection measures for trees were examined to determine which trees would be impacted and which could be retained. In the case of trees requiring removal, compensation for removal is discussed.

Butternut is Endangered Provincially and is therefore regulated by the Ministry of Environment, Conservation and Parks (MECP). Two Butternuts (JUG-002 & JUG-003) and one Butternut hybrid (JUG-001) are known to occur on the subject property (Map 1). Correspondence and permitting processes have occurred with MECP to facilitate the proposed site plan. A Notice of Activity was submitted to MECP to facilitate the removal of one Butternut (JUG-002) and one Butternut hybrid (JUG-001), and the harm of one Butternut (JUG-002). A tree permit was obtained from the City of Guelph to remove the two Butternuts, which occurred in December 2020. The necessary compensation plantings for these Butternuts as required under the *Endangered Species Act* were installed in the Fall of 2020. Potential impacts to planted and naturally occurring Butternuts associated with proposed trail are discussed in Section 4.3.

2.0 Tree Inventory and Methodology

Comprehensive inventories of trees ≥10cm in DBH have been completed routinely on the subject property. NRSI first completed a tree inventory of the eastern portions of the subject property in 2014. Since then, Stantec completed an updated inventory of all trees on the subject property in 2018 and 2019. NRSI completed a site visit on December 19, 2019 to verify tree information, and compiled original NRSI data with the updated information provided by Stantec, accounting for a complete set of tree inventory data. Subsequently, NRSI completed an inventory of trees on the additional lot to the south (1270 Gordon Street) on May 21, 2021. Most recently, NRSI inventoried trees associated with the proposed City trail and trail connection on April 18, 2022. The location of some trees inventoried in the northeastern Eastern White Cedar (*Thuja occidentalis*) community could not be accurately collected, and will require more accurate surveying at the detailed design stage. The average accuracy of these trees is approximately 2m, and are still mapped on Map 2. Some inventories were conducted in the leaf-off period; therefore, the assessor was able to collect the overall health and potential for structural failure of inventoried trees, but not the foliar characteristics of deciduous individuals. Trees that were ≥10cm in DBH were tagged with a pre-numbered aluminum forestry tag (if located on the subject property) and assessed by a Certified Arborist. In some circumstances, if trees were present in monoculture hedgerow features, a polygon method was used. During inventories completed by NRSI Certified Arborists, the location of trees inventoried was surveyed using an SXBlue II GNSS GPS unit. A complete list of the trees that were assessed and their overall health and potential for structural failure is shown on Map 2, and listed in Appendix I. No bat habitat assessments were completed in conjunction with the tree assessments by NRSI Arborists; refer to the EIS prepared by Stantec for bat habitat information.

The following information was recorded for each tree:

- species,
- DBH,
- crown radius (metres),
- general health (excellent, good, fair, poor, very poor, dead),
- potential for structural failure (improbable, possible, probable, imminent, or low, medium, high),
- tree location (on-site/boundary/off-site), and,
- general comments (i.e. disease, aesthetic quality, development constraints, sensitivity to development).

For trees inventoried by NRSI Certified Arborists, the overall health and potential for structural failure of each tree was assessed based on the criteria outlined in Appendix II (Dunster 2009) (Dunster et al. 2013). NRSI has exercised a reasonable standard of care, skill and diligence as would be customarily and normally provided in carrying out these assessments. The assessments have been made using accepted arboricultural techniques. These include a visual examination of each tree for structural defects, scars, external indications of decay such as fungal fruiting bodies, evidence of insect attack, the condition of any visible root structures, the degree and direction of lean (if any), the general condition of the tree(s) and the surrounding site, and the current or planned proximity of property and people. None of the trees examined on the property were dissected, cored, probed, or climbed and detailed root crown examinations involving excavation were not undertaken. The conditions for this assessment, including restrictions, professional responsibility, and third-party liability can be found in Appendix III.

2.1 Trail Alternative Assessment

Stantec and NRSI worked together to create three potential options for trail locations (labelled Alternatives 1-3) that could connect the proposed city trail to the development area and the existing residential neighborhood to the north. The three trail options, which can be seen on Map 1, are located within the northeastern portion of the subject property. On March 29, 2022, NRSI and Stantec biologists met to complete an assessment of each alternative to ensure that the most feasible option was chosen, which considered property access, potential tree removal requirements, and impacts to recently planted and naturally occurring Butternut. It was confirmed that significantly less impacts to existing trees would occur through the implementation of Alternative 3, the southernmost option proposed to the south of the existing woodland, as all other alternatives would include significant portions of the woodland to be removed. On April 18, 2022, a tree inventory was completed by NRSI arborists for the preferred Alternative 3 and the City trail within the subject property. This tree inventory was then compiled with previous inventory data conducted by Stantec and NRSI, as presented in the previous submission of this report.

3.0 Summary of Tree Inventory Findings

In total, 867 trees were inventoried, comprising 40 species. Of the trees inventoried and assessed, 641 are native species and 226 are non-native. Several Eastern White Cedar hedgerows are present, as well as a hedgerow each of Freeman's Maple (*Acer* X *freemanii*) and Norway Spruce (*Picea abies*). These trees were inventoried as groups (Polygon A-F) due to the similarity of species, location, age and conditions. A complete list of trees inventoried is provided in Appendix I, with summarizing tables in Appendix IV. Tree locations are shown on Map 2.

3.1 Development Area

The assessment of the development area includes trees identified in Appendix I as located within several categories, which comprise:

- Public: these include 2 trees located along the Right-of-Way (ROW) of Valley Road to the north;
- Off-property: these include trees that overlap the subject property, but are owned by adjacent landowners;
- Boundary: the stems of these trees are expected to cross the property boundary, and are therefore owned by the developer and at least one adjacent landowner; and
- Development: these trees are located within the footprint of the development area, and are entirely owned by the developer.

In total, 676 trees were inventoried within the Development Area, which includes trees in polygon features. This comprises 453 native trees, and 223 non-native trees. The majority of trees were assessed to be in Fair health with a Low or Medium potential for structural failure. The most common tree species include Eastern White Cedar, Norway Spruce (*Picea abies*), and Black Walnut (*Juglans nigra*). A complete list of trees inventoried is provided in Appendix I, with summarizing tables in Appendix IV. Tree locations are shown on Map 2.

3.2 Trail Area

In total, 191 trees were inventoried within the Trail Area. This comprises 188 native trees, and 3 non-native trees. The majority of trees were assessed to be in Fair health with an Improbable potential for structural failure. The most common tree species include Eastern White Cedar, American Basswood (*Tilia americana*), and Black Cherry (*Prunus serotina*). A complete list of trees inventoried is provided in Appendix I, with summarizing tables in Appendix IV. Tree locations are shown on Map 2.

4.0 Tree Retention Analysis

Tree removal and retention was based on two considerations:

1) Trees identified as having a probable or imminent potential for structural failure or poor or very poor health, or identified as dead: The removal of these trees may be recommended for safety, especially if they are located within striking distance of a component of the proposed development, or existing off-site pathways, roads or buildings.
2) Trees that require removal based on the extent of proposed site grading: The location of the trees was compared to the location of the components of the grading plan, as shown on Map 2 (Stantec 2022).

4.1 Development Area

Of the 676 trees inventoried, 531 are anticipated to be removed, and an additional 51 Eastern White Cedar and Freeman Maple that were inventoried as polygons will be retained where they occur within the protected park block and buffers (Map 2). These trees will be inventoried individually and assessed as part of the Detailed Design of this area, through further correspondence with the City of Guelph. This includes trees situated along the grading limit or in close proximity that may incur root damage as a result of grading. Most of these trees are in fair health with a low to medium potential for structural failure, and range in size from 10cm DBH to 105cm DBH.

Several boundary trees are proposed for removal, which are in-part owned by private landowners to the north of the subject property. NRSI is not aware of any existing written consent from these landowners at this time. Removal of boundary, off-site and municipal trees will require the written permission of all owners involved. If the main stem of any tree is located on multiple properties, all owners of those properties must be consulted before any tree removal occurs. This includes damage to the root zones of boundary trees that may be considered damage to property.

4.2 Trail Area

Of the 191 trees inventoried, 85 are anticipated to be removed. This includes trees situated along the grading limit or in close proximity that may incur root damage as a result of trail installation. Most of these trees are in fair health with an improbable potential for structural failure, and range in size from 10cm DBH to 74cm DBH. The location of some trees inventoried in the northeastern Eastern White Cedar community could not be accurately collected, and will require more accurate surveying at the detailed design stage. This has the potential to affect the final retention analysis when it is updated at that time. Additionally, this trail alternative will impact recently planted compensation trees within the Significant Woodland and buffer. These trees were not inventoried, but will require relocation to areas elsewhere on the property.

4.3 Impacts to Butternut

A Notice of Activity was submitted to the MECP to facilitate the removal of one Butternut (JUG-002) and one Butternut hybrid (JUG-001), and the harm of one Butternut (JUG-003). A tree permit was obtained from the City of Guelph to remove the two Butternuts, which occurred in December 2020. The necessary compensation plantings for these Butternuts as required under the *Endangered Species Act* were installed in the Fall of 2020. Trail Alternative 3 will require construction works to occur within the protection zones of some planted Butternuts, and will further encroach into the protection zone for JUG-003. It is expected that the root zones of the recently planted butternuts will not be impacted during trail construction, however further correspondence with the MECP has been initiated to ensure that this plan is not considered as a contravention of the ESA. A response from the MECP has not yet been received at the time of this submission.

5.0 Tree Compensation Plan

Section 5 (h) in the City's tree by-law (2010)-19058 states that "where three or more trees are proposed for Destruction or Injuring, and where the Inspector so requires, a Landscaping, Replanting and Replacement Plan" is required. Overall compensation for tree loss is a requirement of the City's by-law which notes that "each tree Destroyed or Injured be replaced with one or more replacements trees to be planted and maintained to the satisfaction of the Inspector in accordance with the Landscaping, Replanting and Replacement Plans approved by the Inspector" [Section 7 (b)].

According to City of Guelph Tree By-law Number (2010)-19058, trees exempt from compensation must have the following site-specific criteria:

"A tree having no living tissue, having 70% or more of its crown dead, or being infected by a lethal pathogen, fungus or insect (including the Emerald Ash Borer or the Asian Long-horned Beetle), and where required, a certificate issued by an Arborist, confirming this justification for Destruction or Injuring, has been submitted to an Inspector" [Part 4, section (a)],

"A tree which is Hazardous, and where required, a certificate issued by an Arborist, confirming this justification for Destruction or Injuring, has been submitted to an Inspector" [Part 4, section (b)]

"A specimen of *Rhamnus cathartica* (Common Buckthorn), *Rhamnus frangula* (Glossy Buckthorn), *Alnus glutinosa* (Black Alder), *Elaeagnus umbellata* (Autumn Olive), or *Morus alba* (White Mulberry)" [Part 4, section (g)],

"A fruit tree that is capable of producing fruit for human consumption" [Part 4, section (h)].

Trees proposed for removal that have poor structural integrity and thus a probable potential for structural failure, and/or are in poor to very poor health, and/or are dead, are exempt pursuant to Section 4 of the City's tree by-law and do not require compensation. A total of 3 trees require removal based on their structural integrity, and an additional 8 trees are also in poor or very poor health. Table 1 provides a summary of the trees inventoried throughout the property, total number proposed for removal and the proposed compensation plan. Note that these numbers will require further assessment at the detailed design stage to accommodate for the proposed partial removal of Polygon A, the development of detailed plans for the park block, and the creation of City-owned trails, in cooperation with the City of Guelph. A complete list of inventoried trees, including a determination of whether trees require compensation, is provided in Appendix I.

Table 1. Preliminary Compensation Plan

Preliminary Compensation Plan	
Total number of trees inventoried	**714**
Off-property	4
Public ROW	2
Boundary	17
Development Area (excluding the above categories)	653
Trail Area	191
Total trees to be removed for the proposed development	**531**
Total trees to be removed in fair-good condition (requiring compensation)	461
Total trees to be removed in poor health or worse (exempt from compensation)	70
Total trees to be removed for the proposed trail	**85**
Total trees to be removed in fair-good condition (requiring compensation)	75
Total trees to be removed in poor health or worse (exempt from compensation)	10
Total trees requiring compensation for the proposed development	**461**
On-site trees	453
Boundary trees	7
Off-Property trees	0
ROW trees	1
Total trees requiring compensation for the proposed trail	
Primary Trail	74
Alternative 3	1
Trees in polygons to be partially removed (explored at detailed design)	**51**

Compensation may be in the form of 3:1 replacement 60mm caliper trees, $500 cash-in-lieu value, 5:1 shrubs, or 5:1 of smaller stock trees (to be determined at the detailed design stage). Most likely, a combination of these methods will be used. Other compensation measures may be discussed with the City, and should be finalized in the Detailed Design stage. The retention analysis should also be refined at the Detailed Design stage, and will account for the loss of a portion of Polygons A and E.

6.0 Tree Protection Measures and Recommended Mitigation

6.1 Prior to Construction

This plan still contains preliminary details, and should be updated again at the Detailed Design stage. The updated plan should be referred to during the construction process, not this preliminary iteration.

Alongside the commencement of construction activities, the City has requested that a hazard tree assessment be completed once more along the length of the proposed trail. It is recommended that the extent of the trail, and Alternative 3 be assessed by a Certified Arborist to ensure that no additional trees require removal due to an increased potential for structural failure. This should again be completed when construction of the trails and development are complete, detailed in Section 6.3.

Temporary tree protection fencing (TPF) will be situated where trees are adjacent to the limit of disturbance/grading as shown on Map 2. The temporary TPF will be installed and maintained by the Developer. Prior to any construction activities (rough grading, vegetation and tree removal), the TPF will be installed at the limit of development. Prior to works commencing on-site, fence installation and location is to be inspected by a Certified Arborist. Signage indicating the purpose of protection fencing will be attached to the paige-wire fencing every 100-150m. Recommended fencing locations are along property and trail edges, as shown on Map 2.

The TPP is to be reviewed and approved by the City of Guelph. Upon approval of TPP, and prior to any on-site works (i.e. rough grading, tree removal), a qualified environmental consultant is to submit written verification to the City that all of the recommended tree protection measures have been installed in accordance with the final TPP.

6.2 During Construction

Temporary TPF is to be maintained by the Developer during the entire construction period to ensure that off-site trees being retained and their root systems are protected. Any minimal damage (i.e. damage to limbs or roots) to trees to be retained during construction must be pruned using proper arboricultural techniques. Should any of the trees intended to be retained be seriously damaged or die as a result of construction activities, the owner will remove and replace the tree at their own expense at a 3:1 ratio. Replacement species are to be reviewed by a Certified Ontario Landscape Architect (OLA) or Certified Arborist. Watering and pruning of newly planted trees will be carried out by the owner/contractor as required during the warranty period (approximately 2 years).

6.3 Post-Construction

It is recommended that the temporary tree protection fencing be removed upon completion of all construction activities and adjacent areas are stabilized with a vegetative cover (i.e. sod) to the satisfaction of the Environmental Inspector or qualified biologist. At the time of fencing removal, it is recommended that a Certified Arborist assess the boundaries of all development and trail footprints to ensure that no further removals are required due to any increases in the potential for structural failure of adjacent trees.

6.4 Mitigation

Some compensation trees have already been planted within the subject property as part of the demolition permitting and to compensate for trees previously removed without a tree permit. A small number of these compensation trees may require relocation to facilitate the installation of the proposed trail option. Due to the small size of these trees (currently approximately 1m in height), relocation is expected to be feasible, and no further compensation for these trees should be required. Details regarding the number of trees to be relocated and their final destination within the subject property should be provided during the Detailed Design stage.

Species used for compensation plantings, with the exception of street trees, should be native to Wellington County and not include any species that are listed as introduced, or locally, provincially or federally significant. The use of non-native species that are sometimes more tolerant of urban conditions (i.e. salt and drought tolerant) may be suitable as long as they do not include invasive species such as Norway Maple (*Acer platanoides*) or Sweet Cherry (*Prunus avium*).

It is recommended that the following criteria be followed during the development of proposed planting plans and during the Detailed Design stage, which are to be finalized in an Environmental Implementation Report (EIR) and updated TPP:

- Polygon A and E should be inventoried individually to properly quantify the number of trees to be removed and retained;
- Tree retention within the park block should be reassessed based on City needs and trail design;

- Compensation requirements should be updated to reflect more refined details as they become available;
- The compensation plan should be developed by, or reviewed and approved by a Certified Arborist;
- Include hardy, native tree species where feasible that are known to thrive in more urban conditions (i.e. compacted soil, drought, high salt tolerance),
- Include a diversity of trees from several genus to increase disease and pest tolerance and discourage monocultures (no more than 30% from a single genus, 10% from a single species),
- Include a monitoring plan that is appropriate for the planting and compensation objectives,
- Trees should be replaced if the compensation objectives have not been met,
- Trees should be spaced so as to allow material to reach its ultimate size and form;
- Trees should be provided with appropriate soil types and soil volumes;
- Avoid ash species due to the risk of the emerald ash borer (*Agrilus planipen*nis),
- Avoid 'messy trees', such as fruiting trees or poplars (*Populus* spp.) where plantings occur in close proximity to driveways and roadways;
- Spacing of plant material should account for the ultimate size and form of the selected species and also the purpose of the planting, whether it be for screening, shade, naturalizing, rehabilitation, etc.; and
- Special attention to location and height of trees in proximity to utilities.

7.0 References

City of Guelph. 2010. The Official Plan of The City of Guelph By-law Number (2010)-19058.

City of Guelph. 2022. The City of Guelph Official Plan, February 2022 Consolidation. (https://guelph.ca/plans-and-strategies/official-plan/).

Dunster, J. A. 2009. Tree Risk Assessment in Urban Areas and the Urban/Rural Interface: Course Manual. Pacific Northwest Chapter, International Society of Arboriculture, Silverton, Oregon.

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Appendix I
Tree Inventory Data

1250 Gordon Street Tree Preservation Plan

Tree Inventory Data

No. of Trees	Tree Number	Common Name	Scientific Name	Native/ Non-native	Stem Count	DBH (cm)	Crown Radius (m)	Potential for Structural Failure Rating	Overall Condition	Location	Proposed Action	Compensation Required	Comments
1	A	Freeman's Maple	*Acer X freemanii*	Native	1	75	7.0	Medium	Fair	Development	Remove	Yes	
1	B	Eastern White Cedar	*Thuja occidentalis*	Native	1	16	1.0	Low	Fair	Development	Remove	Yes	
1	C	Eastern Cottonwood	*Populus deltoides*	Native	1	17	2.0	Low	Good	Development	Remove	Yes	
1	D	Black Walnut	*Juglans nigra*	Native	1	12	0.5	Low	Good	Development	Remove	Yes	no tag
1	E	Butternut	*Juglans cinerea*	Native	1	20	4.0	Medium	Fair	Development	Remove	Yes	
1	F	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	30	3.0	Low	Good	Development	Retain	No	off-site, move point 1.5m out
1	G	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	45	4.0	High	Poor	Off-Property	Retain	No	
1	I	Norway Spruce	*Picea abies*	Non-Native	1	45	5.0	Medium	Fair	Development	Remove	Yes	didn't tag since behind low fence
1	J	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	45	3.0	High	Poor	Development	Retain	No	
41	Polygon A	Norway Spruce	*Picea abies*	Non-Native	1	30	2.0	Low	Good	Development	Retain where Feasible	No	20 spruce hedge,
207	Polygon B	Eastern White Cedar	*Thuja occidentalis*	Native	1	16	1.0	Low	Fair	Development	Remove	Yes	
18	Polygon C	Eastern White Cedar	*Thuja occidentalis*	Native	1	18	2.0	Medium	Fair	Development	Remove	Yes	behind fence, 4m south - 10m south
5	Polygon D	Norway Spruce	*Picea abies*	Non-Native	5	34	4.0	Medium	Fair	Development	Remove	Yes	
10	Polygon E	Freeman's Maple	*Acer X freemanii*	Native	1	32	4.0	Medium	Fair	Development	Retain where Feasible	No	
8	Polygon F	Norway Spruce	*Picea abies*	Non-Native	1	30	3.0	Low	Good	Development	Remove	Yes	Hedgerow
1	101	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	65	7.0	Medium	Fair	Boundary	Remove	Yes	
1	102	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	46	5.0	Medium	Fair	Development	Remove	Yes	on-property, few stress cracks on scaffold branches, 1 dead branch
1	103	White Spruce	*Picea glauca*	Native	1	24	3.0	Medium	Fair	Boundary	Remove	Yes	crown uneven due to competition for sunlight with maple
1	104	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	60	6.0	High	Poor	Boundary	Remove	No	codominant branches with included bark, 40% dieback
1	105	Norway Maple	*Acer platanoides*	Non-Native	1	20	3.5	Medium	Fair	Boundary	Remove	Yes	boundary tree
1	106	Manitoba Maple	*Acer negundo*	Native	1	22	4.0	Medium	Fair	Boundary	Remove	Yes	boundary tree, stem grows on 90 degree angle before self correcting
1	107	Eastern White Cedar	*Thuja occidentalis*	Native	2	11	1.5	High	Poor	Boundary	Remove	No	boundary tree, root flare impacted by dumped debris - angled
1	108	Eastern White Cedar	*Thuja occidentalis*	Native	2	10	1.0	Medium	Poor	Boundary	Remove	No	boundary tree, codominant stems with included bark, root flare impacted - angled
1	109	Black Walnut	*Juglans nigra*	Native	1	21	5.0	Medium	Fair	Development	Remove	Yes	boundary tree, codominant branches with included bark
1	110	Eastern White Cedar	*Thuja occidentalis*	Native	1	14	2.5	Medium	Fair	Development	Remove	Yes	boundary tree
1	111	Eastern White Cedar	*Thuja occidentalis*	Native	1	23	2.5	Medium	Fair	Development	Remove	Yes	boundary tree
1	112	Norway Spruce	*Picea abies*	Non-Native	1	56	4.0	Medium	Fair	Development	Remove	Yes	
1	113	Common Pear	*Pyrus communis*	Non-Native	1	27	3.0	High	Very Poor	Development	Remove	No	open wounds in stem + root flare, lean
1	114	Eastern White Cedar	*Thuja occidentalis*	Native	1	22	2.0	High	Poor	Development	Remove	No	40% dieback, crown leans 30 degrees
1	115	Eastern White Cedar	*Thuja occidentalis*	Native	1	10	1.0	High	Poor	Development	Remove	No	

No. of Trees	Tree Number	Common Name	Scientific Name	Native/ Non-native	Stem Count	DBH (cm)	Crown Radius (m)	Potential for Structural Failure Rating	Overall Condition	Location	Proposed Action	Compensation Required	Comments
1	116	Eastern White Cedar	*Thuja occidentalis*	Native	1	14	1.0	High	Poor	Development	Remove	No	
1	117	Eastern White Cedar	*Thuja occidentalis*	Native	1	11	1.0	High	Poor	Development	Remove	No	
1	118	Eastern White Cedar	*Thuja occidentalis*	Native	2	12	2.0	High	Poor	Development	Remove	No	wire around stem, secondary vertical branches
1	119	Eastern White Cedar	*Thuja occidentalis*	Native	2	17	1.0	High	Poor	Development	Remove	No	
1	120	Eastern White Cedar	*Thuja occidentalis*	Native	1	16	2.0	High	Poor	Development	Remove	No	competition for sunlight
1	121	Eastern White Cedar	*Thuja occidentalis*	Native	1	17	1.5	High	Poor	Development	Remove	No	
1	123	Eastern White Cedar	*Thuja occidentalis*	Native	2	14	3.0	Medium	Fair	Development	Remove	Yes	codominant stems with included bark
1	124	Eastern White Cedar	*Thuja occidentalis*	Native	1	15	1.0	High	Poor	Boundary	Remove	No	
1	125	Eastern White Cedar	*Thuja occidentalis*	Native	2	21	3.0	High	Poor	Development	Remove	No	
1	126	Eastern White Cedar	*Thuja occidentalis*	Native	1	30	3.0	High	Poor	Development	Remove	No	
1	127	Eastern White Cedar	*Thuja occidentalis*	Native	2	21	3.0	High	Poor	Development	Remove	No	
1	128	Eastern White Cedar	*Thuja occidentalis*	Native	1	16	1.0	High	Poor	Development	Remove	No	
1	129	Norway Spruce	*Picea abies*	Non-Native	1	36	4.0	Low	Fair	Development	Remove	Yes	
1	130	Eastern White Cedar	*Thuja occidentalis*	Native	1	19	1.5	Medium	Fair	Development	Remove	Yes	
1	131	Eastern White Cedar	*Thuja occidentalis*	Native	1	15	2.0	Medium	Fair	Development	Remove	Yes	
1	133	Norway Spruce	*Picea abies*	Non-Native	1	28	4.0	Low	Good	Development	Remove	Yes	
1	134	Norway Spruce	*Picea abies*	Non-Native	1	38	4.0	Medium	Fair	Development	Remove	Yes	
1	135	Norway Spruce	*Picea abies*	Non-Native	1	21	3.0	High	Poor	Development	Remove	No	
1	136	Common Pear	*Pyrus communis*	Non-Native	1	23	4.0	High	Poor	Development	Remove	No	open wounds in stem
1	137	Common Apple	*Malus domestica*	Non-Native	3	29	5.0	High	Poor	Development	Remove	No	2 stems broken off with decay
1	138	Common Apple	*Malus domestica*	Non-Native	1	22	5.0	High	Poor	Development	Remove	No	wounds on stem compartmentalizing, 2 dead scaffold branches
1	139	Norway Spruce	*Picea abies*	Non-Native	1	51	5.0	Low	Good	Development	Remove	Yes	
1	140	Eastern White Cedar	*Thuja occidentalis*	Native	1	15	3.0	Medium	Fair	Development	Remove	Yes	
1	141	Eastern White Cedar	*Thuja occidentalis*	Native	4	21	1.5	Medium	Fair	Development	Remove	Yes	
1	142	Eastern White Cedar	*Thuja occidentalis*	Native	2	12	2.0	High	Poor	Development	Remove	No	
1	143	Eastern White Cedar	*Thuja occidentalis*	Native	2	16	2.0	High	Poor	Development	Remove	No	competition for sunlight
1	144	Eastern White Cedar	*Thuja occidentalis*	Native	1	17	1.0	Medium	Fair	Development	Remove	Yes	
1	145	Eastern White Cedar	*Thuja occidentalis*	Native	2	19	3.0	High	Poor	Development	Remove	No	competition for sunlight
1	146	Eastern White Cedar	*Thuja occidentalis*	Native	2	19	2.0	Medium	Fair	Development	Remove	Yes	competition for sunlight
1	148	Colorado Spruce	*Picea pungens*	Non-Native	1	11	1.5	Low	Excellent	Development	Remove	Yes	
1	149	Norway Maple	*Acer platanoides*	Non-Native	1	25	5.0	Medium	Fair	Development	Remove	Yes	
1	150	Colorado Spruce	*Picea pungens*	Non-Native	1	10	1.0	High	Dead	Development	Remove	No	

No. of Trees	Tree Number	Common Name	Scientific Name	Native/ Non-native	Stem Count	DBH (cm)	Crown Radius (m)	Potential for Structural Failure Rating	Overall Condition	Location	Proposed Action	Compensation Required	Comments
1	151	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	61	5.0	Medium	Fair	Development	Remove	Yes	
1	152	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	53	5.0	Medium	Fair	Development	Remove	Yes	
1	153	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	64	5.0	High	Poor	Development	Remove	No	50% dieback
1	154	White Ash	*Fraxinus americana*	Native	1	23	4.0	Low	Good	Development	Remove	Yes	
1	155	Norway Spruce	*Picea abies*	Non-Native	1	43	3.0	Low	Good	Development	Remove	Yes	
1	156	Eastern White Cedar	*Thuja occidentalis*	Native	2	24	4.0	Medium	Fair	Development	Remove	Yes	
1	157	Eastern White Cedar	*Thuja occidentalis*	Native	1	15	1.5	High	Poor	Development	Remove	No	
1	158	Norway Spruce	*Picea abies*	Non-Native	1	45	4.0	Low	Good	Development	Remove	Yes	
1	159	Norway Spruce	*Picea abies*	Non-Native	1	40	4.0	Low	Good	Development	Remove	Yes	
1	160	Norway Spruce	*Picea abies*	Non-Native	1	32	2.0	Medium	Fair	Development	Remove	Yes	
1	161	Eastern White Cedar	*Thuja occidentalis*	Native	3	18	3.5	High	Dead	Development	Remove	No	
1	162	Eastern White Cedar	*Thuja occidentalis*	Native	2	19	2.0	High	Dead	Development	Remove	No	
1	163	Norway Spruce	*Picea abies*	Non-Native	1	38	4.0	Low	Good	Development	Remove	Yes	
1	164	Eastern White Cedar	*Thuja occidentalis*	Native	1	16	2.0	Medium	Fair	Development	Remove	Yes	
1	165	Norway Spruce	*Picea abies*	Non-Native	1	29	3.0	Low	Good	Development	Remove	Yes	
1	166	Norway Spruce	*Picea abies*	Non-Native	1	36	3.5	Medium	Fair	Development	Remove	Yes	
1	167	Norway Spruce	*Picea abies*	Non-Native	1	15	2.0	Medium	Fair	Development	Remove	Yes	
1	168	Norway Spruce	*Picea abies*	Non-Native	1	40	4.0	Low	Good	Development	Remove	Yes	
1	169	Norway Spruce	*Picea abies*	Non-Native	1	14	1.0	High	Dead	Development	Remove	No	
1	170	Norway Spruce	*Picea abies*	Non-Native	1	28	3.5	Medium	Fair	Development	Remove	Yes	
1	171	Norway Spruce	*Picea abies*	Non-Native	1	25	5.0	Medium	Fair	Development	Remove	Yes	
1	172	Norway Spruce	*Picea abies*	Non-Native	1	27	3.0	Medium	Fair	Development	Remove	Yes	
1	173	Siberian Elm	*Ulmus pumila*	Non-Native	1	52	8.0	Medium	Fair	Boundary	Remove	Yes	crown leans 70 degree angle
1	174	European Weeping Birch	*Betula pendula*	Non-Native	2	26	4.0	Medium	Fair	Public	Remove	Yes	
1	176	Honey Locust	*Gleditsia triacanthos*	Native	1	40	6.0	Medium	Fair	Public	Retain	No	
1	177	Honey Locust	*Gleditsia triacanthos*	Native	1	21	5.0	Medium	Fair	Off-Property	Retain	No	
1	178	Honey Locust	*Gleditsia triacanthos*	Native	1	14	4.0	Medium	Fair	Off-Property	Retain	No	
1	179	Norway Spruce	*Picea abies*	Non-Native	1	41	4.0	Medium	Fair	Boundary	Retain	No	
1	180	Norway Maple	*Acer platanoides*	Non-Native	1	67	6.0	High	Poor	Boundary	Retain	No	numerous large cracks in stem and branches
1	181	Tamarack	*Larix laricina*	Native	1	30	4.0	Medium	Fair	Boundary	Remove	Yes	
1	182	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	53	7.0	Medium	Fair	Development	Remove	Yes	
1	183	Norway Maple	*Acer platanoides*	Non-Native	1	51	7.0	Medium	Fair	Development	Remove	Yes	hanger, 10% dieback
1	184	American Basswood	*Tilia americana*	Native	3	42	6.0	Medium	Fair	Development	Remove	Yes	10% dieback
1	185	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	17	4.0	Low	Good	Boundary	Remove	Yes	
1	186	Linden	*Tilia sp.*	Non-Native	1	28	5.0	Medium	Fair	Development	Remove	Yes	
1	187	Common Apple	*Malus domestica*	Non-Native	1	44	4.0	High	Poor	Development	Remove	No	
1	188	Linden	*Tilia sp.*	Non-Native	1	19	3.0	Medium	Fair	Development	Remove	Yes	
1	189	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	47	5.0	Medium	Fair	Development	Remove	Yes	
1	190	Eastern White Cedar	*Thuja occidentalis*	Native	1	12	1.0	Low	Good	Development	Remove	Yes	
1	191	Eastern White Cedar	*Thuja occidentalis*	Native	2	20	1.0	Medium	Fair	Development	Remove	Yes	

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1	192	Eastern White Cedar	*Thuja occidentalis*	Native	3	16	2.0	Medium	Fair	Development	Remove	Yes	
1	193	Norway Spruce	*Picea abies*	Non-Native	1	50	3.5	Low	Excellent	Development	Remove	Yes	
1	194	Norway Spruce	*Picea abies*	Non-Native	1	52	3.0	Low	Good	Development	Remove	Yes	
1	195	Linden	*Tilia sp.*	Non-Native	1	22	3.5	Medium	Fair	Development	Remove	Yes	
1	196	Norway Spruce	*Picea abies*	Non-Native	1	35	3.0	Low	Excellent	Development	Remove	Yes	
1	197	Linden	*Tilia sp.*	Non-Native	1	23	4.0	Medium	Fair	Development	Remove	Yes	
1	198	Norway Spruce	*Picea abies*	Non-Native	1	39	3.0	Low	Excellent	Development	Remove	Yes	
1	199	Linden	*Tilia sp.*	Non-Native	1	13	3.0	Medium	Fair	Development	Remove	Yes	
1	200	Norway Spruce	*Picea abies*	Non-Native	1	34	3.0	Low	Good	Development	Remove	Yes	
1	201	Norway Spruce	*Picea abies*	Non-Native	1	41	5.0	Medium	Fair	Development	Remove	Yes	
1	202	Norway Spruce	*Picea abies*	Non-Native	1	19	2.0	High	Poor	Development	Remove	No	
1	204	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	52	7.0	Medium	Fair	Development	Remove	Yes	
1	205	Norway Spruce	*Picea abies*	Non-Native	1	15	1.5	Medium	Fair	Development	Remove	Yes	
1	206	Norway Spruce	*Picea abies*	Non-Native	1	15	2.0	Medium	Fair	Development	Remove	Yes	
1	207	Norway Spruce	*Picea abies*	Non-Native	2	21	2.0	Medium	Poor	Development	Remove	No	
1	208	Norway Spruce	*Picea abies*	Non-Native	1	27	3.0	Medium	Fair	Development	Remove	Yes	
1	209	Norway Spruce	*Picea abies*	Non-Native	1	23	2.0	Medium	Poor	Development	Remove	No	
1	210	Scots Pine	*Pinus sylvestris*	Non-Native	1	36	4.0	High	Poor	Development	Remove	No	
1	211	Common Apple	*Malus domestica*	Non-Native	1	37	6.0	Medium	Fair	Development	Remove	No	behind low fence
1	212	Norway Spruce	*Picea abies*	Non-Native	1	32	4.0	Low	Good	Development	Remove	Yes	
1	213	Norway Spruce	*Picea abies*	Non-Native	1	24	3.0	Medium	Fair	Development	Remove	Yes	
1	214	Norway Spruce	*Picea abies*	Non-Native	1	36	4.0	Low	Good	Development	Remove	Yes	
1	215	Norway Spruce	*Picea abies*	Non-Native	1	41	4.0	Low	Good	Development	Remove	Yes	
1	216	Scots Pine	*Pinus sylvestris*	Non-Native	1	38	4.0	Medium	Fair	Development	Remove	Yes	
1	217	Norway Spruce	*Picea abies*	Non-Native	1	26	2.0	Medium	Fair	Development	Remove	Yes	
1	218	Norway Maple	*Acer platanoides*	Non-Native	1	40	4.0	Medium	Fair	Development	Remove	Yes	
1	220	Norway Spruce	*Picea abies*	Non-Native	1	32	3.0	Low	Good	Development	Remove	Yes	
1	221	Norway Spruce	*Picea abies*	Non-Native	1	31	3.0	Medium	Fair	Development	Remove	Yes	
1	222	Norway Spruce	*Picea abies*	Non-Native	1	43	3.0	Medium	Fair	Development	Remove	Yes	
1	223	Norway Spruce	*Picea abies*	Non-Native	1	35	3.0	Medium	Fair	Development	Remove	Yes	
1	226	Pine Species	*Pinus sp.*	Non-Native	3	18	3.0	Medium	Fair	Development	Remove	Yes	
1	227	Black Walnut	*Juglans nigra*	Native	1	65	6.0	Medium	Fair	Development	Remove	Yes	
1	229	Norway Spruce	*Picea abies*	Non-Native	1	31	3.0	Medium	Fair	Development	Remove	Yes	
1	231	Scots Pine	*Pinus sylvestris*	Non-Native	1	42	3.0	Low	Good	Development	Remove	Yes	
1	233	Scots Pine	*Pinus sylvestris*	Non-Native	1	29	2.5	Low	Good	Development	Retain	No	
1	235	Scots Pine	*Pinus sylvestris*	Non-Native	1	23	3.0	Medium	Fair	Development	Remove	Yes	
1	236	Scots Pine	*Pinus sylvestris*	Non-Native	1	15	2.5	Low	Good	Development	Retain	No	
1	237	Scots Pine	*Pinus sylvestris*	Non-Native	1	16	2.5	Medium	Fair	Development	Retain	No	
1	238	Scots Pine	*Pinus sylvestris*	Non-Native	2	19	3.0	Medium	Fair	Development	Remove	Yes	
1	239	Scots Pine	*Pinus sylvestris*	Non-Native	1	11	1.0	Medium	Good	Development	Retain	No	
1	240	Scots Pine	*Pinus sylvestris*	Non-Native	1	14	2.0	Medium	Fair	Development	Retain	No	
1	241	Scots Pine	*Pinus sylvestris*	Non-Native	1	11	1.0	Low	Good	Development	Retain	No	
1	242	Scots Pine	*Pinus sylvestris*	Non-Native	1	12	1.0	Medium	Fair	Development	Remove	Yes	
1	243	Scots Pine	*Pinus sylvestris*	Non-Native	1	20	3.0	Medium	Fair	Development	Remove	Yes	
1	244	Scots Pine	*Pinus sylvestris*	Non-Native	1	17	2.0	Low	Good	Development	Remove	Yes	
1	245	Scots Pine	*Pinus sylvestris*	Non-Native	1	23	2.0	Low	Good	Development	Remove	Yes	
1	246	Black Walnut	*Juglans nigra*	Native	1	21	3.5	Medium	Fair	Development	Remove	Yes	
1	247	Norway Spruce	*Picea abies*	Non-Native	1	20	2.0	Low	Excellent	Development	Remove	Yes	
1	248	White Spruce	*Picea glauca*	Native	1	12	1.5	Low	Excellent	Development	Remove	Yes	
1	249	White Spruce	*Picea glauca*	Native	1	12	1.5	Low	Good	Development	Remove	Yes	
1	250	Eastern White Cedar	*Thuja occidentalis*	Native	1	14	1.5	Low	Good	Development	Remove	Yes	

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1	251	Eastern White Cedar	*Thuja occidentalis*	Native	1	22	2.0	Low	Good	Development	Remove	Yes	
1	252	Black Walnut	*Juglans nigra*	Native	1	10	1.5	Medium	Fair	Development	Remove	Yes	
1	253	Scots Pine	*Pinus sylvestris*	Non-Native	1	13	1.5	Low	Good	Development	Remove	Yes	
1	254	Scots Pine	*Pinus sylvestris*	Non-Native	1	17	2.0	Low	Good	Development	Remove	Yes	
1	255	Common Pear	*Pyrus communis*	Non-Native	3	12	1.0	High	Poor	Development	Remove	No	
1	256	Scots Pine	*Pinus sylvestris*	Non-Native	1	30	2.5	Low	Good	Development	Remove	Yes	
1	257	Scots Pine	*Pinus sylvestris*	Non-Native	1	21	2.5	Low	Good	Development	Remove	Yes	
1	258	Common Pear	*Pyrus communis*	Non-Native	2	16	2.5	Medium	Poor	Development	Remove	No	
1	259	Common Apple	*Malus domestica*	Non-Native	3	32	4.0	Medium	Poor	Development	Remove	No	1 cavity, sapsucker feeding
1	260	Black Maple	*Acer saccharum ssp. nigrum*	Native	1	14	3.0	High	Poor	Development	Remove	No	
1	261	Green Ash	*Fraxinus pennsylvanica*	Native	1	27	5.0	Low	Good	Development	Remove	Yes	
1	262	Butternut	*Juglans cinerea*	Native	1	28	5.0	Medium	Fair	Development	Remove	Yes	
1	263	Green Ash	*Fraxinus pennsylvanica*	Native	1	23	3.0	Medium	Poor	Development	Remove	No	
1	264	Green Ash	*Fraxinus pennsylvanica*	Native	1	10	2.0	Low	Fair	Development	Remove	Yes	
1	265	White Spruce	*Picea glauca*	Native	1	23	3.0	Medium	Fair	Development	Remove	Yes	
1	266	Black Maple	*Acer saccharum ssp. nigrum*	Native	1	105	9.0	High	Poor	Development	Remove	No	
1	267	Green Ash	*Fraxinus pennsylvanica*	Native	1	12	2.0	Low	Good	Development	Remove	Yes	
1	268	Black Maple	*Acer saccharum ssp. nigrum*	Native	1	19	4.0	High	Poor	Development	Remove	No	
1	269	Black Maple	*Acer saccharum ssp. nigrum*	Native	1	12	2.0	High	Poor	Development	Remove	No	
1	270	Black Maple	*Acer saccharum ssp. nigrum*	Native	1	11	2.5	High	Poor	Development	Remove	No	
1	271	Red Oak	*Quercus rubra*	Native	1	52	7.0	Medium	Fair	Development	Remove	Yes	
1	272	Red Oak	*Quercus rubra*	Native	1	20	2.0	High	Very Poor	Development	Remove	No	
1	273	Red Oak	*Quercus rubra*	Native	1	23	5.0	Medium	Fair	Development	Remove	Yes	
1	274	Red Oak	*Quercus rubra*	Native	1	13	1.5	Low	Good	Development	Remove	Yes	
1	276	Red Oak	*Quercus rubra*	Native	1	65	8.0	Low	Fair	Development	Remove	Yes	
1	277	Red Oak	*Quercus rubra*	Native	1	18	4.0	Low	Fair	Development	Remove	Yes	
1	278	Red Oak	*Quercus rubra*	Native	1	21	4.0	Medium	Fair	Development	Remove	Yes	
1	279	Red Oak	*Quercus rubra*	Native	1	13	4.0	Medium	Fair	Development	Remove	Yes	
1	280	Red Oak	*Quercus rubra*	Native	1	11	2.0	Medium	Fair	Development	Remove	Yes	
1	281	Norway Spruce	*Picea abies*	Non-Native	1	10	1.0	High	Dead	Development	Remove	No	
1	282	Red Oak	*Quercus rubra*	Native	1	65	8.0	Medium	Fair	Development	Remove	Yes	
1	283	Norway Spruce	*Picea abies*	Non-Native	1	16	2.5	Medium	Poor	Development	Remove	No	
1	284	Norway Spruce	*Picea abies*	Non-Native	1	18	4.0	Medium	Fair	Development	Remove	Yes	
1	285	Norway Spruce	*Picea abies*	Non-Native	1	23	3.0	Medium	Fair	Development	Remove	Yes	
1	286	Norway Spruce	*Picea abies*	Non-Native	1	16	2.5	Medium	Fair	Development	Remove	Yes	
1	287	Norway Spruce	*Picea abies*	Non-Native	1	18	1.5	Medium	Poor	Development	Remove	No	
1	288	Norway Spruce	*Picea abies*	Non-Native	1	13	1.5	Medium	Poor	Development	Remove	No	
1	289	American Basswood	*Tilia americana*	Native	1	25	4.0	Medium	Fair	Development	Remove	Yes	
1	290	Norway Spruce	*Picea abies*	Non-Native	1	11	1.5	Medium	Fair	Development	Remove	Yes	
1	291	Norway Spruce	*Picea abies*	Non-Native	1	35	5.0	Low	Good	Development	Remove	Yes	
1	292	Norway Spruce	*Picea abies*	Non-Native	1	15	1.0	Medium	Fair	Development	Remove	Yes	slight lean
1	293	Norway Spruce	*Picea abies*	Non-Native	1	35	3.5	Low	Good	Development	Remove	Yes	
1	294	Norway Spruce	*Picea abies*	Non-Native	1	27	3.0	High	Poor	Development	Remove	No	
1	295	Norway Maple	*Acer platanoides*	Non-Native	2	19	3.0	High	Poor	Development	Remove	No	

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1	296	Norway Spruce	*Picea abies*	Non-Native	1	32	4.0	Low	Good	Development	Remove	Yes	
1	297	Norway Spruce	*Picea abies*	Non-Native	1	40	4.0	Low	Good	Development	Remove	Yes	
1	298	Fir species	*Abies sp.*	Non-Native	1	37	4.0	Medium	Fair	Development	Remove	Yes	
1	299	Balsam Fir	*Abies balsamea*	Native	1	15	2.0	Low	Good	Development	Remove	Yes	
1	300	Black Walnut	*Juglans nigra*	Native	1	12	1.5	Low	Good	Development	Remove	Yes	
1	301	Norway Spruce	*Picea abies*	Non-Native	1	31	3.0	Low	Good	Development	Remove	Yes	
1	302	Crack Willow	*Salix fragilis*	Non-Native	1	73	5.0	High	Poor	Development	Remove	No	unsuitable bat cavities at old branch unions - frass, decay
1	303	Red Maple	*Acer rubrum*	Native	1	12	1.0	High	Dead	Development	Remove	No	
1	304	White Elm	*Ulmus americana*	Native	1	11	4.0	High	Poor	Development	Remove	No	
1	305	Manitoba Maple	*Acer negundo*	Native	1	10	2.0	High	Poor	Development	Remove	No	grapevine throughout crown, 40% dieback
1	306	Manitoba Maple	*Acer negundo*	Native	1	17	2.0	High	Poor	Development	Remove	No	epicormic shoots, grapevine, 30% dieback
1	307	Black Walnut	*Juglans nigra*	Native	1	11	2.0	Low	Good	Development	Remove	Yes	
1	310	White Elm	*Ulmus americana*	Native	2	10	4.0	High	Fair	Development	Remove	Yes	
1	311	White Elm	*Ulmus americana*	Native	1	16	1.5	Medium	Fair	Development	Retain	No	
1	312	White Elm	*Ulmus americana*	Native	1	33	4.0	High	Poor	Development	Retain	No	on-property
1	313	White Elm	*Ulmus americana*	Native	1	25	3.5	Medium	Fair	Development	Retain	No	on-property
1	314	Black Walnut	*Juglans nigra*	Native	1	10	3.0	Low	Good	Development	Retain	No	
1	315	Black Walnut	*Juglans nigra*	Native	1	14	3.0	Low	Good	Development	Retain	No	
1	316	Black Walnut	*Juglans nigra*	Native	1	14	3.0	Low	Good	Development	Retain	No	
1	317	White Elm	*Ulmus americana*	Native	1	19	2.5	Medium	Fair	Development	Retain	No	
1	318	Black Walnut	*Juglans nigra*	Native	1	49	6.0	Low	Good	Development	Remove	Yes	
1	319	White Elm	*Ulmus americana*	Native	1	15	3.0	High	Dead	Development	Remove	No	
1	320	Black Walnut	*Juglans nigra*	Native	1	62	7.0	Medium	Fair	Development	Retain	No	codominant branches with included bark, few small branches previously lost
1	321	White Elm	*Ulmus americana*	Native	1	13	3.0	Medium	Fair	Development	Retain	No	epicormic shoots, leans 45 degrees
1	322	White Elm	*Ulmus americana*	Native	1	12	3.0	High	Dead	Development	Remove	No	leans on 45 degree angle
1	323	White Elm	*Ulmus americana*	Native	1	31	3.0	High	Dead	Development	Remove	No	
1	324	Black Walnut	*Juglans nigra*	Native	1	15	2.5	Low	Good	Development	Retain	No	
1	325	Black Walnut	*Juglans nigra*	Native	1	11	2.0	High	Poor	Development	Retain	No	40% dieback
1	326	White Elm	*Ulmus americana*	Native	1	18	3.0	Medium	Good	Development	Retain	No	
1	327	Black Walnut	*Juglans nigra*	Native	1	12	2.0	Medium	Fair	Development	Retain	No	
1	328	Black Walnut	*Juglans nigra*	Native	1	12	3.0	Medium	Fair	Development	Retain	No	
1	329	Black Walnut	*Juglans nigra*	Native	1	26	3.0	Medium	Fair	Development	Retain	No	boundary tree
1	330	White Elm	*Ulmus americana*	Native	1	31	5.0	Medium	Poor	Development	Remove	No	
1	331	White Elm	*Ulmus americana*	Native	1	14	3.0	Medium	Poor	Development	Remove	No	
1	332	Hawthorn Species	*Crataegus sp.*	Native	1	14	2.0	High	Poor	Development	Retain	No	
1	333	White Elm	*Ulmus americana*	Native	1	10	2.0	Medium	Fair	Development	Retain	No	
1	334	Scots Pine	*Pinus sylvestris*	Non-Native	1	15	1.0	High	Poor	Development	Retain	No	
1	335	Black Walnut	*Juglans nigra*	Native	1	26	3.0	Medium	Fair	Development	Retain	No	
1	336	Eastern Red Cedar	*Juniperus virginiana*	Native	2	14	1.5	Medium	Fair	Development	Retain	No	
1	337	Black Walnut	*Juglans nigra*	Native	1	17	3.0	Medium	Fair	Development	Retain	No	
1	338	White Elm	*Ulmus americana*	Native	1	11	3.0	Medium	Fair	Development	Retain	No	1 large vine in crown - may impact health, 1 dead branch, crown leans
1	339	White Elm	*Ulmus americana*	Native	1	14	2.0	High	Dead	Development	Remove	No	
1	340	Black Walnut	*Juglans nigra*	Native	1	11	2.0	High	Poor	Development	Retain	No	
1	341	Black Cherry	*Prunus serotina*	Native	2	15	2.0	High	Poor	Development	Retain	No	boundary tree
1	342	Manitoba Maple	*Acer negundo*	Native	1	36	6.0	High	Poor	Development	Retain	No	codominant branches with included bark
1	343	Black Cherry	*Prunus serotina*	Native	1	37	6.0	High	Dead	Development	Remove	No	should be removed
1	344	Black Walnut	*Juglans nigra*	Native	1	11	2.0	High	Poor	Development	Retain	No	
1	345	White Elm	*Ulmus americana*	Native	1	12	2.0	High	Poor	Development	Retain	No	
1	346	Black Walnut	*Juglans nigra*	Native	1	12	1.0	High	Dead	Development	Retain	No	
1	347	Black Walnut	*Juglans nigra*	Native	1	17	3.0	High	Dead	Development	Retain	No	

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1	348	Black Walnut	*Juglans nigra*	Native	1	11	2.0	Low	Fair	Development	Retain	No	
1	349	Common Apple	*Malus domestica*	Non-Native	2	10	4.0	High	Poor	Development	Retain	No	
1	350	Black Walnut	*Juglans nigra*	Native	1	12	3.0	Low	Good	Development	Retain	No	
1	351	White Elm	*Ulmus americana*	Native	1	23	5.0	High	Dead	Development	Retain	No	
1	352	Black Cherry	*Prunus serotina*	Native	2	13	4.0	Medium	Fair	Development	Retain	No	
1	353	Scots Pine	*Pinus sylvestris*	Non-Native	1	12	2.0	Low	Good	Development	Retain	No	
1	355	Hawthorn Species	*Crataegus sp.*	Native	2	12	3.0	High	Poor	Development	Retain	No	354 tag missing
1	356	White Elm	*Ulmus americana*	Native	1	22	4.0	High	Dead	Development	Retain	No	
1	357	White Elm	*Ulmus americana*	Native	1	27	4.0	Medium	Fair	Development	Retain	No	
1	358	Black Walnut	*Juglans nigra*	Native	1	12	3.0	Medium	Fair	Development	Retain	No	
1	359	White Elm	*Ulmus americana*	Native	1	16	4.0	Medium	Poor	Development	Remove	No	
1	361	Black Walnut	*Juglans nigra*	Native	1	39	5.0	High	Poor	Boundary	Remove	No	
1	362	Black Walnut	*Juglans nigra*	Native	1	48	7.0	Medium	Fair	Development	Retain	No	
1	363	Black Walnut	*Juglans nigra*	Native	1	38	5.0	Medium	Fair	Boundary	Retain	No	
1	364	Black Walnut	*Juglans nigra*	Native	1	39	6.0	Low	Good	Boundary	Retain	No	
1	365	Black Cherry	*Prunus serotina*	Native	3	23	3.0	High	Very Poor	Boundary	Remove	No	80% dieback
1	366	White Elm	*Ulmus americana*	Native	1	10	2.0	Low	Good	Development	Retain	No	
1	367	White Elm	*Ulmus americana*	Native	1	26	5.0	High	Very Poor	Development	Remove	No	
1	368	White Elm	*Ulmus americana*	Native	1	13	3.0	Low	Good	Development	Retain	No	
1	369	White Elm	*Ulmus americana*	Native	1	15	3.0	High	Dead	Development	Retain	No	
1	370	Scots Pine	*Pinus sylvestris*	Non-Native	1	17	3.0	High	Dead	Development	Retain	No	
1	371	White Elm	*Ulmus americana*	Native	1	12	3.0	Medium	Fair	Development	Retain	No	
1	372	Butternut	*Juglans cinerea*	Native	1	17	3.0	Medium	Fair	Development	Retain	No	
1	373	Scots Pine	*Pinus sylvestris*	Non-Native	1	34	4.0	Improbable	Fair	Trail	Remove	Yes	Minor dead branches.
1	374	White Elm	*Ulmus americana*	Native	1	32	3.0	Medium	Fair	Trail	Retain	No	
1	375	White Elm	*Ulmus americana*	Native	1	12	1.5	Probable	Dead	Trail	Remove	No	Standing snag.
1	379	White Elm	*Ulmus americana*	Native	1	21	2.0	Probable	Dead	Trail	Remove	No	Standing snag.
1	380	White Elm	*Ulmus americana*	Native	1	16	3.0	Medium	Fair	Trail	Retain	No	
1	381	White Elm	*Ulmus americana*	Native	1	28	3.0	Probable	Dead	Trail	Remove	No	Standing snag.
1	382	White Elm	*Ulmus americana*	Native	1	19	2.0	Probable	Dead	Trail	Remove	No	Standing snag.
1	383	White Elm	*Ulmus americana*	Native	1	27	2.5	Probable	Dead	Trail	Remove	No	Standing snag.
1	384	White Elm	*Ulmus americana*	Native	1	30	4.0	Medium	Fair	Development	Remove	Yes	
1	385	Norway Spruce	*Picea abies*	Non-Native	1	28	4.0	Low	Good	Development	Remove	Yes	
1	386	Norway Spruce	*Picea abies*	Non-Native	1	78	4.0	Medium	Fair	Development	Remove	Yes	
1	387	Silver Maple	*Acer saccharinum*	Native	1	36	4.5	Medium	Fair	Development	Remove	Yes	
1	388	Eastern White Cedar	*Thuja occidentalis*	Native	5	22	2.0	Medium	Fair	Development	Retain	No	
1	389	Black Walnut	*Juglans nigra*	Native	1	10	3.0	Medium	Fair	Development	Remove	Yes	
1	390	Butternut	*Juglans cinerea*	Native	2	12	3.0	Medium	Fair	Development	Remove	Yes	codominant stems with included bark, butternut canker - some open
1	391	Norway Spruce	*Picea abies*	Non-Native	1	27	3.0	Medium	Fair	Development	Remove	Yes	
1	392	Norway Spruce	*Picea abies*	Non-Native	1	44	4.0	Medium	Fair	Development	Remove	Yes	
1	393	Norway Spruce	*Picea abies*	Non-Native	1	53	4.0	Medium	Fair	Development	Remove	Yes	
1	394	White Birch	*Betula papyrifera*	Native	2	19	3.0	Medium	Fair	Development	Remove	Yes	
1	395	Norway Spruce	*Picea abies*	Non-Native	1	31	3.0	Medium	Fair	Development	Remove	Yes	
1	396	Norway Spruce	*Picea abies*	Non-Native	1	19	2.0	Medium	Fair	Development	Remove	Yes	
1	397	Norway Spruce	*Picea abies*	Non-Native	1	24	2.5	Medium	Poor	Development	Remove	No	
1	398	Norway Spruce	*Picea abies*	Non-Native	1	21	2.5	Medium	Fair	Development	Remove	Yes	competition for sunlight, top half of crown only, u-bend in branch
1	399	Freeman's Maple	*Acer X freemanii*	Native	1	30	4.0	Medium	Fair	Development	Remove	Yes	
1	400	Freeman's Maple	*Acer X freemanii*	Native	1	38	7.0	Medium	Fair	Development	Remove	Yes	
1	410	Horsechestnut	*Aesculus hippocastanum*	Non-Native	1	14	1.5	Low	Good	Development	Remove	Yes	
1	411	Norway Maple	*Acer platanoides*	Non-Native	1	19	2.0	Medium	Fair	Development	Remove	Yes	

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1	412	Common Apple	*Malus domestica*	Non-Native	3	34	4.0	Medium	Poor	Development	Remove	No	
1	413	Norway Maple	*Acer platanoides*	Non-Native	1	49	6.0	Medium	Fair	Development	Remove	Yes	
1	414	Eastern Cottonwood	*Populus deltoides*	Native	1	22	3.5	Low	Good	Development	Remove	Yes	
1	415	Eastern White Cedar	*Thuja occidentalis*	Native	1	14	1.0	Medium	Fair	Development	Remove	Yes	
1	416	Eastern White Cedar	*Thuja occidentalis*	Native	1	13	1.5	Medium	Fair	Development	Remove	Yes	
1	417	Eastern Cottonwood	*Populus deltoides*	Native	1	26	2.0	Low	Good	Development	Remove	Yes	
1	438	Norway Maple	*Acer platanoides*	Non-Native	1	50	5.0	Medium	Fair	Development	Remove	Yes	
1	439	Norway Maple	*Acer platanoides*	Non-Native	1	59	7.0	Medium	Fair	Development	Remove	Yes	
1	440	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	61	5.0	Medium	Fair	Development	Remove	Yes	
1	441	Freeman's Maple	*Acer X freemanii*	Native	1	37	5.0	Medium	Fair	Development	Remove	Yes	
1	442	Norway Spruce	*Picea abies*	Non-Native	1	39	5.0	Low	Fair	Development	Remove	Yes	
1	443	Norway Spruce	*Picea abies*	Non-Native	1	35	4.0	Medium	Fair	Development	Remove	Yes	
1	444	Norway Spruce	*Picea abies*	Non-Native	1	43	5.0	Low	Fair	Development	Remove	Yes	
1	445	Norway Spruce	*Picea abies*	Non-Native	1	29	4.0	Low	Good	Development	Remove	Yes	
1	446	Norway Spruce	*Picea abies*	Non-Native	1	28	4.0	Low	Good	Development	Remove	Yes	
1	447	Eastern White Cedar	*Thuja occidentalis*	Native	1	15	1.0	Medium	Fair	Development	Remove	Yes	
1	448	Eastern White Cedar	*Thuja occidentalis*	Native	1	20	1.0	Medium	Fair	Development	Remove	Yes	
1	449	Eastern White Cedar	*Thuja occidentalis*	Native	1	23	1.0	Medium	Fair	Development	Remove	Yes	
1	450	Norway Maple	*Acer platanoides*	Non-Native	1	56	6.0	Medium	Fair	Development	Remove	Yes	
1	451	Eastern White Cedar	*Thuja occidentalis*	Native	1	11	1.0	Medium	Fair	Development	Remove	Yes	
1	452	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	47	5.0	Medium	Fair	Development	Remove	Yes	
1	453	White Birch	*Betula papyrifera*	Native	2	25	4.0	Medium	Fair	Development	Remove	Yes	
1	454	White Birch	*Betula papyrifera*	Native	1	27	5.0	Medium	Fair	Development	Remove	Yes	
1	455	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	38	5.0	Medium	Fair	Development	Remove	Yes	
1	456	Black Walnut	*Juglans nigra*	Native	1	11	3.0	Low	Fair	Development	Remove	Yes	
1	502	Norway Spruce	*Picea abies*	Non-Native	1		4.0	Low	Fair	Development	Remove	Yes	Pruned lower branches.
1	503	Norway Spruce	*Picea abies*	Non-Native	1		4.0	Low	Fair	Development	Remove	Yes	Pruned lower branches.
1	504	Norway Spruce	*Picea abies*	Non-Native	1		4.0	Low	Fair	Development	Remove	Yes	Pruned lower branches.
1	506	Norway Spruce	*Picea abies*	Non-Native	1		4.0	Low	Fair	Development	Remove	Yes	Pruned lower branches.
1	507	Norway Spruce	*Picea abies*	Non-Native	1		4.0	Low	Fair	Development	Remove	Yes	Pruned lower branches.
1	508	Norway Spruce	*Picea abies*	Non-Native	1		4.0	Low	Fair	Development	Remove	Yes	Pruned lower branches.
1	509	Norway Spruce	*Picea abies*	Non-Native	1		4.0	Low	Fair	Development	Remove	Yes	Pruned lower branches.
1	510	Norway Spruce	*Picea abies*	Non-Native	1		4.0	Low	Fair	Development	Remove	Yes	Pruned lower branches.
1	511	Norway Spruce	*Picea abies*	Non-Native	1		4.0	Low	Fair	Development	Remove	Yes	Pruned lower branches.
1	512	Norway Spruce	*Picea abies*	Non-Native	1		4.0	Low	Fair	Development	Remove	Yes	Pruned lower branches.
1	513	Norway Spruce	*Picea abies*	Non-Native	1		4.0	Low	Fair	Development	Remove	Yes	Pruned lower branches.
1	514	Norway Spruce	*Picea abies*	Non-Native	1		4.0	Low	Fair	Development	Remove	Yes	Pruned lower branches.
1	516	Norway Spruce	*Picea abies*	Non-Native	1		4.0	Low	Fair	Development	Remove	Yes	Pruned lower branches.
1	517	Norway Spruce	*Picea abies*	Non-Native	1		4.0	Low	Fair	Development	Remove	Yes	Pruned lower branches.
1	518	Norway Spruce	*Picea abies*	Non-Native	1		4.0	Low	Fair	Development	Remove	Yes	Pruned lower branches.
1	519	Norway Spruce	*Picea abies*	Non-Native	1		4.0	Low	Fair	Development	Remove	Yes	Pruned lower branches.
1	522	Trembling Aspen	*Populus tremuloides*	Native	1		4.0	Low	Fair	Development	Remove	Yes	
1	551	Eastern White Cedar	*Thuja occidentalis*	Native	1	25	3.0	Low	Good	Development	Remove	Yes	Rear yard

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1	552	Trembling Aspen	*Populus tremuloides*	Native	1	23	4.5	Low	Good	Development	Remove	Yes	Rear yard
1	582	Black Walnut	*Juglans nigra*	Native	1	13	3.0	Low	Fair	Development	Remove	Yes	Suppressed; small dead branches.
1	583	Black Walnut	*Juglans nigra*	Native	1	13	3.0	Low	Fair	Development	Remove	Yes	Minor dieback.
1	584	Black Walnut	*Juglans nigra*	Native	1	13	2.5	Low	Fair	Development	Remove	Yes	Dead branches; vines.
1	585	Eastern White Cedar	*Thuja occidentalis*	Native	1	12	2.0	Low	Fair	Development	Remove	Yes	Small crown.
1	586	White Spruce	*Picea glauca*	Native	1	16	3.0	Low	Fair	Development	Remove	Yes	Small crown.
1	587	White Spruce	*Picea glauca*	Native	1	15	3.0	Low	Fair	Development	Remove	Yes	Small crown.
1	588	White Spruce	*Picea glauca*	Native	1	13	3.0	Low	Fair	Development	Remove	Yes	Small crown.
1	589	Black Walnut	*Juglans nigra*	Native	1	11	2.0	Low	Fair	Development	Remove	Yes	Minor dieback.
1	590	White Spruce	*Picea glauca*	Native	1	13	3.0	Low	Fair	Development	Remove	Yes	Small crown; dieback.
1	591	White Spruce	*Picea glauca*	Native	1	20	3.0	Low	Fair	Development	Remove	Yes	Small crown; minor dieback.
1	592	Black Walnut	*Juglans nigra*	Native	2	15.1+10.6	3.5	Low	Fair	Development	Remove	Yes	Codominant stems; cankers.
1	593	Black Walnut	*Juglans nigra*	Native	1	13	3.5	Low	Fair	Development	Remove	Yes	Codominant stems; cankers.
1	594	Scots Pine	*Pinus sylvestris*	Non-Native	1	11	1.0	Medium	Fair	Development	Retain	No	Thinning, dieback.
1	595	Black Walnut	*Juglans nigra*	Native	1	11	2.0	Low	Good	Development	Remove	Yes	
1	596	Weeping Birch	*Betula pendula*	Non-Native	1	10	2.0	Low	Good	Development	Remove	Yes	
1	597	Scots Pine	*Pinus sylvestris*	Non-Native	1	14	2.5	Low	Fair	Development	Remove	Yes	Minor dieback.
1	599	Black Walnut	*Juglans nigra*	Native	1	18	3.0	Low	Good	Development	Remove	Yes	Minor dieback.
1	600	Black Walnut	*Juglans nigra*	Native	1	11	2.0	Low	Good	Development	Remove	Yes	Minor dieback.
1	601	Scots Pine	*Pinus sylvestris*	Non-Native	1	12	2.0	Low	Fair	Development	Remove	Yes	Minor dieback.
1	602	Scots Pine	*Pinus sylvestris*	Non-Native	1	13	2.0	Low	Fair	Development	Remove	Yes	Minor dieback.
1	603	Scots Pine	*Pinus sylvestris*	Non-Native	1	14	2.5	Low	Fair	Development	Remove	Yes	Minor dieback.
1	613	Black Walnut	*Juglans nigra*	Native	1	16	3.0	Low	Fair	Development	Remove	Yes	Cankers; small dead branches.
1	617	Scots Pine	*Pinus sylvestris*	Non-Native	1	11	2.5	Low	Good	Development	Retain	No	
1	619	Elm Species	*Ulmus sp.*	Native	1	10	2.0	Low	Good	Development	Retain	No	
1	620	Black Walnut	*Juglans nigra*	Native	1	10	3.0	Low	Good	Development	Retain	No	
1	622	Eastern White Cedar	*Thuja occidentalis*	Native	1	10	2.0	Low	Good	Development	Retain	No	
1	624	Eastern White Cedar	*Thuja occidentalis*	Native	1	10	2.0	Low	Good	Development	Retain	No	
1	686	Eastern White Cedar	*Thuja occidentalis*	Native	1	14	3.0	Improbable	Fair	Off-Property	Retain	No	Asymmetrical crown to southwest.
1	687	Black Walnut	*Juglans nigra*	Native	1	17	3.5	Improbable	Fair	Trail	Retain	No	Canker.
1	688	Black Cherry	*Prunus serotina*	Native	1	13	3.0	Probable	Very Poor	Trail	Remove	No	One dead codominant leader; fruiting bodies on live trunk; minor broken branches.
1	689	Eastern White Cedar	*Thuja occidentalis*	Native	2	28.5+11.9	3.5	Improbable	Fair	Trail	Retain	No	Suppressed on northeast.
1	690	Black Walnut	*Juglans nigra*	Native	1	27	4.0	Improbable	Good	Trail	Retain	No	Good form.
1	691	Black Walnut	*Juglans nigra*	Native	1	24	4.0	Improbable	Fair	Trail	Remove	Yes	Wound at base.
1	692	Eastern White Cedar	*Thuja occidentalis*	Native	1	27	4.0	Improbable	Fair	Trail	Retain	No	Split leader; healthy remaining crown.
1	693	Black Walnut	*Juglans nigra*	Native	1	12	2.5	Improbable	Good	Trail	Retain	No	No notable defects.
1	694	Black Cherry	*Prunus serotina*	Native	1	19	2.0	Probable	Dead	Trail	Remove	No	Tall snag.
1	695	Black Cherry	*Prunus serotina*	Native	1	10	3.0	Improbable	Fair	Trail	Retain	No	Heavy lean over proposed trail.
1	696	Eastern White Cedar	*Thuja occidentalis*	Native	1	20	3.0	Improbable	Fair	Trail	Retain	No	Slightly suppressed.
1	697	Eastern White Cedar	*Thuja occidentalis*	Native	1	15	4.0	Improbable	Fair	Trail	Retain	No	Codominant leaders.
1	698	Eastern White Cedar	*Thuja occidentalis*	Native	1	13	2.5	Improbable	Good	Trail	Retain	No	Small crown.
1	699	Eastern White Cedar	*Thuja occidentalis*	Native	1	20	2.5	Improbable	Fair	Trail	Retain	No	Suppressed all around.
1	700	Black Cherry	*Prunus serotina*	Native	2	28.1+22.3	5.0	Improbable	Fair	Trail	Retain	No	Basal decay; dead lower branches.
1	712	Black Walnut	*Juglans nigra*	Native	1	14	4.0	Low	Good	Development	Remove	Yes	Healthy crown.

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1	713	Black Walnut	*Juglans nigra*	Native	1	13	3.5	Low	Good	Development	Retain	No	
1	714	Black Walnut	*Juglans nigra*	Native	1	12	2.5	Low	Good	Development	Retain	No	
1	715	Black Walnut	*Juglans nigra*	Native	1	12	2.0	Low	Good	Development	Retain	No	
1	775	Eastern White Cedar	*Thuja occidentalis*	Native	1	34	4.0	Improbable	Fair	Trail	Retain	No	Codominant leaders; slightly suppressed.
1	776	Eastern White Cedar	*Thuja occidentalis*	Native	1	23	2.5	Improbable	Fair	Trail	Retain	No	Suppressed on west, east.
1	777	Eastern White Cedar	*Thuja occidentalis*	Native	1	13	2.0	Improbable	Fair	Trail	Retain	No	Low live crown ratio.
1	778	Eastern White Cedar	*Thuja occidentalis*	Native	1	15	2.0	Improbable	Fair	Trail	Remove	Yes	Slightly suppressed all around.
1	779	Eastern White Cedar	*Thuja occidentalis*	Native	1	22	2.0	Improbable	Fair	Trail	Retain	No	Suppressed on north, east.
1	780	Eastern White Cedar	*Thuja occidentalis*	Native	1	23	2.0	Improbable	Fair	Trail	Retain	No	Suppressed on north, east, south.
1	781	Eastern White Cedar	*Thuja occidentalis*	Native	1	11	1.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	782	Eastern White Cedar	*Thuja occidentalis*	Native	1	21	2.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	783	Eastern White Cedar	*Thuja occidentalis*	Native	1	11	1.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	784	Eastern White Cedar	*Thuja occidentalis*	Native	1	25	2.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	785	Black Cherry	*Prunus serotina*	Native	1	10	2.0	Possible	Poor	Trail	Retain	No	Small unbalanced crown.
1	786	Eastern White Cedar	*Thuja occidentalis*	Native	1	11	1.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	787	Eastern White Cedar	*Thuja occidentalis*	Native	1	24	2.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	788	Eastern White Cedar	*Thuja occidentalis*	Native	1	19	2.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	789	Black Cherry	*Prunus serotina*	Native	1	21	5.0	Possible	Fair	Trail	Retain	No	Unbalanced; generally healthy.
1	790	Eastern White Cedar	*Thuja occidentalis*	Native	1	24	2.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	791	Eastern White Cedar	*Thuja occidentalis*	Native	1	17	1.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	793	Eastern White Cedar	*Thuja occidentalis*	Native	1	17	1.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	794	Eastern White Cedar	*Thuja occidentalis*	Native	3	21+18.7+13.6	2.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	795	Eastern White Cedar	*Thuja occidentalis*	Native	1	18	2.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	796	Eastern White Cedar	*Thuja occidentalis*	Native	1	17	1.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	797	Black Cherry	*Prunus serotina*	Native	1	35	6.0	Improbable	Fair	Trail	Remove	Yes	Large tall crown.
1	798	Eastern White Cedar	*Thuja occidentalis*	Native	1	11	1.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	799	Eastern White Cedar	*Thuja occidentalis*	Native	1	25	2.5	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	800	Black Walnut	*Juglans nigra*	Native	1	16	3.5	Improbable	Good	Trail	Retain	No	Good form.
1	813	American Basswood	*Tilia americana*	Native	6	45	5.5	Improbable	Fair	Trail	Retain	No	Codominant leaders; included bark.
1	816	American Basswood	*Tilia americana*	Native	3	36+24+15	5.5	Improbable	Fair	Trail	Retain	No	Codominant leaders; included bark.
1	817	American Basswood	*Tilia americana*	Native	1	25	4.0	Improbable	Fair	Trail	Retain	No	Minor dieback.

No. of Trees	Tree Number	Common Name	Scientific Name	Native/ Non-native	Stem Count	DBH (cm)	Crown Radius (m)	Potential for Structural Failure Rating	Overall Condition	Location	Proposed Action	Compensation Required	Comments
1	818	American Basswood	*Tilia americana*	Native	1	30	3.0	Improbable	Fair	Trail	Remove	Yes	Minor dieback.
1	819	American Basswood	*Tilia americana*	Native	1	18	3.0	Improbable	Fair	Trail	Remove	Yes	Bowed crown east.
1	820	American Basswood	*Tilia americana*	Native	1	14	5.5	Improbable	Fair	Trail	Remove	Yes	Small crown.
1	821	American Basswood	*Tilia americana*	Native	2	16+15	4.0	Improbable	Fair	Trail	Remove	Yes	Leaning east; twisted codominant leaders.
1	822	American Basswood	*Tilia americana*	Native	1	16	4.0	Improbable	Fair	Trail	Remove	Yes	Leaning east.
1	823	American Basswood	*Tilia americana*	Native	1	12	3.0	Improbable	Fair	Trail	Remove	Yes	Bowed crown east.
1	824	American Basswood	*Tilia americana*	Native	1	15	3.0	Improbable	Fair	Trail	Remove	Yes	
1	825	American Basswood	*Tilia americana*	Native	1	21	3.5	Improbable	Fair	Trail	Remove	Yes	Pistol butt.
1	827	Black Cherry	*Prunus serotina*	Native	1	28	4.0	Improbable	Fair	Trail	Remove	Yes	Vines in lower crown; minor dead branches.
1	828	Black Cherry	*Prunus serotina*	Native	2	22.6+18.8	4.5	Improbable	Fair	Trail	Retain	No	Large trunk wound; some deadwood.
1	829	Black Cherry	*Prunus serotina*	Native	1	34	6.0	Possible	Fair	Trail	Retain	No	Generally healthy with minor dead branches.
1	830	Eastern White Cedar	*Thuja occidentalis*	Native	1	22	2.0	Improbable	Good	Trail	Retain	No	Good form.
1	831	Eastern White Cedar	*Thuja occidentalis*	Native	1	21	3.0	Improbable	Fair	Trail	Retain	No	Vine present; partially suppressed on north side.
1	832	Eastern White Cedar	*Thuja occidentalis*	Native	1	20	2.5	Improbable	Fair	Trail	Remove	Yes	Suppressed on east and west.
1	833	Eastern White Cedar	*Thuja occidentalis*	Native	1	18	2.0	Improbable	Fair	Trail	Remove	Yes	Suppressed all around.
1	834	Eastern White Cedar	*Thuja occidentalis*	Native	1	14	3.0	Improbable	Fair	Trail	Retain	No	Suppressed on east, north, west.
1	835	Eastern White Cedar	*Thuja occidentalis*	Native	1	21	3.0	Improbable	Fair	Trail	Remove	Yes	Suppressed on east, north, south.
1	836	Eastern White Cedar	*Thuja occidentalis*	Native	1	14	2.5	Improbable	Fair	Trail	Remove	Yes	Suppressed on west, south.
1	837	Eastern White Cedar	*Thuja occidentalis*	Native	1	15	2.0	Improbable	Fair	Trail	Retain	No	Suppressed all around.
1	838	Eastern White Cedar	*Thuja occidentalis*	Native	1	20	2.5	Improbable	Fair	Trail	Retain	No	Suppressed south, east side.
1	839	Black Cherry	*Prunus serotina*	Native	1	22	3.0	Improbable	Fair	Trail	Remove	Yes	Dead lower branches.
1	840	Eastern White Cedar	*Thuja occidentalis*	Native	1	16	2.5	Improbable	Fair	Trail	Retain	No	Lightly suppressed on east, west.
1	841	American Basswood	*Tilia americana*	Native	1	32	5.0	Improbable	Fair	Trail	Remove	Yes	Minor dead branches.
1	842	American Basswood	*Tilia americana*	Native	1	24	4.5	Improbable	Fair	Trail	Remove	Yes	Minor dead branches.
1	843	American Basswood	*Tilia americana*	Native	1	18	3.0	Improbable	Fair	Trail	Remove	Yes	Tall crown; slightly unbalanced.
1	844	American Basswood	*Tilia americana*	Native	1	24	4.0	Improbable	Fair	Trail	Remove	Yes	Tall crown; slightly unbalanced.
1	845	American Basswood	*Tilia americana*	Native	3	36+25.5+14.5	6.0	Improbable	Fair	Trail	Retain	No	Codominant leaders; open crown.
1	846	Black Cherry	*Prunus serotina*	Native	1	37	5.0	Improbable	Fair	Trail	Remove	Yes	Minor dead branches.
1	847	American Basswood	*Tilia americana*	Native	2	33.6+22	5.0	Improbable	Fair	Trail	Remove	Yes	Minor dead branches.
1	848	White Birch	*Betula papyrifera*	Native	1	20	3.0	Improbable	Fair	Trail	Retain	No	Dead lower branches.

No. of Trees	Tree Number	Common Name	Scientific Name	Native/ Non-native	Stem Count	DBH (cm)	Crown Radius (m)	Potential for Structural Failure Rating	Overall Condition	Location	Proposed Action	Compensation Required	Comments
1	849	Eastern White Cedar	*Thuja occidentalis*	Native	1	17	2.5	Improbable	Fair	Trail	Remove	Yes	Lower trunk wound; minor dead branches.
1	850	Black Cherry	*Prunus serotina*	Native	1	31	4.0	Improbable	Fair	Trail	Retain	No	Lower trunk wound; dead lower branches.
1	851	White Ash	*Fraxinus americana*	Native	1	12	2.0	Improbable	Poor	Trail	Remove	No	EAB; watersprouts.
1	852	American Basswood	*Tilia americana*	Native	1	25	4.0	Improbable	Good	Trail	Remove	Yes	Good health.
1	853	American Basswood	*Tilia americana*	Native	1	32	4.5	Improbable	Good	Trail	Remove	Yes	Good health.
1	855	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	73	7.0	Improbable	Good	Trail	Retain	No	Minor deadwood.
1	856	American Basswood	*Tilia americana*	Native	1	35	8.5	Improbable	Good	Trail	Retain	No	Minor deadwood.
1	857	American Basswood	*Tilia americana*	Native	1	21	4.0	Improbable	Fair	Trail	Remove	Yes	Rubbing and intertwined with adjacent tree.
1	858	American Basswood	*Tilia americana*	Native	1	28	4.0	Improbable	Fair	Trail	Remove	Yes	Trunk wound; rubbing and intertwined with adjacent tree.
1	859	American Basswood	*Tilia americana*	Native	2	20+15.3	4.0	Improbable	Fair	Trail	Remove	Yes	Suppressed on south; rubbing leaders.
1	860	Hop Hornbeam	*Ostrya virginiana*	Native	1	12	3.5	Improbable	Fair	Trail	Retain	No	Dead lower branches; suppressed leader.
1	861	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	74	8.5	Improbable	Good	Trail	Retain	No	Minor deadwood.
1	865	American Basswood	*Tilia americana*	Native	1	46	3.5	Possible	Poor	Trail	Remove	No	One leader good; one dying leader with broken top.
1	866	American Basswood	*Tilia americana*	Native	1	26	3.5	Improbable	Good	Trail	Remove	Yes	Good form.
1	867	American Basswood	*Tilia americana*	Native	2	16.6+10.6	3.0	Improbable	Fair	Trail	Remove	Yes	1 crooked leader from old failure.
1	868	American Basswood	*Tilia americana*	Native	1	24	3.0	Improbable	Fair	Trail	Remove	Yes	Codominant leader pruned at base.
1	869	American Basswood	*Tilia americana*	Native	2	24.7+19.3	5.0	Improbable	Fair	Trail	Remove	Yes	Codominant leaders; leader leaning northward.
1	870	American Basswood	*Tilia americana*	Native	2	31.1+28.5	5.0	Improbable	Fair	Trail	Remove	Yes	Codominant leaders; included bark.
1	871	Eastern White Cedar	*Thuja occidentalis*	Native	1	16	2.0	Improbable	Fair	Trail	Remove	Yes	Slightly suppressed on north.
1	872	Eastern White Cedar	*Thuja occidentalis*	Native	1	17	2.0	Improbable	Fair	Trail	Remove	Yes	Slightly suppressed on south, east.
1	875	Sugar Maple	*Acer saccharum ssp. saccharum*	Native	1	60	6.0	Improbable	Good	Trail	Retain	No	Minor dead branches.
1	876	Eastern White Cedar	*Thuja occidentalis*	Native	1	22	2.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	877	Eastern White Cedar	*Thuja occidentalis*	Native	1	17	2.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	886	White Ash	*Fraxinus americana*	Native	1	35	5.0	Possible	Poor	Trail	Retain	No	Dieback; vines; in decine.
1	901	White Spruce	*Picea glauca*	Native	1	12	2.0	Low	Good	Development	Remove	Yes	Debris around base.
1	917	Hawthorn species	*Crataegus sp.*	Native	1	14	3.5	Improbable	Fair	Trail	Remove	Yes	Minor dead branches.
1	918	Black Cherry	*Prunus serotina*	Native	6	18+17+16	4.0	Improbable	Fair	Trail	Retain	No	Low vigor; extensive vines.
1	919	Hawthorn species	*Crataegus sp.*	Native	1	13	2.5	Improbable	Fair	Trail	Remove	Yes	Minor dead branches.
1	935	Norway Spruce	*Picea abies*	Non-Native	1	44	6.0	Improbable	Fair	Trail	Remove	Yes	Open wound with galleries; codominant leaders.
1	943	Norway Spruce	*Picea abies*	Non-Native	1	16	2.5	Medium	Fair	Development	Retain	No	Lopsided, minor dieback.
1	944	Norway Spruce	*Picea abies*	Non-Native	1	15	2.0	Low	Fair	Development	Retain	No	Vines, minor dieback.
1	945	Norway Spruce	*Picea abies*	Non-Native	1	14	2.0	Low	Fair	Development	Retain	No	Vines, minor dieback.
1	989	Scots Pine	*Pinus sylvestris*	Non-Native	1	15	2.0	Low	Good	Development	Retain	No	Small closed wound.

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1	990	Scots Pine	*Pinus sylvestris*	Non-Native	1	13	2.0	Low	Good	Development	Retain	No	Curled twigs.
1	1001	White Ash	*Fraxinus americana*	Native	1	13	2.5	Improbable	Poor	Trail	Retain	No	EAB; vines; dieback.
1	1002	Eastern White Cedar	*Thuja occidentalis*	Native	1	14	2.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1003	Eastern White Cedar	*Thuja occidentalis*	Native	1	24	2.5	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1004	Eastern White Cedar	*Thuja occidentalis*	Native	1	17	2.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1005	Eastern White Cedar	*Thuja occidentalis*	Native	1	18	2.0	Improbable	Poor	Trail	Retain	No	Broken top; suppressed crown; dead lower branches.
1	1006	Eastern White Cedar	*Thuja occidentalis*	Native	1	11	2.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1007	Eastern White Cedar	*Thuja occidentalis*	Native	1	21	3.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1008	Eastern White Cedar	*Thuja occidentalis*	Native	1	12	2.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1009	Eastern White Cedar	*Thuja occidentalis*	Native	1	17	2.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1010	Eastern White Cedar	*Thuja occidentalis*	Native	1	24	3.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1011	Eastern White Cedar	*Thuja occidentalis*	Native	1	16	3.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1012	Eastern White Cedar	*Thuja occidentalis*	Native	1	20	4.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1013	Black Cherry	*Prunus serotina*	Native	1	12	3.0	Improbable	Fair	Trail	Retain	No	Minor dieback; small crown.
1	1014	Eastern White Cedar	*Thuja occidentalis*	Native	1	17	2.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1015	Eastern White Cedar	*Thuja occidentalis*	Native	1	19	2.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1016	Eastern White Cedar	*Thuja occidentalis*	Native	1	15	2.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1017	Black Cherry	*Prunus serotina*	Native	1	14	3.5	Improbable	Fair	Trail	Remove	Yes	Minor dieback.
1	1018	Eastern White Cedar	*Thuja occidentalis*	Native	2	21+12	3.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1019	Eastern White Cedar	*Thuja occidentalis*	Native	1	25	4.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1020	Eastern White Cedar	*Thuja occidentalis*	Native	1	32	4.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1021	Black Cherry	*Prunus serotina*	Native	1	36	7.0	Improbable	Fair	Trail	Remove	Yes	Minor dead branches; large crown.
1	1022	Eastern White Cedar	*Thuja occidentalis*	Native	1	12	3.5	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1023	Eastern White Cedar	*Thuja occidentalis*	Native	1	21	2.5	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1024	Eastern White Cedar	*Thuja occidentalis*	Native	2	16.2+13	3.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1025	Eastern White Cedar	*Thuja occidentalis*	Native	1	20	2.5	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1026	Eastern White Cedar	*Thuja occidentalis*	Native	1	19	2.5	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1027	Black Cherry	*Prunus serotina*	Native	2	23.8+20	5.5	Improbable	Fair	Trail	Retain	No	Minor dead branches; minor vines.
1	1028	Eastern White Cedar	*Thuja occidentalis*	Native	1	14	2.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1029	Eastern White Cedar	*Thuja occidentalis*	Native	1	11	2.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1030	Trembling Aspen	*Populus tremuloides*	Native	1	29	5.0	Improbable	Fair	Trail	Remove	Yes	Tall crown.

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1	1032	Eastern White Cedar	*Thuja occidentalis*	Native	1	18	1.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1033	Eastern White Cedar	*Thuja occidentalis*	Native	1	11	1.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1034	Black Cherry	*Prunus serotina*	Native	1	23	5.0	Improbable	Fair	Trail	Retain	No	Tall crown; minor dieback.
1	1035	Eastern White Cedar	*Thuja occidentalis*	Native	4	34.5+27.6+23.0	3.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1036	Black Cherry	*Prunus serotina*	Native	1	30	6.0	Improbable	Fair	Trail	Retain	No	Tall crown; minor dieback.
1	1037	Eastern White Cedar	*Thuja occidentalis*	Native	1	20	1.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1038	Eastern White Cedar	*Thuja occidentalis*	Native	1	18	2.5	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1039	Eastern White Cedar	*Thuja occidentalis*	Native	1	14	2.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1040	Eastern White Cedar	*Thuja occidentalis*	Native	1	20	2.5	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1041	Eastern White Cedar	*Thuja occidentalis*	Native	1	26	3.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1042	Eastern White Cedar	*Thuja occidentalis*	Native	1	12	2.5	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1043	Eastern White Cedar	*Thuja occidentalis*	Native	1	18	2.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1044	Eastern White Cedar	*Thuja occidentalis*	Native	1	25	3.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1045	Eastern White Cedar	*Thuja occidentalis*	Native	1	13	2.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1046	Eastern White Cedar	*Thuja occidentalis*	Native	1	22	2.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1047	Eastern White Cedar	*Thuja occidentalis*	Native	2	24.7+13	3.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1048	Eastern White Cedar	*Thuja occidentalis*	Native	1	13	2.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1049	Eastern White Cedar	*Thuja occidentalis*	Native	1	14	2.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1050	Eastern White Cedar	*Thuja occidentalis*	Native	1	19	1.5	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1051	Eastern White Cedar	*Thuja occidentalis*	Native	1	12	1.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1052	Eastern White Cedar	*Thuja occidentalis*	Native	1	15	1.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1054	Eastern White Cedar	*Thuja occidentalis*	Native	1	10	1.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1055	Eastern White Cedar	*Thuja occidentalis*	Native	1	11	1.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1056	Eastern White Cedar	*Thuja occidentalis*	Native	2	51+34.8	3.0	Improbable	Fair	Trail	Retain	No	Low trunk cavity; suppressed crown; dead lower branches.
1	1057	Eastern White Cedar	*Thuja occidentalis*	Native	1	19	1.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1058	Eastern White Cedar	*Thuja occidentalis*	Native	4	19+17.0+14.1+11.3	2.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1059	Eastern White Cedar	*Thuja occidentalis*	Native	2	14.8+14.5	1.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1060	Eastern White Cedar	*Thuja occidentalis*	Native	1	10	1.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.

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1	1062	Eastern White Cedar	*Thuja occidentalis*	Native	1	22	3.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1063	Eastern White Cedar	*Thuja occidentalis*	Native	1	16	3.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1064	Eastern White Cedar	*Thuja occidentalis*	Native	1	14	3.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1065	Black Cherry	*Prunus serotina*	Native	2	24	5.0	Possible	Fair	Trail	Retain	No	Broken branches; extensive vines; codominant leaders.
1	1066	Eastern White Cedar	*Thuja occidentalis*	Native	1	18	3.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1067	Black Cherry	*Prunus serotina*	Native	2	14.5+13.3	4.0	Improbable	Fair	Trail	Remove	Yes	Codominant and unbalanced.
1	1068	Eastern White Cedar	*Thuja occidentalis*	Native	1	27	2.5	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1069	Common Apple	*Malus domestica*	Non-Native	1	21	6.0	Possible	Poor	Trail	Remove	No	Major dieback.
1	1071	Eastern White Cedar	*Thuja occidentalis*	Native	1	21	1.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1072	Eastern White Cedar	*Thuja occidentalis*	Native	1	11	1.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1073	Eastern White Cedar	*Thuja occidentalis*	Native	1	21	1.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1074	Eastern White Cedar	*Thuja occidentalis*	Native	1	18	1.5	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1075	Eastern White Cedar	*Thuja occidentalis*	Native	1	18	2.0	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1076	Eastern White Cedar	*Thuja occidentalis*	Native	1	19	1.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1077	Eastern White Cedar	*Thuja occidentalis*	Native	1	15	1.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1078	Eastern White Cedar	*Thuja occidentalis*	Native	1	17	1.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1079	Eastern White Cedar	*Thuja occidentalis*	Native	1	23	1.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1080	Eastern White Cedar	*Thuja occidentalis*	Native	1	11	1.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1081	Eastern White Cedar	*Thuja occidentalis*	Native	1	24	3.5	Improbable	Fair	Trail	Retain	No	Suppressed crown; dead lower branches.
1	1082	Eastern White Cedar	*Thuja occidentalis*	Native	1	16	3.0	Improbable	Fair	Trail	Remove	Yes	Suppressed crown; dead lower branches.
1	1146	Scots Pine	*Pinus sylvestris*	Non-Native	1	16	2.0	Medium	Fair	Development	Retain	No	Thinning, curled twigs.
1	1395	Manitoba Maple	*Acer negundo*	Native	1	70	5.0	Medium	Poor	Development	Remove	No	30% dieback evenly spread throughout crown.
1	1396	Black Walnut	*Juglans nigra*	Native	1	13	3.0	Low	Good	Development	Remove	Yes	Large open crown.
1	1397	Black Walnut	*Juglans nigra*	Native	1	21	4.0	Low	Good	Development	Remove	Yes	Asymmetrical crown south.
1	1398	Trembling Aspen	*Populus tremuloides*	Native	1	13	2.5	Low	Fair	Development	Remove	Yes	Dead lower levels.
1	1399	Trembling Aspen	*Populus tremuloides*	Native	1	10	2.5	Low	Good	Development	Remove	Yes	Small crown.
1	1400	Trembling Aspen	*Populus tremuloides*	Native	1	10	2.0	Low	Fair	Development	Remove	Yes	Dead lower branches.
1	1401	Eastern White Cedar	*Thuja occidentalis*	Native	1	19	3.0	Low	Good	Development	Retain	No	Minor thinning.
1	1402	Scots Pine	*Pinus sylvestris*	Non-Native	1	15	2.0	Medium	Fair	Development	Retain	No	Reduced crown, thinning.
1	1416	White Ash	*Fraxinus americana*	Native	1	20	2.5	High	Poor	Trail	Retain	No	Leaning, dead branches, vines.
1	1417	Black Walnut	*Juglans nigra*	Native	1	20	4.0	Medium	Fair	Trail	Retain	No	Codominant stems with included bark, old wounds, broken branches.
1	1418	Black Walnut	*Juglans nigra*	Native	1	19	3.0	Medium	Fair	Trail	Retain	No	Lopsided, reduced crown.
1	1419	Black Walnut	*Juglans nigra*	Native	1	23	4.0	High	Poor	Trail	Retain	No	History of branch failure, unbalanced crown.
1	1420	Black Walnut	*Juglans nigra*	Native	1	31	5.0	Medium	Fair	Trail	Retain	No	Codominant stems with included bark, poor branch union.

No. of Trees	Tree Number	Common Name	Scientific Name	Native/ Non-native	Stem Count	DBH (cm)	Crown Radius (m)	Potential for Structural Failure Rating	Overall Condition	Location	Proposed Action	Compensation Required	Comments
1	1442	Black Walnut	*Juglans nigra*	Native	1	33	5.0	Medium	Poor	Development	Retain	No	Codominant stems with included bark, woopecker damage, dead branches.
1	1443	Black Walnut	*Juglans nigra*	Native	1	36	5.0	Medium	Poor	Development	Retain	No	Codominant stems with included bark, woopecker damage, dead branches, previously pruned.
1	1444	Black Walnut	*Juglans nigra*	Native	1	35	5.0	Medium	Poor	Development	Retain	No	Codominant stems with included bark, woopecker damage, dead branches, previously pruned.
1	1455	Norway Spruce	*Picea abies*	Non-Native	1	36	1.0	Medium	Fair	Development	Retain	No	Lopsided, self pruned branches.
1	1480	Norway Spruce	*Picea abies*	Non-Native	1	17		High	Dead	Development	Retain	No	
1	1481	Norway Spruce	*Picea abies*	Non-Native	1	21		High	Dead	Development	Retain	No	
1	1482	Norway Spruce	*Picea abies*	Non-Native	1	19	0.5	High	Very Poor	Development	Retain	No	Dying, significant dieback, very small crown.
1	1552	Scots Pine	*Pinus sylvestris*	Non-Native	1	13		High	Dead	Development	Retain	No	
1	1553	Scots Pine	*Pinus sylvestris*	Non-Native	1	12	1.0	Medium	Fair	Development	Retain	No	Thinning, dieback.
1	1555	Eastern White Cedar	*Thuja occidentalis*	Native	1	11	1.5	Low	Fair	Development	Retain	No	Thinning, vines.
1	1579	Scots Pine	*Pinus sylvestris*	Non-Native	1	11	1.0	High	Poor	Development	Retain	No	Dieback, topped, codominant leaders.
1	1583	Scots Pine	*Pinus sylvestris*	Non-Native	1	13	1.0	Medium	Fair	Development	Retain	No	Thinning, reduced crown.
1	1584	Scots Pine	*Pinus sylvestris*	Non-Native	1	12	1.0	Medium	Fair	Development	Retain	No	Thinning, reduced crown.

Appendix II

Tree Health and Potential for Structural Failure Assessment Criteria

Tree Health Assessment Criteria

Assessment Criteria	Definition[1]
Excellent	Represents a tree in near perfect form, health, and vigour. This tree would exhibit no deadwood, no decline, and no visible defects.
Good	Represents a tree ranging from a generally healthy tree to a near perfect tree in terms of health, vigour and structure. This tree exhibits a complete, balanced crown structure with little to no deadwood and minimal defects as well as a properly formed root flare.
Fair	Represents a tree with minor health, balance or structural issues with minimal to moderate deadwood. Branching structure shows signs of included bark or minor rot within the branch connections or trunk wood. The root flare shows minimal signs of mechanical injury, decay, poor callusing, or girdling roots. Trees in the category require minor remedial actions to improve the vigour and structure of the tree.
Poor	Represents a tree that exhibits a poor vigour, reduced crown size (<30% of crown typical of species caused by overcrowding or decline), extreme crown imbalance, or extensive rot in the branching and trunk wood. Fungus could be seen from these rotting areas, suggesting further decay. These trees have extensive crown die back with a large amount of deadwood, and possibly dead sections. These weakened areas can lead to a potential failure of tree sections. Rooting zones show signs of extensive root decay or damage (fruiting bodies or mechanical damage) or girdling roots. Trees in this category require more extensive actions to prevent failure. A tree identified as poor would be a candidate for removal in the near future.
Very Poor	Represents a tree that exhibits major health and structural defects. Quite often the defects or diseases affecting this tree will be fatal. Large quantities of fungus, large dead sections with possible cavities and bark falling off all are signs that a tree is in a major state of decline and would be identified as very poor. These trees have a probable or imminent potential for structural failure. These trees should be identified for removal.
Dead	Represents a tree that exhibits no sign of new growth, including buds, foliage, or shoot growth. These trees have a probable or imminent potential for structural failure. These trees should be identified for removal.

[1] (Dunster 2009)

Potential for Structural Failure Assessment Criteria

Assessment Criteria*	Definition[1]
Improbable	The tree or branch is not likely to fail during normal weather conditions and may not fail in many severe weather conditions within the specified time frame.
Possible	Failure could occur, but it is unlikely during normal weather conditions within the specified time frame.
Probable	Failure may be expected under normal weather conditions within the specified time frame.
Imminent	Failure has started or is most likely to occur in the near future, even if there is no significant wind or increased load. This is a rare occurrence for an assessor to encounter, and it may require immediate action to protect people from harm.
*A specified time frame of 1 year will be used when assessing potential for structural failure.	

[1] (Dunster et al. 2013)

Appendix III
Conditions of Assessment

Conditions of Tree Assessment

Limitations

This tree inventory and assessment is based on the circumstances and observations by Natural Resource Solutions Inc. (NRSI) as they existed at the time of the site inspection(s) of the Client's Property as described in this report (the "Property") and the trees situated thereon, and upon information provided by the Client to NRSI. The opinions in this assessment are given based on observations made and using generally accepted professional judgment, however, because trees are living organisms and subject to change, damage and disease, the results, observations, recommendations, and analysis as set out in this assessment are valid only at the date any such observations and analysis took place. No guarantee, warranty, representation or opinion is offered or made by NRSI as to the length of the validity of the results, observations, recommendations and analysis contained within this assessment. As a result, the Client shall not rely upon this assessment, save and except for representing the circumstances and observations at the date of site inspection(s), and the analysis and recommendations made in relation to the proposed undertaking. It is recommended that the inventoried trees discussed in this assessment should be re-assessed periodically, where required (i.e. after 2 years).

Further Services

Neither NRSI, nor any assessor employed or retained by NRSI (the "Assessor") for the purpose of preparing or assisting in the preparation of this assessment shall be required to provide any further consultation or services to the Client including, without limitation, acting as an expert witness or witness in any court in any jurisdiction unless the Client has first made specific arrangements with respect to such further services, including providing payment of the Assessor's regular hourly billing fees.

NRSI accepts no responsibility for the implementation of all or any part of this report, unless specifically requested to examine the implementation of such activities recommended herein. Any request for the inspection or supervision of all or part of the implementation shall be made in writing and the details agreed to in writing by both parties.

Assumptions

The Client is hereby notified that where any of the information set out and referenced in this assessment are based on assumptions, facts or information provided to NRSI, NRSI will in no way be responsible for the veracity or accuracy of any such information. Further, the Client acknowledges and agrees that NRSI has, for the purposes of preparing their assessment, assumed that the Property is in full compliance with all applicable federal, provincial, municipal and local statutes, regulations, by-laws, guidelines and other related laws. NRSI explicitly denies any legal liability for any and all issues with respect to non-compliance with any of the above-referenced statutes, regulations, by-laws, guidelines and laws as it may pertain to or affect the Property.

Restriction of Assessment

The assessment carried out was restricted to the areas as described in this report. NRSI is not legally liable for any other trees except those expressly discussed herein. The conclusions of this assessment do not apply to any areas, trees, or any other property not covered or referenced in this assessment.

Professional Responsibility

In carrying out this assessment, NRSI and any Assessor appointed for and on behalf of NRSI to perform and carry out the assessment has exercised a reasonable standard of care, skill and diligence. The assessment has been made using accepted arboricultural techniques. These include a visual examination of each tree for structural defects, scars, external indications of decay such as fungal fruiting bodies, evidence of insect attack, discolored foliage (during the leaf-on period), the condition of any visible root structures, the degree and direction of lean (if any), the general condition of the tree(s) and the surrounding site, and the current or planned proximity of property and people. Except where specifically noted in the assessment, none of the trees examined on the property were dissected, cored, probed, or climbed, and detailed root crown examinations involving excavation were not undertaken.

No guarantees are offered, or implied, that trees recommended for retention, or all parts of them, will remain standing. It is professionally impossible to predict with absolute certainty the behaviour of any single tree or group of trees, or all their component parts, in all given circumstances. Inevitably, a standing tree will always pose some risk. Most trees have the potential to fall, lean, or otherwise pose a danger to property and persons in the event of extreme weather conditions, and this risk can only be eliminated if the tree is removed.

Without limiting the foregoing, no liability is assumed by NRSI or its directors, officers, employers, contractors, agents or Assessors for:

a) any legal description provided with respect to the Property;
b) issues of title and/or ownership with respect to the Property;
c) the accuracy of the Property line locations or boundaries with respect to the Property; and
d) the accuracy of any other information provided to NRSI by the Client or third parties;
e) any consequential loss, injury or damages suffered by the Client or any third parties, including but not limited to replacement costs, loss of use, earnings and business interruption; and
f) the unauthorized distribution of the assessment.

Third Party Liability

This assessment was prepared by NRSI for the Client. The data collected reflect NRSI's best assessment of the inventoried trees situated on the Property with the information available at the time of observation. Data analysis and the assessment of potential impacts to inventoried trees is specific to the proposed undertaking as described in this report. NRSI accepts no responsibility for any damages or loss suffered by any third party or by the Client as a result of decisions made or actions based upon the use of this assessment for purposes unrelated to the proposed undertaking.

General

Any plans and/or illustrations in this assessment are included only to help the Client visualize the issues in this assessment and shall not be relied upon for any other purpose.

This report shall be considered as a whole, no sections are severable, and the assessment shall be considered incomplete if any pages are missing.

Appendix IV
Tree Data and Summary Tables

Tree Inventory Data Summarized by Species

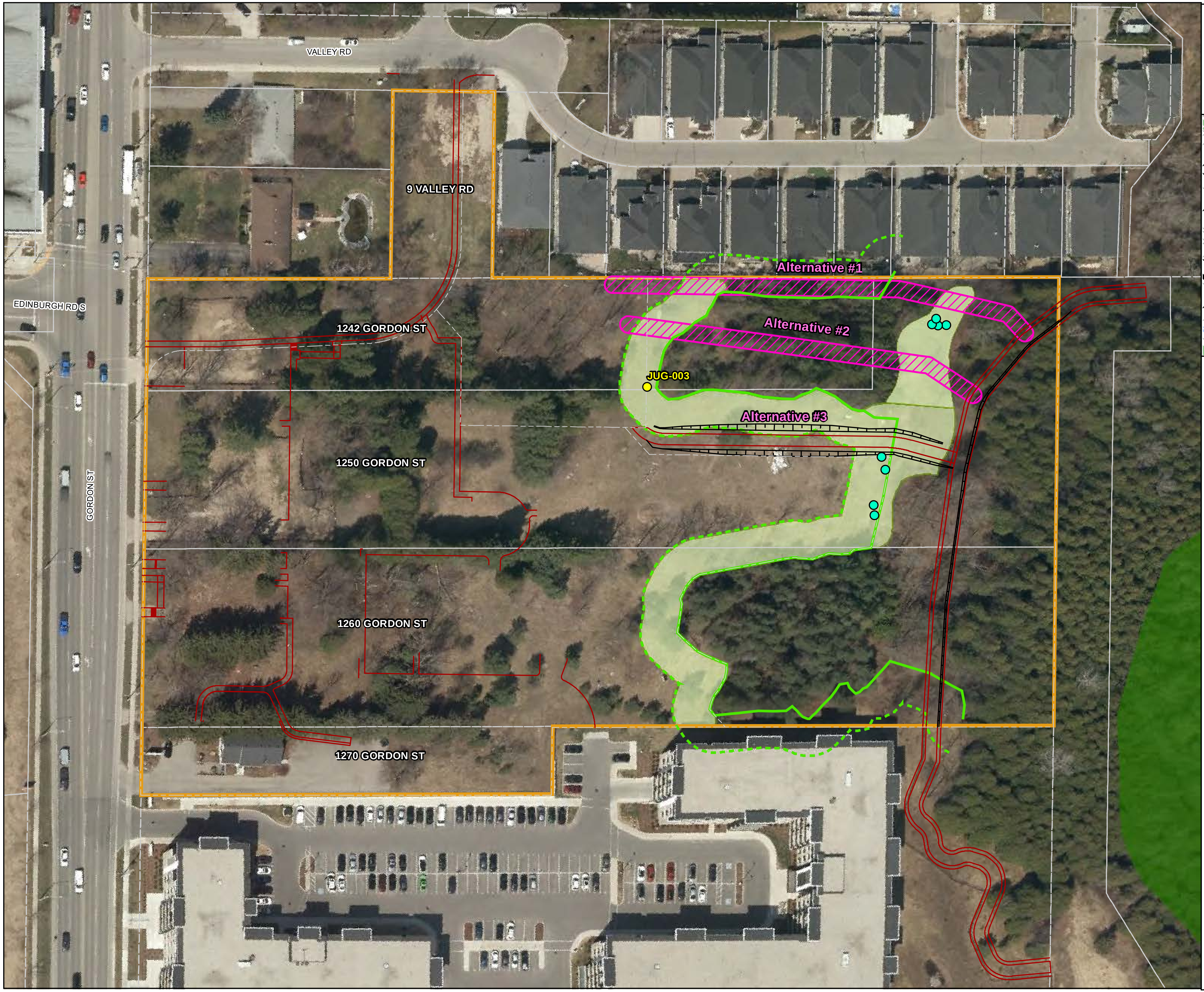
Common Name	Scientific Name	Excellent	Good	Fair	Poor	Very Poor	Dead	Total
Native Species								
American Basswood	*Tilia americana*		4	26	1			31
Balsam Fir	*Abies balsamea*		1					1
Black Cherry	*Prunus serotina*			20	2	2	2	26
Black Maple	*Acer saccharum ssp. nigrum*				5			5
Black Walnut	*Juglans nigra*		23	28	8		2	61
Butternut	*Juglans cinerea*			4				4
Eastern Cottonwood	*Populus deltoides*		3					3
Eastern Red Cedar	*Juniperus virginiana*			1				1
Eastern White Cedar	*Thuja occidentalis*		9	355	20		2	386
Elm Species	*Ulmus* sp.		1					1
Freeman's Maple	*Acer* X *freemanii*			14				14
Green Ash	*Fraxinus pennsylvanica*		2	1	1			4
Hawthorn Species	*Crataegus* sp.			2	2			4
Honey Locust	*Gleditsia triacanthos*			3				3
Hop Hornbeam	*Ostrya virginiana*			1				1
Manitoba Maple	*Acer negundo*			1	4			5
Red Maple	*Acer rubrum*						1	1
Red Oak	*Quercus rubra*		1	8		1		10
Silver Maple	*Acer saccharinum*			1				1
Sugar Maple	*Acer saccharum* ssp. *saccharum*		5	10	4			19
Tamarack	*Larix laricina*			1				1
Trembling Aspen	*Populus tremuloides*		2	4				6
White Ash	*Fraxinus americana*		1		4			5
White Birch	*Betula papyrifera*			4				4
White Elm	*Ulmus americana*		3	12	6	1	12	34
White Spruce	*Picea glauca*	1	2	7				10
Total		**1**	**57**	**503**	**57**	**4**	**19**	**641**
Non-Native Species								
Colorado Spruce	*Picea pungens*	1					1	2

Common Name	**Scientific Name**	**Excellent**	**Good**	**Fair**	**Poor**	**Very Poor**	**Dead**	**Total**
Common Apple	*Malus domestica*			1	7			8
Common Pear	*Pyrus communis*				3	1		4
Crack Willow	*Salix fragilis*				1			1
European Weeping Birch	*Betula pendula*			1				1
Fir species	*Abies* sp.			1				1
Horsechestnut	*Aesculus hippocastanum*		1					1
Linden	*Tilia* sp.			5				5
Norway Maple	*Acer platanoides*			9	2			11
Norway Spruce	*Picea abies*	4	71	62	9	1	4	151
Pine Species	*Picea* sp.			1				1
Scots Pine	*Pinus sylvestris*		15	18	3		2	38
Siberian Elm	*Ulmus pumila*			1				1
Weeping Birch	*Betula pendula*		1					1
Total		**5**	**88**	**99**	**25**	**2**	**7**	**226**
Overall Total		**6**	**145**	**602**	**82**	**6**	**26**	**867**

Summary of Health and Risk Assessment

Potential for Structural Failure Rating	**Overall Condition**						**Total**
	Excellent	Good	Fair	Poor	Very Poor	Dead	
Improbable		12	156	3			171
Low	6	131	255				392
Possible			3	4			7
Medium		2	187	18			207
Probable					1	6	7
High			1	57	5	20	83
Grand Total	**6**	**145**	**602**	**82**	**6**	**26**	**867**

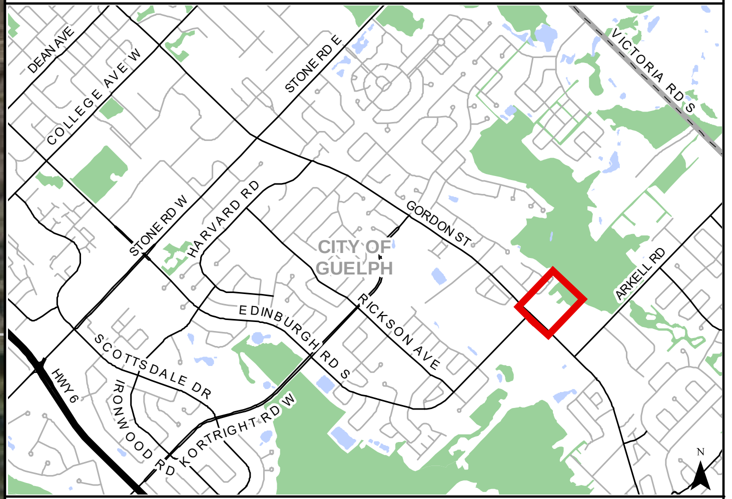
MAPS



Map 1

Tricar Gordon St, Guelph

Subject Property



Legend

- 🟧 Subject Property
- ⬚ Parcel Boundary
- — Proposed Trail Grading
- — Proposed Trail
- — Significant Woodland Boundary - City of Guelph (October 2014 and July 2017)
- - - Significant Woodland 10m Setback
- ▨ Trail Connection Alternative
- 🟩 Tree Compensation Planting Area (planted in 2020)
- 🟩 Provincially Significant Wetland (PSW)
- ● Category 2 Butternut
- ● Planted Butternut Compensation Tree (in vicinity of trail alignment)

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2347
Date: May 24, 2022

NAD83 - UTM Zone 17
Size: 11x17"
1:1,000

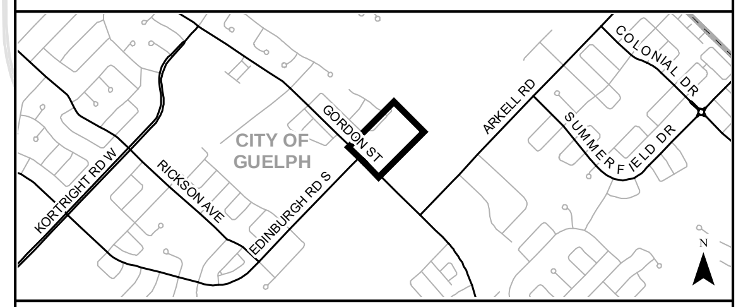
0 20 40 60 Metres

N

Map 2

1250 Gordon Street

Tree Inventory and Preservation Plan



Legend

- Subject Property
- Significant Woodland (To be Retained)
- Significant Woodland Boundary - City of Guelph (October 2014 and July 2017)
- Significant Woodland 10m Setback
- Proposed Grading
- Proposed Development
- Existing Conditions
- Tree Protection Fencing
- Tree Protection Fencing Signage
- Hedgerow to be Retained Where Feasible
- Hedgerow to be Removed

Trees Assessed for Proposed Development

- Inventoried Tree to be Retained (Crown to Scale)
- Retain & Prune
- Inventoried Tree to be Removed (Crown to Scale)

Trees Assessed for Trail Alignments

- Inventoried Tree to be Retained (Crown to Scale)
- Inventoried Tree to be Removed (Crown to Scale)

Natural Resource Solutions Inc.
Aquatic, Terrestrial and Wetland Biologists

Project: 2347 Date: May 24, 2022	NAD83 - UTM Zone 17 Size: 24x36" **1:350**

0 5 10 15 20 Meters

APPENDIX E
HYDROGEOLOGICAL ASSESSMENT

Hydrogeological Assessment

1242, 1250 and 1260 Gordon Street
and 9 Valley Road
City of Guelph, ON

FINAL REPORT
Version 3

June 17, 2022

Prepared for:

Tricar Developments Inc.
3800 Colonel Talbot Road
London, ON N6P 1H5

Prepared by:

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

First Submission: May 2020
Second Submission: August 2021
Third Submission: June 2022

File: 161413684

Sign-off Sheet

This document entitled Hydrogeological Assessment, 1242, 1250 and 1260 Gordon Street and 9 Valley Road, City of Guelph, ON was prepared by Stantec Consulting Ltd. (“Stantec”) for the account of Tricar Developments Inc. (the “Client”). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

PROFESSIONAL GEOSCIENTIST
LIMITED MEMBER
GRANT S. WHITEHEAD
1774
ONTARIO

Digitally signed by Grant Whitehead
Date: 2022.06.17 18:05:14 -04'00'

Prepared by ______________________________
(signature)

Grant Whitehead, MES, P.Geo. (Limited)
Senior Hydrogeologist

Reviewed by ______________________________
(signature)

Roger Freymond, P.Eng.
Senior Hydrogeologist

Table of Contents

LIST OF APPENDICES

APPENDIX A: FIGURES

APPENDIX B: TABLES

Abbreviations

AMSL	above mean sea level
ASTM	American Society for Testing and Materials
BGS	below ground surface
City	City of Guelph
EASR	Environmental Activity Sector Registry
GRCA	Grand River Conservation Area
GRIN	Grand River Information Network
GUDI	Groundwater Under the Direct Influence of Surface Water
DNAPL	dense non-aqueous phase liquid
GUDI	Groundwater Under the Direct Influence
HDPE	high-density polyethylene
HVA	Highly Vulnerable Aquifer
ID	inside diameter
IPZ	Intake Protection Zone
LID	Low Impact Development
Maxxam	Maxxam Analytics Inc.
MECP	Ontario Ministry of the Environment, Conservation and Parks
ODWQS	Ontario Drinking Water Quality Standards
ORP	oxidation reduction potential
PTTW	Permit to Take Water
PVC	polyvinyl chloride

Site	1242, 1250 & 1260 Gordon Street, within the City of Guelph, Ontario
SGRA	Significant Groundwater Recharge Area
Stantec	Stantec Consulting Ltd.
Tricar	Tricar Developments Inc.
WHPA	Well Head Protection Area

1.0 INTRODUCTION

Tricar Developments Inc. (Tricar) retained Stantec Consulting Limited (Stantec) to complete a hydrogeological investigation of the property located at 1242, 1250 & 1260 Gordon Street, within the City of Guelph, Ontario (Site) (Figure 1). The Site is approximately 3.1 hectares (ha) in size and is bounded to the northwest by existing residential subdivision, to the northeast by protected woodlot affiliated with the Torrance Creek Swamp, to the southeast by existing high-density development (i.e., Liberty Square apartment complex), and to the southwest by Gordon Street.

The purpose of the hydrogeological investigation is to support Zoning By-law and Official Plan Amendments and the Site Plan Application to permit the construction of the proposed residential development, which will consist of two 10-storey apartment buildings consisting of 325 units. The development will have a combination of surface parking and two levels of underground parking. The proposed underground parking footprint will cover an area of approximately 11,450 m^2, with the anticipated base of the underground parking garage being located at an elevation of 335.7 m AMSL.

As per input initially provided by the City of Guelph (City) (2018) (Appendix J) and comments provided by the City (2020) following the first submission of this report (Appendix J), this hydrogeological assessment consists of meeting the following objectives:

- Characterize current geological and hydrogeological conditions at the Site, including a discussion of overburden and bedrock stratigraphy, hydrostratigraphic units, seasonal fluctuations in groundwater levels and hydraulic gradients, flow direction across the Site, soil infiltration potential, and groundwater quality conditions.
- Evaluate the hydraulic relationship between the groundwater system present beneath the Site and the adjacent Torrance Creek Swamp and assess whether the future development of the Site could potentially disrupt the hydrogeological form and/or function of this wetland.
- Evaluate pre-development infiltration volumes at the Site and assess the impact that proposed land use changes could potentially have on these volumes under the post-development condition, including an evaluation of potential measures that could be employed throughout the Site under the post-development condition to mitigate these impacts.
- Perform infiltration testing and groundwater mounding analysis to support stormwater infiltration strategies proposed for the Site under the post-development condition.
- Assess whether proposed buildings, site servicing and associated construction activities will intercept the groundwater table and if construction dewatering may be required and assess whether any measures are required to mitigate these potential disturbances to pre-development groundwater levels, flow patterns, and groundwater-surface water interactions.

- Evaluate whether proposed land use activities conform to Source Water Protection requirements as stipulated in the Clean Water Act, S.O. 2006, Chapter 22.

This report is arranged into ten sections, including this introduction (Section 1). Section 2 presents the physical setting of the Site at a regional scale. Section 3 outlines the methods utilized to evaluate the Site hydrogeological conditions. Section 4 presents the results of the Site investigation, with Section 5 presenting the water balance assessment. Section 6 presents the groundwater mounding assessment in support of the post-development stormwater infiltration strategy. Section 7 presents the groundwater dewatering assessment and Section 8 discusses the potential hydrogeological impacts of the project and recommended mitigation measures. Report conclusions and references are listed in Sections 9 and 10, respectively. All figures and tables referenced in this report are presented in Appendices A and B, respectively. Appendices C to J include Regional Groundwater Flow Mapping, Regional Groundwater Recharge Mapping, Borehole Logs, Laboratory Certificates of Analysis, Hydraulic Conductivity Analytical Solutions, Dewatering Calculations, Source Protection Plan - Threat Policy Applicability Mapping, and City of Guelph Correspondence, respectively.

2.0 PHYSICAL SETTING

2.1 PHYSIOGRAPHY AND TOPOGRAPHY

The Site is situated within the physiographic region referred to by Chapman and Putnam (1984) as the Guelph Drumlin Field. The Guelph Drumlin Field consists of a series of broad oval type hills with axes trending in a northwest to southeast direction (i.e., drumlins). As shown in Figure 2, most of the Site is situated upon a drumlin, which is further supported by the regional topographic setting (Figure 3). The drumlins and associated till plain of the physiographic region consist of stony, calcareous till derived from dolostone of the Goat Island and Gasport Formations (formerly referred to as the Amabel Formation) and consists of sand (50%; average content based on grain-size analysis completed on till samples), silt (35%) and clay (15%) (Chapman and Putnam, 1984). The drumlin groupings occur in swampy valleys that are flanked by terraced spillway channels of sand and gravel, which contain tributaries of the Grand River (e.g., Torrance Creek Swamp located northeast of the Site; Figure 2). Gravel ridges or eskers are also known to cut through the till plain in the same general direction as the drumlins.

Most of the Site lies within the Torrance Creek Subwatershed (Totten Sims Hubicki Associates *et al.*, 1998), with the southwestern portions of the property being located within the Upper Hanlon Creek Subwatershed (Golder, 2011; Gamsby & Mannerow, 1993). Both subwatersheds occur within the Grand River Watershed and are under the jurisdiction of the Grand River Conservation Authority (GRCA). The Torrance Creek Subwatershed is characterized by hummocky terrain associated with the drumlins and by the network of broad, relatively flat spillway channels that cut through the drumlin fields. As shown on Figure 3, topographic high points occur along the northwestern and southeastern boundaries within the central portion of the Site, with the topography generally sloping to the northeast towards Torrance Creek Swamp and the southwest towards Gordon Street. As shown on Figure 1, topographic contours throughout the Site range from highs of 344.5 m AMSL near Valley Road (northwest boundary) and 342.5 m AMSL near Borehole 4 (southeast boundary), to lows of 337 m AMSL near Gordon Street and 335 m AMSL along the northeast boundary of the Site near Torrance Creek Swamp.

As shown on Figure 15 and discussed in the Stantec (2021) *Functional Servicing Report*, the direction of surface water runoff occurring within the Site under existing conditions is split between two catchments. Catchment 101 directs surface water runoff westward to an existing storm sewer on Gordon Street, whereas surface water runoff occurring within Catchment 102 flows overland to the east and eventually discharges to Torrance Creek Swamp.

2.2 REGIONAL GEOLOGY AND HYDROSTRATIGRAPHY

Geological conditions within the region have been mapped and described by Matrix Solutions Inc. (2017), the Lake Erie Region Source Protection Committee (LERSPC, 2015a), Golder Associates Limited (2011), Totten Sims Hubicki Associates *et al.* (1998), Gamsby & Mannerow (1993), and Jagger Hims Limited (1998). Based on these previous studies, overburden and bedrock geology near the Site is summarized as follows, listed from ground surface downward:

Organic Deposits: Accumulations of peat and/or muck associated with wetland areas (Figure 4, Unit 20).

Glaciofluvial Deposits: Glaciofluvial outwash and glaciolacustrine deposits of sand and gravel with minor silt and clay associated with the spillway channels (Figure 4, Units 7a and 7b).

Ice-Contact Deposits: Predominantly sand and gravel containing lenses of silt and clay left behind by the melting of enclosed ice blocks (i.e., eskers, kames) (Figure 4, Unit 6).

Port Stanley Till: An occasionally stony, silty sand to sandy silt till, forming the till plain and drumlins that characterize the region (Figure 4, Unit 5b). Some of the drumlins, however, can consist of an older clayey silt till core that is subsequently covered by a veneer of Port Stanley Till (Karrow, 1968). In the areas south of the Speed River, the till plain is often covered by a layer of glaciofluvial and glaciolacustrine sediments (i.e., fine to silty sand, sandy silt, sand and gravel) deposited from melting glacier ice, with the till extending to the bedrock surface.

Bedrock: The Eramosa Formation (Reformatory Quarry Member), representing the uppermost bedrock unit beneath the Site is described as a light brown to cream coloured, pseudonodular, thickly bedded and coarsely crystalline dolostone, which may act as an aquitard (Brunton, 2008). As per Golder (2011), the bedrock surface near the Site appears to be located at an elevation of 320 m AMSL and will not be encountered with the proposed development.

2.3 REGIONAL HYDROGEOLOGY

Based on previous groundwater modeling work completed by Matrix Solutions Inc. (2017), the following aquifer and aquitard systems are identified as occurring throughout the region in which the Site resides:

Upper Sand and Gravel Aquifer: an unconfined aquifer system consisting predominantly of outwash sand and gravel deposits. This unit is reported to have a horizontal hydraulic conductivity ranging from 7.0 x 10^{-4} m/s to 6.0 x 10^{-6} m/s, with the vertical hydraulic conductivity being one tenth (0.1) to an order (1.0) of magnitude lower than the horizontal hydraulic conductivity (Golder, 2011). Soil permeability testing using a Guelph Permeameter indicates that the sandy soils of this unit have vertical hydraulic conductivities in the range of 10^{-5} m/s (Totten Sims Hubicki Associates *et al.*, 1998).

Lower Till Aquitard: dense sandy to silty glacial till (i.e., Port Stanley Till) that is occasionally interbedded with discontinuous lenses of coarse sand and gravel. This unit is reported to have a horizontal hydraulic conductivity ranging from 1.0 x 10^{-4} m/s to 2.0 x 10^{-9} m/s, with the vertical hydraulic conductivity being one half (0.5) to an order (1.0) of magnitude lower than the horizontal hydraulic conductivity (Golder, 2011).

Contact Zone Aquifer: coarse, unconsolidated granular deposits directly overlying, and hydraulically connected to, upper weathered / fractured bedrock. This unit typically forms a thin aquifer having an assumed thickness of four meters (two meters above and below bedrock surface) (Golder, 2011). This aquifer is reported to have a horizontal hydraulic conductivity ranging from 1.0 x 10^{-4} m/s to 1.0 x 10^{-5} m/s, with the vertical hydraulic conductivity being one half (0.5) to an order (1.0) of magnitude lower than the horizontal hydraulic conductivity (Golder, 2011).

Bedrock Aquifer: consisting of medium to thick bedded fossiliferous dolostone of the Guelph Formation. This unit is reported to have a horizontal hydraulic conductivity ranging from 8.0 x 10^{-3} m/s to 7.0 x 10^{-9} m/s, with the vertical hydraulic conductivity being one tenth (0.1) to an order (1.0) of magnitude lower than the horizontal hydraulic conductivity (Golder, 2011).

As presented in Figure 4.3 of Matrix Solutions Inc. (2017) (Appendix C), simulated groundwater table surface elevations produced via a calibrated steady-state groundwater flow model suggests that regional groundwater movement is to the northwest through the overburden aquifer located beneath the Site, eventually discharging to the Speed River. However, groundwater flow interpretations presented in Totten Sims Hubicki Associates *et al.* (1998) (Figure 4.4.7, Appendix C) suggest that at a local scale, groundwater movement through the shallow overburden near the Site is to the northeast and east, with these flows potentially being influenced by pumping from the Burke and/or Carter Municipal Production Wells.

Regionally, the lands containing the Site are characterized by groundwater recharge conditions. Mapping created using the Grand River Information Network (GRIN) (GRCA, 2019) indicates that downward vertical hydraulic gradients are present beneath the Site, with annual recharge rates across the property ranging from 100 to 200 mm/year (Appendix D).

2.4 SOURCE WATER PROTECTION

As established under the Ontario Clean Water Act, 2006, S.O., 2006, c. 22, source protection areas and associated land use restrictions exist for all municipal drinking water sources located throughout the Grand River Source Protection Area (i.e., defined by the boundaries of the Grand River Watershed). Within the Source Protection Area (SPA), the Ministry of the Environment, Conservation and Parks (MECP) has designated four types of vulnerable areas that apply to drinking water sources.

Wellhead Protection Areas (WHPA): an area delineated on the ground surface that represents the capture zone for the underlying aquifer in which a given municipal well draws its water. The zone represents the total amount of time it would take for groundwater to flow through the aquifer system and reach the intake of a given municipal well. The zones are defined as follows:

- WHPA-A: 100 m radius around the municipal well.
- WHPA-B: Horizontal time of travel to the municipal well is two years or less.
- WHPA-C: Horizontal time of travel to the municipal well is equal to or less than five years and greater than two years.

- WHPA-D: Horizontal time of travel to the municipal well is equal to or less than 25 years and greater than five years.
- WHPA-E: Area where groundwater is under the direct influence of surface water (GUDI), where horizontal time of travel to the municipal well is two hours or less from the surface water body to the well.

As shown on Figure 5, the Site is located within the WHPA for the Burke Municipal Production Well (Burke Well), with this production well located approximately 165 m to the southwest of the Site. Specifically, the Site is intercepted by Burke Well WHPA-B and -C, noting that the footprint for the proposed development is confined to the WHPA-C (i.e., representing an area where it takes greater than two years but less than five years for precipitation that has recharged the aquifer to flow through this aquifer to the production well intake). The WHPA-C has an assigned vulnerability score ranging from four (4) to six (6) (Figure 6). Development on municipal services in areas where vulnerability scores are in the 4 to 6 range represent a low threat to drinking water supplies.

The northeastern portion of the Site also lies within the WHPA-E (vulnerability score of 7.2, MECP, 2020; Figure 7) of the Burke Well, with this well being classified as Groundwater Under the Direct Influence (GUDI) of surface water (i.e., a surface water source has a direct connection to the groundwater system and is drawn into the production well during pumping). The extents of the WHPA-E are equivalent to the area of an Intake Protection Zone (IPZ); that is, a capture zone delineated for those drinking-water systems that obtain their potable water from surface water bodies. The WHPA-E is equivalent to an IPZ-3, which represents surface water bodies and adjacent lands (i.e., GRCA Regulation Limit or 120 m, whichever is greater) that may be impacted by extreme events such as storms (e.g., 100-year rainfall event) and subsequently, potentially contribute surface water to the municipal well. For the Burke Well, the IPZ-3 encompasses the nearby Torrance Creek Swamp.

Significant Groundwater Recharge Areas (SGRA): This is an area where it is desirable to regulate drinking water threats that may affect recharge of an aquifer. Recharge areas are classified as “significant” when they supply more water to an aquifer used as a drinking water source than the surrounding area. As shown in Figure 8, the SGRA represents an area where the rate of annual recharge to the underlying aquifer system is greater than the average annual rate of recharge within the Grand River SPA by a factor of 1.15 or more (i.e., at least 15% greater than the average recharge rate). Based on the modeling results presented in AquaResource (2009), the average annual rate of recharge within the Grand River SPA is calculated to be 176 mm/year; consequently, a SGRA threshold is defined as an area within the watershed where the annual recharge rate equals or is greater than 202 mm/year.
A similar SGRA threshold of 200 mm/year was calculated for those lands located within the City of Guelph and Township of Guelph/Eramosa as described in Matrix Solutions Inc. (2017). For the Site, the SGRA is assigned a vulnerability score of four (4), indicating that activities occurring in this area of the property that limit recharge to the underlying aquifer pose a moderate threat to groundwater quantities in the aquifer, which is or may be used as a source of drinking water.

Highly Vulnerable Aquifers (HVA): Defined as subsurface, geologic formations that are sources of drinking water, which could be easily affected by the release of pollutants on the ground surface. The

HVA is identified using variables that include depth to the aquifer, physical properties of the overlying soil and/or rock, and the aquifer composition. In general, an HVA will consist of granular aquifer materials (i.e., sands and gravels) that are exposed near the ground surface and where a relatively shallow groundwater table is present. As per the mapping provided by the MECP (2020), the Site does not occur in an area defined as HVA.

Intake Protection Zones (IPZ): A zone established around a drinking / surface water intake within which a spill or leak may get to the intake too quickly for the operators of the municipal water treatment plant to shut the intake down until the pollutant passes by. These zones also include land adjacent to streams and storm sewers where surface water runoff can quickly reach the intake. As discussed above, the northeastern portion of the Site is intercepted by an IPZ-3.

3.0 METHODOLOGY

The hydrogeological site investigation included the:

- drilling of boreholes
- installation of monitoring wells
- installation of drive-point piezometers
- monitoring of groundwater levels
- collection of groundwater samples for quality testing
- performing hydraulic response (hydraulic conductivity) testing
- completion of infiltration (soil permeability) testing.

The methodology for these tasks is described in Section 3.1 to 3.6 below.

3.1 BOREHOLE DRILLING AND MONITORING WELL INSTALLATIONS

Between July 9 and 30, 2018 boreholes were advanced at seven locations across the Site. Five of the locations involved the drilling of a borehole, which was then equipped with a single monitoring well (i.e., MW1-18 to MW3-18, MW6-18, MW7-18; Figure 1). The remaining two locations involved the installation of a multi-level monitoring well (i.e., MW4-18(S/D) and MW5-18(S/D); Figure 1) where two boreholes (one shallow and one deep) were drilled within meters of each other, with each of these boreholes then being equipped with a single monitoring well. Overall, the boreholes were strategically positioned throughout the Site to obtain a spatially representative understanding of soil conditions, groundwater depths and fluctuations, and to evaluate local patterns of groundwater flow.

In August 2021, boreholes were advanced at an additional four locations throughout the Site. The purpose of this drilling was to confirm soil conditions and groundwater depths and fluctuations beneath those areas of the Site considered for the construction of post-development infiltration facilities. Three of the locations involved the drilling of a borehole, which was then equipped with a single monitoring well (i.e., MW102-21 to MW104-21; Figure 1). The remaining location involved the installation of a multi-level monitoring well (i.e., MW101-21(S/D); Figure 1) where two boreholes (one shallow and one deep) were drilled within meters of each other, with each of these boreholes then being equipped with a single monitoring well.

Stantec on behalf of Tricar retained Aardvark Drilling Inc. to complete the borehole drilling and monitoring well installations. The boreholes were drilled using a CME track-mounted drilling rig equipped with a hollow stem auger drilling system (i.e., to permit the installation of monitoring wells). Soil samples were collected using split-spoon sampling techniques. Soil sampling occurred using a 0.6 m long stainlesssteel split spoon sampler at 0.75 m (2.5 feet) to 1.5 m (5 feet) intervals to the termination depth of the borehole. The completed depths of the boreholes ranged from 7.6 m to 15.8 m below ground surface (BGS). Stantec personnel directed the drilling and soil sampling operations and logged the borehole stratigraphy using the American Society for Testing and Materials (ASTM) guideline for the description and identification of soils (ASTM, 2009). The borehole logs contain descriptions (where relevant and possible) of soil type, texture, colour, structure, consistency, plasticity, moisture content, and other visual and olfactory observations. Copies of the borehole logs are provided in Appendix E.

The drilling contractor installed the monitoring wells adhering to the construction requirements as outlined under Ontario Regulation 903 (O. Reg. 903) (MOE, 1990). Installation details for each of the monitoring wells are summarized in Table 1. Each monitoring well is constructed of 50 mm inside diameter, Schedule 40 polyvinyl chloride (PVC) pipe, having a No. 10 slot screen (0.01-inch slot) measuring 3.0 m in length. Backfilling of the screened interval consisted of silica sand to a height of approximately 0.3 m above the top of screen, followed by granular bentonite to ground surface prevent a hydraulic connection from occurring between the screened formation and overlying soils. The completion of each monitoring well involved encasing the pipe stick-up within a lockable steel casing. Stantec Geomatics surveyed the ground surface and top-of-pipe elevations at each monitoring well location to a geodetic benchmark using the Can-Net GPS Survey system, having a spatial accuracy of ± 0.03 m and ± 0.02 m in the vertical and horizontal plane, respectively.

Following installation, Stantec personnel purged each monitoring well using dedicated 16 mm (2/3 inch) inside diameter high density polyethylene (HDPE) tubing connected to a D-25 Waterra™ foot valve. Using the dedicated tubing, Stantec personnel purged 10 standing column volumes from each well (where possible) to clear out any fine-grained sediments and, subsequently, establish a proper hydraulic connection with the native aquifer material.

3.2 DRIVE-POINT PIEZOMETER INSTALLATIONS

On April 10, 2019 Stantec personnel installed one multi-level drive-point piezometer, consisting of a shallow and a deep piezometer (i.e., DP1-19(S) and DP1-19(D)), within a section of the Torrance Creek Swamp located approximately 75 m to the northeast of the Site (Figure 1). The multi-level piezometer was installed to evaluate whether this wetland functions as a groundwater recharge feature (i.e., contributes water to subsurface), discharge feature (receives water from the subsurface), or a combination of both.

Each drive-point piezometer is constructed of a 0.42 m long steel screen (19 mm diameter) that is connected to 25 mm diameter steel riser pipes. Stantec personnel drove the drive-point piezometers into the substrate using a fence post driver, with shallow and deep pipes being constructed within one meter of each other and their screens being separated by a vertical distance of approximately 1.7 m. Construction details for the drive-point piezometers are summarized in Table 1.

3.3 GROUNDWATER LEVEL MONITORING

Groundwater levels were recorded at MW1-18 to MW7-18 and DP1-19(S/D) from July 2018 to June 2020 using a combination of automated and manual measurement methods. Data loggers (i.e., Solinst® Leveloggers®) were installed at all monitoring well and piezometer locations to allow automatic measurement of water levels. The Leveloggers were suspended into the water column at each monitoring well and drive-point piezometer and set to record water levels at 60-minute intervals. Leveloggers are not vented to the atmosphere and therefore record total pressure (where total pressure is the sum of the atmospheric pressure and the height of water column). To obtain an accurate measurement of the groundwater level at each well, the water level data obtained from the Leveloggers were corrected for atmospheric pressure using data obtained from a Solinst® Edge Barologger® (Barologger), which was suspended in the air column at monitoring well MW5-18(S).

In January 2022, the previously mentioned monitoring wells (i.e., MW1-18 to MW7-18) together with MW101-21(S/D) to MW104-21 were re-equipped with Leveloggers. These Leveloggers are currently recording groundwater level fluctuations in the monitoring wells; however, these data have not been downloaded by Stantec personnel to date and, subsequently, are not presented in this report.

Groundwater levels were manually measured several times from the onsite monitoring wells between July 2018 and June 2020, and between January 2022 and April 2022. The groundwater level measurements were recorded in metres to the nearest 0.01 m using a battery-operated water level indicator. Manual groundwater level measurements were used to verify data recorded by the Leveloggers. Manual water levels collected from the monitoring wells and drive-point piezometer are presented in Tables 2 and 3, respectively. Hydrographs presenting both the automatic and manually measured groundwater level data are provided in Figures 9 and 10.

3.4 GROUNDWATER SAMPLING AND TESTING

Groundwater quality samples were collected from MW2-18, MW4-18(S), MW6-18, and MW7-18 on September 11, 2018. The samples were collected to help evaluate pre-development groundwater quality conditions at the Site. Specifically, all samples were analyzed for general inorganic parameters and dissolved metals and compared against their corresponding Ontario Drinking Water Quality Standard (ODWQS) (MOE, 2006) concentrations, with MW2-18 results being compared against those parameters listed under the City of Guelph Sanitary and Storm Sewer By-law (1996)-15202.

Stantec personnel collected groundwater samples from the onsite monitoring wells using dedicated HDPE tubing connected to a foot valve. Prior to collecting the samples, wells were purged and field parameters including pH, temperature, electrical conductivity, oxidation reduction potential (ORP), and dissolved oxygen (DO) were monitored periodically during the purging process using a multi-parameter water quality meter and flow through cell. The meter was calibrated prior to use according to the manufacturer’s specifications with the appropriate calibration standards. Groundwater sampling occurred after these field parameter concentrations had stabilized, indicating that water being pumped from the monitoring wells was representative of groundwater flowing into the well from surrounding geological formations.

The groundwater sample collected from each monitoring well consisted of pouring water directly from the HDPE tubing into lab supplied sample bottles. Groundwater samples collected for metals analysis were field-filtered using disposable in-line 0.45 µm (micron) filters attached to the HDPE tubing. The groundwater samples were carefully packed into coolers with ice, which was added to maintain sample temperatures below 10ºC during transport to the analytical laboratory. Samples were delivered to Maxxam Analytics Inc. (Maxxam) for analysis. Chain of custody forms were completed and included with the samples.

The results of the groundwater quality testing are summarized in Tables 4 (Sewer By-law) and 5 (ODWQS) and illustrated in a piper diagram on Figure 11. A copy of the Laboratory Certificate of Analysis is presented in Appendix F.

3.5 HYDRAULIC RESPONSE TESTING

Stantec performed in-situ hydraulic response testing at each monitoring well between July 26 and 27, 2018 to estimate the horizontal hydraulic conductivity of the deposits beneath the Site. The testing consisted of creating an instantaneous change in the well water level by removing a known volume of water followed by recording the time taken for the water level to return to static conditions (i.e., a rising head or bail test). Data were analyzed using the Bouwer and Rice (1976) solution for a bail test in an unconfined aquifer as provided in the software package AQTESOLV ™ Pro Version 4.5 (Duffield, 2014). Testing provided an estimate of the horizontal hydraulic conductivity of the sediments within the screened interval for each monitoring well. Table 1 provides a summary of the calculated horizontal hydraulic conductivities, with the analytical solutions for the data being presented in Appendix G.

Since hydraulic conductivity in the horizontal direction is generally an order (potentially two orders for clay-based deposits) of magnitude higher than hydraulic conductivity in the vertical direction (Todd 1980; Freeze and Cherry 1979), the vertical hydraulic conductivities for overburden deposits surrounding the well screens were assumed to be one order of magnitude lower than in-situ measured horizontal hydraulic conductivities calculated at MW2-18 to MW7-18. Infiltration rates were calculated based on an established relationship between vertical hydraulic conductivity and infiltration rate presented in the Credit Valley Conservation and Toronto and Region Conservation Authority (CVC-TRCA, 2010) Low Impact Stormwater Management Planning and Design Guideline - Version 1.0. Table 6 provides a summary of estimated infiltration rates based on the results of the horizontal hydraulic conductivity testing.

3.6 INFILTRATION TESTING

As discussed in the Stantec (2022) *Functional Servicing Report*, the revised stormwater management strategy for the Site will include the construction of the East Infiltration Trench (i.e., clearstone infiltration gallery) immediately to the northeast of Building 2 (Figure 12). The South Infiltration Trench (i.e., StormTech® SC-310 units) will be constructed along the southwestern limits of the Site immediately to the south of Building 2 (Figure 12).

On June 10 and 11, 2021 D&J Lockhart Excavators Ltd. (Lockhart) excavated a series of test pits within locations of the Site where the previously mentioned post-development stormwater infiltration facilities are planned. The excavation of three test pits (TP1 to TP3) occurred near the southeastern limits of the Site where the South Infiltration Trench is proposed for construction, and two test pits (TP4 and TP5) within the central portion of the property at the future location of the East Infiltration Trench (Figure 12). Stantec notes that the locations of TP4 and TP5 occurred in the original footprint of the East Infiltration Trench (as presented in the Stantec (2020) *Hydrogeological Assessment* report); however, the extents of this facility have since been revised resulting in the test pits now being located from five to 22 m outside of the new footprint. However, given that the subsurface deposits characterizing the Site are relatively ubiquitous (i.e., silty to sandy glacial till), the testing results obtained from these test pits are still considered to be representative of infiltration conditions within the new East Infiltration Trench footprint.

Under the supervision of Stantec personnel, the test pit excavations extended to the projected base elevation of each infiltration trench for the performing of soil infiltration testing. Once completing the soil infiltration testing at the proposed base elevation of each trench, the test pits were then excavated further to depths of at least 1.5 m below these base elevations, with the soils at these depths also being subjected to infiltration testing as per the protocols outlined in the Credit Valley Conservation (CVC) and Toronto and Region Conservation (TRCA) (2010) *Low Impact Stormwater Management Planning and Design Guideline*. Stantec personnel classified the soils targeted for infiltration testing using the ASTM guideline for visual-manual description and identification of soils (ASTM D2488-00) and once the test pit was no longer required, Lockhart backfilled the excavations to the existing grade.

Assessment of the infiltration potential for the on-Site soils involved the use of a Guelph Permeameter (a constant head permeameter designed to measure in-situ vertical hydraulic conductivities of a given substrate). At the various excavated depths of the test pits, Stantec personnel used a hand auger to drill an approximately 0.5 m deep, 50 mm diameter cylindrical hole into the native soil to be tested. The Guelph Permeameter was then filled with water, inserted into the hole while making a concerted effort to avoid knocking debris into the excavation, and then stabilized against the substrate. Stantec personnel then proceeded to record the eventual steady-state rate of water recharge into the soil. The infiltration rate for each soil tested was converted from the measured vertical hydraulic conductivity using the established relationship between vertical hydraulic conductivity and infiltration rate presented by the CVC/TRCA (2010). Table 7 presents the results of this soil infiltration testing.

Using the infiltration testing results, Stantec proceeded to calculate the Design Infiltration Rate for each infiltration facility as per the approach outlined by the CVC/TRCA (2010). The calculated infiltration rate used in the design of the East and South Infiltration Trenches is 32 mm/hour and 23 mm/hour, respectively (Table 8).

4.0 LOCAL GEOLOGY AND HYDROGEOLOGY

4.1 GEOLOGY

Figure 4 presents the surficial geology throughout the Site as mapped by the OGS (2010), with this mapping indicating that the entire Site is covered by stone-poor, silty to sandy glacial till (i.e., the Port Stanley Till). Figure 1 shows the locations of Cross-Section A-A’ (Figure 13) and B-B’ (Figure 14), which were constructed using geological information obtained from the onsite drilling completed at the Site by CMT Engineering (2018) and Stantec (Appendix E). Although onsite drilling results confirm that silty sand to sandy silt till (Port Stanley Till) predominantly forms a horizontally and vertically contiguous unit beneath the Site, this unit is overlain by a 2.3 to 4.8 m thick diamicton deposit consisting of very loose to dense sand and silt, with some gravel and trace clay (CMT, 2018). A 2.4 m thick, discontinuous layer of sand was encountered in the Port Stanley Till at a depth of 11.3 m BGS (331.7 m AMSL) at MW2-18. The Port Stanley Till occurs at elevations ranging from 341.6 to 334.7 m AMSL beneath the Site, with this unit extending to the termination depth of the onsite boreholes (333.4 to 324.6 m AMSL). Locally, the bedrock surface is reported to occur at an elevation of approximately 320 m AMSL (Golder, 2011).

4.2 HYDROGEOLOGY

4.2.1 Groundwater Levels and Flow

Figures 9 and 10 and Table 2 present the continuous and manual water levels recorded within the monitoring wells between July 2018 and June 2020, and between January 2022 and April 2022. Groundwater elevations across the Site ranged from 0.9 m BGS (at MW5-18) to 9.2 m BGS (at MW1-18) over the monitoring period, equating to elevations ranging from 332.6 m to 340.7 m AMSL.

As shown in the hydrographs (Figures 9 and 10), the groundwater table demonstrated a similar pattern in fluctuations across the Site, with high groundwater conditions predominantly occurring in the spring (i.e., early March to early June) due to lower evapotranspiration losses and a melting snowpack, which in turn provided a greater volume of water available to infiltrate and recharge the groundwater system. Starting in mid-June, the groundwater table across the entire Site begins to experience a steady decline, reaching its lowest elevation in late October to early November as a response to more water being drawn from the subsurface over this period to meet evapotranspiration demands. Overall, the groundwater table decline that occurred from the early summer to late fall at the monitoring well locations ranged from 1.4 m (MW7-18) to 5.6 m (MW2-18).

In general, groundwater levels showed a limited response to notable precipitation events (i.e., immediate spike/rise in the groundwater table) throughout the Site, suggesting that there is a limited hydraulic connection between the ground surface and the groundwater system (i.e., via vertical fissures/fractures in the overburden). The subdued response to precipitation events is not surprising, given that dense to very densely packed native deposits of silty sand to sandy silt till are present beneath the Site, with these deposits being characterized by horizontal hydraulic conductivities in the range of 10^{-7} to 10^{-9} m/s (Table

1; Appendix G). However, Stantec notes that infiltration testing completed in the shallower native deposits of silty sand to sandy silt till (i.e., 0.5 to 3.5 m BGS) suggest that horizontal hydraulic conductivities are higher within certain areas of the Site (e.g., near proposed locations of the proposed infiltration trenches) where estimated values range from 10^{-5} to 10^{-7} m/s (Table 7).

Figure 12 presents groundwater elevation contours and the interpreted direction of horizontal flow through the groundwater system beneath the Site using level measurements collected from the on-site monitoring wells in May 2019. In general, groundwater contours mimic the prevailing topography of the Site, with a localized groundwater divide running along the northeast-southwest axis of the drumlin upon which the property is situated (Figure 3). From the divide, groundwater is shown to flow to the northeast across the Site towards Torrance Creek Swamp at a calculated horizontal hydraulic gradient of 0.04 m/m, which is in general agreement with regional flow patterns presented in Totten Sims Hubicki Associates *et al.* (1998) (Figure 4.4.7, Appendix C). However, groundwater is also shown to flow to the southwest from the divide towards Gordon Street at a calculated horizontal hydraulic gradient of 0.09 m/m and onward towards Hanlon Creek Swamp. These groundwater flow patterns also mimic existing surface water runoff / drainage patterns occurring at the Site as discussed in Stantec (2021).

Horizontal hydraulic conductivity estimates calculated from onsite hydraulic response testing completed at the onsite monitoring wells, which are all screened within sandy silt till, ranged from 5.4×10^{-7} m/s to 1.6×10^{-9} m/s (Table 1; Appendix G). These calculated values are consistent with the literature values of hydraulic conductivity provided for these deposits (Fetter, 1994) and with values provided for the Lower Till Aquitard (Port Stanley Till) as reported in Golder (2011). Overall, the estimated bulk (i.e., geometric mean) horizontal hydraulic conductivity calculated for the overburden deposits is 3.7×10^{-8} m/s (Table 1).

The velocity at which groundwater horizontally flows through the subsurface is calculated through the application of Darcy's law, where:

$$v = \frac{K \nabla}{\theta}$$

where: v = velocity (m/yr)
K = hydraulic conductivity
∇ = hydraulic gradient
θ = effective porosity

Assuming a soil porosity of 0.2 for glacial till (Fetter, 1994), an average horizontal hydraulic gradient of 0.04 m/m for groundwater moving towards the northeast, and geometric mean hydraulic conductivity of 3.7×10^{-8} m/s, the estimated velocity of groundwater flowing through the overburden beneath the Site towards Torrance Creek Swamp is calculated to be approximately 0.23 m/year (i.e., one meter every 4.3 years). Using the same input parameters as above, except for an average horizontal hydraulic gradient of 0.09 m/m, the estimated velocity of groundwater flowing through the overburden beneath the Site towards Gordon Street is calculated to be approximately 0.52 m/year (i.e., one meter every 1.9 years).

The Site is also characterized by downward vertical hydraulic gradients as recorded at MW4-18(S/D) (Figure 9) and MW5-18(S/D) (Figure 10). Vertical hydraulic gradients ranged from -0.5 to -1.0 over the monitoring period, confirming that the Site is a groundwater recharge area.

4.2.2 Groundwater-Surface Water Interaction

Data available on the Grand River Information Network (GRIN) (GRCA, 2019) indicates that downward vertical hydraulic gradients are present beneath the Site and in the surrounding area, with annual recharge rates within the boundaries of the Site ranging from 100 to 200 mm/year (Appendix D).
As shown in Figure 10, over the monitoring period (i.e., April 2019 to June 2020) groundwater levels recorded in the multi-level drive-point piezometer (i.e., DP1-19(S/D)) installed within Torrance Creek Swamp approximately 75 m to the northeast of the Site show that the groundwater table occurred at or above ground surface during the spring, declining to depths up to 1.1 m BGS by the late summer to early fall (Table 3; Figure 10). Neutral to upward vertical hydraulic gradients consistently occur beneath this area of the Torrance Creek Swamp, although the vertical gradient did switch to downward over the monitoring period. Overall, vertical hydraulic gradients at DP1-19(S/D) have ranged from -0.06 to 0.17, indicating that this area of the wetland functions as both a groundwater recharge and discharge feature. However, the potential volume of groundwater discharging to the Torrance Creek Swamp during those periods where discharge conditions are present is expected to be minimal, given that groundwater moves at a very slow rate through the overburden deposits (i.e., one meter every 4.3 years).

4.2.3 Infiltration Potential

Estimated infiltration rates for the overburden deposits are provided in Tables 6 and 7. Infiltration rates were calculated based on an established relationship between vertical hydraulic conductivity and infiltration rate presented in CVC-TRCA (2010), with vertical hydraulic conductivities being estimated based on both the results of in-situ hydraulic response testing completed at each monitoring well (Section 3.5) and Guelph Permeameter testing completed within the footprints of the proposed infiltration trenches (Section 3.6). Vertical hydraulic conductivities for the deeper deposits of sandy silt till (i.e., 5.0 m to 15.1 m BGS) are assumed to be one order of magnitude lower than in-situ measured horizontal hydraulic conductivities, resulting in values ranging from 5.6×10^{-8} to 1.6×10^{-10} m/s for these till deposits (Table 6). However, results of infiltration testing completed in the areas of the Site where the East and South Infiltration Trenches will be constructed had vertical hydraulic conductivities ranging from 3.9×10^{-5} m/s to 1.8×10^{-7} m/s (i.e., from depths of 0.5 to 3.6 m BGS) (Table 7). Based on these values, the calculated infiltration rates for the previously mentioned deposits can range from as low as 5 mm/hour to an upper value of 123 mm/hour (Tables 6 and 7).

4.2.4 Groundwater Quality

Groundwater quality results from the sample collected from MW2-18 on September 11, 2018 was assessed against City of Guelph Sanitary and Storm Sewer By-law (1996)-15202 guidelines (i.e., for quality of water potentially discharged to storm or sanitary sewage works during dewatering) (Table 4). Groundwater samples collected from MW4-18(S), MW6-18, and MW7-18, together with the previously mentioned sample results, were also compared against the ODWQS (Table 5). A summary of the results is discussed in the sections below.

4.2.4.1 City of Guelph Sanitary and Sewer By-Law

Results of groundwater quality analysis for the sample collected from MW2-18 (Table 4), which was not field-filtered (i.e., representing the quality of groundwater that would be pumped from an open excavation and discharged to the sewer system without treatment), indicate that this groundwater does not meet the City of Guelph Storm Sewer By-law guidelines due to the following parameter concentrations being exceeded:

- Fecal Coliform (200 MPN/100mL): exceeded the storm sewer limit with a count of 350 MPN/100 mL.
- Total Cadmium (0.001 mg/L): exceeded the storm sewer limit with a concentration of 0.0019 mg/L.
- Total Copper (0.01 mg/L): exceeded the storm sewer limit with a concentration of 0.03 mg/L.
- Total Lead (0.05 mg/L): exceeded the storm sewer limit with a concentration of 0.13 mg/L.
- Total Suspended Solids (15 mg/L): exceeded the storm sewer limit with a count of 2,500 mg/L.
- Total Zinc (0.05 mg/L): exceeded the storm sewer limit with a concentration of 0.64 mg/L.

The groundwater also does not meet the City of Guelph Sanitary Sewer By-law guidelines due to the following parameter concentrations being exceeded:

- Total Suspended Solids (350 mg/L): exceeded the sanitary sewer limit with a count of 2,500 mg/L.

Stantec notes that results for the set of groundwater samples that were field-filtered and collected from MW4-18(S), MW6-18, and MW7-18 indicate that if groundwater pumped as part of construction dewatering (if required) is treated for TSS prior to leaving the Site that the removal of the associated sediment-bound metals from the groundwater would result in the remaining dissolved concentrations of cadmium (<0.0001 mg/L), copper (<0.001 mg/L), lead (<0.00056 mg/L), and zinc (<0.005 mg/L) (Table 5) not exceeding the corresponding City of Guelph Storm Sewer By-law concentrations for these parameters.

4.2.4.2 Ontario Drinking Water Quality Standards

Results of the quality testing indicates that the groundwater beneath the Site is classified as calcium-bicarbonate type groundwater (Figure 11), which is typical of shallow fresh groundwater systems in Ontario. The parameters tested in the groundwater samples (i.e., MW4-18(S), MW6-18, and MW7-18) did not exceed any corresponding ODWQS health-related criteria; however, the following tested parameters did exceed their corresponding ODWQS Aesthetic Objectives (non-health related):

- Hardness (100 mg/L): exceeded with concentrations ranging from 320 mg/L to 520 mg/L.
- Total Dissolved Solids (500 mg/L): exceeded at MW4-18(S) (540 mg/L) and MW7-18 (530 mg/L).

In addition, the Medical Officer of Health Reporting Limit (Ontario) of 20 mg/L for sodium was exceeded at MW7-18 (34 mg/L).

5.0 WATER BALANCE

Water balance calculations were completed to quantify infiltration volumes at the Site and confirm the recharge function. A comparison of water balance data under existing (i.e., pre-development) and proposed (i.e., post-development) conditions was completed to determine the potential impacts of development on the Site's recharge function. The methodology for the water balance calculations is provided in Section 5.1. Results of the pre- and post-development water balance analysis are presented in Sections 5.2 and 5.3, respectively.

5.1 METHODOLOGY

Within the hydrologic cycle, the flow of water into and out of system can be described through a simplified water balance equation as follows:

$$P = ET + S + R + INF$$ **Equation 1**

Where:

P = precipitation
ET = evapotranspiration
S = change in groundwater storage
R = runoff
INF = infiltration (groundwater recharge)

Equation 1 may be further simplified by ignoring the change in groundwater storage (S), which trends over time to zero. The various components of the hydrologic cycle may be estimated through calculations or based on measurements made in the field. Precipitation (P) is typically a measured value. Evapo-transpiration (ET) is calculated based on measured air temperatures. The Water Surplus (WS) is calculated based the difference between P and ET, with this surplus then being available for either Infiltration (INF) or Runoff (R) as follows:

$$WS = P - ET$$ **Equation 2**

Where WS is used to calculate INF after applying an infiltration factor (IF),

$$INF = WS \times IF$$ **Equation 3**

And R is estimated by subtracting INF from WS,

$$R = WS - INF$$ **Equation 4**

For this assessment, ET was calculated using the soil moisture balance model by Thornthwaite and Mather (1955). In the Thornthwaite and Mather model monthly potential evapotranspiration (PET) is calculated based on the measured average monthly daily temperature (T_a) and a heat index (H_i) value assuming 12 hours of daylight in a day and 30 days in a month, as follows:

$$PET = 16 \times \left(\frac{10T_a}{H_i}\right)^{\alpha}$$ **Equation 5**

Where T_a is taken as 0 degrees Celsius for months with negative temperatures, and $H_{i,}$ the heat index is estimated as,

$$H_i = \sum_{i=1}^{12} \left(\frac{10T_a}{5}\right)^{1.514}$$ **Equation 6**

For α

$$\alpha \ = 0.49 + \ (0.0179 \ \times \ H_i\ ) - \left(0.0000771 \ \times \ {H_i}^2\right) \ + \left(0.000000675 \ \times \ {H_i}^3\ \right)$$ **Equation 7**

PET values are then multiplied by an adjustment factor, after Thornthwaite and Mather (1957), which represents the average number of daylight hours per month at the latitude of the subject property to give the Adjusted Potential Evapotranspiration (PET_{adj}).

Actual Evapotranspiration (AET) is derived as,

$$AET = PET_{adj} - \ \Delta S$$ **Equation 8**

Where ΔS is the change in storage for the month, calculated as,

$$\Delta S = S_{mc} \times \ e^{\left(\frac{APWL}{S_{mc}}\right)}$$ **Equation 9**

Where:

S_{mc} = soil moisture capacity

APWL = accumulated potential water loss, calculated for ΔP < 0 as $APWL = \ -\sum_{i=0}^{12} PET_i$, and for ΔP > 0 by rearranging equation 8; with ΔP= net precipitation = P - PET_{adj}

WS is derived by subtracting AET from the monthly precipitation,

$$WS \ = \ P - \ AET$$ **Equation 10**

And the infiltration and runoff calculated per Equations 3 and 4 above.

The infiltration factor shown in Equation 3 is estimated based on the topography, soil type and land cover after MOE (2003) and the Ministry of the Environment and Energy (MOEE) (1995). To define appropriate infiltration factors, the Site under the pre-development condition is divided into four Sub-Areas based on similarities in soil type, topography and vegetation cover as follows:

Sub-Area A	Fine sandy to silt loam, rolling topography, woodland cover
Sub-Area B	Fine sandy to silt loam, rolling topography, pasture and shrubs land cover
Sub-Area C	Fine sandy to silt loam, rolling topography, urban lawn
Sub-Area D	Fine sandy to silt loam, rolling topography, urban lawn, 95% impervious cover

The delineated Sub-Areas are shown on Figure 15 and the infiltration factors assigned for each Sub-Area under existing conditions (i.e., pre-development) within Catchment 101 (i.e., drainage directed westward towards Upper Hanlon Creek Watershed) and Catchment 102 (i.e., drainage directed eastward towards Torrance Creek subwatershed) is presented in Tables 9 and 10, respectively.

Soil moisture capacity was set between 75 mm to 300 mm among the Sub-Areas depending on the soil type and land cover as specified under MOE (2003). In Sub-Area A, where the fine sandy to silt loam and woodland cover is present, soil moisture was set at 75 mm. For Sub-Area B, soil moisture content was set at 150 mm corresponding to a fine sandy to silt loam covered with pasture and shrub vegetation. For Sub-Areas C and D, soil moisture content was set at 300 mm corresponding to fine sandy to silt loam having urban lawn type cover associated with the existing onsite residential and commercial properties.

For this water balance assessment, climate normals (1981 to 2010) as recorded at the Guelph Arboretum Climate Station were used to obtain monthly values of precipitation and temperature. The climate data were obtained from Environment Canada (2022) and are summarized in Table 11. The Guelph Arboretum Climate Station is located within approximately 1.5 km to the northwest of the Site and precipitation and air temperatures recorded at this station are assumed to be reflective of climatic conditions occurring at the Site.

5.2 PRE-DEVELOPMENT WATER BALANCE

5.2.1 Catchments Contributing to Upper Hanlon Creek Subwatershed

The average annual precipitation at the Site is estimated at 923 mm based on data obtained from the Guelph Arboretum Climate Station (Environment Canada, 2022). In Sub-Areas A, B, and C/D, annual actual evapotranspiration from pervious areas is estimated as 563 mm, 554 mm, and 541 mm, respectively. This means that 353 mm of surplus water is available for runoff and infiltration across Sub-Area A on an annual basis, with annual surpluses of 362 mm and 375 mm being available across Sub-Areas B and C/D, respectively. Applying the estimated infiltration factors of 0.65 for Sub-Area A, 0.60 for Sub-Area B and 0.50 for Sub-Area C/D, the calculated annual infiltration for these sub-areas is 240 mm, 226 mm, and 195 mm, respectively.

Based on the previously mentioned water balance components, the average annual volume of infiltration occurring within Catchment 101 (Figure 15) under the pre-development condition is estimated at 3,234 m^3, equating to a rate of 202 mm/year (Table 9). This infiltration rate slightly exceeds the 100 mm/year to 200 mm/year groundwater recharge rate range modeled for the Site as per GRIN mapping (Appendix D).

The average annual volume of surface water runoff occurring within Catchment 101 (Figure 15) under the pre-development condition is 3,481 m^3 (217 mm/year) (Table 9).

5.2.2 Catchments Contributing to Torrance Creek Subwatershed

The average annual precipitation at the Site is estimated at 923 mm based on data obtained from the Guelph Arboretum Climate Station (Environment Canada, 2022). In Sub-Areas A, B, and C, annual actual evapotranspiration from pervious areas is estimated as 554 mm, 546 mm, and 533 mm, respectively. This means that 369 mm of surplus water is available for runoff and infiltration across Sub-Area A on an annual basis, with annual surpluses of 377 mm and 390 mm being available across Sub-Areas B and C, respectively. Applying the estimated infiltration factors of 0.65 for Sub-Area A, 0.60 for Sub-Area B and 0.50 for Sub-Area C, the calculated annual infiltration for these sub-areas is 240 mm, 226 mm, and 195 mm, respectively.

Based on the previously mentioned water balance components, the average annual volume of infiltration occurring within Catchment 102 (Figure 15) under the pre-development condition is estimated at 3,993 m^3, equating to a rate of 231 mm/year (Table 10). This infiltration rate slightly exceeds the 200 mm/year groundwater recharge rate range modeled for the Site as per GRIN mapping (Appendix D).

The average annual volume of surface water runoff occurring within Catchment 101 (Figure 15) under the pre-development condition is 2,542 m^3 (147 mm/year) (Table 10).

5.3 POST-DEVELOPMENT WATER BALANCE

5.3.1 Catchments Contributing to Upper Hanlon Creek Subwatershed

Under the post-development condition in the former area of Catchment 101, Stantec has assumed for the water balance calculations that the topography and physical characteristics of the surficial soil deposits (i.e., fine sandy to silt loam) in each of the Sub-Areas will remain relatively unchanged; however, land cover was adjusted to reflect the projected imperviousness cover percentages of the new catchment areas that will occur under proposed conditions (i.e., Catchments 201, 202, 204 and 207 to 210) (Figure 16). Stantec also assumes that the remaining pervious areas within the new catchment areas will consist of urban lawns and other vegetation associated with urban landscaping. Overall, approximately 85% (1.36 ha) of the Site area covered by the previously mentioned catchments will be converted to impervious surfaces. Under this scenario, the annual volume of infiltration occurring across these lands will decline from 3,234 m^3 to 467 m^3, resulting in an annual infiltration deficit of 2,767 m^3 (Table 12). Annual volumes of surface water runoff from these lands will concurrently increase from 3,481 m^3 to 13,062 m^3, for a runoff increase of 9,581 m^3 (Table 12).

5.3.2 Catchments Contributing to Torrance Creek Subwatershed

In the former Catchment 102, which will be replaced largely by Catchments 203, 205, and 206, the topography, soil deposits (i.e., fine sandy to silt loam), and vegetation cover of these lands will remain mostly unchanged between pre- and post-development conditions. Overall, approximately 11% (0.19 ha) of the Site area covered by the previously mentioned catchments will be converted to impervious surfaces. Under this scenario, the annual volume of infiltration occurring across these lands will decline from 3,993 m^3 to 3,459 m^3, resulting in an annual infiltration deficit of 534 m^3 (Table 13). Annual volumes of surface water runoff from these lands will concurrently increase from 2,542 m^3 to 4,070 m^3, for a runoff increase of 1,528 m^3 (Table 13).

6.0 GROUNDWATER MOUNDING ASSESSMENT

As requested by the City, Stantec completed an assessment of the magnitude of groundwater mounding that could potentially occur directly beneath the East Infiltration Trench and South Infiltration Trench following a 25 mm storm event. Stantec calculated the projected height of groundwater mounding up to 36 m away from each infiltration gallery using a spreadsheet developed by the United States Geological Survey (USGS) applying the Hantush equation (Carelton, 2010). The equation consists of the following input parameters:

R = recharge (Infiltration) rate (feet/day)
Sy = specific yield (unitless)
K = horizontal hydraulic conductivity (feet/day)
x = 1/2 length of infiltration gallery
y = 1/2 width of infiltration gallery
t = duration of infiltration (drawdown) period (days)
hi(0) = initial thickness of saturated zone receiving recharge (feet)

The specific values entered in the equation and the subsequent results for each infiltration gallery assessment are discussed below.

The projected high groundwater condition occurring in both areas where the East and South Infiltration Trenches will be constructed is based on groundwater elevation monitoring completed at the Site and the groundwater elevation contours constructed from these data as documented in this report. The groundwater elevation contour mapping presented on Figure 12 (based on data collected in April 2022) represents the period of the monitoring program where groundwater elevations recorded across the Site were at their seasonal high point. As shown in Figure 12, groundwater elevations underlying the East Infiltration Trench slope to the northeast from an elevation of 339.5 m AMSL to 339.0 m AMSL and, as such, Stantec used a groundwater elevation of 339.5 m AMSL for the mounding assessment beneath this facility. For the South Infiltration Trench, the seasonal high groundwater elevation underlying this facility is estimated to be 339.9 m AMSL based on measurements obtained from MW101-21(S) (Figure 12, Table 2).

The specific values entered in the USGS spreadsheet and the subsequent results for each infiltration trench groundwater mounding assessment are discussed below.

6.1 EAST INFILTRATION TRENCH

The proposed construction location for the East Infiltration Trench will be in the central portion of the Site (Catchment 206) immediately to the northeast of Building 2 (Figure 16), with this facility being situated within the Torrance Creek Subwatershed. The East Infiltration Trench will receive stormwater runoff from the rooftop of Building 2 (Catchment 203). The invert (base) of this trench will be constructed at an elevation of 340.5 m AMSL, placing the base elevation of the gallery 1.0 m above the projected seasonally high groundwater table in this area of the Site (i.e., 339.5 m AMSL) (Figure 12).

The projected elevation and extents of the groundwater mound are based on the following equation inputs:

- **R** - Design Infiltration Rate of 32 mm/hour (Table 8).
- **Sy** - A specific yield of 0.23 based on the average of specific yields for silt, fine sand, medium sand, coarse sand, and gravelly sand as reported by Johnson (1967).
- **K** - A geometric vertical hydraulic conductivity of 2.0 x10^{-6} m/s is calculated for the subsurface deposits situated from five to 22 m from the trench footprint based on in-situ Guelph Permeameter testing completed on various soil horizons located at elevations ranging from 340.4 m AMSL to 337.4 m AMSL (Table 7). Since hydraulic conductivity in the horizontal direction is generally an order of magnitude higher than hydraulic conductivity in the vertical direction (Todd 1980; Freeze and Cherry 1979), the horizontal hydraulic conductivity of the shallow groundwater system is assumed to be 2.0 x 10^{-5} m/s (5.62 feet/day). This estimated horizontal hydraulic conductivity falls within the range of conductivities reported for the silty sand and gravel to sandy gravelly silt deposits that characterize the subsurface of the Upper Hanlon Creek Watershed (i.e., 10^{-3} m/s to 10^{-6} m/s; Gamsby and Mannerow Ltd. 1993).
- **x, y** - The dimensions of the infiltration trench are 10 m (16.4 feet) long by 7.5 m (12.3 feet) wide.
- **t** - The time taken for the infiltration gallery to drain following a 25 mm storm event is 12.5 hours (0.54 days).
- **hi(0)** – A saturated zone thickness of 19.5 m (64 feet) (i.e., high groundwater elevation of 339.5 m AMSL minus bedrock surface elevation of 320.0 m AMSL that underlies the Site).

Table 14 presents the results of the groundwater mounding analysis for the East Infiltration Trench. Based on the above input parameters, the maximum groundwater mounding predicted to occur beneath the center of the East Infiltration Trench after a 25 mm event is 0.4 m, equating to an elevation of 339.9 m AMSL based on the seasonally high groundwater elevation (i.e., 339.5 m AMSL + 0.4 m = 339.9 m AMSL). As shown on Table 14 and Figure 17, the rise in the groundwater table does not exceed 0.1 m beyond 12 m from the trench center point after a 25 mm storm event.

Although storm event induced mounding will temporarily raise groundwater elevations beneath the foundation of Building 2, the magnitude of this mounding not expected to exceed more than 0.1 m (Figure 17). Stantec notes that this building foundation (as with all onsite building foundations) will be constructed as a watertight structure (sealed with a water impermeable membrane), with the floor slab designed to structurally resist the hydrostatic pressure exerted by the groundwater. Consequently, no permanent drainage system / dewatering will be required for Building 2. The groundwater mound is also not expected to extend below the residential homes fronting Valley Road to the northwest of the Site.

Stantec notes that East Infiltration Trench overflows potentially occurring following a greater than 25 mm storm event will be directed overland to the northeast where this runoff will eventually discharge to the Torrance Creek Swamp (refer to Stantec (2022) *Functional Servicing Report* for additional details).

6.2 SOUTH INFILTRATION TRENCH

The proposed construction location for the South Infiltration Trench is near the southwest limits of the Site, with this facility being situated within the Upper Hanlon Creek Subwatershed (Figure 16). The South Infiltration Trench will receive stormwater runoff from the rooftop of Building 1 (Catchment 202) and associated parking areas (Catchments 204 and 209). The invert (base) of this StormTech® SC-310 infiltration trench will be constructed at an elevation of 340.9 m AMSL, placing the base elevation of the gallery approximately 1.0 m above the projected seasonally high groundwater table in this area of the Site (i.e., 339.9 m AMSL) (Table 2).

The projected elevation and extents of the groundwater mound are based on the following equation inputs:

- **R** - Design Infiltration Rate of 23 mm/hour (Table 8).
- **Sy** - A specific yield of 0.23 based on the average of specific yields for silt, fine sand, medium sand, coarse sand, and gravelly sand as reported by Johnson (1967).
- **K** - A geometric vertical hydraulic conductivity of 1.8 x10^{-6} m/s is calculated for the subsurface deposits situated within the trench footprint based on in-situ Guelph Permeameter testing completed on various soil horizons located at elevations ranging from 341.6 m AMSL to 339.1 m AMSL (Table 7). Since hydraulic conductivity in the horizontal direction is generally an order of magnitude higher than hydraulic conductivity in the vertical direction (Todd 1980; Freeze and Cherry 1979), the horizontal hydraulic conductivity of the shallow groundwater system is assumed to be 1.8 x10^{-5} m/s (5.02 feet/day). This estimated horizontal hydraulic conductivity falls within the range of conductivities reported for the silty sand and gravel to sandy gravelly silt deposits that characterize the subsurface of the Upper Hanlon Creek Watershed (i.e., 10^{-3} m/s to 10^{-6} m/s; Gamsby and Mannerow Ltd. 1993).
- **x, y** - The dimensions of the infiltration trench are 24.2 m (79.4 feet) long by 11.2 m (36.7 feet) wide.
- **t** - The time taken for the infiltration gallery to drain following a 25 mm storm event is 24 hours (one day).
- **hi(0)** – A saturated zone thickness of 19.5 m (64 feet) (i.e., high groundwater elevation of 339.5 m AMSL minus bedrock surface elevation of 320.0 m AMSL that underlies the Site).

Table 14 presents the results of the groundwater mounding analysis for the South Infiltration Trench. Based on the above input parameters, the maximum groundwater mounding predicted to occur beneath the center of the South Infiltration Trench after a 25 mm event is 0.7 m, equating to an elevation of 340.6 m AMSL based on the seasonally high groundwater elevation (i.e., 339.9 m AMSL + 0.7 m = 340.6 m AMSL). As shown on Table 14 and Figure 17, the rise in the groundwater table does not exceed 0.1 m beyond 18 m from the trench center point after a 25 mm storm event.

As shown in Figure 17, storm event induced mounding will temporarily raise groundwater elevations beneath the underground parking area of the development by 0.1 m along southern limits of this structure, with the mound disappearing once reaching the underside of Building 2. As previously mentioned, the building and underground parking foundations will be constructed as watertight structures (sealed with a water impermeable membrane) to resist the hydrostatic pressure exerted by the groundwater. As such, no permanent drainage system / dewatering will be required for these structures. The predicted groundwater mound is also not expected to intercept the residential buildings located on the adjacent property immediately to the southeast of the Site.

Stantec notes that any overflows from the South Infiltration Trench following a greater than 25 mm storm event will be directed to an underground storage tank and ultimately outlet to the Gordon Street storm sewer (refer to Stantec (2021) *Functional Servicing Report* for additional details).

6.3 IMPACT TO NATURAL HERITAGE FEATURES

As shown in Figure 17, groundwater mounding predicted to occur beneath the East Infiltration Trench under the previously mentioned storm event scenario will not intercept the Torrance Creek Swamp, which is located approximately 75 m to the northeast from where the groundwater mounding effects cease. As such, there is no opportunity for the groundwater mounding to potentially reverse vertical hydraulic gradients observed to occur beneath this wetland (i.e., reversing from a groundwater discharge to recharge function).

Eventually, when storm water exiting the East Infiltration Trench and infiltrating to the groundwater table equals the rate at which the receiving groundwater system can transport this water away, the mounding will subside. This recharge water will flow through the groundwater system to the northeast and discharge to the Torrance Creek Swamp. Stantec's opinion is that this increased recharge will not only help to maintain, but likely enhance, groundwater inputs to the wetland.

7.0 GROUNDWATER DEWATERING ASSESSMENT

The following section evaluates the potential onsite needs for construction dewatering and/or the installation of a permanent drainage system, and what mitigation measures could be employed at the Site to minimize any potential disturbances these activities may cause to the form and function of the groundwater system. If dewatering is anticipated, the section will also provide an indication of the quantity and quality of groundwater that will be discharged to the City sewer system. The evaluation is based on information collected from the Site as part of the field investigation together with a review of available background hydrogeological information.

7.1 GROUNDWATER DEWATERING – QUANTITY

7.1.1 Construction Dewatering Volumes

The proposed residential development is to consist of two 10-storey apartment buildings having nine townhouse units and 368 apartment units. The development will have a combination of surface parking and two levels of underground parking. The proposed footprint of the underground parking area will cover approximately 11,450 m^2, with the anticipated base of the second level of underground parking being located at an elevation of 335.7 m AMSL. Since seasonally high groundwater depths measured within the proposed underground parking area range from 1.0 m to 4.8 m BGS (334.0 m to 340.3 m AMSL), Stantec anticipates that the excavation for this sturcture will intercept the groundwater table.

Stantec utilized the Dupuit-Forchheimer equation (Powers et al., 2007) to calculate what volume of dewatering could be required to lower the groundwater elevation in the excavation of the underground parking area:

$$Q = \frac{\pi K(H^2 - {h_w}^2)}{\ln R_o/r_w}$$

where Q = steady state pumping rate (m^3/s)

K = representative hydraulic conductivity (m/s)

H = height of static water level above assigned datum (m)

h_w = depth of dewatering relative to assigned datum (m)

r_w = equivalent radius of dewatering area (m)

R_o = dewatering radius of influence (m)

The input parameters required for this equation were taken from the findings of this hydrogeological investigation, regional geological studies (Golder, 2011), and the layout for the proposed underground parking area (Figure 1), such as information pertaining to the projected area of the excavation, horizontal hydraulic conductivity of the subsurface material, the base elevation of the aquifer being pumped, and the targeted groundwater dewatering elevation.

For the excavation, the groundwater dewatering volume potentially required during construction is calculated based on the following assumptions:

- The groundwater table resides within the native diamicton deposits of sand and silt to silty sand / sandy silt till (Port Stanley Till) that underly the Site, which is characterized by horizontal conductivities ranging from 5.4 x 10^{-7} m/s to 1.6 x 10^{-9} m/s. The calculated bulk horizontal hydraulic conductivity for the overburden is 3.7 x 10^{-8} m/s, representing the geometric mean of the above field-tested hydraulic conductivities. For the purposes of the dewatering calculations, Stantec used the bulk horizontal hydraulic conductivity of 3.7 x 10^{-8} m/s (Table 1).
- The highest groundwater levels measured in the overburden monitoring wells constructed within the proposed footprint of the underground parking area over the monitoring period (i.e., July 2018 to June 2020) ranged from 1.0 m to 4.8 m BGS, corresponding to elevations of 334.0 m to 340.3 m AMSL. A high groundwater elevation of 340.3 m AMSL was assumed to occur over the full area of the proposed underground parking, with this assumption contributing to the overall conservative nature of the analysis.
- The depth of dewatering is set to 1.0 m below the elevation of the second parking level, which will be constructed at an elevation of 335.7 m AMSL (i.e., 335.7 m – 1.0 m = 334.7 m AMSL).
- The base of the groundwater flow system is set to the elevation of the bedrock surface, which is estimated to occur at an elevation of 320 m AMSL.
- The area of the proposed underground parking structure is estimated to be 11,450 m^2.

Based on the above assumptions, the predicted maximum daily volume of groundwater that will be pumped from the subsurface within the footprint of the underground parking area is approximately 37,700 L (Table H1, Appendix H). Stantec notes that this predicted groundwater volume will likely only be realized during the initial stages of dewatering, with the bulk of this volume representing groundwater that is stored in the overburden deposits. Once this overburden storage is drained and removed from the subsurface, Stantec anticipates that the pumping volumes will lower to reflect a reduced rate of groundwater flowing into the excavation (i.e., normalize to a steady state discharge rate). To account for the initial removal of overburden storage volumes and potential basal groundwater seepage into the excavation, a 3.0 factor of safety is applied to the previously mentioned calculated steady state inflow rate, resulting in a projected dewatering volume of **113,100 L/day**. Stantec notes that these dewatering calculations are estimates and will be subject to adjustments if any changes are made to the input parameters discussed above.

Stantec notes that the predicted dewatering volume does not account for any runoff that may enter the open excavation during construction following a rainfall and/or snowmelt event. Assumming that the excavation required to construct the underground parking garage area is fully open (i.e., 11,450 m^2) during a 25 mm precipitation event, the resulting volume of stormwater accumulating in the excavation together with groundwater inflow volumes could be in the range of **399,350 L**.

Under O. Reg. 64/16 and O. Reg. 63/16, a MECP Permit to Take Water (PTTW) is required when construction dewatering rates are anticipated to exceed 400,000 L/day, whereas an Environmental Activity and Sector Registry (EASR) is required when dewatering volumes are expected to range between 50,000 L/day and 400,000 L/day. Consequently, Stantec's opinion is that Site will require an EASR to complete construction dewatering for the proposed underground parking garage.

The MECP has made recent amendments to EASR requirements for construction dewatering that came into effect July 1, 2021. The following provides a brief summary of the changes:

- The ability to register multiple dewatering pits for a single project under the same EASR.
- Allowing construction dewatering of up to 400,000 L/day for each dewatering pit as long as the dewatering area of influence do not overlap.
- Stormwater will no longer be counted in the 400,000 L/day water taking limit, however, registrants will at a minimum be required to keep a record of precipitation events, or if determined by a Qualified Person, detailed monitoring/documentation.
- EASRs will apply to linear projects including transit and pipelines.
- Registrants will be required to notify the local municipalities and conservation authorities if the water taking is intended to continue for more than 365 days.

Based on the predicted volumes to be pumped from the native diamicton deposits of sand and silt to silty sand / sandy silt till (Port Stanley Till), groundwater dewatering is expected to be handled using conventional pumping methods (i.e., standard sump pumps).

7.1.2 Dewatering Radius of Influence

One of the key issues of concern with the performing of dewatering activities for construction purposes is the potential impact that pumping water from the groundwater system could have on the hydrogeological form and function of nearby natural heritage features, such as the Torrance Creek Swamp.

Based on the above calculations, temporary construction dewatering will likely be required for the short-term cut and cover works associated with the building construction. The effects of local dewatering in general cannot be mitigated, since dewatering deliberately seeks to create an effect (i.e., temporary lowering of groundwater levels); however, the amount of drawdown to occur due to construction activities is expected to remain within a relatively small distance around the excavations due to the low permeability of the surrounding deposits. The lateral extent of groundwater level drawdown from the excavation areas is calculated using the Sichart and Kryieleis method (Powers et al., 2007):

$$R_o = r_w + 3000(H - h_w)\sqrt{K}$$

where R_o = dewatering radius of influence (m)
K = representative hydraulic conductivity (m/s)
H = height of static water level above assigned datum (m)
h_w = depth of dewatering relative to assigned datum (m)
r_w = equivalent radius of dewatering area from center of the excavation (m)

According to the calculation, the predicted dewatering radius of influence from the proposed development is approximately 64 m from the edge of the excavation area (Table H1, Appendix H). Overall, the radius of influence from short-term construction dewatering is not expected to extend into nearby natural heritage features (Figure 18).

7.1.3 Long-term Drainage

The proposed foundation of the underground parking area will be constructed with a waterproof base and, as such, no permanent drainage system / dewatering is planned for this structure.

7.2 GROUNDWATER DEWATERING – QUALITY

7.2.1 Discharging to Storm Sewer

As discussed in Section 4.2.4, groundwater quality results for the sample collected from MW2-18 (Table 4) indicate that any potential dewatering volumes cannot be discharged to the City storm sewer system as the following parameters exceed the City of Guelph Sanitary and Storm Sewer By-law (1996)-15202 limits due to concentrations exceeding the following parameters:

- Fecal Coliform (200 MPN/100mL): exceeded the storm sewer limit with a count of 350 MPN/100 mL.
- Total Cadmium (0.001 mg/L): exceeded the storm sewer limit with a concentration of 0.0019 mg/L.
- Total Copper (0.01 mg/L): exceeded the storm sewer limit with a concentration of 0.03 mg/L.
- Total Lead (0.05 mg/L): exceeded the storm sewer limit with a concentration of 0.13 mg/L.
- Total Suspended Solids (15 mg/L): exceeded the storm sewer limit with a count of 2,500 mg/L.
- Total Zinc (0.05 mg/L): exceeded the storm sewer limit with a concentration of 0.64 mg/L.

7.2.2 Discharging to Sanitary Sewer

Groundwater at the Site does largely satisfy the bylaw limits to permit discharging to the City sanitary sewer system, except for TSS:

- Total Suspended Solids (350 mg/L): exceeded the sanitary sewer limit with a count of 2,500 mg/L.

However, if groundwater is treated for TSS (e.g., filtration or sedimentation measures) prior to leaving the Site, the concentration for this parameter can be reduced to levels that would allow for this groundwater to be discharged to the sanitary sewer system.

Prior to discharging groundwater pumped from the excavation (during construction dewatering) to the sanitary sewer, the Contractor retained to complete the dewatering will be expected to implement measures to reduce TSS in the discharge water to below the corresponding concentrations mentioned above.

The Contractor should consult with the City to confirm whether there are preferred methods and/or policies for reducing TSS concentrations in discharge water (including monitoring requirements).
In Stantec’s experience, common mitigation measures utilized to reduce TSS concentrations in discharge water can include:

- wrapping of the inlet pump head (i.e., sump/trash pumps) with filter fabric and surrounding the inlet with clear stone, or equivalent
- passing discharge water through geotextile filter bags or straw bale/filter fabric device
- directing discharge through a tank, allowing time for the suspended solids to settle out prior to being released to the sewer

In addition, the Contractor’s responsibilities will often include:

- obtaining a sewer use permit prior to discharging to the sanitary sewer
- ensuring that the quality of the pumped groundwater meets required By-law limits
- complete any additional groundwater quality testing as required by the City of Guelph

8.0 IMPACT ASSESSMENT AND MITIGATION MEASURES

8.1 GROUNDWATER RECHARGE

As per the proposed Site Plan (Figure 1), development is to include the construction of two 10-storey apartment consisting of 325 units, internal roadways, surface parking, and two levels of underground parking. In the areas of the Site where this development is to occur, there will also be the introduction of impervious surfaces (e.g., rooftops, concrete/asphalt roadways, and walkways) and, subsequently, a corresponding reduction in the volume of water infiltrating to the subsurface. The potential impacts associated with the introduction of impervious surfaces on the recharge function of the Site are discussed below.

Under the post-development condition, impervious surfaces in the former Catchment 101 (lands draining to the Upper Hanlon Creek Subwatershed) are expected to cover approximately 85% of the post-development catchment areas (1.36 ha of 1.60 ha), resulting in a projected infiltration volume deficit of 2,767 m^3/year (i.e., from 3,234 m^3/year to 467 m^3/year) (Tables 9 and 12). For the former Catchment 102 (lands draining to the Torrance Creek Subwatershed), impervious surfaces will cover approximately 11% of the post-development catchment areas (0.19 ha of 1.73 ha), resulting in a projected infiltration volume deficit of 534 m^3/year (i.e., from 3993 m^3/year to 3,459 m^3/year) (Tables 10 and 13). Overall, the total volume of infiltration at the Site will be reduced from 6,760 m^3/year to 3,926 m^3/year (infiltration deficit of 2,834 m^3/year) from the pre- to post-development condition.

Low impact development (LID) is a stormwater management strategy that seeks to mitigate the impacts of increased stormwater runoff by managing this runoff as close to source as possible, with the implementation of such strategies also providing the residual benefit of offsetting potential infiltration losses associated with the increase in impervious surfaces associated with a given development. Infiltration augmentation options (as described in CVC-TRCA *Low Impact Development Stormwater Management Planning and Design Guide*, 2010) that could potentially be available for use across the Site to assist in maximizing infiltration under the post-development condition include:

- roof downspout disconnection
- soakaways / infiltration trenches
- bioretention cells
- vegetated filter strips
- grass swales or enhanced grassed swales

As discussed in the *Functional Servicing Report* (Stantec, 2022), the post-development LID infiltration strategy proposed for the Site will involve the construction of two infiltration facilities referred to as the East Infiltration Trench and South Infiltration Trench (Figure 12).

The East Infiltration Trench is designed return infiltration volumes lost from the pre- to post-development condition within the portion of the Site located within the Torrance Creek Subwatershed. To address the infiltration deficit of 534 m^3 projected to occur in this area of the Site under the post-development condition, rooftop runoff captured by Building 2 (Catchment 203) will be discharged to this infiltration facility. As outlined in Table 13, Catchment 203 is projected to annually capture 1,741 m^3 of precipitation, which will subsequently reach the East Infiltration Trench and result in an annual infiltration surplus of 1,207 m^3 being added to the subsurface and recharging the local groundwater system post-development (with this groundwater flowing to the northeast towards Torrance Creek Swamp; Figure 12).

The South Infiltration Trench is designed return infiltration volumes lost from the pre- to post-development condition within the portion of the Site located within the Upper Hanlon Creek Subwatershed. To address the infiltration deficit of 2,767 m^3 projected to occur in this area of the Site under the post-development condition, rooftop runoff captured by Building 1 (Catchment 202) and parking areas (Catchments 204 and 209) will be discharged to this infiltration facility. As outlined in Table 12, Catchments 202, 204, and 209 are projected to annually capture 6,406 m^3 of precipitation, which will subsequently reach the South Infiltration Trench and result in an annual infiltration surplus of 3,638 m^3 being added to the subsurface and recharging the local groundwater system post-development (with this groundwater flowing off-Site to the southwest towards the Hanlon Creek Swamp; Figure 12).

For the area of the Site located within Upper Hanlon Creek Subwatershed, 85% of these lands under the post-development condition will be converted to impervious surfaces, resulting in the generation of 13,062 m^3 of stormwater runoff per year and an annual runoff surplus of 9,581 m^3. However, under the post development condition, the annual runoff volume generated by Building 2 / Catchment 203 (of which 62% of this rooftop area covers these lands) will be directed to the East Infiltration Trench, removing approximately 1,079 m^3 (1,741 m^3 x 0.62 = 1,079 m^3 of this stormwater from the Upper Hanlon Creek Subwatershed lands and reduce the runoff surplus to 8,242 m^3 (9,581 m^3 - 1,079 m^3 = 8,242 m^3).
As mentioned previously, approximately 6,406 m^3 of the annual stormwater runoff generated from Catchments 202, 204, and 209 will be directed to the South Infiltration Gallery. Consequently, the infiltration of this runoff will result in the unmitigated runoff surplus of 8,242 m^3 being reduced further to a volume of 1,836 m^3 (8,242 m^3 – 6,406 m^3 = 1,836 m^3) (Table 12). The annual runoff of volume of 1,836 m^3 flowing off-Site will travel southeast along Gordon Street via a drainage ditch and ultimately discharge to a downstream stormwater management facility located near Vaughan Street.

8.2 GROUNDWATER DEWATERING

One of the key issues of concern with the performing of dewatering activities for construction purposes is the potential impact that pumping water from the groundwater system could have on nearby natural heritage features.

The effects of local dewatering in general cannot be mitigated, since dewatering deliberately seeks to create an effect (i.e., temporary lowering of groundwater levels); however, the amount of drawdown expected to occur due to construction activities is expected to remain within a small distance around the development excavation. According to the dewatering calculations, the predicted maximum horizontal distance that the pumping zone of influence will extend outward from the active zone of dewatering is estimated at 64 m. As shown in Figure 17, this predicted dewatering radius of influence will not intercept the Torrance Creek Swamp to the northeast or Hanlon Creek Swamp to the southwest of the Site. Stantec notes that the residual effects of short-term construction dewatering are reversible seeing that once pumping ceases, groundwater levels will recover and re-equilibrate to the local groundwater table.

Since the proposed underground parking area will be constructed with a waterproof base, no permanent drainage system / dewatering is planned for this structure. As such, there will be no long-term effects of permanent dewatering associated with this development.

8.3 SOURCE WATER PROTECTION

A drinking-water threat is 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. The following activities are prescribed by the province of Ontario under O. Reg. 287/07 to be drinking water threats (i.e., Significant Drinking Water Threat Policy Categories):

1. The establishment, operation, or maintenance of a waste disposal site within the meaning of Part V of the *Environmental Protection Act*.
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 (DNAPL).

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. O. Reg. 385/08, s. 3.

The Site is intercepted by the Burke Well WHPA-B and -C, noting that the footprint for the proposed development is confined to the WHPA-C. The WHPA-C has an assigned vulnerability score ranging from four (4) to six (6) (Figure 6), indicating that the threat of an activity or condition occurring at ground surface within this area, and subsequently adversely affecting the quality and/or quantity of the aquifer system in which the Burke Well draws its groundwater supply, is low to medium, respectively.

As per the Source Protection Plan (SPP) (LERSPC, 2015b), the Site is only subject to the protection policies specified under Significant Drinking Water Threat Policy Category 16 (DNAPLs). Since the planned use for the Site does not involve the onsite handling and storage of a DNAPL, the policies under Category 16 does not apply.

No protection policies are specified in the SPP (LERSPC, 2015b) that apply to the Site’s designation as a SGRA or WHPA-E (intercepts the northeast portion of the property).

8.4 SPILL CONTAINMENT AND RESPONSE

The potential exists for spills during any construction activity, with the most probable type of spill occurring being attributable to the refuelling of construction equipment that cannot readily leave the Site (e.g., earth movers). The potential impacts of a spill could be the contamination of soils, groundwater and/or surface water. By implementing proper protocols for the handling of fuels and lubricants during construction, the risk of a spill occurring will be greatly reduced. The procedures to be implemented to prevent onsite spills are as follows:

- all trucks or other road vehicles would be refuelled and maintained offsite, where practicable
- refuelling and lubrication of other construction equipment would not be allowed within 30 m of a drainage system or dewatering excavation
- regular inspections of hydraulic and fuel systems on machinery, with leaks being repaired immediately upon detection or the equipment being removed from Site
- spill kits containing absorbent materials would be kept on hand
- implement best management practices and develop an emergency spill response plan

Given that anticipated construction activities at the Site are not expected to involve the storage or use of bulk chemicals or fuels, any potential spill that does occur would be localized and involve a small volume of material. Standard containment facilities and emergency response materials are to be maintained onsite as required, with refuelling, equipment maintenance, and other potentially contaminating activities being confined to designated areas. As appropriate, spills are to be reported immediately to the MECP Spills Action Centre.

9.0 CONCLUSIONS

Based on the hydrogeological assessment, using the existing data collected at the Site and information obtained from a background review of regional data, the following conclusions are provided:

1. Subsurface conditions across the Site consist of silty sand to sandy silt till (Port Stanley Till), which predominantly forms a horizontally and vertically contiguous unit beneath the Site, with this unit being overlain by a 2.3 to 4.8 m thick diamicton deposit consisting of very loose to dense sand and silt, with some gravel and trace clay. The Port Stanley Till occurs at elevations ranging from 341.6 to 334.7 m AMSL beneath the Site, with this unit extending to the termination depth of the onsite boreholes (333.4 to 324.6 m AMSL). Locally, the bedrock surface is reported to occur at an elevation of approximately 320 m AMSL and does not factor into the construction of the proposed development.

2. Groundwater depths across the Site range from 0.9 m to 9.2 m BGS over the monitoring period (July 2018 to June 2020), fluctuating between elevations of 332.6 m to 340.7 m AMSL. Overall, the highest groundwater table occurred in the spring, declining by up to 5.6 m to its lowest elevation by late fall.

3. Groundwater contours mimic the prevailing topography of the Site, with a localized groundwater divide running along the northeast-southwest axis of the drumlin upon which the property is situated (Figure 12). Groundwater flows from the divide to the northeast and southwest towards Torrance Creek Swamp and Gordon Street, respectively.

4. The estimated velocity of groundwater flowing through the overburden beneath the Site towards Torrance Creek Swamp is calculated to be approximately 0.23 m/year (i.e., one meter every 4.3 years). Groundwater flow towards Gordon Street is estimated to move at a velocity of approximately 0.52 m/year (i.e., one meter every 1.9 years).

5. Neutral to upward vertical hydraulic gradients consistently occur beneath the area of the Torrance Creek Swamp that is located approximately 75 m to the northeast of the Site, although noting that the vertical hydraulic gradient is observed to switch downward over the year. Overall, vertical hydraulic gradients beneath this wetland ranged from -0.06 to 0.17, indicating that the wetland functions as both a groundwater recharge and discharge feature. However, the potential volume of groundwater discharging to the Torrance Creek Swamp during those periods where discharge conditions are present is expected to be minimal, given that groundwater moves at a very slow rate through the overburden deposits (i.e., one meter every 4.3 years).

6. Vertical hydraulic conductivities for the sandy silt till range from 5.6×10^{-8} to 1.6×10^{-10} m/s at depths ranging from 5.0 m to 15.1 m BGS throughout the Site. However, results of infiltration testing completed in the areas of the Site where the East and South Infiltration Trenches will be constructed had vertical hydraulic conductivities ranging from 3.9×10^{-5} m/s to 1.8×10^{-7} m/s (i.e., from depths of 0.5 to 3.6 m BGS). Based on these values, the calculated infiltration rates for the previously

mentioned deposits can range from as low as 5 mm/hour to an upper value of 123 mm/hour at the Site.

7. Groundwater beneath the Site is classified as calcium-bicarbonate type water. No tested parameters having health-related ODWQS were detected above their applicable standards. The ODWQS for hardness was exceeded in samples collected at all wells. The presence of elevated hardness concentrations is typical of groundwater in southern Ontario.

8. The proposed development footprint for the Site is located within the WHPA-C for the Burke Municipal Well. Subsequently, as per the Source Protection Plan, the Site is only subject to the protection policies specified under Significant Drinking Water Threat Policy Category 16 (DNAPLs). Since the planned use for the Site does not involve the onsite handling and storage of a DNAPL, the policies under Category 16 do not apply to the development.

9. Tricar is proposing to construct an infiltration facility (i.e., East Infiltration Trench) within the portion of the Site that lies within the Torrance Creek Subwatershed. Water balance calculations indicate that the proposed development of the Site will reduce infiltration volumes to the Torrance Creek Subwatershed by 534 m^3/year. However, calculations indicate that the East Infiltration Trench as currently designed will maintain to enhance pre-development infiltration volumes to this subwatershed under the post-development condition.

10. The maximum groundwater mounding predicted to occur beneath the center of the East Infiltration Trench after a 25 mm event is 0.4 m, equating to an elevation of 339.9 m AMSL based on the seasonally high groundwater elevation. Although storm event induced mounding will temporarily raise groundwater elevations beneath the foundation of Building 2, the magnitude of this mounding is not expected to exceed more than 0.1 m. Stantec notes that this building foundation (as with all onsite building foundations) will be constructed as a watertight structure (sealed with a water impermeable membrane), with the floor slab designed to structurally resist the hydrostatic pressure exerted by the groundwater.

11. Tricar is proposing to construct an infiltration facility (i.e., South Infiltration Trench) within the portion of the Site that lies within the Upper Hanlon Creek Subwatershed. Water balance calculations indicate that the proposed development of the Site will reduce infiltration volumes to the Upper Hanlon Creek Subwatershed by 2,767 m^3/year. However, calculations indicate that the South Infiltration Trench as currently designed will maintain to enhance pre-development infiltration volumes to the subwatershed under the post-development condition.

12. The maximum groundwater mounding predicted to occur beneath the center of the South Infiltration Trench after a 25 mm event is 0.7 m, equating to an elevation of 340.6 m AMSL based on the seasonally high groundwater elevation. The rise in the groundwater table does not exceed 0.1 m beyond 18 m from the trench center point after a 25 mm storm event. This groundwater storm event induced mounding will temporarily raise groundwater elevations beneath the underground parking

area of the development by 0.1 m along southern limits of this structure, with the mound disappearing once reaching the underside of Building 2.

13. The predicted groundwater mounds for the East and South Infiltration Trenches are not expected to intercept the residential buildings located on surrounding properties.

14. Groundwater mounding predicted to occur beneath the East Infiltration Trench will not intercept the Torrance Creek Swamp, which is located approximately 75 m to the northeast from where the groundwater mounding effects cease. As such, there is no opportunity for the groundwater mounding to potentially reverse vertical hydraulic gradients beneath this wetland (i.e., reversing from a groundwater discharge to recharge function).

15. The steady-state groundwater pumping rate for construction dewatering activities is predicted to be 37,700 L/day. Higher dewatering rates could be realized at the start of construction and during storm / snowmelt events. A design dewatering rate of 399,350 L/day reflects a factor of safety to provide an adequate dewatering volume to account for wet weather events and potential basal groundwater seepage into the excavation. Consequently, an MECP EASR will be required to complete construction dewatering activities, given that pumped volumes will exceed 50,000 L/day and remain below 400,000 L/day. Based on the volumes predicted and the type of material (dense till), groundwater dewatering is expected to be handled using conventional pumping methods (i.e., standard sump pumps).

16. The proposed underground parking area associated with the development will be constructed with a waterproof base and, as such, no permanent drainage system / dewatering is planned for this structure.

17. According to the dewatering calculations, the predicted maximum horizontal distance that the pumping zone of influence will extend is 64 m outward from the active zone of dewatering (Figure 18). This predicted dewatering radius of influence will not intercept the Torrance Creek Swamp to the northeast or Hanlon Creek Swamp to the southwest of the Site and, consequently, not interfere with the hydrogeological function of these wetlands.

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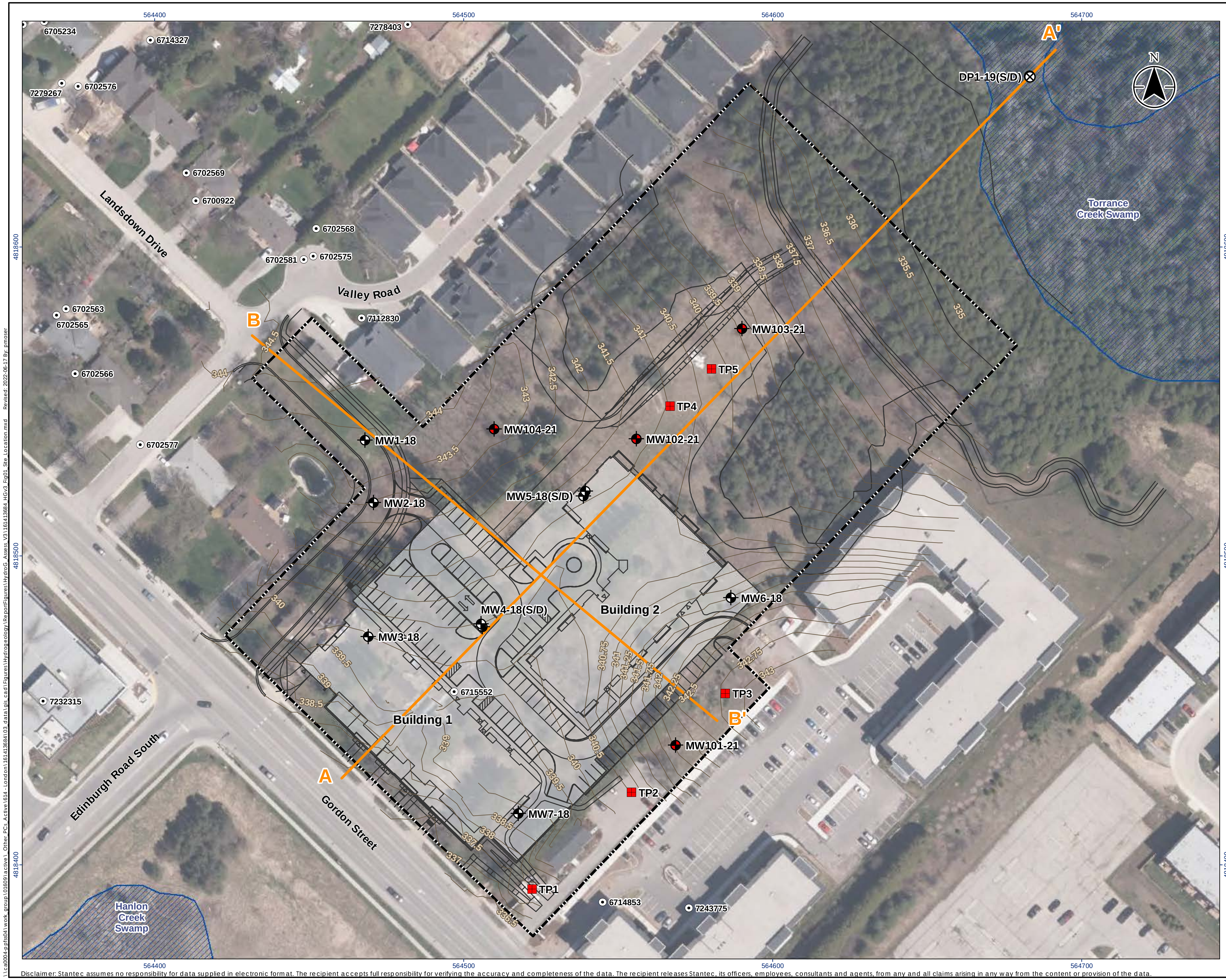
APPENDIX A:
FIGURES



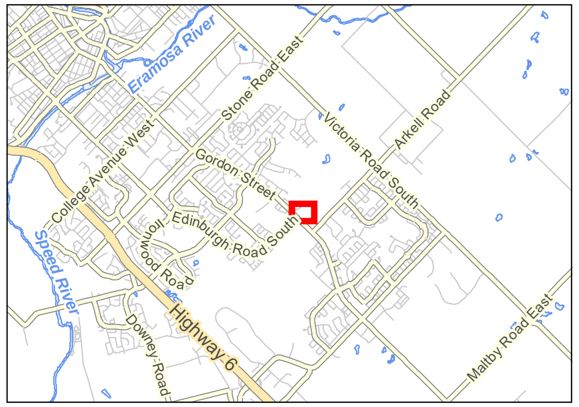
Stantec

Legend
- ⬚ Site Boundary
- ⊕ Monitoring Well (Stantec, 2021)
- ⊕ Monitoring Well (Stantec, 2018)
- 🟥 Test Pit (Stantec, 2021)
- ⊗ Drive-Point Piezometer (Stantec, 2019)
- ⊙ MECP Water Well
- — Cross-Section Location
- — Proposed Development Plan
- — Topographic Contour (m AMSL)
- ▭ Proposed Extent of Underground Parking
- ▨ Wetland - Evaluated (Provincial)

0 25 50 Metres

1:1,250 (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, 2020.
3. Orthoimagery © First Base Solutions, 2018. Imagery flown in 2019.
4. MECP water wells have been positioned based on published UTM coordinates and should be considered approximate.



Project Location
City of Guelph

161413684
Prepared by PRM on 2022-06-17
Technical Review by GW on 2022-06-16

Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD
HYDROGEOLOGICAL ASSESSMENT

Figure No.
1

Title
Site Location

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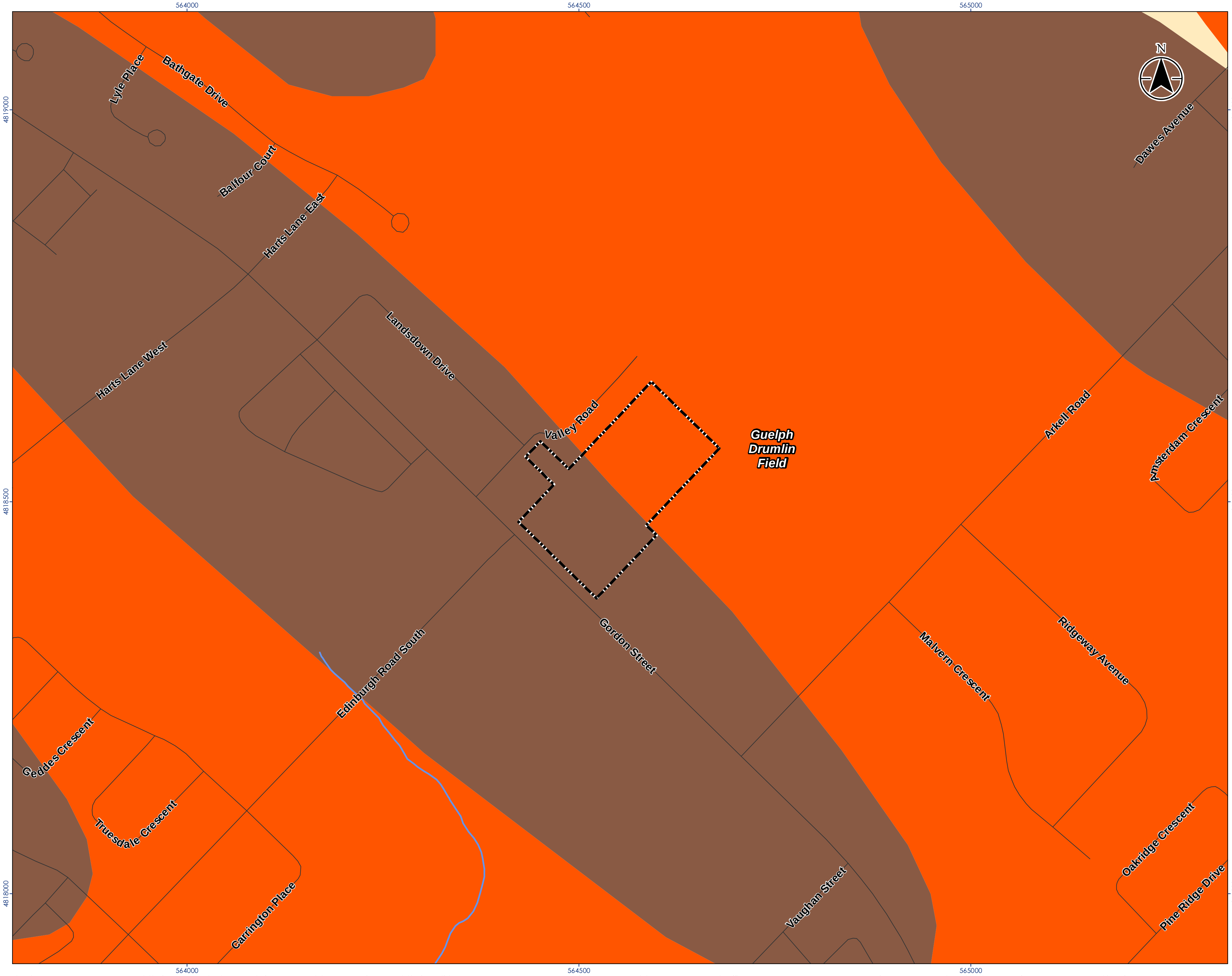


Stantec

Legend

- ⬚ Site Boundary
- — Watercourse (Permanent)
- ⬚ Physiographic Region Boundary

Physiography

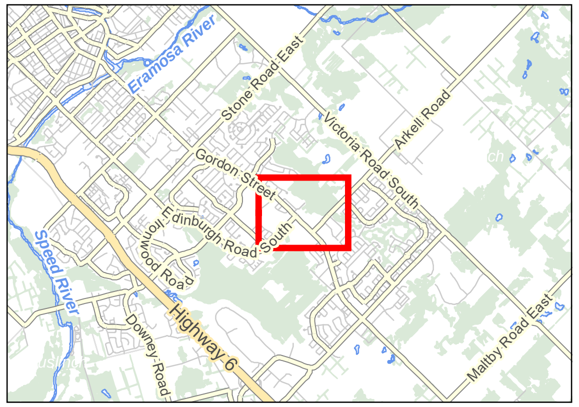
- 🟫 7: Drumlins
- 🟨 6: Till Plains (Drumlinized)
- 🟧 3: Spillways

0 125 250 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 and Forestry © Queen's Printer for Ontario, 2018.
3. Chapman, L.J. and Putnam, D.F. 2007. Physiography of southern Ontario; Ontario Geological Survey, Miscellaneous Release—Data 228.



Project Location
City of Guelph

161413684
Prepared by CMC on 2021-08-12

Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD
HYDROGEOLOGICAL ASSESSMENT

Figure No.
2

Title
Physiography

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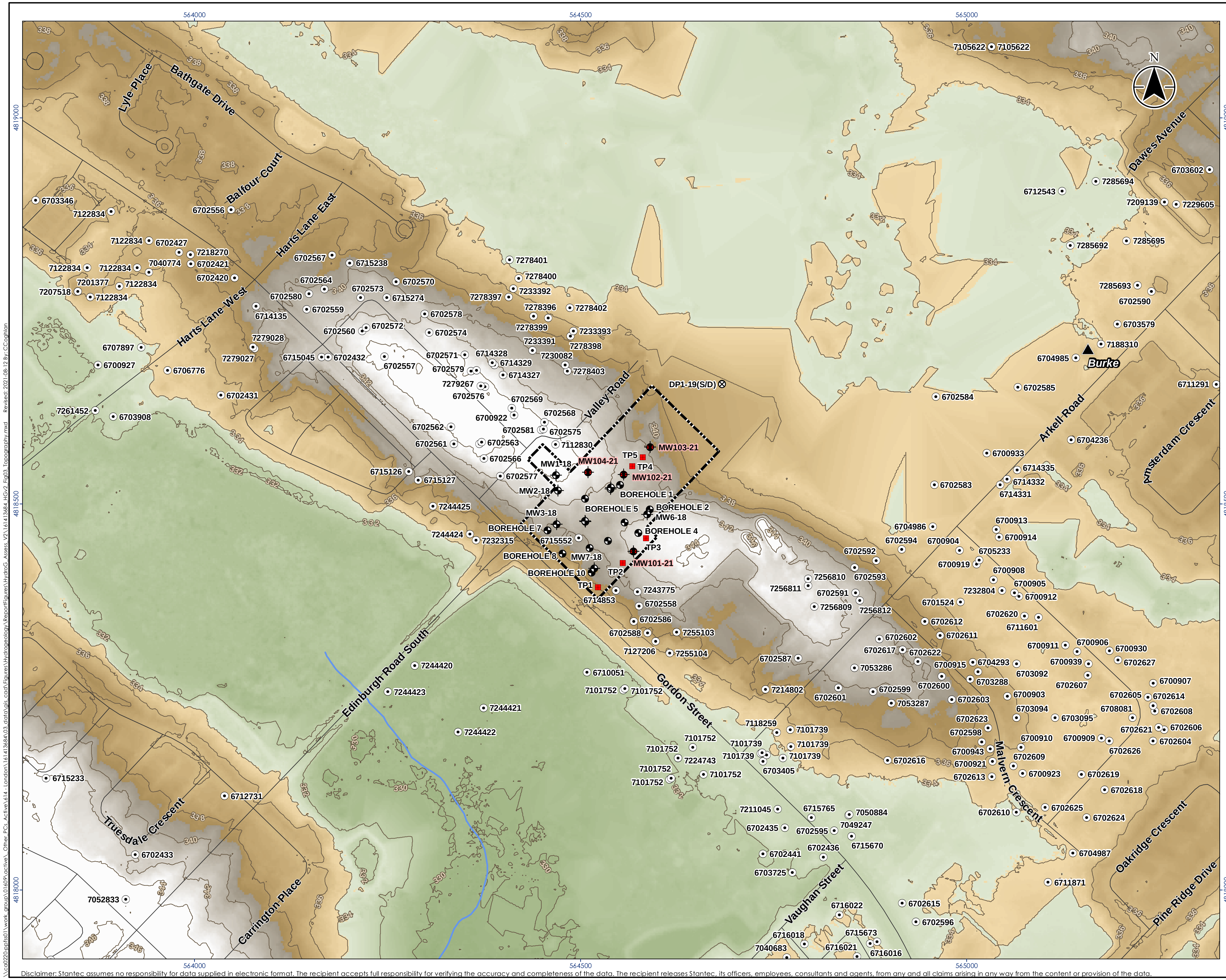


Legend
- ⬚ Site Boundary
- ⌖ Monitoring Well (Stantec, 2018)
- ⊗ Drive-Point Piezometer (Stantec, 2019)
- ● Borehole (CMT Engineering, 2018)
- 🟥 Test Pit (Stantec, 2021)
- ⌖ Proposed Monitoring Well (Stantec, 2021)
- ▲ Production Well
- ⊙ MECP Water Well
- — Watercourse (Permanent)
- — Topographic Contour (m AMSL)

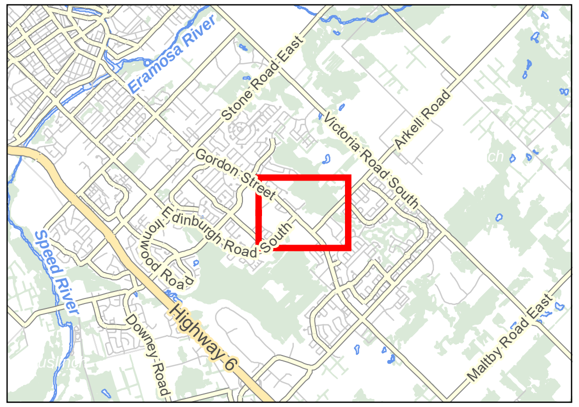
Ground Surface Elevation (m AMSL)
High : 348.52

Low : 328.91

0 125 250 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 and Forestry © Queen's Printer for Ontario, 2019.
3. Topography derived from the Southwestern Ontario Orthophotography Project (2015) © Queen's Printer for Ontario, 2019.



Project Location
City of Guelph

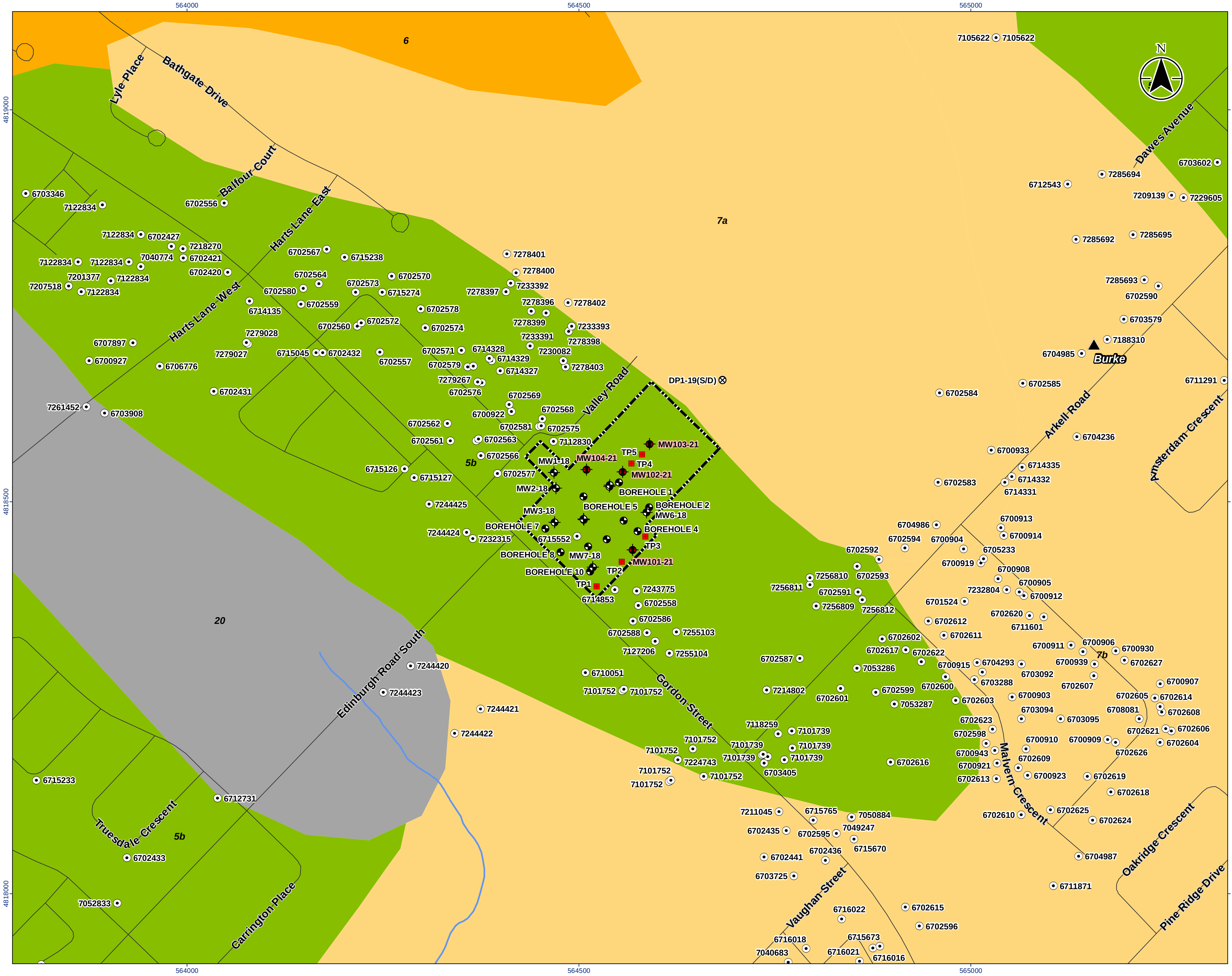
161413684
Prepared by CMC on 2021-08-12

Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD
HYDROGEOLOGICAL ASSESSMENT

Figure No.
3

Title
Topography

\\ca0220-ppfss01\work_group\01609\active_Other_PCs_Active\614 - London\161413684\03_data\gis_cad\Figures\Hydrogeology\ReportFigures\HydroG_Assess_V2\161413684_HGv2_Fig03_Topography.mxd Revised: 2021-08-12 By: CCoghlan



Stantec

Legend

- Site Boundary
- Monitoring Well (Stantec, 2018)
- Drive-Point Piezometer (Stantec, 2019)
- Borehole (CMT Engineering, 2018)
- Test Pit (Stantec, 2021)
- Proposed Monitoring Well (Stantec, 2021)
- Production Well
- MECP Water Well
- Watercourse (Permanent)

Surficial Geology

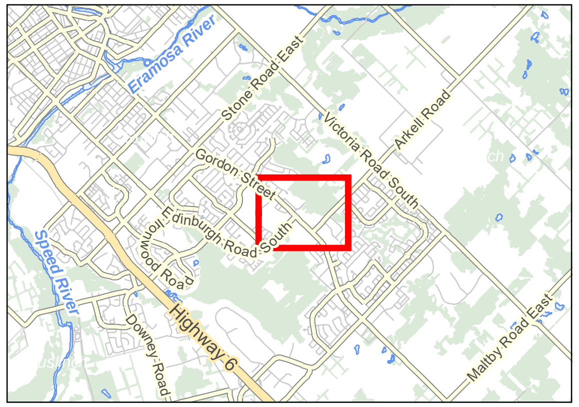
- 20: Organic deposits
- 7a: Glaciofluvial deposits (Sandy deposits)
- 7b: Glaciofluvial deposits (Gravelly deposits)
- 6: Ice-contact stratified deposits
- 5b: Stone-poor, carbonate-derived silty to sandy till

0 125 250 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 and Forestry © Queen's Printer for Ontario, 2018.
3. Ontario Geological Survey 2010. Surficial geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 128-REV ISBN 978-1-4435-2483-4



Project Location
City of Guelph

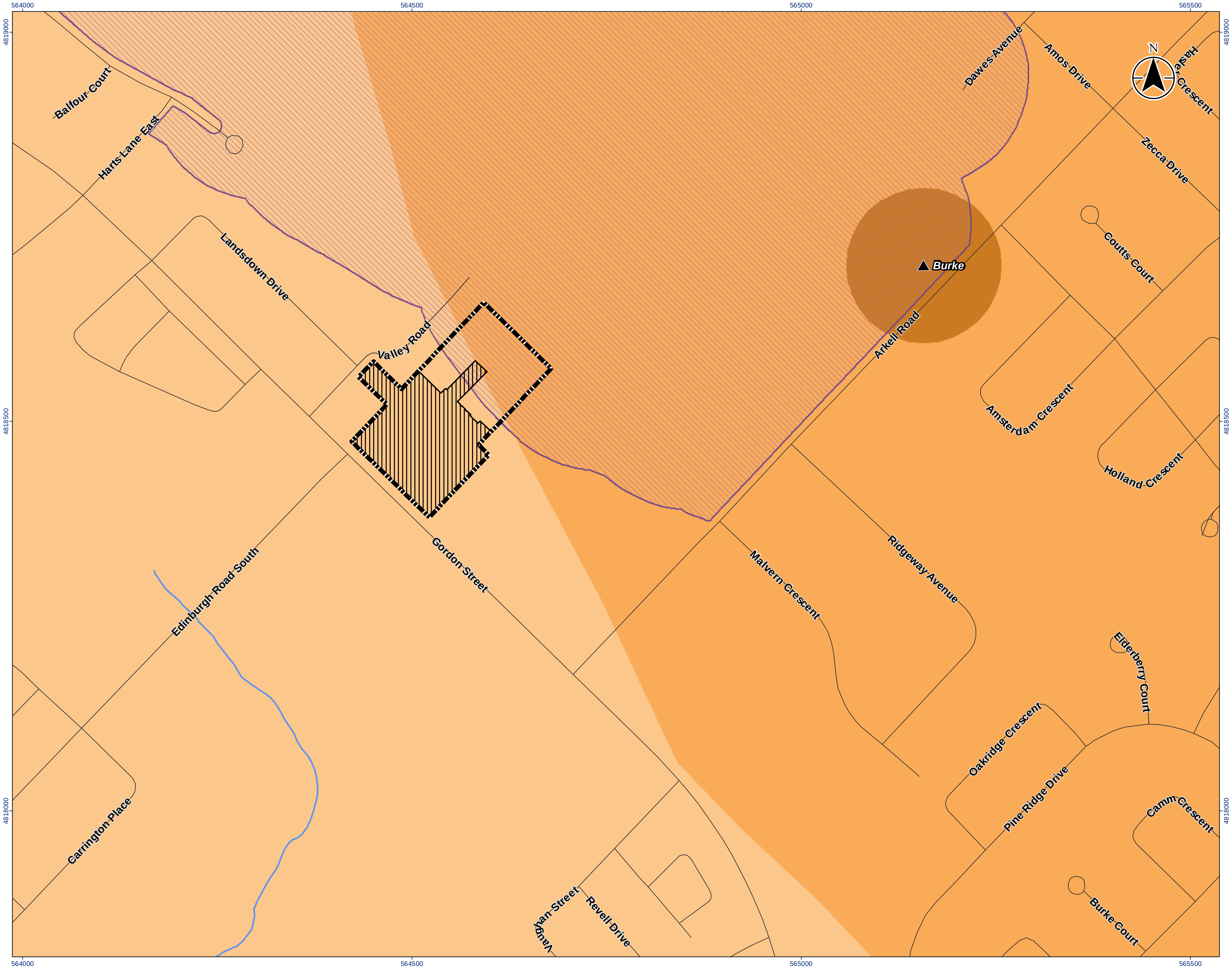
161413684
Prepared by CMC on 2021-08-12

Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD
HYDROGEOLOGICAL ASSESSMENT

Figure No.
4

Title
Surficial Geology

\\ca0220-ppfss01\work_group\01609\active_Other_PCs_Active\614 - London\161413684\03_data\gis_cad\Figures\Hydrogeology\ReportFigures\HydroG_Assess_V2\161413684_HGv2_Fig04_SurficialGeology.mxd Revised: 2021-08-12 By: CCoghlan



Stantec

Legend

- ▨ Site Boundary
- ▥ Proposed Development Footprint
- — Watercourse (Permanent)

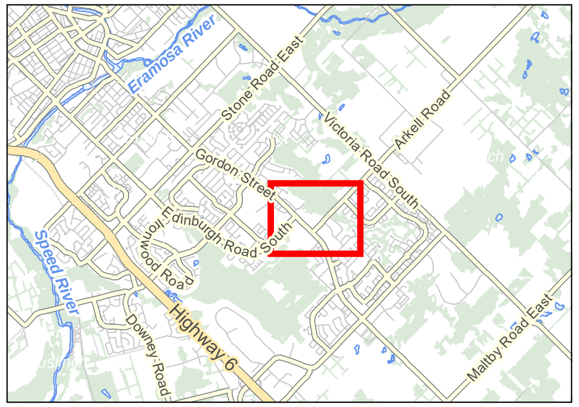
Wellhead Protection Areas

- 🟫 WHPA-A
- 🟧 WHPA-B
- 🟨 WHPA-C
- ▨ WHPA-E

0 125 250 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 and Forestry © Queen's Printer for Ontario, 2018.
3. Wellhead protection areas © Grand River Conservation, 2018.



Project Location
City of Guelph

161413684
Prepared by CMC on 2021-08-12

Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD
HYDROGEOLOGICAL ASSESSMENT

Figure No.
5

Title
Wellhead Protection Areas

\\ca0220-ppfss01\work group\01609\active\ Other PCs Active\614 - London\161413684\03 data\gis cad\Figures\Hydrogeology\ReportFigures\HydroG Assess V2\161413684 HGv2 Fig05 WHPAs.mxd Revised: 2021-08-12 By: CCoghlan

Stantec

Legend

▨ Site Boundary

▥ Proposed Development Footprint

— Watercourse (Permanent)

Wellhead Protection Areas

☐ WHPA-A

☐ WHPA-B

☐ WHPA-C

Vulnerability Scoring

🟩 4

🟨 6

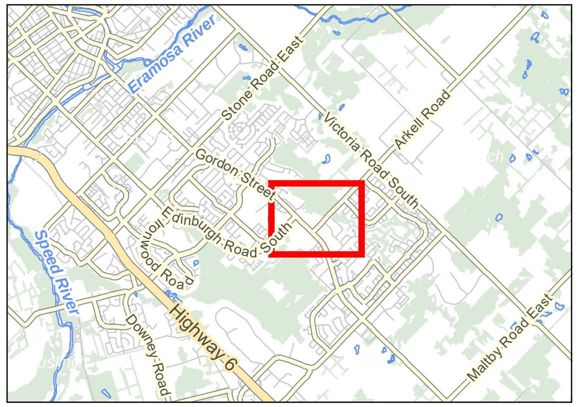
🟧 8

🟥 10

0 125 250 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 and Forestry © Queen's Printer for Ontario, 2018.
3. Wellhead protection areas © Grand River Conservation, 2018.



Project Location
City of Guelph

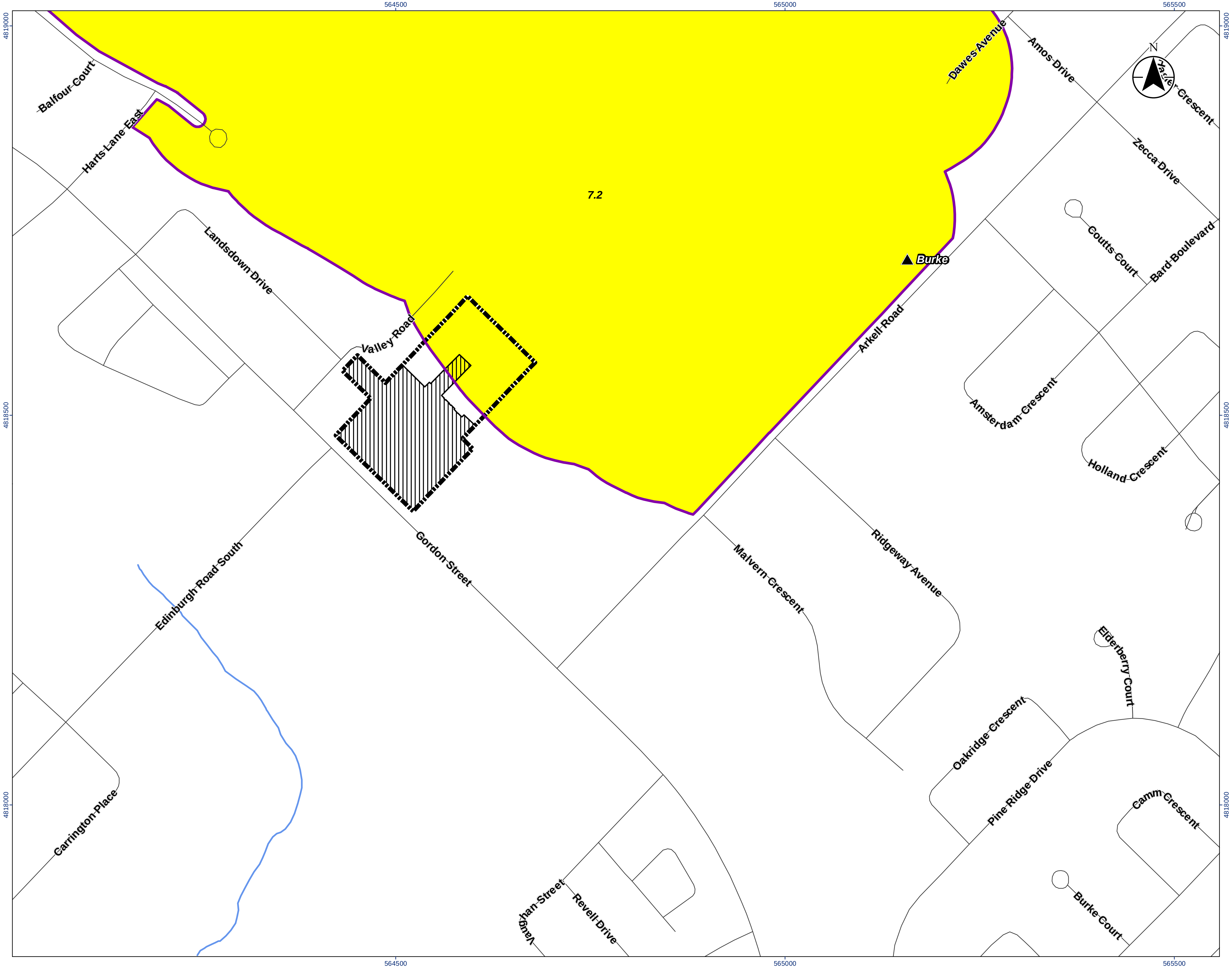
161413684
Prepared by CMC on 2021-08-12

Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD
HYDROGEOLOGICAL ASSESSMENT

Figure No.
6

Title
WHPA Vulnerability Scores

\\ca0220-ppfss01\work_group\01609\active_Other_PCs_Active\614 - London\161413684\03_data\gis_cad\Figures\Hydrogeology\ReportFigures\HydroG_Assess_V2\161413684_HGv2_Fig06_Vulnerability.mxd Revised: 2021-08-12 By: CCoghlan



Stantec

Legend

⬚	Site Boundary
▥	Proposed Development Footprint
—	Watercourse (Permanent)

Wellhead Protection Areas

☐	WHPA-E (GUDI)

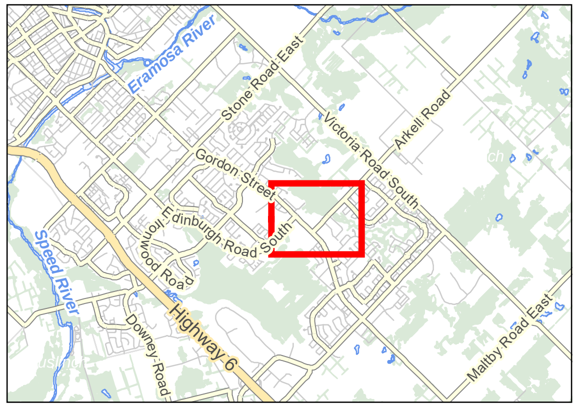
Vulnerability Scoring

🟨	7.2

0 125 250 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 and Forestry © Queen's Printer for Ontario, 2018.
3. Wellhead protection areas © Grand River Conservation, 2018.



Project Location
City of Guelph

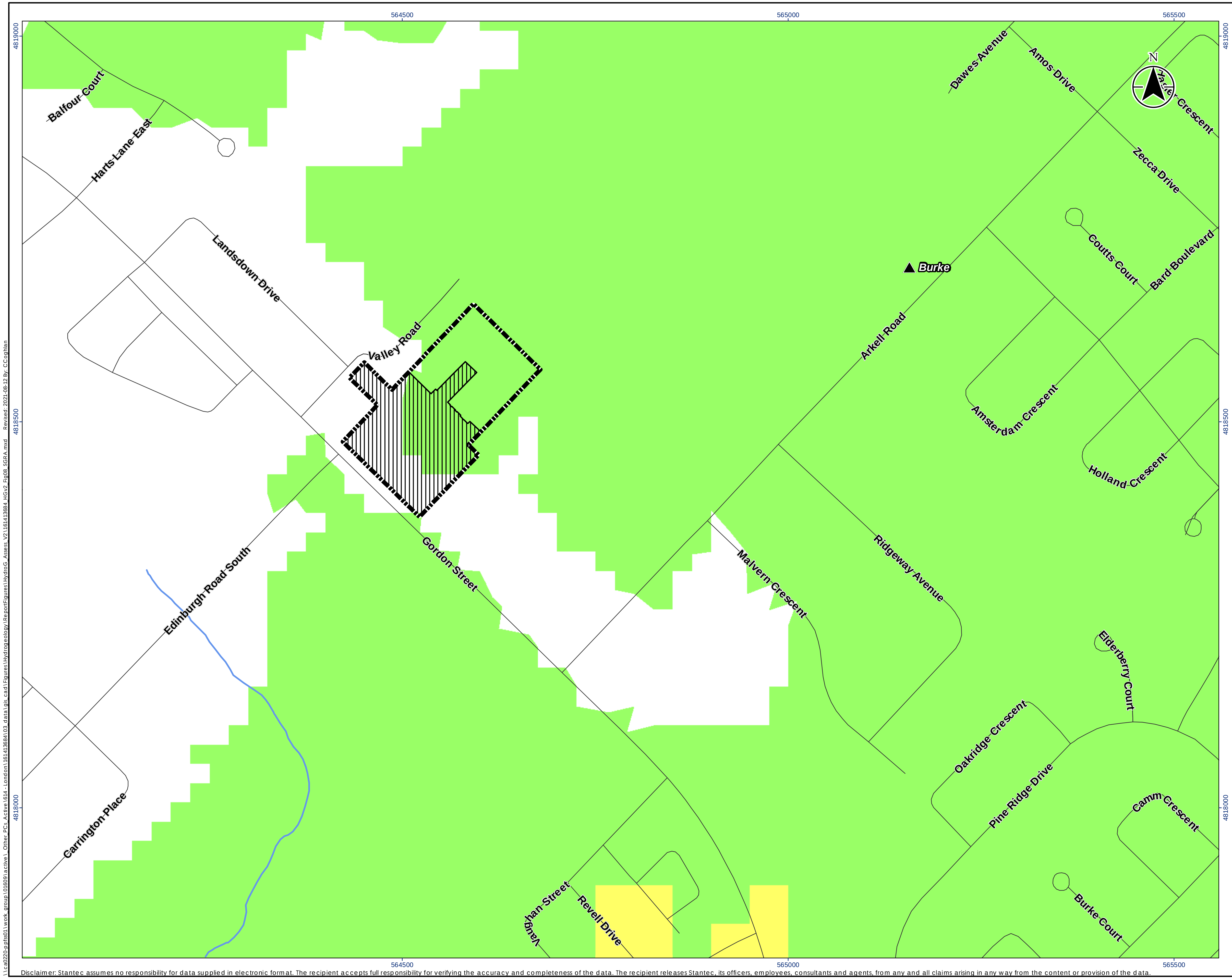
161413684
Prepared by CMC on 2021-08-12

Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD
HYDROGEOLOGICAL ASSESSMENT

Figure No.
7

Title
WHPA-E Vulnerability Scores

\\ca0220-ppfss01\work_group\01609\active_Other_PCs_Active\614 - London\161413684\03_data\gis_cad\Figures\Hydrogeology\ReportFigures\HydroG_Assess_V2\161413684_HGv2_Fig07_VulnerabilityGUDI.mxd Revised: 2021-08-12 By: CCoghlan



Stantec

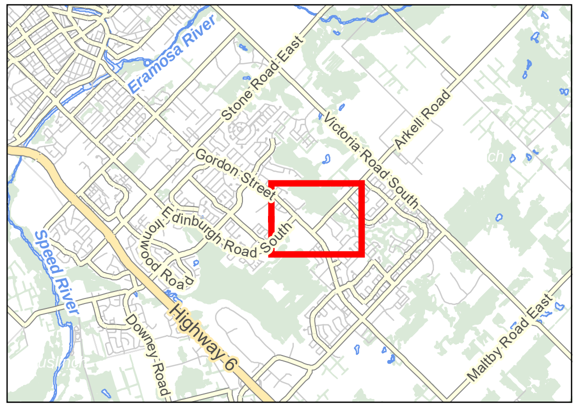
Legend
▨ Site Boundary
▥ Proposed Development Footprint
— Watercourse (Permanent)

Significant Groundwater Recharge Area
🟨 Vulnerability 6
🟩 Vulnerability 4

0 125 250 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 and Forestry © Queen's Printer for Ontario, 2018.
3. Wellhead protection areas © Grand River Conservation, 2018.



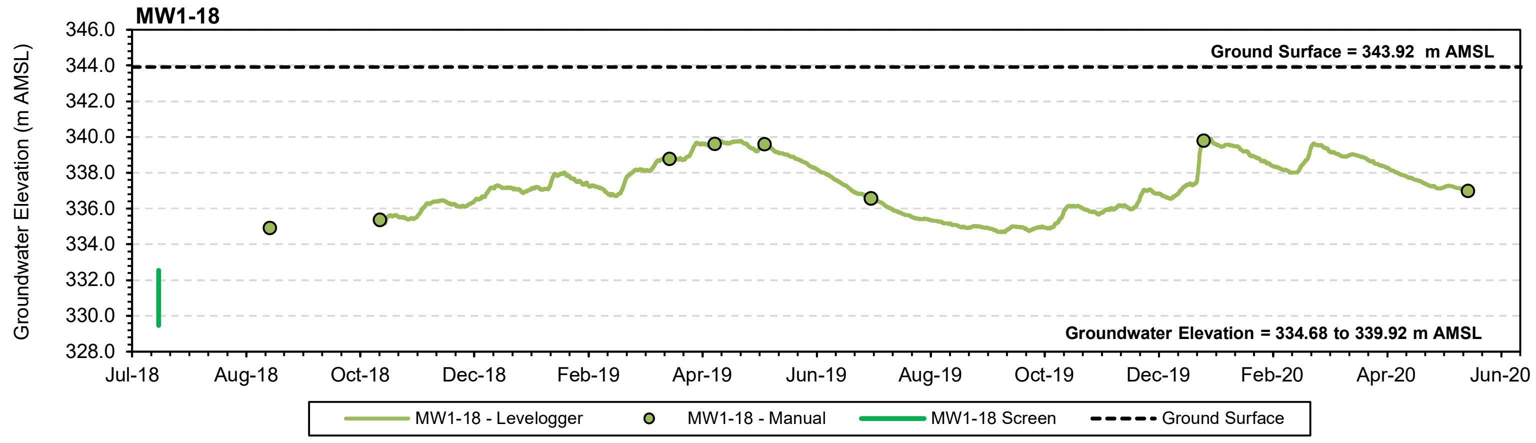
Project Location
City of Guelph

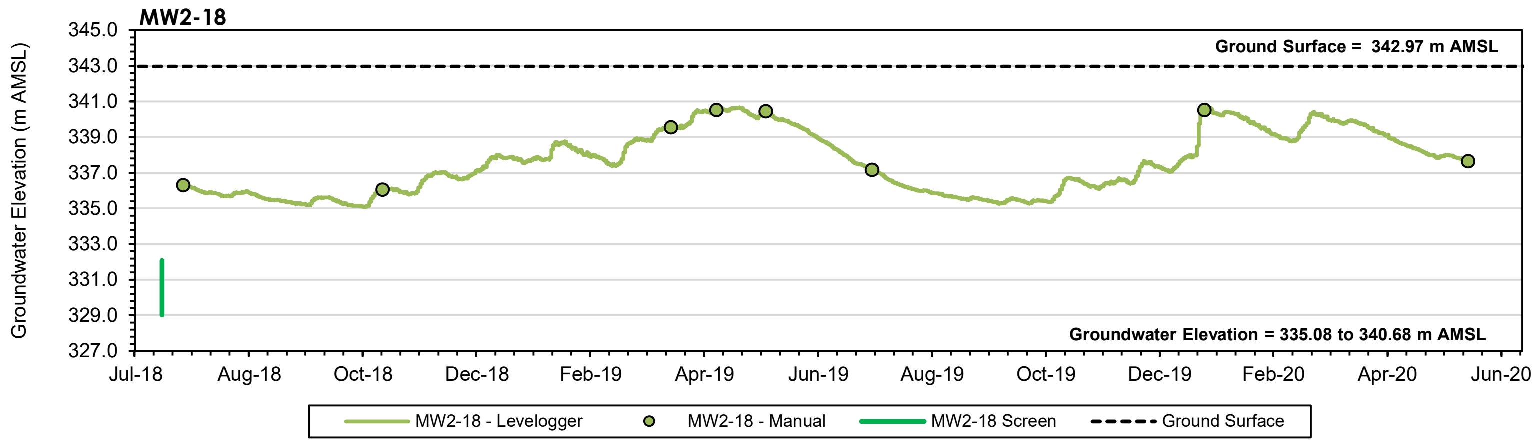
161413684
Prepared by CMC on 2021-08-12

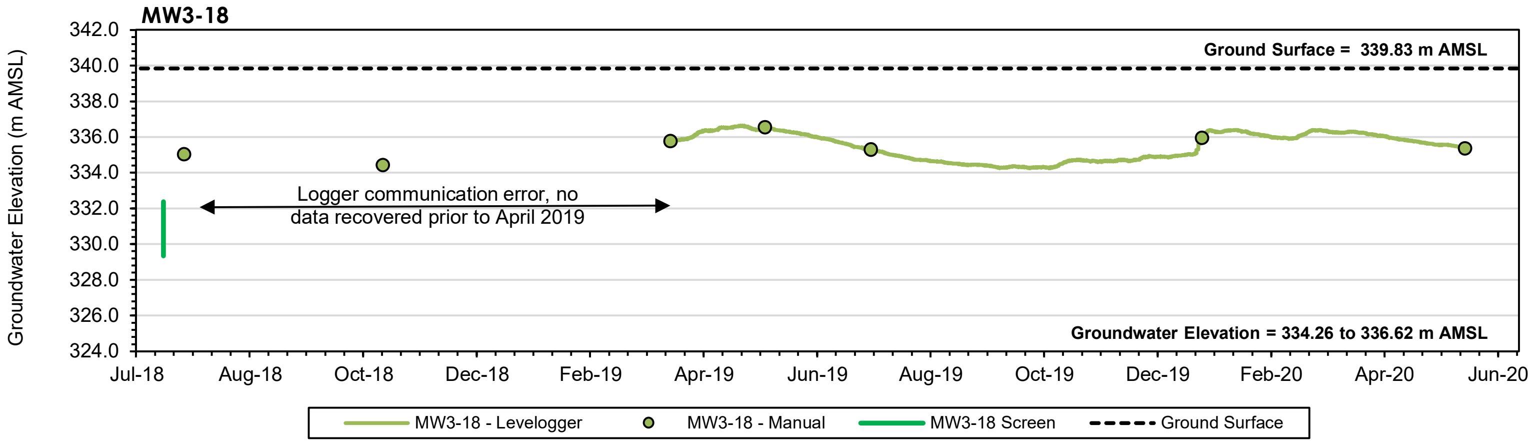
Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD
HYDROGEOLOGICAL ASSESSMENT

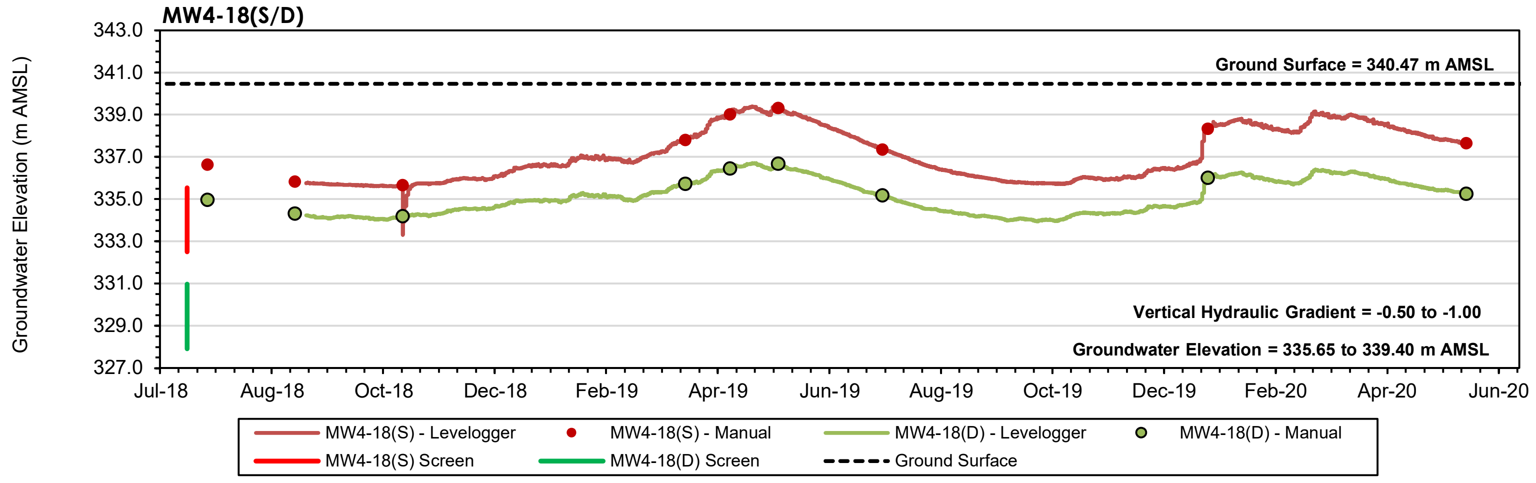
Figure No.
8

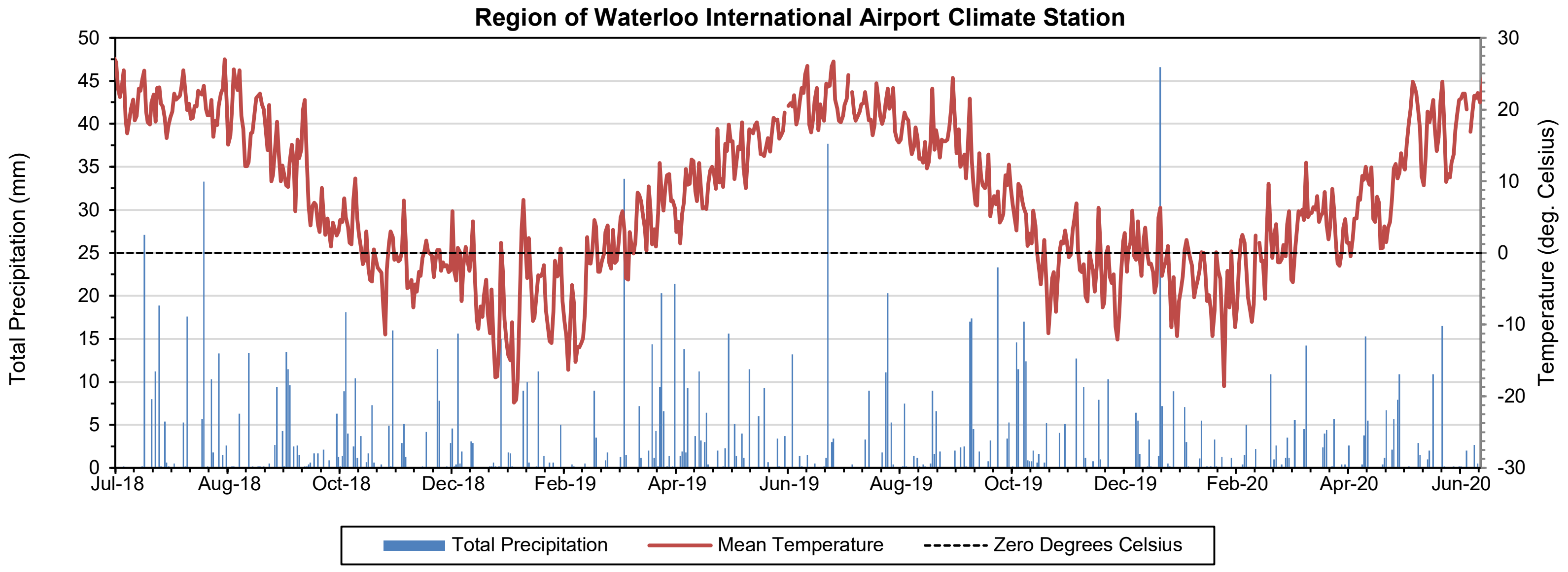
Title
Significant Groundwater Recharge Area









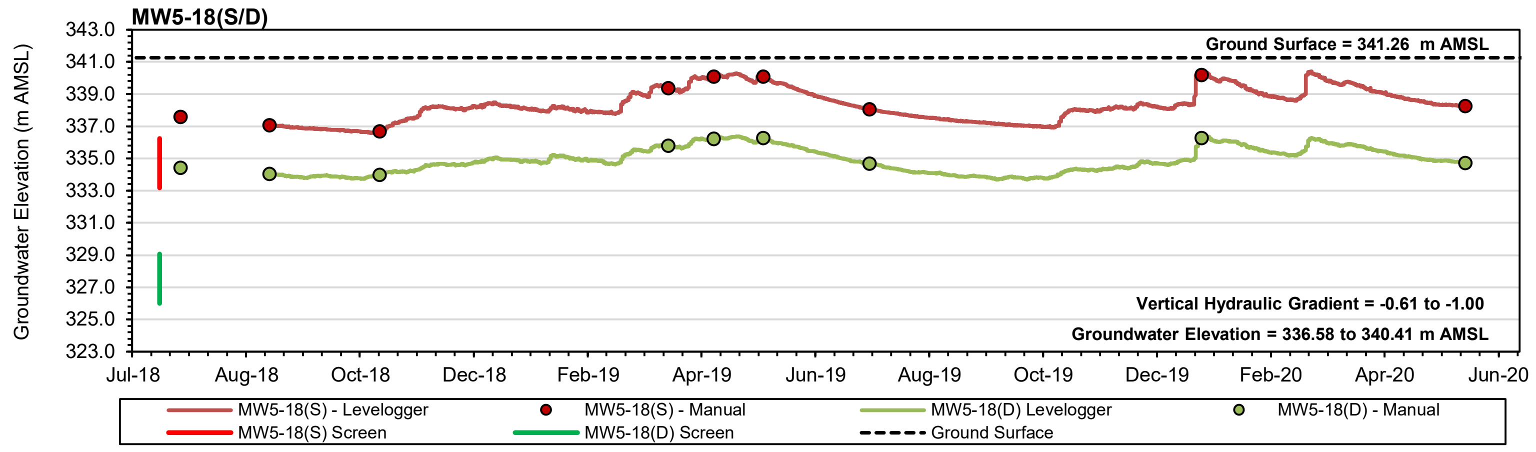


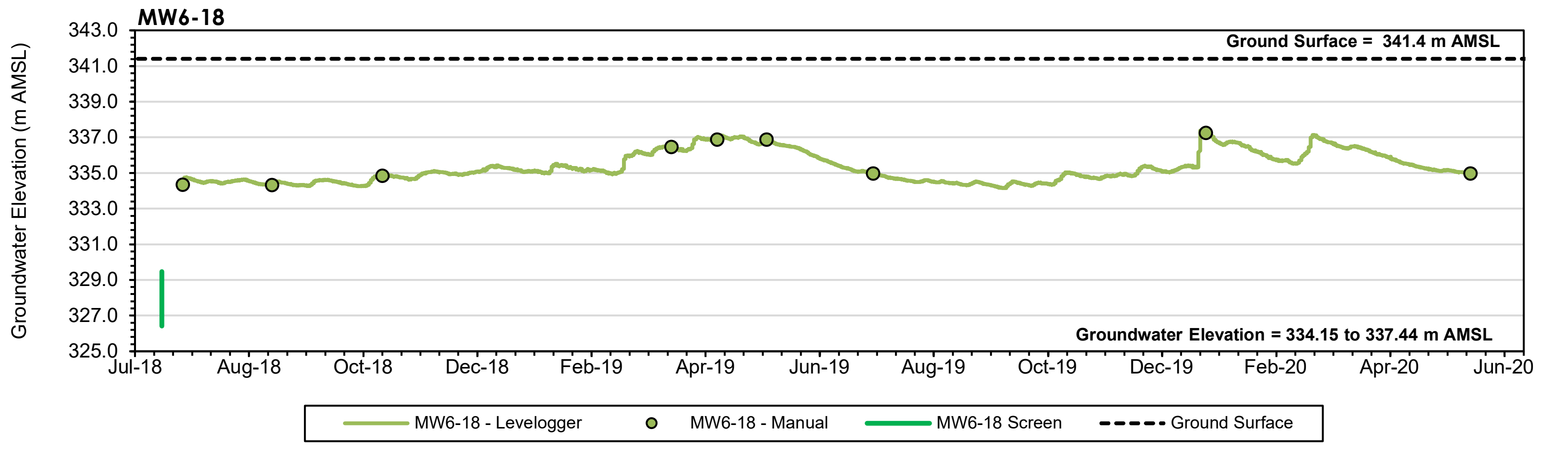
Precipitation and temperature data obtained from Environment Canada for the Region of Waterloo International Airport Climate Station (ID 6144239), accessed June 2020.

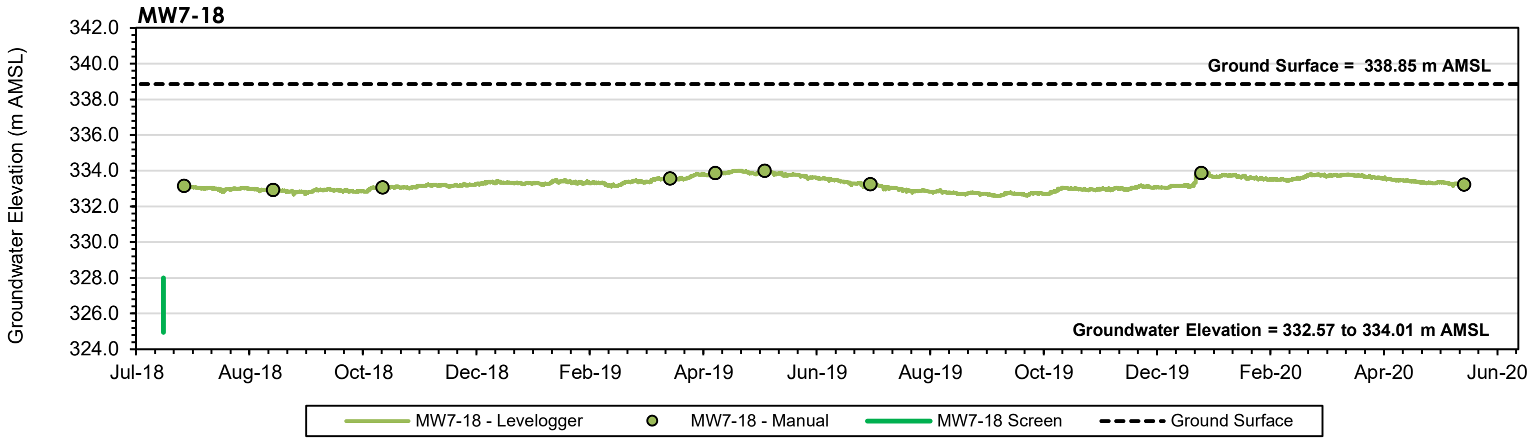
Client/Project
Tricar Developments Inc.
1242, 1250, 1260 Gordon Street and 9 Valley Road, Guelph
Hydrogeological Assessment

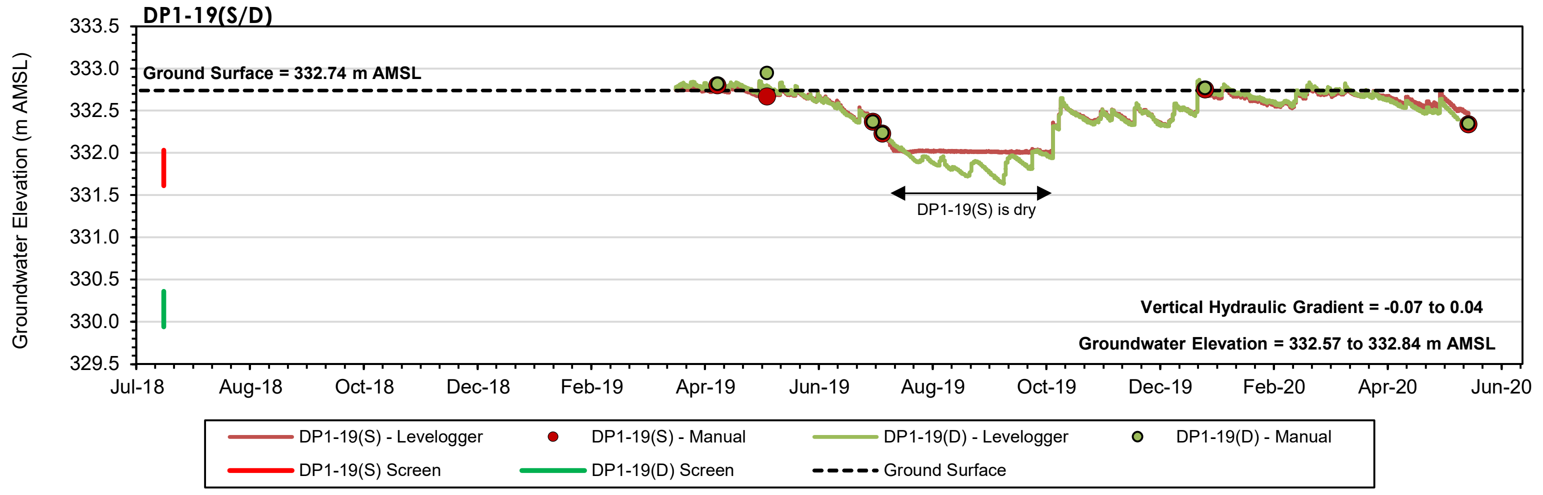
Figure No.
9

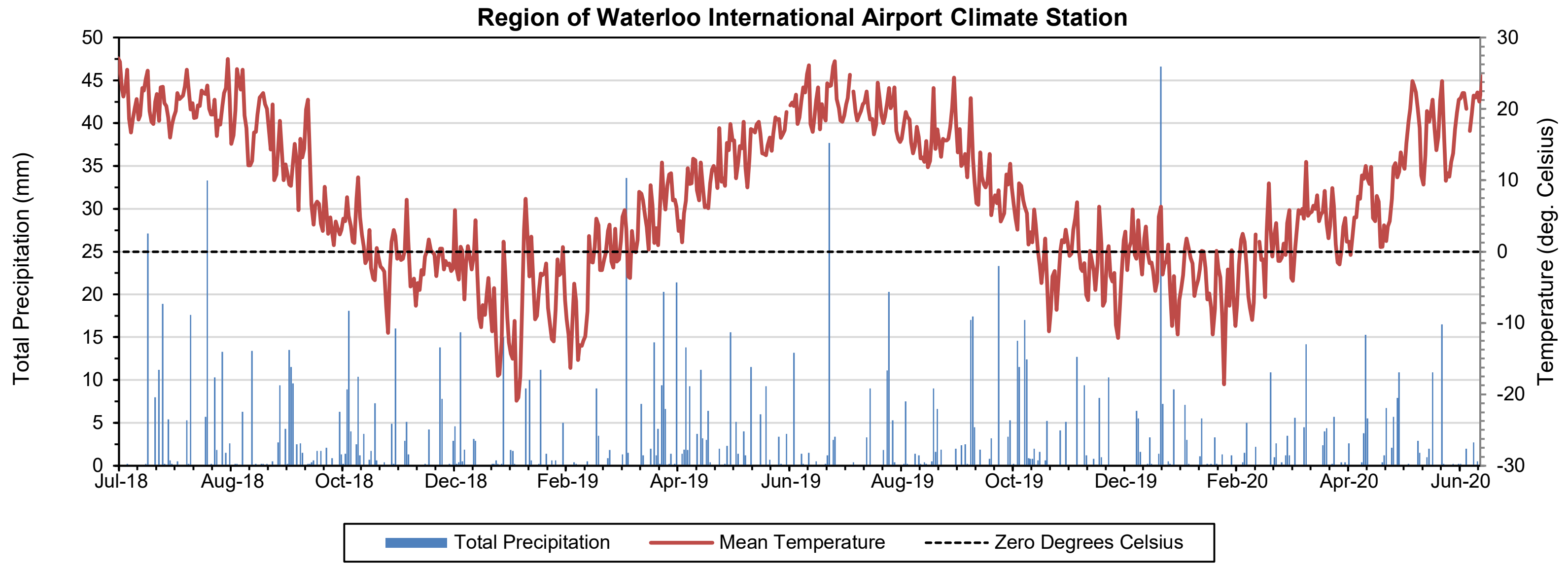
Title
HYDROGRAPHS
MW1-18 to MW4-18











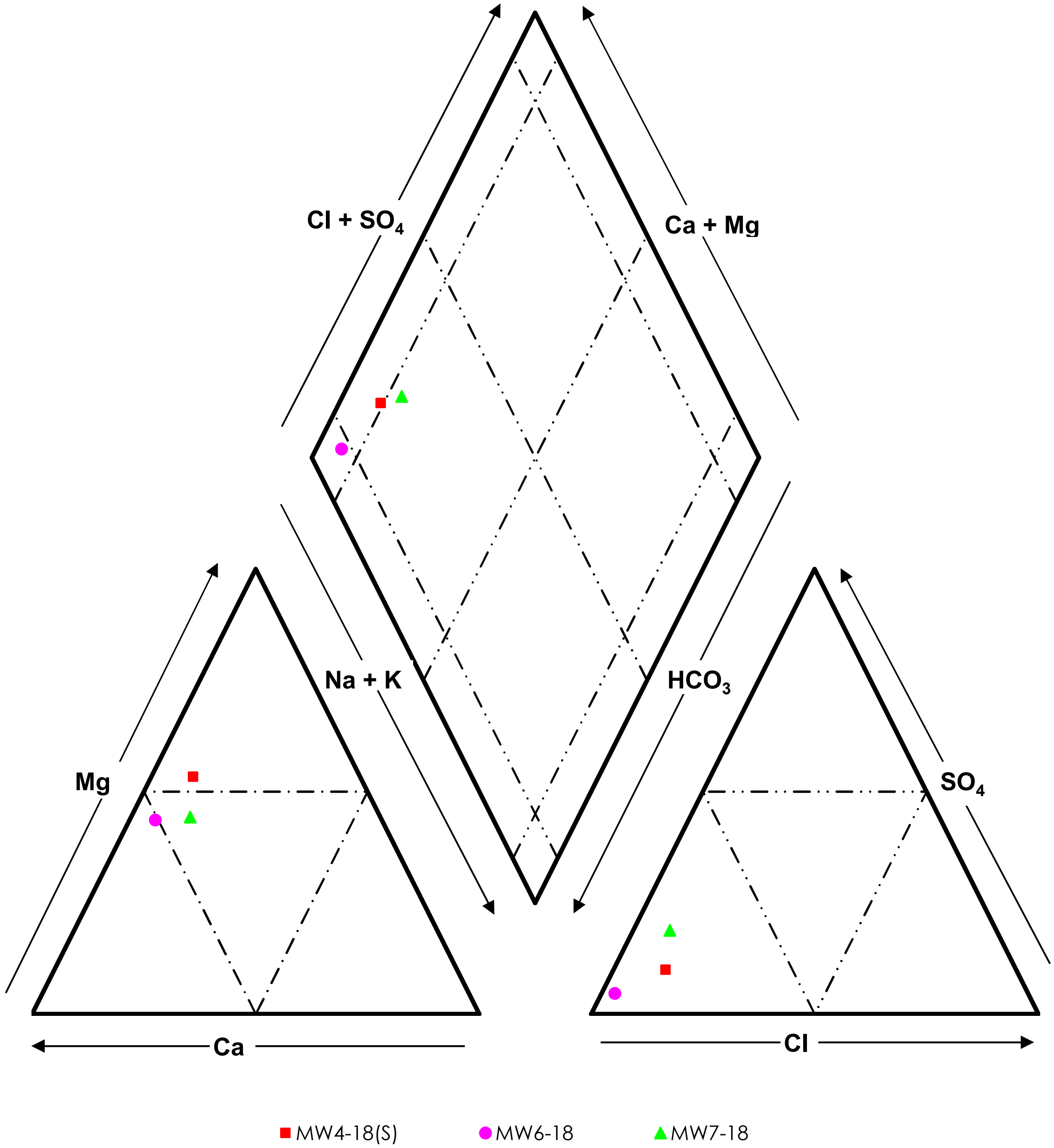
Precipitation and temperature data obtained from Environment Canada for the Region of Waterloo International Airport Climate Station (ID 6144239), accessed June 2020.

Client/Project
Tricar Developments Inc.
1242, 1250, 1260 Gordon Street and 9 Valley Road, Guelph
Hydrogeological Assessment

Figure No.
10

Title
HYDROGRAPHS
MW5-18 to MW7-18 and DP1-19(S/D)

Stantec

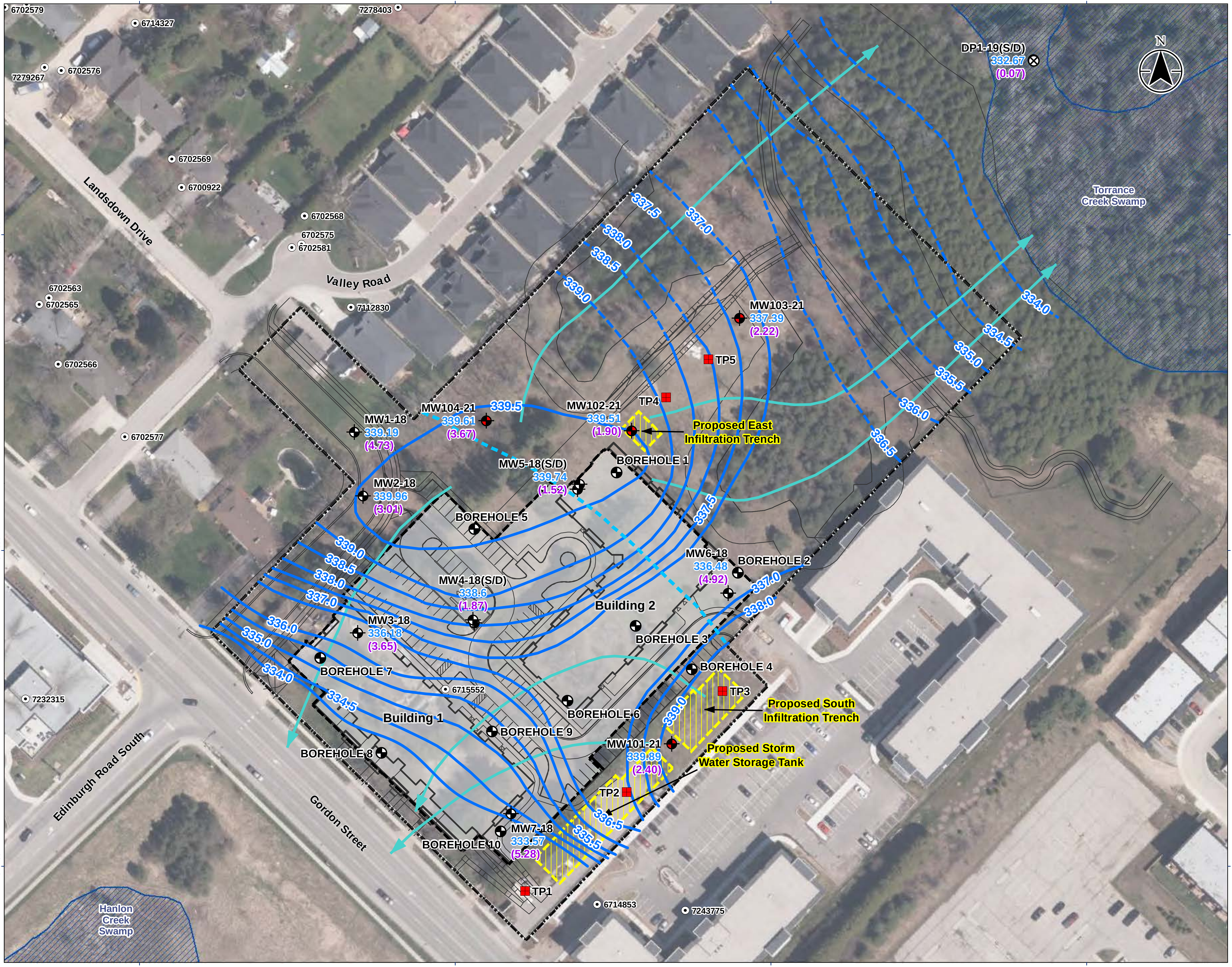


Stantec

1242, 1250, 1260 GORDON ST. AND 9 VALLEY DR.
HYDROGEOLOGICAL ASSESSMENT

PIPER DIAGRAM

DATE:	SCALE:	PROJECT No.	FIGURE No.
August 2021		161413684	**11**



Stantec

Legend

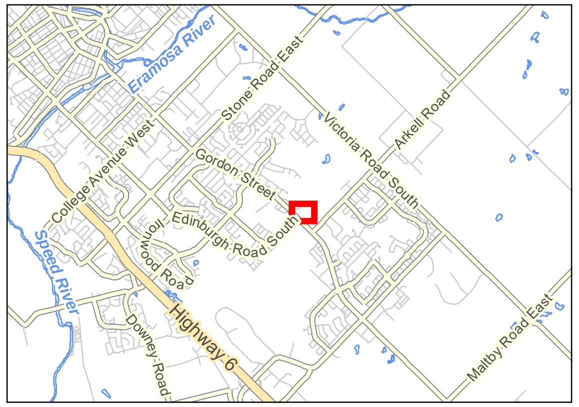
- ⬚ Site Boundary
- ⊕ Monitoring Well (Stantec, 2021)
- ⊕ Monitoring Well (Stantec, 2018)
- ⊗ Drive-Point Piezometer (Stantec, 2019)
- ◐ Borehole (CMT Engineering, 2018)
- 🟥 Test Pit (Stantec, 2021)
- ⊙ MECP Water Well
- 337.54 Groundwater Elevation (m AMSL) - April 2022
- (4.35) Groundwater Depth (m BGS)
- - - Interpreted Groundwater Flow Divide
- — Groundwater Contour (m AMSL)
- → Interpreted Direction of Groundwater Flow
- — Proposed Building
- - - Proposed Building (Underground)
- — Proposed Development Plan
- ▭ Proposed Extent of Underground Parking
- ▨ Proposed Stormwater Management Facility
- ▨ Wetland - Evaluated (Provincial)

0 25 50 Metres

1:1,250 (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, 2018.
3. Orthoimagery © First Base Solutions, 2018. Imagery flown in 2017.
4. MECP water wells have been positioned based on published UTM coordinates and should be considered approximate.
5. Groundwater elevation and depth shown for DP1-19(S/D) measured in May 2019



Project Location
City of Guelph

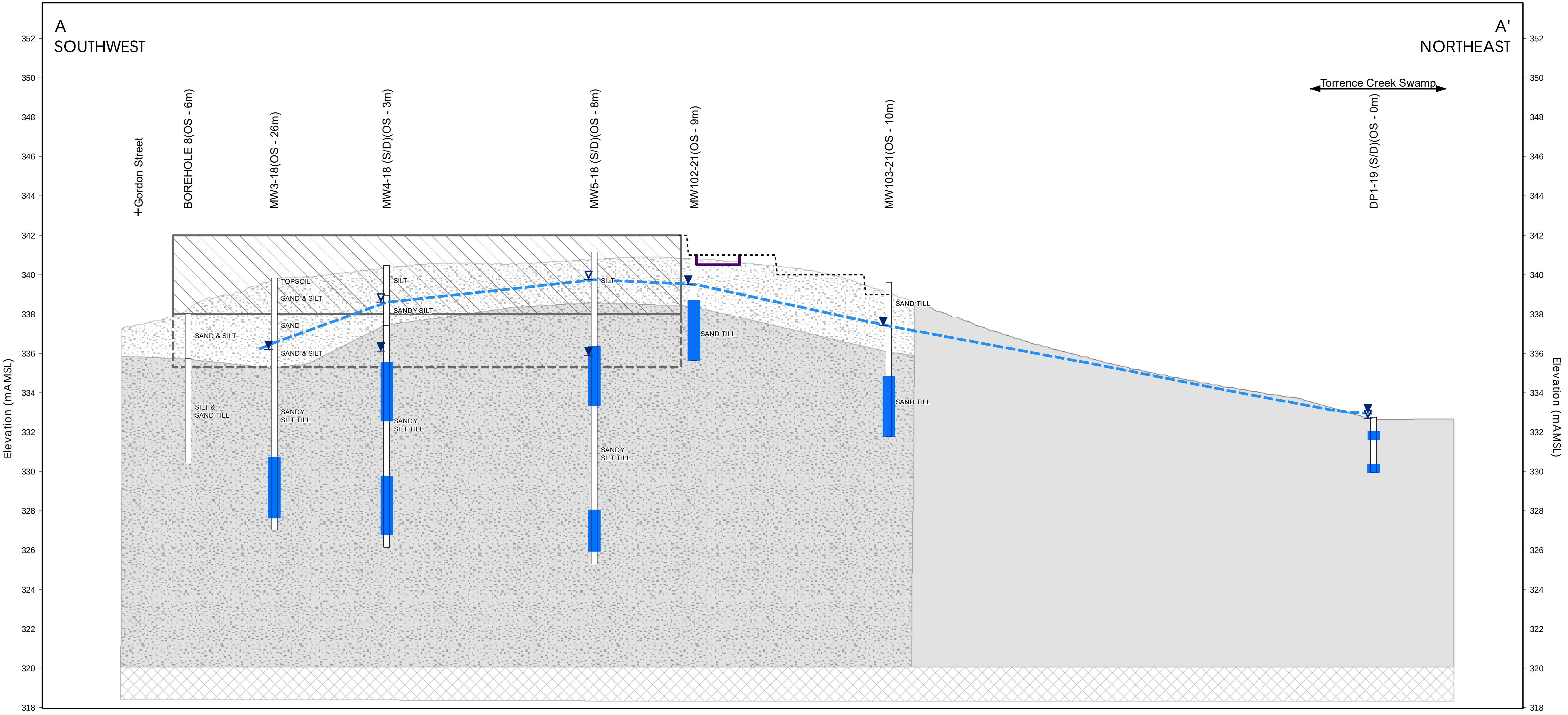
161413684
Prepared by PRM on 2022-06-17

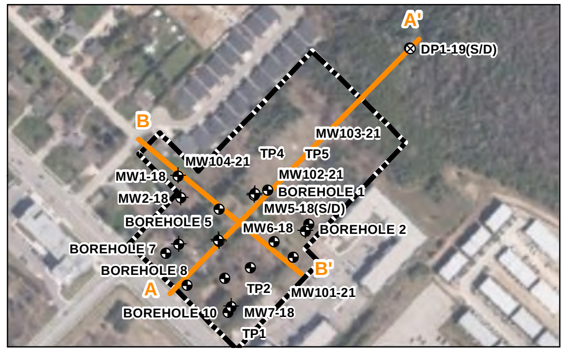
Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD
HYDROGEOLOGICAL ASSESSMENT

Figure No.
12

Title
Groundwater Flow

\\ca0004-ppfss04\work_group\01609\active_Other_PCs_Active\614 - London\161413684\03_data\gis_cad\Figures\Hydrogeology\ReportFigures\HydroG_Assess_V3\161413684_HGv3_Fig12_Grdw_Flow_April2022.mxd Revised: 2022-06-17 By: pmoser





Notes
1. Groundwater levels measured on April 4, 2022.
2. Orthoimagery © First Base Solutions, 2018. Imagery flown in 2019.

MW1-15 (OS m)

Well ID (Offset)

Sand Stratigraphy
▽ Water Level (Shallow Pipe)
▼ Water Level (Deep Pipe)
■ Well Screen

Interpreted Water Table (April 2022)
Proposed Post Development Grade
Proposed East Infiltration Trench (Base Elevation of 340.51 m AMSL)
▨ Proposed Condo Building/Parking Level 1
☐ Proposed Underground Parking Level 2 (Approximate)
▨ Overburden (No Borehole Data Available)
▨ Diamicton (Silt, Sand, Gravel)
▨ Port Stanley Till (Silty Sand to Sandy Silt Till)
▨ Bedrock

5x Vertical Exaggeration
0 20 40 metres
1:1,000 (At original document size of 11x17)

Project Location
City of Guelph

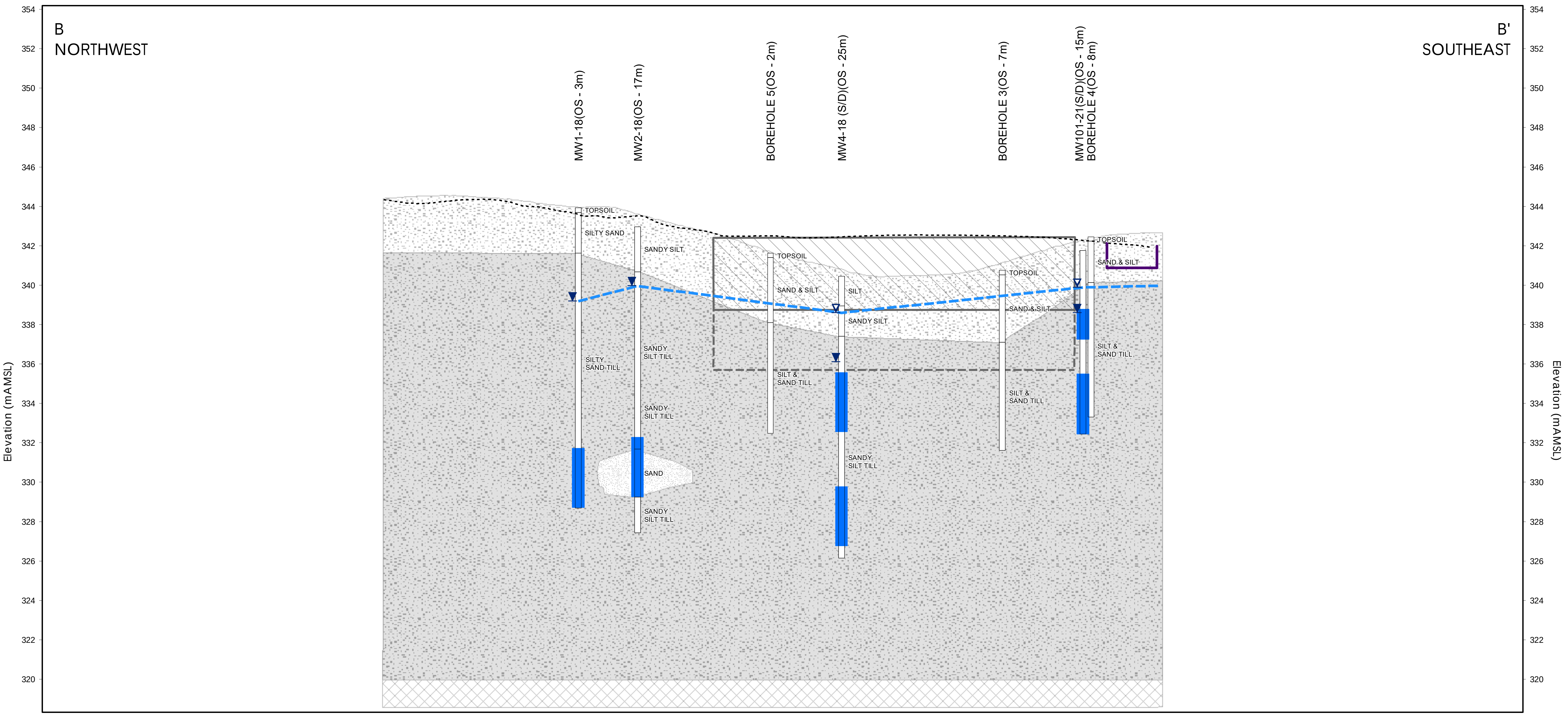
161413684 REVA
Prepared by pmoser on 2022-06-17
Technical Review by GW on 2022-06-17

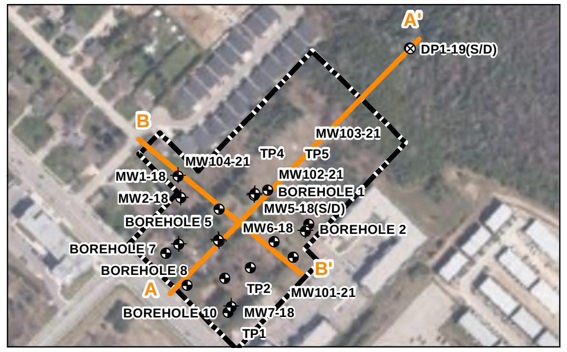
Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD
HYDROGEOLOGICAL ASSESSMENT

Figure No.
13

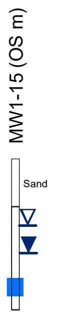
Title
Cross-Section A-A'

\\ca0004-ppfss04\work_group\01609\active_Other_PCs_Active\614 - London\161413684\03_data\gis_cad\Figures\Hydrogeology\ReportFigures\HydroG_Assess_V3\161413684_HGv3_Fig13_xsecAA.mxd Revised: 2022-06-17 By: pmoser





Notes
1. Groundwater levels measured on April 4, 2022.
2. Orthoimagery © First Base Solutions, 2018. Imagery flown in 2017.



Well ID (Offset)

Stratigraphy

Water Level (Shallow Pipe)

Water Level (Deep Pipe)

Well Screen

- Interpreted Water Table (April 2022)
- Proposed South Infiltration Trench (Base Elevation of 340.89 m AMSL)
- Proposed Post Development Grade
- ▨ Proposed Condo Building/Parking Level 1
- ☐ Proposed Underground Parking Level 2
- ☐ Overburden (No Borehole Data Available)
- ☐ Diamicton (Silt, Sand, Gravel)
- ☐ Sand
- ☐ Port Stanley Till (Silty Sand to Sandy Silt Till)
- ☐ Bedrock

5x Vertical Exaggeration

0 20 40 metres

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

Stantec

Project Location
City of Guelph

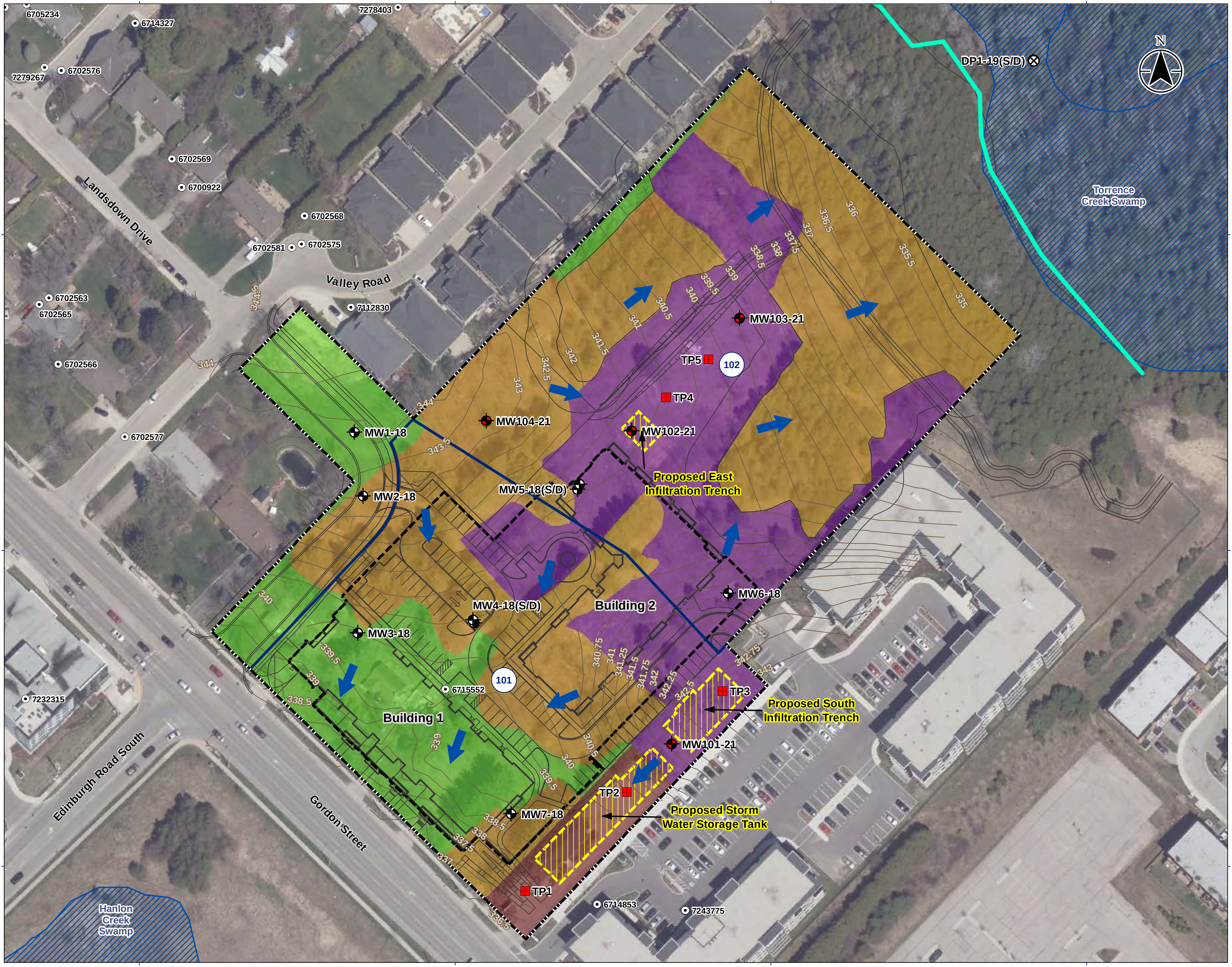
161413684 REVA
Prepared by pmoser on 2022-06-17
Technical Review by GW on 2022-06-16

Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD
HYDROGEOLOGICAL ASSESSMENT

Figure No.
14

Title
Cross-Section B-B'

\\ca0004-ppfss04\work_group\01609\active_Other_PCs_Active\614 - London\161413684\03_data\gis_cad\Figures\Hydrogeology\ReportFigures\HydroG_Assess_V3\161413684_HGv3_Fig14_xsecBB.mxd Revised: 2022-06-17 By: pmoser



Stantec

Legend

- ⬚ Site Boundary
- ⊙ MECP Water Well
- Proposed Building
- Proposed Building (Underground)
- Proposed Development Plan
- Approximate GRCA Wetland Boundary (2014)
- ➡ Major Overland Flood Route
- Topographic Contour (m AMSL)
- Proposed Stormwater Management Facility
- ☐ Stormwater Catchment (Existing Conditions)
- ▨ Wetland - Evaluated (Provincial)

Water Balance Sub Areas

- 🟨 Sub-Area A - Rolling, Fine Sandy Loam, Mature Forest
- 🟪 Sub-Area B - Rolling, Fine Sandy Loam, Pasture and Shrubs
- 🟩 Sub-Area C - Rolling, Fine Sandy Loam, Urban Lawn
- 🟫 Sub-Area D - Rolling, Fine Sandy Loam, Urban Lawn, 95% Impervious Cover

0 25 50 Metres

1:1,250 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
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3. Orthoimagery © First Base Solutions, 2021. Imagery flown in 2020.
4. MECP water wells have been positioned based on published UTM coordinates and should be considered approximate.

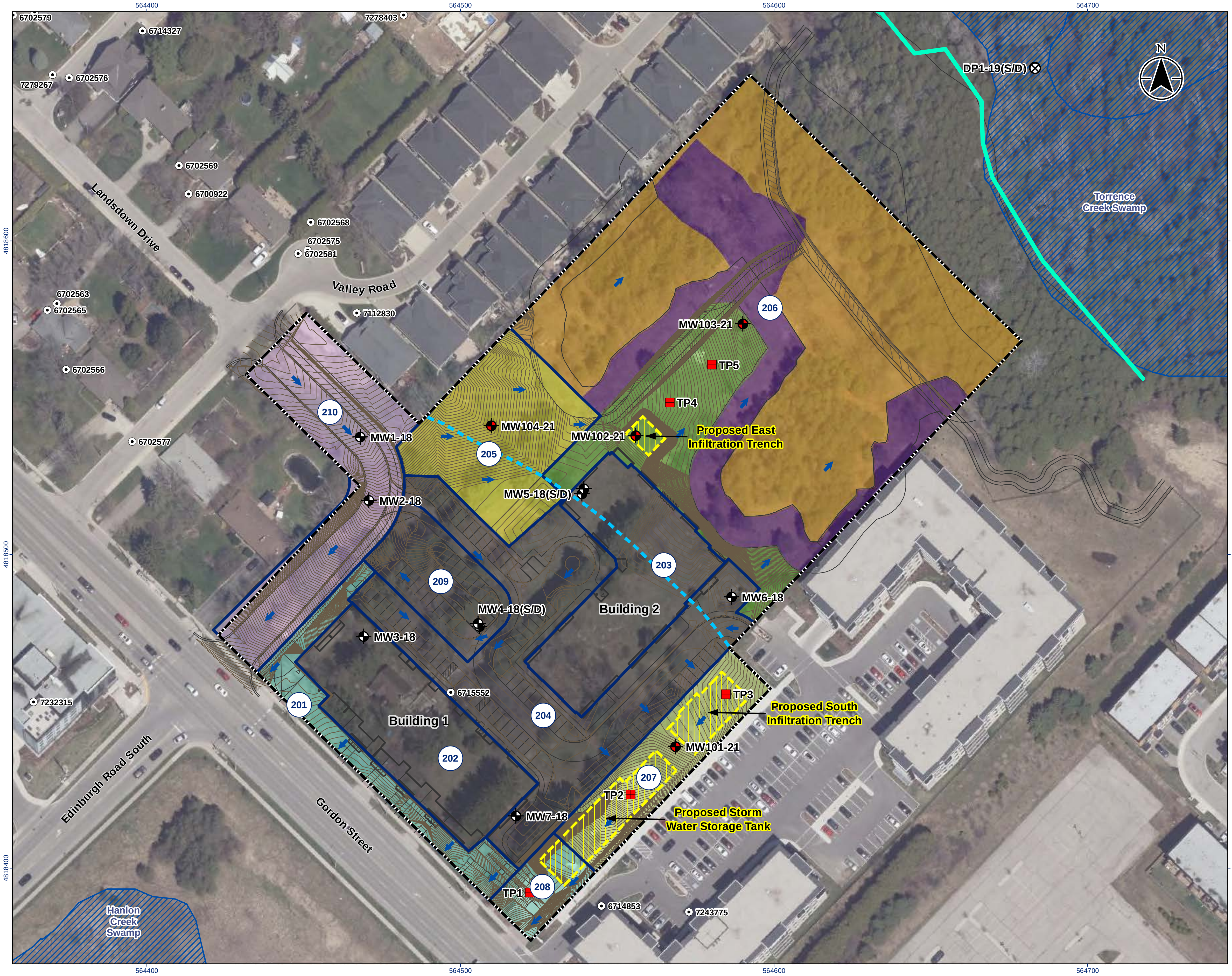
Project Location
City of Guelph

161413684
Prepared by PRM on 2022-06-10

Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD
HYDROGEOLOGICAL ASSESSMENT

Figure No.
15

Title
Water Balance - Pre-Development Condition



Stantec

Legend

⬚ Site Boundary
⊕ Monitoring Well (Stantec, 2021)
⊕ Monitoring Well (Stantec, 2018)
🟥 Test Pit (Stantec, 2021)
⊗ Drive-Point Piezometer (Stantec, 2019)
⊙ MECP Water Well
➔ Major Overland Flood Route
— Proposed Building
— Proposed Development Plan
- - - Interpreted Groundwater Flow Divide
— Approximate GRCA Wetland Boundary (2014)
— Proposed Topographic Contour (m AMSL)
▨ Proposed Stormwater Management Facility
☐ Stormwater Catchment (Proposed Conditions)
▨ Wetland - Evaluated (Provincial)

Water Balance Sub Areas

🟧 Sub-Area A - Rolling, Fine Sandy Loam, Mature Forest
🟪 Sub-Area B - Rolling, Fine Sandy Loam, Pasture and Shrubs
🟩 Sub-Area C - Rolling, Fine Sandy Loam, Urban Lawn
🟨 Sub-Area E - Rolling, Fine Sandy Loam, Urban Lawn, 10% Impervious Cover
▨ Sub-Area F - Rolling, Fine Sandy Loam, Urban Lawn, 50% Impervious Cover
▨ Sub-Area G - Rolling, Fine Sandy Loam, Urban Lawn, 70% Impervious Cover
▨ Sub-Area H - Rolling, Fine Sandy Loam, Urban Lawn, 90% Impervious Cover
▨ Sub-Area I - Rolling, Fine Sandy Loam, Urban Lawn, 100% Impervious Cover

0 25 50 Metres

1:1,250 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
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3. Orthoimagery © First Base Solutions, 2021. Imagery flown in 2020.
4. MECP water wells have been positioned based on published UTM coordinates and should be considered approximate.

Project Location
City of Guelph

161413684
Prepared by PRM on 2022-06-10

Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD
HYDROGEOLOGICAL ASSESSMENT

Figure No.
16

Title
Water Balance - Post-Development Conditions

\\ca0004-ppfss04\work group\01609\active\ Other PCs Active\614 - London\161413684\03 data\gis cad\Figures\Hydrogeology\ReportFigures\HydroG Assess V3\161413684 HGv3 Fig16 WaterBalancePostDev.mxd Revised: 2022-06-10 By: pmoser

Stantec

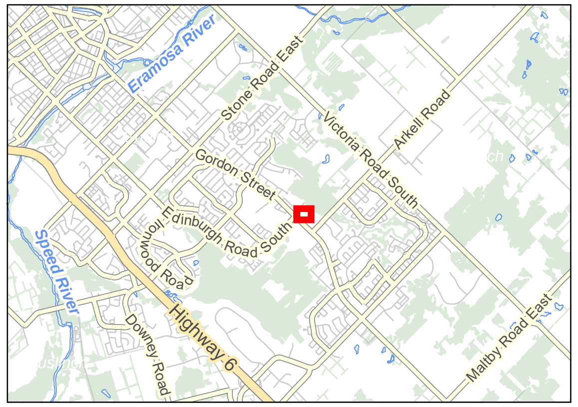
Legend

- ⬚ Site Boundary
- ⌖ Monitoring Well (Stantec, 2018)
- 🟥 Test Pit (Stantec, 2021)
- ⊙ MECP Water Well
- 337.54 Predicted Groundwater Mounding Height (m)
- — Predicted Groundwater Mounding Contour (mAMSL)
- — Proposed Development Plan
- ▨ Proposed Stormwater Management Facility
- ☐ Proposed Extent of Underground Parking
- ▨ Wetland - Evaluated (Provincial)

0 12.5 25 Metres

1:800 (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, 2018.
3. Orthoimagery © First Base Solutions, 2018. Imagery flown in 2017.
4. MECP water wells have been positioned based on published UTM coordinates and should be considered approximate.



Project Location
City of Guelph

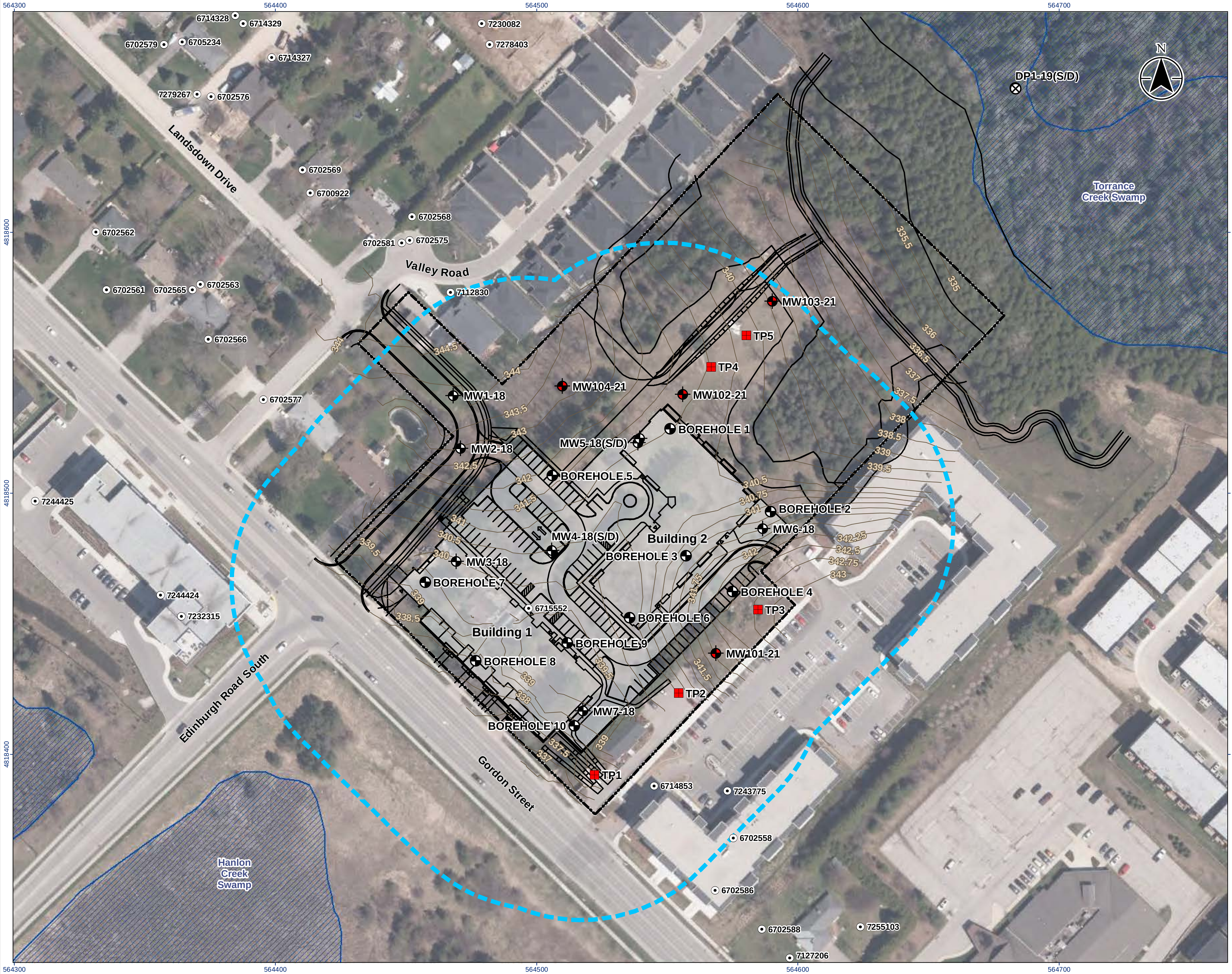
161413684
Prepared by CMC on 2022-06-17

Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD
HYDROGEOLOGICAL ASSESSMENT

Figure No.
17

Title
Groundwater Mounding - 25mm Storm Event

\\ca0004-ppfs04\work group\01609\active\ Other PCs Active\614 - London\161413684\03 data\gis cad\Figures\Hydrogeology\ReportFigures\HydroG Assess V2\161413684 HGv2 Fig17 25mmStorm v2.mxd Revised: 2022-06-17 By: bakaur



\\ca0004-ppfss04\work_group\01609\active_Other_PCs_Active\614 - London\161413684\03_data\gis_cad\Figures\Hydrogeology\ReportFigures\HydroG_Assess_V3\161413684_HGv3_Fig18_DewateringRadius.mxd Revised: 2022-06-17 By: pmoser

Stantec

Legend

- ⬚ Site Boundary
- ⊕ Monitoring Well (Stantec, 2021)
- ⊕ Monitoring Well (Stantec, 2018)
- ⊗ Drive-Point Piezometer (Stantec, 2019)
- ◐ Borehole (CMT Engineering, 2018)
- 🟥 Test Pit (Stantec, 2021)
- ⊙ MECP Water Well
- — Proposed Development Plan
- — Topographic Contour (m AMSL)
- ⬚ Dewatering Radius of Influence
- ▭ Proposed Extent of Underground Parking
- ▨ Wetland - Evaluated (Provincial)

0 25 50 Metres

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

Notes

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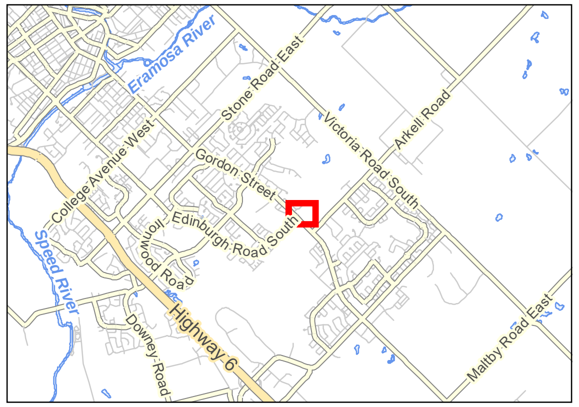
3. Orthoimagery © First Base Solutions, 2018. Imagery flown in 2019.
4. MECP water wells have been positioned based on published UTM coordinates and should be considered approximate.



Project Location
City of Guelph

161413684
Prepared by PRM on 2022-06-17
Technical Review by GW on 2022-06-16

Client/Project
TRICAR DEVELOPMENTS INC.
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD
HYDROGEOLOGICAL ASSESSMENT

Figure No.
18

Title
Dewatering Radius of Influence

APPENDIX B:
TABLES

TABLE 1
WELL CONSTRUCTION DETAILS

Well ID	UTM Coordinates		Elevations		Well Stick-up (m)	Well Depth (m BTOC)	Well Depth (m BGS)	Well Base Elevation (m AMSL)	Screened Interval				Screened Material Description (a)	Hydraulic Conductivity (b) (m/s)
	Northing	Easting	Top of Casing (m AMSL)	Ground Surface (m AMSL)					Top (m BGS)	Top Elevation (m AMSL)	Bottom (m BGS)	Bottom Elevation (m AMSL)		
Stantec Monitoring Wells														
MW1-18	4818537	564468	344.72	343.92	0.77	15.99	15.22	328.70	12.17	331.75	15.22	328.70	Sandy SILT TILL	-
MW2-18	4818517	564471	343.77	342.97	0.80	14.74	13.94	329.03	10.89	332.08	13.94	329.03	Sandy SILT TILL (19%) / SAND (81%)	4.7E-07
MW3-18	4818474	564469	340.91	339.83	1.08	13.30	12.22	327.61	9.17	330.66	12.22	327.61	Sandy SILT TILL	1.6E-09
MW4-18(S)	4818478	564506	341.32	340.47	0.85	8.82	7.97	332.50	4.92	335.55	7.97	332.50	Sandy SILT TILL	1.8E-07
MW4-18(D)	4818478	564506	341.28	340.47	0.81	14.51	13.70	326.77	10.65	329.82	13.70	326.77	Sandy SILT TILL	3.4E-09
MW5-18(S)	4818521	564540	342.02	341.26	0.76	8.84	8.08	333.18	5.03	336.23	8.08	333.18	Sandy SILT TILL	1.2E-08
MW5-18(D)	4818519	564539	342.02	341.14	0.88	16.01	15.13	326.01	13.61	327.53	15.13	326.01	Sandy SILT TILL	2.0E-08
MW6-18	4818487	564586	342.55	341.40	1.15	16.14	14.99	326.41	13.47	327.93	14.99	326.41	Sandy SILT TILL	5.4E-07
MW7-18	4818416	564518	339.64	338.85	0.79	14.69	13.90	324.95	12.38	326.47	13.90	324.95	Sandy SILT TILL	5.8E-08
MW101-21(S)	4818453	564564	342.91	342.29	0.62	5.65	5.03	337.26	3.51	338.78	5.03	337.26	Sandy SILT TILL	-
MW101-21(D)	4818445	564558	342.52	341.76	0.76	10.08	9.32	332.44	6.27	335.49	9.32	332.44	Sandy SILT TILL	-
MW102-21	4818538	564556	342.25	341.41	0.84	6.60	5.76	335.65	2.71	338.70	5.76	335.65	Sandy SILT TILL	-
MW103-21	4818574	564590	340.20	339.61	0.59	8.42	7.83	331.78	4.78	334.83	7.83	331.78	Sandy SILT TILL	-
MW104-21	4818539	564513	344.05	343.28	0.77	8.64	7.87	335.41	4.82	338.46	7.87	335.41	Sandy SILT TILL	-
													GEOMEAN =	**3.7E-08**
Stantec Drive-Point Piezometers														
DP1-19(S)	4818655	564683	333.74	332.74	1.00	2.13	1.13	331.61	0.71	332.03	1.13	331.61	-	-
DP1-19(D)	4818655	564683	333.89	332.74	1.15	3.95	2.80	329.94	2.38	330.36	2.80	329.94	-	-

Notes:

(a) Refer to **Appendix E** for borehole and well construction logs

(b) Refer to **Appendix G** hydraulic conductivity analytical solutions

m AMSL = meters above mean sea level
m BGS = meters below ground surface
m BTOC = meters below top of well casing
\- = data not available

TABLE 2

GROUNDWATER LEVEL DATA - MONITORING WELLS

Well ID	UTM Coordinates		Date	Time	Well Depth			Screen Length	Screen Separation (1)	Top of Casing Elevation (m AMSL)	Ground Surface Elevation (m AMSL)	Pipe Stick-up (m)	Groundwater Level			Vertical Hydraulic Gradient (3)
	Northing	Easting			(m BTOC)	(m BGS)	(m AMSL)	(m)	(m)				(m BGS) (2)	(m BTOC)	(m AMSL)	(+) = Upward (-) = Downward
MW1-18	4818537	564468	26-Jul-18	10:15 AM	15.99	15.22	329.50	3.05		344.72	343.92	0.77	-	-	-	
			11-Sep-18	9:17 AM									9.03	9.80	334.89	
			8-Nov-18	9:10 AM									8.57	9.34	335.35	
			9-Apr-19	2:14 PM									5.16	5.93	338.76	
			3-May-19	8:41 AM									4.34	5.11	339.58	
			29-May-19	11:07 AM									4.36	5.13	339.56	
			24-Jul-19	11:30 AM									7.38	8.15	336.54	
			15-Jan-20	10:55 AM									4.15	4.92	339.77	
			2-Jun-20	12:06 PM									6.97	7.74	336.95	
			24-Jan-22	12:04 PM									7.40	8.17	336.52	
			4-Apr-22	12:20 PM									4.73	5.50	339.19	
MW2-18	4818517	564471	26-Jul-18	3:58 PM	14.74	13.94	329.83	3.05		343.77	342.97	0.80	6.65	7.45	336.32	
			11-Sep-18	-									-	-	-	
			8-Nov-18	9:33 AM									6.90	7.70	336.07	
			9-Apr-19	2:14 PM									3.42	4.22	339.55	
			3-May-19	8:52 AM									2.44	3.24	340.53	
			29-May-19	11:15 AM									2.52	3.32	340.45	
			24-Jul-19	11:41 AM									5.80	6.60	337.17	
			15-Jan-20	11:04 AM									2.45	3.25	340.52	
			2-Jun-20	11:56 AM									5.31	6.11	337.66	
			24-Jan-22	1:09 PM									5.84	6.64	337.13	
			4-Apr-22	12:22 PM									3.01	3.81	339.96	
MW3-18	4818474	564469	26-Jul-18	2:56 PM	13.30	12.22	328.69	3.05		340.91	339.83	1.08	4.81	5.89	335.02	
			11-Sep-18	-									-	-	-	
			8-Nov-18	9:45 AM									5.41	6.49	334.42	
			9-Apr-19	3:29 PM									4.07	5.15	335.76	
			3-May-19	10:55 AM									-	-	-	
			29-May-19	11:22 AM									3.29	4.37	336.54	
			24-Jul-19	11:41 AM									4.54	5.62	335.29	
			15-Jan-20	11:11 AM									3.89	4.97	335.94	
			2-Jun-20	11:52 AM									4.47	5.55	335.36	
			24-Jan-22	1:06 PM									4.86	5.94	334.97	
			4-Apr-22	12:25 PM									3.65	4.73	336.18	
MW4-18(S)	4818478	564506	26-Jul-18	10:15 AM	8.82	7.97	333.35	3.05		341.32	340.47	0.85	3.83	4.68	336.64	
			11-Sep-18	1:18 PM									4.63	5.48	335.84	
			8-Nov-18	10:54 AM									4.81	5.66	335.66	
			9-Apr-19	3:26 PM									2.66	3.51	337.81	
			3-May-19	10:34 AM									1.45	2.30	339.02	
			29-May-19	12:20 PM									1.15	2.00	339.32	
			24-Jul-19	11:56 AM									3.11	3.96	337.36	
			15-Jan-20	12:06 PM									2.12	2.97	338.35	
			2-Jun-20	11:22 AM									2.82	3.67	337.65	
			24-Jan-22	1:03 PM									3.80	4.65	336.67	
			4-Apr-22	12:30 PM									1.87	2.72	338.60	

TABLE 2
GROUNDWATER LEVEL DATA - MONITORING WELLS

Well ID	UTM Coordinates		Date	Time	Well Depth			Screen Length	Screen Separation [1]	Top of Casing Elevation (m AMSL)	Ground Surface Elevation (m AMSL)	Pipe Stick-up (m)	Groundwater Level			Vertical Hydraulic Gradient [3]
	Northing	Easting			(m BTOC)	(m BGS)	(m AMSL)	(m)	(m)				(m BGS) [2]	(m BTOC)	(m AMSL)	(+) = Upward (-) = Downward
MW4-18(D)	4818478	564506	26-Jul-18	10:16 AM	14.51	13.70	327.58	3.05	2.68	341.28	340.47	0.81	5.49	6.30	334.98	-0.62
			11-Sep-18	1:20 PM									6.15	6.96	334.32	-0.57
			8-Nov-18	10:54 AM									6.27	7.08	334.20	-0.54
			9-Apr-19	3:23 PM									4.73	5.54	335.74	-0.77
			3-May-19	10:35 AM									4.01	4.82	336.46	-0.96
			29-May-19	12:18 PM									3.79	4.60	336.68	-0.99
			24-Jul-19	11:59 AM									5.28	6.09	335.19	-0.81
			15-Jan-20	12:08 PM									4.46	5.27	336.01	-0.87
			2-Jun-20	11:20 AM									5.21	6.02	335.26	-0.89
			24-Jan-22	1:01 PM									5.75	6.56	334.72	-0.73
			4-Apr-22	12:29 PM									4.37	5.18	336.10	-0.93
MW5-18(S)	4818521	564540	26-Jul-18	11:27 AM	8.84	8.08	333.94	3.05		342.02	341.26	0.76	3.67	4.43	337.59	
			11-Sep-18	10:17 AM									4.20	4.96	337.06	
			8-Nov-18	10:28 AM									4.57	5.33	336.69	
			9-Apr-19	3:11 PM									1.89	2.65	339.37	
			3-May-19	10:13 AM									1.17	1.93	340.09	
			29-May-19	11:57 AM									1.18	1.94	340.08	
			24-Jul-19	12:29 PM									3.21	3.97	338.05	
			15-Jan-20	11:20 AM									1.06	1.82	340.20	
			2-Jun-20	11:30 AM									3.01	3.77	338.25	
			24-Jan-22	12:12 PM									3.33	4.09	337.93	
			4-Apr-22	1:19 PM									1.52	2.28	339.74	
MW5-18(D)	4818519	564539	26-Jul-18	11:24 AM	14.69	13.81	328.21	1.52	4.21	342.02	341.14	0.88	6.72	7.60	334.42	-0.75
			11-Sep-18	10:18 AM									7.11	7.99	334.03	-0.72
			8-Nov-18	10:23 AM									7.15	8.03	333.99	-0.64
			9-Apr-19	3:09 PM									5.35	6.23	335.79	-0.85
			3-May-19	10:14 AM									4.92	5.80	336.22	-0.92
			29-May-19	11:51 AM									4.87	5.75	336.27	-0.90
			24-Jul-19	12:31 PM									6.46	7.34	334.68	-0.80
			15-Jan-20	11:22 AM									4.87	5.75	336.27	-0.93
			2-Jun-20	11:29 AM									6.41	7.29	334.73	-0.84
			24-Jan-22	12:15 PM									6.72	7.60	334.42	-0.83
			4-Apr-22	1:17 PM									5.27	6.15	335.87	-0.92
MW6-18	4818487	564586	26-Jul-18	1:05 PM	16.14	14.99	327.56	3.05		342.55	341.40	1.15	7.05	8.20	334.35	
			11-Sep-18	11:20 AM									7.07	8.22	334.33	
			8-Nov-18	10:14 AM									6.55	7.70	334.85	
			9-Apr-19	2:52 PM									4.93	6.08	336.47	
			3-May-19	10:03 AM									4.51	5.66	336.89	
			29-May-19	11:43 AM									4.51	5.66	336.89	
			24-Jul-19	12:18 PM									6.42	7.57	334.98	
			15-Jan-20	11:45 AM									4.15	5.30	337.25	
			2-Jun-20	11:44 AM									6.41	7.56	334.99	
			24-Jan-22	12:44 PM									6.64	7.79	334.76	
			4-Apr-22	1:14 PM									4.92	6.07	336.48	

TABLE 2
GROUNDWATER LEVEL DATA - MONITORING WELLS

Well ID	UTM Coordinates		Date	Time	Well Depth			Screen Length	Screen Separation (1)	Top of Casing Elevation (m AMSL)	Ground Surface Elevation (m AMSL)	Pipe Stick-up (m)	Groundwater Level			Vertical Hydraulic Gradient (3)
	Northing	Easting			(m BTOC)	(m BGS)	(m AMSL)	(m)	(m)				(m BGS) (2)	(m BTOC)	(m AMSL)	(+) = Upward (-) = Downward
MW7-18	4818416	564518	26-Jul-18	2:04 PM	14.69	13.90	325.74	1.52		339.64	338.85	0.79	5.71	6.50	333.14	
			11-Sep-18	12:00 PM									5.93	6.72	332.92	
			8-Nov-18	10:03 AM									5.80	6.59	333.05	
			9-Apr-19	2:42 PM									5.29	6.08	333.56	
			3-May-19	9:51 AM									5.00	5.79	333.85	
			29-May-19	11:34 AM									4.86	5.65	333.99	
			24-Jul-19	12:07 PM									5.61	6.40	333.24	
			15-Jan-20	11:55 AM									4.99	5.78	333.86	
			2-Jun-20	11:48 AM									5.62	6.41	333.23	
			24-Jan-22	12:55 PM									5.93	6.72	332.92	
			4-Apr-22	12:34 PM									5.28	6.07	333.57	
MW101-21(S)	4818453	564564	24-Jan-22	12:48 PM	5.65	5.03	337.88	1.52		342.91	342.29	0.62	3.54	4.16	338.75	
			4-Apr-22	1:01 PM						342.52	341.76	0.76	2.40	3.02	339.89	
MW101-21(D)	4818445	564558	24-Jan-22	12:50 PM	10.08	9.32	333.20	3.05	1.24	342.52	341.76	0.76	5.27	6.03	336.49	-0.54
			4-Apr-22	12:40 PM									3.16	3.92	338.60	-0.31
MW102-21	4818538	564556	24-Jan-22	12:18 PM	6.60	5.76	336.49	3.05		342.25	341.41	0.84	3.68	4.52	337.73	
			4-Apr-22	12:40 PM									1.90	2.74	339.51	
MW103-21	4818574	564590	24-Jan-22	12:22 PM	8.42	7.83	332.37	3.05		340.20	339.61	0.59	4.79	5.38	334.82	
			4-Apr-22	1:39 PM									2.22	2.81	337.39	
MW104-21	4818539	564513	24-Jan-22	12:09 PM	8.64	7.87	336.18	3.05		344.05	343.28	0.77	4.78	5.55	338.50	
			4-Apr-22	2:06 PM									3.67	4.44	339.61	

Notes:

(1) Distance between the top of the screen in the deep well and the bottom of screen in the shallow well.
(2) A negative value indicates that the water level measured within the pipe is located above ground surface
(3) Negative and positive values indicate downward and upward gradients, respectively.

m BGS = meters below ground surface
m BTOC = meters below top of casing
DRY = no groundwater or surface water was observed in the piezometer or watercourse, respectively

TABLE 3
GROUNDWATER LEVEL DATA - DRIVE-POINT PIEZOMETERS

Piezometer ID	UTM Coordinates		Total Depth		Screen Length	Screen Separation (1)	Pipe Stick-up	Ground Surface Elevation	Top of Casing Elevation	Date	Time	Groundwater Level			Surface Water Level		Vertical Hydraulic Gradient(4) (+) = Upward (-) = Downward
	Northing	Easting	(m BTOC)	(m BGS)	(m)	(m)	(m)	(m AMSL)	(m AMSL)			(m BGS) (2)	(m BTOC)	(m AMSL)	(m BTOC) (3)	(m AMSL)	
DP1-19(S)	4818655	564683	2.13	1.13	0.30		1.00	332.74	333.74	3-May-19	9:10 AM	-0.06	0.94	332.80	0.90	332.84	
										29-May-19	10:48 AM	0.07	1.07	332.67	DRY	-	
										24-Jul-19	11:02 AM	0.37	1.37	332.37	DRY	-	
										29-Jul-19	3:08 PM	0.51	1.51	332.23	DRY	-	
										15-Jan-20	10:34 AM	-0.01	0.99	332.75	DRY	-	
										2-Jun-20	11:35 AM	0.40	1.40	332.34	DRY	-	
DP1-19(D)	4818655	564683	3.95	2.80	0.30	1.67	1.15	332.74	333.89	3-May-19	9:15 AM	-0.08	1.07	332.82	1.03	332.86	0.01
										29-May-19	10:48 AM	-0.21	0.94	332.95	DRY	-	0.17
										24-Jul-19	11:02 AM	0.37	1.52	332.37	DRY	-	0.00
										29-Jul-19	3:08 PM	0.50	1.65	332.24	DRY	-	0.01
										15-Jan-20	10:37 AM	-0.03	1.12	332.77	DRY	-	0.01
										2-Jun-20	11:34 AM	0.39	1.54	332.35	DRY	-	0.01

Notes:

(1) Distance between the mid-point of the screened intervals of the shallow and deep piezometer.
(2) A negative value indicates that the water level measured within the pipe is located above ground surface.
(3) A negative value indicates that the surface water level is above the top of the piezometer.
(4) Vertical hydraulic gradient between the surface water feature substrate and the piezometer screened interval.

m BGS = meters below ground surface
m BTOC = meters below top of casing
DRY = no groundwater or surface water was observed in the piezometer or surface water feature, respectively
n/a = measurement not available

TABLE 4 - GROUNDWATER QUALITY RESULTS
CITY OF GUELPH SANITARY AND SEWER BY-LAW (1996)-15202

Sample Location			**MW2-18**	
Sample Date			**11-Sep-18**	**11-Sep-18**
Sample ID			**WG-161413684-20180911-DS-04**	**WG-161413684-20180911-DS-04 Lab-Dup**
Sampling Company			**STANTEC**	**STANTEC**
Laboratory			**MAXX**	**MAXX**
Laboratory Work Order			**B8N6455**	**B8N6455**
Laboratory Sample ID			**HSJ715**	**HSJ715**
Sample Type	**Units**	**City of Guelph**		**Lab Replicate**
General Chemistry				
Chloride	mg/L	1,500^A	46	-
Cyanide	mg/L	2^A	<0.0050	-
Fluoride	mg/L	10^A	0.13	-
pH, lab	S.U.	5.5-9.5^A 6.0-9.0^B	7.90	-
Phenols-4AAP	mg/L	n/v	<0.0010	-
Sulfate	mg/L	1,500^A	40	-
Total Suspended Solids	mg/L	350^A 15^B	**2,500^{AB}**	-
Carbonaceous BOD - 5 Day	mg/L	n/v	<2	<2
Total Kjeldahl Nitrogen	mg/L	100^A	1.7	-
Petroleum Hydrocarbons				
Animal/Veg Oil & Grease	mg/L	100^A	<0.50	-
Mineral Oil and Grease	mg/L	n/v	<0.50	-
Oil and Grease, Total	mg/L	n/v	<0.50	-
Metals, Total				
Aluminum	mg/L	50^A	15	-
Antimony	mg/L	5^A	<0.00050	-
Arsenic	mg/L	1^A	0.0062	-
Bismuth	mg/L	5^A	<0.0010	-
Cadmium	mg/L	1^A 0.001^B	**0.0019^B**	-
Chromium	mg/L	5^A 0.2^B	0.040	-
Cobalt	mg/L	5^A	0.0096	-
Copper	mg/L	3^A 0.01^B	**0.030^B**	-
Iron	mg/L	50^A	23	-
Lead	mg/L	5^A 0.05^B	**0.13^B**	-
Manganese	mg/L	5^A	1.3	-
Mercury	mg/L	0.1^A 0.001^B	<0.0001	-
Molybdenum	mg/L	5^A	0.0032	-
Nickel	mg/L	3^A 0.05^B	0.021	-
Phosphorus	mg/L	10^A	1.1	-
Selenium	mg/L	5^A	<0.0020	-
Silver	mg/L	5^A	<0.00010	-
Tin	mg/L	5^A	0.0011	-
Titanium	mg/L	5^A	0.49	-
Vanadium	mg/L	5^A	0.031	-
Zinc	mg/L	3^A 0.05^B	**0.64^B**	-
Microbiological				
Fecal Coliform	5TMPN/100ML	200 (MPN/100mL)^B	**350^B**	-

Notes:

Guelph	City of Guelph
^{A}	City of Guelph Sanitary Sewer-Use By-Law No. (1996)-15202
^{B}	City of Guelph Storm Sewer-Use By-Law
6.5^A	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.

TABLE 5 - GROUNDWATER QUALITY RESULTS
ONTARIO DRINKING WATER QUALITY STANDARDS

Sample Location			**MW2-18**	**MW4-18(S)**	**MW6-18**	**MW7-18**
Sample Date			**11-Sep-18**	**11-Sep-18**	**11-Sep-18**	**11-Sep-18**
Sample ID			**WG-161413684-20180911-DS-04**	**WG-161413684-20180911-DS-03**	**WG-161413684-20180911-DS-01**	**WG-161413684-20180911-DS-02**
Sampling Company			**STANTEC**	**STANTEC**	**STANTEC**	**STANTEC**
Laboratory			**MAXX**	**MAXX**	**MAXX**	**MAXX**
Laboratory Work Order			**B8N6455**	**B8N6455**	**B8N6455**	**B8N6455**
Laboratory Sample ID	**Units**	**ODWS**	**HSJ715**	**HSJ714**	**HSJ712**	**HSJ713**
General Chemistry						
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	-	5.3	3.7	4.7
Alkalinity, Total (as CaCO3)	mg/L	30-500^{E}	-	410	310	340
Ammonia (as N)	mg/L	n/v	-	0.071	<0.050	<0.050
Anion Sum	me/L	n/v	-	10.7	6.67	9.3
Bicarbonate(as CaCO3, Calculated)	mg/L	n/v	-	410	300	330
Cation Sum	me/L	n/v	-	10.9	6.66	11.8
Chloride	mg/L	250^{C}	46	43	7	27
Dissolved Organic Carbon (DOC)	mg/L	5^{C}	-	1.4	0.83	1
Electrical Conductivity, Lab	µmhos/cm	n/v	-	950	580	830
Hardness (as CaCO3)	mg/L	80-100^{E}	-	**490^{E}**	**320^{E}**	**520^{E}**
Ion Balance	%	n/v	-	1.08	0.05	12.1
Langelier Index (at 20 C)	none	n/v	-	1.2	1.01	1.25
Langelier Index (at 4 C)	none	n/v	-	0.947	0.762	0.997
Nitrate (as N)	mg/L	10.0$_{d}^{B}$	-	1.93	0.25	0.12
Nitrate + Nitrite (as N)	mg/L	10.0$_{d}^{B}$	-	1.96	0.25	0.12
Nitrite (as N)	mg/L	1.0$_{d}^{B}$	-	0.026	<0.010	<0.010
Orthophosphate(as P)	mg/L	n/v	-	0.012	<0.010	<0.010
pH, lab	S.U.	6.5-8.5^{E}	7.90	8.14	8.11	8.18
Saturation pH (at 20 C)	none	n/v	-	6.95	7.1	6.93
Saturation pH (at 4 C)	none	n/v	-	7.2	7.35	7.18
Sulfate	mg/L	500$_{h}^{C}$	40	50	15	84
Total Dissolved Solids (Calculated)	mg/L	500^{C}	-	**540^{C}**	330	**530^{C}**
Total Suspended Solids	mg/L	n/v	-	100	1,800	1,200
Metals, Dissolved						
Aluminum	mg/L	0.1^{E}	-	0.0064	<0.0050	0.063
Antimony	mg/L	0.006^{B}	-	<0.00050	<0.00050	<0.00050
Arsenic	mg/L	0.01^{B}	-	<0.0010	<0.0010	0.0015
Barium	mg/L	1^{B}	-	0.13	0.032	0.076
Beryllium	mg/L	n/v	-	<0.00050	<0.00050	<0.00050
Boron	mg/L	5^{B}	-	0.11	0.014	0.013
Cadmium	mg/L	0.005^{B}	-	<0.00010	<0.00010	<0.00010
Calcium	mg/L	n/v	-	82	69	100
Chromium	mg/L	0.05^{B}	-	<0.0050	<0.0050	<0.0050
Cobalt	mg/L	n/v	-	<0.00050	<0.00050	<0.00050
Copper	mg/L	1^{C}	-	<0.0010	<0.0010	<0.0010
Iron	mg/L	0.3^{C}	-	<0.10	<0.10	0.19
Lead	mg/L	0.01^{B}	-	<0.00050	<0.00050	0.00056
Magnesium	mg/L	n/v	-	71	36	63
Manganese	mg/L	0.05^{C}	-	0.02	0.011	0.046
Molybdenum	mg/L	n/v	-	0.0042	0.00079	0.003
Nickel	mg/L	n/v	-	<0.0010	<0.0010	<0.0010
Phosphorus	mg/L	n/v	-	0.11	<0.10	<0.10
Potassium	mg/L	n/v	-	5.9	1.1	2.6
Selenium	mg/L	0.05^{B}	-	0.0022	<0.0020	<0.0020
Silicon	mg/L	n/v	-	5.2	6.3	7.9
Silver	mg/L	n/v	-	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200$_{g}^{C}$ 20$_{g}^{D}$	-	20	5.4	**34^{D}**
Strontium	mg/L	n/v	-	0.23	0.13	0.2
Thallium	mg/L	n/v	-	<0.000050	<0.000050	<0.000050
Titanium	mg/L	n/v	-	<0.0050	<0.0050	0.0051
Uranium	mg/L	0.02^{B}	-	0.003	0.00063	0.0022
Vanadium	mg/L	n/v	-	0.0012	<0.00050	0.0014
Zinc	mg/L	5^{C}	-	<0.0050	<0.0050	<0.0050

Notes:

ODWS	O.Reg 169/03 - Ontario Drinking Water Quality Standards (January 1, 2018); Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE, 2006), in support of O.Reg 169/03 (January 1, 2018)
A	Schedule 1 - Microbiological Standards (expressed as a maximum)
B	Schedule 2 - Chemical Standards (expressed as a maximum acceptable concentration)
C	ODWS Table 4 - Chemical/Physical Objectives and Guidelines, Aesthetic Objectives
D	ODWS Table 4 - Medical Officer of Health Reporting Limit
E	ODWS Table 4 - Chemical/Physical Objectives and Guidelines, Operational Guidelines
6.5^{A}	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
d	Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).
g	The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the sodium concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.
h	When sulfate levels exceed 500 mg/L, water may have a laxative effect on some people.

TABLE 6 - INFILTRATION RATES ESTIMATED FROM HORIZONTAL HYDRAULIC CONDUCTIVITY TESTING RESULTS

Testing Location ID	Horizontal Hydraulic Conductivity (m/s)	Vertical Hydraulic Conductivity (cm/s)	Vertical Hydraulic Conductivity (m/s)	Infiltration Rate (mm/hr)	Pit Depth (m BGS)	Screened Interval (m BGS)	Soil Substrate Tested	Surficial Deposit or Hydrostratigraphic Unit
In-situ Hydraulic Response Testing (Monitoring Wells)								
MW2-18	4.7E-07	-	4.7E-08	20	-	10.9 - 13.9	Sandy SILT TILL (19%) / SAND (81%)	Lower Till Aquitard (Sand Layer)
MW3-18	1.6E-09	-	1.6E-10	5	-	7.5 - 10.5	Sandy SILT TILL	Lower Till Aquitard
MW4-18(S)	1.8E-07	-	1.8E-08	15	-	5.0 - 8.0	Sandy SILT TILL	Lower Till Aquitard
MW4-18(D)	3.4E-09	-	3.4E-10	5	-	9.5 - 12.5	Sandy SILT TILL	Lower Till Aquitard
MW5-18(S)	1.2E-08	-	1.2E-09	8	-	5.0 - 8.0	Sandy SILT TILL	Lower Till Aquitard
MW5-18(D)	2.0E-08	-	2.0E-09	9	-	12.1 - 15.1	Sandy SILT TILL	Lower Till Aquitard
MW6-18	5.4E-07	-	5.4E-08	21	-	12.0 - 15.0	Sandy SILT TILL	Lower Till Aquitard
MW7-18	5.8E-08	-	5.8E-09	12	-	10.9 - 13.9	Sandy SILT TILL	Lower Till Aquitard

Notes:

(1) Infiltration rate calculated based on established relationship between vertical hydraulic conductivity and infiltration rate presented in *Credit Valley Conservation and Toronto and Region Conservation (2010) Low Impact Stormwater Management Planning and Design Guideline - Version 1.0.*

(2) Vertical hydraulic conductivities for deeper overburden deposits assumed to be one order of magnitude lower than in-situ measured horizontal hydraulic conductivities

TABLE 7 - INFILTRATION RATE TESTING RESULTS (2021)

Testing Location ID	Ground Surface Elevation	Vertical Hydraulic Conductivity		Infiltration Rate (1)	Horizontal Hydraulic Conductivity (2)	Testing Depth		Soil Substrate Tested
	(m AMSL)	(cm/s)	(m/s)	(mm/hr)	(m/s)	(m BGS)	(m AMSL)	
East Infiltration Trench - designed base elevation: 340.00 m AMSL								
TP4-21	340.9	3.9E-03	3.9E-05	123	3.9E-04	0.6	340.4	Clayey SAND TILL, fine to medium grained sand
TP5-21	340.3	1.8E-03	1.8E-05	100	1.8E-04	0.6	339.7	Clayey SAND TILL, fine to medium grained sand
TP4-21	340.9	1.1E-04	1.1E-06	48	1.1E-05	2.0	339.0	Clayey SAND TILL, fine to medium grained sand
TP5-21	340.3	2.0E-06	2.0E-08	16	2.0E-07	2.9	337.4	Clayey SAND TILL, fine to medium grained sand
MW5-18(S)	341.3	-	-	8	1.2E-08	5.0 - 8.0	336.2 - 333.2	Sandy SILT TILL
MW5-18(D)	341.1	-	-	9	2.0E-08	13.6 - 15.1	327.5 - 326.0	Sandy SILT TILL
South Infiltration Trench - designed base elevation: 340.43 m AMSL								
TP1-21 (Test 1)	337.9	8.7E-06	8.7E-08	24	8.7E-07	0.5	337.4	Silty Clay FILL, trace fine grained sand and cobbles
TP1-21 (Test 2)	337.9	2.9E-05	2.9E-07	33	2.9E-06	0.5	337.4	Silty Clay FILL, trace fine grained sand and cobbles
TP1-21	337.9	3.5E-03	3.5E-05	120	3.5E-04	1.4	336.5	Silty Clay FILL, trace fine grained sand and cobbles
TP2-21	340.5	1.2E-03	1.2E-05	89	1.2E-04	0.6	340.0	Sandy SILT TILL, fine to medium grained sand
TP2-21	340.5	1.8E-05	1.8E-07	29	1.8E-06	1.5	339.1	Sandy SILT TILL, fine to medium grained sand
TP3-21 (Test 1)	342.8	2.7E-04	2.7E-06	60	2.7E-05	1.2	341.6	Sandy SILT TILL, fine to medium grained sand
TP3-21 (Test 2)	342.8	2.2E-04	2.2E-06	57	2.2E-05	1.2	341.6	Sandy SILT TILL, fine to medium grained sand
TP3-21 (Test 1)	342.8	1.4E-04	1.4E-06	51	1.4E-05	2.6	340.2	Sandy SILT TILL, fine to medium grained sand
TP3-21 (Test 2)	342.8	5.1E-04	5.1E-06	71	5.1E-05	2.6	340.2	Sandy SILT TILL, fine to medium grained sand
TP3-21 (Test 1)	342.8	4.6E-04	4.6E-06	70	4.6E-05	3.5	339.3	Sandy SILT TILL, fine to medium grained sand
TP3-21 (Test 2)	342.8	2.3E-05	2.3E-07	31	2.3E-06	3.6	339.3	Sandy SILT TILL, fine to medium grained sand
MW6-18	342.5	-	-	21	5.4E-07	13.5 - 15.0	327.9 - 326.4	Sandy SILT TILL
MW7-18	339.6	-	-	12	5.8E-08	12.4 - 13.9	326.5 - 324.9	Sandy SILT TILL

Notes:

(1) Infiltration rate calculated based on established relationship between vertical hydraulic conductivity and infiltration rate presented in *Credit Valley Conservation and Toronto and Region Conservation (2010) Low Impact Stormwater Management Planning and Design Guideline - Version 1.0.*

(2) Horizontal hydraulic conductivity assumed to be one order of magnitude greater than Guelph Permeameter tested / calculated vertical hydraulic conductivity as per Freeze and Cherry (1979) and Todd (1980). Note that horizontal hydraulic conductivities for provided MW5-18(S/D), MW6-18 and MW7-18 calculated from in-situ hydraulic response testing completed on each monitoring well.

TABLE 8 - DESIGN INFILTRATION RATE CALCULATIONS

East Infiltration Trench

	Calculated Vertical Hydraulic Conductivities (m/s)			Geomean	Infiltration Rate (mm/hr)
Base (340.00 m AMSL)	3.9E-05	1.8E-05		2.6E-05	111
~1.5 m below Base (338.5 m AMSL)	1.1E-06			1.1E-06	48
Ratio (Base / 1.5 m)					*2.3*
Safety Factor					3.5
Design Infiltration Rate					***32***

South Infiltration Trench

	Calculated Vertical Hydraulic Conductivities (m/s)			Geomean	Infiltration Rate (mm/hr)
Base (340.43 m AMSL)	2.7E-06	2.2E-06		2.4E-06	58
~1.5 m below Base (338.93 m AMSL)	1.4E-06	5.1E-06	1.2E-05	4.4E-06	69
Ratio (Base / 1.5 m)					*0.8*
Safety Factor					2.5
Design Infiltration Rate					***23***

TABLE 9 - PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENT 101 (LANDS TO SOUTHWEST OF FLOW DIVIDE / DRAINING TO THE UPPER HANLON CREEK SUBWATERSHED)

Pre-Development

Model Type: Thornthwaite and Mather (1955)
Client: Tricar Developments Inc.
Location **Catchment 101 (Lands to Southwest of Flow Divide / Draining to Upper Hanlon Creek Subwatershed)**
Total Site Area (ha) **1.60**

Land Description Factors (Sub-area descriptions provided below)	**Sub-Area A**	**Sub-Area B**	**Sub-Area C**	**Sub-Area D**									**Total**
Topography	0.20	0.20	0.20	0.20									
Soils	0.25	0.25	0.25	0.25									
Cover	0.20	0.15	0.05	0.05									
Sum (Infiltration Factor)†	0.65	0.60	0.50	0.50									
Soil Moisture Capacity (mm)	300	150	75	75									
Site area (ha)	0.58	0.26	0.64	0.12									1.60
Imperviousness Coefficient	0.00	0.00	0.00	0.95									
Impervious Area (ha)	0.00	0.00	0.00	0.12									0.12
Percentage of Total Site Area	0.0%	0.0%	0.0%	7.3%									7%
Remaining Pervious Area (ha)	0.58	0.26	0.64	0.01									1.48
Total Pervious Site Area (ha)	0.58	0.26	0.64	0.01									1.48
Percentage of Total Site Area	36.2%	16.1%	40.0%	0.4%									93%

	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	-56	-18	0	0	
Storage (S)	300	300	300	300	300	269	239	229	249	283	300	300	
Change in Storage	0	0	0	0	0	-31	-30	-10	19	34	17	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	107	119	106	73	35	9	0	**554**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	60	78	**369**
Potential Infiltration (I)	37	33	47	30	3	0	0	0	0	0	39	51	240
Potential Direct Surface Water Runoff (R)	20	18	25	16	2	0	0	0	0	0	21	27	129
Potential Infiltration (mm)	0	0	0	197	3	0	0	0	0	0	39	0	240
Pervious Evapotranspiration (m^3)	0	0	0	184	432	619	689	613	422	204	52	0	3,216
Pervious Runoff (m^3)	114	103	146	95	11	0	0	0	0	0	121	158	**749**
Pervious Infiltration (m^3)	0	0	0	1144	20	0	0	0	0	0	225	0	**1,390**
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 9 - PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENT 101 (LANDS TO SOUTHWEST OF FLOW DIVIDE / DRAINING TO THE UPPER HANLON CREEK SUBWATERSHED)

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	-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	82	192	271	295	267	188	91	23	0	1,410
Pervious Runoff (m^3)	58	52	74	48	6	0	0	0	0	0	70	80	**389**
Pervious Infiltration (m^3)	0	0	0	470	8	0	0	0	0	0	106	0	**584**
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	-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	203	477	654	685	643	466	225	58	0	3,411
Pervious Runoff (m^3)	180	163	231	149	17	0	0	0	0	0	260	249	**1,248**
Pervious Infiltration (m^3)	0	0	0	971	17	0	0	0	0	0	260	0	**1,248**
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	2	5	6	7	6	4	2	1	0	33
Pervious Runoff (m^3)	2	2	2	1	0	0	0	0	0	0	3	2	**12**
Pervious Infiltration (m^3)	0	0	0	9	0	0	0	0	0	0	3	0	**12**
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)	66	60	85	92	94	89	104	113	108	81	101	91	**1,083**

TABLE 9 - PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENT 101 (LANDS TO SOUTHWEST OF FLOW DIVIDE / DRAINING TO THE UPPER HANLON CREEK SUBWATERSHED)

Pre-Development Summary - Catchment 101 (Lands to Southwest of Flow Divide / Draining to Upper Hanlon Creek Subwatershed)

Monthly Summary (m^3)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Pre-Development Infiltration (INF)	0	0	0	2,595	46	0	0	0	0	0	593	0	3,234
Pre-Development Runoff (R)	421	379	538	385	128	89	104	113	108	81	555	580	3,481
Pre-Development Evapotranspiration (ET)	0	0	0	471	1,106	1,551	1,675	1,529	1,081	523	134	0	8,070
Total = INF + R + ET	421	379	538	3,451	1,280	1,640	1,779	1,642	1,189	604	1,282	580	14,785

SUMMARY - NO INFILTRATION AUGMENTATION / MITIGATION MEASURES

Pre-Development Infiltration (INF)	3,234	m^3/yr	202	mm/yr	0.1	L/s
Pre-Development Runoff (R)	3,481	m^3/yr	217	mm/yr	0.1	L/s
Pre-Development Evapotranspiration (ET)	8,070	m^3/yr	504	mm/yr	0.3	L/s
Total = INF + R + ET	14,785	m^3/yr	923	mm/yr	0.5	L/s
Precipitation	14,785	m^3/yr	923	mm/yr	0.5	L/s
Error	0.000	(m^3/yr)	0.255	mm/yr	0.000	L/s

Sub-Area Descriptions (topography, soils, cover)

Sub-Area A	Rolling, Fine Sandy to Silt Loam, Mature Forest
Sub-Area B	Rolling, Fine Sandy to Silt Loam, Pasture and Shrubs
Sub-Area C	Rolling, Fine Sandy to Silt Loam, Urban Lawn
Sub-Area D	Rolling, Fine Sandy to Silt Loam, Urban Lawn, 95% 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, 2022. Canadian Climate Normals 1971-2000, Guelph Arboretum Station, Climate ID 6143069. [Online] http://climate.weather.gc.ca/climate_normals/index_e.html Accessed February 8, 2022.

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 10 - PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENT 102 (LANDS TO NORTHEAST OF FLOW DIVIDE / DRAINING TO TORRANCE CREEK SUBWATERSHED)

	Pre-Development
Model Type:	Thornthwaite and Mather (1955)
Client:	Tricar Developments Inc.
Location	**Catchment 102 (Lands to Northeast of Flow Divide / Draining to Torrance Creek Subwatershed)**
Total Site Area (ha)	**1.73**

Land Description Factors (Sub-area descriptions provided below)	**Sub-Area A**	**Sub-Area B**	**Sub-Area C**										**Total**
Topography	0.20	0.20	0.20										
Soils	0.25	0.25	0.25										
Cover	0.20	0.15	0.05										
Sum (Infiltration Factor)†	0.65	0.60	0.50										
Soil Moisture Capacity (mm)	300	150	75										
Site area (ha)	0.98	0.72	0.03										1.73
Imperviousness Coefficient	0.01	0.01	0.01										
Impervious Area (ha)	0.01	0.01	0.00										0.02
Percentage of Total Site Area	0.6%	0.4%	0.0%										1%
Remaining Pervious Area (ha)	0.97	0.71	0.03										1.71
Total Pervious Site Area (ha)	0.97	0.71	0.03										1.71
Percentage of Total Site Area	56.1%	41.2%	1.6%										99%

	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)	56.4	50.8	72.1	46.6	5.4	-32.3	-35.8	-12.5	19.3	34.0	77.3	77.7	**359**

	0	0	0	100	100	100	100	100	100	100	100	0	

Evapotranspiration Analysis													
Sub-Area A	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Precipitation (m^3)	553	498	707	767	783	745	867	940	903	678	846	761	**9,047**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-32	-68	-81	-56	-18	0	0	
Storage (S)	300	300	300	300	300	269	239	229	249	283	300	300	
Change in Storage	0	0	0	0	0	-31	-30	-10	19	34	17	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	107	119	106	73	35	9	0	**554**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	60	78	**369**
Potential Infiltration (I)	37	33	47	30	3	0	0	0	0	0	39	51	240
Potential Direct Surface Water Runoff (R)	20	18	25	16	2	0	0	0	0	0	21	27	129
Potential Infiltration (mm)	0	0	0	197	3	0	0	0	0	0	39	0	240
Pervious Evapotranspiration (m^3)	0	0	0	308	723	1035	1153	1025	707	342	87	0	5,379
Pervious Runoff (m^3)	192	172	245	158	18	0	0	0	0	0	203	264	**1,252**
Pervious Infiltration (m^3)	0	0	0	1914	34	0	0	0	0	0	377	0	**2,325**
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)	6	5	7	8	8	7	9	9	9	7	8	8	**90**

TABLE 10 - PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENT 102 (LANDS TO NORTHEAST OF FLOW DIVIDE / DRAINING TO TORRANCE CREEK SUBWATERSHED)

Evapotranspiration Analysis													
Sub-Area B	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Precipitation (m^3)	406	366	519	564	575	547	637	691	663	498	621	559	**6,648**
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	226	531	749	814	738	519	251	64	0	3,893
Pervious Runoff (m^3)	161	145	206	133	15	0	0	0	0	0	194	222	**1,075**
Pervious Infiltration (m^3)	0	0	0	1298	23	0	0	0	0	0	291	0	**1,613**
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)	4	4	5	6	6	5	6	7	7	5	6	6	**66**

Evapotranspiration Analysis													
Sub-Area C	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Precipitation (m^3)	16	14	20	22	23	22	25	27	26	20	24	22	**262**
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	9	21	29	30	28	20	10	3	0	150
Pervious Runoff (m^3)	8	7	10	7	1	0	0	0	0	0	11	11	**55**
Pervious Infiltration (m^3)	0	0	0	43	1	0	0	0	0	0	11	0	**55**
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	**3**

Pre-Development Summary - Catchment 102 (Lands to Northeast of Flow Divide / Draining to Torrance Creek Subwatershed)

Monthly Summary (m^3)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Pre-Development Infiltration (INF)	0	0	0	3,255	58	0	0	0	0	0	680	0	3,993
Pre-Development Runoff (R)	370	333	473	311	48	13	15	17	16	12	424	510	2,542
Pre-Development Evapotranspiration (ET)	0	0	0	543	1,275	1,813	1,996	1,791	1,246	603	154	0	9,422
Total = INF + R + ET	370	333	473	4,109	1,381	1,826	2,012	1,808	1,262	615	1,258	510	15,956

SUMMARY - NO INFILTRATION AUGMENTATION / MITIGATION MEASURES						
Pre-Development Infiltration (INF)	3,993	m^3/yr	231	mm/yr	0.1	L/s
Pre-Development Runoff (R)	2,542	m^3/yr	147	mm/yr	0.1	L/s
Pre-Development Evapotranspiration (ET)	9,422	m^3/yr	545	mm/yr	0.3	L/s
Total = INF + R + ET	15,956	m^3/yr	923	mm/yr	0.5	L/s
Precipitation	15,956	m^3/yr	923	mm/yr	0.5	L/s
Error	0.000	m^3/yr	0.000	mm/yr	0.000	L/s

Sub-Area Descriptions (topography, soils, cover)	
Sub-Area A	Rolling, Fine Sandy to Silt Loam, Mature Forest
Sub-Area B	Rolling, Fine Sandy to Silt Loam, Pasture and Shrubs
Sub-Area C	Rolling, Fine Sandy to Silt Loam, Urban Lawn

TABLE 10 - PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENT 102 (LANDS TO NORTHEAST OF FLOW DIVIDE / DRAINING TO TORRANCE CREEK SUBWATERSHED)

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, 2022. Canadian Climate Normals 1971-2000, Guelph Arboretum Station, Climate ID 6143069. [Online] http://climate.weather.gc.ca/climate_normals/index_e.html Accessed February 8, 2022.

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 11
1971 TO 2000 CANADIAN CLIMATE NORMALS (GUELPH ARBORETUM)

Climate Normals 1971-2000 Station Data

STATION_NAME	PROVINCE	LATITUDE	LONGITUDE	ELEVATION	CLIMATE_ID	WMO_ID	TC_ID
GUELPH ARBORETUM	ON	43°33'00" N	80°13'00" W	327.7 m	6143069		

Legend
A = WMO "3 and 5 rule" (i.e. no more than 3 consecutive and no more than 5 total missing for either temperature or precipitation)
B = At least 25 years
C = At least 20 years
D = At least 15 years

1971 to 2000 Canadian Climate Normals station data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Temperature														
Daily Average (°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	C
Standard Deviation	3.1	2.8	2	1.6	1.8	1.3	1.1	1.3	0.9	1.5	1.5	2.8	2.5	C
Daily Maximum (°C)	-3.7	-2.6	3.4	11.3	18.5	23.3	25.9	24.5	19.8	12.8	6.2	-0.5	11.6	C
Daily Minimum (°C)	-11.4	-11.1	-6	0.5	6	10.6	13.5	12.6	8.4	3	-1.4	-7.6	1.4	C
Extreme Maximum (°C)	13.9	13.5	23.5	29.2	31.6	36.2	36.5	33.9	32.6	25.2	20.6	19.1		
Date (yyyy/dd)	1995/14	1984/23	1990/15	1990/25	1987/28	1988/25	1988/07	1975/01	1983/10	1988/01	1987/03	1982/03		
Extreme Minimum (°C)	-34.4	-31.7	-26.8	-11.4	-4.3	-0.6	3.3	-0.6	-5	-8.3	-15.1	-30.4		
Date (yyyy/dd)	1994/10	1979/17	1984/08	1982/07	1978/01	1977/03	1977/27	1982/29	1989/27	1975/31	1987/22	1980/25		
Precipitation														
Rainfall (mm)	17.6	22.1	46.9	71.5	79.9	76	88.5	95.9	92.1	67.5	75.3	38.1	771.4	D
Snowfall (cm)	45.8	33.1	25.8	6.3	0.1	0	0	0	0	1.5	9.7	38.5	160.6	D
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	923.3	D
Extreme Daily Rainfall (mm)	33.4	38.3	32.6	37.3	33.3	69.8	62.6	72.9	76.4	27.7	47.4	30		
Date (yyyy/dd)	1993/04	1990/22	1991/27	1992/16	1976/06	1982/28	1991/29	1975/23	1986/10	1977/08	1992/12	1979/24		
Extreme Daily Snowfall (cm)	24.6	25	30	14	1	0	0	0	0	6.6	20	24.3		
Date (yyyy/dd)	1978/26	1985/12	1985/03	1979/04	1989/07	1976/01	1975/01	1975/01	1975/01	1989/20	1986/20	1992/10		
Extreme Daily Precipitation (mm)	33.4	38.7	42	37.3	33.3	69.8	62.6	72.9	76.4	27.7	47.4	38		
Date (yyyy/dd)	1993/04	1981/10	1985/04	1992/16	1976/06	1982/28	1991/29	1975/23	1986/10	1977/08	1992/12	1990/03		
Extreme Snow Depth (cm)	31	41	37	13	0	0	0	0	0	5	17	28		
Date (yyyy/dd)	1984/27	1982/06	1982/09	1976/26	1976/01	1976/01	1975/01	1975/01	1975/01	1976/23	1992/17	1992/11		
Days with Maximum Temperature														
<= 0 °C	23.1	18.2	9.3	0.85	0	0	0	0	0	0	3.7	15.8	70.8	D
> 0 °C	7.9	10.1	21.8	29.2	31	30	31	31	30	31	26.3	15.3	294.4	D
> 10 °C	0.17	0.35	5.1	16.5	29.1	29.9	31	31	29.5	21.3	7.3	1.2	202.3	D
> 20 °C	0	0	0.45	3.3	11.5	23	29.5	27.5	13.9	3	0.1	0	112.1	D
> 30 °C	0	0	0	0	0.35	1.3	2.9	1.3	0.19	0	0	0	6	D
> 35 °C	0	0	0	0	0	0.05	0.19	0	0	0	0	0	0.24	D
Days with Minimum Temperature														
> 0 °C	0.83	1.4	4.7	15	26.8	29.8	31	31	28.3	21.9	10.9	2.7	204.2	D
<= 2 °C	30.8	27.7	28.7	19.9	7.7	0.95	0	0.14	3.6	14.6	23.5	30.2	187.6	D
<= 0 °C	30.2	26.8	26.3	15.1	4.2	0.19	0	0.05	1.7	9.1	19.2	28.3	161	D
< -2 °C	28.4	24.7	22.1	9.5	1.2	0	0	0	0.33	4.5	13.6	24	128.3	D
< -10 °C	16.8	15.6	7.6	0.3	0	0	0	0	0	0	1.2	9.7	51.3	D
< -20 °C	3.9	3.4	0.85	0	0	0	0	0	0	0	0	1.2	9.3	D
< - 30 °C	0.44	0.21	0	0	0	0	0	0	0	0	0	0.05	0.7	D
Days with Rainfall														
>= 0.2 mm	3.7	3.8	7.8	12	12.7	11.4	11.4	12.9	13.4	13.9	12.5	6.4	121.8	D
>= 5 mm	1.1	1.3	3.4	4.6	5.3	5.2	5.4	5.9	5.3	4.9	5.2	2.9	50.4	D
>= 10 mm	0.78	0.58	2	2.5	2.8	2.8	3.4	3.3	3.2	2.4	2.5	1.3	27.4	D
>= 25 mm	0.06	0.21	0.06	0.4	0.35	0.43	0.65	0.76	0.76	0.15	0.3	0.11	4.2	D

TABLE 11
1971 TO 2000 CANADIAN CLIMATE NORMALS (GUELPH ARBORETUM)

Climate Normals 1971-2000 Station Data

STATION_NAME	PROVINCE	LATITUDE	LONGITUDE	ELEVATION	CLIMATE_ID	WMO_ID	TC_ID
GUELPH ARBORETUM	ON	43°33'00" N	80°13'00" W	327.7 m	6143069		

Days With Snowfall														
>= 0.2 cm	14.4	10.3	6.8	1.9	0.05	0	0	0	0	0.5	4.3	12.3	50.5	D
>= 5 cm	3.1	1.9	1.6	0.4	0	0	0	0	0	0.1	0.4	2.8	10.3	D
>= 10 cm	1	0.83	0.56	0.15	0	0	0	0	0	0	0.2	0.56	3.3	D
>= 25 cm	0	0.06	0.22	0	0	0	0	0	0	0	0	0	0.28	D
Days with Precipitation														
>= 0.2 mm	17.3	13.1	13.3	13.5	12.7	11.4	11.4	12.9	13.4	14	16	17.6	166.5	D
>= 5 mm	3.4	2.9	4.9	5.1	5.3	5.2	5.4	5.9	5.3	5	5.8	5.3	59.2	D
>= 10 mm	1.6	1.4	2.7	2.7	2.8	2.8	3.4	3.3	3.2	2.5	2.8	1.9	31.1	D
>= 25 mm	0.11	0.28	0.22	0.4	0.35	0.43	0.65	0.76	0.76	0.15	0.3	0.17	4.6	D
Degree Days														
Above 24 °C	0	0	0	0	0	0.9	4.2	1.8	0.3	0	0	0	7.3	D
Above 18 °C	0	0	0	1	9.7	32.1	72.5	51	13.6	0.5	0	0	180.5	D
Above 15 °C	0	0	0.3	5	28.9	80.1	148.9	117.3	40.1	3.3	0.1	0	424	D
Above 10 °C	0	0	2.8	22	98.5	209	301.8	265.9	133.3	30.3	3.9	0.3	1067.8	D
Above 5 °C	0.4	0.6	15.1	73.9	226.3	357.7	456.8	420.8	272.6	108.7	28.4	3.2	1964.3	D
Above 0 °C	4.9	9.8	55.7	184.3	379.8	507.7	611.8	575.8	422.4	247.6	98.2	20.7	3118.5	D
Below 0 °C	245.2	207.3	95.2	7.7	0	0	0	0	0	0.5	25.7	134.8	716.3	D
Below 5 °C	395.7	339.1	209.6	47.2	1.6	0	0	0	0.2	16.6	106	272.3	1388.2	D
Below 10 °C	550.3	479.6	352.4	145.3	28.7	1.3	0	0.1	10.9	93.1	231.5	424.5	2317.7	D
Below 15 °C	705.3	620.6	504.9	278.3	114.2	22.3	2.2	6.5	67.6	221.2	377.7	579.2	3500	D
Below 18 °C	798.3	705.3	597.6	364.4	187.9	64.4	18.7	33.2	131.2	311.4	467.6	672.2	4352.1	D
Bright Sunshine														
Extreme Daily	8.7	10.3	11.2	13.5	14.7	14.6	14.3	13.9	12.6	10.5	9.3	8.3		D
Date (yyyy/dd)	1984/31	1982/25	1982/28	1976/28	1977/30	1976/02	1977/02	1976/01	1991/01	1983/09	1981/03	1985/03		

TABLE 12 - POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENTS 201, 202, 204, and 207 to 210 (LANDS TO SOUTHWEST OF FLOW DIVIDE / DRAINING TO THE UPPER HANLON CREEK SUBWATERSHED)

Post-Development
Model Type: Thornthwaite and Mather (1955)
Client: Tricar Developments Inc.
Location **Former Catchment 101 (Lands to Southwest of Flow Divide / Draining to Upper Hanlon Creek Subwatershed)**
Post-Development Catchments 201, 202, 204, and 207 to 210
Total Site Area (ha) **1.60**

Land Description Factors **(See end of table for sub-area descriptions)**	Sub-Area A	Sub-Area B	Sub-Area C	**Sub-Area E**	**Sub-Area F**	**Sub-Area G**	**Sub-Area H**	**Sub-Area I**	Sub-Area X	Sub-Area X	Sub-Area X	Sub-Area X	Sub-Area X	**Total**
Topography	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.00	0.00	0.00	0.00	
Soils	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.00	0.00	0.00	0.00	0.00	
Cover	0.20	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	
Sum (Infiltration Factor)†	0.65	0.60	0.50	0.50	0.50	0.50	0.50	0.50	0.00	0.00	0.00	0.00	0.00	
Soil Moisture Capacity (mm)	300	150	75	75	75	75	75	75	0	0	0	0	0	
Site area (ha)	0.00	0.00	0.00	0.10	0.15	0.17	0.28	0.91	0.00	0.00	0.00	0.00	0.00	1.60
Imperviousness Coefficient	0.00	0.00	0.00	0.10	0.50	0.70	0.90	1.00	0.00	0.00	0.00	0.00	0.00	
Impervious Area (ha)	0.00	0.00	0.00	0.01	0.07	0.12	0.25	0.91	0.00	0.00	0.00	0.00	0.00	1.36
Percentage of Total Site Area	0.0%	0.0%	0.0%	0.6%	4.6%	7.3%	15.5%	57.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85%
Remaining Pervious Area (ha)	0.00	0.00	0.00	0.09	0.07	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.24
Total Pervious Site Area (ha)	0.00	0.00	0.00	0.09	0.07	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.24
Percentage of Total Site Area	0.0%	0.0%	0.0%	5.5%	4.6%	3.1%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	15%

	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**

Post-Development Catchment 205 - Portion that only lies to southwest of Surface Water-Groundwater Flow Divide (Figure 16)

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	-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	28	65	89	94	88	64	31	8	0	466
Pervious Runoff (m^3)	25	22	32	20	2	0	0	0	0	0	35	34	**171**
Pervious Infiltration (m^3)	0	0	0	133	2	0	0	0	0	0	35	0	**171**
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)	5	5	7	8	8	7	9	9	9	7	8	8	**90**

TABLE 12 - POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENTS 201, 202, 204, and 207 to 210 (LANDS TO SOUTHWEST OF FLOW DIVIDE / DRAINING TO THE UPPER HANLON CREEK SUBWATERSHED)

Post-Development Catchment 207 (Figure 16)

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	24	55	76	79	75	54	26	7	0	395
Pervious Runoff (m^3)	21	19	27	17	2	0	0	0	0	0	30	29	**145**
Pervious Infiltration (m^3)	0	0	0	113	2	0	0	0	0	0	30	0	**145**
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)	42	38	53	58	59	56	66	71	68	51	64	58	**685**

Post-Development Catchments 201 and 208 (Figure 16)

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	-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	16	37	51	53	50	36	18	4	0	266
Pervious Runoff (m^3)	14	13	18	12	1	0	0	0	0	0	20	19	**97**
Pervious Infiltration (m^3)	0	0	0	76	1	0	0	0	0	0	20	0	**97**
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)	66	59	84	91	93	88	103	112	107	81	100	90	**1,075**

Post-Development Catchment 210 (Figure 16)

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	-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	9	21	28	30	28	20	10	2	0	148
Pervious Runoff (m^3)	8	7	10	6	1	0	0	0	0	0	11	11	**54**
Pervious Infiltration (m^3)	0	0	0	42	1	0	0	0	0	0	11	0	**54**
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)	141	127	180	195	199	189	221	239	229	172	215	194	**2,300**

TABLE 12 - POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENTS 201, 202, 204, and 207 to 210 (LANDS TO SOUTHWEST OF FLOW DIVIDE / DRAINING TO THE UPPER HANLON CREEK SUBWATERSHED)

Post-Development Catchments 202, 204, 209, and 203 (portion of 203 that only lies to southwest of Surface Water-Groundwater Flow Divide) (Figure 16)

Evapotranspiration Analysis													
Sub-Area I	**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)	516	465	660	716	731	695	810	877	843	633	790	711	**8,447**

Lands to Southwest of Flow Divide / Draining to Upper Hanlon Creek Subwatershed

POST-DEVELOPMENT - NO INFILTRATION AUGMENTATION / MITIGATION MEASURES

Post-Development Infiltration	467	m^3/yr	29	mm/yr	0.0	L/s
Post-Development Runoff	13,062	m^3/yr	814	mm/yr	0.4	L/s
Post-Development Evapotranspiration	1,275	m^3/yr	80	mm/yr	0.0	L/s
Total	14,804	m^3/yr	923	mm/yr	0.5	L/s
Original Precipitation	14,804	m^3/yr	923	mm/yr	0.5	L/s
Error	0.000	m^3/yr	-0.246	mm/yr	0.000	L/s

PRE-Development Infiltration	3,234	m^3/yr
Infiltration Deficit	**-2,767**	**m^3/yr**
PRE-Development Runoff	3,481	m^3/yr
Runoff Surplus	**9,581**	**m^3/yr**
Runoff Surplus - Adjusted (1)	**8,242**	**m^3/yr**

Sub-Area Descriptions (topography, soils, cover)	
Sub-Area A	Rolling, Fine Sandy to Silt Loam, Mature Forest
Sub-Area B	Rolling, Fine Sandy to Silt Loam, Pasture and Shrubs
Sub-Area C	Rolling, Fine Sandy to Silt Loam, Urban Lawn, No Impervious Cover
Sub-Area E	Rolling, Fine Sandy to Silt Loam, Urban Lawn, 10% Impervious Cover
Sub-Area F	Rolling, Fine Sandy to Silt Loam, Urban Lawn, 50% Impervious Cover
Sub-Area G	Rolling, Fine Sandy to Silt Loam, Urban Lawn, 70% Impervious Cover
Sub-Area H	Rolling, Fine Sandy to Silt Loam, Urban Lawn, 90% Impervious Cover
Sub-Area I	Rolling, Fine Sandy to Silt Loam, Urban Lawn, 100% Impervious Cover

(1) Note that runoff volume from the area of Catchment 205 (Sub-Area E) accounted for in this table will be directed to the Torrance Creek Subwatershed post-development. Runoff generated from from full rooftop of Building 2 (Catchment 203), of which 62% covers the lands draining to the Hanlon Creek Subwatershed, will be directed to the Torrance Creek Subwatershed post-development

Catchment 205 (Sub-Area E - this Table)			Catchment 203 (refer to Table 12 for volume calculation)		
Total Runoff	260	m^3/yr	Total Runoff	1,741	m^3/yr
			62%	1,079	m^3/yr

Total Runoff volume from portions of Catchments 203 and 205 (located to southwest of flow divide) that will be flowing to Torrance Creek Subwatershed post-development = **1,340** **m^3/yr**
This runoff volume has been subtracted from the calculated surplus presented above.

POST-DEVELOPMENT - WITH INFILTRATION AUGMENTATION / MITIGATION MEASURES

Land Description Factors (Sub-Area I)	**Catchment 202**	**Catchment 204**	**Catchment 209**
Topography	0.20	0.20	0.20
Soils	0.25	0.25	0.25
Cover	0.05	0.05	0.05
Sum (Infiltration Factor)†	0.50	0.50	0.50
Soil Moisture Capacity (mm)	75	75	75
Catchment Area (ha)	0.249	0.501	0.117
Imperviousness Coefficient	1.00	1.00	1.00
Impervious Area (ha)	0.249	0.501	0.117
Percentage of Catchment Area	29%	58%	14%
Remaining Pervious Area (ha)	0.00	0.00	0.00
Total Pervious Site Area (ha)	0.00	0.00	0.00
Percentage of Catchment Area	0.0%	0.0%	0.0%

Stormwater runoff captured by these Catchment impervous surfaces will be directed to the South Infiltration Gallery

Catchment Area = 0.867 ha

TABLE 12 - POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENTS 201, 202, 204, and 207 to 210 (LANDS TO SOUTHWEST OF FLOW DIVIDE / DRAINING TO THE UPPER HANLON CREEK SUBWATERSHED)

Evapotranspiration Analysis													
Catchment 202 (Sub-Area I)	**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)	140	126	179	195	199	189	220	239	229	172	215	193	**2,297**

Evapotranspiration Analysis													
Catchment 204 (Sub-Area I)	**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)	283	255	361	392	400	381	444	481	462	347	433	389	**4,627**

Evapotranspiration Analysis													
Catchment 209 (Sub-Area I)	**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)	66	60	85	92	94	89	104	112	108	81	101	91	**1,083**

Precipitation captured by Catchment 202 (Building 1) and Catchments 204 and 209 (Paved Areas) that is directed to the South Infiltration Gallery post-development

Monthly Summary (m^3)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Post-Development Runoff (R)	489	441	625	679	693	659	768	832	799	600	748	674	8,007
Assumption that 80% Reaches Gallery	391	352	500	543	554	527	614	665	639	480	599	539	6,406

Pre- to Post INFILTRATION (No Mitigation) = -2,767
Pre- to Post Infiltration (With East Gallery Inputs) = **3,638**

Pre- to Post RUNOFF (No Mitigation) = 8,242
Pre- to Post Infiltration (With South Gallery Inputs) = **1,836**

TABLE 12 - POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENTS 201, 202, 204, and 207 to 210 (LANDS TO SOUTHWEST OF FLOW DIVIDE / DRAINING TO THE UPPER HANLON CREEK SUBWATERSHED)

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, 2022. Canadian Climate Normals 1971-2000, Guelph Arboretum Station, Climate ID 6143069. [Online] http://climate.weather.gc.ca/climate_normals/index_e.html Accessed February 8, 2022.

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 13 - POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENTS 203, 205, and 206 (LANDS TO NORTHEAST OF FLOW DIVIDE / DRAINING TO THE TORRANCE CREEK SUBWATERSHED)

	Post-Development
Model Type:	Thornthwaite and Mather (1955)
Client:	Tricar Developments Inc.
Location	**Former Catchment 102 (Lands to Northeast of Surface Water-Groundwater Flow Divide / Draining to Torrance Creek Subwatershed)** **Post-Development Catchments 203, 205, and 206**
Total Site Area (ha)	**1.73**

Land Description Factors (Sub-area descriptions provided below)	**Sub-Area A**	**Sub-Area B**	**Sub-Area C**	**Sub-Area E**	Sub-Area F	Sub-Area G	Sub-Area H	**Sub-Area I**	Sub-Area X	Sub-Area X	Sub-Area X	Sub-Area X	**Total**
Topography	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.00	0.00	0.00	
Soils	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.00	0.00	0.00	0.00	
Cover	0.20	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.00	0.00	0.00	
Sum (Infiltration Factor)†	0.65	0.60	0.50	0.50	0.50	0.50	0.50	0.50	0.00	0.00	0.00	0.00	
Soil Moisture Capacity (mm)	300	150	75	75	75	75	75	75	0	0	0	0	
Site area (ha)	0.82	0.35	0.24	0.13	0.00	0.00	0.10	0.09	0.00	0.00	0.00	0.00	1.73
Imperviousness Coefficient	0.00	0.00	0.00	0.10	0.50	0.70	0.90	1.00	0.00	0.00	0.00	0.00	
Impervious Area (ha)	0.00	0.00	0.00	0.01	0.00	0.00	0.09	0.09	0.00	0.00	0.00	0.00	0.19
Percentage of Total Site Area	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%	5.1%	5.3%	0.0%	0.0%	0.0%	0.0%	11.1%
Remaining Pervious Area (ha)	0.82	0.35	0.24	0.12	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	1.54
Total Pervious Site Area (ha)	0.82	0.35	0.24	0.12	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	1.54
Percentage of Total Site Area	47.6%	20.35%	13.6%	6.8%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	88.9%

	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	-56	-18	0	0	
Storage (S)	300	300	300	300	300	269	239	229	249	283	300	300	
Change in Storage	0	0	0	0	0	-31	-30	-10	19	34	17	0	
Actual Evapotranspiration (mm)	0	0	0	32	75	107	119	106	73	35	9	0	**554**
Recharge/Runoff Analysis													
Water Surplus (mm)	56	51	72	47	5	0	0	0	0	0	60	78	**369**
Potential Infiltration (I)	37	33	47	30	3	0	0	0	0	0	39	51	240
Potential Direct Surface Water Runoff (R)	20	18	25	16	2	0	0	0	0	0	21	27	129
Potential Infiltration (mm)	0	0	0	197	3	0	0	0	0	0	39	0	240
Pervious Evapotranspiration (m^3)	0	0	0	261	613	878	978	869	599	290	74	0	4,562
Pervious Runoff (m^3)	162	146	208	134	15	0	0	0	0	0	172	224	**1,062**
Pervious Infiltration (m^3)	0	0	0	1624	29	0	0	0	0	0	320	0	**1,972**
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 13 - POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENTS 203, 205, and 206 (LANDS TO NORTHEAST OF FLOW DIVIDE / DRAINING TO THE TORRANCE CREEK SUBWATERSHED)

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	-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	112	262	370	402	364	256	124	32	0	1,923
Pervious Runoff (m^3)	79	72	102	66	8	0	0	0	0	0	96	109	**531**
Pervious Infiltration (m^3)	0	0	0	641	11	0	0	0	0	0	144	0	**797**
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	-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	75	176	241	252	237	172	83	21	0	1,258
Pervious Runoff (m^3)	67	60	85	55	6	0	0	0	0	0	96	92	**460**
Pervious Infiltration (m^3)	0	0	0	358	6	0	0	0	0	0	96	0	**460**
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 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	-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	37	88	121	126	119	86	42	11	0	629
Pervious Runoff (m^3)	33	30	43	27	3	0	0	0	0	0	48	46	**230**
Pervious Infiltration (m^3)	0	0	0	179	3	0	0	0	0	0	48	0	**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)	7	7	9	10	10	10	12	13	12	9	11	10	**121**

TABLE 13 - POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENTS 203, 205, and 206 (LANDS TO NORTHEAST OF FLOW DIVIDE / DRAINING TO THE TORRANCE CREEK SUBWATERSHED)

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	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 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	-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 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	-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	3	7	10	10	10	7	3	1	0	52
Pervious Runoff (m^3)	3	2	3	2	0	0	0	0	0	0	4	4	**19**
Pervious Infiltration (m^3)	0	0	0	15	0	0	0	0	0	0	4	0	**19**
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)	49	44	63	68	70	66	77	84	80	60	75	68	**807**

TABLE 13 - POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENTS 203, 205, and 206 (LANDS TO NORTHEAST OF FLOW DIVIDE / DRAINING TO THE TORRANCE CREEK SUBWATERSHED)

Evapotranspiration Analysis													
Sub-Area I	**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)	51	46	66	71	73	69	81	87	84	63	79	71	**840**

POST-DEVELOPMENT - NO INFILTRATION AUGMENTATION / MITIGATION MEASURES

Post-Development Infiltration (INF)	3,459	m^3/yr	200	mm/yr	0.1	L/s
Post-Development Runoff (R)	4,070	m^3/yr	235	mm/yr	0.1	L/s
Post-Development Evapotranspiration (ET)	8,424	m^3/yr	487	mm/yr	0.3	L/s
Total = INF + R + ET	15,952	m^3/yr	922	mm/yr	0.5	L/s
Precipitation	15,971	m^3/yr	923	mm/yr	0.5	L/s
Error	-19	(m^3/yr)	-1	mm/yr	-0.001	L/s

PRE-Development Infiltration	3,993	m^3/yr
Infiltration Deficit	**-534**	**m^3/yr**
PRE-Development Runoff	2,542	m^3/yr
Runoff Surplus	**1,528**	**m^3/yr**

Sub-Area Descriptions (topography, soils, cover)	
Sub-Area A	Rolling, Fine Sandy to Silt Loam, Mature Forest
Sub-Area B	Rolling, Fine Sandy to Silt Loam, Pasture and Shrubs
Sub-Area C	Rolling, Fine Sandy to Silt Loam, Urban Lawn, No Impervious Cover
Sub-Area E	Rolling, Fine Sandy to Silt Loam, Urban Lawn, 10% Impervious Cover
Sub-Area F	Rolling, Fine Sandy to Silt Loam, Urban Lawn, 50% Impervious Cover
Sub-Area G	Rolling, Fine Sandy to Silt Loam, Urban Lawn, 70% Impervious Cover
Sub-Area H	Rolling, Fine Sandy to Silt Loam, Urban Lawn, 90% Impervious Cover
Sub-Area I	Rolling, Fine Sandy to Silt Loam, Urban Lawn, 100% Impervious Cover

TABLE 13 - POST-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
CATCHMENTS 203, 205, and 206 (LANDS TO NORTHEAST OF FLOW DIVIDE / DRAINING TO THE TORRANCE CREEK SUBWATERSHED)

POST-DEVELOPMENT - WITH INFILTRATION AUGMENTATION / MITIGATION MEASURES

Land Description Factors (Sub-Area I)	**Catchment 203**
Topography	0.20
Soils	0.25
Cover	0.05
Sum (Infiltration Factor)†	0.50
Soil Moisture Capacity (mm)	75
Catchment Area (ha)	0.236
Imperviousness Coefficient	1.00
Impervious Area (ha)	0.236
Percentage of Catchment Area	100%
Remaining Pervious Area (ha)	0.00
Total Pervious Site Area (ha)	0.00
Percentage of Catchment Area	0.0%

= area located northeast of groundwater flow divide (0.091 ha) + area located southwest of groundflow flow divide (0.145 ha)

Catchment Area = 0.236 ha

Evapotranspiration Analysis													
Catchment 203 (Sub-Area I)	**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)	133	120	170	185	188	179	209	226	217	163	203	183	**2,176**

Precipitation captured by Catchment 203 (Building 2) that is directed to the East Infiltration Gallery

Monthly Summary (m^3)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Post-Development Runoff (R)	133	120	170	185	188	179	209	226	217	163	203	183	2,176
Assumption that 80% Reaches Gallery	106	96	136	148	151	143	167	181	174	130	163	147	1,741
									Pre- to Post Infiltration (No Mitigation) =				-534
									Pre- to Post Infiltration (With East Gallery Inputs) =				**1,207**

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.

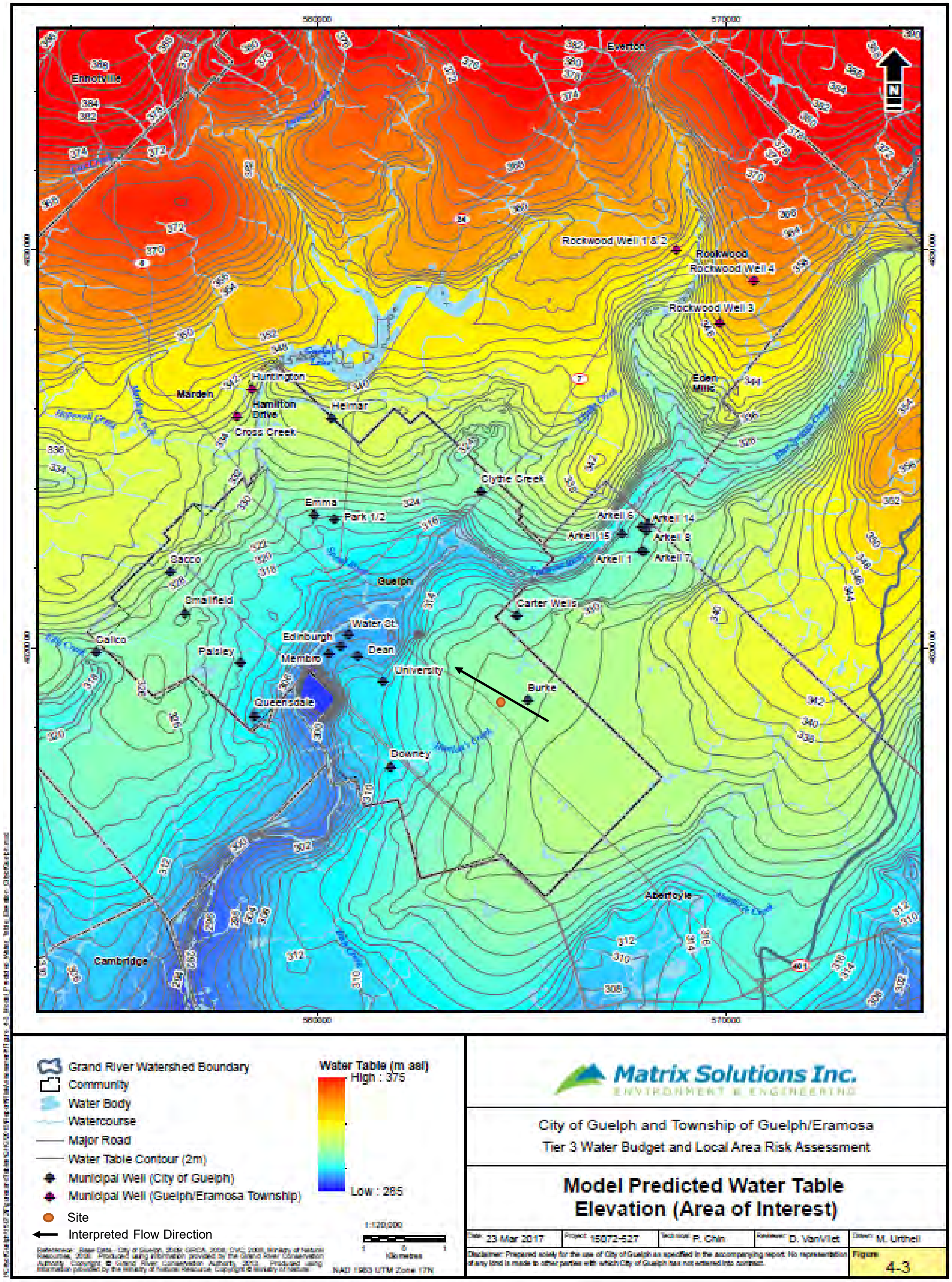
‡ Climate Data after Environment Canada, 2022. Canadian Climate Normals 1971-2000, Guelph Arboretum Station, Climate ID 6143069. [Online] http://climate.weather.gc.ca/climate_normals/index_e.html Accessed February 8, 2022.

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 14 - GROUNDWATER MOUNDING ANALYSIS

Storm Event	Duration of Infiltration Period (1) (days)	Groundwater Mounding Height Above Seasonal High Water Table at Distance (d) from Center of Infiltration Gallery																			
		d = 0 m		d = 6 m		d = 12 m		d = 15 m		d = 18 m		d = 21 m		d =24 m		d = 27 m		d = 30 m		d = 36 m	
		(m)	(m AMSL)	(m)	(m AMSL)	(m)	(m AMSL)	(m)	(m AMSL)	(m)	(m AMSL)	(m)	(m AMSL)	(m)	(m AMSL)	(m)	(m AMSL)	(m)	(m AMSL)	(m)	(m AMSL)
East Infiltration Trench																					
Obvert (Top) Elevation =		341.51	m AMSL																		
Invert (Base) Elevation =		340.51	m AMSL																		
High Groundwater =		339.51	m AMSL	**as estimated from MW102-21**																	
25 mm	0.52	*0.40*	339.91	*0.21*	339.72	*0.08*	339.59	*0.05*	339.56	*0.03*	339.54	*0.01*	339.52	*0.01*	339.52	*0.00*	339.51	*0.00*	339.51	*0.00*	339.51
South Infiltration Trench																					
Obvert (Top) Elevation =			m AMSL																		
Invert (Base) Elevation =		340.89	m AMSL																		
High Groundwater =		339.89	m AMSL	**as estimated from MW101-21**																	
25 mm	0.64	*0.70*	340.59	*0.49*	340.38	*0.21*	340.10	*0.13*	340.02	*0.08*	339.97	*0.05*	339.94	*0.03*	339.92	*0.01*	339.90	*0.01*	339.90	*0.00*	339.89

APPENDIX C:
REGIONAL GROUNDWATER FLOW MAPPING



Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

City of Guelph and Township of Guelph/Eramosa
Tier 3 Water Budget and Local Area Risk Assessment

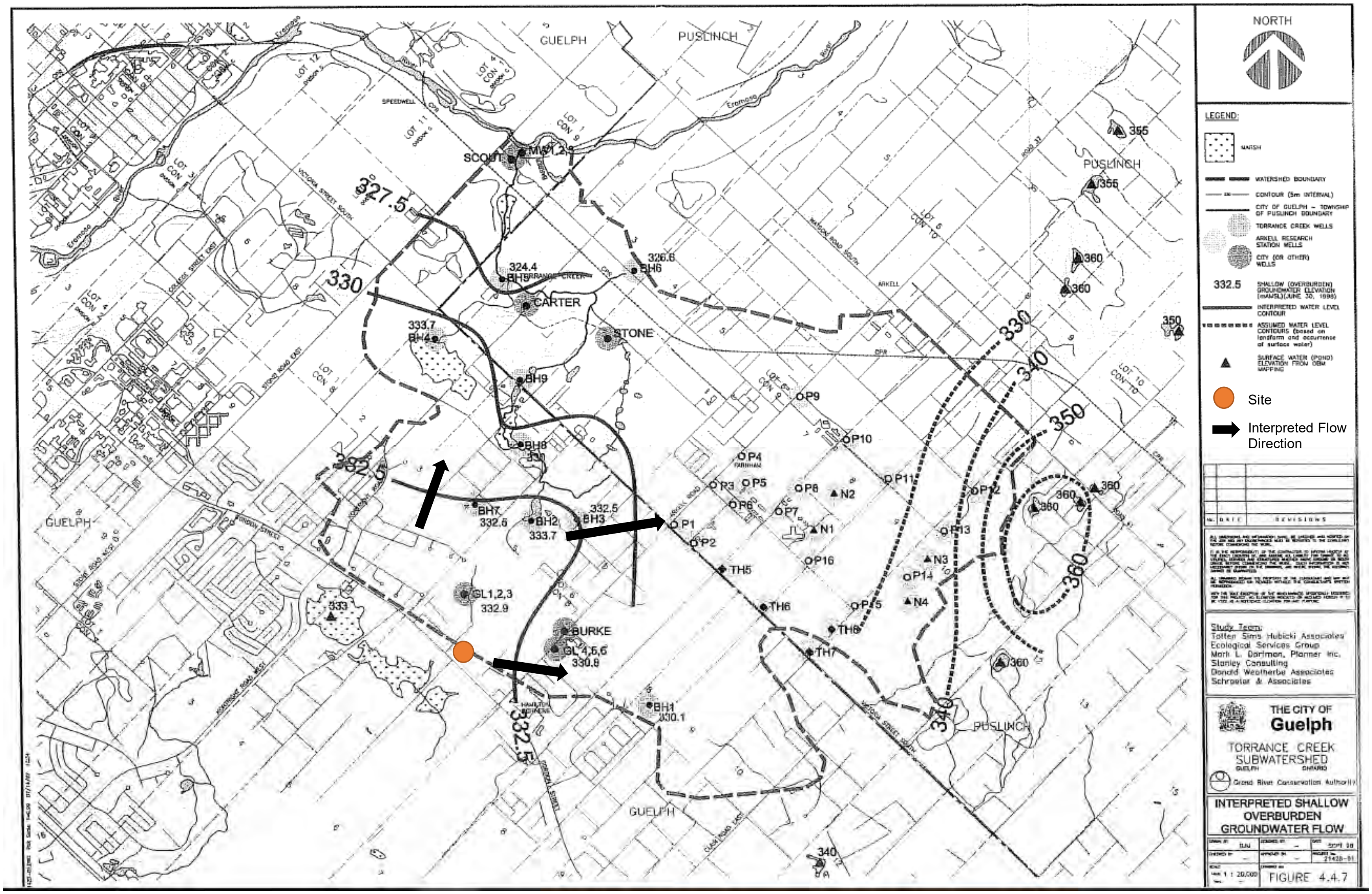
Model Predicted Water Table Elevation (Area of Interest)

Date: 23 Mar 2017	Project: 15072-527	Technical: P. Chin	Reviewer: D. VanVliet	Drawn: M. Urthell

Disclaimer: Prepared solely for the use of City of Guelph as specified in the accompanying report. No representation of any kind is made to other parties with which City of Guelph has not entered into contract.

Figure 4-3

Source: Matrix Solutions Inc. 2017. City of Guelph and Township of Guelph/Eramosa Tier Three Water Budget and Local Area Risk Assessment.



Source: Totten Sims Hubicki Associates, Ecological Services Group, Ray Blackport, Mark L. Dorfman Planner Inc., Shroeter & Associates, and Donald G. Weatherbe Associates. 1998. Torrance Creek Subwatershed Study - Management Study. Prepared for City of Guelph and Grand River Conservation Authority, September 1998, September 1998, Revised November 1998.

APPENDIX D:
REGIONAL GROUNDWATER RECHARGE MAPPING

Map Centre (UTM NAD83 z17): 564,582.48 4,818,656.58

This map is not to be used for navigation

Grand River
Conservation Authority
Date: Jul 22, 2019

Hydraulic Gradient

Legend

- ☐ Municipal Boundary (GRCA)
- Watercourse - Local (GRCA)
- Contour 5m (ON)
- ☐ Park - Local (GRCA)
- 🟦 Waterbody - Local (GRCA)

Hydraulic Gradient (GRCA)

- 🟦 Upward
- ⬛ Downward

🟥 **Site Boundary (Approximate)**

0 45 90 180 270
Metres

N

NAD 1983 UTM Zone 17N

Scale: 7,762

Grand River
Conservation Authority
Date: Jul 22, 2019

Average Annual Recharge

Map Centre (UTM NAD83 z17): 564,582.48 4,818,656.58

This map is not to be used for navigation

Legend

- ☐ Municipal Boundary (GRCA)
- — Watercourse - Local (GRCA)
- — Contour 5m (ON)
- ☐ Park - Local (GRCA)
- ■ Waterbody - Local (GRCA)

Average Annual Recharge (GRCA)

- ■ less than 50 mm/yr
- ■ 50 - 100
- ■ 100 - 200
- ■ 200 - 300
- ■ 300 - 400
- ■ > 400

🟥 **Site Boundary (Approximate)**

Disclaimer: This map is for illustrative purposes only. Information contained herein is not a substitute for professional review or a site survey and is subject to change without notice. The Grand River Conservation Authority takes no responsibility for, nor guarantees, the accuracy of the information contained on this map. Any interpretations or conclusions drawn from this map are the sole responsibility of the user.
The source for each data layer is shown in parentheses in the map legend. For a complete listing of sources and citations go to: https://maps.grandriver.ca/Sources-and-Citations.pdf

0 45 90 180 270 Metres

N

NAD 1983 UTM Zone 17N

Scale: 7,762

APPENDIX E:
BOREHOLE LOGS

kell Rd. Well #2

12 inch E

5 R N

5 R 1 1 1 0 1 0

6. № 933 f

PW2/66(COG)

Burke Well.

The Ontario Water Resources Commission Act

WATER WELL RECORD

12 31 ~~or District~~ Wellington ~~Corp~~.City of Guelph Township, Village, Town or City

number 8 Lot number 6 Date completed 16th June 1966 - well ~~20~~th Aug 1966 - testing

Corporation of the City of Guelph (print in block letters) Address Guelph Ont.

Casing and Screen Record

side diameter of casing 12 inch

length of casing 64 ft 10 in.

ype of screen nil

ength of screen nil

to top of screen nil

Diameter of finished hole 12 inch

Pumping Test

Static level 10 ft. 332

Test-pumping rate 1000 G.P.M.

Pumping level 20 ft 11 inches

Duration of test pumping 24 hours

Water clear or cloudy at end of test clear

Recommended pumping rate 800 G.P.M.

with pump setting of 100 feet below ground surface

Well Log

Overburden and Bedrock Record	From 0 ft.	To 4 ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
black muck and gravel	4	24	136 ft	fresh
rough gravel	24	34		
sandy blue clay	34	55		
blue clay	55	64		
blue clay & gravel	64	95		
light brown rock	95	104		
dark brown rock	104	140		
dark brown & black rock	140	245		
dark grey rock	245	258		
dark blue rock	253	259		
blue shale				

For what purpose(s) is the water to be used?
Corporation of the City of Guelph

s well on upland, in valley, or on hillside?

illing or Boring Firm Graham Well Drilling

119 Renfield St.

ddress Guelph Ont.

icence Number 2076

ame of Driller or Borer Arthut Titus

ddress Eramosa Rd. Guelph Ont.

ate Aug 31st 1966

J L Graham - per MCG

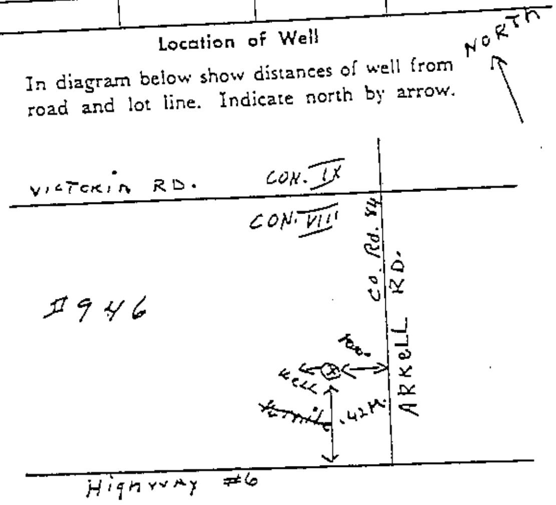
(Signature of Licensed Drilling or Boring Contractor)

orm 7 15M-60-4138

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



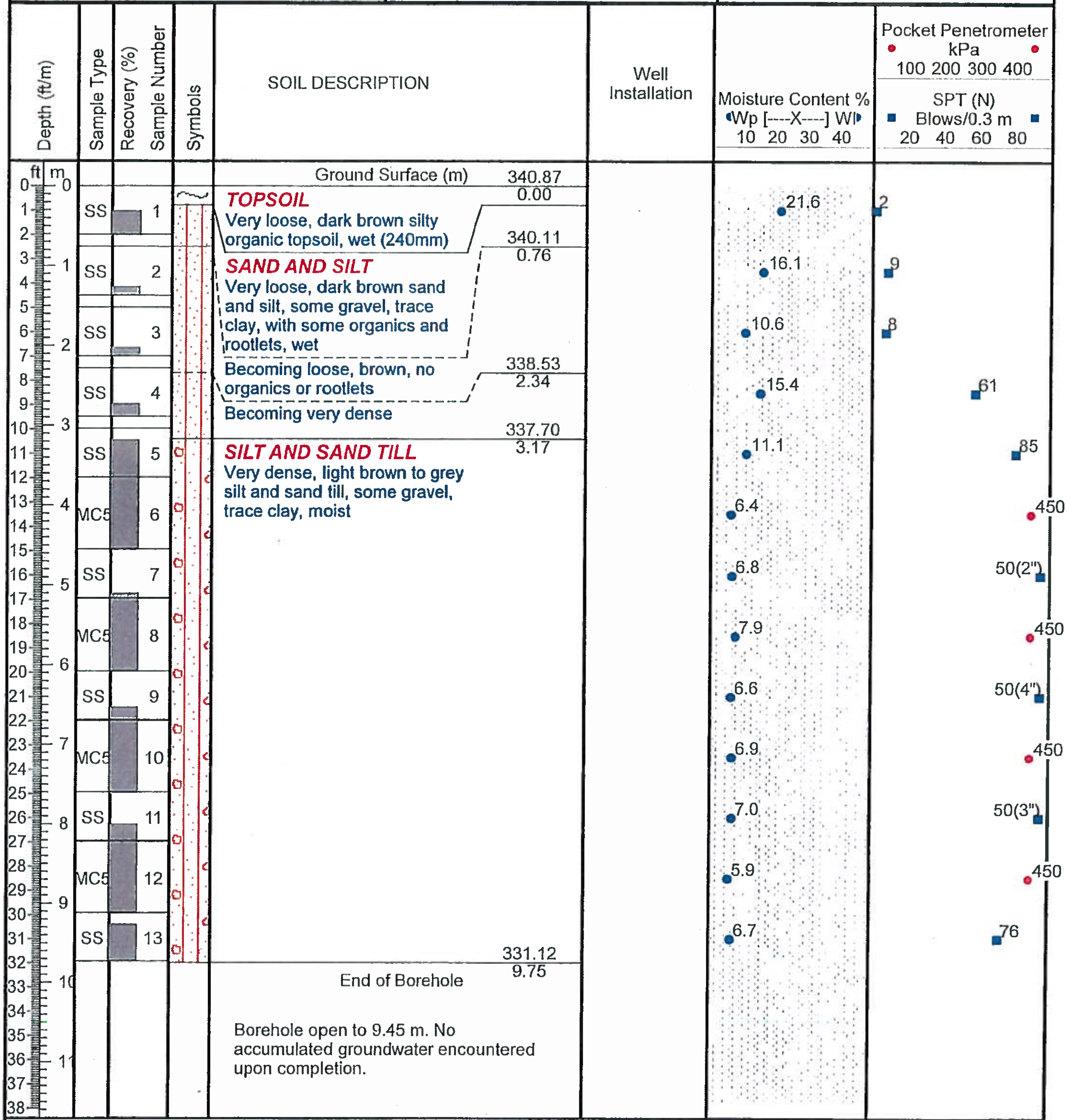
BOREHOLE 1

Page 1 of 1

Date Drilled: April 18, 2018
Rig: Geoprobe 7822DT
Contractor: CMT Drilling Inc.
Drilling Method: SPT

Elevation: 340.87 m
Logged by: SW

Project No.: 18-099
Project: Two 12 Storey Appt. Buildings
Location: 1242, 1250, 1260 Gordon St
Guelph, ON



Ground Surface (m) 340.87

0.00

TOPSOIL
Very loose, dark brown silty organic topsoil, wet (240mm)

340.11
0.76

SAND AND SILT
Very loose, dark brown sand and silt, some gravel, trace clay, with some organics and rootlets, wet

338.53
2.34

Becoming loose, brown, no organics or rootlets

Becoming very dense

337.70
3.17

SILT AND SAND TILL
Very dense, light brown to grey silt and sand till, some gravel, trace clay, moist

331.12
9.75

End of Borehole

Borehole open to 9.45 m. No accumulated groundwater encountered upon completion.

CMT ENGINEERING INC.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
phone 519-699-5775 fax 519-699-4664
www.cmtinc.net

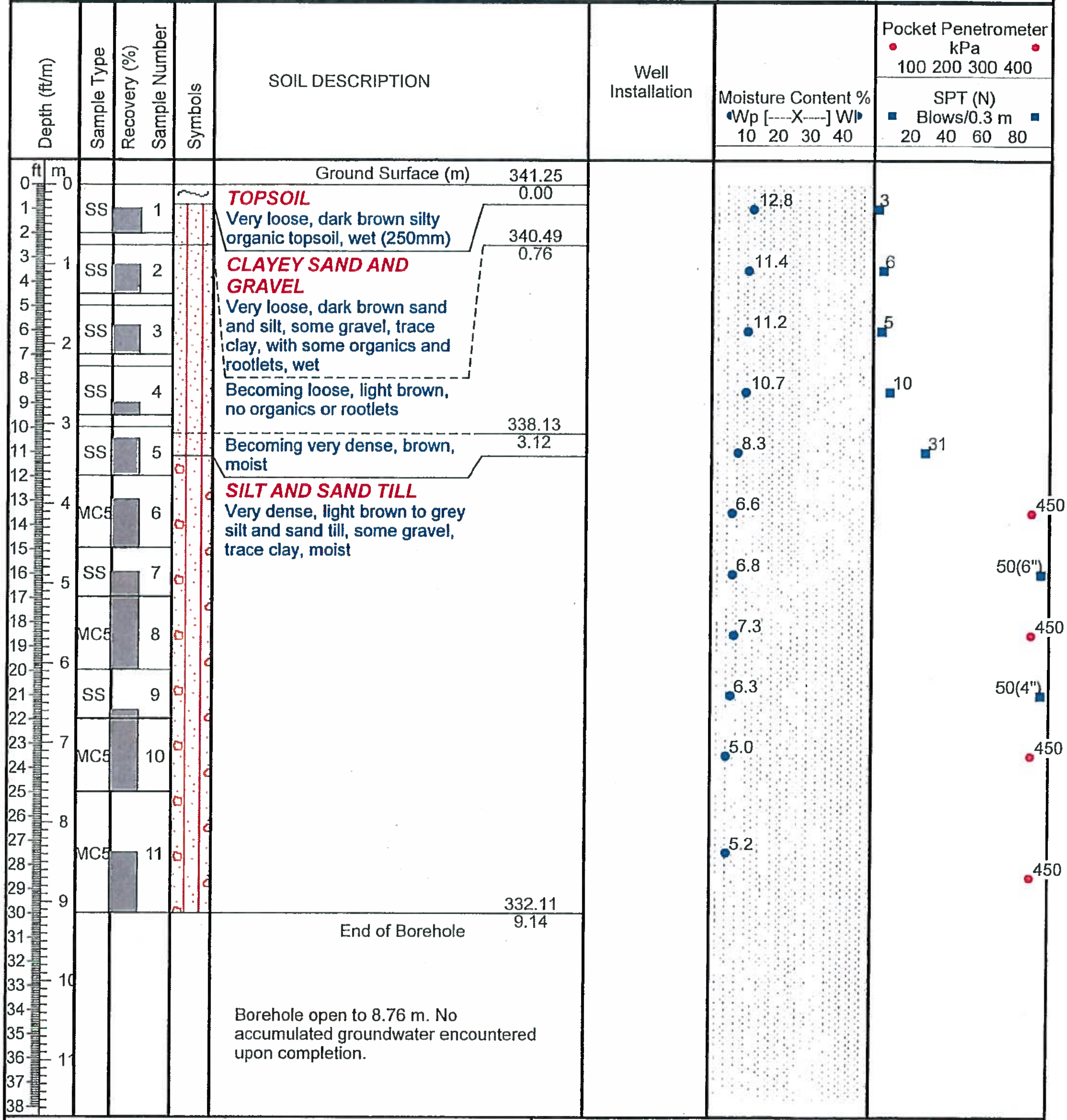
BOREHOLE 2

Page 1 of 1

Date Drilled: April 18, 2018
Rig: Geoprobe 7822DT
Contractor: CMT Drilling Inc.
Drilling Method: SPT

Elevation: 341.25 m
Logged by: SW

Project No.: 18-099
Project: Two 12 Storey Appt. Buildings
Location: 1242, 1250, 1260 Gordon St
Guelph, ON



Ground Surface (m) 341.25

0.00

TOPSOIL
Very loose, dark brown silty organic topsoil, wet (250mm)

340.49
0.76

CLAYEY SAND AND GRAVEL
Very loose, dark brown sand and silt, some gravel, trace clay, with some organics and rootlets, wet

Becoming loose, light brown, no organics or rootlets

338.13
3.12

Becoming very dense, brown, moist

SILT AND SAND TILL
Very dense, light brown to grey silt and sand till, some gravel, trace clay, moist

332.11
9.14

End of Borehole

Borehole open to 8.76 m. No accumulated groundwater encountered upon completion.

SS	1	12.8	3	
SS	2	11.4	6	
SS	3	11.2	5	
SS	4	10.7	10	
SS	5	8.3	31	
MC5	6	6.6		450
SS	7	6.8	50(6")	
MC5	8	7.3		450
SS	9	6.3	50(4")	
MC5	10	5.0		450
MC5	11	5.2		450

CMT ENGINEERING INC.
1011 Industrial Crescent, Unit 1
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phone 519-699-5775 fax 519-699-4664
www.cmtinc.net

BOREHOLE 3

Page 1 of 1

Date Drilled: April 17, 2018
Rig: Geoprobe 7822DT
Contractor: CMT Drilling Inc.
Drilling Method: SPT

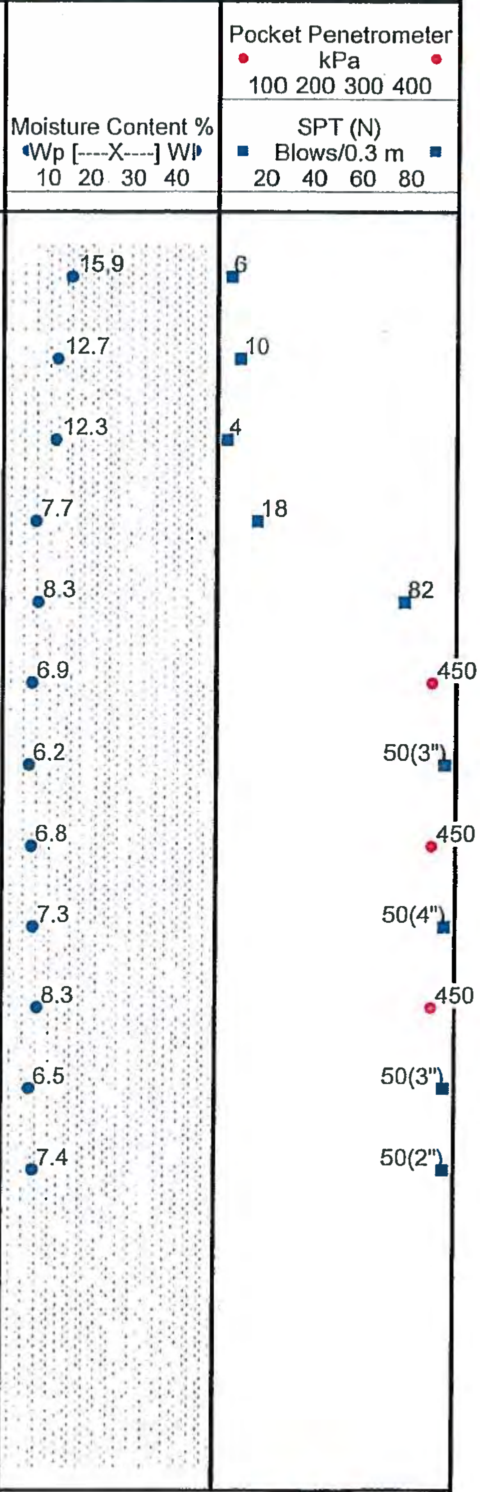
Elevation: 340.76 m
Logged by: SW

Project No.: 18-099
Project: Two 12 Storey Appt. Buildings
Location: 1242, 1250, 1260 Gordon St
Guelph, ON

Elevation / Depth (m)	SOIL DESCRIPTION
340.76 0.00	Ground Surface (m)
	TOPSOIL Loose, dark brown silty organic topsoil, moist (240mm)
	SAND AND SILT Loose, dark brown sand and silt, some gravel, trace clay, wet
338.17 2.59	Becoming very dense, brown
337.10 3.66	**SILT AND SAND TILL** Very dense, light brown to grey silt and sand till, some gravel, trace clay, moist
331.62 9.14	End of Borehole

Cave at 8.05 m. No accumulated groundwater encountered upon completion.

Sample Type	Sample Number	Moisture Content %	Pocket Penetrometer kPa	SPT (N) Blows/0.3 m
SS	1	15.9		6
SS	2	12.7		10
SS	3	12.3		4
SS	4	7.7		18
SS	5	8.3		82
MC5	6	6.9	450	
SS	7	6.2		50(3")
MC5	8	6.8	450	
SS	9	7.3		50(4")
MC5	10	8.3	450	
SS	11	6.5		50(3")
MC5	12	7.4		50(2")



Well Installation

CMT ENGINEERING INC.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
phone 519-699-5775 fax 519-699-4664
www.cmtinc.net

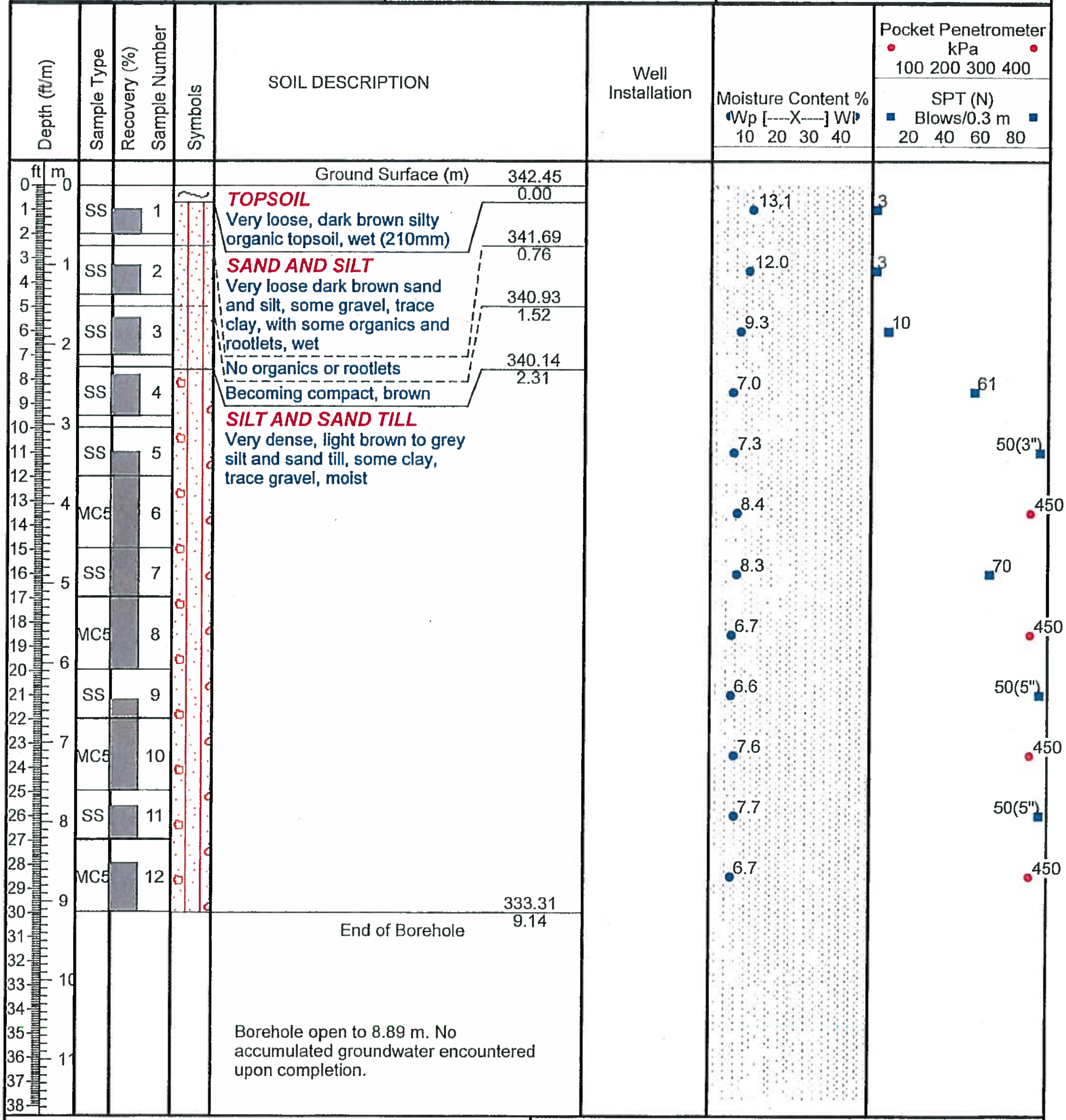
BOREHOLE 4

Page 1 of 1

Date Drilled: April 18, 2018
Rig: Geoprobe 7822DT
Contractor: CMT Drilling Inc.
Drilling Method: SPT

Elevation: 342.45 m
Logged by: SW

Project No.: 18-099
Project: Two 12 Storey Appt. Buildings
Location: 1242, 1250, 1260 Gordon St
Guelph, ON



Elevation (m) / Depth (m)	SOIL DESCRIPTION
342.45	Ground Surface (m)
342.45 0.00	***TOPSOIL*** Very loose, dark brown silty organic topsoil, wet (210mm)
341.69 0.76	***SAND AND SILT*** Very loose dark brown sand and silt, some gravel, trace clay, with some organics and rootlets, wet
340.93 1.52	No organics or rootlets
340.14 2.31	Becoming compact, brown
	SILT AND SAND TILL Very dense, light brown to grey silt and sand till, some clay, trace gravel, moist
333.31 9.14	End of Borehole

Sample Type	Sample Number	Moisture Content %	SPT (N)	Pocket Penetrometer kPa
SS	1	13.1	3	
SS	2	12.0	3	
SS	3	9.3	10	
SS	4	7.0	61	
SS	5	7.3	50(3")	
MC5	6	8.4		450
SS	7	8.3	70	
MC5	8	6.7		450
SS	9	6.6	50(5")	
MC5	10	7.6		450
SS	11	7.7	50(5")	
MC5	12	6.7		450

Borehole open to 8.89 m. No accumulated groundwater encountered upon completion.

CMT ENGINEERING INC.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
phone 519-699-5775 fax 519-699-4664
www.cmtinc.net

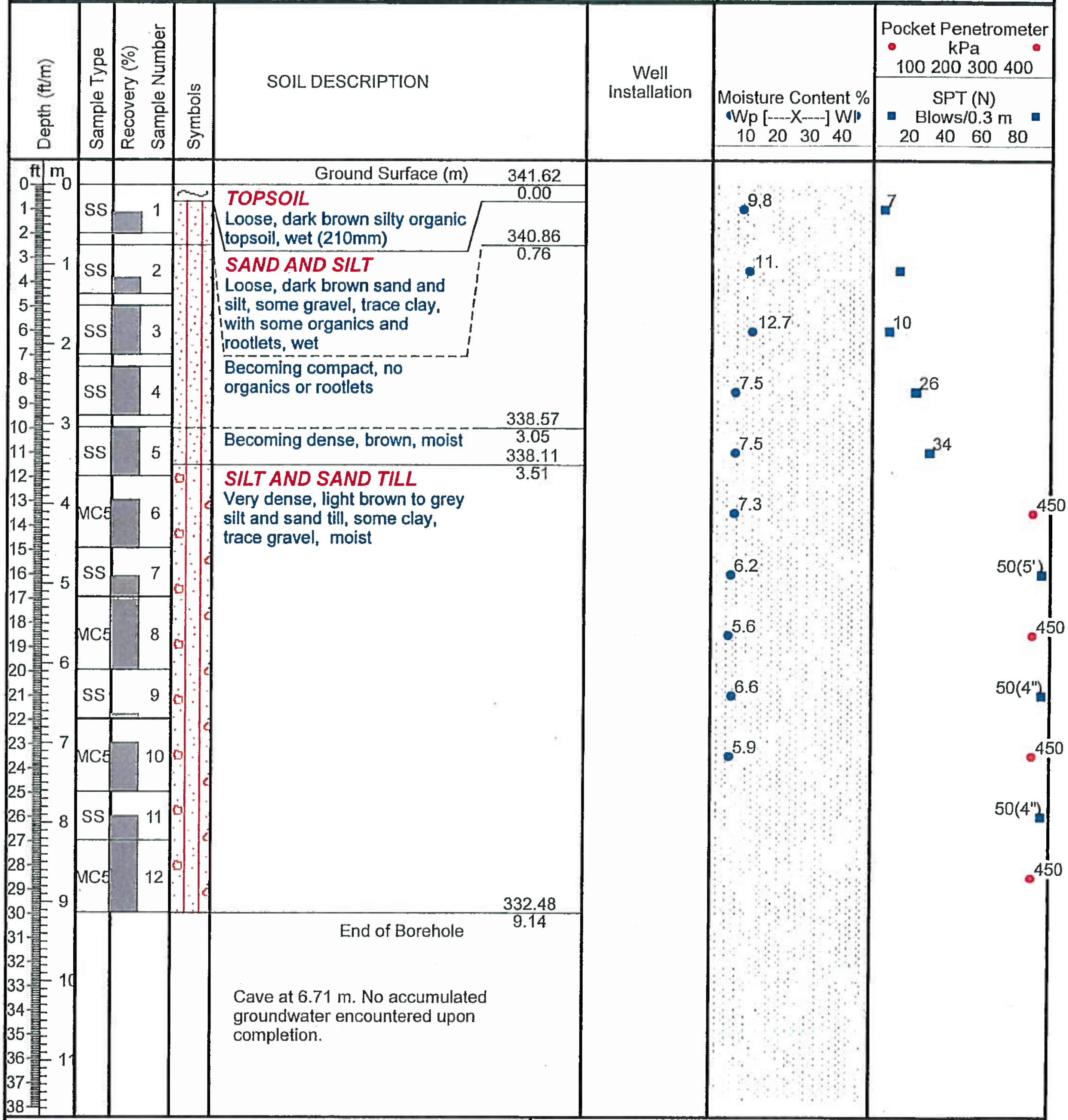
BOREHOLE 5

Page 1 of 1

Date Drilled: April 19, 2018
Rig: Geoprobe 7822DT
Contractor: CMT Drilling Inc.
Drilling Method: SPT

Elevation: 341.62 m
Logged by: SW

Project No.: 18-099
Project: Two 12 Storey Appt. Buildings
Location: 1242, 1250, 1260 Gordon St
Guelph, ON



Ground Surface (m) 341.62

0.00

TOPSOIL
Loose, dark brown silty organic topsoil, wet (210mm)

340.86
0.76

SAND AND SILT
Loose, dark brown sand and silt, some gravel, trace clay, with some organics and rootlets, wet

Becoming compact, no organics or rootlets

338.57
3.05

Becoming dense, brown, moist

338.11
3.51

SILT AND SAND TILL
Very dense, light brown to grey silt and sand till, some clay, trace gravel, moist

332.48
9.14

End of Borehole

Cave at 6.71 m. No accumulated groundwater encountered upon completion.

SS	1	9.8	7	
SS	2	11.		
SS	3	12.7	10	
SS	4	7.5	26	
SS	5	7.5	34	
MC5	6	7.3		450
SS	7	6.2	50(5')	
MC5	8	5.6		450
SS	9	6.6	50(4")	
MC5	10	5.9		450
SS	11		50(4")	
MC5	12			450

CMT ENGINEERING INC.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
phone 519-699-5775 fax 519-699-4664
www.cmtinc.net

BOREHOLE 6

Page 1 of 1

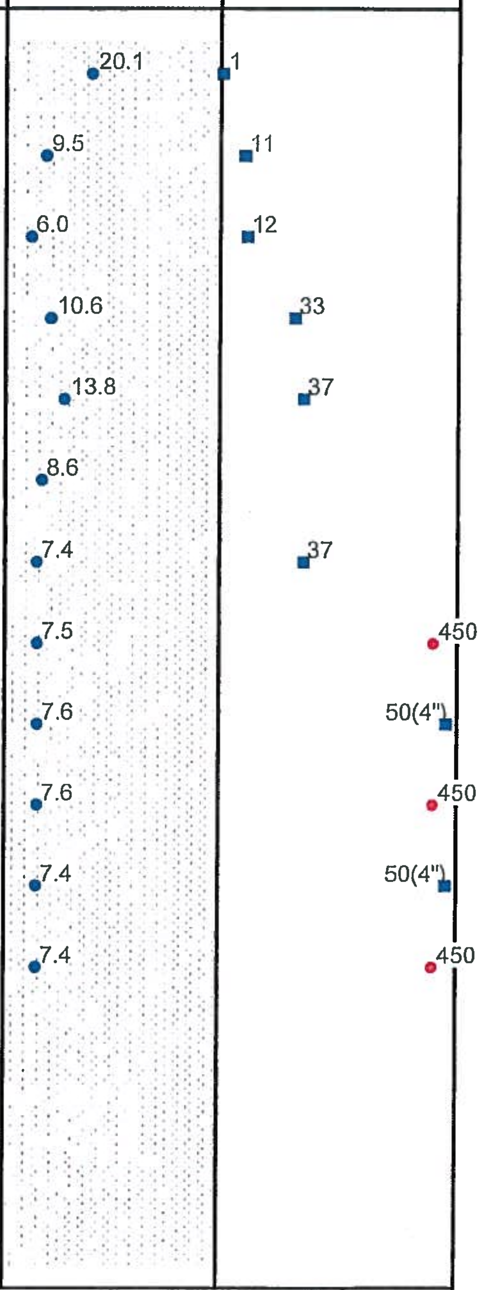
Date Drilled: April 19, 2018
Rig: Geoprobe 7822DT
Contractor: CMT Drilling Inc.
Drilling Method: SPT

Elevation: 340.48 m
Logged by: SW

Project No.: 18-099
Project: Two 12 Storey Appt. Buildings
Location: 1242, 1250, 1260 Gordon St
Guelph, ON

Elevation (m) / Depth (m)	SOIL DESCRIPTION
340.48	Ground Surface (m)
0.00	**TOPSOIL** Loose, dark brown silty organic topsoil, wet (190mm)
339.72 0.76	**SAND AND SILT** Very loose, dark brown sand and silt, some gravel, trace clay, with some organics and rootlets, wet Becoming compact, no organics or rootlets
338.65 1.83	
337.43 3.05	**SAND** Dense, brown sand, trace silt, moist Becoming wet
	SAND AND SILT Compact, brown sand and silt, some gravel, trace clay, moist
335.60 4.88	**SILT AND SAND TILL** Very dense, light brown to grey silt and sand till, some clay, trace gravel, moist
331.34 9.14	End of Borehole

Borehole open to 8.69 m. No accumulated groundwater encountered upon completion.



Sample Type	Sample Number	Moisture Content %	SPT (N) / Pocket Penetrometer kPa
SS	1	20.1	1
SS	2	9.5	11
SS	3	6.0	12
SS	4	10.6	33
SS	5	13.8	37
MC5	6	8.6	
SS	7	7.4	37
MC5	8	7.5	450
SS	9	7.6	50(4")
MC5	10	7.6	450
SS	11	7.4	50(4")
MC5	12	7.4	450

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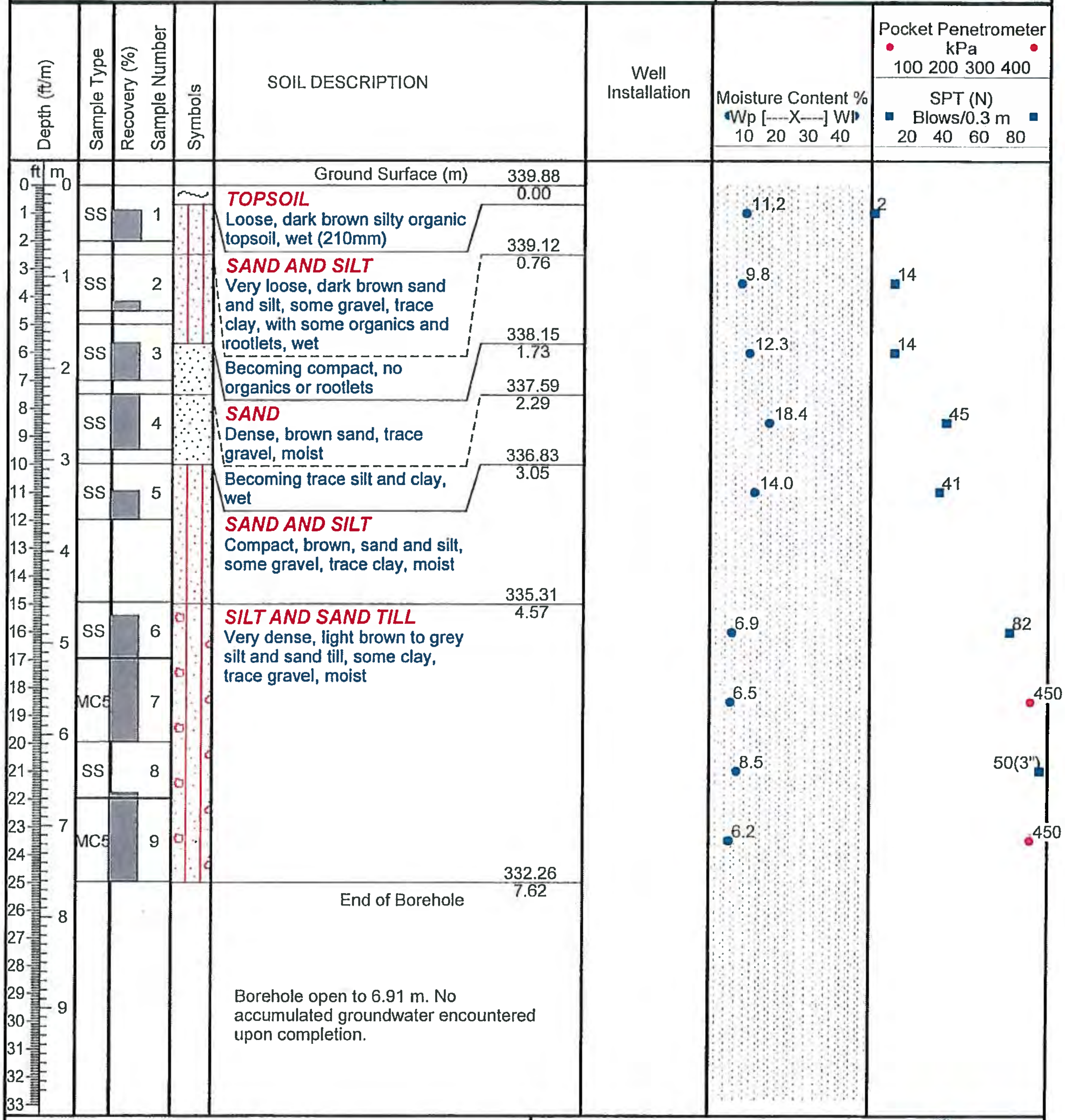
BOREHOLE 7

Page 1 of 1

Date Drilled: April 19, 2018
Rig: Geoprobe 7822DT
Contractor: CMT Drilling Inc.
Drilling Method: SPT

Elevation: 339.88 m
Logged by: SW

Project No.: 18-099
Project: Two 12 Storey Appt. Buildings
Location: 1242, 1250, 1260 Gordon St
Guelph, ON



Ground Surface (m) 339.88

Elevation (m) / Depth (m)	Soil Description
339.88 0.00	***TOPSOIL*** Loose, dark brown silty organic topsoil, wet (210mm)
339.12 0.76	***SAND AND SILT*** Very loose, dark brown sand and silt, some gravel, trace clay, with some organics and rootlets, wet
338.15 1.73	Becoming compact, no organics or rootlets
337.59 2.29	***SAND*** Dense, brown sand, trace gravel, moist
336.83 3.05	Becoming trace silt and clay, wet ***SAND AND SILT*** Compact, brown, sand and silt, some gravel, trace clay, moist
335.31 4.57	***SILT AND SAND TILL*** Very dense, light brown to grey silt and sand till, some clay, trace gravel, moist
332.26 7.62	End of Borehole

Sample Type	Sample Number	Moisture Content %	SPT (N)	Pocket Penetrometer kPa
SS	1	11,2	2	
SS	2	9.8	14	
SS	3	12.3	14	
SS	4	18.4	45	
SS	5	14.0	41	
SS	6	6.9	82	
MC5	7	6.5		450
SS	8	8.5	50(3")	
MC5	9	6.2		450

Borehole open to 6.91 m. No accumulated groundwater encountered upon completion.

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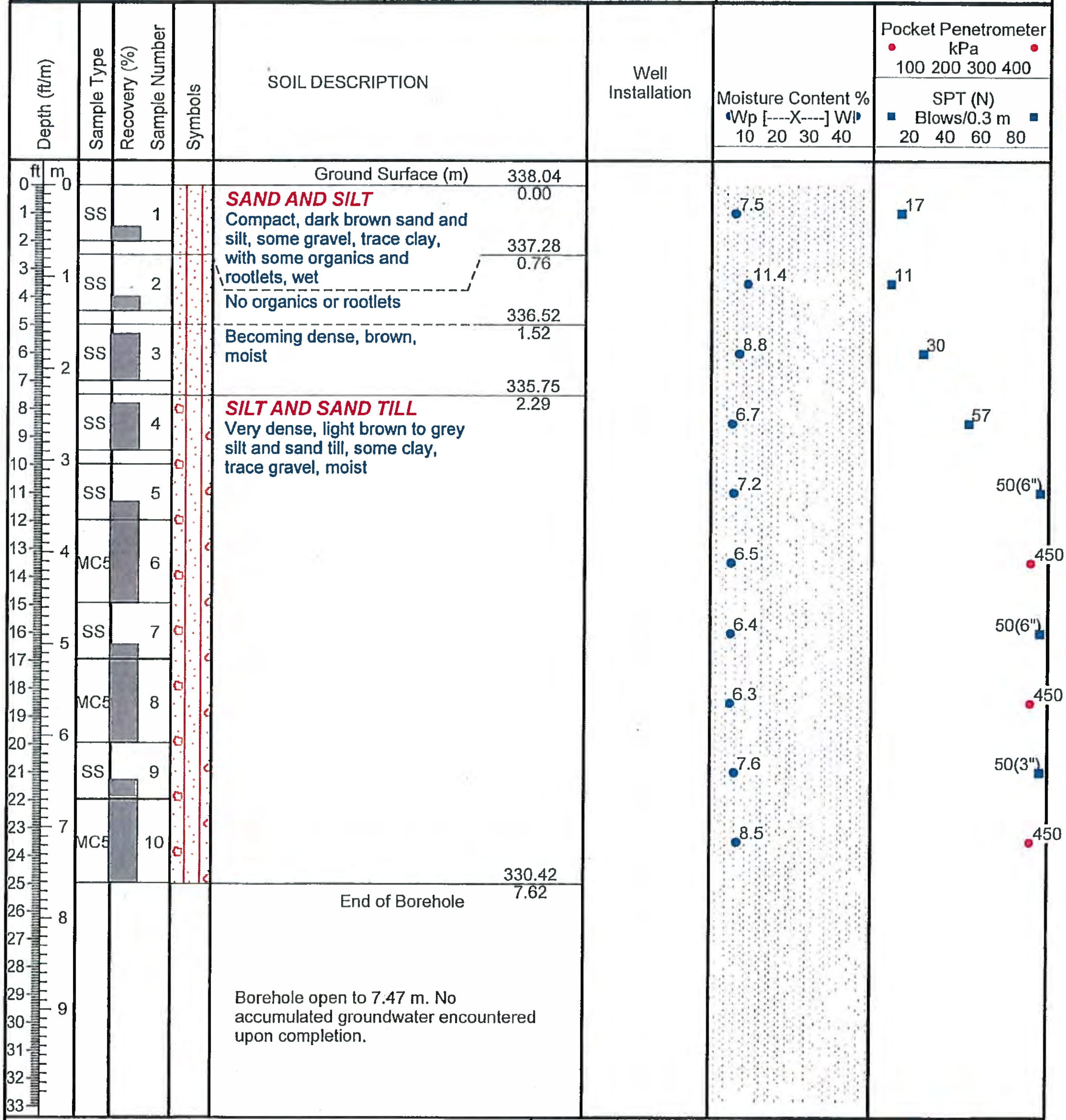
BOREHOLE 8

Page 1 of 1

Date Drilled: April 19, 2018
Rig: Geoprobe 7822DT
Contractor: CMT Drilling Inc.
Drilling Method: SPT

Elevation: 338.04 m
Logged by: SW

Project No.: 18-099
Project: Two 12 Storey Appt. Buildings
Location: 1242, 1250, 1260 Gordon St
Guelph, ON



SOIL DESCRIPTION

Soil Description	Elevation (m)	Depth (m)
Ground Surface (m)	338.04	0.00
SAND AND SILT Compact, dark brown sand and silt, some gravel, trace clay, with some organics and rootlets, wet	337.28	0.76
No organics or rootlets	336.52	1.52
Becoming dense, brown, moist	335.75	2.29
SILT AND SAND TILL Very dense, light brown to grey silt and sand till, some clay, trace gravel, moist	330.42	7.62
End of Borehole		

Borehole open to 7.47 m. No accumulated groundwater encountered upon completion.

Sample Type	Sample Number	Moisture Content %	SPT (N)	Pocket Penetrometer kPa
SS	1	7.5	17	
SS	2	11.4	11	
SS	3	8.8	30	
SS	4	6.7	57	
SS	5	7.2	50(6")	
MC5	6	6.5		450
SS	7	6.4	50(6")	
MC5	8	6.3		450
SS	9	7.6	50(3")	
MC5	10	8.5		450

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BOREHOLE 9

Page 1 of 1

Date Drilled: April 19, 2018
Rig: Geoprobe 7822DT
Contractor: CMT Drilling Inc.
Drilling Method: SPT

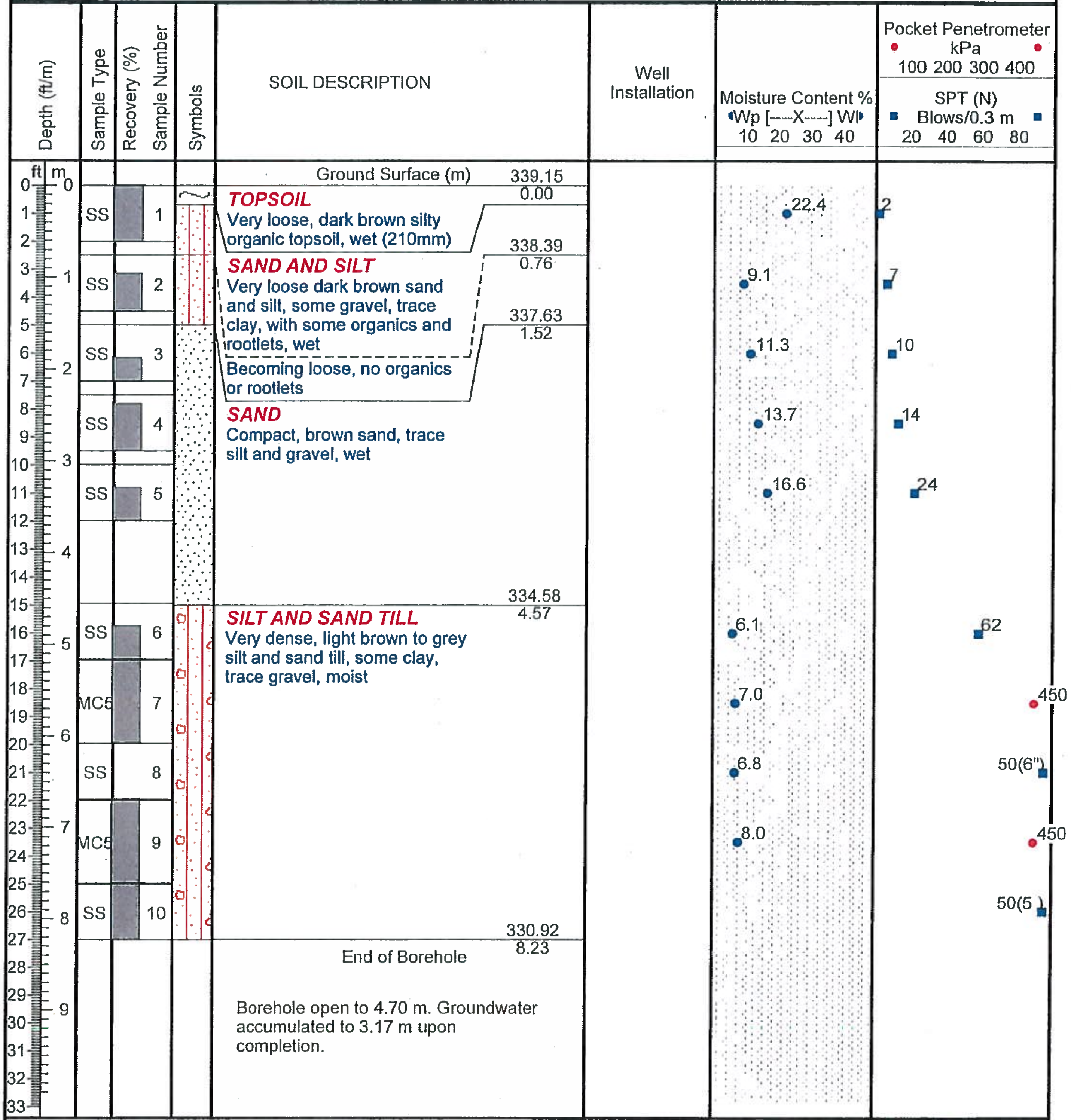
Elevation: 339.15 m
Logged by: SW

Project No.: 18-099
Project: Two 12 Storey Appt. Buildings
Location: 1242, 1250, 1260 Gordon St
Guelph, ON

Elevation (m)	Depth (m)	SOIL DESCRIPTION
339.15		Ground Surface (m)
	0.00	**TOPSOIL** Very loose, dark brown silty organic topsoil, wet (210mm)
338.39	0.76	**SAND AND SILT** Very loose dark brown sand and silt, some gravel, trace clay, with some organics and rootlets, wet Becoming loose, no organics or rootlets
337.63	1.52	**SAND** Compact, brown sand, trace silt and gravel, wet
334.58	4.57	**SILT AND SAND TILL** Very dense, light brown to grey silt and sand till, some clay, trace gravel, moist
330.92	8.23	End of Borehole

Borehole open to 4.70 m. Groundwater accumulated to 3.17 m upon completion.

Sample Type	Sample Number	Moisture Content %	SPT (N) Blows/0.3 m	Pocket Penetrometer kPa
SS	1	22.4	2	
SS	2	9.1	7	
SS	3	11.3	10	
SS	4	13.7	14	
SS	5	16.6	24	
SS	6	6.1	62	
MC5	7	7.0		450
SS	8	6.8	50(6")	
MC5	9	8.0		450
SS	10		50(5")	



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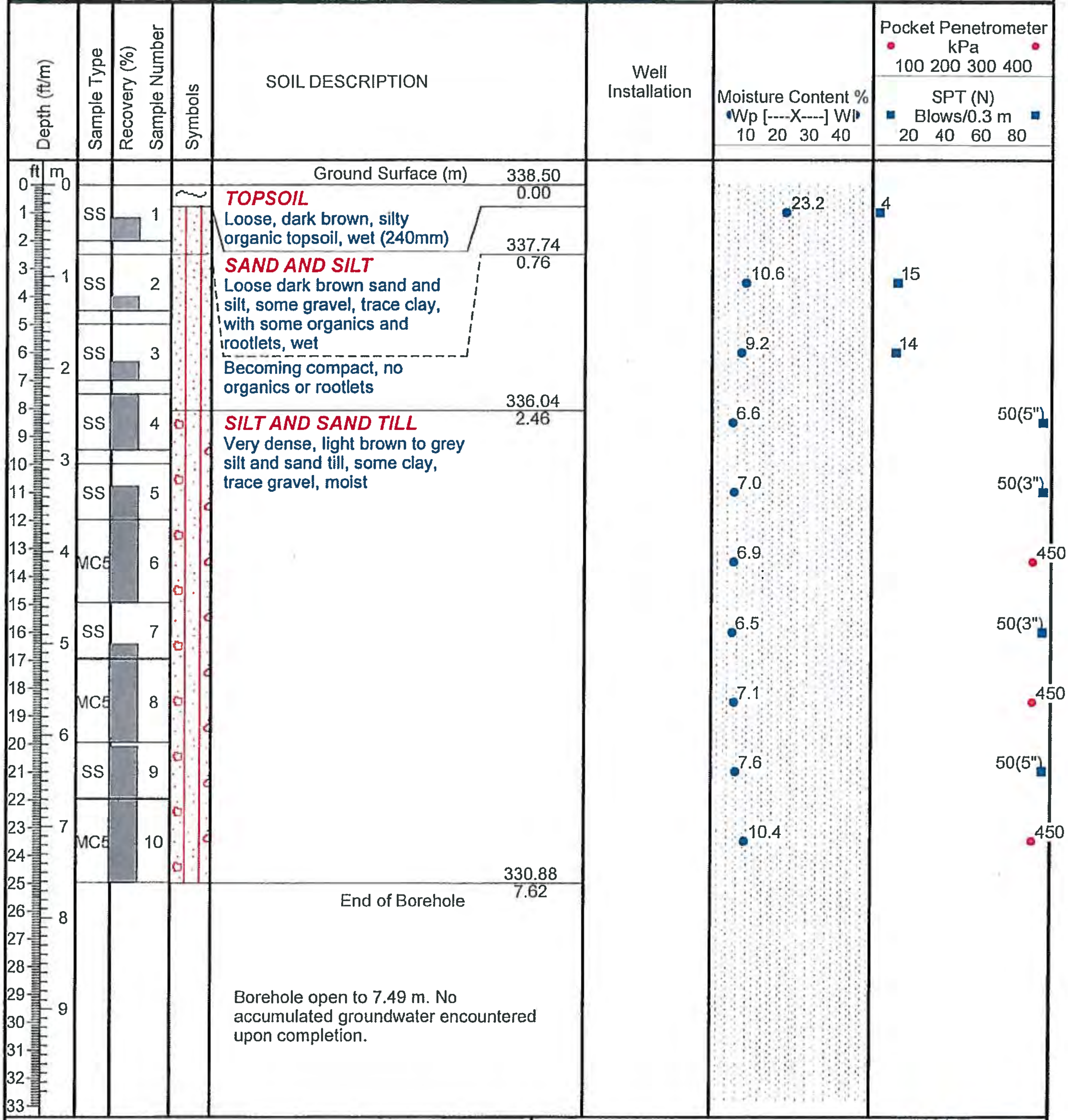
BOREHOLE 10

Page 1 of 1

Date Drilled: April 17, 2018
Rig: Geoprobe 7822DT
Contractor: CMT Drilling Inc.
Drilling Method: SPT

Elevation: 338.50 m
Logged by: SW

Project No.: 18-099
Project: Two 12 Storey Appt. Buildings
Location: 1242, 1250, 1260 Gordon St
Guelph, ON



Ground Surface (m) 338.50 / 0.00

TOPSOIL
Loose, dark brown, silty organic topsoil, wet (240mm)

337.74 / 0.76

SAND AND SILT
Loose dark brown sand and silt, some gravel, trace clay, with some organics and rootlets, wet

Becoming compact, no organics or rootlets

336.04 / 2.46

SILT AND SAND TILL
Very dense, light brown to grey silt and sand till, some clay, trace gravel, moist

330.88 / 7.62

End of Borehole

Borehole open to 7.49 m. No accumulated groundwater encountered upon completion.

SS	1	23.2	4	
SS	2	10.6	15	
SS	3	9.2	14	
SS	4	6.6	50(5")	
SS	5	7.0	50(3")	
MC5	6	6.9		450
SS	7	6.5	50(3")	
MC5	8	7.1		450
SS	9	7.6	50(5")	
MC5	10	10.4		450

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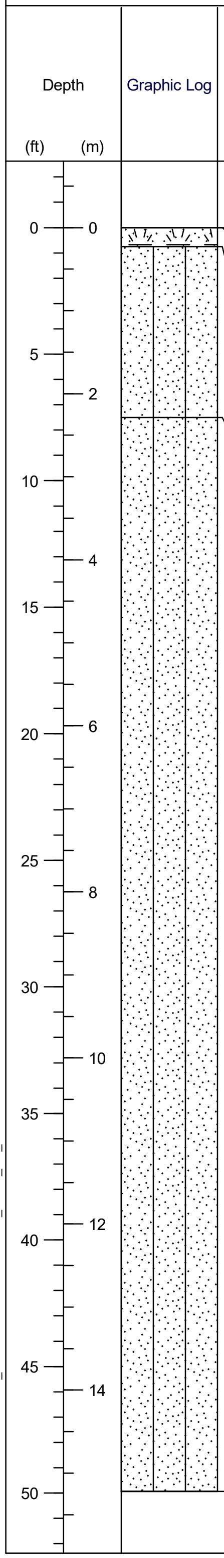
Monitoring Well: MW1-18

Project: 1242, 1250 and 1260 Gordon Street and 9 Valley Road
Client: Tricar Developments Inc.
Location: Guelph, Ontario
Number: 161413684

Field Investigator: C. Davis
Contractor: Aardvark Drilling, Inc
Drilling method: Hollow Stem Auger
Date started/completed: 30-Jul-2018

Ground surface elevation: 343.92 m AMSL
Top of casing elevation: 344.72 m AMSL
Easting: 564468
Northing: 4818537

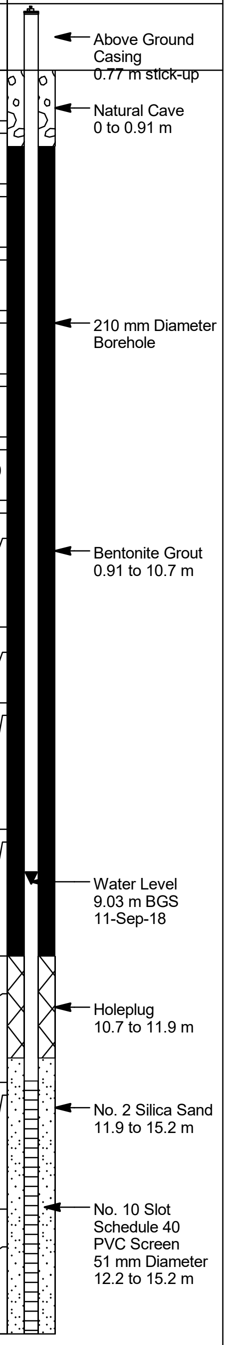
SUBSURFACE PROFILE



Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Recovery	N Value
	344.72				
Ground Surface	343.92				
TOPSOIL Loose, very dark brown (7.5 YR 2/3), silty sand, fine to medium grained sand, fine gravel, dry to moist	0.00				
SILTY SAND Compact, yellowish brown (10 YR 5/4), fine to coarse grained sand, trace fine gravel, trace to some clay in dry clumps, dry to moist	343.69 0.23	1	SS	6" 25%	2-5-6-4 (11)
Becoming moist at 1.1 m BGS		2	SS	18" 75%	5-8-8-11 (16)
Clay and gravel content increases at 1.5 m BGS Colour change to brown (10 YR 5/3) at 1.6 m BGS Becomes moist to wet at 1.9 m BGS Limestone cobble at 2.1 m BGS	341.63	3	SS	21" 88%	4-6-7-10 (13)
SILTY SAND TILL Compact, pale brown (10 YR 6/3), fine to coarse grained sand, limestone fragments, trace to some clay in clumps, fine gravel and cobbles (angular), dry to moist	2.29	4	SS	24" 100%	5-8-10-12 (18)
Becoming dense at 3.0 m BGS		5	SS	24" 100%	9-20-15-40 (35)
Metamorphic rock fragments at 3.6 m BGS Very dense, increased clay content starting at 3.8 m BGS		6	SS	24" 100%	29-37-50 (87)
		7	SS	24" 100%	29-31-49-50 (80)
Cobble/boulders from 5.5 to 6.7 m BGS		8	SS	10.5" 88%	13-50 (50)
At 6.8 m BGS, becomes very dense, grey, fine silty sand, trace medium and coarse grained sand, trace gravel, dry		9	SS	11" 92%	40-50 (50)
Some rounded fine gravel at 7.6 m BGS		10	SS	n/a	50 (0)
		11	SS	5" 83%	50 (0)
Becoming less compact, trace limestone fragments, moist at 10.7 m BGS		12	SS	22" 122%	28-40-50 (90)
Cobble at 11.2 m BGS					
		13	SS	6" 100%	50 (0)
Becoming moist at 14.0 m BGS		14	SS	19" 106%	47-35-50 (85)
	328.70				
End of Borehole	15.22	15	SS	0" 0%	50 (0)

SAMPLE DETAILS

WELL DETAILS



Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
m BTOC - metres below top of casing
SS - split-spoon sample
n/a - not available/applicable

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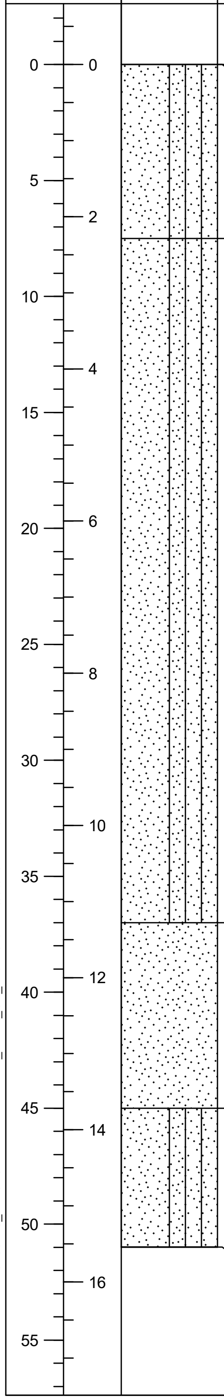
Monitoring Well: MW2-18

Project: 1242, 1250 and 1260 Gordon Street and 9 Valley Road
Client: Tricar Developments Inc.
Location: Guelph, Ontario
Number: 161413684

Field Investigator: A. Healey
Contractor: Aardvark Drilling, Inc
Drilling method: Hollow Stem Auger
Date started/completed: 09-Jul-2018 / 10-Jul-2018

Ground surface elevation: 342.97 m AMSL
Top of casing elevation: 343.77 m AMSL
Easting: 564471
Northing: 4818517

SUBSURFACE PROFILE

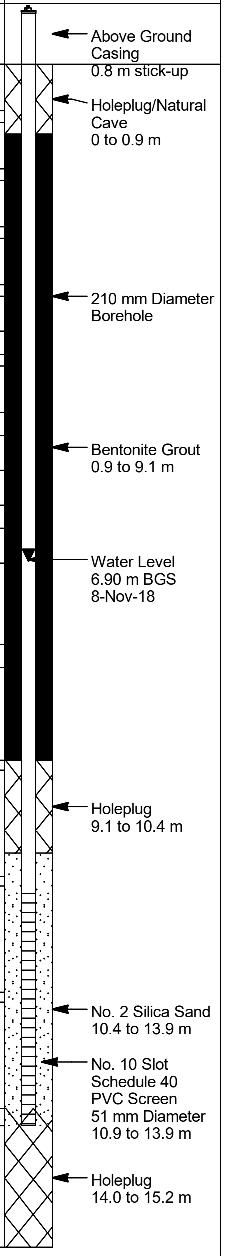


Lithologic Description	Elevation (m AMSL) Depth (m BGS)
	343.77
Ground Surface	342.97 0.00
SANDY SILT Loose, 10 YR 4/3 brown, with organics (roots) and some subangular coarse gravel, dry Compact, organics no longer visible, increased subangular fine and coarse gravel, change in colour to 10 YR 6/3 pale brown at 0.76 m BGS, crumbles easily becoming more silt with some sand, some subangular fine and coarse gravel, moist to dry	340.68
SANDY SILT TILL Compact, 10 YR 5/3 brown, fine sand with some clay and angular fine and coarse gravel, trace coarse sand, moist Very dense, trace 10 YR 6/1 gray coarse gravel/cobble 10 YR 6/1 gray cobble at 5.0 m BGS becoming slightly more moist than above change in colour to 10 YR 6/2 light brownish gray	2.29 331.69
SAND Very dense, medium to coarse sand, some subangular fine gravel, trace coarse gravel, wet	11.28 329.25
SANDY SILT TILL Very dense, 10 YR 6/2 light brownish gray, some medium sand and fine to coarse gravel, trace clay, moist crushed cobble at 13.8 m BGS increased clay content at 13.9 m BGS crushed cobble at 15.3 m BGS	13.72 327.43
End of Borehole	15.54

SAMPLE DETAILS

Sample Number	Sample Type	Recovery	N Value
1	SS	17" 71%	3-3-3-10 (6)
2	SS	19" 79%	8-11-14-17 (25)
3	SS	20" 83%	10-11-11-12 (22)
4	SS	24" 100%	4-7-9-18 (16)
5	SS	19" 106%	13-30-50 (80)
6	SS	2" 33%	50 (0)
7	SS	14" 117%	30-50 (50)
8	SS	20" 111%	26-39-50 (89)
9	SS	23" 128%	30-42-50 (92)
10	SS	13" 108%	31-50 (50)
11	SS	6" 119%	50/5.0" (50/5.0")
12	SS	8" 159%	50/5.0" (50/5.0")
13	SS	4" 79%	50/5.0" (50/5.0")
14	SS	15" 167%	47-50/3.0" (50/3.0")
15	SS	18" 150%	41-50 (50)

WELL DETAILS



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Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
m BTOC - metres below top of casing
SS - split-spoon sample
n/a - not available/applicable

Drawn By/Checked By: AH / SR / GW

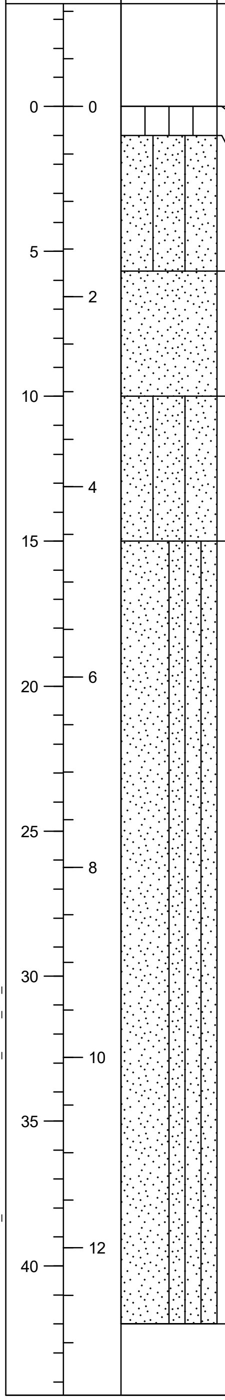
Monitoring Well: MW3-18

Project: 1242, 1250 and 1260 Gordon Street and 9 Valley Road
Client: Tricar Developments Inc.
Location: Guelph, Ontario
Number: 161413684

Field Investigator: A. Healey
Contractor: Aardvark Drilling, Inc
Drilling method: Hollow Stem Auger
Date started/completed: 12-Jul-2018 / 13-Jul-2018

Ground surface elevation: 339.83 m AMSL
Top of casing elevation: 340.91 m AMSL
Easting: 564469
Northing: 4818474

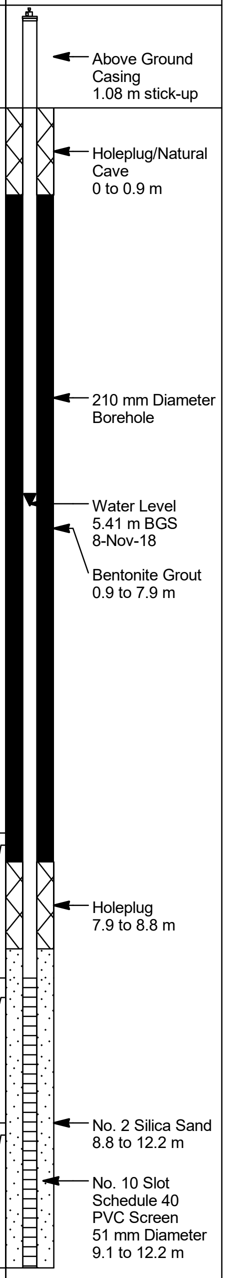
SUBSURFACE PROFILE



Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Recovery	N Value
	340.91				
Ground Surface	339.83 0.00				
TOPSOIL Loose, dark brown silty organic topsoil, wet					
SAND AND SILT Very loose, dark brown sand and silt, some gravel, trace clay, with some organics and rootlets, wet becoming compact, no organics or rootlets	339.53 0.30				
SAND Dense, brown sand, trace gravel, moist becoming trace silt and clay, wet	338.10 1.73				
SAND AND SILT Compact, brown, sand and silt, some gravel, trace clay, moist	336.78 3.05				
SANDY SILT TILL Very dense, 10 YR 6/1 gray, fine sand with trace coarse sand and fine gravel, trace clay, moist	335.26 4.57				
		1	SS	5" 99%	50/5.0" (50/5.0")
wet at 9.4 m BGS		2	SS	12" 149%	43-50/2.0" (50/2.0")
trace coarse gravel at 10.8 m BGS		3	SS	6" 119%	50/5.0" (50/5.0")
		4	SS	12" 109%	49-50/5.0" (50/5.0")
End of Borehole	327.03 12.80				

SAMPLE DETAILS

WELL DETAILS



Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
m BTOC - metres below top of casing
SS - split-spoon sample
n/a - not available/applicable

Well was straight drilled to 7.6 m due to proximity of well in comparison to recently drilled borehole (BH7, drilled April 19, 2018 by CMT Drilling Inc.). Stratigraphy from 0-7.6 m is inferred from this borehole log.

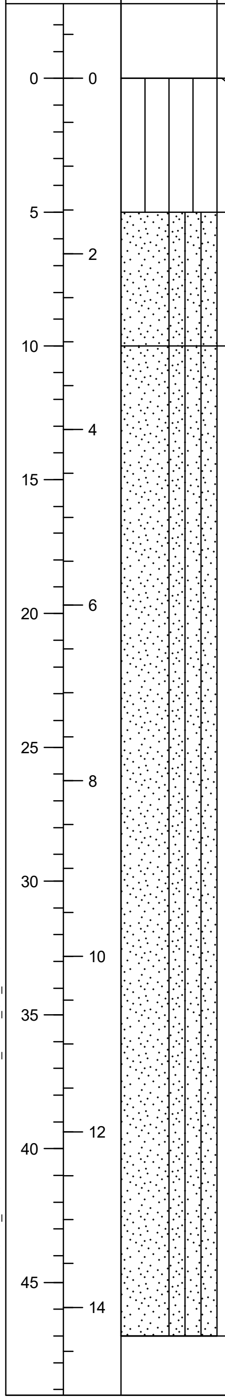
Drawn By/Checked By: AH / SR / GW

Monitoring Well: MW4-18 (S/D)

Project: 1242, 1250 and 1260 Gordon Street and 9 Valley Road
Client: Tricar Developments Inc.
Location: Guelph, Ontario
Number: 161413684

Field Investigator: A. Healey
Contractor: Aardvark Drilling, Inc
Drilling method: Hollow Stem Auger
Date started/completed: 11-Jul-2018 / 12-Jul-2018

SUBSURFACE PROFILE



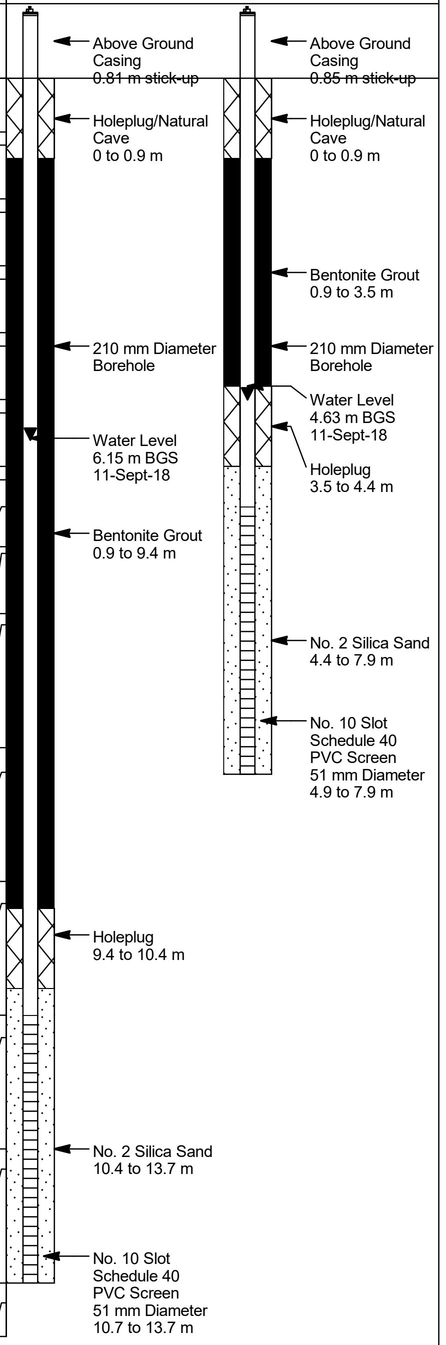
Lithologic Description	Elevation (m AMSL) Depth (m BGS)
	341.32
Ground Surface	340.47
SILT (TOPSOIL) Loose, 10 YR 5/3 brown to 10 YR 5/4 yellowish brown, trace to some fine sand, some organics and fine and coarse gravel (subangular) in top 2 cm, moist compact, increased sand and fine gravel content starting at 1.0 m BGS crushed coarse gravel/cobble at 1.3 m BGS	0.00
SANDY SILT Loose, 10 YR 5/4 yellowish brown, fine sand with some medium to coarse sand and fine to coarse subangular gravel, trace clay, moist compact, crushed coarse gravel/cobble at 2.5 m BGS	338.95 1.52
SANDY SILT TILL Compact, 10 YR 5/3 brown, fine sand and some medium to coarse sand, some fine to coarse gravel, trace clay, moist minor reddish brown mottling at 3.4 m BGS dense, increased sand and gravel content from 3.8 to 4.4 m BGS crushed coarse gravel/cobble at 4.6 and 4.8 m BGS crushed coarse gravel/cobble at 5.3 and 6.2 m BGS change in colour to 10 YR 5/1 gray at 6.1 m BGS, wet coarse gravel at 12.3 m BGS becoming slightly softer at 12.5 m BGS	337.42 3.05
End of Borehole	326.14 14.33

SAMPLE DETAILS

Sample Number	Sample Type	Recovery	N Value
1	SS	20" 83%	3-3-2-2 (5)
2	SS	14" 58%	3-8-18-23 (26)
3	SS	16" 67%	3-4-5-7 (9)
4	SS	20" 83%	11-10-9-7 (19)
5	SS	24" 100%	4-4-12-15 (16)
6	SS	25" 104%	11-21-20-20 (41)
7	SS	12" 100%	46-50 (50)
8	SS	4" 133%	50/3.0" (50/3.0")
9	SS	9" 179%	50/5.0" (50/5.0")
10	SS	18" 163%	44-50/5.0" (50/5.0")
11	SS	17" 171%	49-50/4.0" (50/4.0")
12	SS	13" 131%	49-50/4.0" (50/4.0")
13	SS	14" 156%	39-50/3.0" (50/3.0")
14	SS	12" 133%	48-50/3.0" (50/3.0")

WELL DETAILS

Name:	MW4-18D	Name:	MW4-18S
GS Elev:	340.47 m AMSL	GS Elev:	340.47 m AMSL
TOC Elev:	341.28 m AMSL	TOC Elev:	341.32 m AMSL
Easting:	564506	Easting:	564506
Northing:	4818478	Northing:	4818478
Stick-up:	0.81 m	Stick-up:	0.85 m



Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
m BTOC - metres below top of casing
SS - split-spoon sample
n/a - not available/applicable

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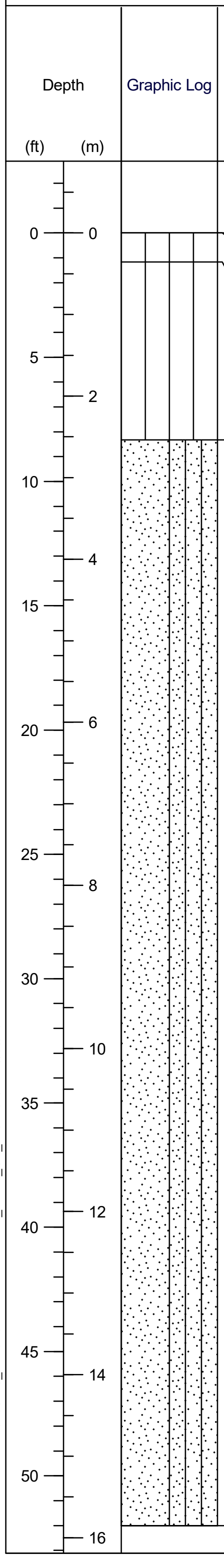
Drawn By/Checked By: AH / SR / GW

Monitoring Well: MW5-18 (S/D)

Project: 1242, 1250 and 1260 Gordon Street and 9 Valley Road
Client: Tricar Developments Inc.
Location: Guelph, Ontario
Number: 161413684

Field Investigator: A. Healey
Contractor: Aardvark Drilling, Inc
Drilling method: Hollow Stem Auger
Date started/completed: 10-Jul-2018 / 11-Jul-2018

SUBSURFACE PROFILE



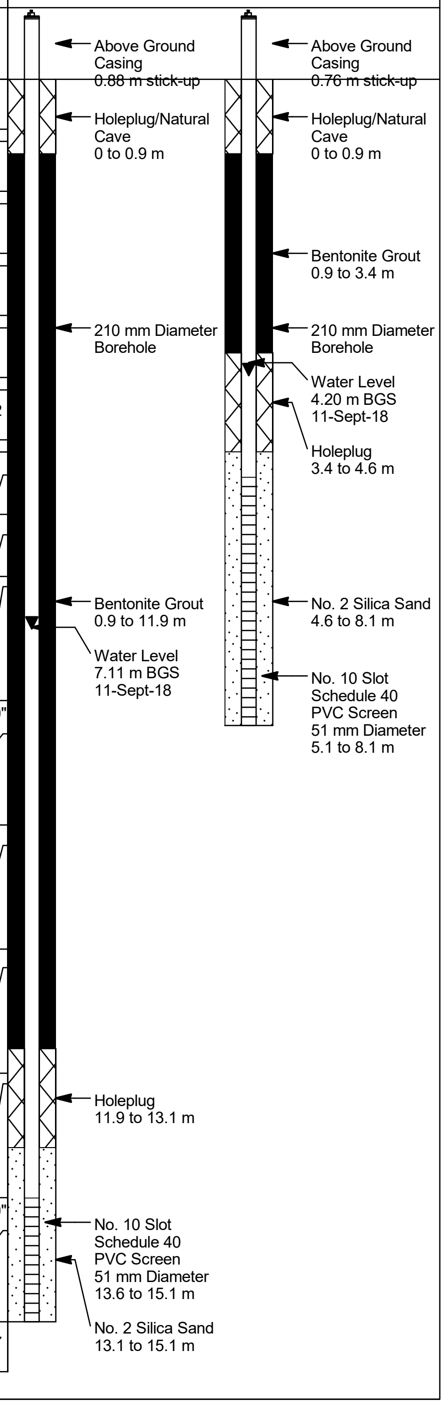
Lithologic Description	Elevation (m AMSL) Depth (m BGS)
	342.02
Ground Surface	341.14
SILT Loose, 10 YR 4/2 dark grayish brown with organics, trace clay and fine to coarse sand, moist	0.00 340.78
SILT Compact, 10 YR 4/3 brown, trace clay and fine to coarse sand, moist increased coarse sand content, trace subangular fine gravel crushed 10 YR 6/1 gray coarse gravel, cobbles further increase of coarse sand and fine gravel content, increased moisture content some coarse gravel starting at 2.0 m BGS	0.36 338.60
SANDY SILT TILL Compact, 10 YR 6/3 pale brown, fine sand, some medium to coarse sand and fine to coarse subangular gravel, moist 10 YR 6/1 gray coarse gravel/cobble at 2.8 m BGS becoming less compact from 3.0 to 3.6 m BGS very dense, some coarse gravel starting at 3.7 m BGS minor reddish brown mottling from 4.3 to 7.6 m BGS coarse gravel/cobble at 4.9 m BGS change in colour to 10 YR 6/2 light brownish gray at 6.1 m BGS coarse gravel/cobble at 6.2 m BGS coarse gravel/cobble at 8.1 m BGS medium to coarse sand content increasing starting at 10.8 m BGS becomes less dense and moisture content increases at 13.8 m BGS, reduced sand content	2.54 325.29
End of Borehole	15.85

SAMPLE DETAILS

Sample Number	Sample Type	Recovery	N Value
1	SS	19" 79%	3-3-3-4 (6)
2	SS	18" 75%	3-4-12-9 (16)
3	SS	15" 63%	2-7-13-12 (20)
4	SS	14" 58%	4-8-9-11 (17)
5	SS	14" 58%	3-4-6-12 (10)
6	SS	30" 125%	15-31-36-32 (67)
7	SS	23" 208%	21-50/5.0" (50/5.0")
8	SS	7" 70%	50 (0)
9	SS	6" 119%	50/5.0" (50/5.0")
10	SS	18" 113%	16-27-50/4.0" (50/4.0")
11	SS	12" 120%	48-50/4.0" (50/4.0")
12	SS	16" 178%	45-50/3.0" (50/3.0")
13	SS	5" 99%	50/5.0" (50/5.0")
14	SS	27" 169%	13-27-50/4.0" (50/4.0")
15	SS	23" 96%	30-40-47-47 (87)

WELL DETAILS

Name:	MW5-18D	Name:	MW5-18S
GS Elev:	341.14 m AMSL	GS Elev:	341.26 m AMSL
TOC Elev:	342.02 m AMSL	TOC Elev:	342.02 m AMSL
Easting:	564540	Easting:	564540
Northing:	4818521	Northing:	4818521
Stick-up:	0.88 m	Stick-up:	0.76 m



Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
m BTOC - metres below top of casing
SS - split-spoon sample
n/a - not available/applicable

Drawn By/Checked By: AH / SR / GW

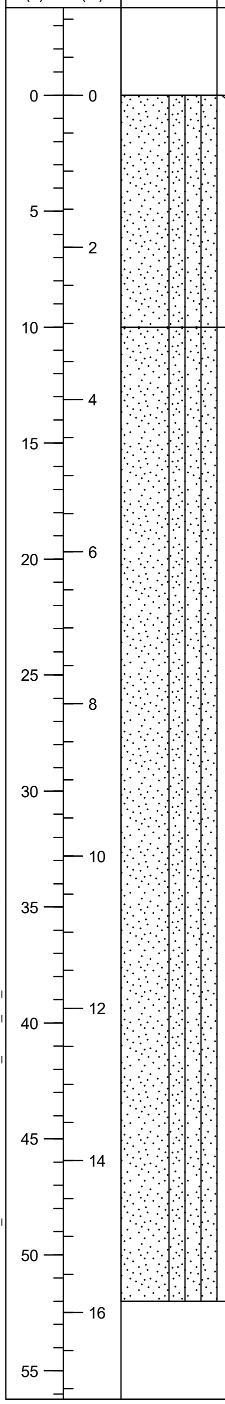
Monitoring Well: MW6-18

Project: 1242, 1250 and 1260 Gordon Street and 9 Valley Road
Client: Tricar Developments Inc.
Location: Guelph, Ontario
Number: 161413684

Field Investigator: A. Healey
Contractor: Aardvark Drilling, Inc
Drilling method: Hollow Stem Auger
Date started/completed: 13-Jul-2018 / 16-Jul-2018

Ground surface elevation: 341.40 m AMSL
Top of casing elevation: 342.55 m AMSL
Easting: 564586
Northing: 4818487

SUBSURFACE PROFILE

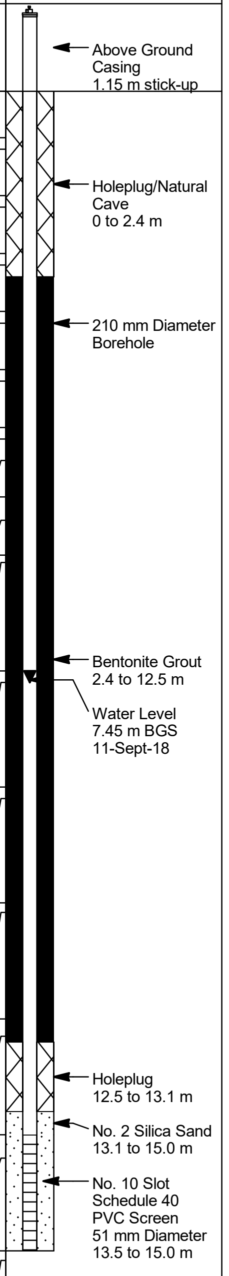


Lithologic Description	Elevation (m AMSL) Depth (m BGS)
	342.55
Ground Surface	341.40
SANDY SILT Loose, 10 YR 4/3 brown, fine sand, some organics, trace fine gravel, moist to dry becoming trace organics starting at 0.3 m BGS becoming moist at 0.43 m BGS some coarse sand and fine gravel starting at 0.89 m BGS minor reddish brown mottling from 1.8 to 2.0 m BGS	0.00
	338.35
SANDY SILT TILL Very dense, 10 YR 6/3 pale brown, fine sand, some medium to coarse sand and fine to coarse gravel, trace clay, moist, crushed coarse gravel/cobbles throughout change in colour to 7.5 YR 5/1 gray wet at 12.2 m BGS increase in clay content and decrease in sand content	3.05
	325.55
End of Borehole	15.85

SAMPLE DETAILS

Sample Number	Sample Type	Recovery	N Value
1	SS	18" 75%	3-4-5-12 (9)
2	SS	20" 83%	10-9-8-7 (17)
3	SS	13" 54%	5-5-4-7 (9)
4	SS	21" 88%	3-5-13-20 (18)
5	SS	27" 113%	8-21-26-37 (47)
6	SS	25" 104%	44-39-43-37 (82)
7	SS	12" 109%	44-50/5.0" (50/5.0")
8	SS	12" 100%	44-50 (50)
9	SS	6" 152%	50/4.0" (50/4.0")
10	SS	8" 133%	50 (0)
11	SS	6" 100%	50 (0)
12	SS	6" 119%	50/5.0" (50/5.0")
13	SS	11" 122%	40-50/3.0" (50/3.0")
14	SS	14" 117%	45-50 (50)
15	SS	8" 159%	50/5.0" (50/5.0")

WELL DETAILS



Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
m BTOC - metres below top of casing
SS - split-spoon sample
n/a - not available/applicable

Stantec

Drawn By/Checked By: AH / SR / GW

Sheet 1 of 1

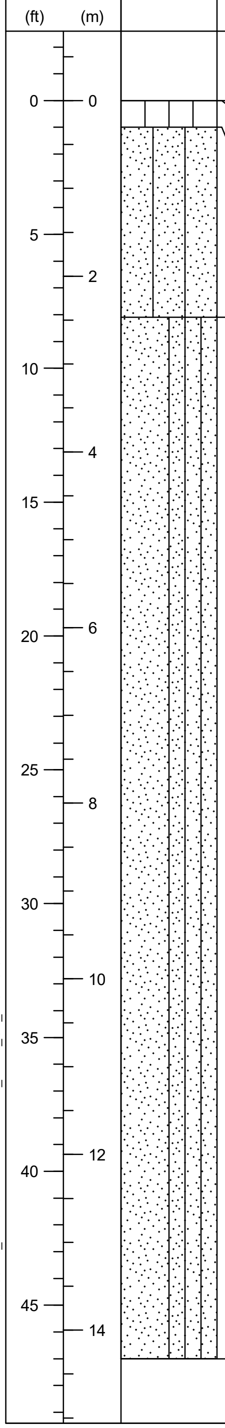
Monitoring Well: MW7-18

Project: 1242, 1250 and 1260 Gordon Street and 9 Valley Road
Client: Tricar Developments Inc.
Location: Guelph, Ontario
Number: 161413684

Field Investigator: A. Healey
Contractor: Aardvark Drilling, Inc
Drilling method: Hollow Stem Auger
Date started/completed: 16-Jul-2018

Ground surface elevation: 338.85 m AMSL
Top of casing elevation: 339.64 m AMSL
Easting: 564518
Northing: 4818416

SUBSURFACE PROFILE

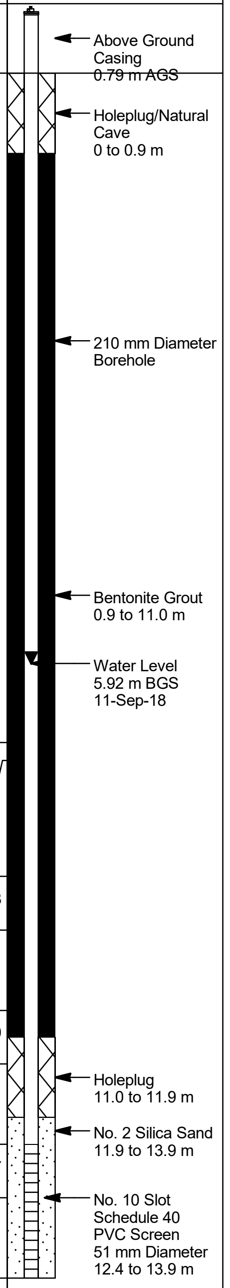


Lithologic Description	Elevation (m AMSL) Depth (m BGS)
	339.64
Ground Surface	338.85
TOPSOIL Loose, dark brown, silty organic topsoil	0.00
SAND AND SILT loose, dark brown, sand and silt, some gravel, trace clay, with some organics and rootlets, wet becoming compact, no organics or rootlets	338.55 0.30
SANDY SILT TILL Compact, 7.5 YR 5/2 brown, fine sand, trace medium to coarse sand, some fine subangular gravel, trace crushed gravel/cobble throughout, moist change in colour to 10 YR 5/1 gray at 9.1 m BGS becoming wet at 9.6 m BGS	336.38 2.47
End of Borehole	324.52 14.33

SAMPLE DETAILS

Sample Number	Sample Type	Recovery	N Value
1	SS	13" 162%	44-50/2.0" (50/2.0")
2	SS	26" 108%	37-31-32-38 (63)
3	SS	26" 108%	13-20-22-30 (42)
4	SS	24" 100%	24-28-34-47 (62)
5	SS	25" 104%	14-13-24-27 (37)

WELL DETAILS



Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
m BTOC - metres below top of casing
SS - split-spoon sample
n/a - not available/applicable

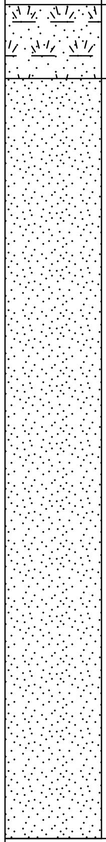
Well was straight drilled to 7.6 m due to proximity of well in comparison to recently drilled borehole (BH10, drilled April 19, 2018 by CMT Drilling Inc.). Stratigraphy from 0-7.6 m is inferred from this borehole log.

Drawn By/Checked By: AH / SR / GW

Monitoring Well: MW101-21 (S/D)

Project: Hydrogeological Assessment
Client: Tricar Development Inc.
Location: Guelph ON
Number: 161413684
Field investigator: A. Vandenhoff
Contractor: Aardvark Drilling Inc.
Method: CME 75 - Hollow Stem Auger/Split Spoon
Date started/completed: 19-Aug-2021

SUBSURFACE PROFILE



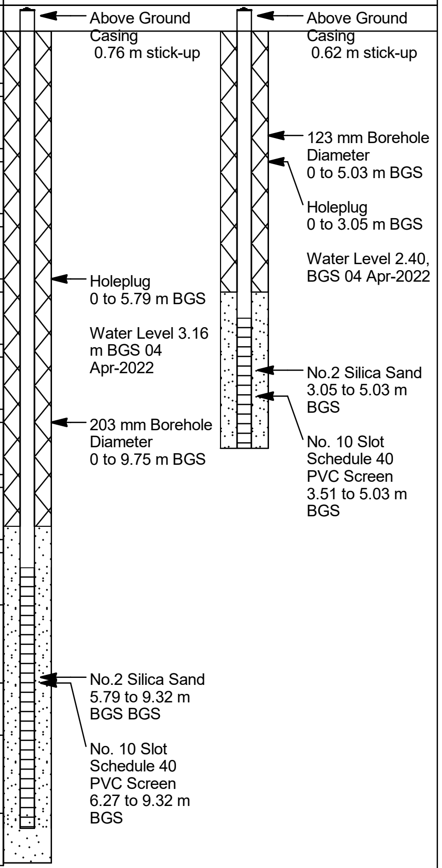
Depth (ft)	Depth (m)	Lithologic Description	Elevation (m AMSL) Depth (m BGS)
			342.07
0	0	Ground Surface	341.76
		TOPSOIL Silty sand, organics, brown (10YR 4/3), moist.	0.00
		SAND TILL Compact to dense fine-coarse sand with trace silt and fine to coarse gravel, subangular to rounded, light yellowish brown (10YR 6/4), dry, well graded, blocky auger scraping / bouncing on cobbles	340.90 0.86
5	2	Trace gravel, moist beginning at 1.68 m BGS	
		Pale brown (10YR 6/3), moist, beginning at 2.29 m BGS	
10		Becoming very dense	
15	4	Silt content increases from trace to little, little auger scraping / bouncing beyond this depth	
20	6		
25	8	Changes to mostly angular fine to coarse gravel	
30			332.01
	10	End of Borehole	9.75

SAMPLE DETAILS

Sample Number	Sample Type	Recovery	N Value
	SS	n/a	n/a
1	SS	22" 92%	5-7-17-23 (24)
2	SS	20" 83%	20-24-20-16 (44)
3	SS	22" 92%	8-20-21-31 (41)
4	SS	18" 75%	17-38-50 (88)
5	SS	24" 100%	13-27-37-37 (64)
6	SS	11" 46%	28-50 (50)
7	SS	5" 21%	50 (0)
8	SS	18" 75%	25-46-50 (96)
9	SS	23" 96%	11-21-22-50 (43)
10	SS	17" 71%	20-44-50 (94)

WELL DETAILS

	MW101-21D	MW101-21S
Name:	MW101-21D	MW101-21S
GS Elev:	341.76 m AMSL	342.29 m AMSL
TOC Elev:	342.52 m AMSL	342.91 m AMSL
Easting:	564558	564564
Northing:	4818445	4818453
Stick-up:	0.76 m	0.62 m



Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
m BTOC - metres below top of casing
SS - split-spoon sample
n/a - not available

AGS - Above Ground Surface

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Drawn By/Checked By: SH/GW

Sheet 1 of 1

STANTEC BOREHOLE AND WELL - CLUST 11X8.5 20220414_1242-1260_GORDON_SH.GPJ STANTEC - DATA TEMPLATE.GDT 6/17/22 RACBAKER

Monitoring Well: MW102-21

Project:	Hydrogeological Assessment	**Field investigator:**	A. Vandenhoff	**Ground surface elevation:**	341.41 m AMSL
Client:	Tricar Development Inc.	**Contractor:**	Aardvark Drilling Inc.	**Top of casing elevation:**	342.25 m AMSL
Location:	Guelph ON	**Method:**	CME 75 - Hollow Stem Auger/Split Spoon	**Easting:**	564564
Number:	161413684	**Date started/completed:**	18-Aug-2021	**Northing:**	4818453

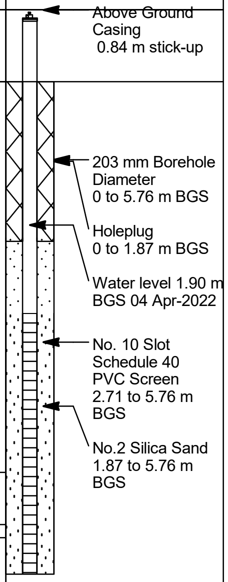
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Lithologic Description	Elevation (m AMSL) Depth (m BGS)
			342.25
0	0	Ground Surface	341.41
		Direct drilled. Refer to MW5-18(S/D) for soil descriptions.	0.00
15		SAND TILL Very dense, fine sand, trace to little silt, trace fine to coarse gravel, pale brown (10YR 6/3), moist, trace oxidation stains	336.84 4.57
20	6	Fissured	
		End of Borehole	334.55 6.71

SAMPLE DETAILS

Sample Number	Sample Type	Recovery	N Value
	SS	n/a	n/a
1	SS	21" 88%	48-36-26-62 (62)
2	SS	9" 38%	48-50 (50)
3	SS	10" 42%	48-50 (50)

WELL DETAILS



Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
m BTOC - metres below top of casing
SS - split-spoon sample
n/a - not available

AGS - Above Ground Surface

Stantec

Drawn By/Checked By: SH/GW

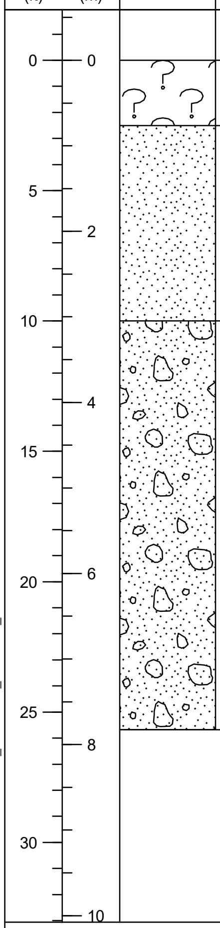
Monitoring Well: MW103-21

Project: Hydrogeological Assessment
Client: Tricar Development Inc.
Location: Guelph ON
Number: 161413684

Field investigator: A. Vandenhoff
Contractor: Aardvark Drilling Inc.
Method: CME 75 - Hollow Stem Auger/Split Spoon
Date started/completed: 18-Aug-2021

Ground surface elevation: 339.61 m AMSL
Top of casing elevation: 340.20 m AMSL
Easting: 564590
Northing: 4818574

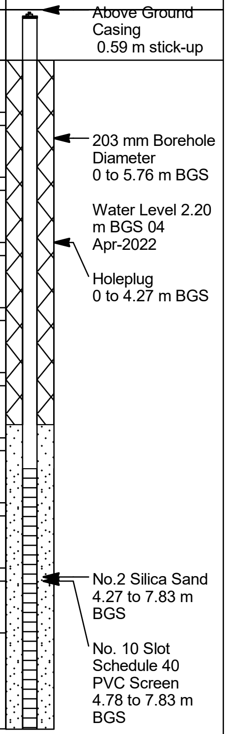
SUBSURFACE PROFILE



Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Recovery	N Value
	340.20				
Ground Surface	339.61				
Not logged.	0.00		SS	n/a	n/a
	338.85				
SAND Compact, fine sand, trace to little silt, little fine to coarse gravel, angular, to subrounded, pale brown (10YR 6/3), moist	0.76	1	SS	18" 75%	4-6-6-6 (12)
		2	SS	20" 83%	6-7-7-9 (14)
Dense		3	SS	22" 92%	8-15-25-37 (40)
	336.56				
SAND TILL Dense to very dense, fine sand, trace to little coarse sand, trace fine to coarse gravel, pale brown (10YR 6/3), mosit, blocky, auger scraping / bouncing on cobbles	3.05	4	SS	10" 42%	40-50 (50)
		5	SS	6" 25%	50 (0)
Trace oxidation stains from 4.57 to 5.33 m BGS		6	SS	9" 38%	44-50 (50)
		7	SS	10" 42%	48-50 (50)
Wet beginning at 6.25 m BGS		8	SS	20" 83%	18-33-28-29 (61)
	331.78				
End of Borehole	7.83				

SAMPLE DETAILS

WELL DETAILS



Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
m BTOC - metres below top of casing
SS - split-spoon sample
n/a - not available

AGS - Above Ground Surface

Stantec

Drawn By/Checked By: SH/GW

Monitoring Well: MW104-21

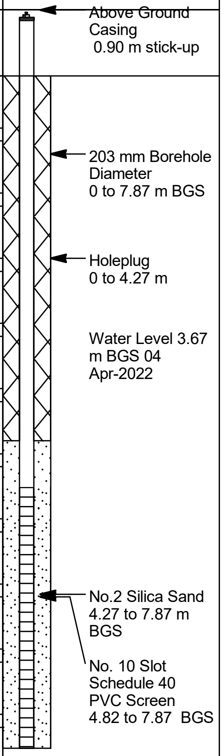
Project: Hydrogeological Assessment
Client: Tricar Development Inc.
Location: Guelph ON
Number: 161413684

Field investigator: A. Vandenhoff
Contractor: Aardvark Drilling Inc.
Method: CME 75 - Hollow Stem Auger/Split Spoon
Date started/completed: 19-Aug-2021

Ground surface elevation: 343.28 m AMSL
Top of casing elevation: 344.05 m AMSL
Easting: 564513
Northing: 4818539

SUBSURFACE PROFILE | SAMPLE DETAILS | WELL DETAILS

Depth (ft)	Depth (m)	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Recovery	N Value
			344.05				
		Ground Surface	343.28				
0	0	Not logged.	0.00		SS	n/a	n/a
			342.52				
		SAND Dense, fine sand, little silt, little cobbles (crushed limestone), pale brown (10YR 6/3), dry, auger scraping cobbles	0.76	1	SS	1" 4%	4-11-28-29 (39)
			341.75				
5	2	SAND Dense, fine sand, little silt and cobbles (crushed limestone), trace coarse sand and fine gravel, pale brown (10Y/R 6/3), dry to moist, auger scraping cobbles	1.52	2	SS	20" 83%	10-19-21-12 (40)
			340.99				
		SAND Dense, trace to little silt, trace coarse sand, pale brown (10Y/R 6/3), moist, auger scraping cobbles	2.29	3	SS	22" 92%	46-17-16-17 (33)
			340.23				
10		SAND TILL Dense to very dense, fine sand, trace to little silt, little fine to coarse gravel, trace coarse sand, pale brown (10YR 6/3), moist, blocky, irregular horizontal breaking	3.05	4	SS	24" 100%	17-23-31-40 (54)
	4			5	SS	24" 100%	23-29-33-42 (62)
15				6	SS	9" 38%	45-50 (50)
				7	SS	10" 42%	46-50 (50)
20	6			8	SS	5" 21%	50 (0)
				9	SS	9" 38%	60-50 (50)
25	8			10	SS	6" 25%	50 (0)
			334.90				
		End of Borehole	8.38				
30							



Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
m BTOC - metres below top of casing
SS - split-spoon sample
n/a - not available

AGS - Above Ground Surface

Stantec

Drawn By/Checked By: SH/GW

APPENDIX F:
LABORATORY CERTIFICATES OF ANALYSIS

Maxxam
A Bureau Veritas Group Company

Your Project #: 161413684
Site Location: GUELPH, ON
Your C.O.C. #: 111362

Attention: Grant Whitehead

Stantec Consulting Ltd
300 Hagey Blvd
Suite 100
Waterloo, ON
CANADA N2L 0A4

Report Date: 2018/09/19
Report #: R5406235
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8N6455
Received: 2018/09/11, 16:40

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	2	N/A	2018/09/14	CAM SOP-00448	SM 23 2320 B m
Alkalinity	1	N/A	2018/09/19	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	3	N/A	2018/09/14	CAM SOP-00102	APHA 4500-CO2 D
Carbonaceous BOD	1	2018/09/12	2018/09/17	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	1	N/A	2018/09/13	CAM SOP-00463	EPA 325.2 m
Chloride by Automated Colourimetry	2	N/A	2018/09/14	CAM SOP-00463	EPA 325.2 m
Chloride by Automated Colourimetry	1	N/A	2018/09/19	CAM SOP-00463	EPA 325.2 m
Conductivity	3	N/A	2018/09/14	CAM SOP-00414	SM 23 2510 m
Total Cyanide	1	2018/09/13	2018/09/13	CAM SOP-00457	OMOE E3015 5 m
Dissolved Organic Carbon (DOC) (1)	3	N/A	2018/09/14	CAM SOP-00446	SM 23 5310 B m
Fluoride	1	2018/09/12	2018/09/13	CAM SOP-00449	SM 23 4500-F C m
Hardness (calculated as CaCO3)	3	N/A	2018/09/17	CAM SOP 00102/00408/00447	SM 2340 B
Mercury in Water by CVAA	1	2018/09/14	2018/09/14	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	1	N/A	2018/09/14	CAM SOP-00447	EPA 6020B m
Dissolved Metals by ICPMS	1	N/A	2018/09/17	CAM SOP-00447	EPA 6020B m
Dissolved Metals by ICPMS	1	N/A	2018/09/19	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	1	N/A	2018/09/13	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	3	N/A	2018/09/17		
Anion and Cation Sum	3	N/A	2018/09/17		
Fecal coliform, (5TMPN/100mL)	1	N/A	2018/09/11	BBY4 SOP-000127	MFHPB-19
Total Ammonia-N	3	N/A	2018/09/18	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	3	N/A	2018/09/13	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Animal and Vegetable Oil and Grease	1	N/A	2018/09/14	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2018/09/14	2018/09/14	CAM SOP-00326	EPA1664B m,SM5520A m
pH	1	N/A	2018/09/13	CAM SOP-00413	SM 4500H+ B m
pH	3	N/A	2018/09/14	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2018/09/14	CAM SOP-00444	OMOE E3179 m
Orthophosphate	3	N/A	2018/09/14	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	3	N/A	2018/09/17		

Your Project #: 161413684
Site Location: GUELPH, ON
Your C.O.C. #: 111362

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300 Hagey Blvd
Suite 100
Waterloo, ON
CANADA N2L 0A4

Report Date: 2018/09/19
Report #: R5406235
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8N6455
Received: 2018/09/11, 16:40

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Sat. pH and Langelier Index (@ 4C)	3	N/A	2018/09/17		
Sulphate by Automated Colourimetry	1	N/A	2018/09/13	CAM SOP-00464	EPA 375.4 m
Sulphate by Automated Colourimetry	3	N/A	2018/09/14	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	3	N/A	2018/09/17		
Total Kjeldahl Nitrogen in Water	1	2018/09/17	2018/09/17	CAM SOP-00938	OMOE E3516 m
Mineral/Synthetic O & G (TPH Heavy Oil) (3)	1	2018/09/14	2018/09/14	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	4	2018/09/12	2018/09/13	CAM SOP-00428	SM 23 2540D m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.
(3) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Your Project #: 161413684
Site Location: GUELPH, ON
Your C.O.C. #: 111362

Attention: Grant Whitehead

Stantec Consulting Ltd
300 Hagey Blvd
Suite 100
Waterloo, ON
CANADA N2L 0A4

Report Date: 2018/09/19
Report #: R5406235
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8N6455
Received: 2018/09/11, 16:40

Encryption Key

```
Colby Coutu
Project Manager Assistant
19 Sep 2018 17:12:27
```

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Augustyna Dobosz, Project Manager
Email: ADobosz@maxxam.ca
Phone# (905)817-5700 Ext:5798

==

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

THE CITY OF GUELPH SANITARY SEWER BYLAW (WATER)

Maxxam ID		HSJ715			HSJ715		
Sampling Date		2018/09/11 15:05			2018/09/11 15:05		
COC Number		111362			111362		
	UNITS	**WG-161413684-20180911-DS-04**	**RDL**	**QC Batch**	**WG-161413684-20180911-DS-04 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters							
Total Animal/Vegetable Oil and Grease	mg/L	<0.50	0.50	5724443			
Inorganics							
Total Carbonaceous BOD	mg/L	<2	2	5726645	<2	2	5726645
Fluoride (F-)	mg/L	0.13	0.10	5727841			
Total Kjeldahl Nitrogen (TKN)	mg/L	1.7	0.10	5734882			
pH	pH	7.90		5727848			
Phenols-4AAP	mg/L	<0.0010	0.0010	5729249			
Total Suspended Solids	mg/L	2500	33	5727677			
Dissolved Sulphate (SO4)	mg/L	40	1.0	5727421			
Total Cyanide (CN)	mg/L	<0.0050	0.0050	5729123			
Dissolved Chloride (Cl-)	mg/L	46	1.0	5727413			
Petroleum Hydrocarbons							
Total Oil & Grease	mg/L	<0.50	0.50	5731988			
Total Oil & Grease Mineral/Synthetic	mg/L	<0.50	0.50	5732048			
Metals							
Mercury (Hg)	mg/L	<0.0001	0.0001	5731153			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

THE CITY OF GUELPH STORM SEWER BYLAW (WATER)

Maxxam ID		HSJ715		
Sampling Date		2018/09/11 15:05		
COC Number		111362		
	UNITS	**WG-161413684-20180911-DS-04**	**RDL**	**QC Batch**
Metals				
Total Aluminum (Al)	mg/L	15	0.025	5728921
Total Antimony (Sb)	mg/L	<0.00050	0.00050	5728921
Total Arsenic (As)	mg/L	0.0062	0.0010	5728921
Total Bismuth (Bi)	mg/L	<0.0010	0.0010	5728921
Total Cadmium (Cd)	mg/L	0.0019	0.00010	5728921
Total Chromium (Cr)	mg/L	0.040	0.0050	5728921
Total Cobalt (Co)	mg/L	0.0096	0.00050	5728921
Total Copper (Cu)	mg/L	0.030	0.0010	5729988
Total Iron (Fe)	mg/L	23	0.10	5728921
Total Lead (Pb)	mg/L	0.13	0.00050	5728921
Total Manganese (Mn)	mg/L	1.3	0.0020	5728921
Total Molybdenum (Mo)	mg/L	0.0032	0.00050	5728921
Total Nickel (Ni)	mg/L	0.021	0.0010	5728921
Total Phosphorus (P)	mg/L	1.1	0.10	5728921
Total Selenium (Se)	mg/L	<0.0020	0.0020	5728921
Total Silver (Ag)	mg/L	<0.00010	0.00010	5728921
Total Tin (Sn)	mg/L	0.0011	0.0010	5728921
Total Titanium (Ti)	mg/L	0.49	0.0050	5728921
Total Vanadium (V)	mg/L	0.031	0.00050	5728921
Total Zinc (Zn)	mg/L	0.64	0.0050	5728921
Microbiological				
Fecal coliform	5TMPN/100mL	350	1.8	5726125

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Stantec Consulting Ltd
Client Project #: 161413684
Site Location: GUELPH, ON
Sampler Initials: DS

RCAP - COMPREHENSIVE (WATER)

Maxxam ID		HSJ712		HSJ713		
Sampling Date		2018/09/11 12:40		2018/09/11 13:10		
COC Number		111362		111362		
	UNITS	**WG-161413684-20180911-DS-01**	**QC Batch**	**WG-161413684-20180911-DS-02**	**RDL**	**QC Batch**
Calculated Parameters						
Anion Sum	me/L	6.67	5724250	9.30	N/A	5724250
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	300	5724251	330	1.0	5724251
Calculated TDS	mg/L	330	5724255	530	1.0	5724255
Carb. Alkalinity (calc. as CaCO3)	mg/L	3.7	5724251	4.7	1.0	5724251
Cation Sum	me/L	6.66	5724250	11.8	N/A	5724250
Hardness (CaCO3)	mg/L	320	5724254	520	1.0	5724254
Ion Balance (% Difference)	%	0.0500	5724249	12.1	N/A	5724249
Langelier Index (@ 20C)	N/A	1.01	5724252	1.25		5724252
Langelier Index (@ 4C)	N/A	0.762	5724253	0.997		5724253
Saturation pH (@ 20C)	N/A	7.10	5724252	6.93		5724252
Saturation pH (@ 4C)	N/A	7.35	5724253	7.18		5724253
Inorganics						
Total Ammonia-N	mg/L	<0.050	5732437	<0.050	0.050	5732437
Conductivity	umho/cm	580	5727479	830	1.0	5727479
Dissolved Organic Carbon	mg/L	0.83	5727802	1.0	0.50	5727802
Orthophosphate (P)	mg/L	<0.010	5727668	<0.010	0.010	5727668
pH	pH	8.11	5727480	8.18		5727480
Dissolved Sulphate (SO4)	mg/L	15	5727661	84	1.0	5727661
Alkalinity (Total as CaCO3)	mg/L	310	5727466	340	1.0	5738172
Dissolved Chloride (Cl-)	mg/L	7.4	5727647	27	1.0	5738161
Nitrite (N)	mg/L	<0.010	5727425	<0.010	0.010	5727425
Nitrate (N)	mg/L	0.25	5727425	0.12	0.10	5727425
Nitrate + Nitrite (N)	mg/L	0.25	5727425	0.12	0.10	5727425
Metals						
Dissolved Aluminum (Al)	mg/L	<0.0050	5728244	0.063	0.0050	5738013
Dissolved Antimony (Sb)	mg/L	<0.00050	5728244	<0.00050	0.00050	5738013
Dissolved Arsenic (As)	mg/L	<0.0010	5728244	0.0015	0.0010	5738013
Dissolved Barium (Ba)	mg/L	0.032	5728244	0.076	0.0020	5738013
Dissolved Beryllium (Be)	mg/L	<0.00050	5728244	<0.00050	0.00050	5738013
Dissolved Boron (B)	mg/L	0.014	5728244	0.013	0.010	5738013

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

RCAP - COMPREHENSIVE (WATER)

Maxxam ID		HSJ712		HSJ713		
Sampling Date		2018/09/11 12:40		2018/09/11 13:10		
COC Number		111362		111362		
	UNITS	**WG-161413684-20180911-DS-01**	**QC Batch**	**WG-161413684-20180911-DS-02**	**RDL**	**QC Batch**
Dissolved Cadmium (Cd)	mg/L	<0.00010	5728244	<0.00010	0.00010	5738013
Dissolved Calcium (Ca)	mg/L	69	5728244	100	0.20	5738013
Dissolved Chromium (Cr)	mg/L	<0.0050	5728244	<0.0050	0.0050	5738013
Dissolved Cobalt (Co)	mg/L	<0.00050	5728244	<0.00050	0.00050	5738013
Dissolved Copper (Cu)	mg/L	<0.0010	5728244	<0.0010	0.0010	5738013
Dissolved Iron (Fe)	mg/L	<0.10	5728244	0.19	0.10	5738013
Dissolved Lead (Pb)	mg/L	<0.00050	5728244	0.00056	0.00050	5738013
Dissolved Magnesium (Mg)	mg/L	36	5728244	63	0.050	5738013
Dissolved Manganese (Mn)	mg/L	0.011	5728244	0.046	0.0020	5738013
Dissolved Molybdenum (Mo)	mg/L	0.00079	5728244	0.0030	0.00050	5738013
Dissolved Nickel (Ni)	mg/L	<0.0010	5728244	<0.0010	0.0010	5738013
Dissolved Phosphorus (P)	mg/L	<0.10	5728244	<0.10	0.10	5738013
Dissolved Potassium (K)	mg/L	1.1	5728244	2.6	0.20	5738013
Dissolved Selenium (Se)	mg/L	<0.0020	5728244	<0.0020	0.0020	5738013
Dissolved Silicon (Si)	mg/L	6.3	5728244	7.9	0.050	5738013
Dissolved Silver (Ag)	mg/L	<0.00010	5728244	<0.00010	0.00010	5738013
Dissolved Sodium (Na)	mg/L	5.4	5728244	34	0.10	5738013
Dissolved Strontium (Sr)	mg/L	0.13	5728244	0.20	0.0010	5738013
Dissolved Thallium (Tl)	mg/L	<0.000050	5728244	<0.000050	0.000050	5738013
Dissolved Titanium (Ti)	mg/L	<0.0050	5728244	0.0051	0.0050	5738013
Dissolved Uranium (U)	mg/L	0.00063	5728244	0.0022	0.00010	5738013
Dissolved Vanadium (V)	mg/L	<0.00050	5728244	0.0014	0.00050	5738013
Dissolved Zinc (Zn)	mg/L	<0.0050	5728244	<0.0050	0.0050	5738013

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

RCAP - COMPREHENSIVE (WATER)

Maxxam ID		HSJ714		
Sampling Date		2018/09/11 13:55		
COC Number		111362		
	UNITS	**WG-161413684-20180911-DS-03**	**RDL**	**QC Batch**
Calculated Parameters				
Anion Sum	me/L	10.7	N/A	5724250
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	410	1.0	5724251
Calculated TDS	mg/L	540	1.0	5724255
Carb. Alkalinity (calc. as CaCO3)	mg/L	5.3	1.0	5724251
Cation Sum	me/L	10.9	N/A	5724250
Hardness (CaCO3)	mg/L	490	1.0	5724254
Ion Balance (% Difference)	%	1.08	N/A	5724249
Langelier Index (@ 20C)	N/A	1.20		5724252
Langelier Index (@ 4C)	N/A	0.947		5724253
Saturation pH (@ 20C)	N/A	6.95		5724252
Saturation pH (@ 4C)	N/A	7.20		5724253
Inorganics				
Total Ammonia-N	mg/L	0.071	0.050	5732437
Conductivity	umho/cm	950	1.0	5727479
Dissolved Organic Carbon	mg/L	1.4	0.50	5727802
Orthophosphate (P)	mg/L	0.012	0.010	5727668
pH	pH	8.14		5727480
Dissolved Sulphate (SO4)	mg/L	50	1.0	5727661
Alkalinity (Total as CaCO3)	mg/L	410	1.0	5727466
Dissolved Chloride (Cl-)	mg/L	43	1.0	5727647
Nitrite (N)	mg/L	0.026	0.010	5727425
Nitrate (N)	mg/L	1.93	0.10	5727425
Nitrate + Nitrite (N)	mg/L	1.96	0.10	5727425
Metals				
Dissolved Aluminum (Al)	mg/L	0.0064	0.0050	5728244
Dissolved Antimony (Sb)	mg/L	<0.00050	0.00050	5728244
Dissolved Arsenic (As)	mg/L	<0.0010	0.0010	5728244
Dissolved Barium (Ba)	mg/L	0.13	0.0020	5728244
Dissolved Beryllium (Be)	mg/L	<0.00050	0.00050	5728244
Dissolved Boron (B)	mg/L	0.11	0.010	5728244

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Stantec Consulting Ltd
Client Project #: 161413684
Site Location: GUELPH, ON
Sampler Initials: DS

RCAP - COMPREHENSIVE (WATER)

Maxxam ID		HSJ714		
Sampling Date		2018/09/11 13:55		
COC Number		111362		
	UNITS	**WG-161413684-20180911-DS-03**	**RDL**	**QC Batch**
Dissolved Cadmium (Cd)	mg/L	<0.00010	0.00010	5728244
Dissolved Calcium (Ca)	mg/L	82	0.20	5728244
Dissolved Chromium (Cr)	mg/L	<0.0050	0.0050	5728244
Dissolved Cobalt (Co)	mg/L	<0.00050	0.00050	5728244
Dissolved Copper (Cu)	mg/L	<0.0010	0.0010	5728244
Dissolved Iron (Fe)	mg/L	<0.10	0.10	5728244
Dissolved Lead (Pb)	mg/L	<0.00050	0.00050	5728244
Dissolved Magnesium (Mg)	mg/L	71	0.050	5728244
Dissolved Manganese (Mn)	mg/L	0.020	0.0020	5728244
Dissolved Molybdenum (Mo)	mg/L	0.0042	0.00050	5728244
Dissolved Nickel (Ni)	mg/L	<0.0010	0.0010	5728244
Dissolved Phosphorus (P)	mg/L	0.11	0.10	5728244
Dissolved Potassium (K)	mg/L	5.9	0.20	5728244
Dissolved Selenium (Se)	mg/L	0.0022	0.0020	5728244
Dissolved Silicon (Si)	mg/L	5.2	0.050	5728244
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	5728244
Dissolved Sodium (Na)	mg/L	20	0.10	5728244
Dissolved Strontium (Sr)	mg/L	0.23	0.0010	5728244
Dissolved Thallium (Tl)	mg/L	<0.000050	0.000050	5728244
Dissolved Titanium (Ti)	mg/L	<0.0050	0.0050	5728244
Dissolved Uranium (U)	mg/L	0.0030	0.00010	5728244
Dissolved Vanadium (V)	mg/L	0.0012	0.00050	5728244
Dissolved Zinc (Zn)	mg/L	<0.0050	0.0050	5728244

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B8N6455
Report Date: 2018/09/19

Stantec Consulting Ltd
Client Project #: 161413684
Site Location: GUELPH, ON
Sampler Initials: DS

RESULTS OF ANALYSES OF WATER

Maxxam ID		HSJ712	HSJ713		HSJ714		
Sampling Date		2018/09/11 12:40	2018/09/11 13:10		2018/09/11 13:55		
COC Number		111362	111362		111362		
	UNITS	**WG-161413684-20180911-DS-01**	**WG-161413684-20180911-DS-02**	**RDL**	**WG-161413684-20180911-DS-03**	**RDL**	**QC Batch**
Inorganics							
Total Suspended Solids	mg/L	1800	1200	25	100	1.3	5727677

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

TEST SUMMARY

Maxxam ID: HSJ712
Sample ID: WG-161413684-20180911-DS-01
Matrix: Water

Collected: 2018/09/11
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5727466	N/A	2018/09/14	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5724251	N/A	2018/09/14	Automated Statchk
Chloride by Automated Colourimetry	KONE	5727647	N/A	2018/09/14	Deonarine Ramnarine
Conductivity	AT	5727479	N/A	2018/09/14	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5727802	N/A	2018/09/14	Shivani Shivani
Hardness (calculated as CaCO3)		5724254	N/A	2018/09/17	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5728244	N/A	2018/09/17	Arefa Dabhad
Ion Balance (% Difference)	CALC	5724249	N/A	2018/09/17	Automated Statchk
Anion and Cation Sum	CALC	5724250	N/A	2018/09/17	Automated Statchk
Total Ammonia-N	LACH/NH4	5732437	N/A	2018/09/18	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5727425	N/A	2018/09/13	Chandra Nandlal
pH	AT	5727480	N/A	2018/09/14	Surinder Rai
Orthophosphate	KONE	5727668	N/A	2018/09/14	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5724252	N/A	2018/09/17	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5724253	N/A	2018/09/17	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5727661	N/A	2018/09/14	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5724255	N/A	2018/09/17	Automated Statchk
Total Suspended Solids	BAL	5727677	2018/09/12	2018/09/13	Jingwei (Alvin) Shi

Maxxam ID: HSJ713
Sample ID: WG-161413684-20180911-DS-02
Matrix: Water

Collected: 2018/09/11
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5738172	N/A	2018/09/19	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5724251	N/A	2018/09/14	Automated Statchk
Chloride by Automated Colourimetry	KONE	5738161	N/A	2018/09/19	Deonarine Ramnarine
Conductivity	AT	5727479	N/A	2018/09/14	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5727802	N/A	2018/09/14	Shivani Shivani
Hardness (calculated as CaCO3)		5724254	N/A	2018/09/17	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5738013	N/A	2018/09/19	Thao Nguyen
Ion Balance (% Difference)	CALC	5724249	N/A	2018/09/17	Automated Statchk
Anion and Cation Sum	CALC	5724250	N/A	2018/09/17	Automated Statchk
Total Ammonia-N	LACH/NH4	5732437	N/A	2018/09/18	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5727425	N/A	2018/09/13	Chandra Nandlal
pH	AT	5727480	N/A	2018/09/14	Surinder Rai
Orthophosphate	KONE	5727668	N/A	2018/09/14	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5724252	N/A	2018/09/17	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5724253	N/A	2018/09/17	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5727661	N/A	2018/09/14	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5724255	N/A	2018/09/17	Automated Statchk
Total Suspended Solids	BAL	5727677	2018/09/12	2018/09/13	Jingwei (Alvin) Shi

TEST SUMMARY

Maxxam ID: HSJ714
Sample ID: WG-161413684-20180911-DS-03
Matrix: Water

Collected: 2018/09/11
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5727466	N/A	2018/09/14	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	5724251	N/A	2018/09/14	Automated Statchk
Chloride by Automated Colourimetry	KONE	5727647	N/A	2018/09/14	Deonarine Ramnarine
Conductivity	AT	5727479	N/A	2018/09/14	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5727802	N/A	2018/09/14	Shivani Shivani
Hardness (calculated as CaCO3)		5724254	N/A	2018/09/17	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5728244	N/A	2018/09/14	Arefa Dabhad
Ion Balance (% Difference)	CALC	5724249	N/A	2018/09/17	Automated Statchk
Anion and Cation Sum	CALC	5724250	N/A	2018/09/17	Automated Statchk
Total Ammonia-N	LACH/NH4	5732437	N/A	2018/09/18	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5727425	N/A	2018/09/13	Chandra Nandlal
pH	AT	5727480	N/A	2018/09/14	Surinder Rai
Orthophosphate	KONE	5727668	N/A	2018/09/14	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5724252	N/A	2018/09/17	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5724253	N/A	2018/09/17	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5727661	N/A	2018/09/14	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	5724255	N/A	2018/09/17	Automated Statchk
Total Suspended Solids	BAL	5727677	2018/09/12	2018/09/13	Jingwei (Alvin) Shi

Maxxam ID: HSJ715
Sample ID: WG-161413684-20180911-DS-04
Matrix: Water

Collected: 2018/09/11
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonaceous BOD	DO	5726645	2018/09/12	2018/09/17	Frank Zhang
Chloride by Automated Colourimetry	KONE	5727413	N/A	2018/09/13	Alina Dobreanu
Total Cyanide	SKAL/CN	5729123	2018/09/13	2018/09/13	Xuanhong Qiu
Fluoride	ISE	5727841	2018/09/12	2018/09/13	Surinder Rai
Mercury in Water by CVAA	CV/AA	5731153	2018/09/14	2018/09/14	Ron Morrison
Total Metals Analysis by ICPMS	ICP/MS	5728921	N/A	2018/09/13	Arefa Dabhad
Fecal coliform, (5TMPN/100mL)	INC	5726125	N/A	2018/09/11	Sirimathie Aluthwala
Animal and Vegetable Oil and Grease	BAL	5724443	N/A	2018/09/14	Automated Statchk
Total Oil and Grease	BAL	5731988	2018/09/14	2018/09/14	Amjad Mir
pH	AT	5727848	N/A	2018/09/13	Surinder Rai
Phenols (4AAP)	TECH/PHEN	5729249	N/A	2018/09/14	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	5727421	N/A	2018/09/13	Alina Dobreanu
Total Kjeldahl Nitrogen in Water	SKAL	5734882	2018/09/17	2018/09/17	Rajni Tyagi
Mineral/Synthetic O & G (TPH Heavy Oil)	BAL	5732048	2018/09/14	2018/09/14	Amjad Mir
Total Suspended Solids	BAL	5727677	2018/09/12	2018/09/13	Jingwei (Alvin) Shi

TEST SUMMARY

Maxxam ID: HSJ715 Dup
Sample ID: WG-161413684-20180911-DS-04
Matrix: Water

Collected: 2018/09/11
Shipped:
Received: 2018/09/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonaceous BOD	DO	5726645	2018/09/12	2018/09/17	Frank Zhang

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.7°C

Sample HSJ713 [WG-161413684-20180911-DS-02] : Elevated ion balance result was confirmed by re-analysis.

Sample HSJ715, Total Metals Analysis by ICPMS: Test repeated.

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5726645	Total Carbonaceous BOD	2018/09/17					<2	mg/L	NC	30	98	85 - 115
5727413	Dissolved Chloride (Cl-)	2018/09/13	NC	80 - 120	104	80 - 120	<1.0	mg/L	0.80	20		
5727421	Dissolved Sulphate (SO4)	2018/09/13	NC	75 - 125	97	80 - 120	<1.0	mg/L	0.58	20		
5727425	Nitrate (N)	2018/09/13	89	80 - 120	102	80 - 120	<0.10	mg/L	NC	20		
5727425	Nitrite (N)	2018/09/13	104	80 - 120	104	80 - 120	<0.010	mg/L	NC	20		
5727466	Alkalinity (Total as CaCO3)	2018/09/14			97	85 - 115	<1.0	mg/L	0.90	20		
5727479	Conductivity	2018/09/14			101	85 - 115	<1.0	umho/cm	0.36	25		
5727480	pH	2018/09/14			101	98 - 103			0.24	N/A		
5727647	Dissolved Chloride (Cl-)	2018/09/14	114	80 - 120	101	80 - 120	<1.0	mg/L	13	20		
5727661	Dissolved Sulphate (SO4)	2018/09/14	104	75 - 125	103	80 - 120	<1.0	mg/L	0.21	20		
5727668	Orthophosphate (P)	2018/09/14	109	75 - 125	99	80 - 120	<0.010	mg/L	NC	25		
5727677	Total Suspended Solids	2018/09/13					<10	mg/L	NC	25	95	85 - 115
5727802	Dissolved Organic Carbon	2018/09/14	95	80 - 120	98	80 - 120	<0.50	mg/L	5.0	20		
5727841	Fluoride (F-)	2018/09/13	97	80 - 120	99	80 - 120	<0.10	mg/L	6.7	20		
5727848	pH	2018/09/13			102	98 - 103			0.24	N/A		
5728244	Dissolved Aluminum (Al)	2018/09/14	102	80 - 120	100	80 - 120	<0.0050	mg/L				
5728244	Dissolved Antimony (Sb)	2018/09/14	105	80 - 120	101	80 - 120	<0.00050	mg/L	NC	20		
5728244	Dissolved Arsenic (As)	2018/09/14	101	80 - 120	100	80 - 120	<0.0010	mg/L	NC	20		
5728244	Dissolved Barium (Ba)	2018/09/14	102	80 - 120	100	80 - 120	<0.0020	mg/L	1.7	20		
5728244	Dissolved Beryllium (Be)	2018/09/14	112	80 - 120	105	80 - 120	<0.00050	mg/L	NC	20		
5728244	Dissolved Boron (B)	2018/09/14	112	80 - 120	104	80 - 120	<0.010	mg/L	NC	20		
5728244	Dissolved Cadmium (Cd)	2018/09/14	103	80 - 120	101	80 - 120	<0.00010	mg/L	NC	20		
5728244	Dissolved Calcium (Ca)	2018/09/14	NC	80 - 120	94	80 - 120	<0.20	mg/L				
5728244	Dissolved Chromium (Cr)	2018/09/14	99	80 - 120	94	80 - 120	<0.0050	mg/L	NC	20		
5728244	Dissolved Cobalt (Co)	2018/09/14	95	80 - 120	96	80 - 120	<0.00050	mg/L	NC	20		
5728244	Dissolved Copper (Cu)	2018/09/14	101	80 - 120	96	80 - 120	<0.0010	mg/L	NC	20		
5728244	Dissolved Iron (Fe)	2018/09/14	103	80 - 120	101	80 - 120	<0.10	mg/L				
5728244	Dissolved Lead (Pb)	2018/09/14	99	80 - 120	100	80 - 120	<0.00050	mg/L	NC	20		
5728244	Dissolved Magnesium (Mg)	2018/09/14	106	80 - 120	102	80 - 120	<0.050	mg/L				
5728244	Dissolved Manganese (Mn)	2018/09/14	100	80 - 120	98	80 - 120	<0.0020	mg/L				

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5728244	Dissolved Molybdenum (Mo)	2018/09/14	105	80 - 120	103	80 - 120	<0.00050	mg/L	8.3	20		
5728244	Dissolved Nickel (Ni)	2018/09/14	96	80 - 120	95	80 - 120	<0.0010	mg/L	3.1	20		
5728244	Dissolved Phosphorus (P)	2018/09/14	115	80 - 120	116	80 - 120	<0.10	mg/L				
5728244	Dissolved Potassium (K)	2018/09/14	106	80 - 120	104	80 - 120	<0.20	mg/L				
5728244	Dissolved Selenium (Se)	2018/09/14	99	80 - 120	99	80 - 120	<0.0020	mg/L	NC	20		
5728244	Dissolved Silicon (Si)	2018/09/14	100	80 - 120	102	80 - 120	<0.050	mg/L				
5728244	Dissolved Silver (Ag)	2018/09/14	98	80 - 120	98	80 - 120	<0.00010	mg/L	NC	20		
5728244	Dissolved Sodium (Na)	2018/09/14	NC	80 - 120	101	80 - 120	<0.10	mg/L	3.9	20		
5728244	Dissolved Strontium (Sr)	2018/09/14	101	80 - 120	98	80 - 120	<0.0010	mg/L				
5728244	Dissolved Thallium (Tl)	2018/09/14	100	80 - 120	97	80 - 120	<0.000050	mg/L	NC	20		
5728244	Dissolved Titanium (Ti)	2018/09/14	105	80 - 120	103	80 - 120	<0.0050	mg/L				
5728244	Dissolved Uranium (U)	2018/09/14	102	80 - 120	101	80 - 120	<0.00010	mg/L	4.9	20		
5728244	Dissolved Vanadium (V)	2018/09/14	97	80 - 120	93	80 - 120	<0.00050	mg/L	NC	20		
5728244	Dissolved Zinc (Zn)	2018/09/14	98	80 - 120	97	80 - 120	<0.0050	mg/L	4.0	20		
5728921	Total Aluminum (Al)	2018/09/13	112	80 - 120	101	80 - 120	0.0062, RDL=0.0050	mg/L	0.18	20		
5728921	Total Antimony (Sb)	2018/09/13	101	80 - 120	99	80 - 120	<0.00050	mg/L	NC	20		
5728921	Total Arsenic (As)	2018/09/13	99	80 - 120	100	80 - 120	<0.0010	mg/L	NC	20		
5728921	Total Bismuth (Bi)	2018/09/13	89	80 - 120	91	80 - 120	<0.0010	mg/L	NC	20		
5728921	Total Cadmium (Cd)	2018/09/13	100	80 - 120	99	80 - 120	<0.00010	mg/L	NC	20		
5728921	Total Chromium (Cr)	2018/09/13	98	80 - 120	95	80 - 120	<0.0050	mg/L	NC	20		
5728921	Total Cobalt (Co)	2018/09/13	99	80 - 120	97	80 - 120	<0.00050	mg/L	NC	20		
5728921	Total Iron (Fe)	2018/09/13	99	80 - 120	98	80 - 120	<0.10	mg/L	1.5	20		
5728921	Total Lead (Pb)	2018/09/13	92	80 - 120	92	80 - 120	<0.00050	mg/L	1.7	20		
5728921	Total Manganese (Mn)	2018/09/13	95	80 - 120	96	80 - 120	<0.0020	mg/L	2.3	20		
5728921	Total Molybdenum (Mo)	2018/09/13	97	80 - 120	100	80 - 120	<0.00050	mg/L	3.9	20		
5728921	Total Nickel (Ni)	2018/09/13	91	80 - 120	92	80 - 120	<0.0010	mg/L	NC	20		
5728921	Total Phosphorus (P)	2018/09/13	NC	80 - 120	111	80 - 120	<0.10	mg/L				
5728921	Total Selenium (Se)	2018/09/13	105	80 - 120	105	80 - 120	<0.0020	mg/L	NC	20		
5728921	Total Silver (Ag)	2018/09/13	95	80 - 120	95	80 - 120	<0.00010	mg/L	NC	20		
5728921	Total Tin (Sn)	2018/09/13	98	80 - 120	97	80 - 120	<0.0010	mg/L	NC	20		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5728921	Total Titanium (Ti)	2018/09/13	96	80 - 120	98	80 - 120	<0.0050	mg/L	6.5	20		
5728921	Total Vanadium (V)	2018/09/13	94	80 - 120	94	80 - 120	<0.00050	mg/L	7.8	20		
5728921	Total Zinc (Zn)	2018/09/13	99	80 - 120	100	80 - 120	<0.0050	mg/L	1.6	20		
5729123	Total Cyanide (CN)	2018/09/13	85	80 - 120	97	80 - 120	<0.0050	mg/L	1.6	20		
5729249	Phenols-4AAP	2018/09/13	93	80 - 120	94	80 - 120	<0.0010	mg/L	NC	20		
5729988	Total Copper (Cu)	2018/09/14	102	80 - 120	103	80 - 120	<0.0010	mg/L	NC	20		
5731153	Mercury (Hg)	2018/09/14	95	75 - 125	92	80 - 120	<0.0001	mg/L	NC	20		
5731988	Total Oil & Grease	2018/09/14	91	75 - 125	96	85 - 115	<0.50	mg/L	1.6	25		
5732048	Total Oil & Grease Mineral/Synthetic	2018/09/14	93	75 - 125	92	85 - 115	<0.50	mg/L	2.7	25		
5732437	Total Ammonia-N	2018/09/18	101	75 - 125	102	80 - 120	<0.050	mg/L	NC	20		
5734882	Total Kjeldahl Nitrogen (TKN)	2018/09/17	98	80 - 120	100	80 - 120	<0.10	mg/L	1.7	20	99	80 - 120
5738013	Dissolved Aluminum (Al)	2018/09/19	105	80 - 120	99	80 - 120	<0.0050	mg/L				
5738013	Dissolved Antimony (Sb)	2018/09/19	110	80 - 120	100	80 - 120	<0.00050	mg/L	NC	20		
5738013	Dissolved Arsenic (As)	2018/09/19	103	80 - 120	100	80 - 120	<0.0010	mg/L	NC	20		
5738013	Dissolved Barium (Ba)	2018/09/19	107	80 - 120	99	80 - 120	<0.0020	mg/L	1.1	20		
5738013	Dissolved Beryllium (Be)	2018/09/19	99	80 - 120	99	80 - 120	<0.00050	mg/L	NC	20		
5738013	Dissolved Boron (B)	2018/09/19	104	80 - 120	100	80 - 120	<0.010	mg/L	0.083	20		
5738013	Dissolved Cadmium (Cd)	2018/09/19	98	80 - 120	98	80 - 120	<0.00010	mg/L	NC	20		
5738013	Dissolved Calcium (Ca)	2018/09/19	NC	80 - 120	99	80 - 120	<0.20	mg/L				
5738013	Dissolved Chromium (Cr)	2018/09/19	100	80 - 120	97	80 - 120	<0.0050	mg/L	NC	20		
5738013	Dissolved Cobalt (Co)	2018/09/19	99	80 - 120	97	80 - 120	<0.00050	mg/L	3.6	20		
5738013	Dissolved Copper (Cu)	2018/09/19	104	80 - 120	98	80 - 120	<0.0010	mg/L	NC	20		
5738013	Dissolved Iron (Fe)	2018/09/19	104	80 - 120	100	80 - 120	<0.10	mg/L				
5738013	Dissolved Lead (Pb)	2018/09/19	90	80 - 120	97	80 - 120	<0.00050	mg/L	NC	20		
5738013	Dissolved Magnesium (Mg)	2018/09/19	NC	80 - 120	99	80 - 120	<0.050	mg/L				
5738013	Dissolved Manganese (Mn)	2018/09/19	101	80 - 120	98	80 - 120	<0.0020	mg/L				
5738013	Dissolved Molybdenum (Mo)	2018/09/19	113	80 - 120	101	80 - 120	<0.00050	mg/L	1.9	20		
5738013	Dissolved Nickel (Ni)	2018/09/19	95	80 - 120	96	80 - 120	<0.0010	mg/L	7.9	20		
5738013	Dissolved Phosphorus (P)	2018/09/19	116	80 - 120	118	80 - 120	<0.10	mg/L				
5738013	Dissolved Potassium (K)	2018/09/19	108	80 - 120	99	80 - 120	<0.20	mg/L				
5738013	Dissolved Selenium (Se)	2018/09/19	99	80 - 120	100	80 - 120	<0.0020	mg/L	NC	20		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5738013	Dissolved Silicon (Si)	2018/09/19	107	80 - 120	101	80 - 120	<0.050	mg/L				
5738013	Dissolved Silver (Ag)	2018/09/19	96	80 - 120	97	80 - 120	<0.00010	mg/L	NC	20		
5738013	Dissolved Sodium (Na)	2018/09/19	NC	80 - 120	97	80 - 120	<0.10	mg/L	1.4	20		
5738013	Dissolved Strontium (Sr)	2018/09/19	NC	80 - 120	97	80 - 120	<0.0010	mg/L				
5738013	Dissolved Thallium (Tl)	2018/09/19	90	80 - 120	96	80 - 120	<0.000050	mg/L	NC	20		
5738013	Dissolved Titanium (Ti)	2018/09/19	110	80 - 120	101	80 - 120	<0.0050	mg/L				
5738013	Dissolved Uranium (U)	2018/09/19	96	80 - 120	100	80 - 120	<0.00010	mg/L	1.8	20		
5738013	Dissolved Vanadium (V)	2018/09/19	106	80 - 120	97	80 - 120	<0.00050	mg/L	NC	20		
5738013	Dissolved Zinc (Zn)	2018/09/19	90	80 - 120	96	80 - 120	<0.0050	mg/L	NC	20		
5738161	Dissolved Chloride (Cl-)	2018/09/19	115	80 - 120	102	80 - 120	<1.0	mg/L	5.6	20		
5738172	Alkalinity (Total as CaCO3)	2018/09/19			96	85 - 115	<1.0	mg/L	1.2	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Cristina Carriere

Cristina Carriere, Scientific Service Specialist

Sirimathie Aluthwala, Campobello Micro

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

MaxXam MICRO
A Bureau Veritas Group Company

CHAIN OF CUSTODY RECORD 111362

Page 1 of 1

Invoice Information
Company Name: Stantec
Contact Name: Grant Whitehead
Address:
Phone:
Fax:
Email: Grant.whitehead@stantec.com

Report Information (if differs from invoice)
Company Name:
Contact Name:
Address:
Phone:
Fax:
Email:

Project Information (where applicable)
Quotation #: Stantec 2015-2018
P.O. # AFE#:
Project #: 16413684
Site Location: Guelph, ON
Site #:
Sampled By: Drew Smith

Turnaround Time (TAT) Required
☒ Regular TAT (5-7 days) Most analyses
PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Rush TAT (Surcharges will be applied)
☐ 1 Day ☐ 2 Days ☐ 3-4 Days
Date Required:
Rush Confirmation #:

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153
☐ Table 1 ☐ Res/Park ☐ Med/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other
☐ Table
FOR RSC (PLEASE CIRCLE) Y / N

Other Regulations
☐ CCME ☐ Sanitary Sewer Bylaw
☐ MISA ☐ Storm Sewer Bylaw
☒ PWQO Region
☒ Other (Specify) ODWS
☐ REG 558 (MIN 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) [✓ Metals] / Hg / CrVI	RCAp comprehensive	Guelph Sewer [illegible]	TSS	HOLD- DO NOT ANALYZE
1	WG-161413684-20180911-DS-01	2018/09/11	12 40	GW		X	X		X	
2	WG-161413684-20180911-DS-02	2018/09/11	13:10	GW		X	X		X	
3	WG-161413684-20180911-DS-03	2018/09/11	13:55	GW		X	X		X	
4	WG-161413684-20180911-DS-04	2018/09/11	15:15	GW				X		
5										
6										
7										
8										

LABORATORY USE ONLY
CUSTODY SEAL Y / N
Present Intact
COOLER TEMPERATURES
COOLING MEDIA PRESENT Y / N
COMMENTS

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)
/ Drew Smith	2018/09/11	16 42			
			[illegible] 4/11 [illegible]	2018/09/11	18 [illegible]

REC'D IN WATERLOO

11-Sep-18 16:40
Augustyna Dobosz
B8N6455
VMK ENV-1263

Maxxam
A Bureau Veritas Group Company

Your Project #: 161413684
Your C.O.C. #: 686036-01-01

Attention: Grant Whitehead

Stantec Consulting Ltd
300 Hagey Blvd
Suite 100
Waterloo, ON
CANADA . N2L 0A4

Report Date: 2018/11/14
Report #: R5484375
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8T9171
Received: 2018/11/08, 14:50

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	4	N/A	2018/11/10	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	4	N/A	2018/11/12	CAM SOP-00102	APHA 4500-CO2 D
Carbonaceous BOD	1	2018/11/09	2018/11/14	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	5	N/A	2018/11/12	CAM SOP-00463	EPA 325.2 m
Conductivity	4	N/A	2018/11/10	CAM SOP-00414	SM 23 2510 m
Total Cyanide	1	2018/11/12	2018/11/13	CAM SOP-00457	OMOE E3015 5 m
Dissolved Organic Carbon (DOC) (1)	4	N/A	2018/11/12	CAM SOP-00446	SM 23 5310 B m
Fluoride	1	2018/11/10	2018/11/13	CAM SOP-00449	SM 23 4500-F C m
Hardness (calculated as CaCO3)	4	N/A	2018/11/13	CAM SOP 00102/00408/00447	SM 2340 B
Mercury in Water by CVAA	1	2018/11/14	2018/11/14	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	5	N/A	2018/11/12	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	1	N/A	2018/11/12	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	4	N/A	2018/11/13		
Anion and Cation Sum	4	N/A	2018/11/13		
Fecal coliform, (5TMPN/100mL)	1	N/A	2018/11/08	BBY4 SOP-000127	MFHPB-19
Total Ammonia-N	3	N/A	2018/11/12	CAM SOP-00441	EPA GS I-2522-90 m
Total Ammonia-N	1	N/A	2018/11/13	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	4	N/A	2018/11/13	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Animal and Vegetable Oil and Grease	1	N/A	2018/11/13	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2018/11/13	2018/11/13	CAM SOP-00326	EPA1664B m,SM5520A m
pH	4	N/A	2018/11/10	CAM SOP-00413	SM 4500H+ B m
pH	1	N/A	2018/11/12	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2018/11/13	CAM SOP-00444	OMOE E3179 m
Orthophosphate	4	N/A	2018/11/12	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	4	N/A	2018/11/13		
Sat. pH and Langelier Index (@ 4C)	4	N/A	2018/11/13		
Sulphate by Automated Colourimetry	5	N/A	2018/11/12	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	4	N/A	2018/11/13		
Total Kjeldahl Nitrogen in Water	1	2018/11/10	2018/11/12	CAM SOP-00938	OMOE E3516 m

Your Project #: 161413684
Your C.O.C. #: 686036-01-01

Attention: Grant Whitehead
Stantec Consulting Ltd
300 Hagey Blvd
Suite 100
Waterloo, ON
CANADA N2L 0A4

Report Date: 2018/11/14
Report #: R5484375
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8T9171
Received: 2018/11/08, 14:50

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Mineral/Synthetic O & G (TPH Heavy Oil) (3)	1	2018/11/13	2018/11/13	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	5	2018/11/09	2018/11/12	CAM SOP-00428	SM 23 2540D m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.
(3) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Your Project #: 161413684
Your C.O.C. #: 686036-01-01

Attention: Grant Whitehead

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300 Hagey Blvd
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CANADA N2L 0A4

Report Date: 2018/11/14
Report #: R5484375
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8T9171
Received: 2018/11/08, 14:50

Encryption Key

Colby Coutu
Project Manager Assistant
14 Nov 2018 17:01:42

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Augustyna Dobosz, Project Manager
Email: ADobosz@maxxam.ca
Phone# (905)817-5700 Ext:5798

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

THE CITY OF GUELPH SANITARY SEWER BYLAW (WATER)

Maxxam ID		IGE068		
Sampling Date		2018/11/08 11:30		
COC Number		686036-01-01		
	UNITS	**WG-161413684-20181108-DS01**	**RDL**	**QC Batch**
Calculated Parameters				
Total Animal/Vegetable Oil and Grease	mg/L	3.3	0.50	5827390
Inorganics				
Total Carbonaceous BOD	mg/L	<2	2	5829310
Fluoride (F-)	mg/L	0.12	0.10	5831501
Total Kjeldahl Nitrogen (TKN)	mg/L	<0.10	0.10	5831642
pH	pH	7.69		5831504
Phenols-4AAP	mg/L	<0.0010	0.0010	5832393
Total Suspended Solids	mg/L	4800	17	5830227
Dissolved Sulphate (SO4)	mg/L	44	1.0	5831429
Total Cyanide (CN)	mg/L	<0.0050	0.0050	5832812
Dissolved Chloride (Cl-)	mg/L	38	1.0	5831425
Petroleum Hydrocarbons				
Total Oil & Grease	mg/L	3.3	0.50	5833748
Total Oil & Grease Mineral/Synthetic	mg/L	<0.50	0.50	5833755
Metals				
Mercury (Hg)	mg/L	<0.0001	0.0001	5836000

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

THE CITY OF GUELPH STORM SEWER BYLAW (WATER)

Maxxam ID		IGE068		
Sampling Date		2018/11/08 11:30		
COC Number		686036-01-01		
	UNITS	**WG-161413684-20181108-DS01**	**RDL**	**QC Batch**
Metals				
Total Aluminum (Al)	mg/L	7.4	0.0050	5831797
Total Antimony (Sb)	mg/L	<0.00050	0.00050	5831797
Total Arsenic (As)	mg/L	0.0038	0.0010	5831797
Total Bismuth (Bi)	mg/L	<0.0010	0.0010	5831797
Total Cadmium (Cd)	mg/L	0.00024	0.00010	5831797
Total Chromium (Cr)	mg/L	0.019	0.0050	5831797
Total Cobalt (Co)	mg/L	0.0040	0.00050	5831797
Total Copper (Cu)	mg/L	0.011	0.0010	5831797
Total Iron (Fe)	mg/L	10	0.10	5831797
Total Lead (Pb)	mg/L	0.030	0.00050	5831797
Total Manganese (Mn)	mg/L	0.40	0.0020	5831797
Total Molybdenum (Mo)	mg/L	0.0040	0.00050	5831797
Total Nickel (Ni)	mg/L	0.0089	0.0010	5831797
Total Phosphorus (P)	mg/L	0.41	0.10	5831797
Total Selenium (Se)	mg/L	<0.0020	0.0020	5831797
Total Silver (Ag)	mg/L	<0.00010	0.00010	5831797
Total Tin (Sn)	mg/L	0.0015	0.0010	5831797
Total Titanium (Ti)	mg/L	0.22	0.0050	5831797
Total Vanadium (V)	mg/L	0.016	0.00050	5831797
Total Zinc (Zn)	mg/L	0.098	0.0050	5831797
Microbiological				
Fecal coliform	5TMPN/100mL	<1.8	1.8	5828861

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

RCAP - COMPREHENSIVE (WATER)

Maxxam ID		IGE069	IGE070	IGE071		
Sampling Date		2018/11/08 12:40	2018/11/08 13:15	2018/11/08 13:20		
COC Number		686036-01-01	686036-01-01	686036-01-01		
	UNITS	**WG-161413684-20181108-DS02**	**WG-161413684-20181108-DS03**	**WG-161413684-20181108-DS04**	**RDL**	**QC Batch**
Calculated Parameters						
Anion Sum	me/L	8.98	7.31	6.51	N/A	5827281
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	230	310	240	1.0	5827280
Calculated TDS	mg/L	460	350	330	1.0	5827284
Carb. Alkalinity (calc. as CaCO3)	mg/L	3.2	3.2	4.1	1.0	5827280
Cation Sum	me/L	9.29	7.10	5.93	N/A	5827281
Hardness (CaCO3)	mg/L	380	330	190	1.0	5827179
Ion Balance (% Difference)	%	1.72	1.43	4.65	N/A	5827180
Langelier Index (@ 20C)	N/A	0.601	0.775	0.477		5827282
Langelier Index (@ 4C)	N/A	0.352	0.526	0.228		5827283
Saturation pH (@ 20C)	N/A	7.57	7.27	7.78		5827282
Saturation pH (@ 4C)	N/A	7.82	7.52	8.03		5827283
Inorganics						
Total Ammonia-N	mg/L	0.23	<0.050	<0.050	0.050	5831662
Conductivity	umho/cm	840	630	590	1.0	5830552
Dissolved Organic Carbon	mg/L	1.4	0.98	0.68	0.50	5830640
Orthophosphate (P)	mg/L	<0.010	0.012	0.027	0.010	5830606
pH	pH	8.17	8.04	8.26		5830556
Dissolved Sulphate (SO4)	mg/L	20	20	54	1.0	5830605
Alkalinity (Total as CaCO3)	mg/L	240	310	250	1.0	5830538
Dissolved Chloride (Cl-)	mg/L	140	18	17	1.0	5830597
Nitrite (N)	mg/L	<0.010	0.074	<0.010	0.010	5830573
Nitrate (N)	mg/L	<0.10	1.01	<0.10	0.10	5830573
Nitrate + Nitrite (N)	mg/L	<0.10	1.08	<0.10	0.10	5830573
Metals						
Dissolved Aluminum (Al)	mg/L	0.25	0.0071	0.0071	0.0050	5828185
Dissolved Antimony (Sb)	mg/L	<0.00050	0.00051	<0.00050	0.00050	5828185
Dissolved Arsenic (As)	mg/L	<0.0010	<0.0010	0.0044	0.0010	5828185
Dissolved Barium (Ba)	mg/L	0.046	0.088	0.024	0.0020	5828185
Dissolved Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	0.00050	5828185
Dissolved Boron (B)	mg/L	0.071	0.047	0.036	0.010	5828185
Dissolved Cadmium (Cd)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	5828185

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

RCAP - COMPREHENSIVE (WATER)

Maxxam ID		IGE069	IGE070	IGE071		
Sampling Date		2018/11/08 12:40	2018/11/08 13:15	2018/11/08 13:20		
COC Number		686036-01-01	686036-01-01	686036-01-01		
	UNITS	**WG-161413684-20181108-DS02**	**WG-161413684-20181108-DS03**	**WG-161413684-20181108-DS04**	**RDL**	**QC Batch**
Dissolved Calcium (Ca)	mg/L	33	47	18	0.20	5828185
Dissolved Chromium (Cr)	mg/L	<0.0050	<0.0050	<0.0050	0.0050	5828185
Dissolved Cobalt (Co)	mg/L	<0.00050	<0.00050	<0.00050	0.00050	5828185
Dissolved Copper (Cu)	mg/L	<0.0010	0.0015	<0.0010	0.0010	5828185
Dissolved Iron (Fe)	mg/L	0.33	<0.10	<0.10	0.10	5828185
Dissolved Lead (Pb)	mg/L	0.0020	<0.00050	<0.00050	0.00050	5828185
Dissolved Magnesium (Mg)	mg/L	73	51	35	0.050	5828185
Dissolved Manganese (Mn)	mg/L	0.030	0.012	<0.0020	0.0020	5828185
Dissolved Molybdenum (Mo)	mg/L	0.027	0.010	0.019	0.00050	5828185
Dissolved Nickel (Ni)	mg/L	0.0021	<0.0010	0.0011	0.0010	5828185
Dissolved Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	0.10	5828185
Dissolved Potassium (K)	mg/L	5.1	7.5	3.0	0.20	5828185
Dissolved Selenium (Se)	mg/L	<0.0020	<0.0020	<0.0020	0.0020	5828185
Dissolved Silicon (Si)	mg/L	5.9	3.9	4.3	0.050	5828185
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	5828185
Dissolved Sodium (Na)	mg/L	33	7.7	47	0.10	5828185
Dissolved Strontium (Sr)	mg/L	0.21	0.15	0.27	0.0010	5828185
Dissolved Thallium (Tl)	mg/L	<0.000050	<0.000050	<0.000050	0.000050	5828185
Dissolved Titanium (Ti)	mg/L	0.012	<0.0050	<0.0050	0.0050	5828185
Dissolved Uranium (U)	mg/L	0.00050	0.0017	0.0010	0.00010	5828185
Dissolved Vanadium (V)	mg/L	0.00084	0.0012	0.0014	0.00050	5828185
Dissolved Zinc (Zn)	mg/L	0.0062	<0.0050	<0.0050	0.0050	5828185

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

RCAP - COMPREHENSIVE (WATER)

Maxxam ID		IGE072		
Sampling Date		2018/11/08 13:45		
COC Number		686036-01-01		
	UNITS	**WG-161413684-20181108-DS05**	**RDL**	**QC Batch**
Calculated Parameters				
Anion Sum	me/L	13.3	N/A	5827281
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	290	1.0	5827280
Calculated TDS	mg/L	700	1.0	5827284
Carb. Alkalinity (calc. as CaCO3)	mg/L	2.4	1.0	5827280
Cation Sum	me/L	13.2	N/A	5827281
Hardness (CaCO3)	mg/L	470	1.0	5827179
Ion Balance (% Difference)	%	0.280	N/A	5827180
Langelier Index (@ 20C)	N/A	0.753		5827282
Langelier Index (@ 4C)	N/A	0.506		5827283
Saturation pH (@ 20C)	N/A	7.18		5827282
Saturation pH (@ 4C)	N/A	7.43		5827283
Inorganics				
Total Ammonia-N	mg/L	0.13	0.050	5831661
Conductivity	umho/cm	1300	1.0	5830552
Dissolved Organic Carbon	mg/L	1.0	0.50	5830640
Orthophosphate (P)	mg/L	0.012	0.010	5830606
pH	pH	7.94		5830556
Dissolved Sulphate (SO4)	mg/L	84	1.0	5830605
Alkalinity (Total as CaCO3)	mg/L	300	1.0	5830538
Dissolved Chloride (Cl-)	mg/L	200	2.0	5830597
Nitrite (N)	mg/L	<0.010	0.010	5830573
Nitrate (N)	mg/L	<0.10	0.10	5830573
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	5830573
Metals				
Dissolved Aluminum (Al)	mg/L	<0.0050	0.0050	5828185
Dissolved Antimony (Sb)	mg/L	<0.00050	0.00050	5828185
Dissolved Arsenic (As)	mg/L	0.0011	0.0010	5828185
Dissolved Barium (Ba)	mg/L	0.089	0.0020	5828185
Dissolved Beryllium (Be)	mg/L	<0.00050	0.00050	5828185
Dissolved Boron (B)	mg/L	0.069	0.010	5828185
Dissolved Cadmium (Cd)	mg/L	<0.00010	0.00010	5828185

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

RCAP - COMPREHENSIVE (WATER)

Maxxam ID		IGE072		
Sampling Date		2018/11/08 13:45		
COC Number		686036-01-01		
	UNITS	**WG-161413684-20181108-DS05**	**RDL**	**QC Batch**
Dissolved Calcium (Ca)	mg/L	71	0.20	5828185
Dissolved Chromium (Cr)	mg/L	<0.0050	0.0050	5828185
Dissolved Cobalt (Co)	mg/L	<0.00050	0.00050	5828185
Dissolved Copper (Cu)	mg/L	0.0016	0.0010	5828185
Dissolved Iron (Fe)	mg/L	<0.10	0.10	5828185
Dissolved Lead (Pb)	mg/L	<0.00050	0.00050	5828185
Dissolved Magnesium (Mg)	mg/L	71	0.050	5828185
Dissolved Manganese (Mn)	mg/L	0.021	0.0020	5828185
Dissolved Molybdenum (Mo)	mg/L	0.012	0.00050	5828185
Dissolved Nickel (Ni)	mg/L	0.0015	0.0010	5828185
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	5828185
Dissolved Potassium (K)	mg/L	5.6	0.20	5828185
Dissolved Selenium (Se)	mg/L	<0.0020	0.0020	5828185
Dissolved Silicon (Si)	mg/L	5.0	0.050	5828185
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	5828185
Dissolved Sodium (Na)	mg/L	84	0.10	5828185
Dissolved Strontium (Sr)	mg/L	0.26	0.0010	5828185
Dissolved Thallium (Tl)	mg/L	<0.000050	0.000050	5828185
Dissolved Titanium (Ti)	mg/L	<0.0050	0.0050	5828185
Dissolved Uranium (U)	mg/L	0.0027	0.00010	5828185
Dissolved Vanadium (V)	mg/L	0.0012	0.00050	5828185
Dissolved Zinc (Zn)	mg/L	<0.0050	0.0050	5828185

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

RESULTS OF ANALYSES OF WATER

Maxxam ID		IGE069		IGE070		IGE071		
Sampling Date		2018/11/08 12:40		2018/11/08 13:15		2018/11/08 13:20		
COC Number		686036-01-01		686036-01-01		686036-01-01		
	UNITS	**WG-161413684-20181108-DS02**	**RDL**	**WG-161413684-20181108-DS03**	**RDL**	**WG-161413684-20181108-DS04**	**RDL**	**QC Batch**
Inorganics								
Total Suspended Solids	mg/L	3000	20	630	10	2400	20	5830227

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		IGE072		
Sampling Date		2018/11/08 13:45		
COC Number		686036-01-01		
	UNITS	**WG-161413684-20181108-DS05**	**RDL**	**QC Batch**
Inorganics				
Total Suspended Solids	mg/L	1400	10	5830227

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		IGE068		
Sampling Date		2018/11/08 11:30		
COC Number		686036-01-01		
	UNITS	**WG-161413684-20181108-DS01**	**RDL**	**QC Batch**
Metals				
Dissolved Aluminum (Al)	mg/L	<0.0050	0.0050	5828185
Dissolved Antimony (Sb)	mg/L	<0.00050	0.00050	5828185
Dissolved Arsenic (As)	mg/L	<0.0010	0.0010	5828185
Dissolved Bismuth (Bi)	mg/L	<0.0010	0.0010	5828185
Dissolved Cadmium (Cd)	mg/L	<0.00010	0.00010	5828185
Dissolved Chromium (Cr)	mg/L	<0.0050	0.0050	5828185
Dissolved Cobalt (Co)	mg/L	<0.00050	0.00050	5828185
Dissolved Copper (Cu)	mg/L	0.0012	0.0010	5828185
Dissolved Iron (Fe)	mg/L	<0.10	0.10	5828185
Dissolved Lead (Pb)	mg/L	<0.00050	0.00050	5828185
Dissolved Manganese (Mn)	mg/L	0.019	0.0020	5828185
Dissolved Molybdenum (Mo)	mg/L	0.0027	0.00050	5828185
Dissolved Nickel (Ni)	mg/L	<0.0010	0.0010	5828185
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	5828185
Dissolved Selenium (Se)	mg/L	<0.0020	0.0020	5828185
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	5828185
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	5828185
Dissolved Titanium (Ti)	mg/L	<0.0050	0.0050	5828185
Dissolved Vanadium (V)	mg/L	0.0015	0.00050	5828185
Dissolved Zinc (Zn)	mg/L	<0.0050	0.0050	5828185

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

TEST SUMMARY

Maxxam ID: IGE068
Sample ID: WG-161413684-20181108-DS01
Matrix: Water

Collected: 2018/11/08
Shipped:
Received: 2018/11/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonaceous BOD	DO	5829310	2018/11/09	2018/11/14	Althea Gonzalez
Chloride by Automated Colourimetry	KONE	5831425	N/A	2018/11/12	Deonarine Ramnarine
Total Cyanide	SKAL/CN	5832812	2018/11/12	2018/11/13	Xuanhong Qiu
Fluoride	ISE	5831501	2018/11/10	2018/11/13	Surinder Rai
Mercury in Water by CVAA	CV/AA	5836000	2018/11/14	2018/11/14	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5828185	N/A	2018/11/12	Thao Nguyen
Total Metals Analysis by ICPMS	ICP/MS	5831797	N/A	2018/11/12	Arefa Dabhad
Fecal coliform, (5TMPN/100mL)	INC	5828861	N/A	2018/11/08	Sirimathie Aluthwala
Animal and Vegetable Oil and Grease	BAL	5827390	N/A	2018/11/13	Automated Statchk
Total Oil and Grease	BAL	5833748	2018/11/13	2018/11/13	Francis Afonso
pH	AT	5831504	N/A	2018/11/12	Surinder Rai
Phenols (4AAP)	TECH/PHEN	5832393	N/A	2018/11/13	Bramdeo Motiram
Sulphate by Automated Colourimetry	KONE	5831429	N/A	2018/11/12	Deonarine Ramnarine
Total Kjeldahl Nitrogen in Water	SKAL	5831642	2018/11/10	2018/11/12	Rajni Tyagi
Mineral/Synthetic O & G (TPH Heavy Oil)	BAL	5833755	2018/11/13	2018/11/13	Francis Afonso
Total Suspended Solids	BAL	5830227	2018/11/09	2018/11/12	Nilam Borole

Maxxam ID: IGE069
Sample ID: WG-161413684-20181108-DS02
Matrix: Water

Collected: 2018/11/08
Shipped:
Received: 2018/11/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5830538	N/A	2018/11/10	Neil Dassanayake
Carbonate, Bicarbonate and Hydroxide	CALC	5827280	N/A	2018/11/12	Automated Statchk
Chloride by Automated Colourimetry	KONE	5830597	N/A	2018/11/12	Deonarine Ramnarine
Conductivity	AT	5830552	N/A	2018/11/10	Neil Dassanayake
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5830640	N/A	2018/11/12	Nimarta Singh
Hardness (calculated as CaCO3)		5827179	N/A	2018/11/13	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5828185	N/A	2018/11/12	Thao Nguyen
Ion Balance (% Difference)	CALC	5827180	N/A	2018/11/13	Automated Statchk
Anion and Cation Sum	CALC	5827281	N/A	2018/11/13	Automated Statchk
Total Ammonia-N	LACH/NH4	5831662	N/A	2018/11/12	Chandra Nandlal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5830573	N/A	2018/11/13	Chandra Nandlal
pH	AT	5830556	N/A	2018/11/10	Neil Dassanayake
Orthophosphate	KONE	5830606	N/A	2018/11/12	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5827282	N/A	2018/11/13	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5827283	N/A	2018/11/13	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5830605	N/A	2018/11/12	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5827284	N/A	2018/11/13	Automated Statchk
Total Suspended Solids	BAL	5830227	2018/11/09	2018/11/12	Nilam Borole

TEST SUMMARY

Maxxam ID: IGE070
Sample ID: WG-161413684-20181108-DS03
Matrix: Water

Collected: 2018/11/08
Shipped:
Received: 2018/11/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5830538	N/A	2018/11/10	Neil Dassanayake
Carbonate, Bicarbonate and Hydroxide	CALC	5827280	N/A	2018/11/12	Automated Statchk
Chloride by Automated Colourimetry	KONE	5830597	N/A	2018/11/12	Deonarine Ramnarine
Conductivity	AT	5830552	N/A	2018/11/10	Neil Dassanayake
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5830640	N/A	2018/11/12	Nimarta Singh
Hardness (calculated as CaCO3)		5827179	N/A	2018/11/13	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5828185	N/A	2018/11/12	Thao Nguyen
Ion Balance (% Difference)	CALC	5827180	N/A	2018/11/13	Automated Statchk
Anion and Cation Sum	CALC	5827281	N/A	2018/11/13	Automated Statchk
Total Ammonia-N	LACH/NH4	5831662	N/A	2018/11/12	Chandra Nandlal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5830573	N/A	2018/11/13	Chandra Nandlal
pH	AT	5830556	N/A	2018/11/10	Neil Dassanayake
Orthophosphate	KONE	5830606	N/A	2018/11/12	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5827282	N/A	2018/11/13	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5827283	N/A	2018/11/13	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5830605	N/A	2018/11/12	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5827284	N/A	2018/11/13	Automated Statchk
Total Suspended Solids	BAL	5830227	2018/11/09	2018/11/12	Nilam Borole

Maxxam ID: IGE071
Sample ID: WG-161413684-20181108-DS04
Matrix: Water

Collected: 2018/11/08
Shipped:
Received: 2018/11/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5830538	N/A	2018/11/10	Neil Dassanayake
Carbonate, Bicarbonate and Hydroxide	CALC	5827280	N/A	2018/11/12	Automated Statchk
Chloride by Automated Colourimetry	KONE	5830597	N/A	2018/11/12	Deonarine Ramnarine
Conductivity	AT	5830552	N/A	2018/11/10	Neil Dassanayake
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5830640	N/A	2018/11/12	Nimarta Singh
Hardness (calculated as CaCO3)		5827179	N/A	2018/11/13	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5828185	N/A	2018/11/12	Thao Nguyen
Ion Balance (% Difference)	CALC	5827180	N/A	2018/11/13	Automated Statchk
Anion and Cation Sum	CALC	5827281	N/A	2018/11/13	Automated Statchk
Total Ammonia-N	LACH/NH4	5831662	N/A	2018/11/12	Chandra Nandlal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5830573	N/A	2018/11/13	Chandra Nandlal
pH	AT	5830556	N/A	2018/11/10	Neil Dassanayake
Orthophosphate	KONE	5830606	N/A	2018/11/12	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5827282	N/A	2018/11/13	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5827283	N/A	2018/11/13	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5830605	N/A	2018/11/12	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5827284	N/A	2018/11/13	Automated Statchk
Total Suspended Solids	BAL	5830227	2018/11/09	2018/11/12	Nilam Borole

TEST SUMMARY

Maxxam ID: IGE072
Sample ID: WG-161413684-20181108-DS05
Matrix: Water

Collected: 2018/11/08
Shipped:
Received: 2018/11/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5830538	N/A	2018/11/10	Neil Dassanayake
Carbonate, Bicarbonate and Hydroxide	CALC	5827280	N/A	2018/11/12	Automated Statchk
Chloride by Automated Colourimetry	KONE	5830597	N/A	2018/11/12	Deonarine Ramnarine
Conductivity	AT	5830552	N/A	2018/11/10	Neil Dassanayake
Dissolved Organic Carbon (DOC)	TOCV/NDIR	5830640	N/A	2018/11/12	Nimarta Singh
Hardness (calculated as CaCO3)		5827179	N/A	2018/11/13	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	5828185	N/A	2018/11/12	Thao Nguyen
Ion Balance (% Difference)	CALC	5827180	N/A	2018/11/13	Automated Statchk
Anion and Cation Sum	CALC	5827281	N/A	2018/11/13	Automated Statchk
Total Ammonia-N	LACH/NH4	5831661	N/A	2018/11/13	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5830573	N/A	2018/11/13	Chandra Nandlal
pH	AT	5830556	N/A	2018/11/10	Neil Dassanayake
Orthophosphate	KONE	5830606	N/A	2018/11/12	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	5827282	N/A	2018/11/13	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5827283	N/A	2018/11/13	Automated Statchk
Sulphate by Automated Colourimetry	KONE	5830605	N/A	2018/11/12	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	5827284	N/A	2018/11/13	Automated Statchk
Total Suspended Solids	BAL	5830227	2018/11/09	2018/11/12	Nilam Borole

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	0.0°C

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5828185	Dissolved Aluminum (Al)	2018/11/12	97	80 - 120	98	80 - 120	<0.0050	mg/L				
5828185	Dissolved Antimony (Sb)	2018/11/12	110	80 - 120	101	80 - 120	<0.00050	mg/L	2.4	20		
5828185	Dissolved Arsenic (As)	2018/11/12	103	80 - 120	100	80 - 120	<0.0010	mg/L	NC	20		
5828185	Dissolved Barium (Ba)	2018/11/12	100	80 - 120	99	80 - 120	<0.0020	mg/L	1.3	20		
5828185	Dissolved Beryllium (Be)	2018/11/12	103	80 - 120	100	80 - 120	<0.00050	mg/L	NC	20		
5828185	Dissolved Bismuth (Bi)	2018/11/12	92	80 - 120	92	80 - 120	<0.0010	mg/L				
5828185	Dissolved Boron (B)	2018/11/12	99	80 - 120	100	80 - 120	<0.010	mg/L	2.5	20		
5828185	Dissolved Cadmium (Cd)	2018/11/12	103	80 - 120	99	80 - 120	<0.00010	mg/L	NC	20		
5828185	Dissolved Calcium (Ca)	2018/11/12	NC	80 - 120	98	80 - 120	<0.20	mg/L				
5828185	Dissolved Chromium (Cr)	2018/11/12	100	80 - 120	98	80 - 120	<0.0050	mg/L	NC	20		
5828185	Dissolved Cobalt (Co)	2018/11/12	100	80 - 120	99	80 - 120	<0.00050	mg/L	NC	20		
5828185	Dissolved Copper (Cu)	2018/11/12	103	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20		
5828185	Dissolved Iron (Fe)	2018/11/12	103	80 - 120	101	80 - 120	<0.10	mg/L				
5828185	Dissolved Lead (Pb)	2018/11/12	94	80 - 120	94	80 - 120	<0.00050	mg/L	NC	20		
5828185	Dissolved Magnesium (Mg)	2018/11/12	NC	80 - 120	98	80 - 120	<0.050	mg/L				
5828185	Dissolved Manganese (Mn)	2018/11/12	101	80 - 120	98	80 - 120	<0.0020	mg/L				
5828185	Dissolved Molybdenum (Mo)	2018/11/12	106	80 - 120	101	80 - 120	<0.00050	mg/L	4.7	20		
5828185	Dissolved Nickel (Ni)	2018/11/12	101	80 - 120	100	80 - 120	<0.0010	mg/L	NC	20		
5828185	Dissolved Phosphorus (P)	2018/11/12	109	80 - 120	109	80 - 120	<0.10	mg/L				
5828185	Dissolved Potassium (K)	2018/11/12	102	80 - 120	99	80 - 120	<0.20	mg/L				
5828185	Dissolved Selenium (Se)	2018/11/12	103	80 - 120	105	80 - 120	<0.0020	mg/L	NC	20		
5828185	Dissolved Silicon (Si)	2018/11/12	96	80 - 120	97	80 - 120	<0.050	mg/L				
5828185	Dissolved Silver (Ag)	2018/11/12	98	80 - 120	99	80 - 120	<0.00010	mg/L	NC	20		
5828185	Dissolved Sodium (Na)	2018/11/12	NC	80 - 120	97	80 - 120	<0.10	mg/L	0.78	20		
5828185	Dissolved Strontium (Sr)	2018/11/12	NC	80 - 120	99	80 - 120	<0.0010	mg/L				
5828185	Dissolved Thallium (Tl)	2018/11/12	93	80 - 120	93	80 - 120	<0.000050	mg/L	NC	20		
5828185	Dissolved Tin (Sn)	2018/11/12	103	80 - 120	99	80 - 120	<0.0010	mg/L				
5828185	Dissolved Titanium (Ti)	2018/11/12	98	80 - 120	101	80 - 120	<0.0050	mg/L				
5828185	Dissolved Uranium (U)	2018/11/12	105	80 - 120	102	80 - 120	<0.00010	mg/L	1.2	20		
5828185	Dissolved Vanadium (V)	2018/11/12	102	80 - 120	98	80 - 120	<0.00050	mg/L	9.2	20		
5828185	Dissolved Zinc (Zn)	2018/11/12	99	80 - 120	99	80 - 120	<0.0050	mg/L	NC	20		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5829310	Total Carbonaceous BOD	2018/11/14					<2	mg/L	9.6	30	96	85 - 115
5830227	Total Suspended Solids	2018/11/12					<10	mg/L	NC	25	96	85 - 115
5830538	Alkalinity (Total as CaCO3)	2018/11/09			94	85 - 115	<1.0	mg/L	1.2	20		
5830552	Conductivity	2018/11/09			100	85 - 115	<1.0	umho/cm	0.43	25		
5830556	pH	2018/11/09			101	98 - 103			1.5	N/A		
5830573	Nitrate (N)	2018/11/13	90	80 - 120	98	80 - 120	<0.10	mg/L	0.38	20		
5830573	Nitrite (N)	2018/11/13	103	80 - 120	103	80 - 120	<0.010	mg/L	NC	20		
5830597	Dissolved Chloride (Cl-)	2018/11/12	115	80 - 120	104	80 - 120	<1.0	mg/L	1.3	20		
5830605	Dissolved Sulphate (SO4)	2018/11/12	NC	75 - 125	105	80 - 120	<1.0	mg/L	0.99	20		
5830606	Orthophosphate (P)	2018/11/12	113	75 - 125	100	80 - 120	<0.010	mg/L	NC	25		
5830640	Dissolved Organic Carbon	2018/11/12	95	80 - 120	98	80 - 120	<0.50	mg/L	0.55	20		
5831425	Dissolved Chloride (Cl-)	2018/11/12	110	80 - 120	103	80 - 120	<1.0	mg/L	0.67	20		
5831429	Dissolved Sulphate (SO4)	2018/11/12	NC	75 - 125	106	80 - 120	<1.0	mg/L	0.10	20		
5831501	Fluoride (F-)	2018/11/12	95	80 - 120	107	80 - 120	<0.10	mg/L	0	20		
5831504	pH	2018/11/12			102	98 - 103			2.1	N/A		
5831642	Total Kjeldahl Nitrogen (TKN)	2018/11/12	NC	80 - 120	102	80 - 120	<0.10	mg/L	0.78	20	99	N/A
5831661	Total Ammonia-N	2018/11/13	103	75 - 125	101	80 - 120	<0.050	mg/L	3.8	20		
5831662	Total Ammonia-N	2018/11/12	97	75 - 125	100	80 - 120	<0.050	mg/L	NC	20		
5831797	Total Aluminum (Al)	2018/11/12	101	80 - 120	101	80 - 120	<0.0050	mg/L	1.1	20		
5831797	Total Antimony (Sb)	2018/11/12	104	80 - 120	101	80 - 120	<0.00050	mg/L				
5831797	Total Arsenic (As)	2018/11/12	102	80 - 120	101	80 - 120	<0.0010	mg/L				
5831797	Total Bismuth (Bi)	2018/11/12	102	80 - 120	101	80 - 120	<0.0010	mg/L				
5831797	Total Cadmium (Cd)	2018/11/12	104	80 - 120	101	80 - 120	<0.00010	mg/L	NC	20		
5831797	Total Chromium (Cr)	2018/11/12	95	80 - 120	94	80 - 120	<0.0050	mg/L	NC	20		
5831797	Total Cobalt (Co)	2018/11/12	102	80 - 120	99	80 - 120	<0.00050	mg/L	NC	20		
5831797	Total Copper (Cu)	2018/11/12	103	80 - 120	102	80 - 120	<0.0010	mg/L	10	20		
5831797	Total Iron (Fe)	2018/11/12	99	80 - 120	99	80 - 120	<0.10	mg/L	0.34	20		
5831797	Total Lead (Pb)	2018/11/12	101	80 - 120	100	80 - 120	<0.00050	mg/L	NC	20		
5831797	Total Manganese (Mn)	2018/11/12	96	80 - 120	97	80 - 120	<0.0020	mg/L	2.3	20		
5831797	Total Molybdenum (Mo)	2018/11/12	103	80 - 120	97	80 - 120	<0.00050	mg/L	1.3	20		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5831797	Total Nickel (Ni)	2018/11/12	99	80 - 120	99	80 - 120	<0.0010	mg/L	0.39	20		
5831797	Total Phosphorus (P)	2018/11/12	102	80 - 120	106	80 - 120	<0.10	mg/L				
5831797	Total Selenium (Se)	2018/11/12	109	80 - 120	109	80 - 120	<0.0020	mg/L				
5831797	Total Silver (Ag)	2018/11/12	100	80 - 120	97	80 - 120	<0.00010	mg/L	NC	20		
5831797	Total Tin (Sn)	2018/11/12	104	80 - 120	101	80 - 120	<0.0010	mg/L	NC	20		
5831797	Total Titanium (Ti)	2018/11/12	99	80 - 120	101	80 - 120	<0.0050	mg/L	NC	20		
5831797	Total Vanadium (V)	2018/11/12	97	80 - 120	96	80 - 120	<0.00050	mg/L	13	20		
5831797	Total Zinc (Zn)	2018/11/12	100	80 - 120	101	80 - 120	<0.0050	mg/L	3.2	20		
5832393	Phenols-4AAP	2018/11/13	101	80 - 120	102	80 - 120	<0.0010	mg/L	NC	20		
5832812	Total Cyanide (CN)	2018/11/13	103	80 - 120	100	80 - 120	<0.0050	mg/L	NC	20		
5833748	Total Oil & Grease	2018/11/13			99	85 - 115	<0.50	mg/L	3.9	25		
5833755	Total Oil & Grease Mineral/Synthetic	2018/11/13			96	85 - 115	<0.50	mg/L	2.7	25		
5836000	Mercury (Hg)	2018/11/14	99	75 - 125	105	80 - 120	<0.0001	mg/L	NC	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Anastassia Hamanov, Scientific Specialist

Sirimathie Aluthwala, Campobello Micro

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

MICRO

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel (905) 817-5700 Toll-free 800-563-6266 Fax (905) 817 5777 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE TO:
Company Name: #9197 Stantec Consulting Ltd
Attention: Accounts Payable
Address: 300 Hagey Blvd Suite 100
Waterloo ON N2L 0A4
Tel: (519) 579-4410 Fax: (519) 579-6733
Email: SAPinvoices@Stantec.com

REPORT TO:
Company Name:
Attention: Grant Whitehead
Address:
Tel: (519) 585-7400 Fax: (519) 579-4239
Email: grant.whitehead@stantec.com

PROJECT INFORMATION:
Quotation #: B77373
P.O. #: 400
Project: 161413684
Project Name:
Site #:
Sampled By: Drew Smith

Laboratory Use Only:
Maxxam Job #:
Bottle Order #: 686036
COC #: C#686036-01-01
Project Manager: Augustyna Dobosz

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agr/Other ☐ For RSC
☐ Table ___

Other Regulations
☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ________
☒ PWQO
☒ Other ODWS

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ______

Turnaround Time (TAT) Required
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required ________ Time Required ________ ☐
Rush Confirmation Number ________ (call lab for #)

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle) [✓ Metals] / Hg / Cr VI	RCAp - Comprehensive	Total Suspended Solids	The City of Guelph Sanitary and Storm Sewer Bylaw	Total metals (not filtered)	# of Bottles	Comments
1		WG-161413684-20181108-DP1	2018/11/08	11:30	GW	X			X	X	11	Total metals and dissolved metals
2		WG-161413684-20181108-DS03	2018/11/08	12:40	GW	X	X	X			5	
3		WG-161413684-20181108-DS03		13:15	GW	X	X	X			5	
4		WG-161413684-20181108-DS04		13:20	GW	X	X	X			5	
5		WG-161413684-20181108-DS05		13:45	GW	X	X	X			5	
6												
7												
8												
9												
10												

08-Nov-18 14:50
Augustyna Dobosz
B8T9171
CA2 ENV-961

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Drew Smith	18/11/08	15:00	[illegible]	2018/11/08	16:50	
			[illegible]	2018/11/08	17:55	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	0 0 0	Present		✓
		Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

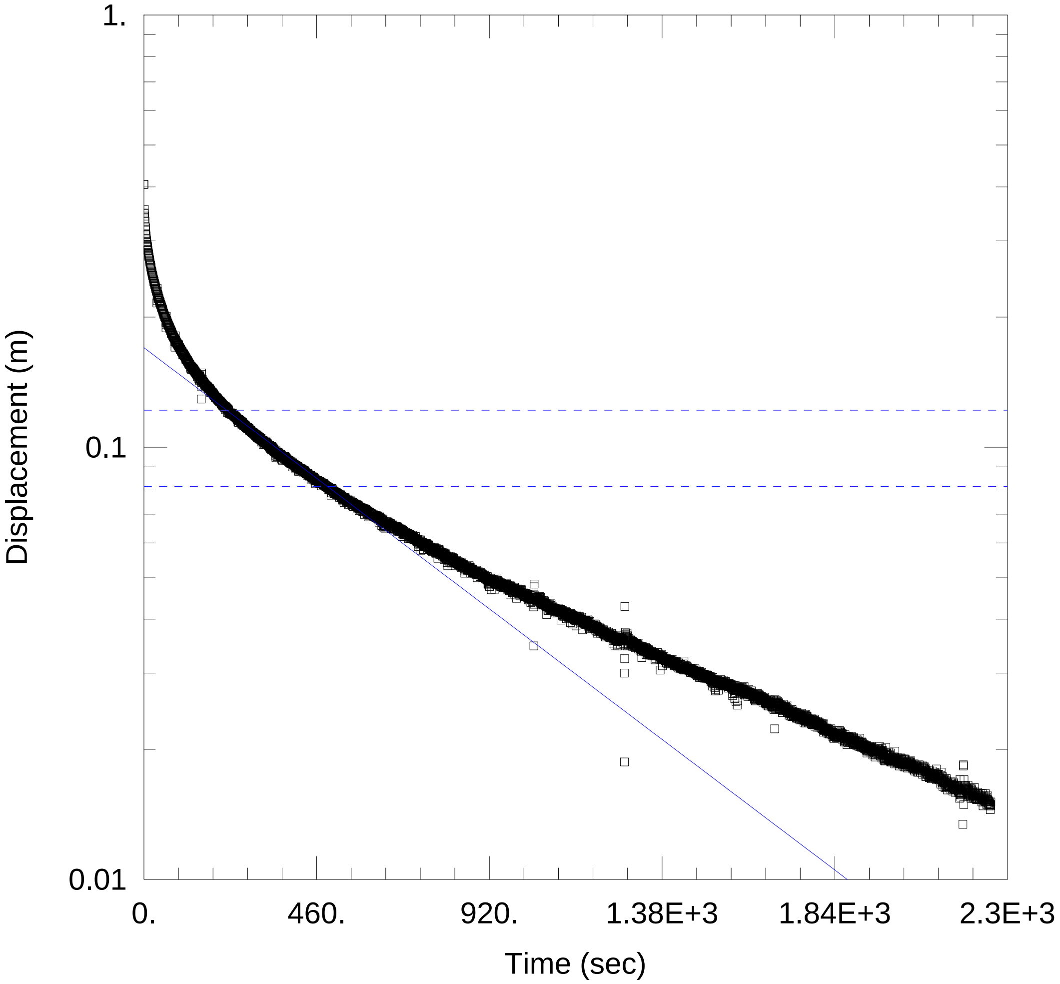
White: Maxxam Yellow: Client

37021

6/3/4 ice

Maxxam Analytics International Corporation o/a Maxxam Analytics

APPENDIX G:
HYDRAULIC CONDUCTIVITY ANALYTICAL SOLUTIONS



MW2-18

Data Set: \...\161413684_MW2-18_20180803_DS_JK.aqt
Date: 11/21/18 Time: 15:25:14

PROJECT INFORMATION

Company: Stantec
Project: 161413684
Location: Guelph, Ontario
Test Well: MW2-18
Test Date: 2018/07/27

AQUIFER DATA

Saturated Thickness: 2.44 m
Anisotropy Ratio (Kz/Kr): 0.5

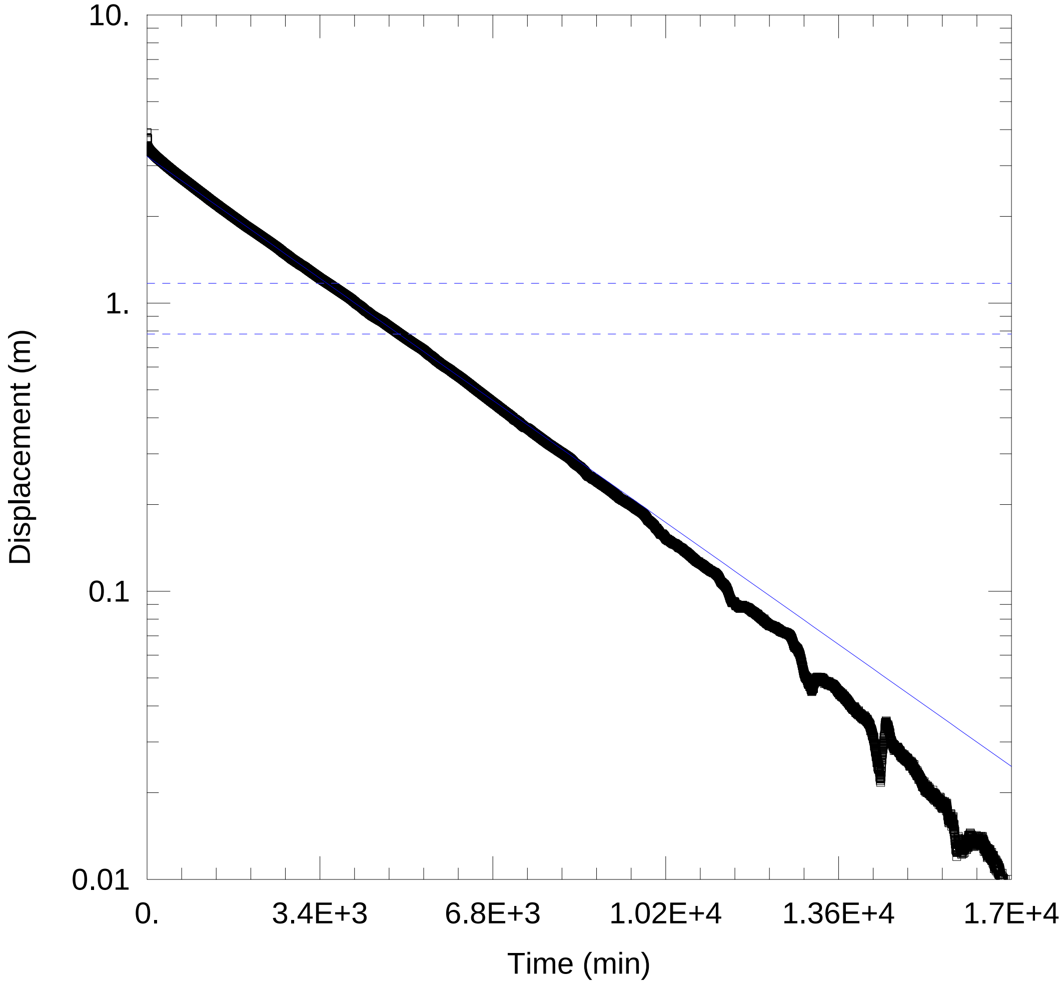
WELL DATA (MW2-18)

Initial Displacement: 0.4056 m
Static Water Column Height: 7.29 m
Total Well Penetration Depth: 2.44 m
Screen Length: 2.44 m
Casing Radius: 0.0254 m
Well Radius: 0.105 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 4.7E-7 m/sec
y0 = 0.1699 m



MW3-18

Data Set: \...\161413684_MW3-18_DS_JK.aqt
Date: 11/21/18 Time: 16:06:39

PROJECT INFORMATION

Company: Stantec
Project: 161413684
Location: Kitchener, ON
Test Well: MW3-18
Test Date: 2018/07/27

AQUIFER DATA

Saturated Thickness: 6.91 m
Anisotropy Ratio (Kz/Kr): 0.3

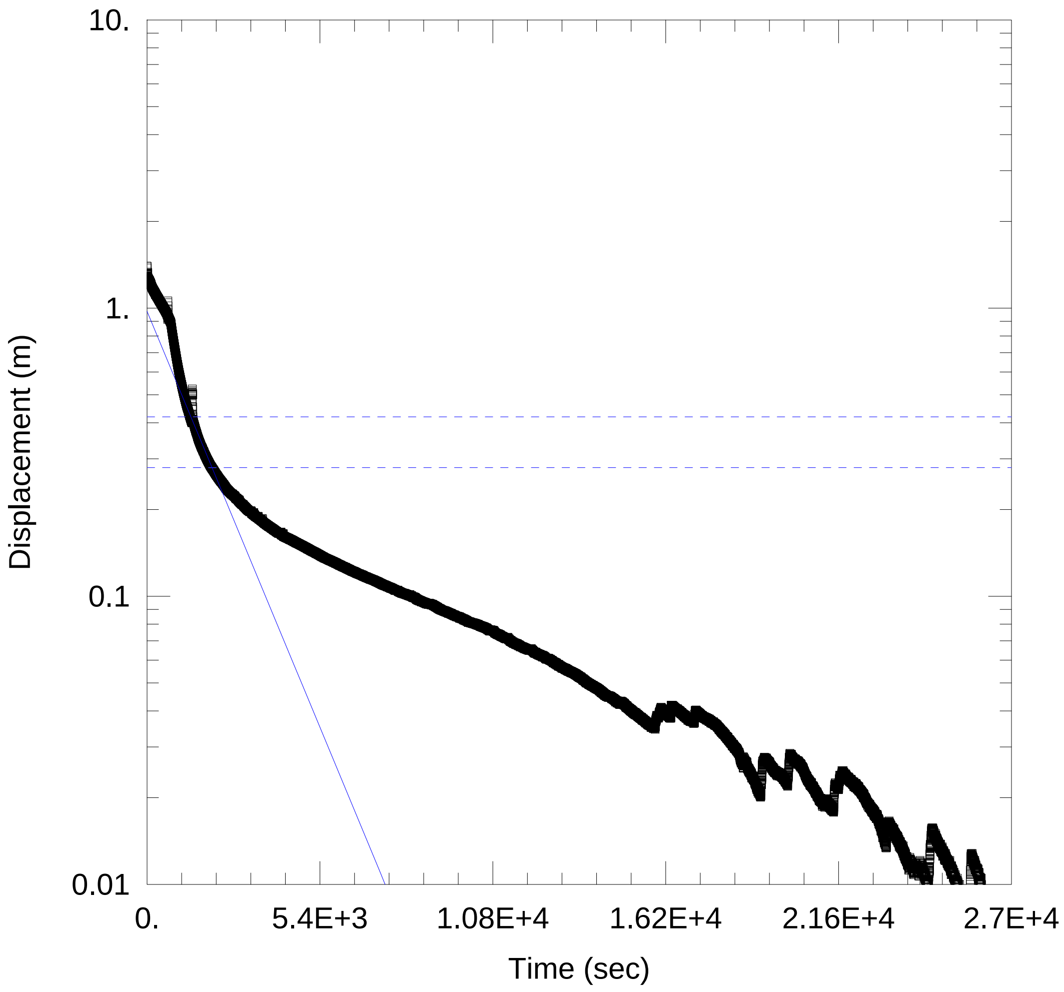
WELL DATA (MW3-18)

Initial Displacement: 3.902 m
Static Water Column Height: 6.375 m
Total Well Penetration Depth: 6.325 m
Screen Length: 3.05 m
Casing Radius: 0.0254 m
Well Radius: 0.105 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.6E-9 m/sec
y0 = 3.231 m



MW4-18S

Data Set: \...\161413684_MW4-18S_DS_JK.aqt
Date: 11/22/18 Time: 10:00:42

PROJECT INFORMATION

Company: Stantec
Project: 161413684
Location: Kitchener, ON
Test Well: MW4-18S
Test Date: 2018/07/27

AQUIFER DATA

Saturated Thickness: 10.41 m
Anisotropy Ratio (Kz/Kr): 0.3

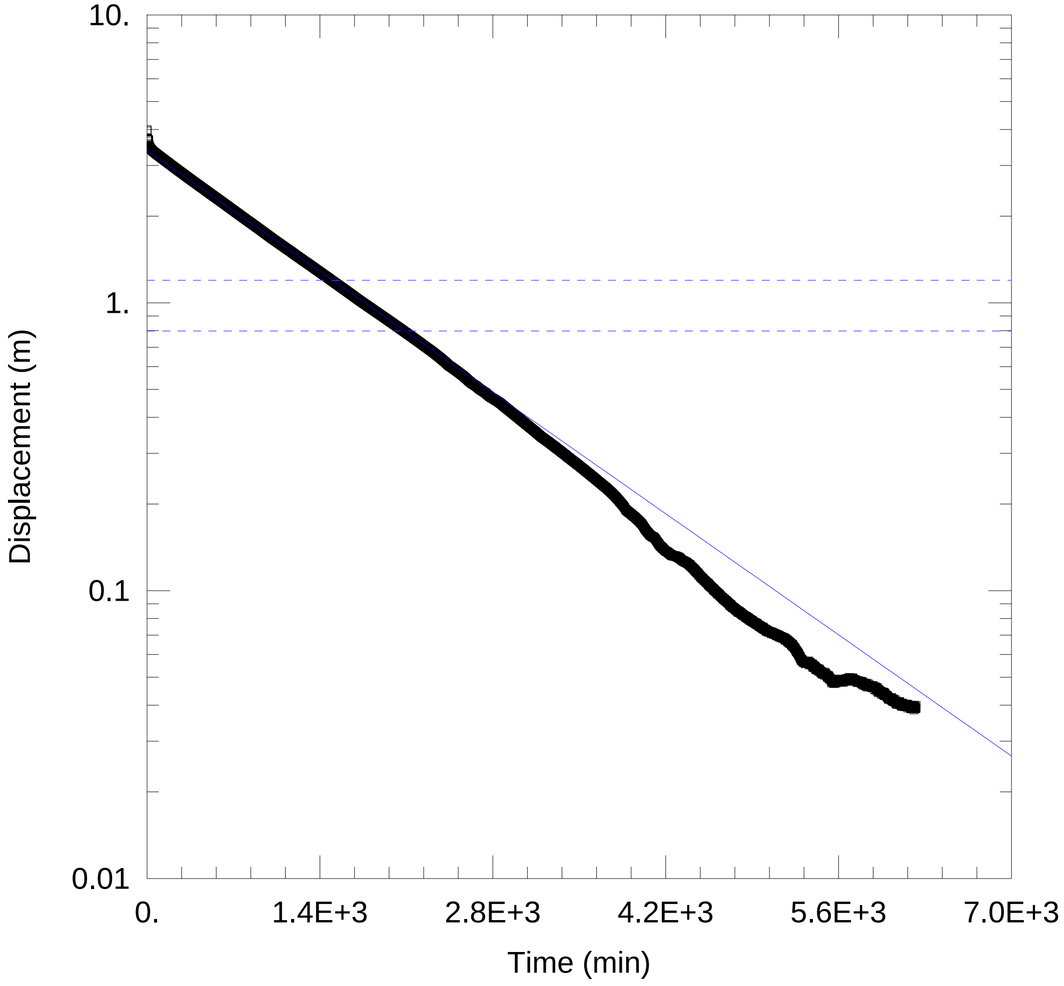
WELL DATA (MW4-18S)

Initial Displacement: 1.398 m
Static Water Column Height: 4.105 m
Total Well Penetration Depth: 4.155 m
Screen Length: 3.05 m
Casing Radius: 0.0254 m
Well Radius: 0.105 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.8E-7 m/sec
y0 = 0.9741 m



MW4-18D

Data Set: \...\161413684_MW4-18D_confined_DS_JK.aqt
Date: 11/22/18 Time: 09:54:50

PROJECT INFORMATION

Company: Stantec
Project: 161413684
Location: Kitchener, ON
Test Well: MW4-18D
Test Date: 2018/07/27

AQUIFER DATA

Saturated Thickness: 3.63 m
Anisotropy Ratio (Kz/Kr): 0.3

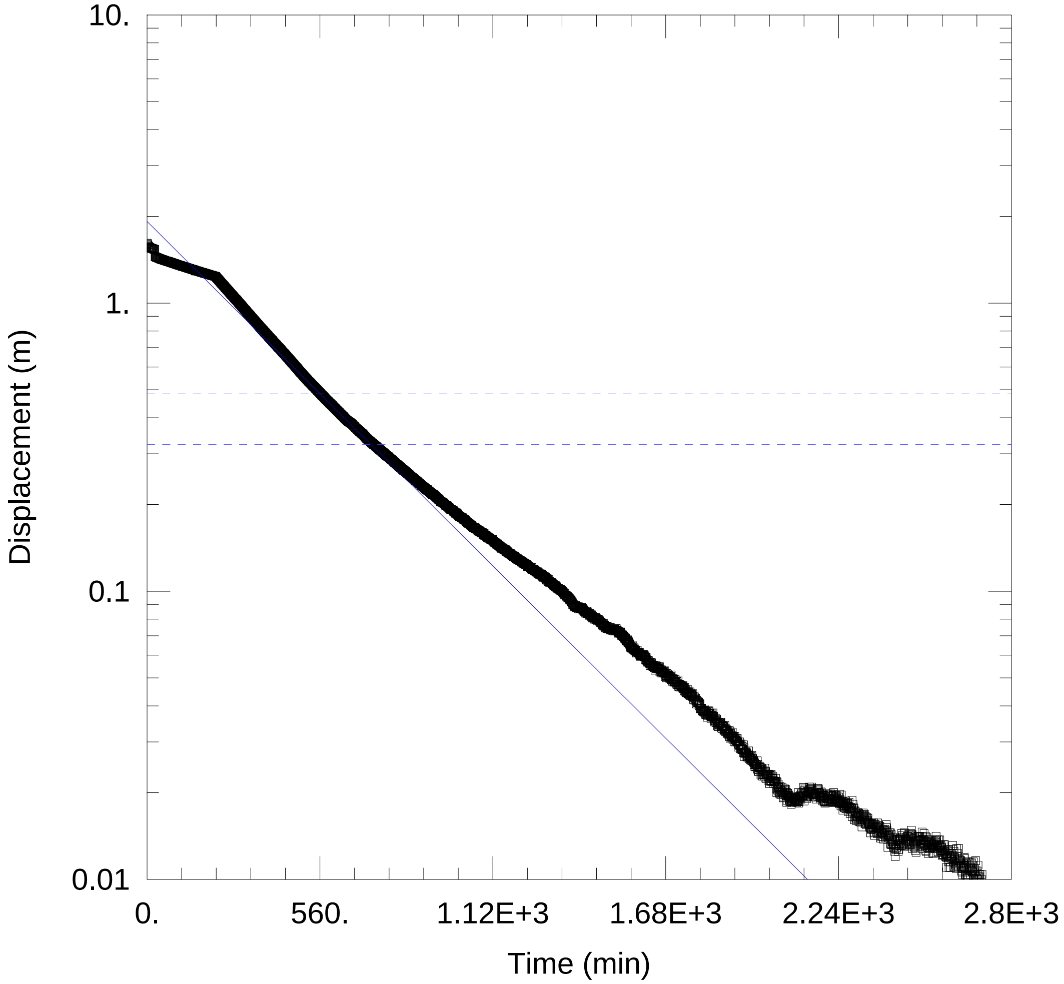
WELL DATA (MW4-18D)

Initial Displacement: 3.99 m
Static Water Column Height: 8.185 m
Total Well Penetration Depth: 3.05 m
Screen Length: 3.05 m
Casing Radius: 0.0254 m
Well Radius: 0.105 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.4E-9 m/sec
y0 = 3.387 m



MW5-18S

Data Set: \...\161413684_MW5-18S_DS_JK.aqt
Date: 11/21/18 Time: 16:35:11

PROJECT INFORMATION

Company: Stantec
Project: 161413684
Location: Guelph, ON
Test Well: MW5-18S
Test Date: 2018/07/27

AQUIFER DATA

Saturated Thickness: 12.16 m Anisotropy Ratio (Kz/Kr): 0.3

WELL DATA (MW5-18S)

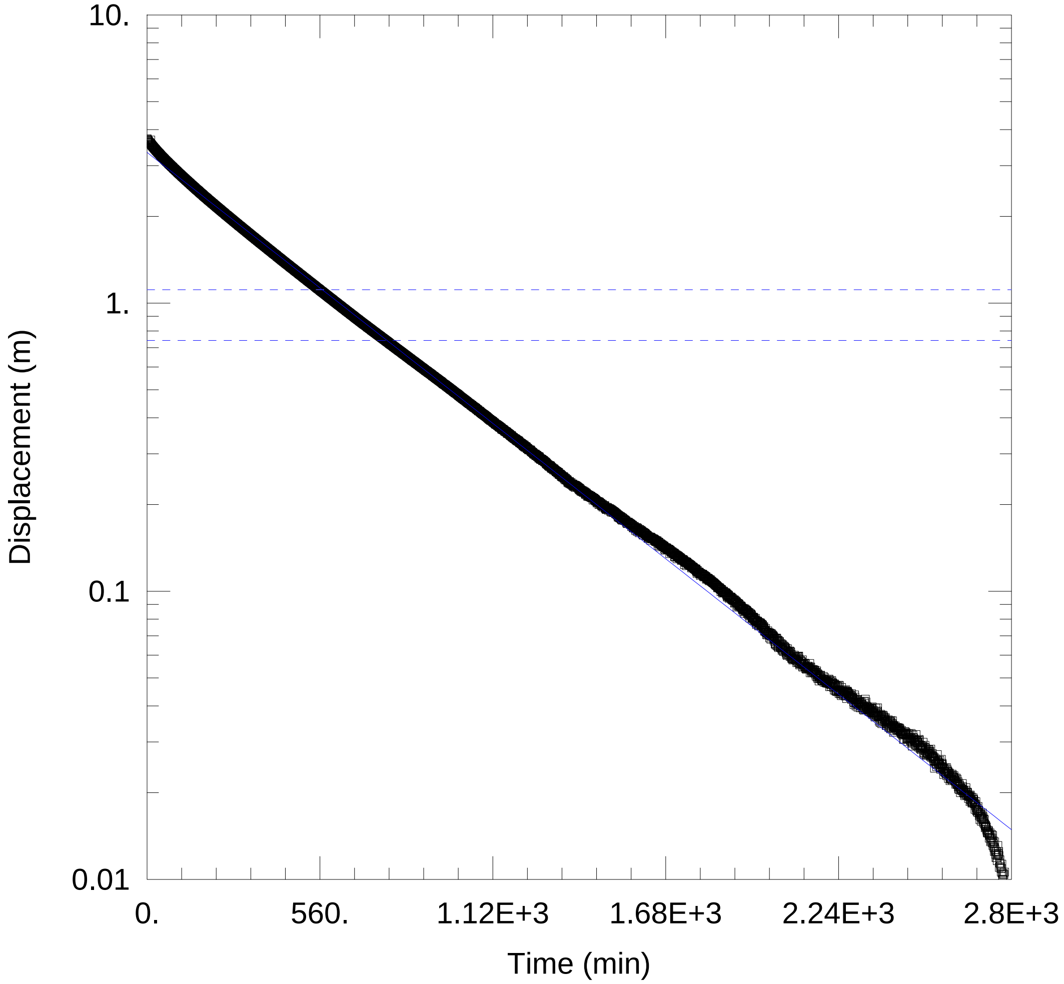
Initial Displacement: 1.613 m
Total Well Penetration Depth: 4.35 m
Casing Radius: 0.0254 m

Static Water Column Height: 4.35 m
Screen Length: 3.05 m
Well Radius: 0.105 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.2E-8 m/sec y0 = 1.92 m



MW5-18D

Data Set: \...\161413684_MW5-18D_DS_JK.aqt
Date: 11/21/18 Time: 16:34:37

PROJECT INFORMATION

Company: Stantec
Project: 161413684
Location: Kitchener, ON
Test Well: MW5-18D
Test Date: 2018/07/27

AQUIFER DATA

Saturated Thickness: 9.015 m
Anisotropy Ratio (Kz/Kr): 0.3

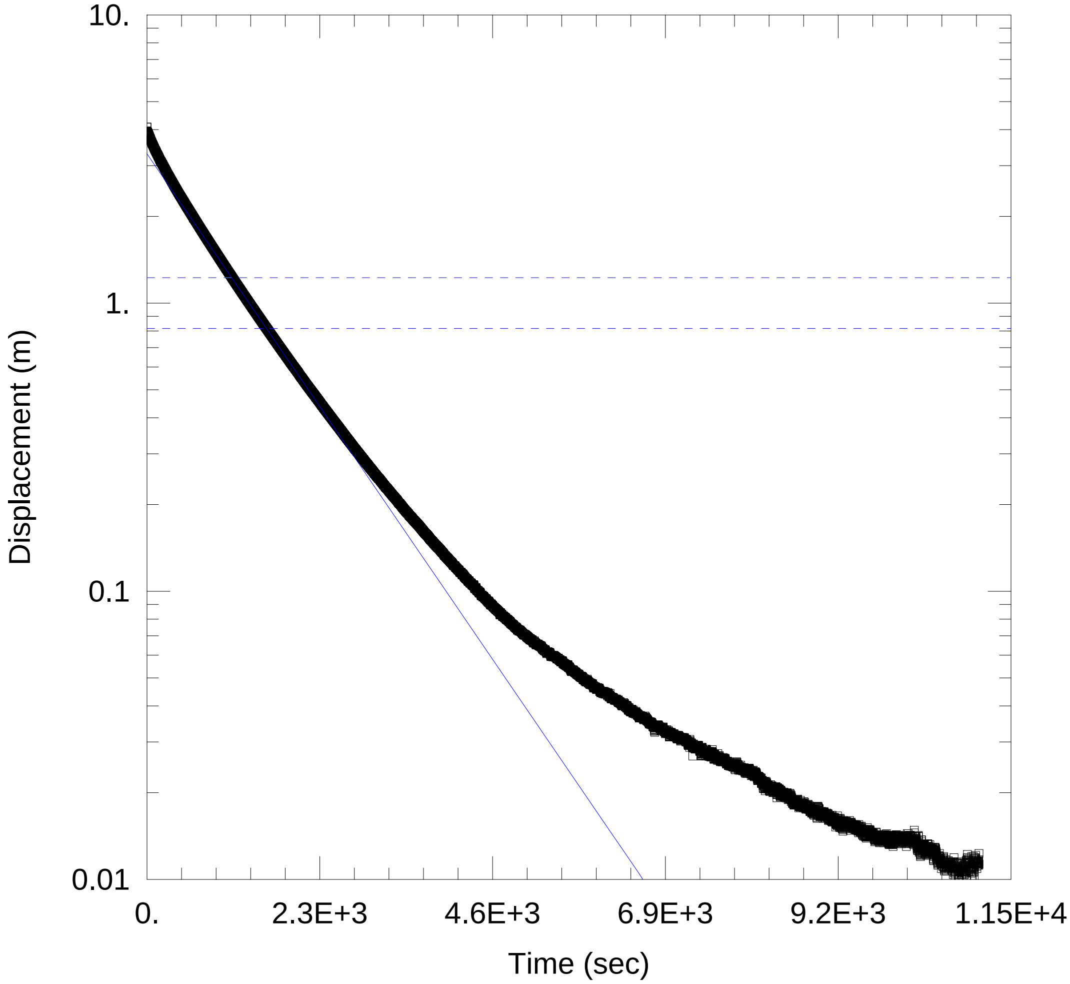
WELL DATA (MW5-18D)

Initial Displacement: 3.711 m
Static Water Column Height: 8.455 m
Total Well Penetration Depth: 8.459 m
Screen Length: 1.524 m
Casing Radius: 0.0254 m
Well Radius: 0.105 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 2.0E-8 m/sec
y0 = 3.333 m



MW6-18

Data Set: \...\161413684_MW6-18_20180807_DS_JK.aqt
Date: 11/21/18
Time: 16:37:22

PROJECT INFORMATION

Company: Stantec
Project: 161413684
Location: Guelph, Ontario
Test Well: MW6-18
Test Date: 2018/07/26

AQUIFER DATA

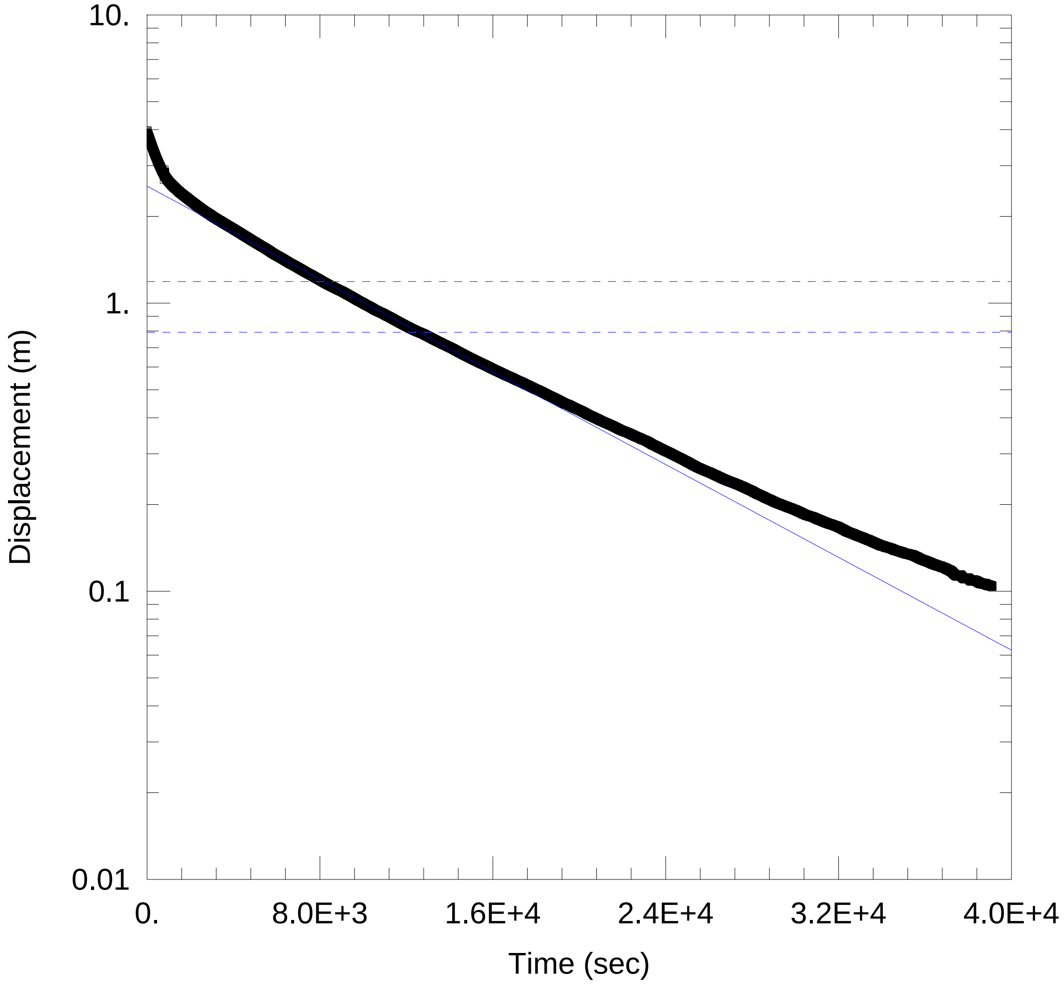
Saturated Thickness: 8.545 m
Anisotropy Ratio (Kz/Kr): 0.3

WELL DATA (MW6-18)

Initial Displacement: 4.08 m
Static Water Column Height: 7.94 m
Total Well Penetration Depth: 7.964 m
Screen Length: 1.524 m
Casing Radius: 0.0254 m
Well Radius: 0.105 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 5.4E-7 m/sec
y0 = 3.297 m



MW7-18

Data Set: \...\161413684_MW7-18_20180803_DS_JK.aqt
Date: 11/21/18 Time: 16:42:06

PROJECT INFORMATION

Company: Stantec
Project: 161413684
Location: Guelph, Ontario
Test Well: MW7-18
Test Date: 2018/07/26

AQUIFER DATA

Saturated Thickness: 8.64 m
Anisotropy Ratio (Kz/Kr): 0.3

WELL DATA (MW7-18)

Initial Displacement: 3.961 m
Static Water Column Height: 8.195 m
Total Well Penetration Depth: 8.219 m
Screen Length: 1.524 m
Casing Radius: 0.0254 m
Well Radius: 0.105 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.8E-8 m/sec
y0 = 2.545 m

APPENDIX H:
DEWATERING CALCULATIONS

Table H1 - Groundwater Dewatering Calculations

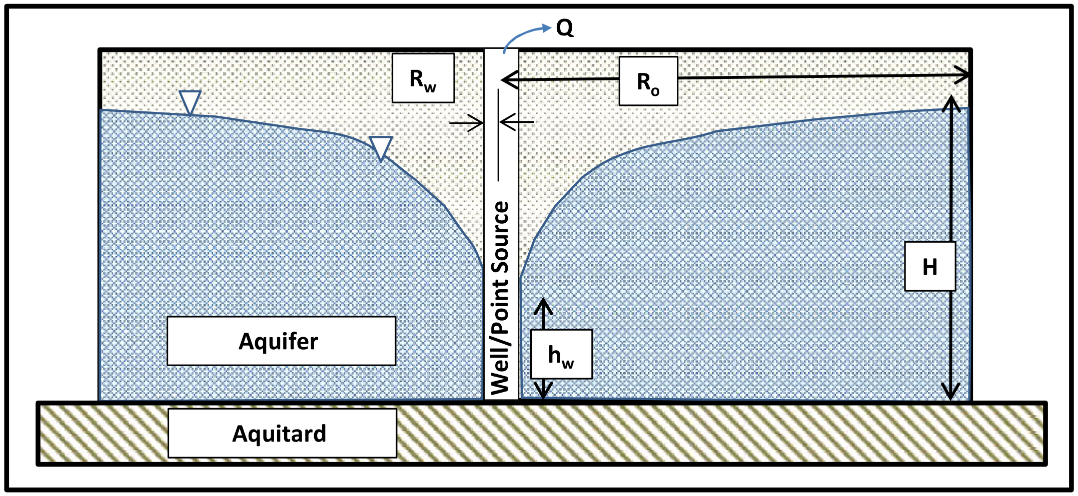
Dupuit Forcheimer Equation for Radial Flow to a Well or Point Source Excavation in an Unconfined Aquifer:

$$Q = \frac{\pi K\left(H^2 - {h_w}^2\right)}{ln\,\frac{R_o}{r_w}}$$

Where:

Q = pumping rate (m^3/s)
K = hydraulic conductivity (m/s)
H = hydraulic head of the original water table (m)
h_w = hydraulic head at maximum dewatering (m)
R_o = radius of influence from centre of the excavation caused by pumping (m)
r_w = equivalent radius of dewatering area / theoretical radius of pumping well (m)

Conceptual Drawdown



The equivalent radius of influence (R_o) is approximated using the Sichart and Kryieleis method:

$$R_o = r_w + 3000(H - h_w)\sqrt{K}$$

The term r_w is calculated as follows:

$$r_w = \sqrt{\frac{area}{\pi}}$$

Where: area = area of excavation (m^2)

Calculations:

K = 3.7E-08 m/s
H = 20.3 m
h_w = 14.7 m
R_o = 63.6 m
r_w = 60.4 m

Q= 0.00043649 m^3/s
37,713 L/day

Saftey Factor = 3.0

Safety Factor Adjusted Volume
113,138 L/day

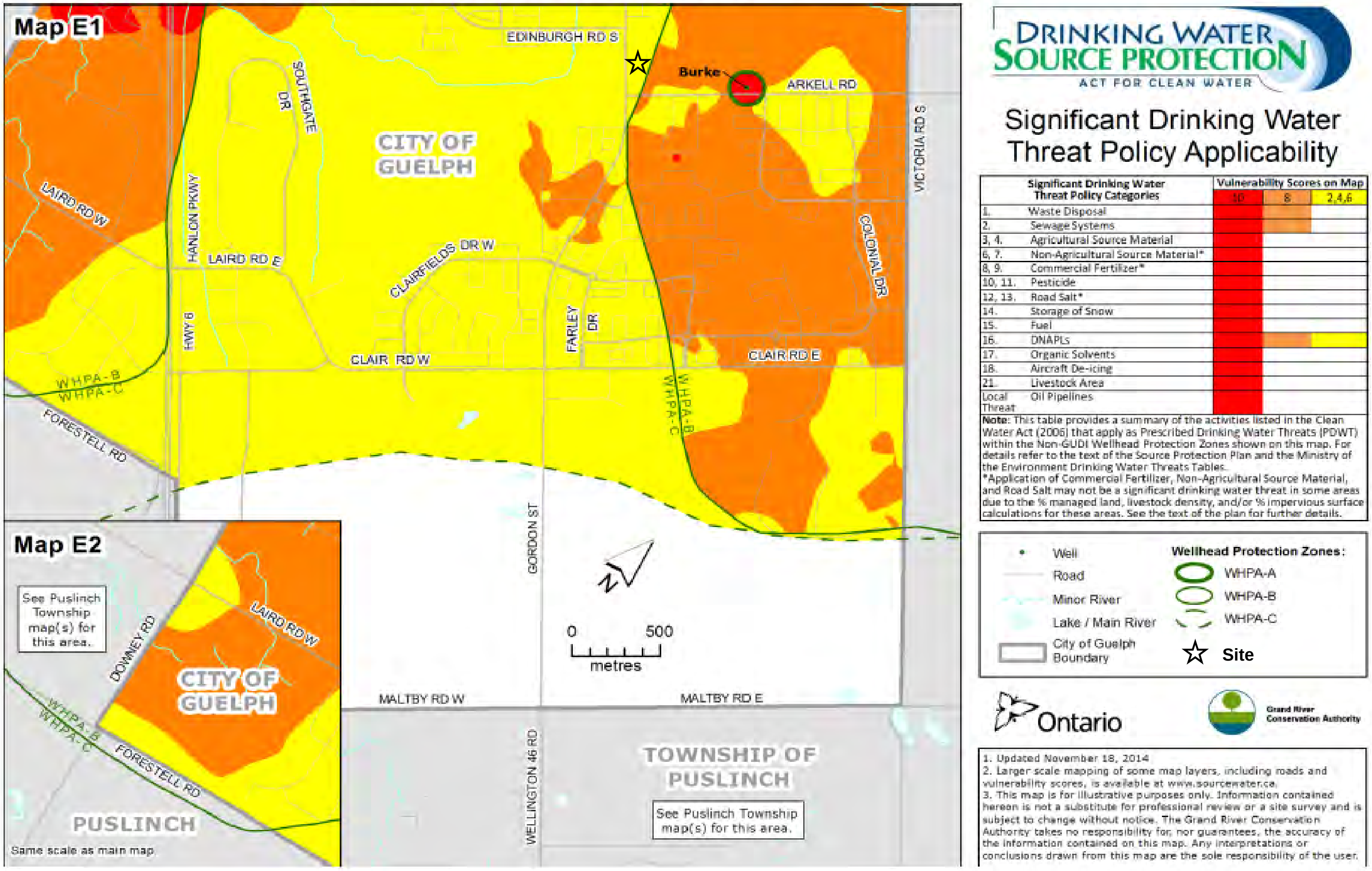
Dewatering radius of influence beyond edge of dewatering area = 3.2 m

Base of Aquifer	320	m AMSL		approximate elevation at which bedrock is encountered beneath the Site
Static Water Level	340.3	m AMSL		highest groundwater elevation measured in onsite monitoring wells
Elevation requiring dewatering	334.7	m AMSL	5.6	meters of groundwater height to be lowered (base elevation of Parking Level 2)

Equations obtained from Powers, J.P., A.B. Corwin, P.C. Schmall, and W.E. Kaeck, 2007. Construction Dewatering and Groundwater Control, New Methods and Applications. John Wiley & Sons, Inc., 3rd Edition.

APPENDIX I:
SOURCE PROTECTION PLAN - THREAT POLICY APPLICABILITY MAPPING

8.12 Schedule F: City of Guelph: Guelph Waterworks Well Supply, Map E



Significant Drinking Water Threat Policy Applicability

Significant Drinking Water Threat Policy Categories		Vulnerability Scores on Map		
		10	8	2,4,6
1.	Waste Disposal	🟥	🟧	
2.	Sewage Systems	🟥	🟧	
3, 4.	Agricultural Source Material	🟥		
6, 7.	Non-Agricultural Source Material*	🟥		
8, 9.	Commercial Fertilizer*	🟥		
10, 11.	Pesticide	🟥		
12, 13.	Road Salt*	🟥		
14.	Storage of Snow	🟥		
15.	Fuel	🟥		
16.	DNAPLs	🟥	🟧	🟨
17.	Organic Solvents	🟥		
18.	Aircraft De-icing	🟥		
21.	Livestock Area	🟥		
Local Threat	Oil Pipelines	🟥		

Note: This table provides a summary of the activities listed in the Clean Water Act (2006) that apply as Prescribed Drinking Water Threats (PDWT) within the Non-GUDI Wellhead Protection Zones shown on this map. For details refer to the text of the Source Protection Plan and the Ministry of the Environment Drinking Water Threats Tables.

*Application of Commercial Fertilizer, Non-Agricultural Source Material, and Road Salt may not be a significant drinking water threat in some areas due to the % managed land, livestock density, and/or % impervious surface calculations for these areas. See the text of the plan for further details.

1. Updated November 18, 2014
2. Larger scale mapping of some map layers, including roads and vulnerability scores, is available at www.sourcewater.ca.
3. This map is for illustrative purposes only. Information contained hereon is not a substitute for professional review or a site survey and is subject to change without notice. The Grand River Conservation Authority takes no responsibility for, nor guarantees, the accuracy of the information contained on this map. Any interpretations or conclusions drawn from this map are the sole responsibility of the user.

Source: Lake Erie Region Source Protection Committee. 2015b. Grand River Source Protection Area, Approved Source Protection Plan – Volume II. November 26, 2015.

APPENDIX J:
CORRESPONDENCE WITH CITY OF GUELPH

17 October 2018

Sent via email

Melissa Straus, MSc.
Terrestrial Ecologist
Stantec
1-70 Southgate Drive
Guelph ON
N1G 4P5

Dear Melissa,

RE: 1242, 1250 and 1260 Gordon Street and 9 Valley Road EIS TOR

City of Guelph Environmental Planning and Park Planning staff reviewed the proposed Environmental Impact Study (EIS) Terms of Reference (TOR) prepared by Stantec, dated July 19, 2018. Park Planning staff provided comments to Environmental Planning Staff on September 7, 2018. The Grand River Conservation Authority (GRCA) also provided comments on the EIS TOR on October 17, 2018 via email. All comments received to date are integrated below and appended to this letter.

On September 12, 2018 the EIS TOR was brought forward to the Environmental Advisory Committee (EAC) and the TOR was accepted with conditions.

Subwatershed Context:

1. The EIS TOR should indicate that the lands fall partially within the Hanlon Creek Subwatershed and partially within the Torrance Creek Subwatershed. As part of the background review, the Torrance Creek Subwatershed Study and Hanlon Creek Subwatershed Study should be referred to. These subwatershed studies include targets and recommendations that should also be considered in the EIS.
2. The hydrology of the adjacent Provincially Significant Wetland (PSW) should be characterized and an associated water balance for the natural feature should be prepared as part of a Hydrogeological Report to support the EIS, in addition to the water budget that forms part of the Stormwater Management Report. This should include consideration for any groundwater impacts from underground parking, where proposed. Incorporation of Low Impact Development (LID) as part of the stormwater management (SWM) approach is also encouraged to assist with achieving a water balance for the site, and maintaining infiltration and recharge functions.

Hydrological / Hydrogeological Study to support EIS

3. It is not clear where or what type of instrumentation will be used to characterize existing conditions and assess the wetland water balance. In terms of data collection, staff would like to see continuous data loggers installed in piezometers. Also, ensure wetland catchments are delineated and depicted to set the context and that the analysis is provided on a

monthly as well as annual basis. Please interpret the data in terms of the pre-to-post wetland water balance.

4. The Hydrogeological Study should identify groundwater levels to inform the required separation distance for the development from the groundwater table.
5. Consideration should also be given to the protection of groundwater functions, including recharge. Also review and consider any other recommendations or requirements from the Torrance Creek Subwatershed Study within the EIS.
6. Results from the Hydrological Study should be integrated into the EIS to assess the potential for hydrologic impacts to the adjacent wetland.

Preliminary Screening Assessment for Significant Wildlife Habitat:

7. April 2017 guidance from the Ministry of Natural Resources and Forestry (MNRF) Guelph District on survey protocols for identifying suitable maternity roost trees indicate that surveys should be completed during leaf-on condition for Tri-colored Bat (*Perimyotis subflavus*) which roost in dead/dying leaves along a dead branch, and during leaf-off condition for Little Brown Myotis/Northern Myotis (*Myotis lucifugus*/*M. septentrionalis*) which roost in tree hollows and cracks. Field surveys are proposed in May to assess Bat Roost Habitat, and should also be proposed during leaf-off condition. Note that surveys in May should be completed in late May to ensure that leaves have in fact developed.
8. Note that where surveys for SWH are not proposed, staff expect a conservative approach to be taken in the EIS which acknowledges candidate SWH and identifies constraints based on the precautionary principle.
9. The EIS TOR indicates that candidate SWH is present for Reptile Hibernaculum. Clarification is needed as to what field surveys for wildlife habitat assessment entail. It is unclear whether or not snake exit surveys and/or snake surveys are proposed.
10. Candidate SWH is also identified for Woodland Raptor Nesting Habitat. Clarification is needed as to whether or woodland raptor nesting surveys are proposed as part of surveys for wildlife habitat.
11. Note that deer movement occurs along the edge of the PSW (as observed through other EISs) as well as across Gordon Street (as indicated in the Natural Heritage Strategy). Table 1 should be updated to reflect this information.

EIS Field Surveys:

12. Location of field surveys, such as breeding bird point count locations and amphibian monitoring stations should be provided on a study area map.
13. MNRF has identified the Torrance Creek PSW as a deer winter congregation area. The habitat should be characterized and impacts assessed through the EIS. In addition, staff request that movement of deer be studied on the subject lands using wildlife cameras to assess movement in the east-west and north-south direction.
14. Clarification on the timing (e.g. spring emergence, first/second breeding bird window), conditions and search effort proposed for wildlife surveys, species of special concern and rare species searches is necessary.
15. Vegetation community mapping should also indicate woodland staking with City staff as a requirement.

16. Spring botanical inventories should ideally be completed in early May. Waiting until June will miss early spring ephemerals, which will have senesced by June.
17. Vegetation community descriptions should include description of soils, per the Ecological Land Classification (ELC) protocol.
18. Table 1 indicates that incidental observations of terrestrial crayfish will be recorded. Clarify where searches for terrestrial crayfish will be performed (i.e. target habitats).
19. Regarding Species of Conservation Concern/Locally Rare Species, it should be noted that City records show that American Bullfrog (*Lithobates catesbeianus*) and Meadow Horsetail (*Equisetum pretense*) have been recently documented in the Torrance Creek Subwatershed.
20. Section 4.2.1.2 Vascular Plants should be revised to indicate that a three-season botanical inventory will be completed.
21. Note that formal wetland boundary and woodland boundary delineation with agencies is required.
22. With respect to area sensitive breeding bird habitat, based on results from multiple EISs completed in this area of the City, it has been confirmed that the Torrance Creek PSW is SWH for area-sensitive breeding bird habitat. The proposed studies should assess the use of habitat edges and areas in relation to the site in order to assess potential impacts.

Tree Inventory and Preservation Plan:

23. The subject lands are regulated under the City’s Private Tree By-law and any tree removals will require authorization from the City. The EIS should inform the development application and should look for opportunities to retain trees and integrate them into the development proposal, where feasible. A Tree Inventory and Preservation Plan (TIPP), undertaken by a qualified arborist, is required and should be integrated into the EIS. The TIPP should include the following:
    - Tree inventory information for all trees 10cm Diameter at Breast Height (DBH) or greater proposed to be removed/retained including: Tree # corresponding to plan/drawing, species name, DBH, crown diameter, condition (vigour), remarks, recommended action and rationale.
    - Identify shared, public and private trees with crowns that are within 6m of property lines.
    - Identify opportunities for protection, enhancement and restoration of trees within the Urban Forest.
    - Tree Protection Fencing locations and/or other tree protection/mitigation measures.
24. The TIPP should also note that where preservation is not possible, as agreed to by the City, compensation is required. Note that the City seeks compensation at a 3:1 replacement ratio. Where replacement plantings are not achievable cash-in-lieu may be accepted at a rate of $500 for each damaged or destroyed tree.

EIS Data Analysis

25. The EIS TOR should indicate that where candidate or confirmed SWH exists, staff would like to see it mapped in the EIS.

26. The City of Guelph Local Species List should be consulted when doing the impact analysis and the species lists should include a column to indicate any locally significant species.
27. Deer movement patterns that occur on the subject lands should be mapped in the EIS, and all data collected from wildlife cameras and field studies should be provided.

Impact Analysis:

28. A buffer analysis should be included within the impacts assessment/avoidance discussion. While the City's OP does include policies for minimum buffers, the establishment of larger buffers warrants consideration in the EIS and is also reflected in the City's OP policies.
29. The proposed development concept needs to consider the trail connection across the site. The EIS should explore alternatives for a trail alignment and assess impacts associated with each alignment. Staff should be consulted for further direction on this item.
30. The setbacks and buffers assigned to the development should factor in the community trail that will be built, even though the trail will ultimately be completed by the City.
31. Opportunities for protection, enhancement and restoration of trees within the Urban Forest should also be identified.
32. The impact analysis should mention potential impacts and/or mitigation measures to address salt application.
33. It is acknowledged that the EIS will include a more defined concept of the proposed development plan in order to assess potential impacts resulting from grading, roads, SWM, etc.

Recommended Mitigation Measures:

34. The EIS should also recommend mitigation measures including environmental education and outreach opportunities, demarcation and any recommendations for monitoring plans.
35. The monitoring plan should include post-construction monitoring of SWM design, LID measures and mitigation.
36. An Environmental Implementation Report (EIR) will be required for this development. Environmental Planning staff have found it helpful to document considerations for the EIR in the EIS.

Park Planning Comments (see attached Memo):

37. Provide a revised development concept plan indicating all the proposed elements including public park, east-west and north-south public trail, Active Transportation Network (ATN) and open space in consultation with City staff.
38. Park planning staff would like to walk the site along with the environmental consultant and environmental planning staff to identify and approve a preliminary trail alignment. The approved trail alignment will be flagged on site. Identify the final trail alignment west of Torrance Creek PSW, through EIS and flag the trail route on site for City's review.
39. Trail design including surfacing, clear width and height, grading and drainage, trail signage, etc. should be provided in consultation with Park Planning staff. The design and development of the trail system should be completed in accordance with the city's Facility Accessibility Design

Manual, the city's current trail design and development practice and standards, and ATN standards.

40. Assess the environmental impact of the proposed trail development in the EIS.
41. Recommend measures to mitigate the environmental impact due to the proposed trail development in the EIS.
42. Recommend management of the woodland along the trail route including removal of invasive species and hazard trees in the EIS.
43. Recommend preparation of an EIR, Trail and Landscape Drawings through EIS to detail design an appropriate trail system and associated mitigation measures in accordance with the city's design and development standards.
44. Provide preliminary grading and drainage plans to demonstrate that the design of the park block, trail connection and open space meets city standards.
45. The owner will be responsible for implementation of city approved landscape plans in accordance with the EIR including, but not limited to restoration, compensation and enhancement planting within the open space.
46. Describe the recommended approach to demarcate existing and proposed public park and open spaces, if any, within and adjacent to the subject property.
47. Recommend provision of public education through educational/interpretive signage at the entry points to the trail and open space system. Public education should address the environmental sensitivity of natural heritage features and procedures residents can follow to protect and/or enhance these areas.
48. City will review and approve the design and locations of interpretive and educational signage, to be included on landscape plans.

Environmental Advisory Committee:
On September 12, 2018 the EIS TOR was brought forward to EAC and resulted in the following draft motion. Note that motions remain draft until such time that EAC formally adopts the minutes.

Staff recommends that the Environmental Advisory Committee accept the Terms of Reference for an Environmental Impact Study prepared by Stantec (July 19, 2018) with the following condition:
THAT a revised EIS TOR is provided which addresses staff comments and at a minimum includes:

- A study area map showing survey locations;
- A Tree Inventory and Preservation Plan;
- Clarification on surveys proposed for assessing significant wildlife habitat;
- Deer movement surveys using wildlife cameras;
- Commitment to utilize continuous data loggers to collect data to support a wetland water balance and a monthly analysis;
- Recommended mitigation measures for salt management; and
- Considerations for a future Environmental Implementation Report.
- A hydrogeological report that includes the following:
  - Infiltration testing using a Guelph Permeameter (or equivalent method) to support SWM planning;

- Hydrographs that include high water table data including the spring freshet and other storm and melt events. Groundwater data should be collected for a minimum of 1 year, with comparison to local precipitation data;
- It is also recommended that groundwater data be collected from the wetland area (pending access).

Do not hesitate to contact me further should you have any questions.

Regards,

Leah Lefler

Leah Lefler, MES
Environmental Planner

Planning, Urban Design and Building Services
Infrastructure, Development and Enterprise
City of Guelph: 1 Carden Street, Guelph

T 519-822-1260 x2362
F 519-822-4632
E leah.lefler@guelph.ca

cc Chris DeVriendt – Manager, Development Planning
Melissa Aldundate – Manager, Planning Policy and Urban Design
Mary Angelo – Supervisor, Development Engineering
Jyoti Pathak – Park Planner

INTERNAL MEMO

DATE	September 7, 2018
TO	**Leah Lefler**
FROM	Jyoti Pathak
DIVISION	Parks and Recreation
DEPARTMENT	Public Services
SUBJECT	**1242, 1250 and 1260 Gordon Street and 9 Valley Road – Proposed Terms of Reference for Environmental Impact Study –(File # TBD)**

Parks Planning and Development has reviewed the draft Terms of Reference (TOR) prepared by Stantec dated July 19, 2018 for an Environmental Impact Study (EIS) to be compiled in support of a draft plan of subdivision and Zoning By-Law and Official Plan Amendments for the proposed high density residential subdivision development on the subject property.

Location: The subject property is located on the east side of Gordon Street immediately south of Valley Road.

Development Proposal: The future development proposal will include a public street, public park, public trail/ ATN route, natural open space, residential apartments and townhouses. A pre-consultation meeting between the applicant and City staff was scheduled on Wednesday June 13, 2018 and a concept plan has been developed by the applicant. The site area is 3.67 hectares inclusive of natural heritage features and a developable area.

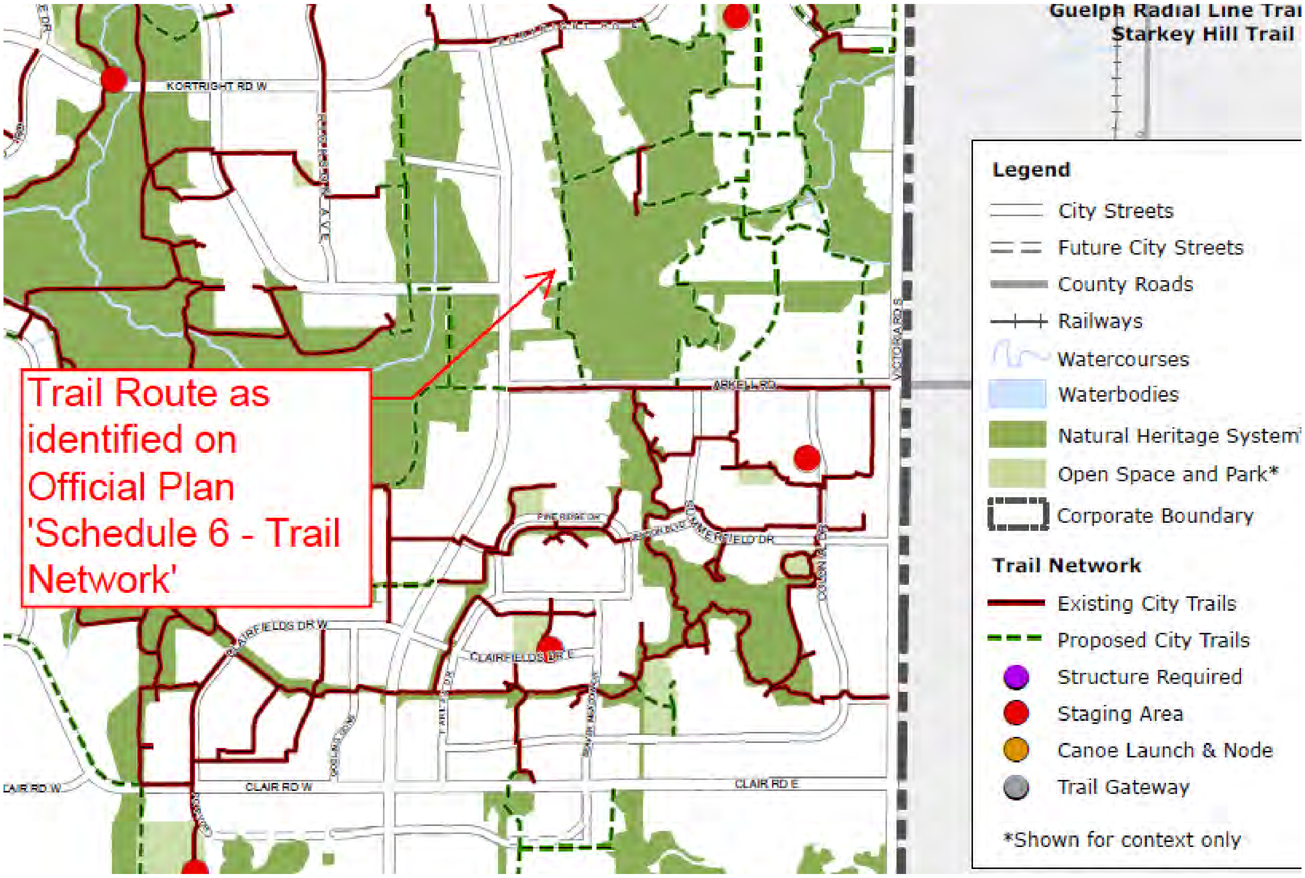
Background:

Parkland Dedication:
In accordance with the City's Official Plan Policy 7.3.5.1 (ii) parkland dedication is required for the proposed residential subdivision development. Park block frontage, size and configuration of the park will be determined in accordance with the neighbourhood park design criteria outlined in City's official Plan and Zoning By-Law. Park block would be located within developable area of the site and outside of the existing natural heritage system.

Guelph Trail Network:
Official Plan 'Schedule 6 - Trail Network' identifies a proposed north-south multi-use trail route from Brady Lane (south of Kortright Road East) to Arkell Road along the west side of Torrance Creek PSW Complex. The proposed multi-use trail would be used for walking, cycling, personal mobility devices etc.

Multi-Use Trail System / Active Transportation Route (AT Route) (north-south) from Arkell Road to Brady Lane west of the Torrance Creek provincially significant wetlands (PSW):
The trail system from Arkell Road to Brady Lane aligns with the active transportation route and serves both recreational and transportation purposes. This route is being detailed designed in segments through review of the past and current development applications. The trail route immediately north of the subject property was identified through site plan approval process of the existing Valley Road extension condominium and the trail property immediately south of the subject property has been secured through development approval process on 1280 and 1284 Gordon Street.

Multi-Use Trail / AT Route (east-west) from Gordon Street to the proposed Trail west of Torrance Creek PSW: Provide a direct, accessible, multi-use active transportation route from the Gordon Street to the proposed Multi Use Trail system.



Trail Route as identified on Official Plan 'Schedule 6 - Trail Network'

Active Transportation Route in yellow highlight

Parks Planning and Development offer the following comments:

1. **Development concept plan:**
   - Provide a revised development concept plan indicating all the proposed elements including public park, east-west and north-south public trail/ ATN route from Gordon Street to the and open space in consultation with City staff.

2. **Trail route alignment:**
   - Park planning staff would like to walk the site along with the environmental consultant and environmental planning staff to identify and approve preliminary trail alignment. The approved trail alignment will be flagged on site. Identify the final trail alignment west of Torrance Creek PSW, through EIS and flag the trail route on site for City's review.

3. **Trail design and development standards:**
   - Trail design including surfacing, clear width and height, grading and drainage, trail signage etc. would be finalized in consultation with Park Planning staff. The design and development of the trail system would be completed in accordance with City's Facility Accessibility Design Manual, City's current trail design and development practice and standards and Active Transpiration standards.

4. **Environmental impacts and mitigation:**
    - Assess the environmental impact of the proposed trail development through EIS.
    - Recommend measures to mitigate the environmental impact due to the proposed trail development through the EIS.
    - Recommend management of the woodlot along the trail route including removal of invasive species and hazard trees through the EIS.
    - Recommend preparation of an Environmental Implementation Report (EIR), Trail and Landscape Drawings through EIS to detail design an appropriate trail system and associated mitigation measures in accordance with the City's design and development standards.
5. **Grading and drainage:**
    - Provide preliminary grading and drainage plans to demonstrate that the design of the park block, trail connection and open space meets City's standards.
6. **Open space restoration and enhancement:**
    - The owner will be responsible for implementation of City approved landscape plans in accordance with the EIR including, but not limited to, restoration, compensation and enhancement planting within the open space.
7. **Demarcation of public open space:**
    - Describe the recommended approach to demarcate existing and proposed public park and open spaces, if any, within and adjacent to the subject property.
8. **Public education:**
    - Recommend provision of public education through educational/ interpretive signage at the entry points to the trail and open space system. Public education should address the environmental sensitivity of natural Heritage features and procedures residents can follow to protect and/or enhance these areas.
    - City will review and approve the design and locations of interpretive and educational signage, to be included on landscape plans.

Summary:

Revise the Terms of Reference for scoped EIS, to address Parks comments above, for our further review.

Please contact me if you have any questions.

Sincerely,

Jyoti Pathak,
Parks Planner

Parks and Recreation
Public Services
Location: City Hall
T 519-822-1260 x 2431
E Jyoti.pathak@guelph.ca

From: Fred Natolochny <fnatolochny@grandriver.ca>
Sent: Wednesday, October 17, 2018 10:11 AM
To: Leah Lefler
Subject: FW: 1242, 1250, 1260 Gordon St. 9 Valley Rd. Guelph

From our ecologist. Can you also send me the original message again – I appear to have mis-filed it. Sorry

---

From: Robert Messier
Sent: October 16, 2018 9:06 AM
To: Fred Natolochny
Subject: 1242, 1250, 1260 Gordon St. 9 Valley Rd. Guelph

I have reviewed the ToR EIS for the redevelopment of 1242, 1250, 1260 Gordon St. and 9 Valley Rd. in Guelph. As part of the background review they should also look at the Torrence Creek Subwatershed study and the Hanlon Creek subwatershed study. For the monitoring plan they should include a post construction monitoring of SWM design and mitigation. The setbacks and buffers assigned to the development should factor in the community trail that will be built even though the trail will ultimately be completed by the City. If you have any questions please let me know

Robert Messier
Ecologist
Grand River Conservation Authority
400 Clyde Road
Cambridge, Ontario N1R 5W6
(519) 621-2763 x2310
www.grandriver.ca

INTERNAL MEMO

DATE October 2, 2020 File No. 16.152.369

TO **Lindsay Sulatycki**

FROM Mohsin Talpur
DIVISION Engineering Services
DEPARTMENT Infrastructure, Development and Enterprise Services

SUBJECT **1242-1260 Gordon Street and 9 Valley Road – Draft Plan of Subdivision, Official Plan Amendment and Zoning By-law Amendment.**

We have reviewed the following plans and reports that were submitted in support of the 1242-1260 Gordon Street and 9 Valley Road Draft Plan of Subdivision, Official Plan Amendment and Zoning By-law Amendment:

a) *Report, Re, Functional Servicing Report for Gordon Street, Guelph ON; dated April 13, 2020; prepared by Stantec;*
b) *b) Report, Re, Geotechnical Investigation, Two 12-story Apartment Buildings 1242, 1250, 1260 Gordon Street, Guelph Ontario; dated April 25, 2018; prepared by CMT Engineering Inc.;*
c) *Report, Re, Hydrogeological Assessment, 1242, 1250, 1260 Gordon Street, City of Guelph ON; dated May 4, 2020; prepared by Stantec;*
d) *Report, Re, Noise Impact Study, 1250 Gordon Street, Guelph ON; dated February 20, 2020; prepared by J.E. Coulter Associates Limited;*
e) *Engineering Plans; dated April 15, 2020; prepared by Stantec;*
f) *Report, Re, 1242, 1250, 1260 Gordon Street and 9 Valley Road, Traffic Impact Study; dated May 21, 2020; prepared by Stantec.; and*
g) *Report, Re, 1242, 1250, 1260 Gordon Street and 9 Valley Road, Guelph, ON-Environmental Impact Sturdy; dated May 22, 2020; prepared by Stantec.*

And offer the following comments:

Functional Servicing Report

1. The disclaimer statement does not include City of Guelph to rely on the report. Please include City in the disclaimer statement or remove it.

2. Please provide a copy of Phase One ESA and/or Phase Two ESA reports for our review prior to zone change.

3. Sufficient and adequate capacity is available of the City's existing water supply and distribution system to accommodate the proposed development

and there are no water capacity constraints expected for most demand scenarios. However, 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 scenario at locations with elevation greater than 339 m height AMSL in the existing water system.

4. In Section 3, email correspondence from City regarding sanitary servicing capacity was discussed, but there are no email attachments found in the report as mentioned. Please include the correspondence is the FSR.

5. No capacity is available in the City's Gordon St. existing downstream sanitary sewer to accommodate discharge of sanitary flows from the proposed development. However, City is in process of studying the upgradation of the sanitary service capacity within Gordon Street. Therefore, a 'H' (holding) symbol will be placed on the property until such time a new sewer is installed.

6. The gradient of Street A, an extension of Landsdown Drive and Edinburgh appears to be over 6% that is not desirable in the approach of an intersection. Please refer TAC section 9.7.3 and lower the gradient.

7. The typical cross-section and label for centreline radius (minimum 18m) are missing. Please provide the details for review.

8. The pavement width should be 8.4 m as per Development Engineering manual. Provide sidewalks on both sides of proposed Street A.

9. Provide traffic geometrics plan showing large moving trucks to/from the site.

10. The proposed Street A ROW appears to be excluded from the pre-development and post-development stormwater management plan. The drainage area (i.e. 0.29 ha) of the Street A is discharging stormwater to Gordon Street uncontrolled without any quality control measures. Please include the area of Street A and demonstrate the quality and quantity control requirements are met and provide details for review.

11. Based on the topographic plan, there are external areas draining to the proposed development site from adjacent lots on Valley Road and the backyards of Gordon Street lots. Please delineate the external drainage areas discharging to the proposed development and update the drainage plans by accounting for external drainage under pre- and post-development stormwater management plan.

12. In section 5, the stormwater management strategy is discussed. The first document referred is Hanlon Creek Watershed Plan (HCWSP) that states all

stormwater generated from the area including 100-year storm must either infiltrate into the ground or evaporate (i.e. zero runoff). Another document referred is Torrance Creek Subwatershed Study (TCSS) that states that for the zone 2, detain the post-development flow to pre-development rates for the 2-year to 100-year storm events and to infiltrate minimum 150 mm/year. The Report indicates that the TCSS criteria is decided to be applicable for the site. However, it appears that, except for the woodlot area (draining uncontrolled east to the TCSS), the proposed stormwater is diverted to the Gordon street (Hanlon Creek Subwatershed area), which is contradicting the selection criteria. Please demonstrate the equitable share of surface water contribution to TCSS is maintained under post development conditions.

13. Based on information provided in figure 1, the existing stormwater is divided between two Subwatershed areas, major portion of the area (1.73 ha) discharges to TCSS and remaining area (1.13 ha) discharge to Gordon Street (HCWSP). The groundwater flow follows a similar divide to the surface water flow, with a portion flowing east as part of the Torrance Creek Subwatershed another portion flowing west as part of the Hanlon Creek Subwatershed. However, under proposed conditions, the infiltration gallery is proposed at TCSS portion and we have concerns that that may reduce recharge targets for Hanlon Creek Subwatershed area. Please demonstrate equitable share of recharge is maintained for each Subwatershed under post development adopting distributed infiltration approach.

14. It is mentioned that the development will also increase the impervious area and will produce increase in stormwater flows to the downstream Gordon Street storm sewer. The Gordon storm sewer (525 mm diameter storm sewer) is discharging to the existing downstream SWM facility (at 1291 Gordon Street), which is already at capacity. The additional flow from the development including uncontrolled flow from Street A could cause surcharging in the existing storm sewers and negative impacts downstream such as, erosion etc. Therefore, it is suggested to explore the option of discharging additional stormwater to the TCSS area.

15. Rooftop controls (i.e. 16 cm of ponding) are proposed for both buildings for the attenuation of stormwater discharging to the infiltration trench through downspout system with 75mm diameter orifice. The overflow arrangements of infiltration trench are directing water to the underground storage tank for out-letting to Gordon Street. The rooftop water is considered as clean; therefore, it is recommended to direct the overflow towards Provincially Significant Wetland (PSW) part of Torrance Creek Subwatershed.

16. It appears that an underground storage tank (located in the underground parking structure) is proposed to attenuate runoff generated form parking area and laneway; in addition, the underground storage is proposed for

attenuation of active storage required for rooftop runoff at 100-year event. The underground storage tank is not a desirable option for the City. Please explore surface water storage for the water quantity control.

17. The proposed infiltration gallery invert is set at 339.00 m and the invert of perforated pipe at inlet appears to be at 339.96 m. Based on the nearest monitoring well (MW5-18 (S)) data provided in the hydrological assessment report shows that the seasonal high groundwater level is approximately 340.7 m. Thus, all rooftop runoff could bypass the gallery and discharge to proposed underground storage via proposed overflow arrangements. Please revise the infiltration gallery design and ensure bottom of infiltration gallery is set minimum 1m higher than the seasonal high groundwater elevation and size appropriately to meet recharge targets.

18. It appears that the propose cover for the infiltration gallery is less than 0.5 m that does not meet frost protection requirement of minimum 1.2 m. Please ensure the minimum 1.2 m cover for the frost protection. Please refer Section 5.7.8 of DEM for further details

19. There is no discussion of on-site permeameter testing conducted at the location of proposed infiltration gallery. Please conduct in-situ permeameter testing using Guelph Permeameter or double ring infiltration testing method as per our Development Engineering Manual and CVC LID manual− Appendix C and size the infiltration gallery accordingly.

20. For water quality control an Oil-grit Separator (i.e. Stormceptor EF 4) is proposed and claimed 90% TSS removal. Based on Environmental Testing Verification (ETV) Canada, Oil-grit separators are 60% efficient when used as stand alone. Therefore, please justify enhanced quality control through the proposed OGS unit.

21. The IDF values used for hydrologic modeling are based on our Development Engineering Manual (DEM); however, the runoff coefficient (C) values do not match DEM. Please be consistent in using hydrologic parameters for the analysis based on DEM.

Hydrogeological Report

22. It seems that the proposed foundation of the underground parking area will be constructed with a water proof base and, as such, no permanent drainage system/dewatering is expected for these structures. However, a large footprint of infiltration is proposed in the close proximity of proposed building. Assuming it functions as designed, the concentrated flow from infiltration gallery and presence of dense glacial till encountered in the lower zone may have the potential to create perched water condition. There are chances of groundwater mounding impacts on the building’s underground

parking lot and adjacent properties. Please conduct a groundwater mounding analysis including influence zone and submit for review.

23. Approach to analysis of slug testing results. Most of Stantec's graphs display a double straight-line effect that may be exaggerating the geometric mean conductivity values in the formation itself. They have matched most of the curves to the early drawdown, which typically is assumed to be the response of the gravel pack and not the formation itself.

24. The in-situ hydraulic response testing conducted at each monitoring well to estimate horizontal hydraulic conductivity of the deposit. All MW screens are located within sandy silt till layer that are deeper than the bottom of proposed infiltration gallery. Thus, the hydraulic conductivity estimated using slug tests would not be representative (k) values for designing infiltration galleries. The field saturated hydraulic conductivity should be determine using Constant heads Guelph Permeameter method or Constant head double-ring infiltrometer method. As stated in City's Development Engineering Manual (DEM), a minimum of one on-site infiltration test shall be conducted at the proposed bottom elevation of infiltration gallery; in addition, one on-site infiltration test shall be conducted at every other soil horizon encountered with 1.5 meters below the proposed bottom elevation. Please arrange onsite testing at the proposed locations and design infiltration gallery as per details provided in Section 5.7.7 & 5.7.8 of DEM.

Water Balance Analysis

25. Evapotranspiration estimations for pre-development conditions is based on annual precipitation (i.e. 916 mm) from Waterloo Wellington A. However, under post-development water balance evapotranspiration estimations are based on annual precipitation (i.e. 921 mm) seems from another climate station. Despite climatic data taken from two different stations, the adjusting factor for latitude remains unchanged. Please justify.

26. The climate data of 1981 to 2010 (22 years) selected from Waterloo Wellington Station A for water balance calculations. However, the climate data is available for more than 36 years period. Please provide the rationale for using only 22 years data.

27. It appears that the topographic factor (0.1) used for the sub-area A to Sub-area C considering the areas as hilly. However, these sub-areas can be categorized as rolling lands with factor 0.2. Please update the factors in water balance calculations.

Source Water Protection:

28. The property is located in a WHPA B and C with a vulnerability score of 4-8. As such, all construction related activities are subject to the City of Guelph's

SOP for construction projects within 500 m of a municipal well (attached). The property is not located in an Issue Contributing Area.

29. In accordance with Grand River Source Protection Policy CG-CW-29, please provide 5 digital copies of a Salt Management Plan.

30. Ensure that any private water supply or monitoring wells that are no longer in use are abandoned in accordance with O. Reg. 903.

31. 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.

Noise Impact Study

32. The title of the report is Noise Impact Study. The report appears to be a combination of both feasibility study and detailed study features as per the Guelph Noise Control Guidelines (GNCG) study requirements. Please clarify and change the tile appropriately to avoid any confusion.

33. The Noise Impact Study (NIS) submitted in support of "Zone change and Draft Plan amendment for the property 1242 – 1260 Gordon Street. However, the address mentioned as 1250 Gordon Street that is not consistent with the submission. Please correct the address.

34. In Section 2 of the NIS report, it is mentioned that the west facades of the Buildings A and B are setback approximately 24 m and 77m, respectively from the centerline of Gordon Street. However, other drawings included in the submission show that parts of the building facade with amenity areas are approximately 12.4m from the centreline of Gordon Street, and approximately 8.3m from the centreline of Street A (an extension of Edinburgh Road South). Please clarify, updating the report as necessary.

35. Table 1 includes "Outside bedroom window" and "Outside living room window" as part of the listed "Sound Level Limits…". The other values in this table correspond to MECP NPC-300 stated criteria sound level limits, whereas these two categories correspond to values used to determine ventilation and building component requirements; distinction between these should be made (we suggest separating them into two separate tables, for clarity).

36. The statement in the footnote of Table 1 is incorrect and should be removed or reworded. Excess above the stated criteria for OLAs may be permitted, with engineering judgment and justification, at the discretion of the Municipality, and are not automatically allowed.

37. In Section 3.2, not sure why the word “excesses” is used; the unit ventilation requirements are stated, and no “excess” to these are permitted. In addition, there are no discussions about building component design requirements.

38. In Section 3.3, technically, the stationary noise criteria is based on the worst-case scenario for the affected site; while is this often at the point of time of lowest ambient roadway traffic, that isn't always the case, and is not the way NPC-300 defines it. Please correct.

39. In Section 3.3, it is mentioned that the proposed development is located in a Class 1 Urban Area. However, this is Class 2 Area. Please update the report and analysis accordingly.

40. Table 2, there are several datasets included in the appendix. How was AADT values mentioned determined? If additional calculations were done, please include them in the report. In addition, future heavy truck percentage on Edinburgh Road is assumed as zero. Even if existing heavy truck % is zero, why is projected heavy truck % zero? It would only be valid if the road has a heavy truck prohibition (if it does, verify it is planned to remain in place to the horizon year). Please also update the roadway descriptions to include the class of road (arterial, collector, etc.) and whether or not it is a divided roadway

41. The note for the Table 2 mentioned that the traffic growth on all roads has been assumed to be 1.5% per annum. There is no rationale provided for the assumption of only 1.5% per year. The standard is 2.5% traffic growth rate. Please justify or correct it accordingly.

42. The first paragraph in Section 5 refers to Appendix A, Figure 2 for calculation locations. However, Appendix A Figure 2 does not appear to specify or otherwise indicate the calculation locations. Please update the figure accordingly.

43. The building identifications mentioned in Table 3 is not consistent with other submitted plans/reports. Please standardize building identifications.

44. The outdoor amenity is mentioned in the Table 3, without referring to amenity location. The concept plan submitted with the complete application (revision 3 dated 2020.05.21) shows two separate outdoor common amenity areas, plus a proposed park, and an “Amenity Roof”. Please verify that all appropriate OLAs are being analyzed. In addition, the outdoor amenity daytime sound level at exterior façade mentioned as << 55 dB L_{eq}. Please clarify if this value is calculated/predicted or assumed: only calculated/predicted values should be indicated in the table.

45. The Table 3 note 2 does not match the definition of an OLA as per the Guelph Noise Control Guidelines. Please correct it. In addition, the second sentence of note 2 should be separated as note 3. Again, actual calculated/predicted values should always be reported in the table, even if upon analysis they are determined to be "insignificant". That said, it may be relevant to not include noise from Edinburgh Road South for some of the calculated receiver locations: this should be outlined in the report complete with justification.

46. In Section 6, air conditioning and warning clauses are listed as noise control measures. These are not noise control measures and should not be listed as such. In addition, it appears that the building component calculations are missing in the report. Please include in the report and reference in the section.

47. There are patio/balconies identified on the submitted plans that are more than 4m deep. However, there are also ground-based OLAs and indoor amenity spaces that have not been identified or analyzed. Please clarify, updating the report as necessary.

48. When including stationary noise calculations in a noise report, many more details are required. Please see the Guelph Noise Control Guidelines for information on what level of detail is required.

49. The point of reception for stationary off-site noise sources are identified in Section 7, but it is not clear how were these locations selected? Are there other locations (including other floors) that would experience a larger impact from these sources? Please provide details.

50. Section 7 does not include analysis of proposed outdoor points of reception. Please include these in the analysis.

51. In Section 8, the surrounding buildings (1280 Gordon Street & 1284 Gordon Street) are identified as 5 story buildings but that is not consistent with earlier in the report where they are identified as 6 story apartment buildings. Please clarify.

52. Please include, in an appendix of this report, the HVAC design drawings for each building. Verify that there are no planned sources of noise at any location on/at/around these proposed buildings other than the roof-top (above the 12th storey): other elements that may be missing from this analysis include (but not limited to) blowers/exhaust from the underground parking, emergency generators, HVAC equipment on lower roof levels, etc. If the HVAC has not yet been designed, this needs to be documented in this report, along with sources for equipment/noise levels used in the analysis, assumptions on location, assumptions on other equipment, etc.

53. The analysis of the impact of proposed development on the surrounding areas appears to be based on a "best-case scenario" for HAVC design for buildings of this type, and provides little assistance to identify possible noise impacts to external sensitive receivers. Please provide justification within the report concerning the type, number, placement and selection of HVAC equipment for these proposed buildings.

54. Please clarify what methodology was used for the evaluation in Section 10. Additional details are required, as are the calculations completed (can be included in an appendix). Based on most methods, review of actual architectural drawings would be required: was this done? If this is a Feasibility Noise Study, the level of detail expected is much lower, but detailed evaluation would be required as part of the subsequent Detailed Noise Study (typically at Site Plan or similar stage of the land development). It should be noted in this section that a review of the building components is a requirement under NPC-300 due to the sound levels predicted.

55. The summary of on-site noise impacts on adjacent noise sensitive land uses is missing. Please include it.

56. In Section 12 recommendation 2 identifies reference to recommended warning clauses. Please note that, if this is a Detailed Noise Study, the warning clauses need to be specified in detail within the report, as per the GNCG Appendix A, and not simply referenced by clause "letter". If this is a Feasibility Noise Study, warning clauses need not be recommended (see the GNCG for details of report requirements).

57. In Section 12, it is mentioned in recommendation 4 that the analysis will be conducted prior to building permit. This analysis will be required prior to Site Plan Approval, as per the Guelph Noise Control Guidelines.

58. The Figure 1 does not include standard required map orientation items. Please include standard-required map orientation items, such as a north arrow, etc. This figure should also outline the extents of the site under investigation.

59. Please include the locations of the on-site points of reception used in the evaluation of transportation noise in Figure 2.

60. Please include standard required map orientation items, such as a north arrow in Figure 3 & Figure 4.

61. Please clarify that the building description is based on magnetic north or project/site north in the STAMPSON output, and/or coordinate and standardize the location descriptions to cardinal points based on included drawings.

62. The location of the points of reception mentioned in the model are unknown, beyond the general description (as they are not shown on an included drawing/figure). Once they are known, we will review the STAMSON predictions in more detail. Until that time, please see some general comments below.

63. It appears that absorptive ground surface is used in the model. Based on the included drawings, the intervening ground surface to all receptors on site would not be considered absorptive. Therefore, reflective ground should be used for all predictions.

64. The receiver height mentioned in STAMPSON is 36.00 m. However, based on the submitted elevation drawings, this value does not appear correct. Please clarify how the receiver height was determined?

65. It appears that a barrier is included in some predictions. Why was a barrier introduced? If a barrier exists, complete the three elevation values. Note that barriers should not be included in the analysis for receivers in the bright zone of the barrier.

Water Servicing, including Metering

66. The plans are missing a property line valve. For new servicing we are looking for a tapping valve (or valve on the 'T') and a property line valve in all cases.

67. All water, including that to supply fire suppression and hydrants, must be bulk metered.

68. The water meter shall be located within a meter chamber at property line. The chamber position would be at the PL of building 1 or be bulk metered inside Building 1 for the entire property

Traffic Impact Study

69. "Section 7.1 Zoning By-law Requirements" noted that a review was completed to determine the reduced drive aisle width of 6.7m meters. Please provide the details of the review.

70. The proponent will be responsible for design and construction of Street A, and reconstruction of the intersection at Gordon Street and Edinburgh Road including any modifications to geometry and traffic signalization.

TDM

71. Per section 8.2 of the TIS, please strengthen active transportation connections between Buildings #1, #2 and Gordon Street, on the south side of the site. A 3.0 m wide shared pathway for pedestrians and cyclists

eliminates the need for these users to travel out of their way via the proposed municipal ROW, when travelling southbound on Gordon Street.

72. Per section 8.1 of the TIS, staff recommend provision of high quality, secure, indoor bicycle storage. This means at least half of the bike racks provided should be horizontal and lift-assist, rather than all racks being vertical wall mounted. Providing high quality amenities ensures a range of users can access these spaces, and promotes active transportation as an appealing alternative to single-occupancy vehicle use.

73. Several ground mounted racks for oversized bicycles such as cargo bikes, recumbent hand cycles and bicycles with trailers attached should be provided.

74. Section 2.0, on page 2.1 indicates there will be 442 bicycle parking spaces underground, while table 13 indicates 415 spaces. Please clarify.

75. Note, per the Site Plan procedures and guidelines the long term bike parking should be provided at a rate of one space per unit, while the 2 spaces per 20 units are for visitor bike parking. These visitor bike parking spaces should be situated above ground, directly next to the main building entrances.

76. Please consider unbundled parking provisions so residents can opt-out of parking spaces they may not need.

77. Staff recommend the implementation of EV-charging stations for residents in the underground parking.

Please do not hesitate to contact me if you have any questions regarding my comments.
Thanks,

Mohsin Ali Talpur, M.Eng., P.Eng.
Development - Environmental Engineer

Internal Memo

Date	December 8, 2020
To	**Lindsay Sulatycki, Senior Development Planner**
From	Leah Lefler, Environmental Planner
Service Area	Infrastructure, Development and Enterprise Services
Department	Planning and Building Services
Subject	**1242-1260 Gordon Street and 9 Valley Road** **Draft Plan of Subdivision, Official Plan Amendment and Zoning By-law Amendment** **Environmental Planning Comments on First Submission**

Environmental Planning reviewed the following documents that pertain to the proposed Draft Plan of Subdivision, Official Plan Amendment and Zoning By-law Amendment at 1242-1260 Gordon Street and 9 Valley Road:

Environmental Impact Study, Stantec, May 2020
Functional Servicing Report, Stantec, April 2020
Geotechnical Report, CMT Engineering Inc., April 2018
Hydrogeological Assessment, Stantec, May 2020
Landscape Concept, Stantec, March 2020
Planning Justification Report – May 2020
Tree Inventory and Preservation Plan – March 2020

Based on the review of the materials listed above, Environmental Planning staff offer the following comments at this time:

Environmental Impact Study

1. In the Introduction, please note that the planning approval sought by the applicant is a Draft Plan of Subdivision, Official Plan Amendment and Zoning By-law Amendment. Following approval, the development will proceed to detailed design and subdivision registration. Text in the third paragraph should be updated accordingly.
2. Under 1.1 Agency Consultation, reference is made to a Hydrology Report. Please revise this to Hydrogeological Assessment.
3. Under 2.2.1 Official Plan, it is stated that "Natural Areas where development may be permitted provided an EIS can demonstrate that there will be no negative impacts to the natural heritage features or their ecological function". This statement is incorrect. General Permitted uses and feature specific policies apply to Significant Natural Areas and Natural Areas alike. Permitted uses may be more permissive in Natural Areas in comparison to Significant Natural Areas,

but not necessarily. If a feature does not meet criteria for protection, development may be permitted. Conversely, if a feature meets criteria for protection, the general permitted use policies and feature-specific policies apply. Please clarify this.

4. The last sentence on page 2.2 states that “The Natural Heritage System also incorporates hazard lands including steep slopes, erosion hazard lands and unstable soils that are under the jurisdiction of the GRCA”. This statement is incorrect. Criteria for designating Significant Valleylands (a Significant Natural Area included in the NHS) includes undeveloped portions of the regulatory floodplain. Hazard lands are not outright included in the NHS. Please correct this.
5. Under 2.2.3 Tree By-law, it is stated that the “Tree By-law was created to prevent damage or destruction to trees”. This statement is incorrect. The Tree By-law ‘regulates’ the destruction or injuring of trees and enables the City of Guelph to require a tree permit prior to the injury/destruction of a regulated tree, and compensation. The Tree By-law helps protect and enhance the tree canopy cover in the City. Please revise accordingly.
6. Under 3.2 Field Investigations on page 3.8, please include bat acoustic surveys as well as bat exit surveys in the list of targeted field surveys.
7. Under 3.2.8.2 Bat Exit Surveys on page 3.14, please include the type of device used for acoustic monitoring. For example, was a hand-held unit used, a song meter or both?
8. Under 3.2.9.1 Diurnal Surveys on page 3.15, it is stated that “fieldwork was conducted at, or within, half an hour of sunrise”. This statement does not match dates and times listed in Table 3.7. Best results are achieved within half an hour of sunrise, especially in noisy urban environments, and especially in forested ecosystems. The first breeding bird survey was completed on June 12, 2018, which is very late for a first visit. Based on timing of field surveys, data should be interpreted accordingly (i.e. lack of record does not indicate absence). Please update the text, as appropriate.
9. Under 3.2.9.2 Crepuscular Surveys on page 3.16, mention of moon phase is not made. Were conditions appropriate for surveying crepuscular birds during site visits completed for bats? Refer to MNRF’s ‘Eastern Whip-poor-will and Common Nighthawk Survey Protocol’ for guidance.
10. Under 4.4.6 Amphibian Survey and Habitat Assessment on page 4.6, it is stated that suitable habitat for amphibian breeding was not present. This seems odd, given that the Torrance Creek PSW is located within the Study Area, which is known to provide woodland amphibian breeding habitat. Snow melt and a high groundwater table result in seasonal ponding within this wetland complex. Please clarify.
11. Under 4.4.14 Incidental Wildlife Observations, the DeKay’s Brownsnake observation from May 16, 2019 should be added to the list of incidental wildlife. This species was observed, along with several Eastern Gartersnake and a Red-bellied Snake during the feature staking exercise, with City staff. Further, please assess the significance of the snake records recorded with respect to

significant wildlife habitat and the potential for snake hibernacula to occur in the vicinity of the subject property.

12. Section 5.0 Significant Natural Heritage Features should be based on the natural heritage and water resources policies of the City of Guelph Official Plan (March 2018 Consolidation), in addition to the policies of the Provincial Policy Statement. Please update this section to address Official Plan policy.
13. Section 5.2 Significant Woodlands includes the following statement: "notwithstanding the criteria denoted in the OP excluding plantations". This statement is incorrect. *Plantations* is a defined term in the Official Plan. Cultural Plantation, per ELC, is not the same thing as *plantation* in the Official Plan. A cultural plantation unit must meet the Official Plan's definition of *plantation* to be excluded from the assessment of significant woodland. Please clarify this.
14. Section 5.2.1 Other Woodlands refers to a deciduous woodland and claims that it was excluded from Significant Woodland due to composition, origin and size. Please provide the analysis to support this. Do the Cultural Woodlands criteria of the Official Plan to this deciduous woodland? This assessment should also be included in a revised EIS.
15. What does the bolded text indicate in Table 5.1? For clarity, please uses bolded text consistently within each Table, and among Tables 5.1 through 5.4. Also, please update Tables 5.1 through 5.4 to accurately assess field data collected against MNRF's Ecoregion 6E Criteria to determine whether or not Candidate or Confirmed SWH is present within the Study Area and/or Subject Property.
16. Section 5.3.5 Locally Significant Species should be updated to include the names of the two locally significant plant species. Also, the list of locally significant bird species should be updated to include Northern Flicker. A total of six locally significant bird species were documented, based on field records.
17. Section 5.4.1 Butternut should be updated to indicate that an 'authorization' under the *Endangered Species Act* is sought. The EIS should be updated with information from the MECP and Natural Resource Solutions Inc. to reflect the current status of Butternut, ESA requirements and compensation plantings. Correspondence and supporting documentation should be included as an Appendix.
18. Section 5.4.3 Bat SAR, please provide a map showing the extent of bat species at risk habitat (roosting habitat, foraging habitat). Please also provide correspondence with MECP confirming support of the proposed approach.
19. Section 5.5 Significant Natural Heritage Features Summary, on page 5.8, please update the bullet list to include bat species at risk, and to note that honey locust is a planted specimen. Also, the statement "unable to confirm presence/absence" is incorrect. The field surveys were designed to enable an assessment of SWH. For example, breeding bird survey results in fact confirm the woodland as Woodland Area Sensitive Breeding Bird Habitat. Based on results of field surveys, it may or may not be possible to confirm SWH. Unconfirmed SWH would remain Candidate SWH in areas meeting the criteria of the schedules for 6E. Please clarify this in the text.
20. Section 5.5 Significant Natural Heritage Features Summary, on page 5.9, includes other woodlands (WODM4-4). Based on the ELC figure, the WODM4-4

vegetation community appears to be contiguous with an FOCM5 vegetation community. As per comment 14 above, please assess this woodland against the Official Plan's criteria for Cultural Woodland and update the text on page 5.9 accordingly.

21. Section 6.1 Stormwater Management should reference stormwater targets prescribed in the Torrance Creek Subwatershed Study for infiltration rates. A portion of the site is located in Catchment 102, where the following targets apply:

    - infiltrate to enhance baseflow in Torrance Creek: 150mm/yr to 200mm/year or match pre- to post-
    - pre- to post- peak flow control for all design events (2 to 100-year events)
    - 24-hour extended detention for 25mm rainfall event
    - minimum 80% TSS removal

    Similarly, the Stormwater targets prescribed in the Hanlon Creek Subwatershed Study should be referenced in this section, as a portion of the site is located within the Hanlon Creek Subwatershed. The proposed stormwater outlet drains to Tributary D, where the following targets apply:

    - match pre- to post- peak flows for all storm events
    - implement infiltration best practice to the great extent feasible

22. The Functional Servicing Report (FSR)and Engineering Plans indicate that parking lot water as well as rooftop water will be directed to the infiltration trench. Further, stormwater management does not appear to be provided for a portion of the site, including drainage from the extension of Edinburgh Road. Lastly, sufficient capacity to accommodate flows from the proposed development is not available in the receiving stormwater management pond. Section 6.1 should be updated to provide an accurate and detailed description of the proposed stormwater management system so that all potential impacts can be identified in Section 7.0.

23. The first paragraph on page 6.2 states that "the total flow to Gordon Street (inclusive of rooftop-controlled flow) meets the predevelopment target rates". Please provide supporting documentation or provide reference to specific values and/or sections of the FSR.

24. On page 6.2, a description of the infiltration trench is provided. Based on this description, it is unclear how groundwater levels factored into the design of the facility. For example, has 1m separation distance from the high-water level mark been factored in?

25. Section 6.1.2 Trail, references the Guelph Trail Master Plan and a proposed connection through the subject property. A recommendation is provided that the trail be completed as part of a broader trail design approach, to be completed by the City at a future date. This recommendation conflicts with the requirements set out in the Terms of Reference, which included an assessment of the trail route, recommendation for trail alignment consistent with Official Plan policy (i.e., consistent with permitted uses within the natural heritage system, demonstration of no negative impact, etc.) and identification of best management practices to provide the basis for basic trail design, which is to be

completed as part of the Environmental Implementation Report (refer to pages 18 and 20 of the approved TOR). The Active Transportation Network Study maps the portion of trail through the subject property as a desired Active Transportation route (i.e. for cycling). The feasibility of accommodating an Active Transportation route through the subject project is to be assessed based on Official Plan policy in the EIS. Lastly, a trail connection from the Park Block to the trail network is desired and should be assessed and evaluated through the EIS to inform the design.

26. Section 7.0 Potential Impacts of Development and Mitigation Recommendations, reference is made to “net environmental impact assessment”. This is not appropriate as the policy test is “no negative impact”. Please revise this statement and confirm that the analysis provided is based on the “no negative impact” test.

27. Section 7.1 Impacts on Significant Natural Features, given that two 12 storey buildings are proposed, the EIS should evaluate the potential for bird strike impacts, and inform the design, as appropriate. Lighting impacts may also result from the proposal; the EIS should make recommendations for lighting adjacent to the natural heritage system based on best management practices. Lastly, grading impacts should be assessed in the EIS. An analysis of the grading plan should be provided in the context of permitted uses within the natural heritage system. Please update section 7.1 accordingly.

28. In Section 7.1.1 Significant Wetlands, it is stated that “incidental runoff impacts associated with sediments, dust, as well as nutrient loads will be reduced by the natural polishing function of the vegetative zone between the feature ad development”. It is unclear what this statement means. The Stormwater system is designed to infiltrate the 25mm storm event via an infiltration trench. Surplus runoff will fill a storage tank and then outlet to the storm sewer on Gordon Street, which outlets to a stormwater pond, which discharges to the Hanlon Creek PSW. Further, the last sentence of the first paragraph in this section states that “all surface runoff from the proposed development is directed to the existing storm sewer on Gordon Street”. This statement is not consistent with section 6.1 of the EIS or the FSR. Please clarify.

29. Also in Section 7.1.1 Significant Wetlands, please demonstrate that infiltration rates and volumes have been matched, pre- to post- in the Torrance Creek and Hanlon Creek Subwatersheds. This section notes that infiltration will “match and likely notably exceed pre-development infiltration volumes” in the catchment that directs flows to Torrance Creek. Torrance PSW has both a recharge and discharge function, depending on the time of year. During periods of an elevated water table and an upward hydraulic gradient, are impacts associated with the infiltration trench anticipated? For example, if infiltration cannot occur due to a high-water table, surplus will fill the storage tank and discharge to Hanlon PSW, likely resulting in a negative impact to both PSWs. Please include an in-depth analysis of stormwater impacts on the natural heritage system’s features and functions.

30. On page 7.2, discussion is provided on the predicted impacts associated with reduced infiltration to the Hanlon Creek Subwatershed, with a conclusion of no negative impact drawn. Please provide the supporting analysis to support this

claim. For example, what is the difference in pre- to post- infiltration volumes and rates? If infiltration is reduced, is the potential for baseflow impacts in Hanlon Creek? If infiltration is reduced, will more runoff be directed to Hanlon PSW? In addition, the FSR indicates that this runoff would be directed to the storm sewer on Gordon. The EIS fails to address Stormwater impacts associated with unattenuated/untreated runoff from the catchment containing the extension of Valley Road/Edinburgh.

31. The Torrance Creek PSW has a recharge and discharge function. What impact does the proposed stormwater management system have on the recharge/discharge function of the wetland? Please update the EIS to include a comparison of pre- to post- monthly differences in vertical hydraulic gradients, infiltration, runoff, etc. Note that this is required to demonstrate no negative impact the PSW.

32. Section 7.1.5 Significant Habitat of Endangered and Threatened Species, please provide documentation of correspondence with MECP confirming the proposed mitigation measures for bat species at risk are acceptable. Please also update the Butternut paragraph to include details from NRSI, as requested above.

33. Section 7.1.6 Locally Significant Species, please clarify where the Yellow-billed Cuckoo was heard. The text appears to indicate that the Yellow-billed Cuckoo was heard singing from the development area of the site. Please provide an assessment based on the Official Plan’s policy on Habitat for Significant Species to establish whether or not this Natura Area designation applies.

34. In section 7.3.1.3 Wildlife Friendly Building Design, please note that the EIR should include more detailed guidance on bird-friendly building design to inform detailed design.

35. Environmental planning staff are supportive of the timing recommendations made for the removal of debris and woodchip piles to protect snakes. Consider including a recommendation to incorporate snake hibernacula and/or gestation site habitat structures in the buffer portion of the natural heritage system. The Environmental Implementation Report would then provide further information on location, design, etc. to assist with detailed design and implementation.

36. In section 7.3.4 on page 7.8, please update the paragraph on Butternut to reflect the outcome of the Butternut Health Assessment and authorization. NRSI should be contacted for this information.

37. The details included in the post-construction monitoring program are acceptable for the EIS; however, please note that a requirement of the forthcoming EIR will be to provide a detailed post-construction monitoring plan. Similarly, additional detail on vegetation plantings will also need to be provided in the EIR. Please update the EIS to include a summary section on EIR requirements and a proposed outline for the future report. Please note that this was included within the approved Terms of Reference.

38. The following major topics were omitted from the EIS and should be assessed in detail in a revised EIS as part of the next submission:

    - assessment of bat species at risk habitat and supporting documentation from MECP;
    - Butternut assessment details and supporting documentation from MECP;

- assessment of Habitat for Significant Species;
- assessment of Cultural Woodland;
- assessment of the need for Established Buffers;
- assessment of grading impacts;
- assessment of wetland water balance, based on assessment of monthly differences, pre- to post-development, for lands draining to the Torrance PSW and Hanlon PSW, to determine whether or not ecological and/or hydrologic impacts resulting from the proposed development are anticipated; and
- recommended scope for EIR.

39. Section 9.0 Policy Compliance should focus on the consistency of the proposal with the “no negative impact test”. As written, the focus appears to be on establishing feature-based constraints to development. This is not consistent with the PPS, and the natural heritage system’s approach to protecting, enhancing and restoring natural heritage in Ontario.

40. Section 10.1 Report Summary, please update the bullet on SWH to indicate Candidate vs Confirmed. Further, the bullet on the proposed stormwater management plan indicates that parking lot runoff will be infiltrated. This detail was not included in the description of the stormwater management system presented earlier in the EIS. Please ensure that all statements are consistent and coordinated with the engineering plans prepared for the proposed development. Please note that infiltration of parking lot water is not supported by the City. Lastly, the report summary should include changes to wetland hydrology and ecology, and removal of accessory habitat to list of potential impacts associated with the proposed development.

41. Please update section 10.2 Recommendations to include the erection of Tree Protection Fencing prior to the commencement of site alteration/construction.

42. Please update mapping provided in Appendix A to include the following:

    - established wetland buffer;
    - Ecological Land Classification vegetation community information for polygon adjacent to FOD5-6;
    - extent and type of Significant Wildlife Habitat features;
    - limit of the Natural Heritage System; and
    - Cultural Woodland and/or Habitat for Significant Species, as appropriate, based on the criteria-based assessment requested above.

Hydrogeological Assessment

43. In section 4.2.4.1, pre-treatment for TSS is suggested to eliminate a number of sediment-bound metals in the discharge effluent. City staff agree that the proposed pre-treatment approach would likely reduce these concentrations; however, please note that samples would still be required to be collected to confirm this assumption, prior to the discharge being authorized to City sewers.

44. Please update section 4.2.4.1 to clarify whether or not VOCs were sampled to confirm presence/absence. The City’s Sewer Use By-law prohibits discharge of VOC-impacted. Please note that VOC sampling may be required under a future discharge agreement with the City’s Wastewater Division.

45. The post-development water balance provided in section 5.3 does not appear to account for the lands fronting on Valley Road (0.27ha catchment shown on Figure 15). Please explain why this area was excluded from water balance calculations, or update the water balance to include this catchment. Further, the size of the catchment draining to Torrance provided in the water balance assessment is 1.73ha, which does not match the catchment area of 1.44 ha in the hydrologic model. Please update the calculations ensuring that consistent catchment areas are applied.

46. The EIS should refer to Section 6.0 Groundwater Dewatering Assessment and include recommendations for monitoring and best practice. This could be included as an item for the future EIR.

47. Section 6.1 – It appears that a safety factor was not considered in the calculations of dewatering volume estimation, nor was any basal seepage considered. Although the site typically has observed downward gradients, the hydrological assessment indicates that upward gradients are present. Please add a factor of safety to the calculations and account for basal seepage, or provide text to explain why these elements were not considered in the calculations.

48. An infiltration (rock) trench is proposed to address the infiltration deficit. The infiltration (rock) trench is located within the Torrance Creek Subwatershed. Please include an analysis of the post-development water balance per watershed. For example, with LID measures in place, the water balance should demonstrate that the infiltration rate/volume should roughly match pre- to post-rates/volumes within each Subwatershed (i.e. Torrance and Hanlon). A stormwater management design and supporting analysis demonstrate no negative impact to the receiving natural heritage system is required. This is typically achieved by demonstrating that the proposed development and stormwater management system matches pre- to post- monthly infiltration rates/volumes and monthly runoff rates/volumes. Hydrographs depicting monthly differences in runoff volumes and infiltration volumes are helpful in demonstrating consistency with the natural heritage system “no negative impact” policy test.

49. In Section 7.2 construction proximity to the nearby municipal well is accounted for; however, there is no discussion provided as to private residential wells in the area. During the filing of an application for PTTW or registration under the EASR, it is recommended that the proponent assess potential impacts to private residential wells.

Tree Preservation Plan

50. Please update the Tree Preservation Plan to include recommendations for the EIR and detailed design.

51. Environmental planning is generally supportive of using a polygon approach in certain situations; however, based on data provided in Appendix 1 Tree Inventory Data, it is unclear how the stem count column relates to the Polygon. For example, 1 stem is reported from each of Polygons A, B, C, E and F. Given the brief description provided on page 4 of the plan: “If trees were present in monoculture hedgerow features, a polygon method was used”. Based on this description, >1 stem per polygon would be expected. Please clarify.

52. Please update Map 2 of the Tree Inventory and Preservation Plan to show Tree Protection Fencing around the perimeter of the natural heritage system.

Functional Servicing Report

53. Please update section 5.1.2 Torrance Creek Subwatershed Study to accurately reflect recommended infiltration rates, which in the case of the proposed development is between 150mm/yr to 200 mm/yr.

54. The FSR indicates that the area outletting to Gordon Street (Hanlon Creek Subwatershed) will increase, post-development. The infiltration trench is proposed in the Torrance Creek Subwatershed, which means the majority of stormwater originating from the Hanlon Creek catching will be generated as runoff. Please clarify that the receiving stormwater pond has capacity to control the runoff volumes generated by the proposed development. Please note that surcharge of this facility is directed to the Hanlon PSW. Runoff volumes should match pre- to post- per the Hanlon Creek Subwatershed recommendations.

55. The description of Catchment 202 provided at the bottom of 5.6 indicates that roof-top water will be directed the storm sewer on Gordon Street, with the 25mm event being directed to the infiltration trench. Please clarify that up to and including the 25mm is intended to be directed to the infiltration trench. Events in excess of 25mm or when back to back events occur prior to draw-down would be directed to the storage tank, eventually draining to the storm sewer when capacity is reached. Environmental planning strongly encourages infiltration of ‘clean’ water to maintain infiltration and baseflow in Hanlon Creek to the greatest extent feasible. Please consider this comment when updating the FSR.

56. The EIS should include an analysis of the findings presented on page 5.8 which relate to pre- to post- differences in runoff and infiltration being directed to the Torrance and Hanlon Subwatersheds under the post-development scenario. Based on the analysis provided in the FSR, the EIS should provide an assessment as to whether or not impacts to the ecology or hydrology of the wetlands are anticipated.

57. How would the infiltration trench function in the event of back-to-back storms? Please clarify whether or not a safety factor was incorporated into the sizing and design of the infiltration trench.

58. In section 5.6 On-site Infiltration, on page 5.9, it is stated that “The infiltration gallery should only be intercepted by groundwater in spring-time”. How was this detail factored into the water balance? The EIS should provide an analysis of potential impacts arising from the proposed stormwater design. For example, if groundwater intercepts the infiltration trench during the spring, infiltration will not occur which would result in more runoff being directed to Hanlon Subwatershed. This is unacceptable and should be addressed in the next submission.

59. Please note that in situ permeameter testing is required to demonstrate that the proposed infiltration trench will function as anticipated. Please provide this information in the next submission.

60. Drawing SSP-2 Storm Drainage Area Plan – It is unclear how the Area IDs relate to the Catchments described in the FSR and Hydrological Investigation report's water balance calculations. Please ensure that this is clarified and coordinated among studies and drawings in the next submission.
61. Drawing GP-1 Grading Plan indicates that extensive grading is required adjacent to the natural heritage system. Please provide additional detail on grading requirements (e.g. spot elevations) to enable a proper assessment of consistency with Official Plan policy. Please note that a cross-section can be helpful in demonstrating how the required grading relates to the protection of the natural heritage system. At a minimum, please update GP-1 to show differences in grade adjacent to the natural heritage system, and slope, particularly at the southeast end of the site.
62. It is unclear how the proposed erosion and sediment control plan has been coordinated with the proposed grading plan. For example, tree protection fencing and silt fencing is proposed in an area identified for extensive grading on GP-1. Please clarify.

Landscape Concept

63. The Landscape Concept proposes the planting of coniferous and deciduous trees on top of the infiltration facility. Guelph's Engineering Development Manual specifies a minimum 1m offset of plant material from infiltration galleries. Please relocate the proposed trees outside of the infiltration gallery area.

Summary

A revised EIS is required to address the comments provided above. Revisions to the supporting studies, including the Tree Preservation Plan, Hydrological Assessment, Functional Servicing Report and Landscape Plan are required. Environmental planning encourages the applicant to meet with City staff to discuss the comments provided, prior to providing a second submission. Substantial work remains outstanding to adequately demonstrate no negative impact to the natural heritage system's ecological and hydrologic features and functions.

Please note that comments provided by Scott Cousins, City of Guelph Hydrologist, are incorporated into the comments provided under the Hydrogeological Assessment heading above.

Leah Lefler, Environmental Planner
Planning and Building Services, **Infrastructure, Development and Enterprise**
Location: City Hall
519-822-1260 extension 2362
leah.lefler@guelph.ca

Copy: Mohsin Talpur, Jyoti Pathak, Scott Cousins

APPENDIX F
FIELD NOTES

BAOR

Stantec

Legend

- ⬚ Study Area (120 m)
- 🟥 Subject Property
- 🟨 ELC Boundary
- Approximate Wetland Boundary (Stantec 2019)
- Watercourse (Permanent)
- **Woodland Boundary**

ELC Communities

- **CUM1**- Mineral Cultural Meadow Ecosite
- **CUP3-3**- Scotch Pine Coniferous Plantation Type
- **CUP3**- Coniferous Plantation
- **CUW**- Cultural Woodland
- **CVC-1**- Business Sector
- **CVI-1**- Transportation
- **CVI-3**- Sewage and Water Treatment
- **CVR-1**- Low Density Residential
- **CVR-2**- High Density Residential
- **CVR-3**- Single Family Residential
- **FOC2-2**- Dry White Cedar Coniferous Forest Type
- **FOCM5**- Naturalized Coniferous Hedge-row Ecosite
- **FOD5-6**- Dry – Fresh Sugar Maple – Basswood Deciduous Forest Type
- **HR**- Hedge-row
- **MAM2-2**- Reed-canary Grass Graminoid Mineral Meadow Marsh Type
- **MAS2-1**- Cattail Mineral Shallow Marsh Type
- **SWM3-2**- Poplar-Conifer Deciduous Mixed Swamp
- **WODM4-4**- Dry - Fresh Black Walnut Deciduous Woodland Type

0 25 50 Metres

1:2,200 (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, 2018.
3. Orthoimagery © First Base Solutions, 2020. Imagery flown in 2019.

Project Location 161413684
City of Guelph
Prepared by DH on 2020-05-11

Client/Project
TRICAR
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD

Figure No.
3

Title
Vegetation Communities

EAKJ - new planted area

ELC COMMUNITY DESCRIPTION & CLASSIFICATION			
SITE (project no./name): 161413684		**POLYGON:** C	
SURVEYOR(S): M STRAUS	**DATE:** June 2/21		**PHOTO No.:**
START: 715	**END:** 800	**ZONE & UTM:**	

POLYGON DESCRIPTION

SYSTEM
- ☒ TERRESTRIAL
- ☐ WETLAND
- ☐ AQUATIC

SITE
- ☐ OPEN WATER
- ☐ SHALLOW WATER
- ☐ SURFICIAL DEP.
- ☐ BEDROCK

SUBSTRATE
- ☐ ORGANIC
- ☒ MINERAL SOIL
- ☐ PARENT MIN.
- ☐ ACIDIC BEDRK.
- ☐ BASIC BEDRK.
- ☐ CARB. BEDRK.

TOPOGRAPHIC FEATURE
- ☐ LACUSTRINE
- ☐ RIVERINE
- ☐ BOTTOMLAND
- ☐ TERRACE
- ☐ VALLEY SLOPE
- ☐ TABLELAND
- ☒ ROLL. UPLAND
- ☐ CLIFF
- ☐ TALUS
- ☐ CREVICE / CAVE
- ☐ ALVAR
- ☐ ROCKLAND
- ☐ BEACH / BAR
- ☐ SAND DUNE
- ☐ BLUFF

HISTORY
- ☐ NATURAL
- ☒ CULTURAL

COVER
- ☒ OPEN
- ☐ SHRUB
- ☐ TREED

PLANT FORM
- ☐ PLANKTON
- ☐ SUBMERGED
- ☐ FLOATING-LVD.
- ☒ GRAMINOID
- ☐ FORB
- ☐ LICHEN
- ☐ BRYOPHYTE
- ☐ DECIDUOUS
- ☐ CONIFEROUS
- ☐ MIXED

COMMUNITY
- ☐ LAKE
- ☐ POND
- ☐ RIVER
- ☐ STREAM
- ☐ MARSH
- ☐ SWAMP
- ☐ FEN
- ☐ BOG
- ☐ BARREN
- ☒ MEADOW
- ☐ PRAIRIE
- ☐ THICKET
- ☐ SAVANNAH
- ☐ WOODLAND
- ☐ FOREST
- ☐ PLANTATION

STAND DESCRIPTION: ✓ only on new property doesnt includ Prev assess

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>>MUCH GREATER THAN; >GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	1	POPLAR < JUGNIGR >> ACENEGU
2	SUB-CANOPY	3	2	JUGNIGR
3	UNDERSTOREY	4	2	POPLAR
4	GRD. LAYER	5		grasses > forbs (agrostis > BROINER) > goldenrod

HT CODES: **1**=>25m **2**=10<HT≤25m **3**=2<HT≤10m **4**=1<HT≤2m **5**=0.5<HT≤1m **6**=0.2<HT≤0.5m **7**=HT<0.2m

CVR CODES: **0**=NONE **1**=0%<CVR≤10% **2**=10<CVR≤25% **3**=25<CVR≤60% **4**=CVR>60%

STAND COMPOSITION:		**BA:**

SIZE CLASS ANALYSIS:	O	<10	R	10 – 24	R	25 – 50	N	>50
STANDING SNAGS:	N	<10	N	10 – 24	N	25 – 50	N	>50
DEADFALL/LOGS:	N	<10	N	10 – 24	N	25 – 50	N	>50

ABUNDANCE CODES: **N**=NONE **R**=RARE **O**=OCCASIONAL **A**=ABUNDANT

COMM. AGE:	X	PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	**DEPTH TO MOTTLES/GLEY**	**g=**	**G=**
MOISTURE:	**DEPTH OF ORGANICS:**		**(cm)**
HOMOGENEOUS / VARIABLE	**DEPTH TO BEDROCK:**		**(cm)**

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS:		**CODE:**
COMMUNITY SERIES:		**CODE:**
ECOSITE:		**CODE:**
VEGETATION TYPE:		**CODE:** CUM/[illegible]
INCLUSION		**CODE:**
COMPLEX		**CODE:**

Notes: (e.g. disturbance, surface water depths, etc.)

- Same as ELC'ed - plant list supplemental @ new access

Plant dumping

- At back [illegible]

LAYERS: **1**=CANOPY>10m **2**=SUB-CANOPY **3**=UNDERSTOREY **4**=GROUND (GRD.) LAYER
ABUNDANCE CODES: **N**=NONE **R**=RARE **O**=OCCASIONAL **A**=ABUNDANT **D**=DOMINANT

SPECIES CODE	LAYER 1	LAYER 2	LAYER 3	LAYER 4	COLL.
POPALB			R		
PICGLAU			R		
FRAMMCR			R		
POPGRAN	R	R	O		
JUGNIGR					
Raicolor		R	R		
PINSYLV		R	R		
Norway Map			R		
ACENEGU	R				
RHACATH					
VIBOPUL					

SPECIES CODE	LAYER 1	LAYER 2	LAYER 3	LAYER 4	COLL.
VICCIA ~~sp.~~ CRAC				O	
Flechane Sp.				O	
goldenrod sp.				A	
PACGLAU				A	
AGROSTIS				A	
BROINER				A	
VITRIPA				O	
DAUCARO				O	
yellow hawkweed				R	
Oxeye daisy				R	
Virg. Creeper					

Page 1 of 1

Print Name: M STRAUS
(Field Notes Author)

Quality Control: This form is complete ☐ & legible ☐

Signature:
(Field Notes QA/QC personnel)

V:\01609\resource\Internal Info and Teams\FIELD FORMS\Vegetation\ELC\elc-wildlife-habitat-form-update_rev-02.docx / (DERIVED FROM LEE ET AL., 1998)

Stantec Consulting Ltd.
1 – 70 Southgate Drive
Guelph, ON
Canada N1G 4P5
Tel: (519) 836-6050
Fax: (519) 836-2493

Wildlife Habitat Assessment Form

Project Number: 6141368?4   Polygon No.: C

Assessment Type: ☐-Visual; no access/☒-Entire; walk through feature/☐-Partial access *(indicate on map)*

Weather Conditions:	TEMP (°C):	WIND:	CLOUD:	PPT:	PPT (last 24 hrs):
	7	0	0	0	0

NOTES & SPECIES OBSERVATIONS (list species and type of observation, indicate on map):

→ skunk

→ cottontail

CA=carcass; DP=distinct ve parts; FE=feeding evidence; FY=eggs/nest; HO=house/den; OB=observed; SC=scat; SI=other sign; TK=track, VO=vocalization

Wildlife Habitat Type & Description	**Site Assessment**	**Photo ID**	**Map ID**	**UTM Coordinates**		
				Zone	**Easting**	**Northing**
ALL SITES						
Bat Hibernacula: Caves, abandoned mines, underground foundations, karst features	Size of opening(s) Bedrock Type Depth of feature (if possible)					
Snake Hibernacula: Burrows, rock crevices, fissures that extend below the frost line (i.e. at least 1 m)	Number of access points Size of opening(s) Substrate →1 rock pile not below frost - on top of ground →no access to bld.					
Bank / Cliff Colonial Bird Nesting Habitat: Exposed soil banks, undisturbed, naturally eroding, steep slopes, cliff faces with evidence of nests or burrows	Size of burrow Number of burrows					
Stick Nests: Stick nests found in any forest/ woodland/swamp; includes heron colonies and bald eagle/ osprey/other raptor nests	Tree species Nest size					
WOODLANDS						
Vernal Pools: Permanent or semi-permanent pool or pond. Evidence of holding water in most years through late spring (i.e. late May) or into summer	Number of features Feature size (diameter) Water depth					
Seeps and Springs: Locations where groundwater comes to the surface in forests (see document for indicator species)	Sub/emergent veg present Shrubs/logs at edge present Water permanency					
WETLANDS						
Turtle Wintering Areas: Permanent water bodies, large wetlands, bogs, or fens with soft substrates and deep enough not to freeze solid	Feature size (diameter) Water depth Substrate of water body Water permanency					
Turtle Nesting Habitat: Exposed mineral soil (sand or gravel) areas adjacent (<100 m) to MAM/SA/BOO/ FEO (note if man-made)	Type of substrate Distance to wetland Size of feature					
Terrestrial Crayfish Habitat: Edges of shallow marshes and meadows (no minimum size) with crayfish chimneys	Number of chimneys					

BATS

→2 trees >10cm assessed for bats

- ACENEGU has a hole from branch but has grown over

No roost trees

→Building - has vents + flight not in place could allow bats in.

Page 2 of 2

Print Name: M STRAUS
(Field Notes Author)

Quality Control: This form is complete ☐ & legible ☐

Signature:
(Field Notes QA/QC personnel

REV: 2014-04-17

Stantec **Stantec Consulting Ltd.**
1 - 70 Southgate Drive, Guelph ON N1G 4P5

Bat Hibernacula Exit Survey

Project Number: 1614 13684
Project Name: 1250 Gordon
Date: June 10, 21
Field Personnel: MSTRAUS

Weather Conditions:

21	15Km/hr E	0	0	0
TEMP (°C)	WIND	CLOUD	PPT (current)	PPT (last 24 hrs)

Feature ID: Monty's Place (indicate on map)
Start/End times (24 hr): 21:00 Start 22:30 End
Tree No.: NE Corner
UTM Coordinates: Zone Easting Northing NE Corner of house
Equipment ID # used: → Sm4-N

Bats Observed Exiting Hibernacula

No. of Bats Observed	Time Recorded	Frequency Range(s)	Probable Species	Recording File No.	Notes

Flyovers

No. of Bats Observed	Time Recorded	Frequency Range(s)	Probable Species	Recording File No.	Notes
?	21:45	?	?	?	heard in opening
					Where bld used to
					be. Didn't see.
					Sounded bat-like.
?	22:05	?	?	?	Same as above.
					insects? bats?
* Northside	Centre:	Sm4-O			
*					

PAGE 1 OF 1
Print Name & Initial: MSTRAUS (field notes author)

Quality Control: This form is complete ☐ & legible ☐
Print Name & Initial: (field notes QA/QC personnel)

Stantec
Stantec Consulting Ltd.
1 - 70 Southgate Drive, Guelph ON N1G 4P5

Bat Hibernacula Exit Survey

Project Number: 16143684

Project Name: Montes Place - Exitsurvey - 1250 Gordon St.

Date: June 10/21

Field Personnel: N. Burnett

Weather Conditions:	21°C	15 Km/hr E	0%	None	None.
	TEMP (°C)	WIND	CLOUD	PPT (current)	PPT (last 24 hrs)

Feature ID: Southeast and front of building. (indicate on map)

Start/End times (24 hr) Start: 21:00 End: 22:30

~~Tree No.~~: Montes Place - House - 1250 Gordon St.

UTM Coordinates: Zone — Easting — Northing

Equipment ID # used: SM4-5 - w/ Nathan, SM4-1 - on front porch.

Bats Observed Exiting Hibernacula

No. of Bats Observed	Time Recorded	Frequency Range(s)	Probable Species	Recording File No.	Notes
0					

Flyovers

No. of Bats Observed	Time Recorded	Frequency Range(s)	Probable Species	Recording File No.	Notes
SM4-5 unit possibly					
picking up					
activity around	9:55-9:59pm				

PAGE 1 OF 1

Print Name & Initial: N. Burnett
(field notes author)

Quality Control: This form is complete ☐ & legible ☐

Print Name & Initial:
(field notes QA/QC personnel)

BADR

Stantec

Legend

- Study Area (120 m)
- Subject Property
- ELC Boundary
- Approximate Wetland Boundary (Stantec 2019)
- Watercourse (Permanent)
- **Woodland Boundary**

ELC Communities

- CUM1- Mineral Cultural Meadow Ecosite
- CUP3-3- Scotch Pine Coniferous Plantation Type
- CUP3- Coniferous Plantation
- CUW- Cultural Woodland
- CVC-1- Business Sector
- CVI-1- Transportation
- CVI-3- Sewage and Water Treatment
- CVR-1- Low Density Residential
- CVR-2- High Density Residential
- CVR-3- Single Family Residential
- FOC2-2- Dry White Cedar Coniferous Forest Type
- FOCM5- Naturalized Coniferous Hedge-row Ecosite
- FOD5-6- Dry – Fresh Sugar Maple – Basswood Deciduous Forest Type
- HR- Hedge-row
- MAM2-2- Reed-canary Grass Graminoid Mineral Meadow Marsh Type
- MAS2-1- Cattail Mineral Shallow Marsh Type
- SWM3-2- Poplar-Conifer Deciduous Mixed Swamp
- WODM4-4- Dry- Fresh Black Walnut Deciduous Woodland Type

0 25 50 Metres

1:2,200 (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, 2018.
3. Orthoimagery © First Base Solutions, 2020. Imagery flown in 2019.

Project Location
City of Guelph

161413684
Prepared by DH on 2020-05-11

Client/Project
TRICAR
1242, 1250, 1260 GORDON ST AND 9 VALLEY RD

Figure No.
3

Title
Vegetation Communities

EAKJ - new planted area

Stantec

Breeding Bird Survey Observation Form

Project Number: 1614 3684
Date: June 2/ 21
Project Name: 1250 Golden
Field Personnel: mShani

Weather Conditions:

7°	0	0	0	0
TEMP (°C)	WIND	CLOUD	PPT (current)	PPT (last 24 hrs)

sunrise @ 5.42

Habitat No.	ELC Code(s) or Habitat Descriptions	TIME (HH:mm) Start	TIME (HH:mm) End
A	Former residence area	550	800
B	[illegible]	550	800
C	"New" Property (Marty's Place	550	800
D	meadow	545	730
E	Woodlot	555	630
F	CUP	555	630

↳ Transects completed by 630AM but remained on site until 8

Breeding Evidence (BE) Codes (Breeding Bird Atlas of Ontario - http://www.birdsontario.org/atlas/codes.jsp?lang=en)

OBSERVED

- **X** Species observed in its breeding season (no breeding evidence)

POSSIBLE

- **H** Species observed in its breeding season in suitable nesting habitat
- **S** Singing male(s) present, or breeding calls heard, in suitable nesting habitat in breeding season

PROBABLE

- **M** At least 7 individuals singing or producing other sounds associated with breeding (e.g., calls or drumming), heard during the same visit to a single square and in suitable nesting habitat during the species' breeding season
- **P** Pair observed in suitable nesting habitat in nesting season
- **T** Permanent territory presumed through registration of territorial song, or the occurrence of an adult bird, at the same place, in breeding habitat, on at least two days a week or more apart, during its breeding season. Use discretion when using this code
- **D** Courtship or display, including interaction between a male and a female or two males, including courtship feeding or copulation
- **V** Visiting probable nest site
- **A** Agitated behaviour or anxiety calls of an adult
- **B** Brood Patch on adult female or cloacal protuberance on adult male
- **N** Nest-building or excavation of nest hole, except by a wren or a woodpecker

CONFIRMED

- **NB** Nest-building or excavation of nest hole by a species other than a wren or a woodpecker
- **DD** Distraction display or injury feigning
- **NU** Used nest or egg shells found (occupied or laid during the survey)
- **FY** Recently fledged young (nidicolous species) or downy young (nidifugous species), including incapable of sustained flight
- **AE** Adult leaving or entering nest sites in circumstances indicating occupied nest
- **FS** Adult carrying fecal sac
- **CF** Adult carrying food for young
- **NE** Nest containing eggs
- **NY** Nest with young seen or heard

PAGE 1 OF ___

Print Name & Initial: MSTRAVS
(field notes author)

Quality Control: This form is complete ☐ & legible ☐

Print Name & Initial: ___
(field notes QA/QC personnel)

CONTINUED SITE: 1260 Aldon DATE: June 2/21 Breeding Bird Survey
Observation Form

Record location of all significant species on site map

Species	Habitats	BE*	Species	Habitats	BE*	Species	Habitats	BE*
Can. Goose	A	FLY	Red-bellied Wo.			**Gold-wing. Wa** † 'Ω**		
Wood Du. 'Ω			**Yell-bellied Sap. ‡'Ω**			Nashville Wa.		
Am. Black Duck 'Ω			Downy Wo.			Yellow Wa.		
Mallard 'Ω			Hairy Wo.			Chestnut-s. Wa.		
R. N. Pheasant			**No. Flicker †**	E2	S	**Magnolia Wa. ‡**		
Ruffed Grouse ‡			**Pileated Wo. ‡'Ω**			**Bl-thr Blue Wa. ‡'Ω**		
W. Turkey			**Ea. Wood-Pewee **†**			**Yel-rumped Wa. ‡**		
Co. Loon ‡'Ω			Alder Fly.			**Bl-thr Gr. Wa. ‡'Ω**		
Pied-b. Grebe 'Ω			**Willow Fly. †'Ω**			**Blackburnian Wa. ‡'Ω**		
D. C. Cormorant ‡			Least Fly.			**Pine Wa. ‡**		
Am. Bittern 'Ω			Ea. Phoebe			**Cerulean Wa** †‡'Ω**		
Least Bittern ‡**			Gr. Crested Fly.			**Bl-and-wh Wa. ‡**		
Gr. B. Heron 'Ω			**Ea. Kingbird †**	D - called 10x4 ft	S	**Am. Redstart ‡**		
Gr. Egret 'Ω			**Yellow-thr. Vireo ‡**			**Ovenbird ‡'Ω**		
Green Heron 'Ω			**Blue-headed Vireo ‡'Ω**			**No. Waterthrush ‡**		
T. Vulture			Warbling Vireo			**Mourning Wa. ‡**		
Osprey 'Ω			Red-eyed Vireo	E,A,D	S	Co. Yellowthroat		
N. Harrier †‡'Ω			Blue Jay	D	S	**Hooded Wa†‡****		
Sharp-sh. Hawk ‡'Ω			Am. Crow	B,F	FY	**Canada Wa. †‡** 'Ω**		
Coopers Hawk ‡'Ω			Co. Raven			**Scarlet Tanager ‡'Ω**		
Red-shou. Hawk †‡'Ω			Horned Lark			**Eastern Towhee †'Ω**		
Red-tailed Hawk			Purple Mart.			Chipping Sp.	C→A,F	P
Am. Kestrel †			Tree Swallow			**Clay-colored Sp. 'Ω**		
Virginia Rail 'Ω			**No. R. W. Swal. 'Ω**			**Field Sp. †'Ω**		
Sora 'Ω			**Bank Swallow †** 'Ω**			**Vesper Sp. †'Ω**		
Killdeer			**Cliff Swallow 'Ω**			**Savannah Sp. †'Ω**		
Spot. Sandpiper			**Barn Swallow****			**Grasshopper Sp. †** 'Ω**		
Upla. Sandpiper ‡'Ω			Bl-capped Chickadee	A	S	Song Sp.	C	S
Wilson's Snipe			Tufted Titmouse			Swamp Sp.		
Am. Woodcock			**Red-br. Nuthatch 'Ω**			**Wh-throated Sp. ‡**		
Ring-b. Gull			Wh-br. Nuthatch	E2	S	No. Cardinal	C	S
Herring Gull			**Br. Creeper ‡**			**Rose-br. Grosbeak †**		
Caspian Tern			Carolina Wren.			Indigo Bunt.		
Black Tern ‡'Ω**			House Wren	A,D	S	**Bobolink †****		
Common Tern			**Winter Wren ‡'Ω**			Red-winged Bl.	B,2,	H, Stage left
Rock Dove			**Sedge Wren 'Ω**			**Ea. Meadowlark †****		
Mourn. Dove	A	S	**Marsh Wren 'Ω**			Co. Grackle		
Yellow-b Cuckoo			**Golded-cr. Kinglet ‡**			Br-headed Cow.	A	S
Black-b Cuckoo †'Ω			**B. G. Gnatcatcher ‡**			Orchard Oriole		
Ea. Screech Owl			Ea. Bluebird			**Baltimore Oriole †**	D	S
Gr. Horned Owl			**Veery 'Ω**			Purple Finch		
Barred Owl ‡'Ω			**Hermit Thrush ‡**			House Finch		
Long-eared Owl			**Wood Thrush †****			Pine Siskin		
No. Saw-whet Owl			Am. Robin	A	A	Am. Goldfinch	A	S
Co. Nighthawk**			Gray Catbird			House Sparrow		
Whip-poor-will †‡**			No. Mockingbird			Other Species ...		
Chimney Swift †**			**Br. Thrasher †'Ω**			NOWA	E2	S
Yellow-b Cuckoo			European Starling	A	FY	[illegible] faint		
Black-b Cuckoo †'Ω			Cedar Waxwing	D	H			
Ea. Screech Owl			**Blue-wing. Wa. †**					

* Record highest Breeding Evidence (BE) observed over all habitat. Use codes as in Breeding Bird Atlas of Ontario (see opposite side of this page).
** Endangered, Threatened or Special Concern
† Partners In Flight
‡ Area Sensitive Species
'Ω Significant Wildlife Habitat Indicator

PAGE 2 OF 2

Print Name & Initial: MSMAVS
(field notes author)

Quality Control: This form is complete ☐ & legible ☐
Print Name & Initial:
(field notes QA/QC personnel)

FORM 031 / REV: 2015-05-28

Stantec Stantec Consulting Ltd.
1 - 70 Southgate Drive, Guelph ON N1G 4P5

Bat Hibernacula Exit Survey

Project Number: 161413684
Project Name: 1250 Gordon.
Date: June 28/21
Field Personnel: M Straus

Weather Conditions:

TEMP (°C)	WIND	CLOUD	PPT (current)	PPT (last 24 hrs)
26°	11 km/hr NW	20	0	0

Feature ID: (indicate on map)
Start/End times (24 hr): Start 21:05 End 22:35

Tree No.: House
UTM Coordinates: Zone Easting Monty's Place Northing

Equipment ID # used: ET-K

Bats Observed ~~Exiting Hibernacula~~ Flyover

No. of Bats Observed	Time Recorded	Frequency Range(s)	Probable Species	Recording File No.	Notes
1	21:30 - ~~21~~45	~~[illegible]~~	~~[illegible]~~ / EPFU		foraging where house was circling around - visible
1	2145		EPFU		
?	- 22 → 2234	various recordings - no visual -	[LACI, EPFU, LANO]		Clearing? Not @ house
1	22:34	↳ LANO?			saw in opening + dove to get prey.

Flyovers

No. of Bats Observed	Time Recorded	Frequency Range(s)	Probable Species	Recording File No.	Notes

---

Feature ID: (indicate on map)
Start/End times (24 hr): Start End

Tree No.:
UTM Coordinates: Zone Easting Northing

Equipment ID # used:

Bats Observed Exiting Hibernacula

No. of Bats Observed	Time Recorded	Frequency Range(s)	Probable Species	Recording File No.	Notes

Flyovers

No. of Bats Observed	Time Recorded	Frequency Range(s)	Probable Species	Recording File No.	Notes

---

PAGE 1 OF 1
Print Name & Initial: M Straus (field notes author)

Quality Control: This form is complete ☐ & legible ☐
Print Name & Initial: (field notes QA/QC personnel)

1 - 70 Southgate Drive, Guelph ON N1G 4P5

Exit Survey

Project Number: 161413684
Date: June 28, 2021
Project Name: 1250 Gordon St.
Field Personnel: Kim Zupfer

Weather Conditions:

TEMP (°C)	WIND	CLOUD	PPT (current)	PPT (last 24 hrs)
27	1	20%	-	-

Feature ID: Monté's Place (indicate on map)
Start/End times (24 hr): Start 9:06pm End 10:36pm
Tree No.: —
UTM Coordinates: Zone Easting Northing
Equipment ID # used: ET - L

Bats Observed Exiting Hibernacula

No. of Bats Observed	Time Recorded	Frequency Range(s)	Probable Species	Recording File No.	Notes
NONE OBSERVED					

Flyovers NONE OBSERVED – RECORDED ON ECHO METER

No. of Bats Observed	Time Recorded	Frequency Range(s)	Probable Species	Recording File No.	Notes
𝍸 |	9:53 – 10:30		LACI		
|	10:06		EPFU		

Feature ID: (indicate on map)
Start/End times (24 hr): Start End
Tree No.:
UTM Coordinates: Zone Easting Northing
Equipment ID # used:

Bats Observed Exiting Hibernacula

No. of Bats Observed	Time Recorded	Frequency Range(s)	Probable Species	Recording File No.	Notes

Flyovers

No. of Bats Observed	Time Recorded	Frequency Range(s)	Probable Species	Recording File No.	Notes

PAGE 1 OF 1
Print Name & Initial: (field notes author)

Quality Control: This form is complete ☐ & legible ☐
Print Name & Initial: (field notes QA/QC personnel)

APPENDIX G
BUTTERNUT DOCUMENTATION

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

September 16, 2020 2347B

Leah Lefler
City of Guelph
Planning and Building Services
Infrastructure, Design and Enterprise
1 Carden St., Guelph N1H 3A1

Dear: Leah Lefler

RE: 1242, 1250, 1260 Gordon Street, Guelph
Butternut Tree Removal Permit

Natural Resource Solutions Inc. (NRSI) was retained by The Tricar Group to prepare a tree permit application for the proposed removal of one Butternut (*Juglans cinerea*) and one Butternut Hybrid, and the proposed harm of one additional Butternut on the subject properties. The location of the butternuts is shown on Map 1. These removal and harm activities will occur in the fall of 2020, outside of the Migratory Bird and Active Bat windows (after September).

NRSI submitted a Butternut Health Assessment Report to the Ministry of Environment, Conservation and Parks (MECP) for these trees on July 12, 2020, and as such, the 30-day review window has passed. It is understood that the City of Guelph requires the landowner obtain a tree permit to remove/harm these butternuts and that a compensation plan must be prepared. Compensation planting and tending activities will follow the requirements of Section 23.7 of Ontario Regulation 242/08 of the Endangered Species Act (ESA 2007). A Notice of Activity has been submitted to MECP.

The following letter provides the details of the proposed compensation measures, including a planting plan that will be carried out on-site.

Tree Compensation

As per field surveys carried out by NRSI, 2 Butternuts and 1 Butternut Hybrid were identified on the subject property, as shown on Map 1. Compensation measures fall into the following categories:

- JUG-001: Category 1 Hybrid Butternut identified by NRSI, proposed for removal – does not require compensation plantings (as per ESA, and as per City of Guelph Private Tree By-law due to poor condition/potential hazard);
- JUG-002: Category 2 Butternut identified by NRSI, proposed for removal – requiring 20 Butternut seedling compensation plantings; and
- JUG-003: Category 2 Butternut identified by NRSI, proposed to be harmed – requiring 10 Butternut seedling compensation plantings.

As such, 30 Butternut seedling plantings are required. The ESA (2007) requires that an equal number of companion plantings also occur near the proposed Butternut seedling plantings to avoid a monoculture.

NRSI is proposing to plant an additional 10 butternut seedlings and 10 companion trees to account for some die-off, for a total of 40 butternut seedlings and 40 companion trees. The location of the proposed butternut seedlings and companion plantings is shown on Map 1. The planting area is located within more open areas within the significant woodland boundary and within the significant woodland buffer.

The Butternut replacement seedlings will be planted in accordance with the following conditions, as stated in Section 23.7 of the ESA:

- at least 3m from other planted Butternut seedlings,
- at least 2m from other trees or shrubs that are likely to be the same height or shorter than the Butternut tree at full growth,
- at least 4m from other trees or shrubs that are likely to be taller than the Butternut tree at full growth,
- at least 5m from the canopy dripline of trees that are greater than 4m in height at the time of planting, and
- at least 100m from a highway consisting of two (2) or more lanes in either direction.

The butternut seedling planting area will accommodate plantings spaced at 3m on-centre. The planting area shown on Map 1 is conceptual and the seedlings will be field-fit within the gaps of the woodland. An additional 15% planting area has been proposed to account for existing vegetation and stoniness of soils.

The companion tree plantings will be located within the gaps of the woodland and up to 5m from the woodland dripline within the buffer. These plantings will be intermixed with the tree violation plantings. Trees will be planted at 2.5m spacing on-centre. An additional 15% planting area has been proposed to account for existing vegetation and stoniness of the soils.

Exact locations of plantings will be determined based predominantly on soil moisture and shade tolerances for the respective species.

Plantings are proposed to be installed in Fall 2020 by NRSI. Herbivory will be a concern on this property, and, as such, smaller planting stock is recommended to allow for the use of 1.2m Tubex Combitube tree tubes.

The proposed species and sizes are listed in Table 1. Exact sizing is subject to change based on availability at the time of planting.

Table 1. Proposed Tree Plantings

Common Name	Scientific Name	Quantity	Size
Butternut	*Juglans cinerea*	40	40-75cm 2 gallon coco fibre
Black Cherry	*Prunus serotina*	10	40-75cm 1 gallon
Sugar Maple	*Acer saccharum*	20	40-60 2x5” plug
Red Oak	*Quercus rubra*	10	40-75cm 1 gallon

All plant material on-site is to:

- Conform to the latest edition of the *Canadian Nursery Trades Association Specifications and Standards, 8th Edition, 2008*.
- Be installed during the appropriate planting season (no later than May 20th or in early October) under ideal conditions to ensure their survival and decrease plant stress.
- Be installed by hand in order to minimize damage to the root zone of existing trees within the planting area.
- Be mulched using coconut mulch/weed mats.
- Be fitted with 1.2m Tubex Combitube tree tubes.

Maintenance and Monitoring

NRSI will tend to (i.e. maintain) each Butternut replacement seedling in accordance with the following conditions, as stated in Section 23.7 of the ESA:

- Tending activities will take place once per week from May 15 to September 20 (i.e. 19 visits) during the first growing season after the Butternut replacement seedlings are planted.
- Tending activities during the first growing season after the Butternut replacement seedlings are planted will include:
    - Maintenance of tree guards/tubes to protect the lower stems from rodents,
    - Vegetation control 60 cm around the base of the trees until the trees are above the herbaceous vegetation, and
    - Watering during drought or low rainfall periods.
- Tending activities will take place during the second growing season after the Butternut replacement seedlings are planted as required, to ensure that:
    - Vegetation is controlled 60 cm around the base of the trees until the trees are above the herbaceous vegetation, and
    - The trees are watered during drought or low rainfall periods. NRSI has assumed 5 site visits between May-September is sufficient to ensure the continued health of seedlings.

Typical monitoring of the companion plantings is recommended for a period of 2 years to ensure the survival of planted stock and the successful establishment of the plantings. It will occur at the one- and two-year mark following the inspection of plantings from the City of Guelph. Monitoring will be conducted by a qualified Certified Arborist from NRSI. It will consist of a visual inspection of the plantings at the end of the year following the installation of stock and any follow-up management will be determined. The City of Guelph requires the survival of at least 30 companion trees at the end of the two-year warranty period. A minimum survival of 30 butternut seedlings must also be met to satisfy the conditions of the ESA. Removal of guards will be done prior to the end of the two-year monitoring period, unless otherwise directed by City staff. A brief memo will be prepared and circulated to the City after the 1-year and 2-year monitoring inspections that summarizes the results of monitoring efforts and provides recommendations for re-plantings, if necessary. If re-plantings are required in Spring 2022, NRSI will meet onsite with City staff to confirm initial acceptance of the plants, as per the Tree Compensation Plan.

Cost

The cost required as a security deposit is $22,549.43. This includes a 5% contingency and HST (13%) as requested by the City of Guelph. A breakdown of costs is found in Table 2 and outlines the costs associated with the required 30 butternut seedling and 30 companion tree plantings.

Table 2. Cost Breakdown for Butternut Tree Compensation Plantings

Item	*Unit Price*	*Quantity*	*Total Cost*
Tree Installation & Tree Protection			
Juglans cinerea 50-75cm 2 gallon coco fibre pot	*$50.00*	*30*	*$1500.00*
Prunus serotina 40-75cm 1 gallon pot	*$25.00*	*10*	*$250.00*
Acer saccharum 40-60cm 2x5" plug	*$10.00*	*10*	*$100.00*
Quercus rubra 40-75cm 1 gallon pot	*$25.00*	*10*	*$250.00*
Coco fibre weed mats	*$3.00*	*60*	*$180.00*
Tree tubes	*$5.00*	*60*	*$300.00*
Wooden stakes	*$5.00*	*75*	*$375.00*
Landscape staples	*$50.00*	*1*	*$50.00*
Labour	-	-	*$3700.00*
Maintenance & Monitoring for 2 years			
Vehicle	*$50.00*	*24*	*$1200.00*
Labour (including reporting)	-	-	*$11100.00*
5% Contingency			*$638.05*
SUBTOTAL			***$19955.25***
HST (13%)			***$2594.18***
TOTAL			***$22549.43***

I trust that the above information is sufficient for addressing the compensation requirements for the proposed removal and harm of butternuts at 1242, 1250, and 1260 Gordon Street. Should you have any questions about this, please do not hesitate to contact the undersigned.

Sincerely,

Natural Resource Solutions Inc.

David Stephenson
Senior Biologist, Certified Arborist

Ken Burrell
Terrestrial Biologist

Laura Hockley

Laura Hockley
GIS Specialist/Environmental Analyst

MAPS

Map 1

Tricar - Gordon Street

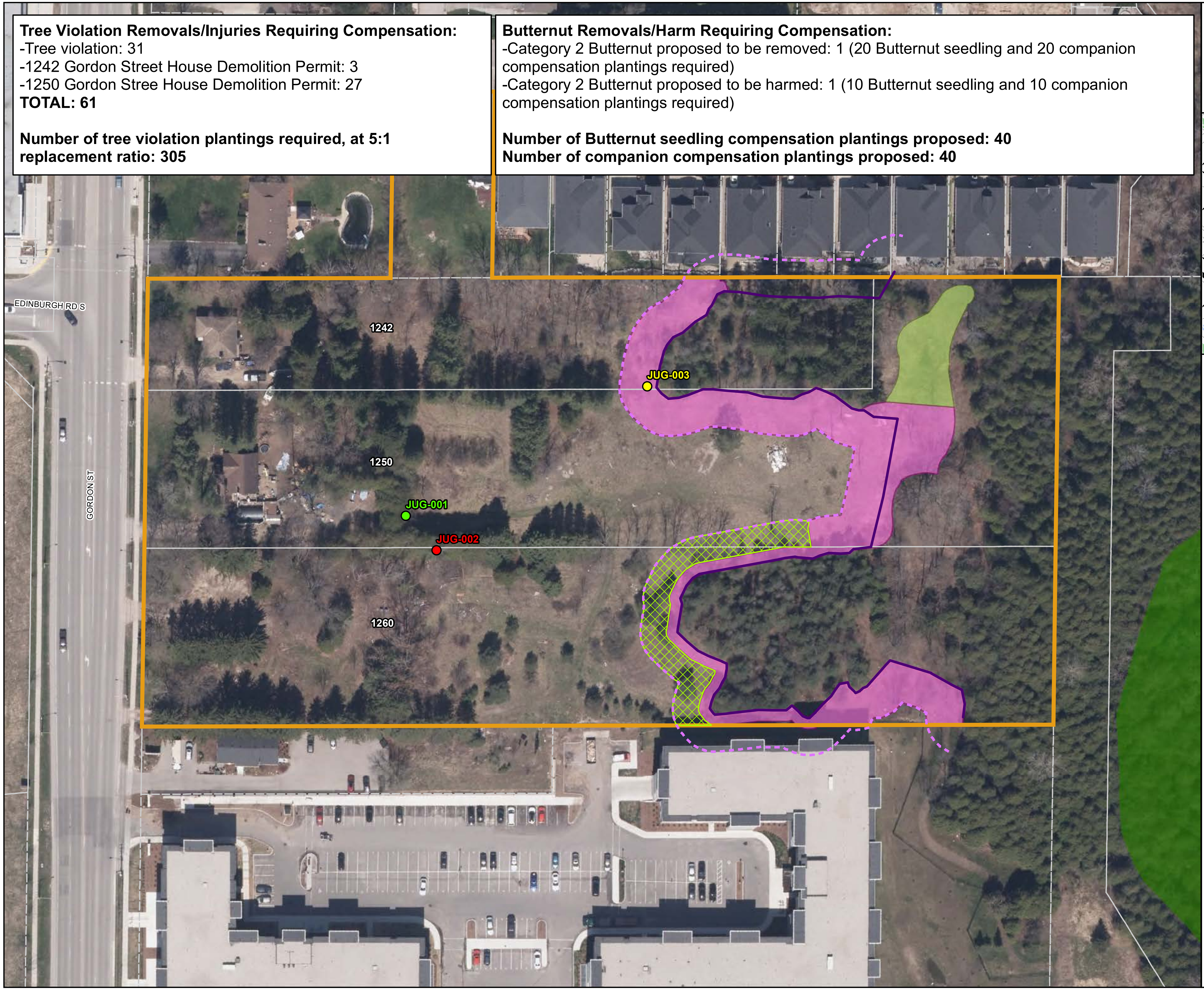
Tree Compensation

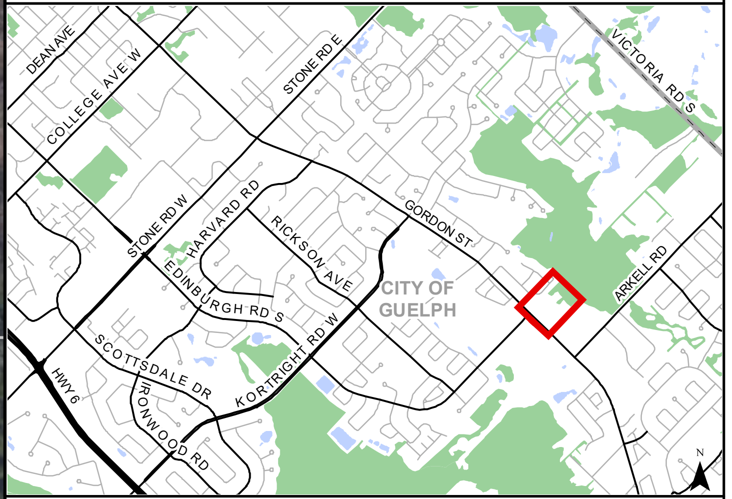
Tree Violation Removals/Injuries Requiring Compensation:
-Tree violation: 31
-1242 Gordon Street House Demolition Permit: 3
-1250 Gordon Stree House Demolition Permit: 27
TOTAL: 61

Number of tree violation plantings required, at 5:1 replacement ratio: 305

Butternut Removals/Harm Requiring Compensation:
-Category 2 Butternut proposed to be removed: 1 (20 Butternut seedling and 20 companion compensation plantings required)
-Category 2 Butternut proposed to be harmed: 1 (10 Butternut seedling and 10 companion compensation plantings required)

Number of Butternut seedling compensation plantings proposed: 40
Number of companion compensation plantings proposed: 40





Legend

🟧	Subject Property
⬚	Parcel Boundary
●	Category 1 Butternut Hybrid Proposed to be Removed
●	Category 2 Butternut Tree Proposed to be Removed
●	Category 2 Butternut Tree Proposed to be Harmed
🟪	Proposed Tree Violation Compensation and Butternut Companion Planting Area (0.248ha)*
🟩	Proposed Butternut Planting Area (0.041ha)†
▨	Additional Planting Area, as Required
- - -	Significant Woodland 10m Setback
—	Significant Woodland Boundary - City of Guelph (October 2014 and July 2017)
🟩	Provincially Significant Wetland (PSW)

*Tree violation and butternut companion planting area size calculated based on 2.5m spacing on-centre at 1,600/ha, with an additional 15% planting area to account for existing vegetation and stoniness of soils.

†Butternut planting area size calculated based on 3.0m spacing on-centre at 1111trees/ha. Butternuts will be planted at least 5.0m from existing tall trees and 4.0m from other planted trees, with an additional 15% planting area to account for existing vegetation and stoniness of soils.

Natural Resource Solutions Inc.
Aquatic, Terrestrial and Wetland Biologists

Map Produced by Natural Resource Solutions Inc. This map is proprietary and confidential and must not be duplicated or distributed by any means without express written permission of NRSI. Data provided by MNRF© Copyright: Queen's Printer Ontario.
Imagery: First Base Solutions Inc. (2019).

Project: 2347
Date: September 1, 2020

NAD83 - UTM Zone 17
Size: 11x17"
1:1,000

0 20 40 60 Metres

N

Path: X:\2347_TricarGordonStreet\NRSI_2347_Map1_TreeCompensation_1K_2020_09_01_LEH.mxd

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Memo

To: **Chris Leigh, Tricar Developments Inc.**
From: **Patrick Deacon, NRSI**
Date: **July 12, 2020**
Re: **Gordon Street, Guelph**
Butternut Health Assessment

Please find enclosed a Butternut Health Assessment Report for the 3 Butternut (*Juglans cinerea*) located at 1242, 1250 and 1260 Gordon Street in Guelph, Ontario.

The information for Tree 372 has been included in this report (based off a previous BHA by Stantec). This was done for clarity and to put all 3 Butternut trees into a single report.

A field hybridity test found Tree 390, to exhibit signs of hybridity, scoring a total of 4 (potentially 5) points in the field hybridity test as per *Identification of Butternuts and Butternut Hybrids* (Farlee et al., undated). Photographs of the traits that were scored are available upon request.

Based on the assessments completed to date, the site contains 2 trees considered Category 2 and subject to permitting and regulation under the Endangered Species Act (ESA), 2007, and 1 tree considered Category 1 (which was determined to be a hybrid and is not protected under the ESA).

Should you have any questions or comments regarding this proposal, please do not hesitate to contact the undersigned.

Sincerely,
Natural Resource Solutions Inc.

Patrick Deacon
Terrestrial and Wetland Biologist, Certified Butternut Health Assessor

Ministry of Natural Resources and Forestry

Species At Risk
P.O. Box 7000, 300 Water Street
Peterborough ON K9J 8M5

Ministère des Richesses naturelles et des Forêts

Espèces en péril
C.P. 7000, 300, rue Water
Peterborough ON K9J 8M5

The enclosed Butternut Health Assessor's Report documents the results of the Butternut health assessment that was conducted by the designated Butternut Health Assessor (BHA) identified in the top section of the report. If there are other Butternut trees (of any size or age) at the site that may be affected by the activity and they are not identified in the enclosed BHA Report, they too must be assessed by a designated BHA.

Butternut is listed as an endangered species on the Species at Risk in Ontario List, and as such, it is protected under the *Endangered Species Act, 2007* (ESA) from being killed, harmed, or removed. If you are planning to undertake an activity that may affect Butternut, you may be eligible to follow the requirements set out in section 23.7 of Ontario Regulation 242/08 under the ESA, or you may need to seek an authorization under the ESA (e.g., a permit).

Please visit e-laws at the link provided below for the legal requirements of eligible activities under section 23.7 of Ontario Regulation 242/08 and conditions that must be fulfilled. Information about Butternut is also available at: http://www.ontario.ca/environment-and-energy/butternut-trees-your-property.

If you are eligible to kill, harm or take Butternut under section 23.7 of the regulation, your first step is to submit the BHA Report and the original data forms enclosed in this package to the local Ministry of Natural Resources and Forestry (MNRF) District Manager. Note that MNRF cannot accept photocopies or scanned electronic copies of the data forms.

Note regarding changes:

If the enclosed BHA Report does not identify which Butternut tree(s) are proposed to be killed, harmed, or taken in Table 1 (i.e., if "unknown" is indicated in the second last column of Table 1), or, if the information in the last two columns of Table 1 has changed since the date this BHA Report was produced, **do not make any edits to the BHA Report**. Instead, please attach a cover letter that identifies which Butternut tree(s) are proposed to be killed, harmed, or taken (by referencing the tree identification numbers) when you submit the enclosed BHA Report to the local MNRF District Manager.

The BHA Report must be submitted at least 30 days prior to registering an eligible activity to kill, harm, or remove a Butternut tree. During this 30 day period, no Butternut trees (of any category) may be killed, harmed, or removed, and MNRF may contact you for an opportunity to examine the trees. If MNRF chooses to examine the trees, a representative of MNRF will contact you using the information you supplied when you submitted the BHA Report.

If you are eligible to follow the rules in regulation under section 23.7, you may register your activity using the “Notice of Butternut Impact” form on the MNRF Registry **after the 30 day period has elapsed**.

If you are **not** eligible to follow the rules in regulation under section 23.7, please contact the local MNRF district office to determine whether you will need to seek an authorization (e.g., a permit). A link to the directory of MNRF offices is provided below.

Note that municipal by-laws and legislation other than the ESA may also be applicable to the removal or harming of trees.

Please retain this information and a copy of the BHA Report (including copies of all data forms) for your records, along with any other documentation you may receive from MNRF should an examination of the trees occur. If you have any questions, please contact your local MNRF district office.

Links:

Endangered Species Act, 2007:
http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_07e06_e.htm

Ontario Regulation 242/08 (refer to section 23.7):
http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_080242_e.htm

MNRF Office Locations:
https://www.ontario.ca/government/ministry-natural-resources-and-forestry-regional-and-district-offices

Butternut Health Assessor's Report Number: 523-026

Patrick Deacon #0523
Natural Resource Solutions Inc.
415 Phillip Street, Unit C
Waterloo, Ontario
N2L 3X2
(519) 725-2227 x407
pdeacon@nrsi.on.ca

Tricar Developments Inc.
3800 Colonel Talbot Road,
London, Ontario
N6P 1H5
(519) 652-8900 (ext 107)
cleigh@tricar.com

Site location: 1242, 1250 and 1260 Gordon St., Guelph, ON

Date(s) of Butternut health assessment: June 9, 2020
Date BHA Report prepared: July 12, 2020

Map datum used: ☒ NAD83 ☐ WGS84

Total number of trees assessed in this BHA Report: 3

The assessed trees were numbered on site using (white flagging tape). The numbers at the site correspond to the tree numbers referenced in this report.

This BHA Report includes the following tables:

- Table 1: Butternut Trees Assessed
- Table 2: Trees Determined by BHA to be Butternut Hybrids
- Table 3: Summary of Assessment Results

Table 1: Butternut Trees Assessed

Tree #	UTM coordinates	Category[1] (1, 2, or 3[2])	dbh[3] (cm)	Cultivated? (Y/N)	Proposed to be: (enter one: unknown[4], killed, harmed or taken)	If tree is proposed to be killed, harmed, or taken, indicate reason tree is proposed to be killed, harmed or taken:
372	17T 564536 4818551	2	18	N	Killed	Tree proposed to be

---

[1] The extent to which the tree is affected by Butternut Canker is presented in the Excel document titled, "BHA Tree Analysis" that accompanies this BHA Report.
[2] Category 3 trees are not eligible to be killed, harmed or taken under section 23.7 of Ontario Regulation 242/08.
[3] dbh: diameter at breast height, rounded to nearest cm (if tree is shorter than breast height, enter zero)
[4] In this column, "unknown" indicates that at the time of assessment, there are no proposals to kill, harm or take this tree that are known to the BHA.

Tree #	UTM coordinates	Category[1] (1, 2, or 3[2])	dbh[3] (cm)	Cultivated? (Y/N)	Proposed to be: (enter one: unknown[4], killed, harmed or taken)	If tree is proposed to be killed, harmed, or taken, indicate reason tree is proposed to be killed, harmed or taken:
						removed
390	17T 564517 4818480	1	15	N	Killed	Tree proposed to be removed
262	17T 564529 4818480	2	29	N	Killed	Tree proposed to be removed

Table 2: Trees Determined by BHA to be Butternut Hybrids

Tree #	UTM coordinates	Method used (genetic testing or field identification):
390	17T 564517 4818480	Field identification

Table 3: Summary of Assessment Results

Result:	Total #:	Important information for persons planning activities that may affect Butternut:
Category 1	0	• A Category 1 tree is one that is affected by butternut canker to such an advanced degree that retaining the tree would not support the protection or recovery of butternut in the area in which the tree is located; and is considered “non-retainable”. • During the 30 day period that follows your submission of this BHA Report to the MNRF District Manager, no Butternut trees (of Category 1, 2, or 3) may be killed, harmed, or taken, and MNRF may contact you for an opportunity to examine the trees. • Category 1 trees may be killed, harmed or taken **after** the 30 day period that follows submission of this BHA Report to the MNRF District Manager, unless the results of an MNRF examination indicate that the assessment has not been conducted in accordance with the document entitled “Butternut Assessment Guidelines: Assessment of Butternut Tree Health for the Purposes of the *Endangered Species Act, 2007”*.
Category 2	2	• A Category 2 tree is one that is not affected by Butternut Canker, or is affected by Butternut Canker but the degree to which it is affected is not too advanced and retaining the tree could support the protection or recovery of butternut in the area in which the tree is located, and is considered “retainable”. • During the 30 day period that follows your submission of this BHA Report to the MNRF District Manager, no Butternut trees (of Category 1, 2, or 3) may be killed, harmed, or taken,

Result:	**Total #:**	**Important information for persons planning activities that may affect Butternut:**
		and MNRF may contact you for an opportunity to examine the trees. • Activities that may kill, harm or take up to a **maximum of ten (10)** Category 2 trees may be eligible to follow the rules in section 23.7 of Ontario Regulation 242/08, in accordance with the conditions and requirements set out in the regulation. • Refer to e-Laws for the legal requirements of eligible activities under section 23.7 of Ontario Regulation 242/08 and conditions that must be fulfilled: http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_080242_e.htm • Activities that may kill, harm or take more than ten (10) Category 2 trees are not eligible to follow the rules in section 23.7 of Ontario Regulation 242/08. Contact the local MNRF district office for information on how to seek an ESA authorization (e.g., a permit) or consider an alternative that would be eligible for the regulation.
Category 3	0	• A Category 3 tree is one that may be useful in determining sources of resistance to Butternut Canker, and is considered "archivable". • Category 3 trees are not eligible to be killed, harmed or taken under section 23.7 of Ontario Regulation 242/08. • Contact the local MNRF district office for information on how to seek an ESA authorization, or consider an alternative that will avoid killing, harming or taking any Category 3 trees.
Cultivated	0	• An activity that involves killing, harming, or taking a cultivated Butternut tree that was not required to be planted to fulfill a condition of an ESA permit or a condition of a regulation, may be eligible for the exemption provided by subsection 23.7 (11) of O. Reg. 242/08. • Prior to undertaking the activity, the owner or occupier of the land on which the Butternut is located (or person acting on their behalf) will need to determine whether the exemption for cultivated trees is applicable by determining whether or not the tree was cultivated as a result of the requirements for an exemption under O. Reg. 242/08 or a condition of a permit issued under the ESA. This information can be accessed by contacting the local MNRF district office. • The owner or occupier of the land on which the Butternut is located (or person acting on their behalf) is encouraged to append the details regarding whether the tree was planted to satisfy a requirement (e.g., the permit number or registration number) to this BHA Report for their records.
Hybrid	1	• Hybrid Butternut trees are not protected under the ESA, but their removal may be subject to municipal by-laws and other legislation.

Butternut Health Assessor's Comments:

The details for Tree 372 were taken from a previous BHA (Stantec). This was done for clarity to put all 3 trees on a single BHA and consolidate information as opposed to submitting various piecemeal reports for a single development site. Tree 372 was not re-assessed and is presumed to remain a Category 2 tree as per the previous assessment.

This concludes the summary of the BHA Report. A complete BHA Report must also include:

1. All original (hard copy) data forms (i.e., all completed sets of Form 1 and Form 2), and
2. Electronic and printed copies of the Excel data analysis spreadsheet.

BHA Tree Analysis (version: December 2013)

This table is to be completed by a designated Butternut Health Assessor (BHA).

BHA Report #	**26**	**Assessment Date(s)**	**9-Jun-20**	**Total # Butternut Trees in BHA Report**	**3**
BHA ID #	**523**	**BHA Name**	**Patrick Deacon**		
Landowner / Client Name			**Tricar Developments Inc.**		
Property Location	**1242, 1250 and 1260 Gordon St., Guelph, ON**				

input field data										automatic calculations from field data						**Categories: 1: non-retainable, 2: retainable, 3: archivable**				
Tree #	Live Crown %	Tree dbh (cm)	# bole cankers				# root flare (RF) cankers		<40 m from cankered tree? **(Y or N)**	**Circ.** (cm) = Pi x dbh	total **bole canker width** (sooty x 2.5 + open x 5)	total **RF canker width** (sooty x 2.5 + open x 5)	bole canker **%** of circ.	RF canker **%** of circ.	total bole & root canker % of 2xCirc	LC% >/= 50 & BC% = 0	LC% >70 & BRC % <20	LC% >70 & BC % <20	**Preliminary tree call**	**FINAL TREE CALL** a Cat 2, dbh>20cm <40m from a Cat 1
			sooty (S) (will be assigned 2.5 cm per canker)		open (O) (will be assigned 5 cm per canker)															
			S **<**2 m	S **>**2 m	O **<**2 m	O **>**2 m	RF S	RF O		**Circ** (cm)	**BC** (cm)	**RC** (cm)	**BC%**	**RC%**	**BRC%**					
372	75	18	0	0	0	0	0	0	n	56.52	0.0	0.0	**0.0**	**0.0**	**0.0**	2	2	2	**2**	**2**
390	5	15	13	8	0	0	7	0	n	47.1	52.5	17.5	**111.5**	**37.2**	**74.3**	1	1	1	**1**	**1**
262	90	29	3	1	0	0	4	0	n	91.06	10.0	10.0	**11.0**	**11.0**	**11.0**	1	2	2	**2**	**2**
4										0	0.0	0.0	**#####**	**#####**	**#####**	####	###	###	**##**	**#DIV/0!**
5										0	0.0	0.0	**#####**	**#####**	**#####**	####	###	###	**##**	**#DIV/0!**
6										0	0.0	0.0	**#####**	**#####**	**#####**	####	###	###	**##**	**#DIV/0!**
7										0	0.0	0.0	**#####**	**#####**	**#####**	####	###	###	**##**	**#DIV/0!**
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10										0	0.0	0.0	**#####**	**#####**	**#####**	####	###	###	**##**	**#DIV/0!**
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19										0	0.0	0.0	**#####**	**#####**	**#####**	####	###	###	**##**	**#DIV/0!**
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21										0	0.0	0.0	**#####**	**#####**	**#####**	####	###	###	**##**	**#DIV/0!**
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26										0	0.0	0.0	**#####**	**#####**	**#####**	####	###	###	**##**	**#DIV/0!**
27										0	0.0	0.0	**#####**	**#####**	**#####**	####	###	###	**##**	**#DIV/0!**
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31										0	0.0	0.0	**#####**	**#####**	**#####**	####	###	###	**##**	**#DIV/0!**

0cm 3cm 15cm

Butternut Data Collection Form 1 - 2010 Edition

Surveyor ID or BHA # 0523

(PLEASE USE BLOCK LETTERS)

Date (dd/mm/yyyy) 09-06-2020

Shaded fields are mandatory for Butternut Health Assessments

Surveyor Contact

First PATRICK Last DEACON

Email pdeacon@nrsi.on.ca

Telephone (519)725-2227 Telephone Other ( ) - x

Property Owner (check if same as surveyor) ☐

First Last

or Company TRICAR DEVELOPMENTS

Email cleigh@tricar.com

Telephone (519)652-8900 Telephone Other ( ) - x

Property Owner's Mailing address

Address 3800 COL TALBOT ROAD Postal Code N6P1H5 Prov. ON

City LONDON

Tree Location (if different from mailing address)

Address/(911#) 1242, 1250, 1260 GORDON STREET

Township Lot Con

Directions City GUELPH

☑ Yes ☐ No Can Share Location Information with other Butternut Recovery Organizations?

☑ Yes ☐ No Site visits OK? (prior arrangments will always be made for a site vist)

\> (Greater than)
< (Less than)

Butternut Trees Tally by Diameter Class

(Do a dot tally in blank space; write total# in box for each)

Tree Condition	< 3 cm	3-15 cm	16-30cm	>30 cm
Vigorous: > 50% Live Crown Minor or no cankers	00	00	02	00
Poor Vigor: <50% Live Crown or >50% Live Crown + heavily cankered stem	00	01	00	00
Dead	00	00	00	00

Historically, do some trees produce seeds? ☑ Y ☐ N ☐ Unkown

Estimated area containing butternut for properties > 1 acre (0.4 hectares) 002 ☐ Acres ☑ Hectares

Tree 372 part of previous BHA, included here to have all 3 trees on same file.

Overall Property Description (area(s) containing Butternut)

☐ Rolling Upland
☐ Valley Slope
☑ Tableland
☐ Bottomland
☐ Variable
☐ Unknown

Vegetation Community/ies

☐ Open
☐ Shrubland
☐ DeciduousForest
☐ ConiferForest
☐ MixedForest
☐ Fencerow
☐ Roadside
☐ Quary
☑ UrbanYard
☐ UrbanPark

Other

Soil Drainage

☐ Well Drained
☑ Moderately Drained
☐ Poorly Drained
☐ Unknown

Soil Depth

☑ > 1metre
☐ 30 - 99cm
☐ < 30cm
☐ Variable
☐ Unknown

Soil Texture

☐ Clay
☐ Clay Loam
☑ Loam
☐ Loamy Sand
☐ Sand
☐ Variable
☐ Unknown

Please enter matching numerical page link code on forms 1 and 2

Page Link 564517

(Contact Information follows all applicable privacy policies and guidelines)

Please return forms to:
Forest Gene Conservation Association
Suite 233, 266 Charlotte St.
Peterborough, ON, K9J 2V4
www.fgca.net

49731

Butternut Data Collection FORM 2 (2010 Edition) (PLEASE USE BLOCK LETTERS)

Shaded fields are mandatory for Butternut Health Assessments

Fill when Form 1 indicates canker is well established. The information opn Form 2 must be filled out for all trees when doing a Butternut Health Assessment.

Site Code(A,B,...Z, AA...): A

Surveyor ID or BHA #: 0523

Surveyor Last Name: DEACON

Date (dd/mm/yyyy): 09-06-2020

Tree ID Numbering: 1,2,3,...Starting from 1 for each site

Tree #: 390 Zone: 17 Easting: 564517 Northing: 4818480

Crown Class: 1 Live Crown %: 005 Main Stem Length(m) Below crown: 08

☑ Twig Dieback
☑ Branch Dieback
☐ Defoliation
☐ Discolouration

#Stems: 1
DBH(cm): 015

Butternut Origin: ☐ Natural ☐ Planted ☑ Unknown

Seed Signs: ☐ Male Flowers ☐ Female Flowers ☑ Seed Set ☐ None

Assess below live crown

#Epic-Live: 02
#Epic-Dead: 04
Bark Type: S
Callused Wounds: 01

	#Open	#Sooty
Root	00	07
=<2m	00	13
>2m	00	08

Metres from badly cankered tree: ☐ < 40 ☐ > 40 ☑ None Found

Competing Species: —

Field hybridity test indicates tree is a hybrid (scores 4 pts as per Farlee et al.)

Tree #: 262 Zone: 17 Easting: 564529 Northing: 4818480

Crown Class: 1 Live Crown %: 090 Main Stem Length(m) Below crown: 09

☑ Twig Dieback
☐ Branch Dieback
☐ Defoliation
☐ Discolouration

#Stems: 1
DBH(cm): 029

Butternut Origin: ☐ Natural ☐ Planted ☑ Unknown

Seed Signs: ☐ Male Flowers ☐ Female Flowers ☐ Seed Set ☑ None

Assess below live crown

#Epic-Live: 00
#Epic-Dead: 00
Bark Type: S
Callused Wounds: 01

	#Open	#Sooty
Root	00	04
=<2m	00	03
>2m	00	01

Metres from badly cankered tree: ☐ < 40 ☐ > 40 ☑ None Found

Competing Species: —

Tree #: 372 Zone: 17 Easting: 564536 Northing: 4818551

Crown Class: 1 Live Crown %: 075 Main Stem Length(m) Below crown: 04

☐ Twig Dieback
☐ Branch Dieback
☐ Defoliation
☐ Discolouration

#Stems: 1
DBH(cm): 018

Butternut Origin: ☐ Natural ☐ Planted ☑ Unknown

Seed Signs: ☐ Male Flowers ☐ Female Flowers ☐ Seed Set ☑ None

Assess below live crown

#Epic-Live: 00
#Epic-Dead: 00
Bark Type: S
Callused Wounds: 00

	#Open	#Sooty
Root	00	00
=<2m	00	00
>2m	00	00

Metres from badly cankered tree: ☐ < 40 ☐ > 40 ☑ None Found

Competing Species: —

Previous BHA by Stantec, data presented here.

Tree #: Zone: 1 Easting: Northing:

Crown Class: Live Crown %: Main Stem Length(m) Below crown:

☐ Twig Dieback
☐ Branch Dieback
☐ Defoliation
☐ Discolouration

#Stems:
DBH(cm):

Butternut Origin: ☐ Natural ☐ Planted ☐ Unknown

Seed Signs: ☐ Male Flowers ☐ Female Flowers ☐ Seed Set ☐ None

Assess below live crown

#Epic-Live:
#Epic-Dead:
Bark Type:
Callused Wounds:

	#Open	#Sooty
Root		
=<2m		
>2m		

Metres from badly cankered tree: ☐ < 40 ☐ > 40 ☐ None Found

Competing Species:

Tree #: Zone: 1 Easting: Northing:

Crown Class: Live Crown %: Main Stem Length(m) Below crown:

☐ Twig Dieback
☐ Branch Dieback
☐ Defoliation
☐ Discolouration

#Stems:
DBH(cm):

Butternut Origin: ☐ Natural ☐ Planted ☐ Unknown

Seed Signs: ☐ Male Flowers ☐ Female Flowers ☐ Seed Set ☐ None

Assess below live crown

#Epic-Live:
#Epic-Dead:
Bark Type:
Callused Wounds:

	#Open	#Sooty
Root		
=<2m		
>2m		

Metres from badly cankered tree: ☐ < 40 ☐ > 40 ☐ None Found

Competing Species:

Please enter matching page link code on forms 1 and 2

Page Link: 564517

(Contact Information follows all applicable privacy policies and guidelines)

Please return forms to:
Forest Gene Conservation Association
Suite 233, 266 Charlotte St.
Peterborough, ON, K9J 2V4
www.fgca.net

49731

APPENDIX H
FUNCTIONAL SERVICING REPORT

Functional Servicing Report for 1242, 1250, 1260 & 1270 Gordon Street and 9 Valley Road – Guelph ON

June 8, 2022

Prepared for:

Tricar Developments Inc.

Prepared by:

Stantec Consulting Ltd.
600-171 Queens Avenue
London ON N6A 5J7

This document entitled Functional Servicing Report for 1242, 1250, 1260 & 1270 Gordon Street and 9 Valley Road – Guelph ON was prepared by Stantec Consulting Ltd. (“Stantec”) for the account of Tricar Development Inc. (the “Client”) for submission to the City of Guelph for Zoning Bylaw Amendment Approval. Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

LICENSED PROFESSIONAL ENGINEER
C. J. HENDRIKSEN
100125181
Jun 13/22
PROVINCE OF ONTARIO

Approved by ____
(signature)

Chris Hendriksen, P.Eng.

Table of Contents

1.0 INTRODUCTION AND BACKGROUND

1.1 OVERVIEW

This Functional Servicing Report has been prepared in support of the Zoning and Official Plan amendment and the Site Plan Application for the proposed development located at 1242, 1250, 1260 & 1270 Gordon Street and 9 Valley Road (Site) in the City of Guelph (City). The subject property is approximately 3.323 ha in size and is bounded to the northwest by existing residential subdivision, to the northeast by protected woodlot, to the southwest by Gordon Street, and to the southeast existing high-density development.

The conceptual site plan for the proposed development that forms the basis of this servicing assessment includes two 10 story apartment buildings consisting of 325 units. The bulk of site parking will be achieved through underground and at/above grade enclosed parking.

This report outlines how the proposed development can be supplied with adequate services, including sanitary, domestic water, storm drainage and includes the preliminary design of the infiltration and water quality facilities proposed to provide the required water quality and quantity controls and the preliminary erosion and sediment control strategy to be implemented during construction.

1.2 BACKGROUND INFORMATION

A variety of sources have been referenced during the preparation of this report, and the following should be read in conjunction with this Report:

- Geotechnical Engineering Report, Two 12-Storey Apartment Buildings 1242, 1250, 1260 Gordon Street, Guelph, Ontario (CMT Engineering Inc, April 2018)
- Low Impact Development Stormwater Management Planning and Design Guide (Credit Valley Conservation Authority and Toronto and Region Conservation Authority, 2010)
- Erosion & Sediment Control Guideline for Urban Construction, (Greater Golden Horseshoe Area Conservation Authorities, December 2006)
- Stormwater Management Planning and Design Manual (SWMPD Manual), (Ontario Ministry of the Environment, March 2003)
- Development Engineering Manual, City of Guelph (City of Guelph Engineering and Transportation Services, January 2019)
- Groundwater Flow, Figure 14 of 1242, 1250, 1260 Gordon Street and 9 Valley Road Hydrogeological Assessment (Stantec Consulting Ltd., March 2020)

- Hanlon Creek Watershed Plan (Marshal Macklin Monaghan Ltd., LGL Ltd., October 1993)
- Torrance Creek Subwatershed Study- Management Strategy (Totten Sims Hubicki Associates, et al, September 1998)

1.3 EXISTING INFRASTRUCTURE

A summary of the municipal infrastructure that currently exists near the Site is as follows:

- A 200mm sanitary sewer located on Gordon Street.
- A 400mm watermain on Gordon.
- A 575mm storm sewer on Gordon Street.

Fully constructed municipal roads include Gordon Street to the west and Valley Road to the north.

2.0 OVERALL GRADING AND DRAINAGE

2.1 DESIGN CONSTRAINTS AND PROCEDURES

Using existing topographic information provided by BSR&D limited (dated November 2014), the proposed Site grading will be designed to generally meet the following criteria:

- Match existing grades at all site boundaries.
- Match existing grades at existing tree driplines wherever possible to facilitate tree retention.
- Extension of Edinburgh Road and Valley Road to municipal standards and match into existing road grades of Gordon Street and Valley Road.
- Account for future urbanization of adjacent lands.
- Have consideration for future pedestrian connections north of the site towards Valley Road.
- Provide adequate cover over underground services.
- Ensure all building openings are protected from flooding.
- Comply with Municipal standards for minimum and maximum grades.
- Provide major overland flow routes for flows exceeding the storm sewer capacity.
- Maintain drainage from Gordon Street right-of-way and neighboring properties to the north and south.

2.2 PROPOSED ROAD PROFILES AND OVERALL SITE GRADING

Road profiles within the subject site were established based on the proposed street pattern to satisfy the constraints outlined in the previous Section 2.1. The road profiles have been designed to accommodate the constraints set out by the site layout and underground parking limits with grades ranging from 0.5% to 8.0% with 3:1 and 4:1 transition slopes or retaining walls utilized to accommodate the various grade changes within the site and at various perimeter locations. The proposed centerline road elevations for the extension Landsdown Drive and Edinburgh Road and lot grades are illustrated on the Grading plan as well as the plan and profile provided for these extensions (Drawing No. 5 of 8 and 4 of 8 respectively) included in Appendix A. Existing grades and cross sections of Gordon Street and Valley Road have been considered fixed constraints in the development of the preliminary grading. The extension of Landsdown Drive and Edinburgh Road will be 8.4m back of curb to back of curb as per City of Guelph’s Linear Infrastructure Standard drawing SD-48a. Internal roads, consisting of 6.7m wide asphalt as the building has structured parking not subject to the standard 7.0m minimum width drive aisle.

3.0 SANITARY SERVICING

The City of Guelph is currently completing the Gordon Street Improvements EA and an overall Master Wastewater Servicing Plan that is considering an upgrade to the sanitary service capacity within Gordon Street fronting the site. Through correspondence with the City in 2019 through 2022, the proposed development will be incorporated in the design of the sanitary sewer upgrades. Confirmation of this has been received from Ike Umar via email on March 15, 2022 (see email correspondence attached in Appendix C). Staff have recommended that an H be applied to the property until such time as the sewer has been installed and the outlet is available however timing of the two projects may alleviate this requirement.

A 200mm extension of the municipal sanitary sewer east on the Edinburgh Road extension proposed as part of this redevelopment to provide service to the site. Sewers will be designed in accordance with the requirements of the Ontario Building Code and the City of Guelph. An illustration of the sanitary sewer layout can be found in the Sanitary Area Plan (Sheet No. 3 of 8) included in Appendix A.

4.0 WATER DISTRIBUTION

The existing water distribution system near the Site includes a 400mm watermain on Gordon Street. The primary source for the proposed development will be the Gordon Street watermain. It is anticipated that the following work to the existing municipal infrastructure will be made:

- Tapping sleeve and valve connection to the 400mm Gordon Street watermain (200mm connection).
- Extension of the municipal watermain along the Edinburgh Road extension to provide service to the Site.

Please refer to the Preliminary Servicing plan (Drawing No. 1 of 8) for an illustration of the watermain layout.

Based on building information currently available, a conservative fire flow requirement for the site is 150 L/s, based on typical OBC calculations as provided in Appendix B.

A 200 mm diameter watermain is proposed for the development with 200mm connections provided to each building. They are positioned as illustrated on the Preliminary Servicing plan (Drawing No. 1 of 8).

Fire protection will be provided via onsite hydrants, adequately spaced to ensure proper coverage to all buildings, in conjunction with standpipe connections for building sprinkler systems. The City of Guelph will confirm the pipe sizing proposed provides adequate pressure to meet MOE design criteria. No backflow prevention or pressure reducing valves (PRV) have been proposed for this development.

The City has advised that sufficient and adequate capacity is available in the City's existing water supply and distribution system to accommodate the proposed development and there are no water capacity constraints expected for most demand scenarios. However, 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 scenario at locations with elevation greater than 339 m height AMSL in the existing water system.

5.0 STORMWATER MANAGEMENT (SWM) STRATEGY

5.1 STORMWATER MANAGEMENT CRITERIA

This site is covered by criteria from different documents. The documents and site criteria are discussed below.

5.1.1 Hanlon Creek Watershed Plan (HCWP)

The HCWP states that for upper Hanlon Creek development no urban drainage will be permitted to the headwaters of Tributary E or F, except for lands that already have drainage outlets. All stormwater generated from the area must either infiltrate into the ground or evaporate (100-year infiltration and zero runoff). There is no discussion in the report on requirements for redeveloping lands within the existing development areas where this project is located.

5.1.2 Torrance Creek Subwatershed Study (TCSS)

The TCSS states that for Zone 2, where this site is located, the requirement is to detain the post-development flow to pre-development ratees for the 2- to 100-year events and to infiltrate 150 mm/yr.

5.1.3 City of Guelph Development Engineering Manual

The specific SWM Criteria for the Site from the City of Guelph Development Engineering Manual (January 2019) is outlined below.

Water Quantity Control

- Based on City Guidelines, on-site stormwater control should be sized to attenuate post-development peaks flows to the pre-development (existing) peak flows. This ‘post-to-pre’ control should be provided for the 2-year through to the 100-year storm events.

Water Quality Control

- Based on City guidelines, the feasibility of on-site infiltration should be investigated. All developments are required to provide a minimum of Enhanced water quality level protection (i.e., 80% TSS removal). It is recommended for small development sites (approximately 2 ha) a treatment train approach be followed.

5.1.4 Criteria for the Site

The HCWP appears to be more applicable to development in the upper Hanlon Creek areas, with drainage to Tributaries E and F. The project site is located in the ‘existing development’ area within the study and is not specifically addressed within the plan and drains to Tributary D.

Additionally, the GRCA mapping for the site shows a recharge of 122-199 mm/year and runoff of 118-207 mm/year while sites within the Upper Hanlon Creek area have a recharge of 315-371 mm/year and a runoff of 0 mm/year, showing that the flow regime for the two areas is obviously different.

Based on the above information, it was decided that applying the TCSS criteria to the site was a reasonable approach based on the information available. The SWM criteria for the site are as follows:

- Attenuate post-development peak flows to pre-development rates for the 2-year though 100-year storm events
- Maintain infiltration balance
- Minimum of Enhanced Water Quality Protection.

5.2 SOILS INFORMATION

Site soil properties were confirmed using the Geotechnical Investigation Report (XCG Consulting Ltd., April 2018), which outlined soil conditions for the site as per tested boreholes. It was confirmed that site soils can be expected to be sand – silt with traces of clay, with overall good drainage properties. For this analysis, site soils were classified as BC, which was deemed to be a conservative estimate.

Infiltration rates for the site were determined to be approximately 23 mm/hr for the south portion of the site and 32 mm/hr for the east portion of the site. These design rates were calculated by Stantec Consulting Ltd. (Stantec) based on test pit and infiltration testing completed in June 2021.

A hydrogeologic assessment of the Site was completed by Stantec, and is documented in the Hydrogeological Report, 1242, 1250, 1260 Gordon Street, and 9 Valley Road, City of Guelph (Stantec, 2020 and as amended). In the Site monitoring well MW5 – 18S a high water table elevation of 340.3 m was recorded. The groundwater flow follows a similar divide as surface water, with a portion flowing east as part of the Torrance Creek Watershed, and another portion flowing west as part of the Hanlon Creek Watershed.

5.3 HYDROLOGIC MODELING

A hydrologic model was prepared to simulate drainage conditions for the subject development. MIDUSS was used to predict flows for the existing and proposed development conditions and to design the SWM system to ensure the previously mentioned criteria were achieved.

To address the criteria, existing and post-development conditions were modeled for the 2 year, 5 year and 100 year 3-hour Chicago design storms, derived using the City of Guelph parameters as provided in Table 1.

Table 1: City of Guelph – Chicago Storm Parameters

Storm Event	a	b	c	Duration (hrs.)	Depth (mm)
2-year	743	6	0.798	3	34
5-year	1593	11	0.879		47
100-year	4688	17	0.925		87

5.4 EXISTING CONDITIONS

The proposed development encompasses 3.323 ha and 5 residential properties however this infill project is unique with a portion of the site being dedicated as municipal right-of-way with different controls and so for the purposes of the proposed site SWM design, the existing site is defined by lands outside the municipal right-of-way being 3.05 ha including 4 residential properties with gravel/asphalt driveways. A large portion of the site is a woodlot area, associated with the Torrance Creek Swamp (Provincially Significant Wetland), and generally has steep slopes (approximately 5 %). A portion of the properties drain to an existing storm sewer on Gordon Street. The drainage catchments are shown on Figure 1, attached, and are summarized below.

- **Catchment 101** – A 1.33 ha area that includes residential homes, with storm water out-letting to Gordon Street to the west.
- **Catchment 102** – A 1.72 ha undeveloped area, which discharges as shallow overland flow to the woodlot to the east, part of the Torrance Creek Swamp

5.5 PROPOSED CONDITIONS

The proposed site plan includes two 10-storey apartment buildings, with two levels of underground parking. The proposed drainage catchments are summarized in detail below and shown in Figure 2, attached. Generally, the proposed conditions will increase the area out-letting to Gordon Street to the west and will reduce the area out-letting to the Torrance watershed to the east. The development will also increase the impervious area and will produce an increase in stormwater flows to the downstream Gordon Street storm sewer.

- **Catchment 201** – A 0.09 ha building/landscaped area that will drain uncontrolled to Gordon Street to the west.
- **Catchment 202** – A 0.24 ha roof top area. Runoff from this area will be attenuated by a roof-top control system (Zurn Z105 Control-Flo Roof Drain, or approved equivalent), controlling 100-year storm event runoff to a rate of 42L/s/ha (industry standard). The first 25 mm of runoff will be directed to an infiltration chamber (StormTech® SC-310) while overflows will be directed to a subsurface stormwater detention facility (StormTech® M-3500) and ultimately the Gordon Street storm sewer.
- **Catchment 203** – A 0.24 ha rooftop area. Runoff from this area will be attenuated by a roof-top control system (Zurn Z105 Control-Flo Roof Drain, or approved equivalent), controlling 100-year storm event runoff to a rate of 42L/s/ha (industry standard). Rooftop runoff will discharge to a clearstone infiltration gallery designed to infiltrate the runoff from a 25 mm event, with overflows discharging overland the Torrance Creek Swamp.
- **Catchment 204** – A 0.51 ha area, including the parking area, lane-way and small portions of landscape. Runoff will be collected by catchbasins and conveyed via a storm sewer system to a StormTech® infiltration chamber. Prior to discharging to the chamber, flows will be treated with an oil/grit-separator and StormTech® Isolator Row Plus, to minimize the potential for clogging. Flows exceeding that capacity of the infiltration chamber will discharge to an underground StormTech® stormwater detention facility (StormTech® M-3500) and ultimately the Gordon Street storm sewer.
- **Catchment 205** – A 0.23 ha designated park area draining uncontrolled east to the Torrance Watershed.
- **Catchment 206** – A 1.41 ha undeveloped woodlot area draining uncontrolled east to the Torrance Watershed.
- **Catchment 207** – A 0.15 ha landscaped area that will outlet to the StormTech® subsurface stormwater detention facility.
- **Catchment 208** – A 0.06 ha amenity area, which will flow uncontrolled to the Gordon Street storm sewer.
- **Catchment 209** – A 0.12 ha parking area, with minor flows (up to the 5-year storm event) collected via parking lot structure roof drains and conveyed south to the StormTech® infiltration chamber (StormTech® SC-310) while overflows will be directed to a subsurface stormwater detention facility (StormTech® M-3500) and ultimately the Gordon Street storm sewer. Major flows (larger than the 5-year storm event) will outlet via overland flow to Street A and ultimately the Gordon Street storm sewer.

- **Catchment 210** – 0.11 ha of Street A right-of-way. Street A is a proposed municipal right-of-way not part of the proposed development. Based on discussions with the City of Guelph water quantity controls are not required for this portion of the site, and therefore has only been included in figures for completeness.

5.6 STORMWATER MANAGEMENT

5.6.1 Water Quantity Controls

Water Quantity controls for the subject site will be provided through the use of rooftop flow controls, infiltration chambers/galleries and a subsurface stormwater management facility.

5.6.2 Infiltration Augmentation

Two infiltration facilities have been provided augment infiltration of site runoff.

The east infiltration gallery is a 7.5 m (W) x 10 m (L) x 1 m (D) clearstone infiltration gallery designed to infiltrate the runoff from Building 2 (easternmost building, Catchment 203) under the 25 mm storm event. Overflows from the gallery will discharge overland to the Torrance Creek Swamp east of the site. An infiltration rate of 32 mm/hr was assumed based on the Hydrogeological Report (Stantec, 2020 and as amended)

The south infiltration gallery has been designed to infiltrate the runoff from Catchment 202, 204 and 209 under the 25 mm storm event. The volume of the proposed chamber is 116 m³ and is comprised of StormTech® SC-310 units (drawings attached). Overflows will discharge to a subsurface stormwater detention facility, prior to discharging to the Gordon Street Storm Sewer. An overflow weir with an elevation equal to the obvert of the infiltration chamber has been provided in MH6 direct flows to the gallery prior to overflow discharge to the downstream system. An infiltration rate of 23 mm/hr was assumed based on the Hydrogeological Report (Stantec, 2020 and as amended)

5.6.3 StormTech® Subsurface SWM Facility

A StormTech® M-3500 subsurface SWM facility has been proposed in the southwest portion of the property to provide water quantity controls for runoff draining to Gordon Street. The proposed facility is 553 m³ with outflows controlled through the use of a 75 mm diameter orifice provided in CBMH1.

5.6.4 Hydrologic Modeling Results

Table 2 summarizes the pre- and post-development modeling results for the site.

Storm Event	Existing Flow Rates to Outlet (m^3/s)	
	Gordon Street (101)	Torrance Creek Watershed (102)
2-yr	0.03	0.02
5-yr	0.04	0.04

100-yr	0.19	0.25
Storm Event	**Proposed Flow Rates to Outlet (m^3/s)**	
	Gordon Street (201, 202, 204, 207, 208, 209)	**Torrance Creek Watershed (203,205, 206)**
2-yr	0.03	0.02
5-yr	0.04	0.05
100-yr	0.13	0.28

Torrance Creek Watershed

As shown in Table 2, post-development flows to the Torrance Creek watershed are proposed to have a minor increase over the pre-development flow rates during the modeled storm events. Based on the hydrologic modeling the increase in flows is primarily a result of uncontrolled runoff from Catchments 205 (Future Park Block) and 206 (landscaped area on the east portion of the site) and the result of shorter flow paths than under pre-development conditions. It is noted that the Torrance Creek Swamp adjacent to the site is significantly larger than the subject site with an even larger contributing watershed. It is not expected that this minor increase in flows (30 L/s in the 100-year storm event) will have significant impact on the downstream Torrance Creek Swamp or downstream infrastructure (which will be buffered by the Torrance Creek Swamp).

Gordon Street

As shown in Table 2, the proposed SWM controls satisfy water quantity targets to Gordon Street.

5.6.5 Water Quality Controls

Torrance Creek

Catchments contributing to the Torrance Creek watershed consist of rooftop runoff (Catchment 203), Park Block (Catchment 205) and Landscaped Area (Catchment 206). Runoff from these areas can be considered clean, and no additional water quantity controls are required.

Gordon Street / Infiltration Chamber

Water quality controls for the parking lot and driveway areas conveyed to the infiltration chamber and subsurface stormwater detention facility will be provided through a treatment train approach. An OGS (ADS FD-4HC or approved equivalent) has been sized to provide an enhanced level of water quality control upstream of the infiltration chamber. In addition, a StormTech Isolator Row Plus ® has been provided at the inlet of the chamber to filter out suspended solids prior to distribution throughout the facility, and alone exceeds the requirement TSS removal to provide an enhanced level of water quality control. Uncontrolled areas fronting Gordon Street are landscaped areas and can be considered clean.

Water quality calculations have been attached for reference.

Street A

An OGS (ADS FD-4HC or approved equivalent) has been provided for Street A, prior to discharging to the Gordon Street storm sewer. The OGS has been sized to provide an enhanced level of water quality treatment for the Street A right-of-way. Calculations have been attached for reference.

5.7 SALT MANAGEMENT

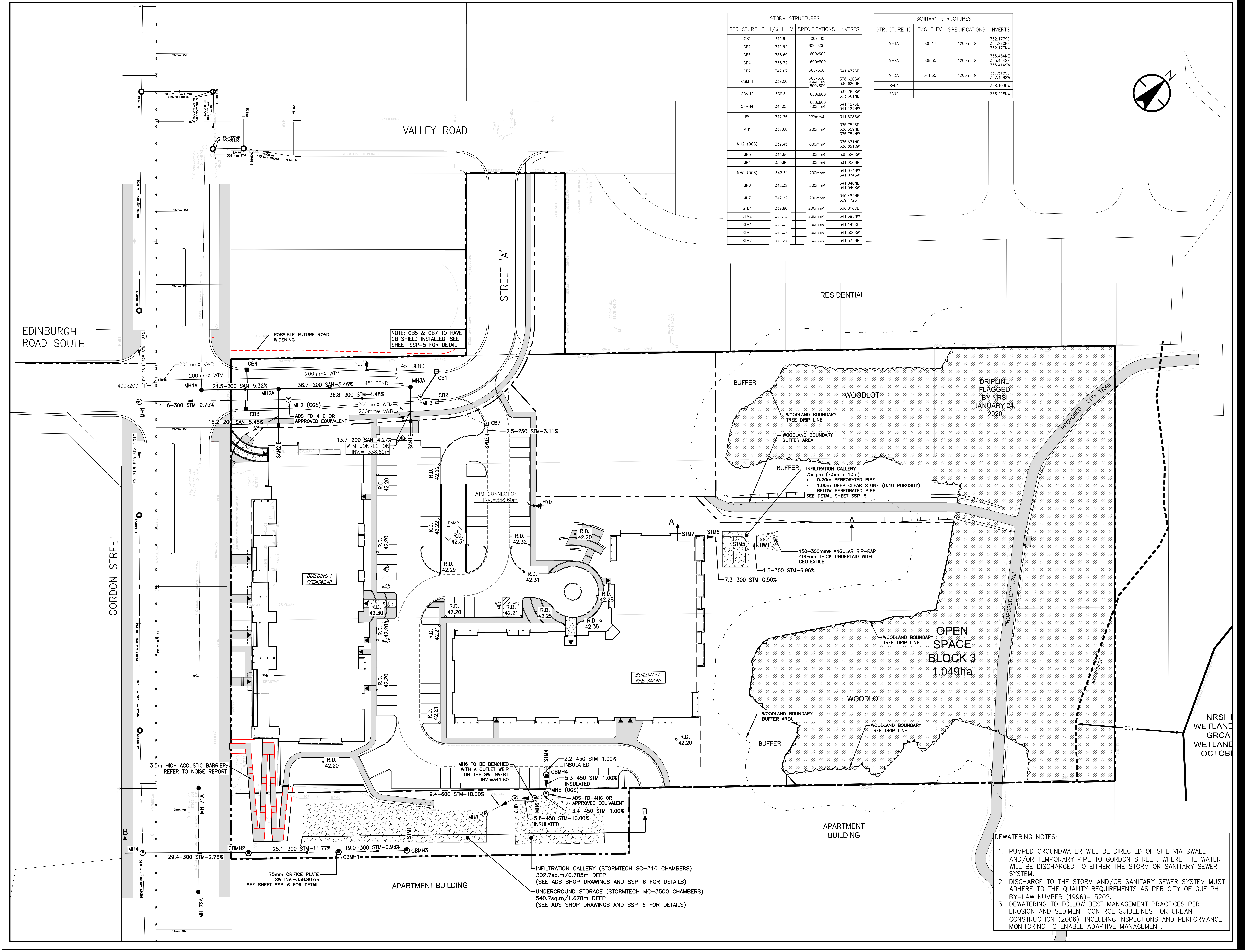
In order to meet water balance criteria, the infiltration of treated parking lot runoff was necessary. In order to mitigate the discharge of chloride laden water into the groundwater system, it is recommended that salt application for winter maintenance is prohibited and that site owners employ non-chloride salt alternatives.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the preceding report, the following conclusions can be drawn:

- Sanitary service is provided by the proposed upgrade to the municipal system located on Gordon Street just west of the site access.
- Water service is provided from the existing 400mm watermain on Gordon Street fronting this site.
- Enhanced (Level 1) water quality control will be provided for the parking lot and driveway runoff through the use of an OGS and Stormtech Isolator Row Plus® treatment train
- The proposed rooftop storage, infiltration chamber and subsurface stormwater detention facility provide water quantity controls prior to discharge to Gordon Street.

APPENDIX A – PRELIMINARY CIVIL DRAWING PACKAGE



STORM STRUCTURES			
STRUCTURE ID	T/G ELEV	SPECIFICATIONS	INVERTS
CB1	341.92	600x600	
CB2	341.92	600x600	
CB3	338.69	600x600	
CB4	338.72	600x600	
CB7	342.67	600x600	341.472SE
CBMH1	339.00	600x600 1200mmø	336.620SW 336.620NE
CBMH2	336.81	600x600 1200mmø	332.762SW 333.661NE
CBMH4	342.03	600x600 1200mmø	341.127SE 341.127NW
HW1	342.26	???mmø	341.508SW
MH1	337.68	1200mmø	335.754SE 336.309NE 335.754NW
MH2 (OGS)	339.45	1800mmø	336.671NE 336.621SW
MH3	341.66	1200mmø	338.320SW
MH4	335.90	1200mmø	331.950NE
MH5 (OGS)	342.31	1200mmø	341.074NW 341.074SW
MH6	342.32	1200mmø	341.040NE 341.040SW
MH7	342.22	1200mmø	340.482NE 339.172S
STM1	339.80	200mmø	336.810SE
STM2	341.75	200mmø	341.395NW
STM4	342.00	200mmø	341.149SE
STM6	342.32	200mmø	341.500SW
STM7	342.24	200mmø	341.536NE

SANITARY STRUCTURES			
STRUCTURE ID	T/G ELEV	SPECIFICATIONS	INVERTS
MH1A	338.17	1200mmø	332.173SE 334.270NE 332.173NW
MH2A	339.35	1200mmø	335.464NE 335.464SE 335.414SW
MH3A	341.55	1200mmø	337.518SE 337.468SW
SAN1			338.103NW
SAN2			336.298NW

DEWATERING NOTES:

1. PUMPED GROUNDWATER WILL BE DIRECTED OFFSITE VIA SWALE AND/OR TEMPORARY PIPE TO GORDON STREET, WHERE THE WATER WILL BE DISCHARGED TO EITHER THE STORM OR SANITARY SEWER SYSTEM.
2. DISCHARGE TO THE STORM AND/OR SANITARY SEWER SYSTEM MUST ADHERE TO THE QUALITY REQUIREMENTS AS PER CITY OF GUELPH BY-LAW NUMBER (1996)-15202.
3. DEWATERING TO FOLLOW BEST MANAGEMENT PRACTICES PER EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN CONSTRUCTION (2006), INCLUDING INSPECTIONS AND PERFORMANCE MONITORING TO ENABLE ADAPTIVE MANAGEMENT.

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Liability Note:

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Notes

1. CITY OF GUELPH BENCHMARK 225 ELEVATION 338.665 LOCATION: 1221 GORDON STREET
2. EXISTING SURVEY COMPLETED BY BSR&D (NOVEMBER, 4 2014)
3. THE CONTRACTOR IS TO VERIFY ALL EXISTING ELEVATIONS AND EXISTING CONDITIONS AND TO REPORT ANY DISCREPANCIES TO THE CONSULTING ENGINEER

Legend

▬ ▪ ▬ ▪ ▬	SITE LIMIT
	EX. STORM SEWER
	PROPOSED STORM SEWER
	EX. SANITARY SEWER
	PROPOSED SANITARY SEWER
● S2	PROPOSED SANITARY MANHOLE
◉ R2	PROPOSED STORM MANHOLE
◙ CBMH1	PROPOSED CATCHBASIN MANHOLE
☐ CB or CICB	PROPOSED CATCHBASIN
◉ EX. MH	EX. MANHOLE
☐ EX. CB	EX. CATCHBASIN
	PROPOSED WATERMAIN
	EX. WATERMAIN
	PROPOSED 3-WAY FIRE HYDRANT C/W STORZ CONNECTION
	EX. FIRE HYDRANT
	PROPOSED WATER VALVE
	EX. WATER VALVE
Ⓜ	BULK WATER METER

	By	Appd.	YY.MM.DD
1. PER CITY COMMENTS	JAC	CJH	22.05.31
Revision			

	By	Appd.	YY.MM.DD
2. ISSUED FOR DRAFT PLAN APPROVAL	JAC	CJH	22.05.31
1. ISSUED FOR DRAFT PLAN APPROVAL	JAC	CJH	21.08.24
Issued			

	Dwn.	Chkd.	Dsgn.	YY.MM.DD
File Name: 161413684_c-db	JAC	CJH	JAC	21.07.23

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C. J. HENDRIKSEN
100125181
May 31/22

Client/Project

TRICAR DEVELOPMENTS INC.

1242, 1250, 1260 GORDON STREET
& 9 VALLEY ROAD
GUELPH, ON

Title

SERVICING PLAN

Project No. 161413684
Scale 1:500 0 5 15 25m

Drawing No. SSP-1
Sheet 1 of 8
Revision 1

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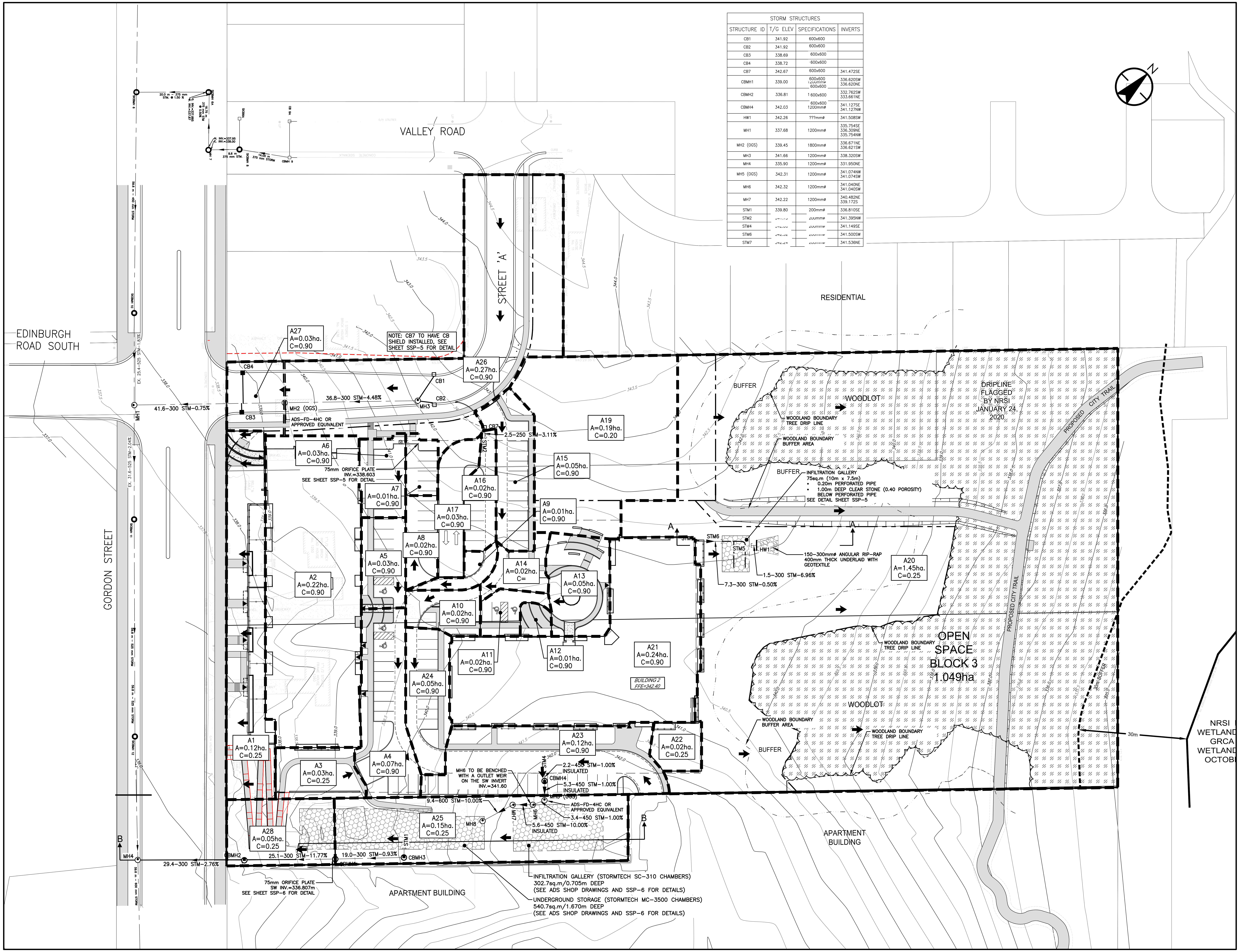

STORM STRUCTURES			
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CBMH4	342.03	600x600 1200mmø	341.127SE 341.127NW
HW1	342.26	???mmø	341.508SW
MH1	337.68	1200mmø	335.754SE 336.309NE 335.754NW
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STM6	[illegible]	[illegible]	341.500SW
STM7	[illegible]	[illegible]	341.536NE

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Notes

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Legend

A1 A=0.23ha. C=0.25	AREA ID CONTRIBUTING AREA (ha) RUNOFF COEFFICIENT
↑	MAJOR OVERLAND FLOW ROUTE
▬ ▬ ▬	DRAINAGE BOUNDARY

1. PER CITY COMMENTS	JAC	CJH	22.05.31
Revision	By	Appd.	YY.MM.DD

2. ISSUED FOR DRAFT PLAN APPROVAL	JAC	CJH	22.05.31
1. ISSUED FOR DRAFT PLAN APPROVAL	JAC	CJH	21.08.24
Issued	By	Appd.	YY.MM.DD

File Name: 161413684_c-sd	JAC	CJH	JAC	21.07.23
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

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100125181
May 31/22

Client/Project

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1242, 1250, 1260 GORDON STREET
& 9 VALLEY ROAD
GUELPH, ON

Title

STORM DRAINAGE AREA PLAN

Project No. 161413684

Scale 1:400 0 4 12 20m

Drawing No. SSP-2

Sheet 2 of 8

Revision 1

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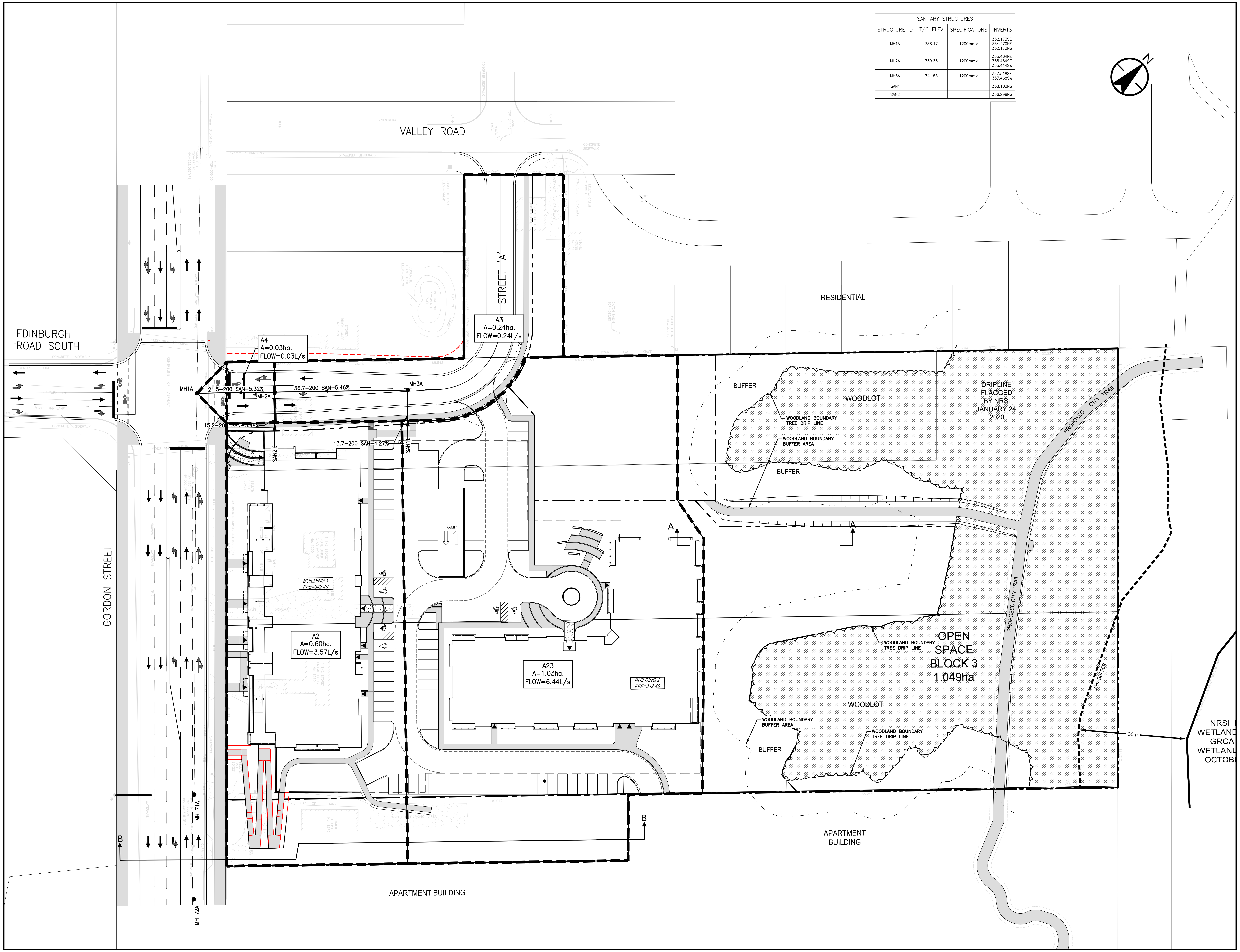

SANITARY STRUCTURES			
STRUCTURE ID	T/G ELEV	SPECIFICATIONS	INVERTS
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MH3A	341.55	1200mmø	337.518SE 337.468SW
SAN1			338.103NW
SAN2			336.298NW

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Legend

A1	AREA ID
A=0.92ha.	CONTRIBUTING AREA (ha)
FLOW=6.44L/s	FLOW RATE (7L/s/ha. APARTMENTS–1L/s/ha. RESIDENTIAL)
▬ ▬ ▬	DRAINAGE BOUNDARY

Revision	By	Appd.	YY.MM.DD
1. PER CITY COMMENTS	JAC	CJH	22.05.31

Issued	By	Appd.	YY.MM.DD
2. ISSUED FOR DRAFT PLAN APPROVAL	JAC	CJH	22.05.31
1. ISSUED FOR DRAFT PLAN APPROVAL	JAC	CJH	21.08.24

	Dwn.	Chkd.	Dsgn.	YY.MM.DD
File Name: 161413684_c-ss	JAC	CJH	JAC	21.07.23

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May 31/22

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1242, 1250, 1260 GORDON STREET
& 9 VALLEY ROAD
GUELPH, ON

Title

SANITARY DRAINAGE AREA PLAN

Project No. 161413684

Scale 1:500 0 5 15 25m

Drawing No. SSP-3

Sheet 3 of 8

Revision 1

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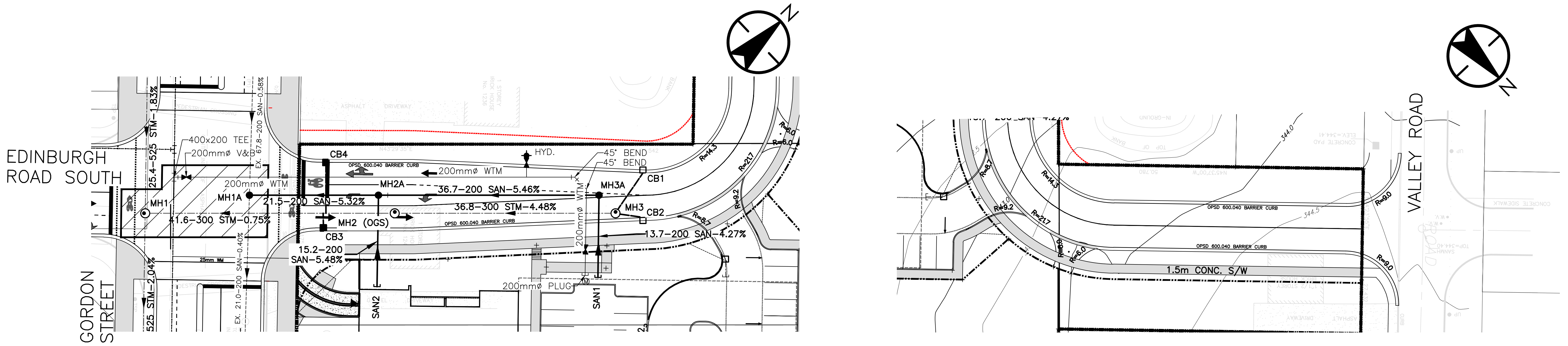
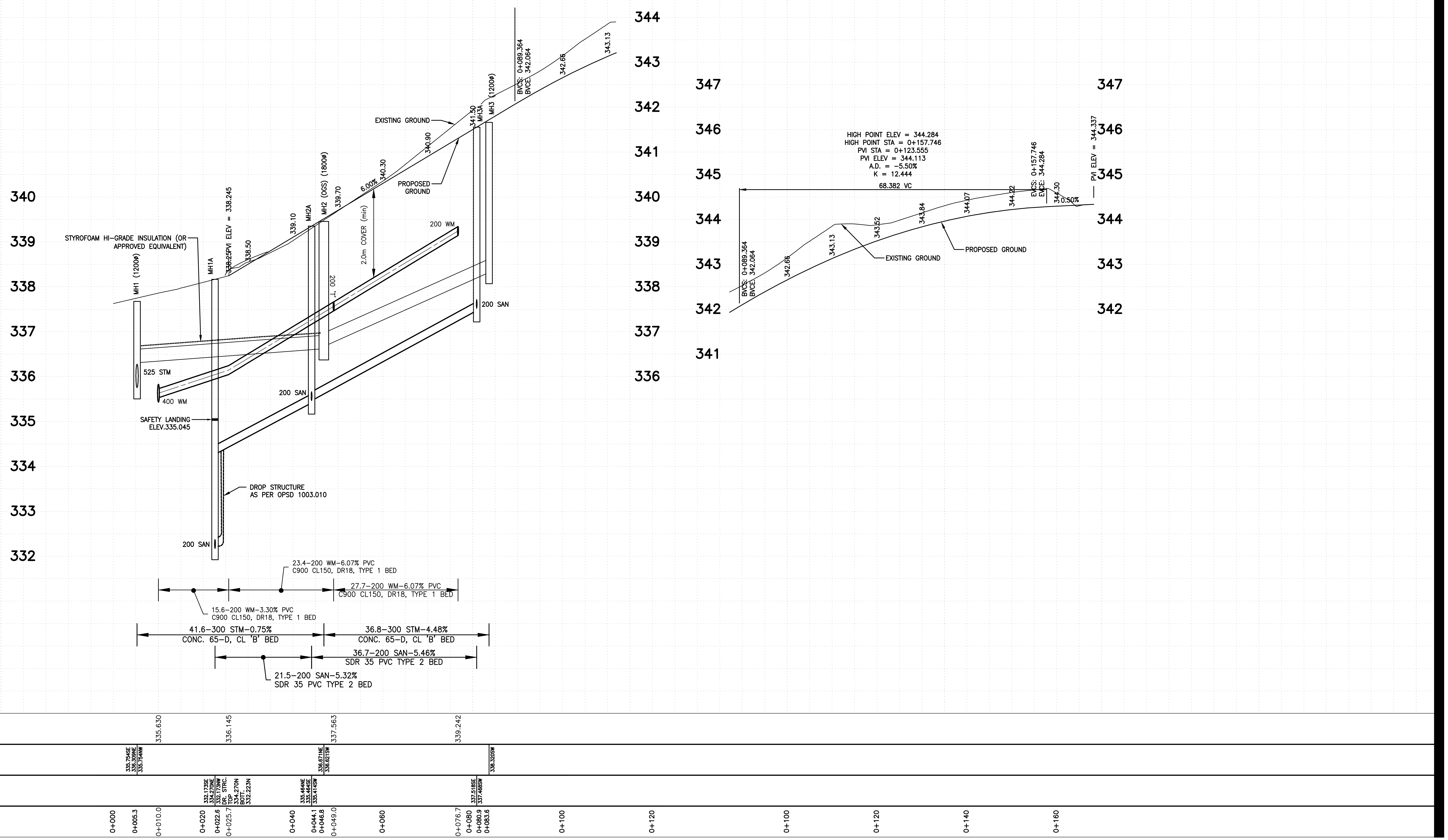
ORIGINAL SHEET - ANSI D



STREET 'A'

OPSD 600.040 CONCRETE BARRIED CURB WITH STANDARD GUTTER



Stantec
600-171 Queens Avenue
London ON N6A 5J7
Tel. 519-645-2007
www.stantec.com

Liability Note:

The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay.

Notes

1. CITY OF GUELPH BENCHMARK 225 ELEVATION 338.665 LOCATION: 1221 GORDON STREET
2. EXISTING SURVEY COMPLETED BY BSR&D (NOVEMBER, 4 2014)
3. THE CONTRACTOR IS TO VERIFY ALL EXISTING ELEVATIONS AND EXISTING CONDITIONS AND TO REPORT ANY DISCREPANCIES TO THE CONSULTING ENGINEER

Legend

SITE LIMIT
EX. STORM SEWER
PROPOSED STORM SEWER
EX. SANITARY SEWER
PROPOSED SANITARY SEWER
● S2 PROPOSED SANITARY MANHOLE
R2 PROPOSED STORM MANHOLE
CBMH1 PROPOSED CATCHBASIN MANHOLE
☐ CB or CICB PROPOSED CATCHBASIN
EX. MH EX. MANHOLE
☐ EX. CB EX. CATCHBASIN
PROPOSED WATERMAIN
EX. WATERMAIN
PROPOSED 3-WAY FIRE HYDRANT C/W STORZ CONNECTION
EX. FIRE HYDRANT
PROPOSED WATER VALVE
EX. WATER VALVE
▨ RESTORATION LIMITS WITH LAP JOINT PER 509.010

1. PER CITY COMMENTS	JAC	CJH	22.05.31
Revision	By	Appd.	YY.MM.DD

2. ISSUED FOR DRAFT PLAN APPROVAL	JAC	CJH	22.05.31
1. ISSUED FOR DRAFT PLAN APPROVAL	JAC	CJH	21.08.24
Issued	By	Appd.	YY.MM.DD

File Name: 161413684_c-st	JAC	CJH	JAC	21.07.23
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

C. J. HENDRIKSEN
100125181
May 31/22

Client/Project

TRICAR DEVELOPMENTS INC.

1242, 1250, 1260 GORDON STREET
& 9 VALLEY ROAD
GUELPH, ON

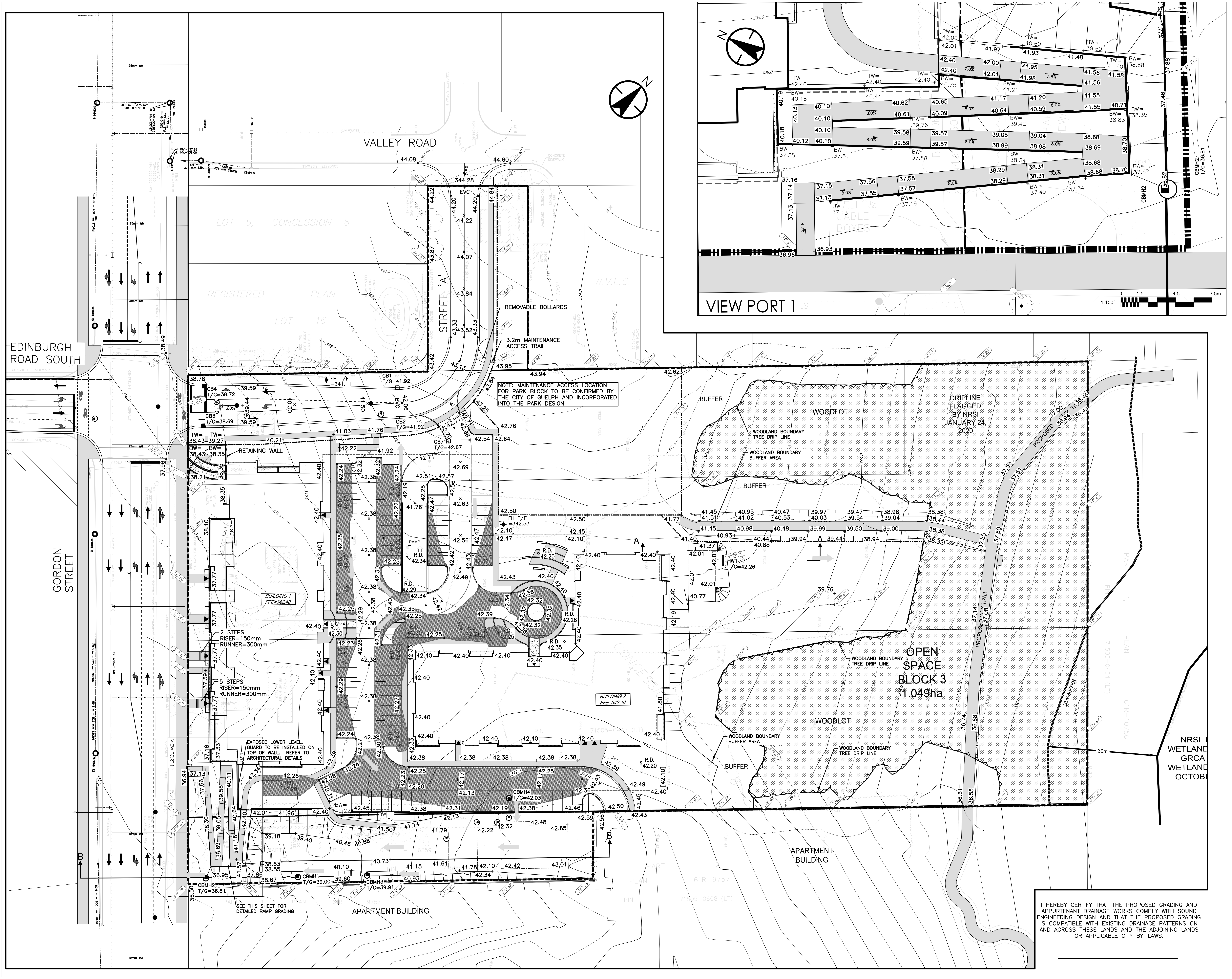
Title

STREET 'A'
PLAN & PROFILE

Project No. 161413684
Scale 1:500 0 5 15 25m

Drawing No. SSP-4
Sheet 4 of 8
Revision 1

ORIGINAL SHEET - ANSI D



I HEREBY CERTIFY THAT THE PROPOSED GRADING AND APPURTENANT DRAINAGE WORKS COMPLY WITH SOUND ENGINEERING DESIGN AND THAT THE PROPOSED GRADING IS COMPATIBLE WITH EXISTING DRAINAGE PATTERNS ON AND ACROSS THESE LANDS AND THE ADJOINING LANDS OR APPLICABLE CITY BY–LAWS.

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2022-6-1 10:06 AM by: Childs, Jason

ORIGINAL SHEET - ANSI D

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Legend

←	PROPOSED SWALE
⊙	PROPOSED STORM MANHOLE
⊙	PROPOSED STORM CATCH BASIN MANHOLE
●	PROPOSED SANITARY MANHOLE
⊙	EX. STORM MANHOLE
⊙	EX. SANITARY MANHOLE
□	PROPOSED CATCH BASIN
□	EX. CATCH BASIN
•75.95	PROPOSED GRADES
•75.95 (SP)	PROPOSED OVERLAND FLOW SPILL POINT
75.95	EXISTING GRADES
⇦	MAJOR OVERLAND FLOW ROUTE
▬ ▮ ▮ ▬	SITE BOUNDARY
•71.77 (SW)	PROPOSED SWALE GRADE
180.5	EXISTING CONTOURS
←	FLOW DIRECTION
✦	HYDRANTS

1. PER CITY COMMENTS	JAC	CJH	22.05.31
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	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

C. J. HENDRIKSEN
100125181
May 31/22

Client/Project

TRICAR DEVELOPMENTS INC.

1242, 1250, 1260 GORDON STREET
& 9 VALLEY ROAD

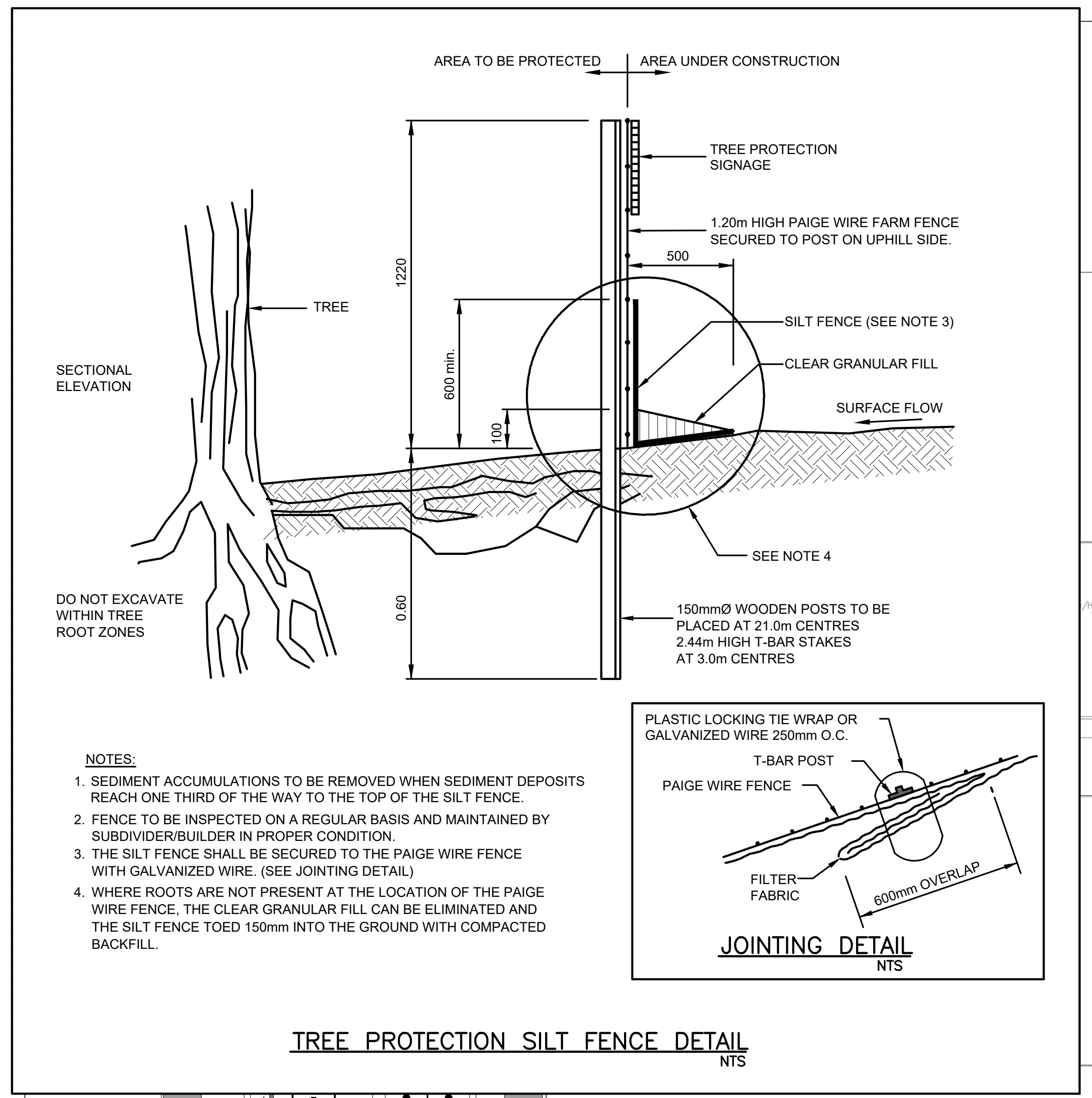
GUELPH, ON

Title

GRADING PLAN

Project No.	Scale
161413684	1:500 0 5 15 25m

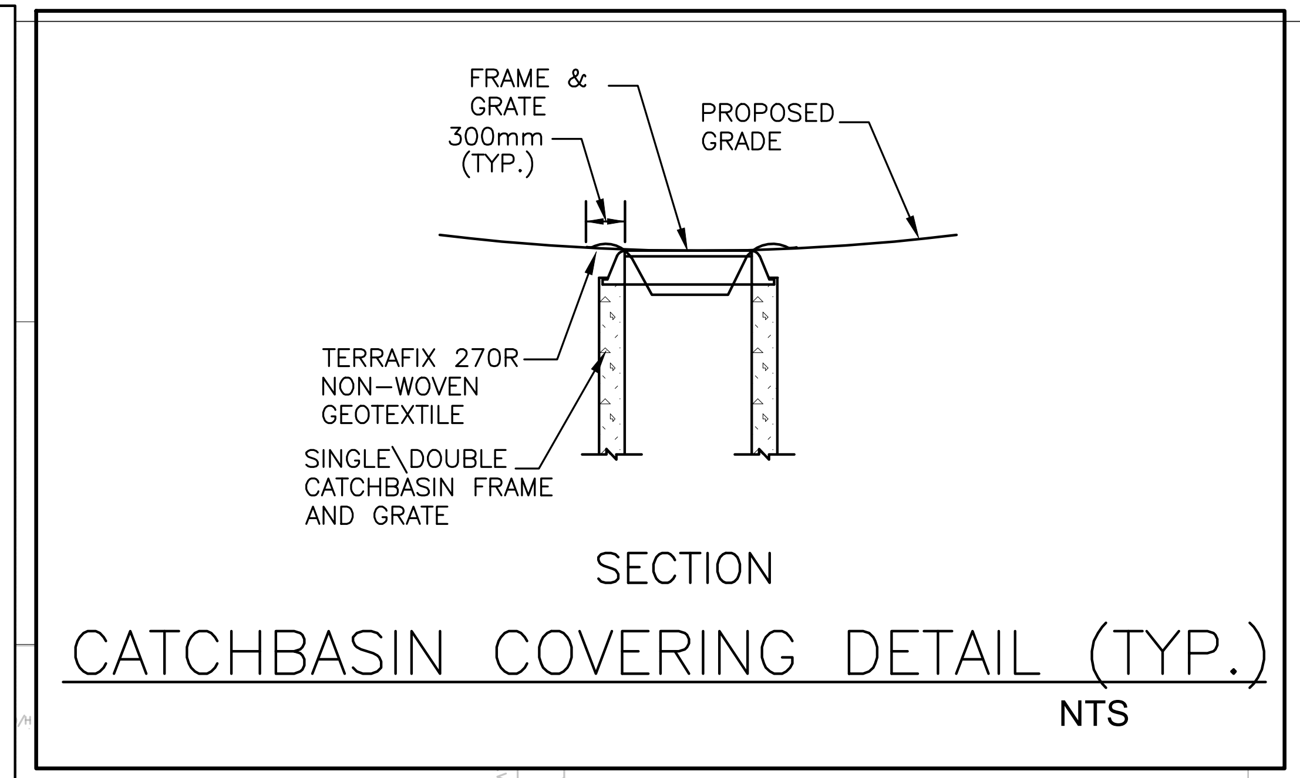
Drawing No.	Sheet	Revision
GP-1	5 of 8	1



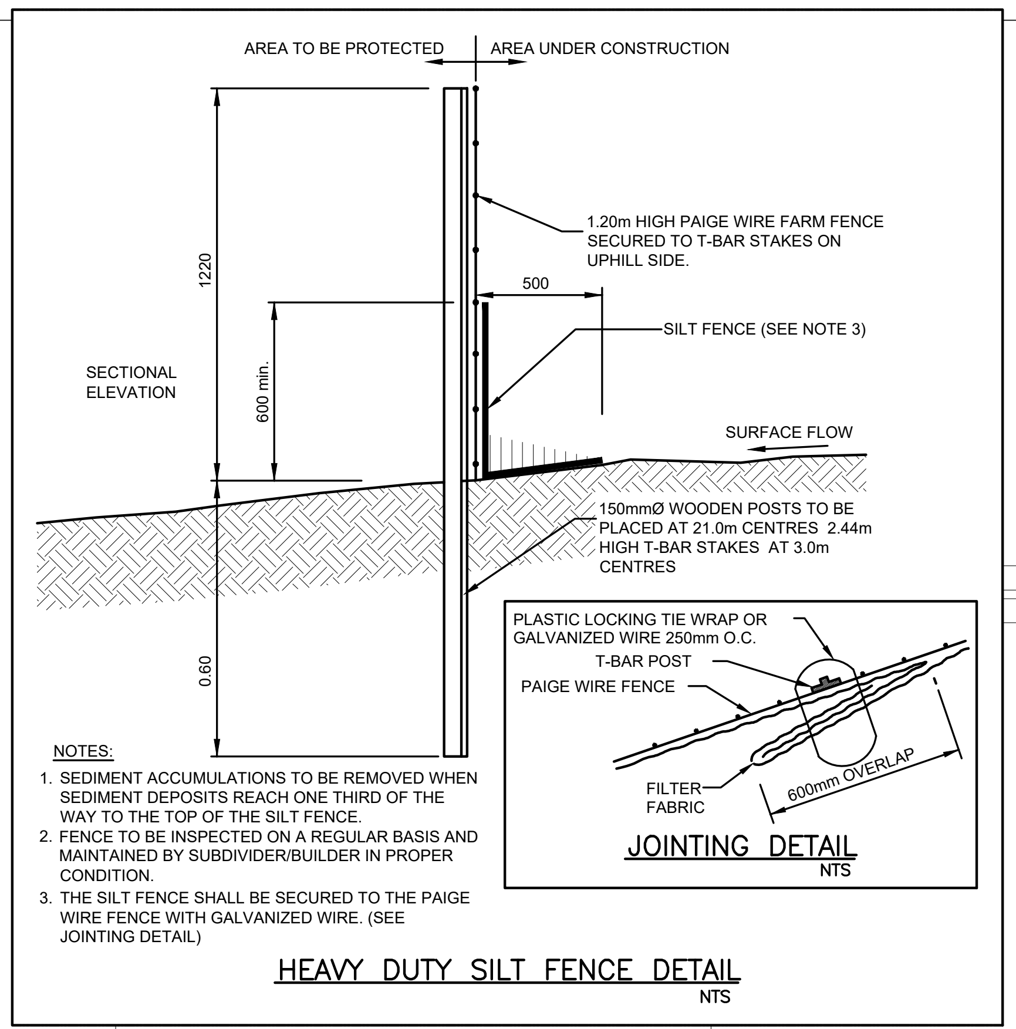
NOTES:

1. SEDIMENT ACCUMULATIONS TO BE REMOVED WHEN SEDIMENT DEPOSITS REACH ONE THIRD OF THE WAY TO THE TOP OF THE SILT FENCE.
2. FENCE TO BE INSPECTED ON A REGULAR BASIS AND MAINTAINED BY SUBDIVIDER/BUILDER IN PROPER CONDITION.
3. THE SILT FENCE SHALL BE SECURED TO THE PAIGE WIRE FENCE WITH GALVANIZED WIRE. (SEE JOINTING DETAIL)
4. WHERE ROOTS ARE NOT PRESENT AT THE LOCATION OF THE PAIGE WIRE FENCE, THE CLEAR GRANULAR FILL CAN BE ELIMINATED AND THE SILT FENCE TOED 150mm INTO THE GROUND WITH COMPACTED BACKFILL.

TREE PROTECTION SILT FENCE DETAIL
NTS



CATCHBASIN COVERING DETAIL (TYP.)
NTS



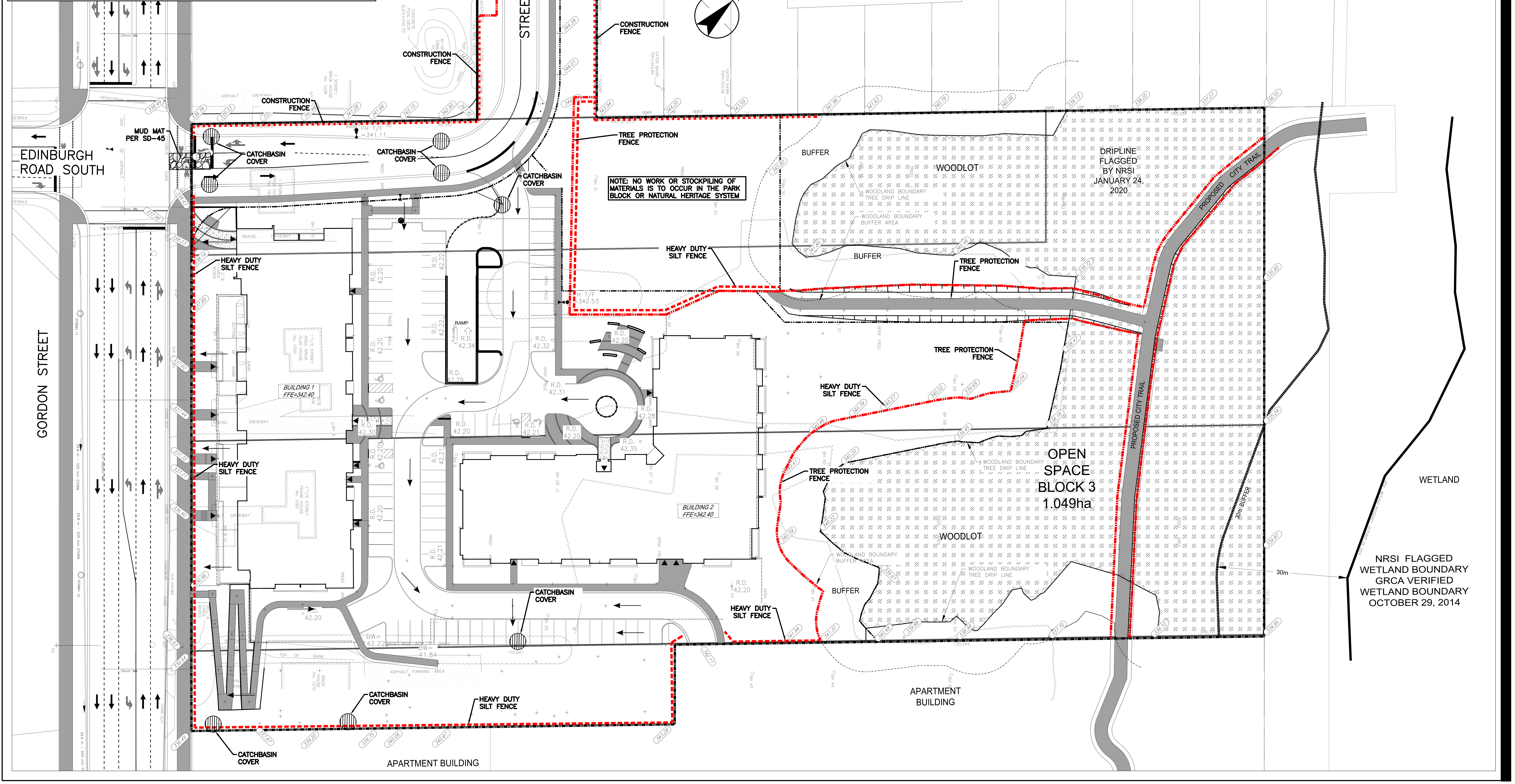
NOTES:

1. SEDIMENT ACCUMULATIONS TO BE REMOVED WHEN SEDIMENT DEPOSITS REACH ONE THIRD OF THE WAY TO THE TOP OF THE SILT FENCE.
2. FENCE TO BE INSPECTED ON A REGULAR BASIS AND MAINTAINED BY SUBDIVIDER/BUILDER IN PROPER CONDITION.
3. THE SILT FENCE SHALL BE SECURED TO THE PAIGE WIRE FENCE WITH GALVANIZED WIRE. (SEE JOINTING DETAIL)

HEAVY DUTY SILT FENCE DETAIL
NTS

IMPLEMENTATION SCHEDULE AND DETAILS FOR EROSION AND SEDIMENTATION CONTROL MEASURES

PRIOR TO ANY SITE WORKS	– INSTALL ALL SILT FENCE AND PROTECTIVE FENCING AS SHOWN ON THE PLANS AND MAINTAIN DURING CONSTRUCTION. – MONTHLY EROSION AND SEDIMENT CONTROL REPORTS (QUARTERLY DURING PERIODS OF INACTIVITY OR HOUSE CONSTRUCTION) ARE TO BE SUBMITTED TO THE AUTHORITY UNTIL THE SITE HAS BEEN BUILT OUT (90%–100%) AND STABILIZED. REPORTS TO BE BASED ON FREQUENT INSPECTIONS PARTICULARLY AFTER SIGNIFICANT EVENTS.
DURING TOPSOIL STRIPPING	– CONSTRUCT TEMPORARY SEDIMENT CONTROL BASINS, DIVERSION SWALES & BERMS –CONSTRUCT TEMPORARY DIVERSION BERMS/SWALES/ROCK CHECK DAMS –SURPLUS TOPSOIL IS BE STOCKPILED IN LOCATIONS SHOWN
DURING AREA GRADING	–ALL DIVERSION BERMS/SWALES TO BE CHECKED REGULARLY AND AFTER EACH SIGNIFICANT RAINFALL AS GRADING PROCEEDS. DIVERSION BERMS/SWALES TO BE RECONSTRUCTED/RELOCATED AS NECESSARY TO ENSURE THAT THEY DIRECT FLOWS INTO BASINS. – SILT FENCE TO BE CHECKED REGULARLY AND AFTER EACH RAINFALL FOR UNDERMINING OR DETERIORATION OF THE FABRIC. SEDIMENT SHALL BE REMOVED WHEN THE LEVEL OF SEDIMENT DEPOSITION REACHES ONE THIRD OF THE WAY TO THE TOP OF THE BARRIER. – SEDIMENT CONTROL BASINS TO BE CHECKED REGULARLY AND AFTER EACH RAINFALL AND CLEANED OUT WHEN THE LEVEL OF SEDIMENT BUILDUP HAS REDUCED THE VOLUME OF THE DEAD STORAGE BY ONE HALF.
AFTER AREA GRADING	–ALL AREAS (INCLUDING STOCKPILES) WHERE ACTIVE CONSTRUCTION IS NOT EXPECTED FOR 30 DAYS, SHALL BE REVEGETATED WITH 50mm OF TOPSOIL AND HYDROSEEDED IN ACCORDANCE WITH OPSS 572.
DURING SERVICING AND ROADWORKS CONSTRUCTION	– MAINTAIN FUNCTION OF SEDIMENT CONTROLS – ENSURE GRADED AREAS DRAIN TO SEDIMENT BASINS – INSTALL ROCK CHECK DAMS IN LOW POINT OF AREAS CUT OFF BY ROADS AS DIRECTED BY THE ENGINEER. – INSTALL STORM SERVICE OUTLETS AT ALL LOW POINTS (SEE DETAILS) –CATCHBASINS TO BE SEALED UNTIL ROADS ARE PAVED. –INSTALL FILTER FABRIC UNDER CATCHBASIN GRATES
DURING HOUSE CONSTRUCTION	–SEDIMENTATION BASINS CONFLICTING WITH HOUSE CONSTRUCTION ARE TO BE FILLED AND STORM SERVICE OUTLETS ARE TO BE INSTALLED (SEE DETAIL). –STREETS TO BE KEPT CLEAN.
FOLLOWING SITE STABILIZATION	–REMOVAL OF SEDIMENT CONTROL MEASURES AND COLLECTION OF ACCUMULATED SEDIMENT SHALL OCCUR FOLLOWING SUBSTANTIAL COMPLETION OF CONSTRUCTION (90%–100%) AND SITE STABILIZATION.



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Notes

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Legend

▪▪▪▪▪▪	SILT FENCE (SD–74B)
▪▫▪▫▪▫	CONSTRUCTION FENCE
▬▪▬▪▬	TREE PROTECTION FENCE (SD–90A)
←	SURFACE FLOW DIRECTION
▨	CATCHBASIN COVERING

1. PER CITY COMMENTS	JAC	CJH	22.05.31
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Permit-Seal

C. J. HENDRIKSEN
100125181
May 31/22

Client/Project

TRICAR DEVELOPMENTS INC.

1242, 1250, 1260 GORDON STREET
& 9 VALLEY ROAD
GUELPH, ON

Title

EROSION & SEDIMENT CONTROL PLAN

Project No. 161413684

Scale 1:400 (0 4 12 20m)

Drawing No. GP-2

Sheet 6 of 8

Revision 1

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2022-6-6 9:27 AM by: Childs, Jason

ORIGINAL SHEET - ANSI D

NOTES AND SPECIFICATIONS:

A. GENERAL:

1. BUILDINGS ARE NOT TO BE SITED WITH THIS DRAWING.
   THIS DRAWING TO BE READ IN CONJUNCTION WITH THE SITE SERVICING PLANS (SSP SERIES) & THE GRADING PLAN (GP SERIES) PREPARED BY STANTEC CONSULTING.
2. THESE PLANS FOR CONSTRUCTION ONLY WHEN APPROVED BY THE CITY OF GUELPH AND SEALED BY THE ENGINEER.
3. THE CONTRACTOR MUST CHECK AND VERIFY DIMENSIONS; OBTAIN ALL UTILITY LOCATES AND OBTAIN ALL REQUIRED PERMITS/LICENSES AND VERIFY ELEVATIONS OF EXISTING SERVICES BEFORE PROCEEDING WITH ANY WORK.
4. ALL WORK WITHIN THE RIGHTS-OF-WAY OR CITY EASEMENTS ARE TO BE INSTALLED BY CITY OF GUELPH AT THE OWNER'S EXPENSE UNLESS OTHERWISE NOTED.
5. ANY PROPOSED CHANGES SHALL BE APPROVED BY THE ENGINEER AND CITY OF GUELPH.
6. ALL UNDERGROUND SERVICING TO BE INSPECTED BY STANTEC CONSULTING LTD. AND CERTIFIED FOR THE CITY OF GUELPH. CONTRACTOR SHALL COORDINATE WITH STANTEC AND SHALL CONTACT SAME AT LEAST 48 HOURS PRIOR TO INSTALLATION OF SERVICES.
7. CONTRACTOR SHALL COORDINATE WITH STANTEC AND SHALL CONTACT SAME AT LEAST 48 HOURS PRIOR TO INSTALLATION OF SERVICES.
8. ALL CONSTRUCTION WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS (LATEST EDITION).
9. THE PROPERTY OWNER IS RESPONSIBLE FOR RESTORATION OF ALL DAMAGED AND/OR DISTURBED PROPERTY WITHIN THE MUNICIPAL RIGHT-OF-WAY TO CITY OF GUELPH STANDARDS.
10. IF, FOR UNFORESEEN REASONS, THE OWNER AND/OR HIS/HER REPRESENTATIVE MUST ENCROACH ONTO PRIVATE LANDS TO UNDERTAKE ANY WORKS, HE/SHE MUST OBTAIN WRITTEN PERMISSION FROM THE ADJACENT PROPERTY OWNERS PRIOR TO ENTERING UPON THE PRIVATE PROPERTY TO PERFORM ANY WORKS. COPIES OF THESE LETTERS OF CONSENT MUST BE SUBMITTED TO THE DEVELOPMENT & TECHNICAL SERVICES – ENGINEERING DEVELOPMENT DIVISION, PRIOR TO ANY WORK BEING PERFORMED. FAILURE TO COMPLY WITH THE ABOVE IS AT THE PROPERTY OWNERS OWN RISK.

B. UNDERGROUND SERVICES:

1. CONTRACTOR SHALL VERIFY ELEVATION AND LOCATION OF EXISTING SANITARY AND STORM SEWERS AND WATERMAINS PRIOR TO COMMENCING SITE WORK AND SHALL NOTIFY THE ENGINEER OF ANY CONFLICTS BETWEEN EXISTING AND PROPOSED SERVICES.
2. THE CONTRACTOR TO MAKE CONNECTIONS TO SERVICES AT STUB LOCATION FOR SANITARY, STORM SEWERS, WATERMAIN AND TO RESTORE ALL OFF-SITE AFFECTED PROPERTY TO ORIGINAL CONDITION.
3. ON-SITE SERVICING SHALL NOT BE UNDERTAKEN PRIOR TO COMPLETION OF SERVICE CONNECTIONS WITHIN THE ROAD R.O.W.'S.
4. ALL UNDERGROUND SERVICES TO BE IN COMPLIANCE WITH THE LATEST REVISED BUILDING CODE, CITY OF GUELPH ENGINEERING STANDARDS, ONTARIO PROVINCIAL STANDARDS (OPSS, OPSD) AND WITH THE LATEST REGULATIONS OF THE ONTARIO PLUMBING CODE AND SUPPLEMENT SPECIFICATION FOR MUNICIPAL SERVICES (DGSSMS) AND INSPECTED BY CITY STAFF/CONSULTANT PRIOR TO BACKFILLING.
5. UNDERGROUND SERVICES TO TERMINATE 1.5m FROM BUILDING LINE, PLUGGED OR CAPPED C/W MARKER EXTENDING FROM INVERT TO 1.0M ABOVE FINISHED GRADE.
6. ALL BEDDING TO BE AS NOTED BELOW. TRENCH BACKFILL TO BE APPROVED NATIVE MATERIAL COMPACTED IN 200mm MAX. LIFTS TO 95% STANDARD PROCTOR DENSITY.
7. ALL SERVICES SHALL BE TESTED AS SPECIFIED IN THE APPLICABLE OPSS (OPSS 410 & 441).
8. ALL SERVICES, UTILITIES AND CATCHBASIN LEADS ARE TO BE SUPPORTED AS PER OPSD 1007.01 DURING TRENCHING ACTIVITIES. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES PRIOR TO AND DURING CONSTRUCTION. LOCATION OF EXISTING UTILITIES TO BE VERIFIED IN THE FIELD.
9. ANY UTILITY RELOCATION DUE TO THIS DEVELOPMENT TO BE UNDERTAKEN AT THE EXPENSE OF THE OWNER/DEVELOPER.

C. SEWERS/APPURTENANCES:

4. STORM SEWERS:
   - LESS THAN 200mmø – PVC DR-28
   - 200mmø TO 375mmø – PVC DR-35
     – PVC RIBBED PIPE (ULTRA-RIB OR EQUIVALENT)
     – CL-3 CONCRETE
   - 450mmø TO 600mmø – PVC RIBBED PIPE (ULTRA-RIB OR EQUIVALENT)
     – 65D CONCRETE
   - 450mmø TO 600mmø – 65D CONCRETE
5. SANITARY SEWERS:
   - LESS THAN 200mmø – PVC DR-28
   - 200mmø OR LARGER – PVC DR-35
   - 2.5m MINIMUM COVER FOR SANITARY SEWERS.
3. SEWER BEDDING:
   - CITY OF GUELPH SD-29
   - 150mm (MIN) GRAN 'A' TO 98% S.P.D.
4. STORM MANHOLES:
   - OPSD 701.010 (1200mmø)
   - OPSD 701.011 (1500mmø)
   - OPSD 701.012 (1800mmø)
   - OPSD 701.013 (2400mmø)
   - OPSD 701.014 (3000mmø)
6. SANITARY MAINTENANCE HOLE:
   - OPSD 701.010 (1200mmø)
7. MAINTENANCE HOLE BENCHING:
   - CITY OF GUELPH SD-44
   - CBMH'S WITH AN OUTLET PIPE GREATER THAN 450mmø SHOULD BE BENCHED. 450mmø OR LESS SHALL BE PROVIDED WITH A 600mm SUMP.
8. CATCHBASINS/CATCHBASIN LEADS:
   - OPSD 705.01 (SINGLE)
   - OPSD 705.02 (DOUBLE)
   - OPSD 705.03 (DITCH INLET – 3:1 SLOPE)
   - MINIMUM LEAD DIAMETER. 200mmø FOR SINGLE, 300mmø FOR DOUBLE CATCHBASINS.
9. FRAMES AND GRATES/COVERS:
   - OPSD 400.10 (CB'S & CBMH'S)
   - OPSD 401.01 TYPE 'A' (SANITARY AND STORM MH'S)
   - CITY OF GUELPH SD-15 (RLCB'S)
   - CITY OF GUELPH SD-16 (DICB'S)
   - CITY OF GUELPH SD-9 (SAFETY GRATE FOR MH'S)
   - ALL FRAMES ON STRUCTURES TO BE SET USING PRECAST CONCRETE ADJUSTMENT UNITS

D. WATER SERVICES/APPURTENANCES:

1. WATERMAIN
   - 100mmø TO 300mmø – AWWA C-900 PVC SDR-18
   - 350mmø TO 600mmø – AWWA C905 PVC SDR-25
   - 2.0m MINIMUM COVER
   - FITTINGS TO AWWA C-907
   - WHERE CONFLICT ARISES AT WATERMAIN/SERVICE CROSSING OTHER UNDERGROUND SERVICES, WATERMAIN/SERVICES SHALL BE LOWERED TO MAINTAIN 0.50m VERTICAL SEPARATION.
2. PIPE BEDDING:
   - CITY OF GUELPH SD-29
   - 150mm (MIN) GRANULAR 'A' 98% S.P.D.
3. THRUST BLOCKING:
   - CITY OF GUELPH SD-27
4. TRACER WIRE:
   - CITY OF GUELPH SD-54A
5. HYDRANTS:
   - CITY OF GUELPH SD-25A (OPEN RIGHT)
6. VALVES:
   - ALL VALVES TO OPEN COUNTER-CLOCKWISE AND COMPLY WITH A.W.W.A. SPEC.
   - CITY OF GUELPH SD-24
7. WATER SERVICES
   - 25mmø TYPE K COPPER PIPING WET TAPPED TO PVC WATERMAIN WITH APPROVED SADDLE
   - CITY OF GUELPH SD-54B
8. WATER METERS:
   - BUILDING UNITS TO HAVE INDIVIDUAL WATER METERS TO THE SATISFACTION OF CITY OF GUELPH WATERWORKS DEPARTMENT
9. MAINTAIN SPATIAL SEPARATION FOR SITE SERVICES PER BUILDING CODE PART 7.3.5.6
10. ALL NEW WATER PIPING INSTALLATIONS AS PER AWWA C651-05
11. CATHODIC PROTECTION IN ACCORDANCE WITH CITY OF GUELPH STANDARDS.
12. A WATERMAIN COMMISSIONING PLAN IN ACCORDANCE WITH DGSSMS WILL BE REQUIRED.

E. GRADING:

1. COMPLETE ALL EXCAVATION, GRADING, TRIMMING AND COMPACTION AS REQUIRED TO FACILITATE THE WORK, ALL SUBGRADE AREAS SHALL BE PROOF ROLLED TO 98% S.D.P. PRIOR TO GRANULAR SUBBASE PLACEMENT.
2. DISPOSE OF ALL SURPLUS AND UNSUITABLE MATERIAL OFFSITE.
3. SAWCUT ASPHALT IN NEAT LINES AT ALL MATCH LINES.
4. MATCH EXISTING GRADES AT ADJACENT PROPERTY LINES.
5. TRANSITION SLOPES TO BE MAXIMUM 3:1 (HORIZONTAL TO VERTICAL) UNLESS OTHERWISE NOTED.

F. SURFACE WORKS:

1. CURBS:
   - OPSD 600.040 (CONCRETE BARRIER CURB WITH STANDARD GUTTER)
   - OPSD 600.070 (CONCRETE BARRIER CURB WITH STANDARD GUTTER, TWO STAGE CONSTRUCTION)
   - OPSD 600.080 (CONCRETE BARRIER CURB WITH NARROW GUTTER)
   - OPSD 600.110 (CONCRETE BARRIER CURB)
2. ASPHALT PAVEMENT: (PARKING AREA)
   - 40mm HL 3 (SURFACE ASPHALT) 97% MARSHALL
   - 50mm HL4 (BASE ASPHALT) 97% S.P.D.
   - 150mm GRANULAR 'A' BASE 100% S.P.D.
   - 300mm GRANULAR 'B' SUB-BASE 100% S.P.D.
3. ASPHALT PAVEMENT: (ABOVE PARKING GARAGE)
   - CONCRETE DECK
   - ROOFING MEMBRANE
   - PROTECTION BOARD
   - 40MM HL 3 (SURFACE ASPHALT) 97% MARSHALL
   - 50MM HL4 (BASE ASPHALT) 97% S.P.D.
4. PAVEMENT: (HEAVY DUTY/FIRE ROUTE)
   - 50mm HL-3 SURFACE ASPHALT 97% MARSHALL – (WHERE IN PLACE)
   - 60mm HL-4 BASE ASPHALT 97% MARSHALL
   - 150mm GRANULAR 'A' 100% S.P.D.
   - 400mm GRANULAR 'B' 100% S.P.D.
   - SAW CUT CLEAN EDGES AT ALL MATCH LINES AND APPLY TACK COAT.
5. CONCRETE SIDEWALKS:
   - CITY OF GUELPH SD-2, 1.5m WIDE (CONCRETE SIDEWALK)
   - CITY OF GUELPH SD-4 (SIDEWALK RAMPS)
6. SITE AREAS DISTURBED BY CONSTRUCTION AND NOT INDICATED FOR REMOVAL TO BE RESTORED TO ORIGINAL CONDITIONS.

G. EROSION CONTROL:

1. ALL SILT FENCING TO BE INSTALLED PRIOR TO COMMENCEMENT OF ANY AREA GRADING, EXCAVATION OR DEMOLITION.
2. EROSION CONTROL FENCE TO BE PLACED AROUND THE BASE OF ALL STOCKPILES. ALL STOCKPILES TO BE KEPT A MINIMUM OF 2.5m FROM ALL PROPERTY LINES.
3. P-250 FILTER FABRIC UNDERLYING CONSTRUCTION VEHICLE ENTRANCE TO CONSIST OF CLEANED OR REPLACED 200mm THICK, 50mmø STONE. STONE TO BE TAKEN UP AND WHEN ACCUMULATIONS COVER 50% OF TOP OF STONE (SEE DETAIL).
4. EROSION PROTECTION TO BE PROVIDED AROUND ALL STORM AND SANITARY MANHOLES AND/OR CATCHBASINS.
5. ADDITIONAL EROSION CONTROL MEASURES MAY BE REQUIRED AS SITE DEVELOPMENT PROGRESSES. CONTRACTOR TO PROVIDE ALL ADDITIONAL EROSION CONTROL STRUCTURES.
6. EROSION CONTROL STRUCTURES TO BE MONITORED REGULARLY BY STANTEC CONSULTING LTD. AND ANY DAMAGE REPAIRED IMMEDIATELY. SEDIMENTS TO BE REMOVED WHEN ACCUMULATIONS REACH A MAXIMUM OF ONE THIRD (1/2) THE HEIGHT OF THE SILT FENCE.
7. ALL EROSION CONTROL STRUCTURES TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND SURFACES HAVE BEEN RE-STABILIZED EITHER BY PAVING OR RESTORATION OF VEGETATIVE GROUND COVER.
8. NO ALTERNATE METHODS OF EROSION PROTECTION SHALL BE PERMITTED UNLESS APPROVED BY STANTEC CONSULTING LTD. AND THE CITY OF GUELPH'S WORKS DEPARTMENT
9. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING SEDIMENTS FROM THE MUNICIPAL ROAD AND SIDEWALKS AT THE END OF EACH WORK DAY.
10. MUD MATS TO BE PROVIDED ON SITE AT ALL LOCATIONS WHERE CONSTRUCTION VEHICLES EXIT THE SITE. MUD MATS SHALL BE A MINIMUM OF 3.0m WIDE, 15.0m LONG (LENGTH MAY VARY DEPENDING ON SITE LAYOUT) AND 0.3m DEEP AND SHALL CONSIST OF 20mm CLEAR STONE MATERIAL OR APPROVED EQUIVALENT. CONTRACTOR TO ENSURE ALL VEHICLES LEAVE THE SITE VIA THE MUD MAT AND THAT THE MAT IS MAINTAINED IN A MANNER TO MAXIMIZE ITS EFFECTIVENESS AT ALL TIMES.
11. STANTEC CONSULTING LTD. TO MONITOR THE SITE DEVELOPMENT TO ENSURE ALL EROSION CONTROLS ARE INSTALLED AND MAINTAINED TO CITY REQUIREMENTS. CONTRACTOR TO COMPLY WITH THE ENGINEER'S INSTRUCTIONS TO INSTALL, MODIFY, OR MAINTAIN EROSION CONTROL WORKS.

H. RETAINING WALLS:

1. RETAINING WALL TO BE CONSTRUCTED AS DESIGNED BY OTHERS. APPROPRIATE CONSTRUCTION DETAILS SHALL BE PROVIDED FOR RETAINING WALLS HIGHER THAN 0.80m. DETAILS SHALL BE DESIGNED AND SEALED BY A PROFESSIONAL ENGINEER UPON APPROVAL. GUARD RAIL IS REQUIRED WHEN HEIGHT EXCEEDS 0.80m.
2. CONTRACTOR TO CONTACT GEOTECHNICAL ENGINEER 48 HOURS PRIOR TO CONSTRUCTION OF RETAINING WALL TO ALLOW FOR INSPECTION OF SOIL CONDITIONS.
3. ANY CHANGES IN WALL HEIGHT MUST BE APPROVED BY THE ENGINEER.
4. BUILDING PERMIT MUST BE OBTAINED FOR RETAINING WALL

I. DEWATERING NOTES:

1. PUMPED GROUNDWATER WILL BE DIRECTED OFFSITE VIA SWALE AND/OR TEMPORARY PIPE TO POPPY DRIVE EAST, WHERE THE WATER WILL BE DISCHARGED TO EITHER THE STORM OR SANITARY SEWER SYSTEM.
2. DISCHARGE TO THE STORM AND/OR SANITARY SEWER SYSTEM MUST ADHERE TO THE QUALITY REQUIREMENTS AS PER CITY OF GUELPH BY-LAW NUMBER (1996)-15202.

J. MISCELLANEOUS:

1. WHERE COVER OVER SEWERS IS LESS THAN 1.2m IN PAVED AREAS, OR LESS THAN 0.90m IN GRASSED AREAS INSTALL INSULATION AS PER DETAIL. INSULATION TO BE 60mm THICK x 1800mm WIDE UNLESS OTHERWISE NOTED. INSTALL LONGITUDINALLY OVER CENTERLINE OF PIPE WITH OVERLAPPING JOINTS.
2. IT IS THE SITE OWNERS' RESPONSIBILITY TO ENSURE THAT ALL SEDIMENT CONTROLS ARE IMPLEMENTED AND MAINTAINED IN ACCORDANCE WITH THE ABOVE CRITERIA.

UNDERGROUND STORAGE AND INFILTRATION TRENCHES

1 PRIOR TO INSTALLATION

- EFFORTS SHOULD BE MADE TO AVOID COMPACTION BY NOT USING THE FACILITY LOCATION AS:
- LAYDOWN OR STOCKPILE LOCATIONS;
- EQUIPMENT STORAGE;
- TRAFFIC FLOW OR SITE ACCESS.
- MATERIAL TO BE USED IN THE CONSTRUCTION OF THE FACILITY SHOULD NOT BE BROUGHT ON SITE PRIOR TO IT BEING NEEDED. IF THIS MATERIAL IS ON SITE PRIOR TO FINAL PLACEMENT, IT SHALL BE STOCKPILED SEPARATELY FROM ANY OTHER CONSTRUCTION MATERIALS AND ADEQUATELY PROTECTED (AS DIRECTED BY THE LID INSPECTOR).

2 INSTALLATION

- TRENCH FLOOR TO BE SCARIFIED TO A DEPTH OF 0.15M UNLESS THE LID INSPECTOR DIRECTS GREATER DEPTHS OF SCARIFICATION.
- ONCE THE AREA IS SCARIFIED, AT LEAST 2 LOCATIONS IN EACH FACILITY ARE TO BE TESTED FOR IN-SITU INFILTRATION RATE. ADDITIONAL SCARIFICATION MAY BE REQUIRED FOLLOWING THESE TESTS, AFTER WHICH THE TESTS SHOULD BE COMPLETED AGAIN IN OTHER LOCATIONS.
- SHOULD THE TRENCH WORK BE COMPLETED IN ADVANCE ON THE INSTALLATION OF THE GEOTEXTILE AND STONE, THE TRENCH SHOULD BE PROTECTED IN THE EVENT OF RAIN.
- THE OVERLAP ON THE GEOTEXTILE SHALL BE A MINIMUM OF 0.3M. THE GEOTEXTILE SHALL BE WRAPPED OVERTOP OF THE STONE STORAGE AT THE MINIMUM OVERLAP.
- ALL STONE INSTALLED IS TO BE TRIPLE WASHED TO PREVENT DUST FROM CLOGGING THE FABRIC AND SOIL PORES. STONE IS TO BE INSTALLED IN LIFTS OF 0.3M MAXIMUM. THESE LIFTS SHOULD BE LIGHTLY WORKED TO SETTLE THE STONE BUT MECHANICAL COMPACTION IS NOT TO BE USED.
- ALL UNDERDRAIN PIPES ARE TO BE WRAPPED IN A SEDIMENT SOCK.
- IF THE FACILITY IS COMPLETED PRIOR TO SITE STABILIZATION, RUNOFF SHOULD BE DIRECTED AWAY FROM THE FACILITY TO PREVENT HEAVY SEDIMENTATION. EROSION CONTROLS SHOULD BE INSTALLED AS PER THE DIRECTION OF THE LID INSPECTOR.

3 MAINTENANCE

- REMOVE ANY DEBRIS, GARBAGE, LEAVES, STICKS, OR OTHER ITEMS FROM THE FACILITY INLETS. THIS SHOULD BE DONE BIANNUALLY WITH SPECIAL ATTENTION IN FALL TO REMOVE FALLEN LEAVES;
- REMOVE ACCUMULATED SEDIMENT FROM THE BOTTOM OF THE FACILITY AS NEEDED BY FLUSHING;
- MONITOR PERFORMANCE; OBSERVE WATER DEPTHS IN THE FACILITY DURING RAIN EVENTS BIANNUALLY.

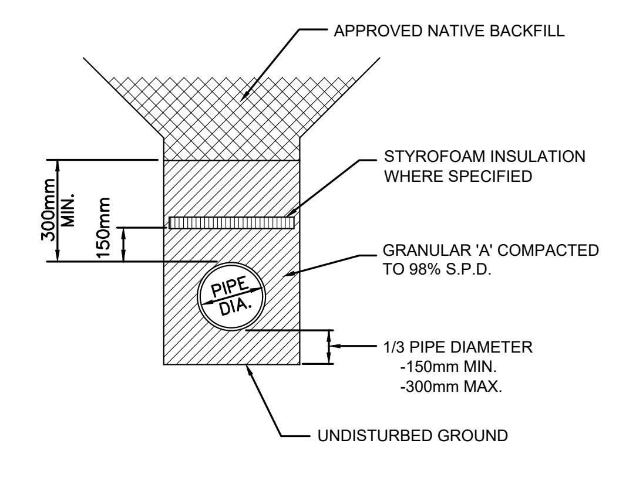
OIL GRIT SEPARATOR

1 INSTALLATION

- ONCE INSTALLED, THE INLET TO THE OGS SHOULD BE SURROUNDED BY A FILTER SOCK RING TO REMOVE THE HEAVIEST SEDIMENT LOADS. THE OGS SHOULD BE INSPECTED BIWEEKLY DURING CONSTRUCTION AND CLEANED BY VACUUM TRUCK WHEN THE SUMP IS 50% FULL OF SILT.
- WHEN CONSTRUCTION IS COMPLETE, THE OGS SHOULD BE CLEANED OF ANY SEDIMENT.

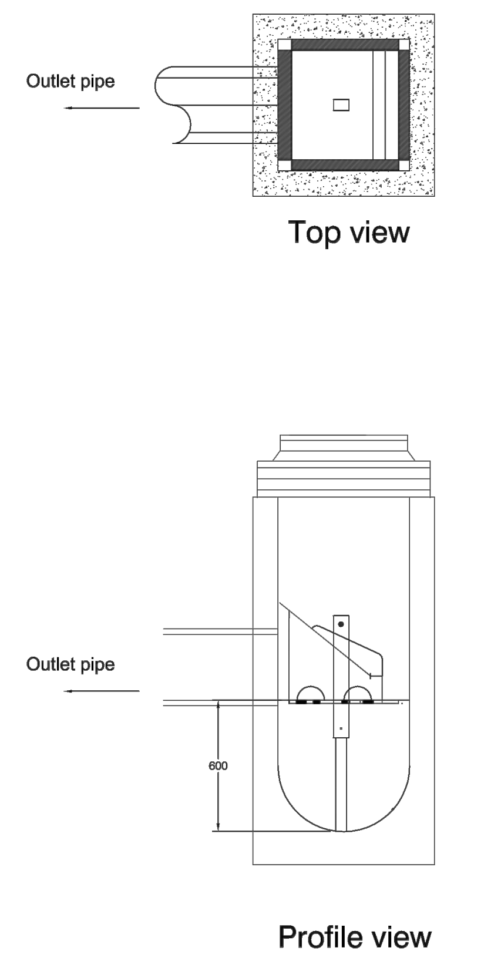
2 MAINTENANCE

- INSPECTION SHOULD BE DONE BIANNUALLY;
- REMOVE ACCUMULATED SEDIMENT FROM THE BOTTOM OF THE FACILITY WHEN 50% FULL BY VACUUM TRUCK;
- REMOVAL OF ANY OILS OR FLOATABLES AS NEEDED, WITH SPECIAL ATTENTION PAID IN THE EVENT OF A DELETERIOUS SPILL.

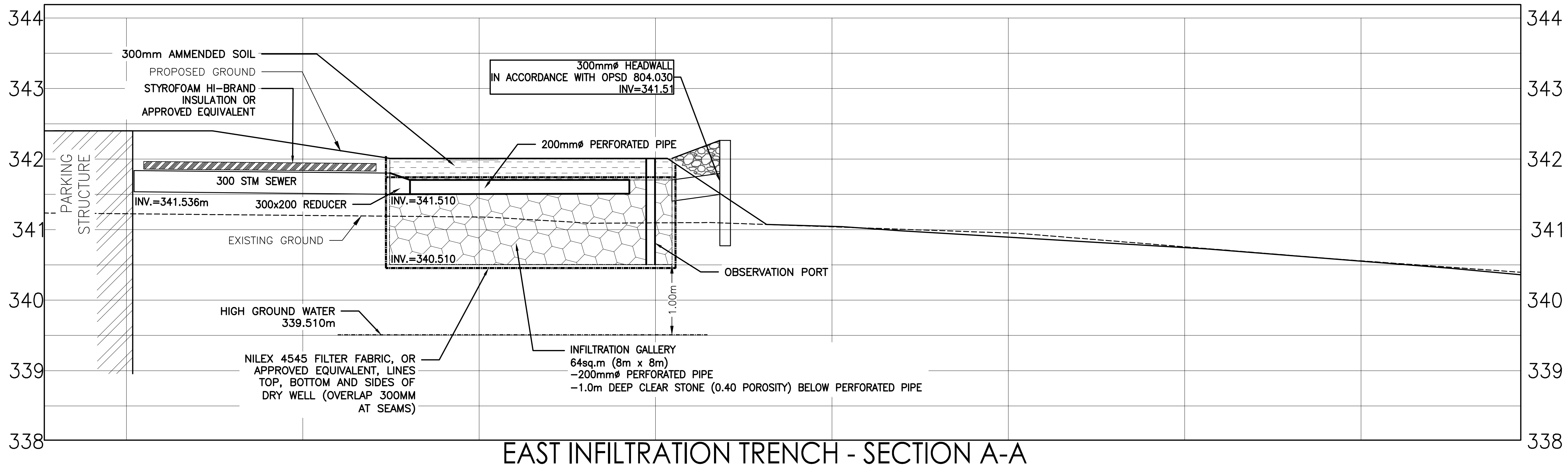


TYP. PIPE BEDDING DETAIL
NTS

Notes
1. CB Shield can be installed at any time. In a non frozen condition.
2. The frame and cover should be well aligned with the catchbasin for proper installation
3. The catchbasin sump must be clean before installation
4. The grate should be at the same level as the standing water in the sump.



CB Shield (600mm Sump)



EAST INFILTRATION TRENCH - SECTION A-A
VERT - 1:50 HORZ - 1:100

V:\01614\active\161413684\design\drawing\civil\sheet_files\161413684_C-DT.dwg
2022-6-1 10:06 AM by: Childs, Jason

ORIGINAL SHEET - ANSI D

Stantec

Stantec
600-171 Queens Avenue
London ON N6A 5J7
Tel. 519-645-2007
www.stantec.com

Liability Note:

The Contractor shall verify and be responsible for all dimensions.
DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay.

Notes

1. CITY OF GUELPH BENCHMARK 225 ELEVATION 338.665 LOCATION: 1221 GORDON STREET
2. EXISTING SURVEY COMPLETED BY BSR&D (NOVEMBER, 4 2014)
3. THE CONTRACTOR IS TO VERIFY ALL EXISTING ELEVATIONS AND EXISTING CONDITIONS AND TO REPORT ANY DISCREPANCIES TO THE CONSULTING ENGINEER

Legend

Revision	By	Appd.	YY.MM.DD
1. PER CITY COMMENTS	JAC	CJH	22.05.31

Issued	By	Appd.	YY.MM.DD
2. ISSUED FOR DRAFT PLAN APPROVAL	JAC	CJH	22.05.31
1. ISSUED FOR DRAFT PLAN APPROVAL	JAC	CJH	21.08.24

File Name: 161413684_c-dt	Dwn.	Chkd.	Dsgn.	YY.MM.DD
	JAC	CJH	JAC	21.07.23

Permit-Seal

C. J. HENDRIKSEN
100125181
May 31/22

Client/Project

TRICAR DEVELOPMENTS INC.

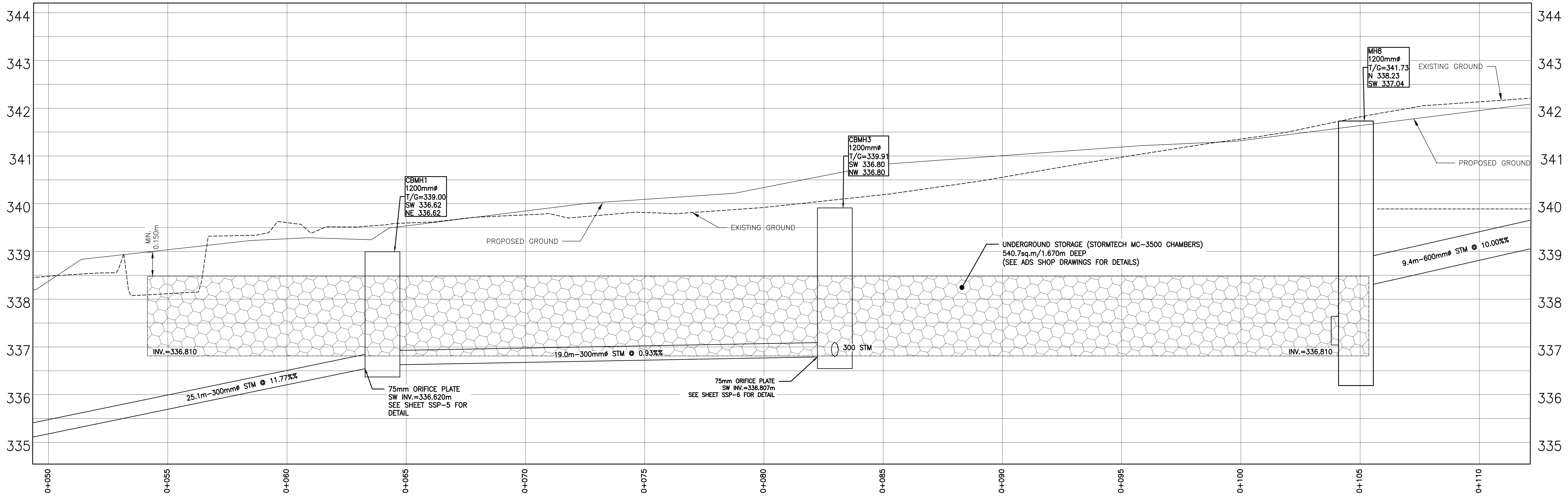
1242, 1250, 1260 GORDON STREET
& 9 VALLEY ROAD
GUELPH, ON

Title

NOTES & DETAILS

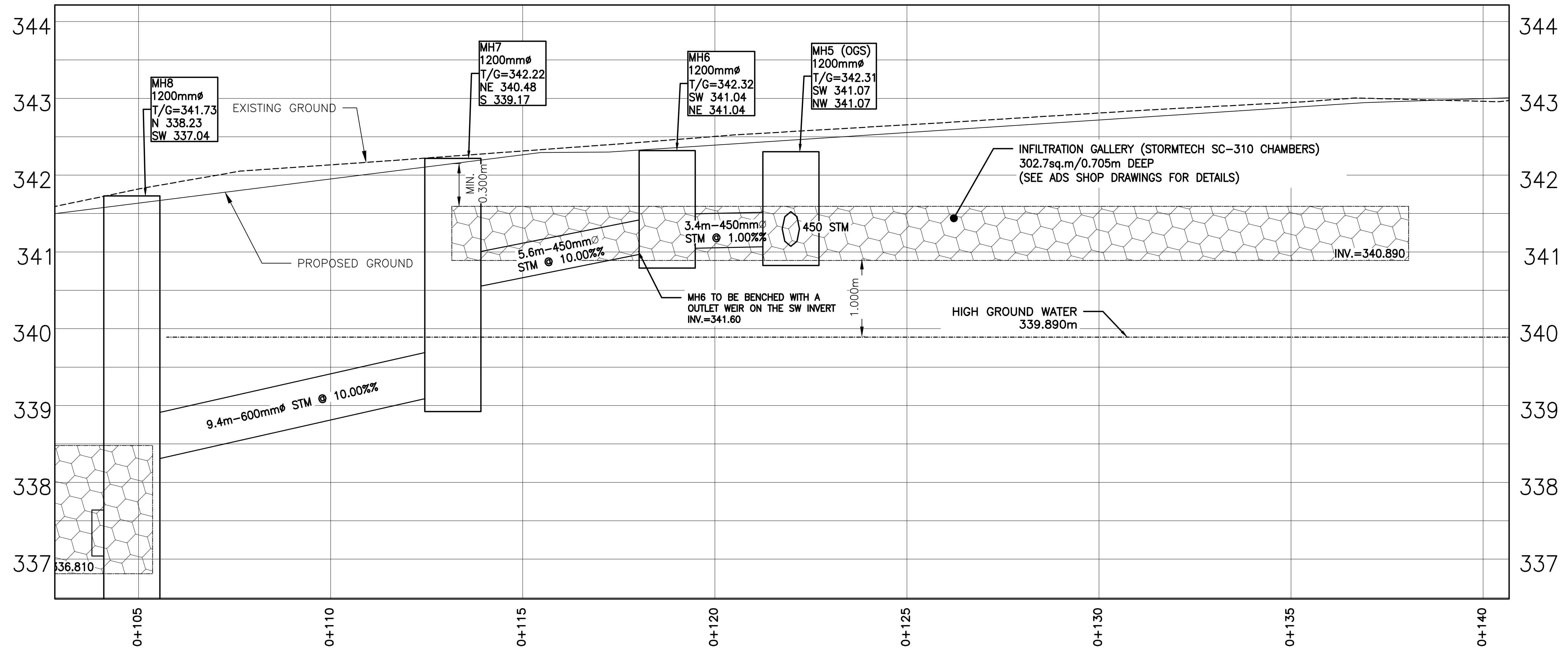
Project No. 161413684
Scale 1:100 0 1 3 5m

Drawing No. SSP-5
Sheet 7 of 8
Revision 1



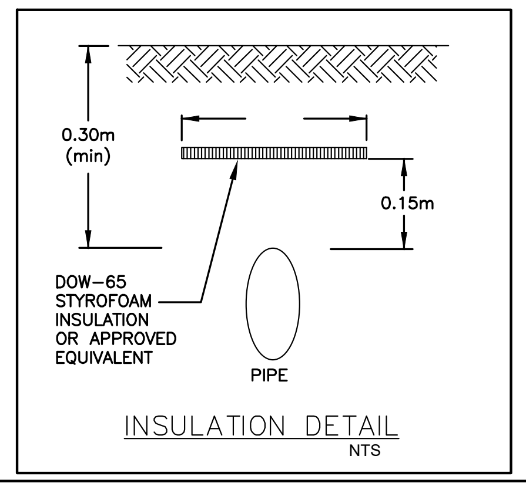
SOUTH INFILTRATION TRENCH - SECTION B-B - PART 1

VERT - 1:50 HORZ - 1:100



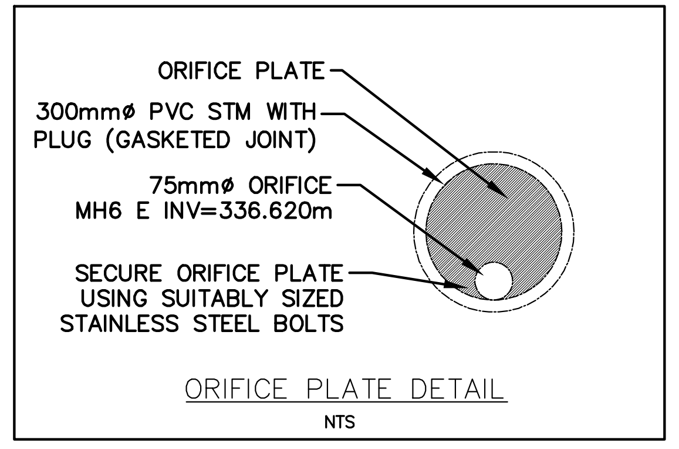
SOUTH INFILTRATION TRENCH - SECTION B-B - PART 2

VERT - 1:50 HORZ - 1:100



INSULATION DETAIL

NTS



ORIFICE PLATE DETAIL

NTS

Stantec
600-171 Queens Avenue
London ON N6A 5J7
Tel. 519-645-2007
www.stantec.com

Liability Note:

The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay.

Notes

1. CITY OF GUELPH BENCHMARK 225 ELEVATION 338.665 LOCATION: 1221 GORDON STREET
2. EXISTING SURVEY COMPLETED BY BSR&D (NOVEMBER, 4 2014)
3. THE CONTRACTOR IS TO VERIFY ALL EXISTING ELEVATIONS AND EXISTING CONDITIONS AND TO REPORT ANY DISCREPANCIES TO THE CONSULTING ENGINEER

Legend

1. PER CITY COMMENTS	JAC	CJH	22.05.31
Revision	By	Appd.	YY.MM.DD

2. ISSUED FOR DRAFT PLAN APPROVAL	JAC	CJH	22.05.31
1. ISSUED FOR DRAFT PLAN APPROVAL	JAC	CJH	21.08.24
Issued	By	Appd.	YY.MM.DD

File Name: 161413684_c-dt	JAC	CJH	JAC	21.07.23
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

C. J. HENDRIKSEN
100125181
May 31/22

Client/Project

TRICAR DEVELOPMENTS INC.

1242, 1250, 1260 GORDON STREET
& 9 VALLEY ROAD

GUELPH, ON

Title

NOTES & DETAILS

Project No. 161413684

Scale 1:100 0 1 3 5m

Drawing No. SSP-6

Sheet 8 of 8

Revision 1

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2022-6-1 10:06 AM by: Childs, Jason

ORIGINAL SHEET - ANSI D

APPENDIX B – DESIGN SHEETS

Tricar Development
1242, 1250, 1260 Gordon Street & 9 Valley Road

DATE: May 19, 2022
DESIGNED BY: JC
CHECKED BY: CH

STORM SEWER
DESIGN SHEET

FILE NUMBER: 30T-

DESIGN PARAMETERS

DESIGN STORM 1 IN 5 Years

I = a / ((tc + b) ^c)

a=	0.00	MANNING'S n =	0.000	
b=	0.00	MINIMUM COVER:	48.000	m
c=	0.0000	TIME OF ENTRY	10	min

LOCATION			DRAINAGE AREA								PIPE SELECTION												
Street	U/S	D/S	Area ID	5-Year Area Design (ha)	Runoff Coeff. Design	A x R	Accum. A x R	U/S T_C (min)	Rainfall Intensity (mm/hr)	Total Flow (m^3/s)	Length Design (m)	Design Size (mm)	Slope Design (%)	Full Capacity (m^3/s)	Full Velocity (m/s)	Actual Velocity (m/s)	Time of Flow (min)	5-Year Q_A/Q_C (%)	Fall in Sewer (m)	Upper Inv. (m)	Lower Inv. (m)	Drop (m)
Street A	MH3	MH2	A26	0.27	0.90	0.24	0.24	10.00	109.68	0.074	36.80	300	4.48	0.205	2.90	2.63	0.23	36.2%	1.65	338.320	336.67	0.05
Street A	MH2	MH1	A27	0.03	0.90	0.03	0.27	10.23	108.62	0.081	41.60	300	0.75	0.084	1.18	1.37	0.50	97.3%	0.31	336.621	336.31	

1250 Gordon Street
161413684

Jun 8, 2022

FIRE FLOW CALCULATIONS AS PER OBC REQUIREMENTS

ONTARIO BUILDING CODE CLAUSE A-3.2.5.7.

$$Q = K\,x\,V\,x\,S_{Tot}$$

Q = MINIMUM SUPPLY OF WATER (L)
K = WATER SUPPLY COEFFICIENT
V = BUILDING VOLUME (m^3)
S_{Tot} = TOTAL OF SPATIAL COEFFICIENT VALUES FROM PROPERTY LINE
EXPOSURES ON ALL SIDES AS OBTAINED FROM THE FORMULA
where:

$$S_{Tot} = 1.0 + (S_{side1} + S_{side2} + \cdots etc)$$

values are obtained from Figure 1 A-3.2.5.7, OBC, as modified by Sections 6.3 (e) and 6.3 (f) of this guideline, and

$$S_{Tot} = need\ not\ exceed\ 2.0$$

As per Table 2, Section A-3.2.5.7, OBC

OBC Part 3 Buildings under Building Code	**Required Minimum Water Supply Flow Rate (L/min)**
One-storey building with area ≤ 600 m2	1800
All other buildings	2700 (if Q ≤ 108,000 L)
	3600 (if Q >108,000 L and ≤ 135,000 L)
	4500 (if Q >135,000 L and ≤ 162,000 L)
	5400 (if Q >162,000 L and ≤ 190,000 L)
	6300 (if Q >190,000 L and ≤ 270,000 L)
	9000 (if Q >270,000 L)

Major Occupancy Classification

Group C	Residential Occupancies

Water Supply Coefficient - K

As per Table 1, Section A-3.2.5.7, OBC	K= 10

Total Building Volume

Bldg	Area (m^2)	Flr Height (m)	Volume (m^3)
2	23900	3.2	76480
			0
			0
Total			76480

**Assuming single 10 storey Building #2 apartment is critical*

Exposures

		Separation (m)	Spatial Coeff
North		50	0.00
South		50	0.00
East		50	0.00
West		24	0.00
S_{tot}			1.00

***above separation distances conservative estimates.*

Minimum Water Supply

$Q = K\,x\,V\,x\,S_{Tot}$ **Q = 10 x 76480 x 1.00 = 764,800** L

since Q > 270,000 L

Required Fire Flow (from Table 2 above) = **9000** L/min

= **150** L/s

APPENDIX C – EMAIL CORRESPONDENCE

From:	Ike Umar
To:	Hendriksen, Chris (Vancouver)
Subject:	RE: Gordon Street Sanitary Sewer upgrades
Date:	Tuesday, March 15, 2022 6:12:37 AM

Good Morning Chris, We will be retaining consultant in Q2. We will be reviewing the 1242-1270 Gordon Street development during the design of Gordon St.

Thanks.

Ike Umar, C.E.T. |Project Manager
Engineering and Transportation Services | **Infrastructure, Development and Enterprise**
City of Guelph

T 519-822-1260 X2242
E ike.umar@guelph.ca

From: Hendriksen, Chris (Vancouver) <Chris.Hendriksen@stantec.com>
Sent: Friday, March 11, 2022 9:51 AM
To: Ike Umar <Ike.Umar@guelph.ca>
Subject: RE: Gordon Street Sanitary Sewer upgrades

Good morning Ike. I wanted to follow up on the design progression of this work and to confirm that the design contributions from the proposed development at 1242-1270 Gordon Street and 9 Valley Road are being incorporated. Can you please provide an update?

Thanks

Chris

From: Ike Umar <Ike.Umar@guelph.ca>
Sent: Tuesday, August 10, 2021 8:01 AM
To: Rice, Derrick <Derrick.Rice@stantec.com>
Cc: Hendriksen, Chris (Vancouver) <Chris.Hendriksen@stantec.com>
Subject: RE: Gordon Street Sanitary Sewer upgrades

Good Morning Derrick, As per email below from Reg I do not have anything to add. We would know better once we have a schedule of construction in 2023.

Thanks
Ike Umar, C.E.T. |Project Manager
Engineering and Transportation Services | **Infrastructure, Development and Enterprise**
City of Guelph

T 519-822-1260 X2242
E ike.umar@guelph.ca

From: Rice, Derrick <Derrick.Rice@stantec.com>

Sent: Thursday, August 5, 2021 4:47 PM
To: Ike Umar <Ike.Umar@guelph.ca>
Cc: Hendriksen, Chris (Vancouver) <Chris.Hendriksen@stantec.com>
Subject: RE: Gordon Street Sanitary Sewer upgrades

Good afternoon Ike,

I am reaching out regarding the Gordon Street Sanitary Sewer works as per the correspondence below. We would like to confirm that the proposed sanitary sewer fronting the 1250 Gordon Street proposed development will be available as part of the construction work noted below which notes availability late 2023 to early 2024? Do you have any insight on anticipated Construction staging to better understand when the sewer servicing the 1250 site will be available? Any information on this would be greatly appreciated.

Thanks,

Derrick Rice P. Eng
Project Engineer, Community Development

Direct: 519-675-6644
Cell: 519-630-3627
Derrick.Rice@stantec.com

Stantec
600-171 Queens Avenue
London ON N6A 5J7

From: Reg Russwurm <Reg.Russwurm@guelph.ca>
Sent: Wednesday, July 21, 2021 5:01 PM
To: Rice, Derrick <Derrick.Rice@stantec.com>
Cc: Hendriksen, Chris (Vancouver) <Chris.Hendriksen@stantec.com>; Ike Umar <Ike.Umar@guelph.ca>; Mary Angelo <Mary.Angelo@guelph.ca>; Colleen Gammie <Colleen.Gammie@guelph.ca>
Subject: RE: Gordon Street Sanitary Sewer upgrades

Derrick,

The Gordon St EA has been completed so we're moving ahead with implementation. The City is currently preparing a RFP to retain an engineering firm to undertake final design starting later this year and construction in 2023. The sewers will be available earliest as late 2023 or more likely in 2024. We'll know better once the final design is completed and staging of works is better understood.

Ike Umar (cc'd) is the City's PM for the works.

- Reg

From: Rice, Derrick <Derrick.Rice@stantec.com>

Sent: July 21, 2021 8:31 AM
To: Reg Russwurm <Reg.Russwurm@guelph.ca>
Cc: Hendriksen, Chris (Vancouver) <Chris.Hendriksen@stantec.com>; Arun Hindupur <arun.hindupur@guelph.ca>
Subject: RE: Gordon Street Sanitary Sewer upgrades

[EXTERNAL EMAIL] Do not click links or attachments unless you recognize the sender and know the content is safe.

Good morning Reg,

I reached out to you last year regarding the Gordon Street sanitary sewer upgrades and our client was hoping we could get an update on the work. I see from the links you provided me that design is scheduled for 2021 and construction 2023, could you give any further insight on progress for the project and if there is an anticipated date of when the new sewers will be in service?

Thanks,

Derrick Rice P. Eng
Project Engineer, Community Development

Direct: 519-675-6644
Cell: 519-630-3627
Derrick.Rice@stantec.com

Stantec
600-171 Queens Avenue
London ON N6A 5J7

From: Reg Russwurm <Reg.Russwurm@guelph.ca>
Sent: Wednesday, March 4, 2020 3:54 PM
To: Rice, Derrick <Derrick.Rice@stantec.com>
Cc: Hendriksen, Chris <Chris.Hendriksen@stantec.com>; Arun Hindupur <arun.hindupur@guelph.ca>
Subject: RE: Gordon Street Sanitary Sewer upgrades

Derrick,

I can't commit to keep you current on the status of works. Please monitor the City's webpages concerning the EA's and get added to the circulation list.

https://guelph.ca/city-hall/planning-and-development/community-plans-studies/environment-planning/environmental-assessments/gordon-street-improvements/

https://guelph.ca/plans-and-strategies/water-and-wastewater-servicing-master-plan/

- Reg

From: Rice, Derrick <Derrick.Rice@stantec.com>
Sent: March 4, 2020 3:22 PM
To: Reg Russwurm <Reg.Russwurm@guelph.ca>
Cc: Hendriksen, Chris <Chris.Hendriksen@stantec.com>; Arun Hindupur <Arun.Hindupur@guelph.ca>
Subject: RE: Gordon Street Sanitary Sewer upgrades

Thanks for the quick response Reg,

If you could keep us in the loop as things progress it would be greatly appreciated.

Thanks,

Derrick Rice EIT
Engineering Intern, Community Development

Direct: 519-675-6644
Cell: 519-630-3627
Derrick.Rice@stantec.com

Stantec
600-171 Queens Avenue
London ON N6A 5J7

From: Reg Russwurm <Reg.Russwurm@guelph.ca>
Sent: Wednesday, March 4, 2020 2:50 PM
To: Rice, Derrick <Derrick.Rice@stantec.com>
Cc: Hendriksen, Chris <Chris.Hendriksen@stantec.com>; Arun Hindupur <arun.hindupur@guelph.ca>
Subject: RE: Gordon Street Sanitary Sewer upgrades

Derrick,

The sizing of the sanitary system along Gordon Street is being considered within the overall Master Wastewater Servicing Plan currently underway. Sizing takes into account future growth including this development.

Funding is allocated in the capital budget for design to commence later this year, but I would not want to say construction will be completed in 2021. There is a large scope of work to complete plus two EA's to wrap up. We'll know much better when the new sewer will be in service once the road related EA and the Wastewater Servicing Master Plan EA are complete.

Reg Russwurm, MBA, P.Eng, **Manager, Design and Construction**
Engineering and Transportation Services, **Infrastructure, Development and Enterprise**
City of Guelph
519-822-1260 extension 2765

reg.russwurm@guelph.ca

guelph.ca
facebook.com/cityofguelph
@cityofguelph

- Reg

From: Rice, Derrick <Derrick.Rice@stantec.com>
Sent: March 4, 2020 11:44 AM
To: Reg Russwurm <Reg.Russwurm@guelph.ca>
Cc: Hendriksen, Chris <Chris.Hendriksen@stantec.com>
Subject: RE: Gordon Street Sanitary Sewer upgrades

Hi Reg,

We had previously corresponded with Daryush Esmaili about the Gordon Street Sanitary Sewer upgrades to ensure that our development at 1250 Gordon Street (encompasses 9 Valley, 1242, 1250 and 1260 Gordon) would be considered in the sanitary sewer upgrade planned on Gordon Street. He had confirmed our development would be accommodated in the sizing of the planned upgrade back in June of 2019. I just wanted to contact you to find out if there are any updates on this project that you can provide?

If you have any questions please feel free to contact me.

Thanks,

Derrick Rice EIT
Engineering Intern, Community Development

Direct: 519-675-6644
Cell: 519-630-3627
Derrick.Rice@stantec.com

Stantec
600-171 Queens Avenue
London ON N6A 5J7

From: Engineering General Delivery <Engineering@guelph.ca>
Sent: Wednesday, March 4, 2020 11:33 AM
To: Rice, Derrick <Derrick.Rice@stantec.com>
Cc: Reg Russwurm <Reg.Russwurm@guelph.ca>
Subject: RE: Gordon Street Sanitary Sewer upgrades

Good morning Mr. Rice,

Unfortunately Daryush Esmaili is no longer with the City of Guelph. Reg Russwurm is now the Manager of Design and Construction with Engineering and Transportation Services.

I have cc'ed him on this email in the hopes he can help provide the information you require.

Thank you,

Steve Wark, Clerical Assistant II
Engineering and Transportation Services, **Infrastructure, Development and Enterprise**
City of Guelph
519-822-1260 extension 2338
steve.wark@guelph.ca

From: Rice, Derrick <Derrick.Rice@stantec.com>
Sent: March 4, 2020 10:07 AM
To: Engineering General Delivery <Engineering@guelph.ca>
Subject: Gordon Street Sanitary Sewer upgrades

Hi,

I am trying to contact Daryush Esmaili regarding the Gordon Street Sanitary Sewer upgrades but seem to be getting a bounce back email from guelph.ca, could you please forward my contact information along to Daryush or let me know what I need to do to fix the issue?

Thanks,

Derrick Rice EIT
Engineering Intern, Community Development

Direct: 519-675-6644
Cell: 519-630-3627
Derrick.Rice@stantec.com

Stantec
600-171 Queens Avenue
London ON N6A 5J7

APPENDIX D – SWM FIGURES, MODELS & SUPPORTING DATA

Stantec

Stantec
600-171 Queens Avenue
London ON N6A 5J7
Tel. 519-645-2007
www.stantec.com

Liability Note:

Notes

1. CITY OF GUELPH BENCHMARK 225 ELEVATION 338.665 LOCATION: 1221 GORDON STREET
2. EXISTING SURVEY COMPLETED BY BSR&D (NOVEMBER, 4 2014)
3. THE CONTRACTOR IS TO VERIFY ALL EXISTING ELEVATIONS AND EXISTING CONDITIONS AND TO REPORT ANY DISCREPANCIES TO THE CONSULTING ENGINEER
4. SITE PLAN PREPARED BY STANTEC, DATED JANUARY, 2020.

101	AREA ID
A=1.73	CONTRIBUTING AREA (ha)
↑	MAJOR OVERLAND FLOOD ROUTE
■ ■ ■ ■	DRAINAGE BOUNDARY

1. SITE PLAN REVISIONS	JAC	CJH	21.05.14
Revision	By	Appd.	YY.MM.DD

2. FOR SITE PLAN APPROVAL	JAC	CJH	21.05.14
1. FOR SITE PLAN APPROVAL	JAC	CJH	20.03.24
Issued	By	Appd.	YY.MM.DD

File Name: 161413684_c-sd_ex	JAC	CJH	JAC	19.05.31
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project

TRICAR DEVELOPMENTS INC.

1250 GORDON STREET

GUELPH, ON

Title

EXISTING STORM DRAINAGE CONDITIONS

Project No.
161413684

Scale
1:400
0 4 12 20m

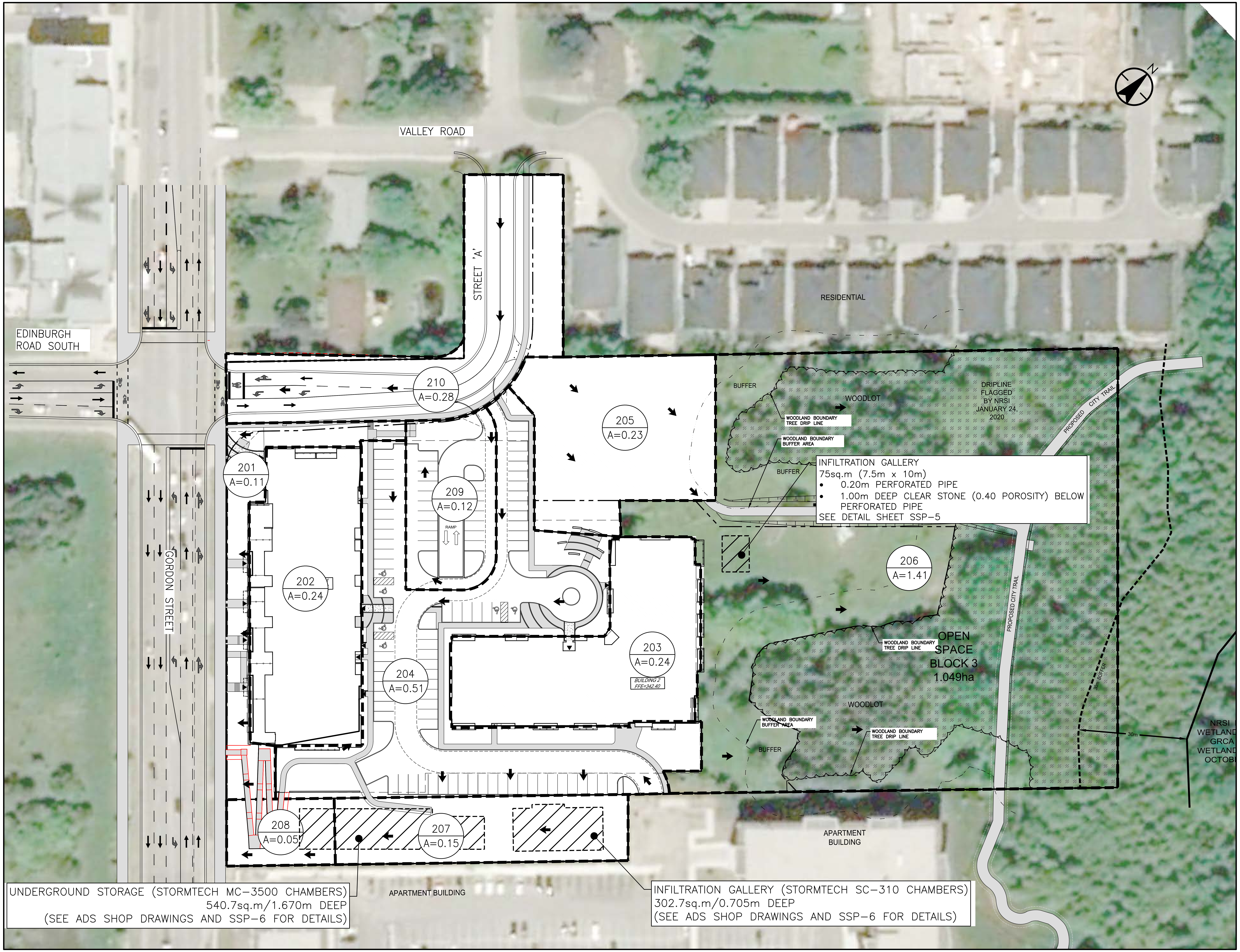
Drawing No.
1

Sheet
1 of 2

Revision
1

V:\01614\active\161413684\design\drawing\report figures\swm\161413684_C-SD_ex.dwg
2021-8-4 3:07 PM by: Childs, Jason

ORIGINAL SHEET - ANSI D



INFILTRATION GALLERY
75sq.m (7.5m x 10m)
- 0.20m PERFORATED PIPE
- 1.00m DEEP CLEAR STONE (0.40 POROSITY) BELOW PERFORATED PIPE

SEE DETAIL SHEET SSP–5

UNDERGROUND STORAGE (STORMTECH MC–3500 CHAMBERS)
540.7sq.m/1.670m DEEP
(SEE ADS SHOP DRAWINGS AND SSP–6 FOR DETAILS)

INFILTRATION GALLERY (STORMTECH SC–310 CHAMBERS)
302.7sq.m/0.705m DEEP
(SEE ADS SHOP DRAWINGS AND SSP–6 FOR DETAILS)

V:\01614\active\161413684\design\drawing\report figures\swm\161413684_C-SD_prop.dwg
2022-6-2 7:13 AM by: Childs, Jason

ORIGINAL SHEET - ANSI D

Stantec

Stantec
600-171 Queens Avenue
London ON N6A 5J7
Tel. 519-645-2007
www.stantec.com

Liability Note:

Notes

1. CITY OF GUELPH BENCHMARK 225 ELEVATION 338.665 LOCATION: 1221 GORDON STREET
2. EXISTING SURVEY COMPLETED BY BSR&D (NOVEMBER, 4 2014)
3. THE CONTRACTOR IS TO VERIFY ALL EXISTING ELEVATIONS AND EXISTING CONDITIONS AND TO REPORT ANY DISCREPANCIES TO THE CONSULTING ENGINEER
4. SITE PLAN PREPARED BY STANTEC, DATED JANUARY, 2020.

Legend

201	AREA ID
A=0.12	CONTRIBUTING AREA (ha)
↑	MAJOR OVERLAND FLOOD ROUTE
▬ ▬ ▬	DRAINAGE BOUNDARY

Revision	By	Appd.	YY.MM.DD
2. SWM DESIGN REVISIONS	JAC	DW	22.05.31
2. SITE PLAN REVISIONS	JAC	CJH	21.07.30
1. SITE PLAN REVISIONS	JAC	CJH	21.05.14

	Dwn.	Chkd.	Dsgn.	YY.MM.DD
File Name: 161413684_c-sd_prop	JAC	CJH	JAC	19.05.31

Permit-Seal

Client/Project

TRICAR DEVELOPMENTS INC.

1250 GORDON STREET

GUELPH, ON

Title

PROPOSED STORM DRAINAGE CONDITIONS

Project No. 161413684

Scale 1:400 0 4 12 20m

Drawing No. 2

Sheet 2 of 2

Revision 2

HYDROLOGIC MODELING INPUTS

Subject: **MIDUSS Parameters**
Project: **1242-1260 Gordon and 9 Valley**
Project No.: **161413684**
Client: **Tricar**
Date: **June 6, 2022**

Table 1: CN Values

Land Use		Hydrologic Soil Type							Source
		A	AB	B	BC	C	CD	D	
Meadow	"Good"	30	44	58	65	71	75	78	USDA
Woodlot	"Fair"	36	48	60	67	73	76	79	USDA
Lawns	"Good"	39	50	61	68	74	77	80	USDA
Pasture/Range		49	55	60	70	79	82	84	USDA
Crop		64	70	74	79	81	84	85	USDA
Gravel		76	81	85	87	89	90	91	USDA
Bare Soil (Fallow)		77	82	86	89	91	93	94	USDA
Impervious		98	98	98	98	98	98	98	USDA

USDA - United States Department of Agriculture (2004), National Engineering Handbook, Part 630 Hydrology,

Table 2: Pre-Development Parameters

Area Description	**Catchment Number**	**Area (ha)**	**Flow Path Length (m)**	**CN**	**Slope (%)**	**Impervious Coverage (%)**
To Gordon Street	101	1.33	70.00	67	2.50	10
To Torrance Watershed	102	1.72	150.00	67	5.00	1
TOTAL AREA		**3.05**				

Table 3: Post-Development Parameters

Area Description	**Catchment Number**	**Area (ha)**	**Flow Path Length (m)**	**CN**	**Slope (%)**	**Imperviousness (%)**
Uncontrolled to Gordon	201	0.11	6	68	2.0	70
West Building (Building 1)	202	0.24	15	68	0.5	99
East Buidling (Building 2)	203	0.24	15	68	0.5	99
Parking	204	0.51	10	68	2.0	90
Future Park	205	0.23	50	68	2.0	10
Uncontrolled to Torrance	206	1.41	120	68	5.0	0
Landscaped Area to Storage	207	0.15	75	68	3.0	50
Uncontrolled Landscape Area	208	0.05	35	68	25.0	70
Parking (Minor to Storage)	209	0.12	10	68	2.0	99
Street A (outside site limits)	210	0.28	-	-		
TOTAL AREA		**3.34**				

Notes:

Slope measure from topographic contours and pre-development drainage plan

Imperviousness estimated from development plan (existing buildings imperviouness estimated to be 99%)

Street A is not included within the hydrologic model as it is outside the site boundaries

Stantec

Project: **1242-1260 Gordon and 9 Valley**
Project Number: **161413684**
Project Location: **Guelph**
Designer: **DW**
Date: **6/6/2022**
Pond Name: **Subsurface Storage**

Stormwater Management Facility Design Calculations

	Rating Curve			Estimated Detention	Volume Estimation			Outlet Structure Controls
			Storage			Active Storage		
	Elevation (m)	Discharge (m³/s)	Active (m³)	Time (hrs)	Elevation (m)	Depth (m)	Elevation (m)	Orifice #1 (m³/s)
Orifice Invert	336.62				336.62		336.6	
Stone Invert	336.81	0.0047			336.81	0.19	336.8	0.005
	336.84	0.0051	5.49	0.3	336.84	0.2	336.8	0.005
	336.86	0.0055	10.98	0.6	336.86	0.2	336.9	0.005
	336.89	0.0058	16.47	0.9	336.89	0.3	336.9	0.006
	336.91	0.0061	21.96	1.1	336.91	0.3	336.9	0.006
	336.94	0.0064	27.45	1.4	336.94	0.32	336.9	0.006
	336.96	0.0067	32.94	1.6	336.96	0.34	337.0	0.007
	336.99	0.0070	38.44	1.8	336.99	0.37	337.0	0.007
	337.01	0.0072	43.93	2.0	337.01	0.39	337.0	0.007
Base of Chamber	337.04	0.0075	49.42	2.2	337.04	0.42	337.0	0.007
	337.06	0.0077	61.00	2.7	337.06	0.44	337.1	0.008
	337.09	0.0080	72.54	3.1	337.09	0.47	337.1	0.008
	337.11	0.0082	84.03	3.5	337.11	0.49	337.1	0.008
	337.14	0.0084	95.49	3.9	337.14	0.52	337.1	0.008
	337.17	0.0086	106.91	4.2	337.17	0.55	337.2	0.009
	337.19	0.0089	118.29	4.6	337.19	0.57	337.2	0.009
	337.22	0.0091	129.63	4.9	337.22	0.60	337.2	0.009
	337.24	0.0093	140.93	5.3	337.24	0.62	337.2	0.009
	337.27	0.0095	152.18	5.6	337.27	0.65	337.3	0.009
	337.29	0.0097	163.37	5.9	337.29	0.67	337.3	0.010
	337.32	0.0099	174.52	6.3	337.32	0.70	337.3	0.010
	337.34	0.0100	185.62	6.6	337.34	0.72	337.3	0.010
	337.37	0.0102	196.66	6.9	337.37	0.75	337.4	0.010
	337.39	0.0104	207.64	7.2	337.39	0.77	337.4	0.010
	337.42	0.0106	218.55	7.5	337.42	0.80	337.4	0.011
	337.45	0.0108	229.40	7.7	337.45	0.83	337.4	0.011
	337.47	0.0109	240.19	8.0	337.47	0.85	337.5	0.011
	337.50	0.0111	250.89	8.3	337.50	0.88	337.5	0.011
	337.52	0.0113	261.53	8.5	337.52	0.90	337.5	0.011
	337.55	0.0114	272.08	8.8	337.55	0.93	337.5	0.011
	337.57	0.0116	282.55	9.1	337.57	0.95	337.6	0.012
	337.60	0.0118	292.93	9.3	337.60	0.98	337.6	0.012
	337.62	0.0119	303.21	9.5	337.62	1.00	337.6	0.012
	337.65	0.0121	313.40	9.8	337.65	1.03	337.6	0.012
	337.67	0.0122	323.48	10.0	337.67	1.05	337.7	0.012
	337.70	0.0124	333.46	10.2	337.70	1.08	337.7	0.012
	337.72	0.0125	343.31	10.5	337.72	1.10	337.7	0.013
	337.75	0.0127	353.05	10.7	337.75	1.13	337.7	0.013
	337.78	0.0128	362.66	10.9	337.78	1.16	337.8	0.013
	337.80	0.0130	372.14	11.1	337.80	1.18	337.8	0.013
	337.83	0.0131	381.46	11.3	337.83	1.21	337.8	0.013
	337.85	0.0133	390.64	11.5	337.85	1.23	337.9	0.013
	337.88	0.0134	399.65	11.7	337.88	1.26	337.9	0.013
	337.90	0.0135	408.48	11.8	337.90	1.28	337.9	0.014
	337.93	0.0137	417.12	12.0	337.93	1.31	337.9	0.014
	337.95	0.0138	425.55	12.2	337.95	1.33	338.0	0.014
	337.98	0.0139	433.75	12.4	337.98	1.36	338.0	0.014
	338.00	0.0141	441.69	12.5	338.00	1.38	338.0	0.014
	338.03	0.0142	449.32	12.7	338.03	1.41	338.0	0.014
	338.05	0.0143	456.58	12.8	338.05	1.43	338.1	0.014
	338.08	0.0145	463.26	12.9	338.08	1.46	338.1	0.014
	338.11	0.0146	469.45	13.0	338.11	1.49	338.1	0.015
	338.13	0.0147	475.45	13.2	338.13	1.51	338.1	0.015
	338.16	0.0149	481.27	13.3	338.16	1.54	338.2	0.015
Top of Chamber	338.18	0.0150	486.86	13.4	338.18	1.56	338.2	0.015
	338.21	0.0151	492.35	13.5	338.21	1.59	338.2	0.015
	338.23	0.0152	497.84	13.6	338.23	1.61	338.2	0.015
	338.26	0.0153	503.33	13.7	338.26	1.64	338.3	0.015
	338.28	0.0155	508.82	13.8	338.28	1.66	338.3	0.015
	338.31	0.0156	514.31	13.9	338.31	1.69	338.3	0.016
	338.33	0.0157	519.81	14.0	338.33	1.71	338.3	0.016
	338.36	0.0158	525.30	14.1	338.36	1.74	338.4	0.016
	338.38	0.0159	530.79	14.2	338.38	1.76	338.4	0.016
	338.41	0.0161	536.28	14.3	338.41	1.79	338.4	0.016
	338.44	0.0162	541.77	14.4	338.44	1.82	338.4	0.016
	338.46	0.0163	547.26	14.4	338.46	1.84	338.5	0.016
Top of Stone	338.49	0.0164	552.75	14.5	338.49	1.87	338.5	0.016
	339.00	0.0204	552.75	14.5	339.49	2.38	339.5	0.020

Parameters	
Orifice #1 Elev (m)	Orifice Coeff.
336.62	0.620
Orifice #1-Midpoint (mm)	Perimeter (m)
336.66	0.236
Orifice Diameter (mm)	Area (m²)
75	0.004
Weir Coeff. (Semi-Circular)	Orientation
1.62	Vertical

Drawdown Time Calculations

Greater than 0.1 m above Orifice 1 Invert
$T=[v_2-v_1]/[(Q_2+Q_1)/2]/3600$
where
T=drawdown time in hours
v_2=starting pond volume
v_2=ending pond volume
Q_2=starting flow
Q_1=ending flow

From 0.0 to 0.1 m above Orifice 1 invert
$T=[v_2-v_1]/[(Q_2)]/3600$
where
T=drawdown time in hours
v_2=starting pond volume
v_2=ending pond volume
Q_2=starting flow

Orifice Flow Calculations:

Orifice flow equation
$Q = C{*}A{*}(2{*}g{*}H)^{0.5}$
where
C = orifice coefficient
A = area of orifice
g = acceleration due to gravity
H = head above centre line of orifice
Note: used when water elevation is above 3/4 of the orifice diameter

Sharp crested semi-circular weir equation
$Q=C{*}D^{2.5}{*}(H/D)^{1.88}$
where
C = sharp crested semi-circular weir coefficient
D = diameter of orifice
H = head above orifice invert
Note: used when water elevation is below 3/4 of the orifice diameter

Subject: **Rooftop Storage Calculations**
Project: **1242-1260 Gordon and 9 Valley**
Project No. **161413684**
Client: **Tricar**
Date: **June 6, 2022**

Rating Curve for 1 ha

Q (m3/s)	Storage (ha-m)	Depth (m)
0.0226	0.023	0.023
0.0275	0.031	0.031
0.034	0.045	0.045
0.042	0.061	0.061
0.208	0.0625	0.0625

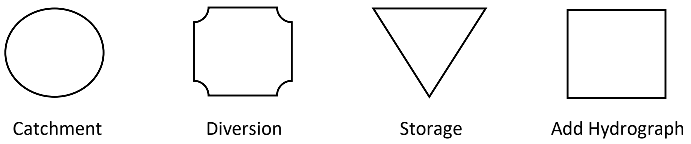
.

Catchment 202/203
Site Ara 0.24

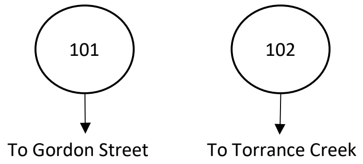
Q (m3/s)	Storage (ha-m)	Depth (m)
0.0054	0.0055	0.023
0.0066	0.0074	0.031
0.0082	0.0108	0.045
0.0101	0.0146	0.061
0.0499	0.0150	0.063

Subject: MIDUSS Schematic
Project: 1242-1260 Gordon and 9 Valley
Project No.: 161413684
Client: Tricar
Date: June 6, 2022

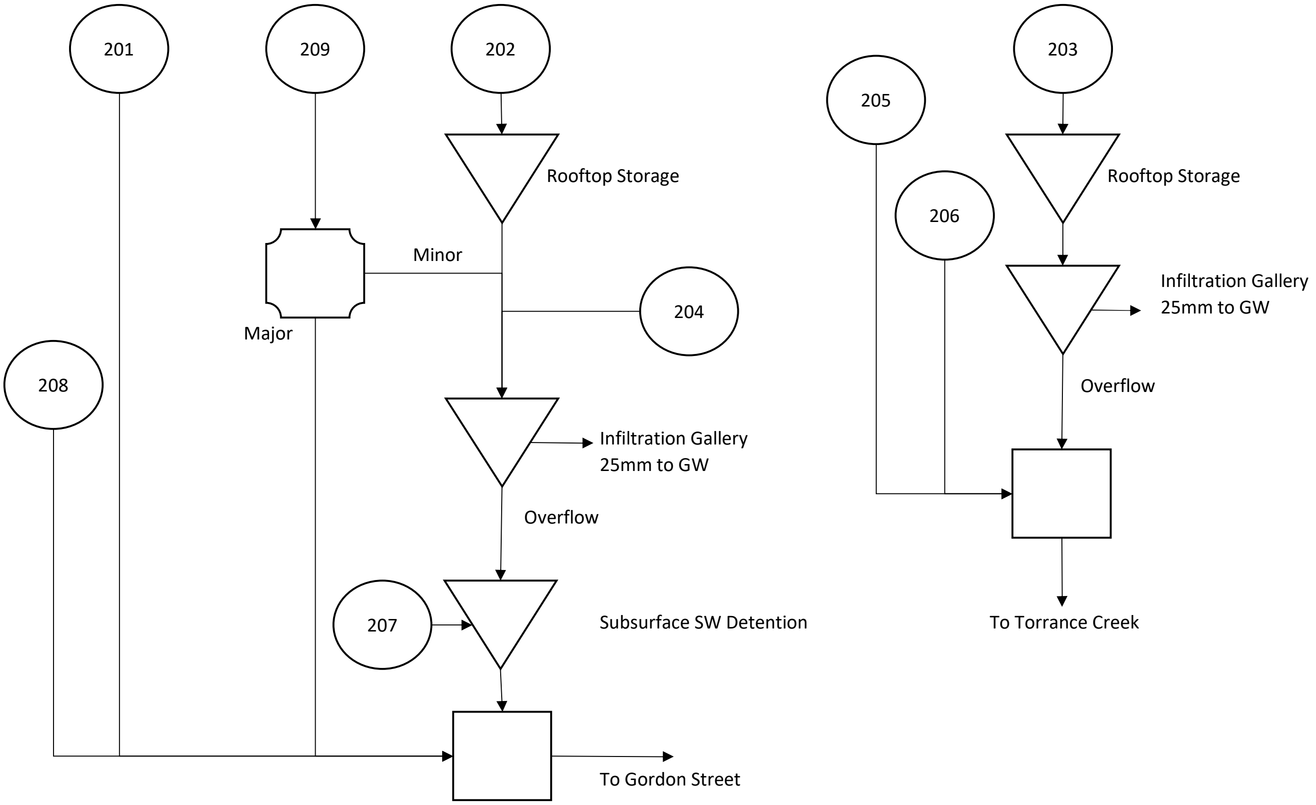
Legend



Existing Conditions



Proposed Conditions



MIDUSS FILES

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       5     line(s) of comment
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        1242-1260 Gordon Street and 9 Valley - 1614-13684
        Stormwater Management Modelling
        May 2022 - D. Williams
        *******************************
 14     START
       1     1=Zero; 2=Define
 35     COMMENT
       7     line(s) of comment
        **********************


        25-mm STORM


        **********************
  2     STORM
             1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
      509.000     Coefficient  a
        6.000     Constant  b    (min)
         .799     Exponent  c
         .400     Fraction to peak  r
      240.000     Duration ó 1500 min
                25.028 mm     Total depth
  3     IMPERVIOUS
             1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .013     Manning "n"
       98.000     SCS Curve No or C
         .100     Ia/S Coefficient
        2.000     Initial Abstraction
 14     START
       1     1=Zero; 2=Define
 35     COMMENT
       3     line(s) of comment
        ****************************
        Catchment 101 - Existing to Gordon
        ****************************
  4     CATCHMENT
      101.000     ID No.ó 99999
        1.330     Area in hectares
      110.000     Length (PERV) metres
        2.500     Gradient (%)
       10.000     Per cent Impervious
       70.000     Length (IMPERV)
```

```
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      67.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .018       .000       .000       .000 c.m/s
              .110       .736       .173     C perv/imperv/total
15     ADD RUNOFF
              .018       .018       .000       .000 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       *********************************
       Catchment 102 - Existing to Torrence
       ****************************
 4     CATCHMENT
     102.000     ID No.ó 99999
       1.720     Area in hectares
     150.000     Length (PERV) metres
       5.000     Gradient (%)
       1.000     Per cent Impervious
       1.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      67.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .005       .000       .000       .000 c.m/s
              .110       .650       .116     C perv/imperv/total
15     ADD RUNOFF
              .005       .005       .000       .000 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      7     line(s) of comment
       **********************


       2-Year STORM


       **********************
 2     STORM
           1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
     743.000     Coefficient  a
```

```
       6.000     Constant  b    (min)
        .798     Exponent  c
        .400     Fraction to peak  r
     180.000     Duration ó 1500 min
                34.438 mm     Total depth
 3     IMPERVIOUS
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .013     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
       2.000     Initial Abstraction
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       ****************************
       Catchment 101 - Existing to Gordon
       ****************************
 4     CATCHMENT
     101.000     ID No.ó 99999
       1.330     Area in hectares
     110.000     Length (PERV) metres
       2.500     Gradient (%)
      10.000     Per cent Impervious
      70.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      67.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .027       .000       .000       .000 c.m/s
              .163       .799       .226     C perv/imperv/total
15     ADD RUNOFF
              .027       .027       .000       .000 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       *********************************
       Catchment 102 - Existing to Torrence
       ****************************
 4     CATCHMENT
     102.000     ID No.ó 99999
       1.720     Area in hectares
     150.000     Length (PERV) metres
       5.000     Gradient (%)
       1.000     Per cent Impervious
       1.000     Length (IMPERV)
```

```
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      67.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .015       .000       .000       .000 c.m/s
              .163       .698       .168     C perv/imperv/total
15     ADD RUNOFF
              .015       .015       .000       .000 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      7     line(s) of comment
       **********************


       5-Year STORM


       **********************
 2     STORM
           1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    1593.000     Coefficient  a
      11.000     Constant  b    (min)
        .879     Exponent  c
        .400     Fraction to peak  r
     180.000     Duration ó 1500 min
                47.240 mm     Total depth
 3     IMPERVIOUS
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .013     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
       2.000     Initial Abstraction
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       ****************************
       Catchment 101 - Existing to Gordon
       ****************************
 4     CATCHMENT
     101.000     ID No.ó 99999
       1.330     Area in hectares
     110.000     Length (PERV) metres
       2.500     Gradient (%)
      10.000     Per cent Impervious
      70.000     Length (IMPERV)
```

```
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      67.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .040       .000       .000       .000 c.m/s
              .226       .841       .287     C perv/imperv/total
15     ADD RUNOFF
              .040       .040       .000       .000 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       *********************************
       Catchment 102 - Existing to Torrence
       ****************************
 4     CATCHMENT
     102.000     ID No.ó 99999
       1.720     Area in hectares
     150.000     Length (PERV) metres
       5.000     Gradient (%)
       1.000     Per cent Impervious
       1.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      67.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .038       .000       .000       .000 c.m/s
              .226       .739       .231     C perv/imperv/total
15     ADD RUNOFF
              .038       .038       .000       .000 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      7     line(s) of comment
       **********************


       100-Year STORM


       **********************
 2     STORM
           1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    4688.000     Coefficient  a
```

```
      17.000     Constant  b    (min)
        .925     Exponent  c
        .400     Fraction to peak  r
     180.000     Duration ó 1500 min
               106.103 mm     Total depth
 3     IMPERVIOUS
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .013     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
       2.000     Initial Abstraction
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       ****************************
       Catchment 101 - Existing to Gordon
       ****************************
 4     CATCHMENT
     101.000     ID No.ó 99999
       1.330     Area in hectares
     110.000     Length (PERV) metres
       2.500     Gradient (%)
      10.000     Per cent Impervious
      70.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      67.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .191       .000       .000       .000 c.m/s
              .426       .920       .475     C perv/imperv/total
15     ADD RUNOFF
              .191       .191       .000       .000 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       *********************************
       Catchment 102 - Existing to Torrence
       ****************************
 4     CATCHMENT
     102.000     ID No.ó 99999
       1.720     Area in hectares
     150.000     Length (PERV) metres
       5.000     Gradient (%)
       1.000     Per cent Impervious
       1.000     Length (IMPERV)
```

```
          .000     %Imp. with Zero Dpth
             1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250     Manning "n"
        67.000     SCS Curve No or C
          .100     Ia/S Coefficient
         5.000     Initial Abstraction
             1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .251       .000       .000       .000 c.m/s
                .425       .808       .429     C perv/imperv/total
15     ADD RUNOFF
                .251       .251       .000       .000 c.m/s
20     MANUAL
```

```
        Output File (4.7) GOR.out      opened 2022-06-06  21:05
        Units used are defined by G =    9.810
           300   600     5.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Paragon Engineering Limited
 35     COMMENT
       5     line(s) of comment
        *******************************
        1242-1260 Gordon Street and 9 Valley - 1614-13684
        Stormwater Management Modelling
        May 2022 - D. Williams
        *******************************
 14     START
       1     1=Zero; 2=Define
 35     COMMENT
       7     line(s) of comment
        **********************


        25-mm STORM


        **********************
  2     STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
      509.000     Coefficient  a
        6.000     Constant  b    (min)
         .799     Exponent  c
         .400     Fraction to peak  r
      240.000     Duration ó 1500 min
                 25.028 mm     Total depth
  3     IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .013     Manning "n"
       98.000     SCS Curve No or C
         .100     Ia/S Coefficient
        2.000     Initial Abstraction
 14     START
       1     1=Zero; 2=Define
 35     COMMENT
       3     line(s) of comment
        ****************************
        Catchment 202 - RFTOP
        ****************************
  4     CATCHMENT
      202.000     ID No.ó 99999
         .240     Area in hectares
        1.000     Length (PERV) metres
         .500     Gradient (%)
       99.000     Per cent Impervious
       15.000     Length (IMPERV)
```

```
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .031       .000       .000       .000 c.m/s
              .114       .740       .733     C perv/imperv/total
15     ADD RUNOFF
              .031       .031       .000       .000 c.m/s
35     COMMENT
      3     line(s) of comment
       *********************************
       West Building - Rooftop Control
       *********************************
10     POND
      6 Depth - Discharge - Volume sets
          .000        .000          .0
          .023      .00540        55.2
          .031      .00660        74.4
          .045      .00820       108.0
          .061       .0101       146.4
          .063       .0499       150.0
       Peak Outflow    =      .003 c.m/s
       Maximum Depth   =      .012 metres
       Maximum Storage =       28. c.m
              .031       .031       .003       .000 c.m/s
16     NEXT LINK
              .031       .003       .003       .000 c.m/s
17     COMBINE
    500     Junction Node No.
              .031       .003       .003       .003 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       ****************************
       Catchment 209 - Min to Storage - Maj Uncontrolled
       ****************************
 4     CATCHMENT
     209.000     ID No.ó 99999
        .120     Area in hectares
       5.000     Length (PERV) metres
       2.000     Gradient (%)
      99.000     Per cent Impervious
      10.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
```

```
        68.000     SCS Curve No or C
          .100     Ia/S Coefficient
         5.000     Initial Abstraction
             1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .018       .000       .003       .003 c.m/s
                .115       .736       .729     C perv/imperv/total
 15     ADD RUNOFF
                .018       .018       .003       .003 c.m/s
 12     DIVERT
             1     U/S Node No.ó 99999
          .038     Threshold Discharge
          .038     Max. Outflow reqd.
              Qmax & Vol.Diverted =      .000 c.m/s          .0 c.m
              No flow diverted
                .018       .018       .018       .003 c.m/s
 16     NEXT LINK
                .018       .018       .018       .003 c.m/s
 35     COMMENT
        3     line(s) of comment
         ****************************
         Catchment 204
         ****************************
  4     CATCHMENT
       204.000     ID No.ó 99999
          .510     Area in hectares
         4.000     Length (PERV) metres
         2.000     Gradient (%)
        90.000     Per cent Impervious
        10.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
             1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250     Manning "n"
        68.000     SCS Curve No or C
          .100     Ia/S Coefficient
         5.000     Initial Abstraction
             1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .068       .018       .018       .003 c.m/s
                .115       .736       .674     C perv/imperv/total
 15     ADD RUNOFF
                .068       .085       .018       .003 c.m/s
  9     ROUTE
          .000     Conduit Length
          .000     No Conduit defined
          .000     Zero lag
          .000     Beta weighting factor
          .000     Routing timestep
             0     No. of sub-reaches
                .068       .085       .085       .003 c.m/s
 17     COMBINE
      500     Junction Node No.
```

```
              .068       .085       .085       .086 c.m/s
18     CONFLUENCE
    500     Junction Node No.
              .068       .086       .085       .000 c.m/s
35     COMMENT
      3     line(s) of comment
       *********************************
       Infiltration Chamber
       *********************************
10     POND
      4 Depth - Discharge - Volume sets
          .000        .000          .0
          .178      .00180          .1
          .711      .00190       116.2
          .712        .400       117.0
       Peak Outflow    =      .002 c.m/s
       Maximum Depth   =      .685 metres
       Maximum Storage =      111. c.m
              .068       .086       .002       .000 c.m/s
16     NEXT LINK
              .068       .002       .002       .000 c.m/s
35     COMMENT
      3     line(s) of comment
       ****************************
       Catchment 207
       ****************************
 4     CATCHMENT
     207.000     ID No.ó 99999
        .150     Area in hectares
      75.000     Length (PERV) metres
       3.000     Gradient (%)
      50.000     Per cent Impervious
      35.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .010       .002       .002       .000 c.m/s
              .115       .740       .427     C perv/imperv/total
15     ADD RUNOFF
              .010       .012       .002       .000 c.m/s
35     COMMENT
      3     line(s) of comment
       *********************************
       Storage
       *********************************
10     POND
```

```
          9 Depth - Discharge - Volume sets
              .000        .000          .0
              .190      .00470          .1
              .420      .00750        49.4
              .880       .0111       250.9
             1.380       .0141       441.7
             1.560       .0150       486.9
             1.870       .0164       552.8
             2.380       .0204       553.0
             2.390        .200       553.1
           Peak Outflow    =      .005 c.m/s
           Maximum Depth   =      .209 metres
           Maximum Storage =        4. c.m
                  .010       .012       .005       .000 c.m/s
    17     COMBINE
       500     Junction Node No.
                  .010       .012       .005       .005 c.m/s
    22     FILE HYDROGRAPH
          1     1=READ: 2=WRITE
          1     D                   is Filename
          3     1=Overland: 2=Inflow: 3=Outflow: 4=Temp'ary
                  .010       .012       .000       .005 c.m/s
    17     COMBINE
       500     Junction Node No.
                  .010       .012       .000       .005 c.m/s
    14     START
          1     1=Zero; 2=Define
    35     COMMENT
          3     line(s) of comment
           ***********************************
           Uncontrolled Flow to Gordon Street
           ***********************************
     4     CATCHMENT
        201.000     ID No.ó 99999
           .110     Area in hectares
          6.000     Length (PERV) metres
          2.000     Gradient (%)
         70.000     Per cent Impervious
          6.000     Length (IMPERV)
           .000     %Imp. with Zero Dpth
              1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
           .250     Manning "n"
         68.000     SCS Curve No or C
           .100     Ia/S Coefficient
          5.000     Initial Abstraction
              1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                  .012       .000       .000       .005 c.m/s
                  .115       .722       .540     C perv/imperv/total
    15     ADD RUNOFF
                  .012       .012       .000       .005 c.m/s
```

```
35     COMMENT
      3     line(s) of comment
       **********************************
       Uncontrolled Flow to Gordon Street
       **********************************
 4     CATCHMENT
     208.000     ID No.ó 99999
        .050     Area in hectares
      35.000     Length (PERV) metres
      25.000     Gradient (%)
      70.000     Per cent Impervious
       6.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .005       .012       .000       .005 c.m/s
              .115       .675       .507     C perv/imperv/total
15     ADD RUNOFF
              .005       .017       .000       .005 c.m/s
 9     ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
              .005       .017       .017       .005 c.m/s
35     COMMENT
      3     line(s) of comment
       **********************************
       TOTAL FLOW TO GORDON
       **********************************
17     COMBINE
    500     Junction Node No.
              .005       .017       .017       .022 c.m/s
18     CONFLUENCE
    500     Junction Node No.
              .005       .022       .017       .000 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       ********************************
       Catchment 203 - RFTOP
       ****************************
 4     CATCHMENT
```

```
     203.000     ID No.ó 99999
        .240     Area in hectares
       1.000     Length (PERV) metres
        .500     Gradient (%)
      99.000     Per cent Impervious
      15.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .031       .000       .017       .000 c.m/s
              .114       .740       .733     C perv/imperv/total
15     ADD RUNOFF
              .031       .031       .017       .000 c.m/s
35     COMMENT
      3     line(s) of comment
       *********************************
       East Building - Rooftop Control
       *********************************
10     POND
      6 Depth - Discharge - Volume sets
          .000        .000          .0
          .023      .00540        55.2
          .031      .00660        74.4
          .045      .00820       108.0
          .061       .0101       146.4
          .063       .0499       150.0
       Peak Outflow    =      .003 c.m/s
       Maximum Depth   =      .012 metres
       Maximum Storage =       28. c.m
              .031       .031       .003       .000 c.m/s
16     NEXT LINK
              .031       .003       .003       .000 c.m/s
35     COMMENT
      3     line(s) of comment
       *********************************
       EAST LID
       *********************************
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
         1.000     .000700        30.0
         1.001       .0500        31.0
       Peak Outflow    =      .001 c.m/s
       Maximum Depth   =      .929 metres
       Maximum Storage =       28. c.m
              .031       .003       .001       .000 c.m/s
```

```
16     NEXT LINK
              .031       .001       .001       .000 c.m/s
35     COMMENT
      3     line(s) of comment
       *********************************
       Catchment 206 - Uncontrolled To Torrence
       ****************************
 4     CATCHMENT
     206.000     ID No.ó 99999
       1.410     Area in hectares
     120.000     Length (PERV) metres
       5.000     Gradient (%)
       1.000     Per cent Impervious
       5.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .005       .001       .001       .000 c.m/s
              .115       .700       .121     C perv/imperv/total
15     ADD RUNOFF
              .005       .005       .001       .000 c.m/s
35     COMMENT
      3     line(s) of comment
       *********************************
       Catchment 205 - Park Block - Uncontrolled to Torrence
       ****************************
 4     CATCHMENT
     205.000     ID No.ó 99999
        .230     Area in hectares
      50.000     Length (PERV) metres
       2.000     Gradient (%)
      10.000     Per cent Impervious
       5.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .004       .005       .001       .000 c.m/s
              .115       .716       .175     C perv/imperv/total
15     ADD RUNOFF
              .004       .006       .001       .000 c.m/s
14     START
      1     1=Zero; 2=Define
```

```
35     COMMENT
      7     line(s) of comment
       *********************


       2 Year STORM


       *********************
 2     STORM
           1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
     743.000     Coefficient  a
       6.000     Constant  b    (min)
        .798     Exponent  c
        .400     Fraction to peak  r
     180.000     Duration ó 1500 min
                34.438 mm     Total depth
 3     IMPERVIOUS
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .013     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
       2.000     Initial Abstraction
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       ****************************
       Catchment 202 - RFTOP
       ****************************
 4     CATCHMENT
     202.000     ID No.ó 99999
        .240     Area in hectares
       1.000     Length (PERV) metres
        .500     Gradient (%)
      99.000     Per cent Impervious
      15.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .051       .000       .000       .000 c.m/s
             .168       .801       .794     C perv/imperv/total
15     ADD RUNOFF
             .051       .051       .001       .000 c.m/s
35     COMMENT
      3     line(s) of comment
```

```
       *********************************
       West Building - Rooftop Control
       *********************************
10     POND
      6 Depth - Discharge - Volume sets
           .000        .000          .0
           .023      .00540        55.2
           .031      .00660        74.4
           .045      .00820       108.0
           .061       .0101       146.4
           .063       .0499       150.0
       Peak Outflow    =      .004 c.m/s
       Maximum Depth   =      .019 metres
       Maximum Storage =       45. c.m
               .051       .051       .004       .000 c.m/s
16     NEXT LINK
               .051       .004       .004       .000 c.m/s
17     COMBINE
    500     Junction Node No.
               .051       .004       .004       .004 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       ****************************
       Catchment 209 - Min to Storage - Maj Uncontrolled
       ****************************
 4     CATCHMENT
     209.000     ID No.ó 99999
        .120     Area in hectares
       5.000     Length (PERV) metres
       2.000     Gradient (%)
      99.000     Per cent Impervious
      10.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .028       .000       .004       .004 c.m/s
               .168       .787       .781     C perv/imperv/total
15     ADD RUNOFF
               .028       .028       .004       .004 c.m/s
12     DIVERT
           1     U/S Node No.ó 99999
        .038     Threshold Discharge
        .038     Max. Outflow reqd.
          Qmax & Vol.Diverted =      .000 c.m/s          .0 c.m
```

```
          No flow diverted
            .028       .028       .028       .004 c.m/s
 16     NEXT LINK
            .028       .028       .028       .004 c.m/s
 35     COMMENT
       3     line(s) of comment
        ****************************
        Catchment 204
        ****************************
  4     CATCHMENT
     204.000     ID No.ó 99999
        .510     Area in hectares
       4.000     Length (PERV) metres
       2.000     Gradient (%)
      90.000     Per cent Impervious
      10.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .108       .028       .028       .004 c.m/s
            .168       .787       .725     C perv/imperv/total
 15     ADD RUNOFF
            .108       .136       .028       .004 c.m/s
  9     ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
            .108       .136       .136       .004 c.m/s
 17     COMBINE
     500     Junction Node No.
            .108       .136       .136       .137 c.m/s
 18     CONFLUENCE
     500     Junction Node No.
            .108       .137       .136       .000 c.m/s
 35     COMMENT
       3     line(s) of comment
        *********************************
        Infiltration Chamber
        *********************************
 10     POND
       4 Depth - Discharge - Volume sets
          .000        .000          .0
          .178      .00180          .1
```

```
           .711      .00190       116.2
           .712        .400       117.0
        Peak Outflow    =      .022 c.m/s
        Maximum Depth   =      .711 metres
        Maximum Storage =      116. c.m
               .108       .137       .022       .000 c.m/s
16      NEXT LINK
               .108       .022       .022       .000 c.m/s
35      COMMENT
       3     line(s) of comment
        ****************************
        Catchment 207
        ****************************
 4      CATCHMENT
      207.000     ID No.ó 99999
         .150     Area in hectares
       75.000     Length (PERV) metres
        3.000     Gradient (%)
       50.000     Per cent Impervious
       35.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250     Manning "n"
       68.000     SCS Curve No or C
         .100     Ia/S Coefficient
        5.000     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .016       .022       .022       .000 c.m/s
               .169       .801       .485     C perv/imperv/total
15      ADD RUNOFF
               .016       .025       .022       .000 c.m/s
35      COMMENT
       3     line(s) of comment
        *********************************
        Storage
        *********************************
10      POND
       9 Depth - Discharge - Volume sets
           .000        .000          .0
           .190      .00470          .1
           .420      .00750        49.4
           .880       .0111       250.9
          1.380       .0141       441.7
          1.560       .0150       486.9
          1.870       .0164       552.8
          2.380       .0204       553.0
          2.390        .200       553.1
        Peak Outflow    =      .007 c.m/s
        Maximum Depth   =      .396 metres
        Maximum Storage =       44. c.m
```

```
             .016       .025       .007       .000 c.m/s
17     COMBINE
    500     Junction Node No.
             .016       .025       .007       .007 c.m/s
22     FILE HYDROGRAPH
      1     1=READ: 2=WRITE
      1     D                   is Filename
      3     1=Overland: 2=Inflow: 3=Outflow: 4=Temp'ary
             .016       .025       .000       .007 c.m/s
17     COMBINE
    500     Junction Node No.
             .016       .025       .000       .007 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       ***********************************
       Uncontrolled Flow to Gordon Street
       ***********************************
 4     CATCHMENT
     201.000     ID No.ó 99999
        .110     Area in hectares
       6.000     Length (PERV) metres
       2.000     Gradient (%)
      70.000     Per cent Impervious
       6.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .019       .000       .000       .007 c.m/s
             .168       .770       .590     C perv/imperv/total
15     ADD RUNOFF
             .019       .019       .000       .007 c.m/s
35     COMMENT
      3     line(s) of comment
       ***********************************
       Uncontrolled Flow to Gordon Street
       ***********************************
 4     CATCHMENT
     208.000     ID No.ó 99999
        .050     Area in hectares
      35.000     Length (PERV) metres
      25.000     Gradient (%)
      70.000     Per cent Impervious
       6.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
```

```
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .008       .019       .000       .007 c.m/s
              .168       .715       .551     C perv/imperv/total
15     ADD RUNOFF
              .008       .027       .000       .007 c.m/s
 9     ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
              .008       .027       .027       .007 c.m/s
35     COMMENT
      3     line(s) of comment
       ***********************************
       TOTAL FLOW TO GORDON
       ***********************************
17     COMBINE
    500     Junction Node No.
              .008       .027       .027       .032 c.m/s
18     CONFLUENCE
    500     Junction Node No.
              .008       .032       .027       .000 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       ********************************
       Catchment 203 - RFTOP
       ****************************
 4     CATCHMENT
     203.000     ID No.ó 99999
        .240     Area in hectares
       1.000     Length (PERV) metres
        .500     Gradient (%)
      99.000     Per cent Impervious
      15.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
```

```
              .051       .000       .027       .000 c.m/s
              .168       .801       .794     C perv/imperv/total
 15     ADD RUNOFF
              .051       .051       .027       .000 c.m/s
 35     COMMENT
       3     line(s) of comment
        ********************************
        East Building - Rooftop Control
        ********************************
 10     POND
       6 Depth - Discharge - Volume sets
          .000        .000           .0
          .023      .00540         55.2
          .031      .00660         74.4
          .045      .00820        108.0
          .061       .0101        146.4
          .063       .0499        150.0
        Peak Outflow    =      .004 c.m/s
        Maximum Depth   =      .019 metres
        Maximum Storage =       45. c.m
              .051       .051       .004       .000 c.m/s
 16     NEXT LINK
              .051       .004       .004       .000 c.m/s
 35     COMMENT
       3     line(s) of comment
        ********************************
        EAST LID
        ********************************
 10     POND
       3 Depth - Discharge - Volume sets
          .000        .000           .0
         1.000     .000700         30.0
         1.001       .0500         31.0
        Peak Outflow    =      .003 c.m/s
        Maximum Depth   =     1.000 metres
        Maximum Storage =       30. c.m
              .051       .004       .003       .000 c.m/s
 16     NEXT LINK
              .051       .003       .003       .000 c.m/s
 35     COMMENT
       3     line(s) of comment
        ********************************
        Catchment 206 - Uncontrolled To Torrence
        ***************************
  4     CATCHMENT
      206.000     ID No.ó 99999
        1.410     Area in hectares
      120.000     Length (PERV) metres
        5.000     Gradient (%)
        1.000     Per cent Impervious
```

```
         5.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
             1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250     Manning "n"
        68.000     SCS Curve No or C
          .100     Ia/S Coefficient
         5.000     Initial Abstraction
             1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .014       .003       .003       .000 c.m/s
                .169       .738       .175     C perv/imperv/total
15     ADD RUNOFF
                .014       .015       .003       .000 c.m/s
35     COMMENT
      3     line(s) of comment
       ********************************
       Catchment 205 - Park Block - Uncontrolled to Torrence
       ***************************
 4     CATCHMENT
       205.000     ID No.ó 99999
          .230     Area in hectares
        50.000     Length (PERV) metres
         2.000     Gradient (%)
        10.000     Per cent Impervious
         5.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
             1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250     Manning "n"
        68.000     SCS Curve No or C
          .100     Ia/S Coefficient
         5.000     Initial Abstraction
             1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .006       .015       .003       .000 c.m/s
                .169       .763       .228     C perv/imperv/total
15     ADD RUNOFF
                .006       .017       .003       .000 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      7     line(s) of comment
       *********************


       5 Year STORM


       *********************
 2     STORM
             1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
      1593.000     Coefficient  a
        11.000     Constant  b    (min)
```

```
        .879     Exponent  c
        .400     Fraction to peak  r
     240.000     Duration ó 1500 min
               49.540 mm     Total depth
 3     IMPERVIOUS
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .013     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
       2.000     Initial Abstraction
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       ****************************
       Catchment 202 - RFTOP
       ****************************
 4     CATCHMENT
     202.000     ID No.ó 99999
        .240     Area in hectares
       1.000     Length (PERV) metres
        .500     Gradient (%)
      99.000     Per cent Impervious
      15.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .072       .000       .003       .000 c.m/s
              .239       .854       .847     C perv/imperv/total
15     ADD RUNOFF
              .072       .072       .003       .000 c.m/s
35     COMMENT
      3     line(s) of comment
       *********************************
       West Building - Rooftop Control
       *********************************
10     POND
      6 Depth - Discharge - Volume sets
           .000        .000           .0
           .023      .00540         55.2
           .031      .00660         74.4
           .045      .00820        108.0
           .061       .0101        146.4
           .063       .0499        150.0
       Peak Outflow    =      .006 c.m/s
       Maximum Depth   =      .029 metres
```

```
       Maximum Storage =       69. c.m
              .072       .072       .006       .000 c.m/s
16     NEXT LINK
              .072       .006       .006       .000 c.m/s
17     COMBINE
    500     Junction Node No.
              .072       .006       .006       .006 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       ****************************
       Catchment 209 - Min to Storage - Maj Uncontrolled
       ****************************
 4     CATCHMENT
     209.000     ID No.ó 99999
        .120     Area in hectares
       5.000     Length (PERV) metres
       2.000     Gradient (%)
      99.000     Per cent Impervious
      10.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .038       .000       .006       .006 c.m/s
              .242       .833       .828     C perv/imperv/total
15     ADD RUNOFF
              .038       .038       .006       .006 c.m/s
12     DIVERT
           1     U/S Node No.ó 99999
        .038     Threshold Discharge
        .038     Max. Outflow reqd.
            Qmax & Vol.Diverted =      .000 c.m/s          .0 c.m
            Majors From 209
              .038       .038       .038       .006 c.m/s
16     NEXT LINK
              .038       .038       .038       .006 c.m/s
35     COMMENT
      3     line(s) of comment
       ****************************
       Catchment 204
       ****************************
 4     CATCHMENT
     204.000     ID No.ó 99999
        .510     Area in hectares
       4.000     Length (PERV) metres
```

```
       2.000     Gradient (%)
      90.000     Per cent Impervious
      10.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .149       .038       .038       .006 c.m/s
              .242       .833       .774     C perv/imperv/total
 15     ADD RUNOFF
              .149       .187       .038       .006 c.m/s
  9     ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
              .149       .187       .187       .006 c.m/s
 17     COMBINE
    500     Junction Node No.
              .149       .187       .187       .190 c.m/s
 18     CONFLUENCE
    500     Junction Node No.
              .149       .190       .187       .000 c.m/s
 35     COMMENT
      3     line(s) of comment
        *********************************
        Infiltration Chamber
        *********************************
 10     POND
      4 Depth - Discharge - Volume sets
          .000        .000          .0
          .178      .00180          .1
          .711      .00190       116.2
          .712        .400       117.0
        Peak Outflow    =      .121 c.m/s
        Maximum Depth   =      .711 metres
        Maximum Storage =      116. c.m
              .149       .190       .121       .000 c.m/s
 16     NEXT LINK
              .149       .121       .121       .000 c.m/s
 35     COMMENT
      3     line(s) of comment
        ****************************
        Catchment 207
        ****************************
```

```
 4     CATCHMENT
    207.000     ID No.ó 99999
       .150     Area in hectares
     75.000     Length (PERV) metres
      3.000     Gradient (%)
     50.000     Per cent Impervious
     35.000     Length (IMPERV)
       .000     %Imp. with Zero Dpth
          1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250     Manning "n"
     68.000     SCS Curve No or C
       .100     Ia/S Coefficient
      5.000     Initial Abstraction
          1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .023       .121       .121       .000 c.m/s
             .244       .854       .549     C perv/imperv/total
15     ADD RUNOFF
             .023       .140       .121       .000 c.m/s
35     COMMENT
     3     line(s) of comment
      *********************************
      Storage
      *********************************
10     POND
     9 Depth - Discharge - Volume sets
         .000        .000           .0
         .190      .00470           .1
         .420      .00750         49.4
         .880       .0111        250.9
        1.380       .0141        441.7
        1.560       .0150        486.9
        1.870       .0164        552.8
        2.380       .0204        553.0
        2.390        .200        553.1
      Peak Outflow    =      .009 c.m/s
      Maximum Depth   =      .651 metres
      Maximum Storage =      150. c.m
             .023       .140       .009       .000 c.m/s
17     COMBINE
   500     Junction Node No.
             .023       .140       .009       .009 c.m/s
22     FILE HYDROGRAPH
     1     1=READ: 2=WRITE
     1     D                     is Filename
     3     1=Overland: 2=Inflow: 3=Outflow: 4=Temp'ary
             .023       .140       .000       .009 c.m/s
17     COMBINE
   500     Junction Node No.
             .023       .140       .000       .009 c.m/s
14     START
```

```
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       ***********************************
       Uncontrolled Flow to Gordon Street
       ***********************************
 4     CATCHMENT
     201.000     ID No.ó 99999
        .110     Area in hectares
       6.000     Length (PERV) metres
       2.000     Gradient (%)
      70.000     Per cent Impervious
       6.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .025       .000       .000       .009 c.m/s
              .243       .810       .639     C perv/imperv/total
15     ADD RUNOFF
              .025       .025       .000       .009 c.m/s
35     COMMENT
      3     line(s) of comment
       ***********************************
       Uncontrolled Flow to Gordon Street
       ***********************************
 4     CATCHMENT
     208.000     ID No.ó 99999
        .050     Area in hectares
      35.000     Length (PERV) metres
      25.000     Gradient (%)
      70.000     Per cent Impervious
       6.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .011       .025       .000       .009 c.m/s
              .243       .756       .602     C perv/imperv/total
15     ADD RUNOFF
              .011       .036       .000       .009 c.m/s
 9     ROUTE
        .000     Conduit Length
        .000     No Conduit defined
```

```
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
              .011       .036       .036       .009 c.m/s
35     COMMENT
      3     line(s) of comment
       ***********************************
       TOTAL FLOW TO GORDON
       ***********************************
17     COMBINE
    500     Junction Node No.
              .011       .036       .036       .041 c.m/s
18     CONFLUENCE
    500     Junction Node No.
              .011       .041       .036       .000 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       ********************************
       Catchment 203 - RFTOP
       ****************************
 4     CATCHMENT
     203.000     ID No.ó 99999
        .240     Area in hectares
       1.000     Length (PERV) metres
        .500     Gradient (%)
      99.000     Per cent Impervious
      15.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .072       .000       .036       .000 c.m/s
              .239       .854       .847     C perv/imperv/total
15     ADD RUNOFF
              .072       .072       .036       .000 c.m/s
35     COMMENT
      3     line(s) of comment
       *********************************
       East Building - Rooftop Control
       *********************************
10     POND
      6 Depth - Discharge - Volume sets
          .000        .000          .0
          .023      .00540        55.2
```

```
              .031      .00660        74.4
              .045      .00820       108.0
              .061       .0101       146.4
              .063       .0499       150.0
           Peak Outflow    =      .006 c.m/s
           Maximum Depth   =      .029 metres
           Maximum Storage =       69. c.m
                  .072       .072       .006       .000 c.m/s
 16        NEXT LINK
                  .072       .006       .006       .000 c.m/s
 35        COMMENT
          3     line(s) of comment
           *********************************
           EAST LID
           *********************************
 10        POND
          3 Depth - Discharge - Volume sets
              .000        .000          .0
             1.000     .000700        30.0
             1.001       .0500        31.0
           Peak Outflow    =      .006 c.m/s
           Maximum Depth   =     1.000 metres
           Maximum Storage =       30. c.m
                  .072       .006       .006       .000 c.m/s
 16        NEXT LINK
                  .072       .006       .006       .000 c.m/s
 35        COMMENT
          3     line(s) of comment
           *********************************
           Catchment 206 - Uncontrolled To Torrence
           ****************************
  4        CATCHMENT
         206.000     ID No.ó 99999
           1.410     Area in hectares
         120.000     Length (PERV) metres
           5.000     Gradient (%)
           1.000     Per cent Impervious
           5.000     Length (IMPERV)
            .000     %Imp. with Zero Dpth
               1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
            .250     Manning "n"
          68.000     SCS Curve No or C
            .100     Ia/S Coefficient
           5.000     Initial Abstraction
               1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                  .038       .006       .006       .000 c.m/s
                  .244       .776       .249     C perv/imperv/total
 15        ADD RUNOFF
                  .038       .039       .006       .000 c.m/s
 35        COMMENT
```

```
      3     line(s) of comment
       *********************************
       Catchment 205 - Park Block - Uncontrolled to Torrence
       ***************************
 4     CATCHMENT
     205.000     ID No.ó 99999
        .230     Area in hectares
      50.000     Length (PERV) metres
       2.000     Gradient (%)
      10.000     Per cent Impervious
       5.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .008       .039       .006       .000 c.m/s
              .244       .800       .300     C perv/imperv/total
15     ADD RUNOFF
              .008       .046       .006       .000 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      7     line(s) of comment
       *********************


        100 Year STORM


       *********************
 2     STORM
           1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    4688.000     Coefficient  a
      17.000     Constant  b    (min)
        .925     Exponent  c
        .400     Fraction to peak  r
     180.000     Duration ó 1500 min
               106.103 mm     Total depth
 3     IMPERVIOUS
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .013     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
       2.000     Initial Abstraction
14     START
      1     1=Zero; 2=Define
35     COMMENT
```

```
       3     line(s) of comment
        ****************************
        Catchment 202 - RFTOP
        ****************************
 4      CATCHMENT
     202.000     ID No.ó 99999
        .240     Area in hectares
       1.000     Length (PERV) metres
        .500     Gradient (%)
      99.000     Per cent Impervious
      15.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .155       .000       .006       .000 c.m/s
              .429       .920       .915     C perv/imperv/total
15      ADD RUNOFF
              .155       .155       .006       .000 c.m/s
35      COMMENT
       3     line(s) of comment
        *********************************
        West Building - Rooftop Control
        *********************************
10      POND
       6 Depth - Discharge - Volume sets
          .000        .000          .0
          .023      .00540        55.2
          .031      .00660        74.4
          .045      .00820       108.0
          .061       .0101       146.4
          .063       .0499       150.0
        Peak Outflow    =      .049 c.m/s
        Maximum Depth   =      .062 metres
        Maximum Storage =      150. c.m
              .155       .155       .049       .000 c.m/s
16      NEXT LINK
              .155       .049       .049       .000 c.m/s
17      COMBINE
     500     Junction Node No.
              .155       .049       .049       .049 c.m/s
14      START
       1     1=Zero; 2=Define
35      COMMENT
       3     line(s) of comment
        ****************************
        Catchment 209 - Min to Storage - Maj Uncontrolled
```

```
      ****************************
 4    CATCHMENT
    209.000     ID No.ó 99999
       .120     Area in hectares
      5.000     Length (PERV) metres
      2.000     Gradient (%)
     99.000     Per cent Impervious
     10.000     Length (IMPERV)
       .000     %Imp. with Zero Dpth
          1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250     Manning "n"
     68.000     SCS Curve No or C
       .100     Ia/S Coefficient
      5.000     Initial Abstraction
          1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .077       .000       .049       .049 c.m/s
             .429       .876       .872     C perv/imperv/total
15    ADD RUNOFF
             .077       .077       .049       .049 c.m/s
12    DIVERT
          1     U/S Node No.ó 99999
       .038     Threshold Discharge
       .038     Max. Outflow reqd.
           Qmax & Vol.Diverted =      .039 c.m/s        14.9 c.m
           Majors From 209
             .077       .077       .038       .049 c.m/s
16    NEXT LINK
             .077       .038       .038       .049 c.m/s
35    COMMENT
     3     line(s) of comment
      ****************************
      Catchment 204
      ****************************
 4    CATCHMENT
    204.000     ID No.ó 99999
       .510     Area in hectares
      4.000     Length (PERV) metres
      2.000     Gradient (%)
     90.000     Per cent Impervious
     10.000     Length (IMPERV)
       .000     %Imp. with Zero Dpth
          1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250     Manning "n"
     68.000     SCS Curve No or C
       .100     Ia/S Coefficient
      5.000     Initial Abstraction
          1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .307       .038       .038       .049 c.m/s
             .427       .876       .831     C perv/imperv/total
15    ADD RUNOFF
```

```
              .307       .345       .038       .049 c.m/s
 9     ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
              .307       .345       .345       .049 c.m/s
17     COMBINE
   500     Junction Node No.
              .307       .345       .345       .352 c.m/s
18     CONFLUENCE
   500     Junction Node No.
              .307       .352       .345       .000 c.m/s
35     COMMENT
     3     line(s) of comment
       *********************************
       Infiltration Chamber
       *********************************
10     POND
     4 Depth - Discharge - Volume sets
          .000        .000          .0
          .178      .00180          .1
          .711      .00190       116.2
          .712        .400       117.0
       Peak Outflow    =      .351 c.m/s
       Maximum Depth   =      .712 metres
       Maximum Storage =      117. c.m
              .307       .352       .351       .000 c.m/s
16     NEXT LINK
              .307       .351       .351       .000 c.m/s
35     COMMENT
     3     line(s) of comment
       ****************************
       Catchment 207
       ****************************
 4     CATCHMENT
     207.000     ID No.ó 99999
        .150     Area in hectares
      75.000     Length (PERV) metres
       3.000     Gradient (%)
      50.000     Per cent Impervious
      35.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
```

```
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .051       .351       .351       .000 c.m/s
              .436       .919       .678     C perv/imperv/total
 15     ADD RUNOFF
              .051       .402       .351       .000 c.m/s
 35     COMMENT
       3     line(s) of comment
        *********************************
        Storage
        *********************************
 10     POND
       9 Depth - Discharge - Volume sets
            .000        .000          .0
            .190      .00470          .1
            .420      .00750        49.4
            .880       .0111       250.9
           1.380       .0141       441.7
           1.560       .0150       486.9
           1.870       .0164       552.8
           2.380       .0204       553.0
           2.390        .200       553.1
        Peak Outflow    =      .016 c.m/s
        Maximum Depth   =     1.677 metres
        Maximum Storage =      512. c.m
              .051       .402       .016       .000 c.m/s
 17     COMBINE
     500     Junction Node No.
              .051       .402       .016       .016 c.m/s
 22     FILE HYDROGRAPH
       1     1=READ: 2=WRITE
       1     D                    is Filename
       3     1=Overland: 2=Inflow: 3=Outflow: 4=Temp'ary
              .051       .402       .039       .016 c.m/s
 17     COMBINE
     500     Junction Node No.
              .051       .402       .039       .047 c.m/s
 14     START
       1     1=Zero; 2=Define
 35     COMMENT
       3     line(s) of comment
        ***********************************
        Uncontrolled Flow to Gordon Street
        ***********************************
  4     CATCHMENT
      201.000     ID No.ó 99999
         .110     Area in hectares
        6.000     Length (PERV) metres
        2.000     Gradient (%)
       70.000     Per cent Impervious
        6.000     Length (IMPERV)
```

```
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .055       .000       .039       .047 c.m/s
              .432       .841       .718     C perv/imperv/total
15     ADD RUNOFF
              .055       .055       .039       .047 c.m/s
35     COMMENT
      3     line(s) of comment
       ***********************************
       Uncontrolled Flow to Gordon Street
       ***********************************
 4     CATCHMENT
     208.000     ID No.ó 99999
        .050     Area in hectares
      35.000     Length (PERV) metres
      25.000     Gradient (%)
      70.000     Per cent Impervious
       6.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .024       .055       .039       .047 c.m/s
              .433       .803       .692     C perv/imperv/total
15     ADD RUNOFF
              .024       .080       .039       .047 c.m/s
 9     ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
              .024       .080       .080       .047 c.m/s
35     COMMENT
      3     line(s) of comment
       ***********************************
       TOTAL FLOW TO GORDON
       ***********************************
17     COMBINE
    500     Junction Node No.
              .024       .080       .080       .127 c.m/s
```

```
18     CONFLUENCE
    500     Junction Node No.
              .024       .127       .080       .000 c.m/s
14     START
      1     1=Zero; 2=Define
35     COMMENT
      3     line(s) of comment
       ********************************
       Catchment 203 - RFTOP
       ****************************
 4     CATCHMENT
     203.000     ID No.ó 99999
        .240     Area in hectares
       1.000     Length (PERV) metres
        .500     Gradient (%)
      99.000     Per cent Impervious
      15.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .155       .000       .080       .000 c.m/s
              .429       .920       .915     C perv/imperv/total
15     ADD RUNOFF
              .155       .155       .080       .000 c.m/s
35     COMMENT
      3     line(s) of comment
       *********************************
       East Building - Rooftop Control
       *********************************
10     POND
      6 Depth - Discharge - Volume sets
          .000        .000          .0
          .023      .00540        55.2
          .031      .00660        74.4
          .045      .00820       108.0
          .061       .0101       146.4
          .063       .0499       150.0
       Peak Outflow    =      .049 c.m/s
       Maximum Depth   =      .062 metres
       Maximum Storage =      150. c.m
              .155       .155       .049       .000 c.m/s
16     NEXT LINK
              .155       .049       .049       .000 c.m/s
35     COMMENT
      3     line(s) of comment
       *********************************
```

```
       EAST LID
       ********************************
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
         1.000     .000700        30.0
         1.001       .0500        31.0
       Peak Outflow    =      .030 c.m/s
       Maximum Depth   =     1.001 metres
       Maximum Storage =       31. c.m
              .155       .049       .030       .000 c.m/s
16     NEXT LINK
              .155       .030       .030       .000 c.m/s
35     COMMENT
      3     line(s) of comment
       ********************************
       Catchment 206 - Uncontrolled To Torrence
       ***************************
 4     CATCHMENT
     206.000     ID No.ó 99999
       1.410     Area in hectares
     120.000     Length (PERV) metres
       5.000     Gradient (%)
       1.000     Per cent Impervious
       5.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      68.000     SCS Curve No or C
        .100     Ia/S Coefficient
       5.000     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .229       .030       .030       .000 c.m/s
              .436       .813       .440     C perv/imperv/total
15     ADD RUNOFF
              .229       .245       .030       .000 c.m/s
35     COMMENT
      3     line(s) of comment
       ********************************
       Catchment 205 - Park Block - Uncontrolled to Torrence
       ***************************
 4     CATCHMENT
     205.000     ID No.ó 99999
        .230     Area in hectares
      50.000     Length (PERV) metres
       2.000     Gradient (%)
      10.000     Per cent Impervious
       5.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
```

```
          .250     Manning "n"
        68.000     SCS Curve No or C
          .100     Ia/S Coefficient
         5.000     Initial Abstraction
             1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .043       .245       .030       .000 c.m/s
                .436       .831       .476     C perv/imperv/total
 15     ADD RUNOFF
                .043       .283       .030       .000 c.m/s
 20     MANUAL
```

INFILTRATION GALLERY PARAMETERS

Subject: **Infiltration Information**
Project: **1242-1260 Gordon and 9 Valley**
Project No.: **161413684**
Client: **Tricar**
Date: **June 6, 2022**

East Infiltration Gallery - Stone Gallery

Infiltration Rate	32	mm/hr
Void Ratio	0.4	
Depth	1	m
Footprint Provided	75	m^2
Volume	30	m^3
Outflow Rate	0.0007	m^3/s
Drawdown	12.5	hr

South Infiltration Gallery - StormTech®

Infiltration Rate	23	mm/hr
Max Depth	0.705	m
Footprint Provided	302.7	m^2
Voume	116.2	m^3
Outflow Rate	0.0019	m^3/s
Drawdown	16.7	hr

WATER QUALITY

ADS OGS Sizing Summary

Project Name: 1242-1260 Gordon St.

Consulting Engineer: Stantec

Location: Guelph, ON

Sizing Completed By: C. Neath **Email:** cody.neath@ads-pipe.com

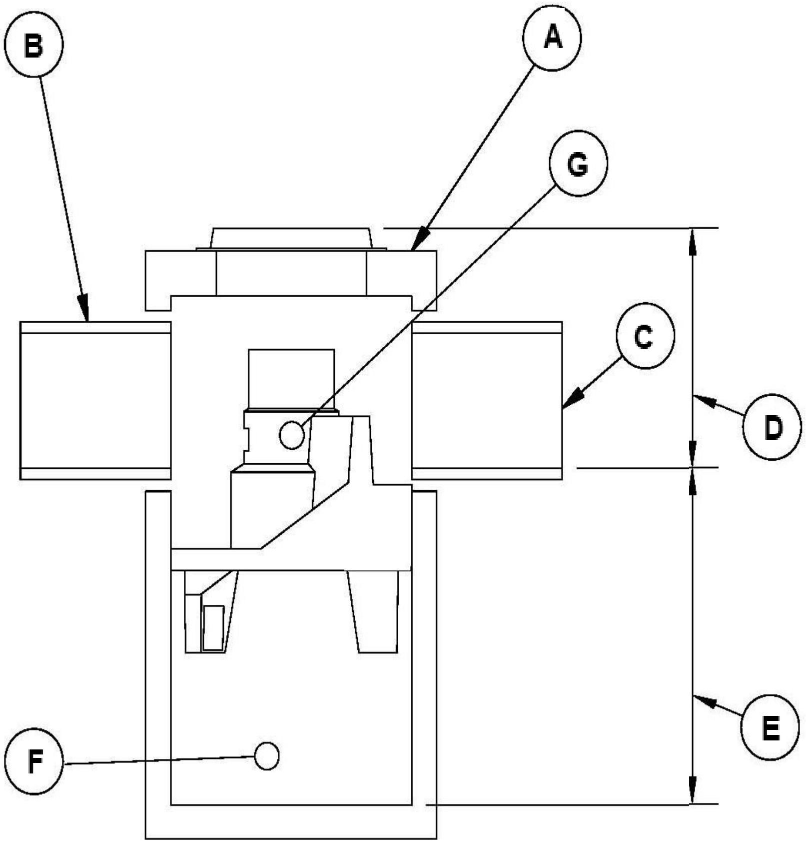
Treatment Requirements		
Treatment Goal:	Enhanced (MOE)	
Selected Parameters:	80% TSS	90% Volume
Selected Unit:	**FD-4HC**	

Site Details	
Site Area:	0.87 ha
% Impervious:	95%
Rational C:	0.87
Rainfall Station:	Waterloo_Wellington
Particle Size Distribution:	Fine
Peak Flowrate:	---

Summary of Results

Model	TSS Removal	Volume Treated
FD-4HC	87.0%	>90%
FD-5HC	91.0%	>90%
FD-6HC	93.0%	>90%
FD-8HC	95.0%	>90%
FD-10HC	97.0%	>90%

FD-4HC Specification	
Unit Diameter (A):	1,200 mm
Inlet Pipe Diameter (B):	450 mm
Outlet Pipe Diameter (C):	450 mm
Height, T/G to Outlet Invert (D):	1630 mm
Height, Outlet Invert to Sump (E):	1515 mm
Sediment Storage Capacity (F):	0.78 m³
Oil Storage Capacity (G):	723 L
Recommended Sediment Depth for Maintenance:	440 mm
Max. Pipe Diameter:	600 mm
Peak Flow Capacity:	510 L/s



Site Elevations:	
Rim Elevation:	342.53
Inlet Pipe Elevation:	340.90
Outlet Pipe Elevation:	340.90

Notes:

Removal efficiencies are based on NJDEP Test Protocols and independently verified.

All units supplied by ADS have numerous local, provincial, and international certifications (copies of which can be provided upon request). The design engineer is responsible for ensuring compliance with applicable regulations.

Project Name: 1242-1260 Gordon St.
Consulting Engineer: Stantec
Location: Guelph, ON

Net Annual Removal Efficiency Summary: FD-4HC

Rainfall Intensity[1]	Fraction of Rainfall[1]	FD-4HC Removal Efficiency[2]	Weighted Net-Annual Removal Efficiency
mm/hr	**%**	**%**	**%**
0.50	0.3%	100.0%	0.3%
1.00	27.0%	97.0%	26.2%
1.50	3.2%	93.5%	3.0%
2.00	13.6%	91.0%	12.4%
2.50	7.2%	89.1%	6.4%
3.00	1.8%	87.6%	1.6%
3.50	6.7%	86.4%	5.8%
4.00	3.7%	85.3%	3.2%
4.50	1.5%	84.4%	1.3%
5.00	4.8%	83.6%	4.0%
6.00	3.3%	82.1%	2.7%
7.00	4.7%	81.0%	3.8%
8.00	2.8%	80.0%	2.2%
9.00	2.0%	79.1%	1.6%
10.00	2.5%	78.3%	2.0%
20.00	9.0%	73.4%	6.6%
30.00	3.1%	70.7%	2.2%
40.00	1.0%	68.9%	0.7%
50.00	0.8%	67.4%	0.5%
100.00	0.9%	63.2%	0.6%
150.00	0.1%	60.9%	0.1%
200.00	0.0%	59.3%	0.0%
		Total Net Annual Removal Efficiency:	87.0%
		Total Runoff Volume Treated:	99.9%

Notes:

(1) Rainfall Data: 1981:2007,HLY03 6149387, Waterloo/Wellingotn Airport, ON

(2) Based on third party verified data and appoximating the removal of a PSD similar to the STC Fine distribution

(3) Rainfall adjusted to 5 min peak intensity based on hourly average.

ADS OGS Sizing Summary

Project Name: 1250 Gordon St. A

Consulting Engineer: Stantec

Location: Guelph, ON

Sizing Completed By: C. Neath **Email:** cody.neath@ads-pipe.com

Treatment Requirements		
Treatment Goal:	Enhanced (MOE)	
Selected Parameters:	80% TSS	90% Volume
Selected Unit:	**FD-4HC**	

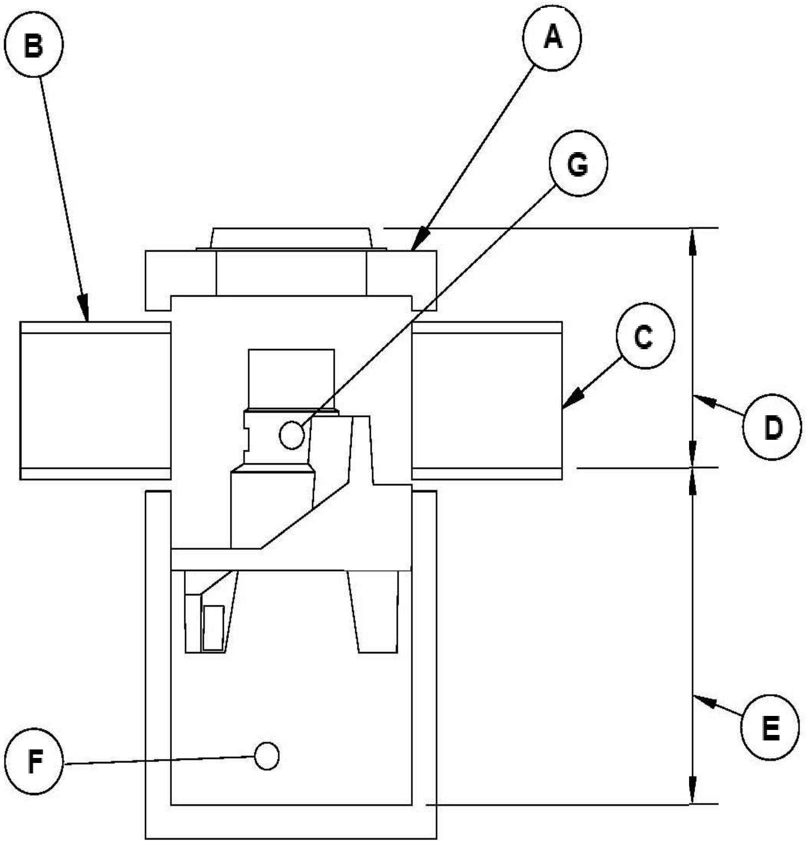
Site Details	
Site Area:	0.3 ha
% Impervious:	90%
Rational C:	0.84
Rainfall Station:	Waterloo_Wellington
Particle Size Distribution:	NJDEP / ETV
Peak Flowrate:	---

Summary of Results

Model	TSS Removal	Volume Treated
FD-4HC	82.0%	>90%
FD-5HC	83.0%	>90%
FD-6HC	86.0%	>90%
FD-8HC	91.0%	>90%
FD-10HC	94.0%	>90%

FD-4HC Specification	
Unit Diameter (A):	1,200 mm
Inlet Pipe Diameter (B):	300 mm
Outlet Pipe Diameter (C):	300 mm
Height, T/G to Outlet Invert (D):	2000 mm
Height, Outlet Invert to Sump (E):	1515 mm
Sediment Storage Capacity (F):	0.78 m³
Oil Storage Capacity (G):	723 L
Recommended Sediment Depth for Maintenance:	440 mm
Max. Pipe Diameter:	600 mm
Peak Flow Capacity:	510 L/s

Site Elevations:	
Rim Elevation:	100.00
Inlet Pipe Elevation:	98.00
Outlet Pipe Elevation:	98.00



Notes:

Removal efficiencies are based on NJDEP Test Protocols and independently verified.

All units supplied by ADS have numerous local, provincial, and international certifications (copies of which can be provided upon request). The design engineer is responsible for ensuring compliance with applicable regulations.

Project Name:	1250 Gordon St. A
Consulting Engineer:	Stantec
Location:	Guelph, ON

Net Annual Removal Efficiency Summary: FD-4HC

Rainfall Intensity[(1)]	Fraction of Rainfall[(1)]	FD-4HC Removal Efficiency[(2)]	Weighted Net-Annual Removal Efficiency
mm/hr	%	%	%
0.50	0.3%	105.5%	0.3%
1.00	27.0%	96.9%	26.1%
1.50	3.2%	91.9%	3.0%
2.00	13.6%	88.3%	12.0%
2.50	7.2%	85.6%	6.1%
3.00	1.8%	83.3%	1.5%
3.50	6.7%	81.4%	5.5%
4.00	3.7%	79.7%	2.9%
4.50	1.5%	78.3%	1.2%
5.00	4.8%	77.0%	3.7%
6.00	3.3%	74.7%	2.5%
7.00	4.7%	72.8%	3.4%
8.00	2.8%	71.1%	2.0%
9.00	2.0%	69.7%	1.4%
10.00	2.5%	68.4%	1.7%
20.00	9.0%	59.8%	5.4%
30.00	3.1%	54.7%	1.7%
40.00	1.0%	51.2%	0.5%
50.00	0.8%	48.4%	0.4%
100.00	0.9%	39.8%	0.4%
150.00	0.1%	0.0%	0.0%
200.00	0.0%	0.0%	0.0%
		Total Net Annual Removal Efficiency:	82.0%
		Total Runoff Volume Treated:	99.9%

Notes:

(1) Rainfall Data: 1981:2007,HLY03 6149387, Waterloo/Wellingotn Airport, ON

(2) Based in NJDEP / ETV PSD, NJDEP Test Protocols 2013.

(3) Rainfall adjusted to 5 min peak intensity based on hourly average.

STORMTECH DESIGN

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

ADS
Advanced Drainage Systems, Inc.

ADS SiteAssist™
FOR STORMTECH
INSTALLATION INSTRUCTIONS
VISIT OUR APP

1242 - 1260 GORDON ST.

GUELPH, CANADA

SC-310 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-310.

2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE OR POLYETHYLENE COPOLYMERS.

3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".

4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.

5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.

6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.

7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 50 mm (2").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2922 SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2922 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.

9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-310 SYSTEM

1. STORMTECH SC-310 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.

2. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".

3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.

4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.

5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.

6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.

7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 20-50 mm (3/4-2").

8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.

9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".

2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-310 & SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".

3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROJECT INFORMATION

ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

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Advanced Drainage Systems, Inc.

ADS SiteAssist™
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INSTALLATION INSTRUCTIONS
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GUELPH, CANADA

MC-3500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-3500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
    - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
    - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 75 mm (3").
    - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
    - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
    - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
    - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-3500 CHAMBER SYSTEM

1. STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
    - STONESHOOTER LOCATED OFF THE CHAMBER BED.
    - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
    - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE WELL GRADED BETWEEN ¾" AND 2" (20-50 mm)..
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
10. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
11. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
    - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
    - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
    - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

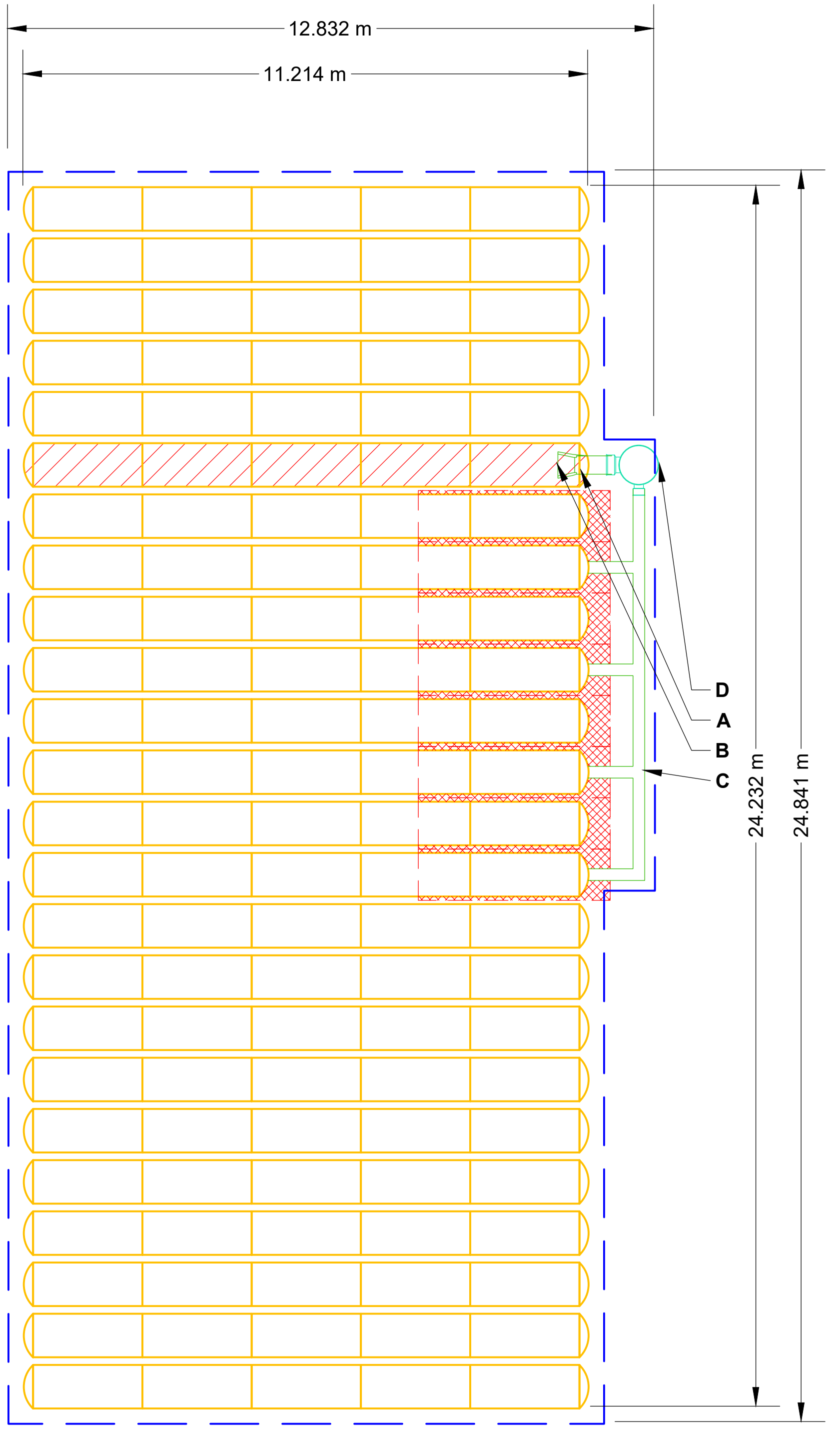
CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT: INFILTRAT	
120	STORMTECH SC-310 CHAMBERS
48	STORMTECH SC-310 END CAPS
152	STONE ABOVE (mm)
152	STONE BELOW (mm)
40	STONE VOID
116.2	INSTALLED SYSTEM VOLUME (m^3) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)
302.7	SYSTEM AREA (m^2)
75.3	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS: INFILTRAT	
MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	343.724
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	341.895
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	341.743
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	341.743
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	341.743
TOP OF STONE:	341.438
TOP OF SC-310 CHAMBER:	341.286
200 mm x 200 mm TOP MANIFOLD INVERT:	340.968
300 mm ISOLATOR ROW PLUS INVERT:	340.902
BOTTOM OF SC-310 CHAMBER:	340.879
BOTTOM OF STONE:	340.727

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED EZ END CAP	A	300 mm BOTTOM PREFABRICATED EZ END CAP, PART#: SC310ECEZ / TYP OF ALL 300 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	23 mm	
FLAMP	B	INSTALL FLAMP ON 300 mm ACCESS PIPE / PART#: SC31012RAMP		
MANIFOLD	C	200 mm x 200 mm TOP MANIFOLD, MOLDED FITTINGS	89 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	D	750 mm DIAMETER (610 mm SUMP MIN)		65 L/s IN



▨	ISOLATOR ROW PLUS (SEE DETAIL)
▩	PLACE MINIMUM 3.810 m OF ADSPLUS125 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS
—	BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

1242 - 1260 GORDON ST.
GUELPH, CANADA

DATE:
DRAWN: CN
PROJECT #:
CHECKED: N/A

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StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

SCALE = 1 : 150

PROPOSED LAYOUT: STORAGE SYSTEM

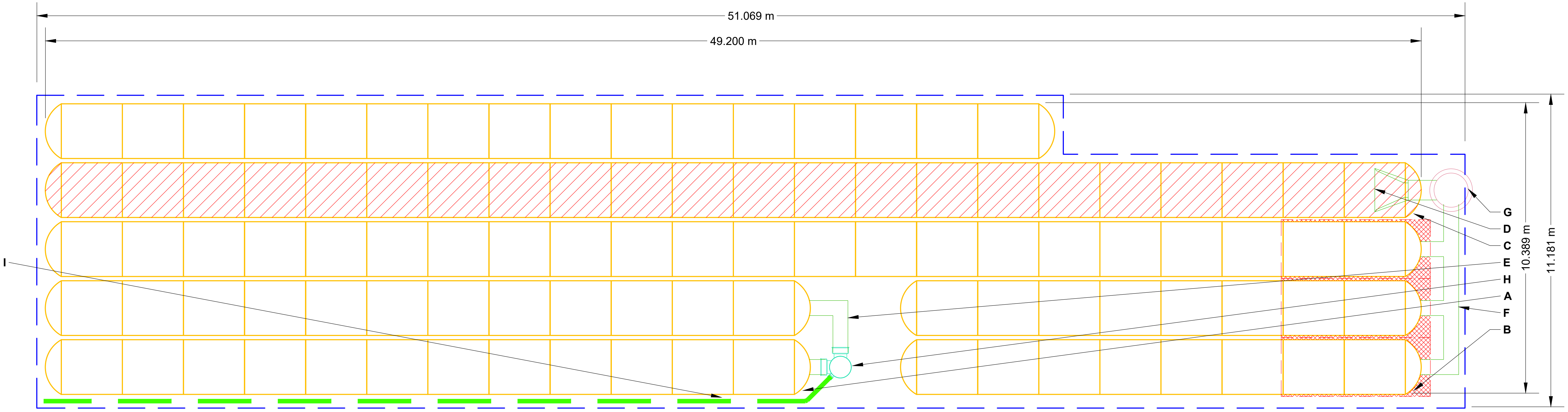
100	STORMTECH MC-3500 CHAMBERS
14	STORMTECH MC-3500 END CAPS
305	STONE ABOVE (mm)
229	STONE BELOW (mm)
40	STONE VOID
552.9	INSTALLED SYSTEM VOLUME (m^3) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)
540.7	SYSTEM AREA (m^2)
124.5	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS: STORAGE SYSTEM

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	340.620
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	338.791
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	338.639
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	338.639
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	338.639
TOP OF STONE:	338.486
TOP OF MC-3500 CHAMBER:	338.182
450 mm x 450 mm TOP MANIFOLD INVERT:	337.547
600 mm ISOLATOR ROW PLUS INVERT:	337.091
450 mm x 450 mm BOTTOM MANIFOLD INVERT:	337.084
450 mm BOTTOM CONNECTION INVERT:	337.084
BOTTOM OF MC-3500 CHAMBER:	337.039
UNDERDRAIN INVERT:	336.810
BOTTOM OF STONE:	336.810

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	450 mm BOTTOM CORED END CAP, PART#: MC3500IEPP18BC / TYP OF ALL 450 mm BOTTOM CONNECTIONS	45 mm	
PREFABRICATED END CAP	B	450 mm TOP CORED END CAP, PART#: MC3500IEPP18TC / TYP OF ALL 450 mm TOP CONNECTIONS	509 mm	
PREFABRICATED END CAP	C	600 mm BOTTOM CORED END CAP, PART#: MC3500IEPP24BC / TYP OF ALL 600 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	52 mm	
FLAMP	D	INSTALL FLAMP ON 600 mm ACCESS PIPE / PART#: MC350024RAMP		
MANIFOLD	E	450 mm x 450 mm BOTTOM MANIFOLD, ADS N-12	45 mm	
MANIFOLD	F	450 mm x 450 mm TOP MANIFOLD, ADS N-12	509 mm	
CONCRETE STRUCTURE	G	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		460 L/s IN
NYLOPLAST (OUTLET)	H	750 mm DIAMETER (DESIGN BY ENGINEER)		227 L/s OUT
UNDERDRAIN	I	150 mm ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		



▨ ISOLATOR ROW PLUS (SEE DETAIL)

▩ PLACE MINIMUM 5.334 m OF ADSPLUS175 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

— BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

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GUELPH, CANADA

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Chamber System
888-892-2694 | WWW.STORMTECH.COM

ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

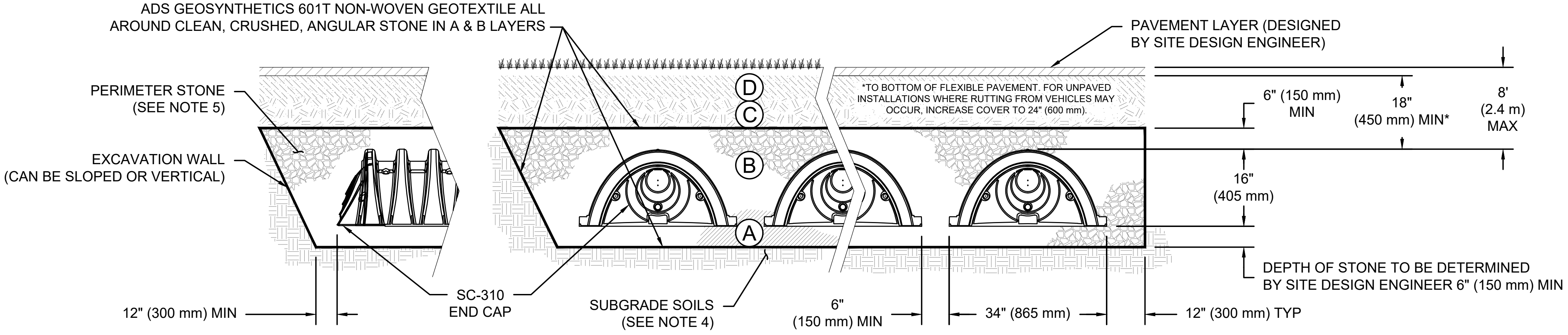
SCALE = 1 : 150

ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:

1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-310 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

1242 - 1260 GORDON ST.
GUELPH, CANADA

DATE:
PROJECT #:
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DATE	DRW	CHK	DESCRIPTION

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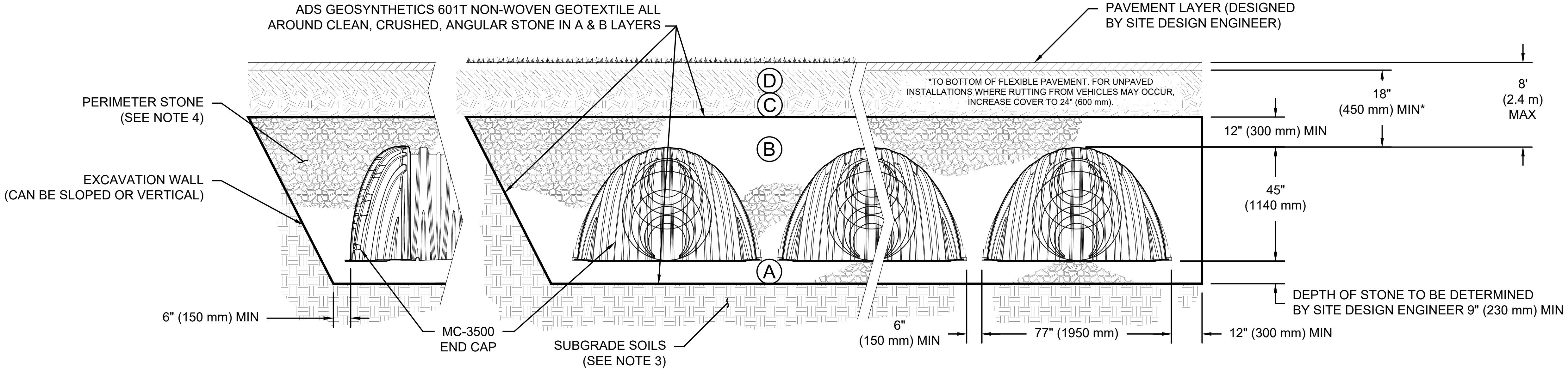
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:

1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
2. MC-3500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

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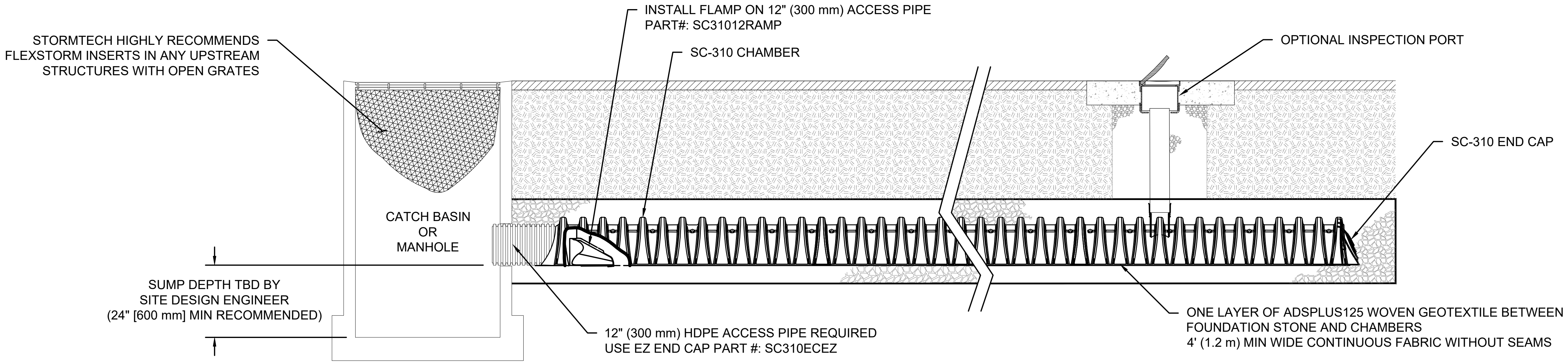

SC-310 ISOLATOR ROW PLUS DETAIL

NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

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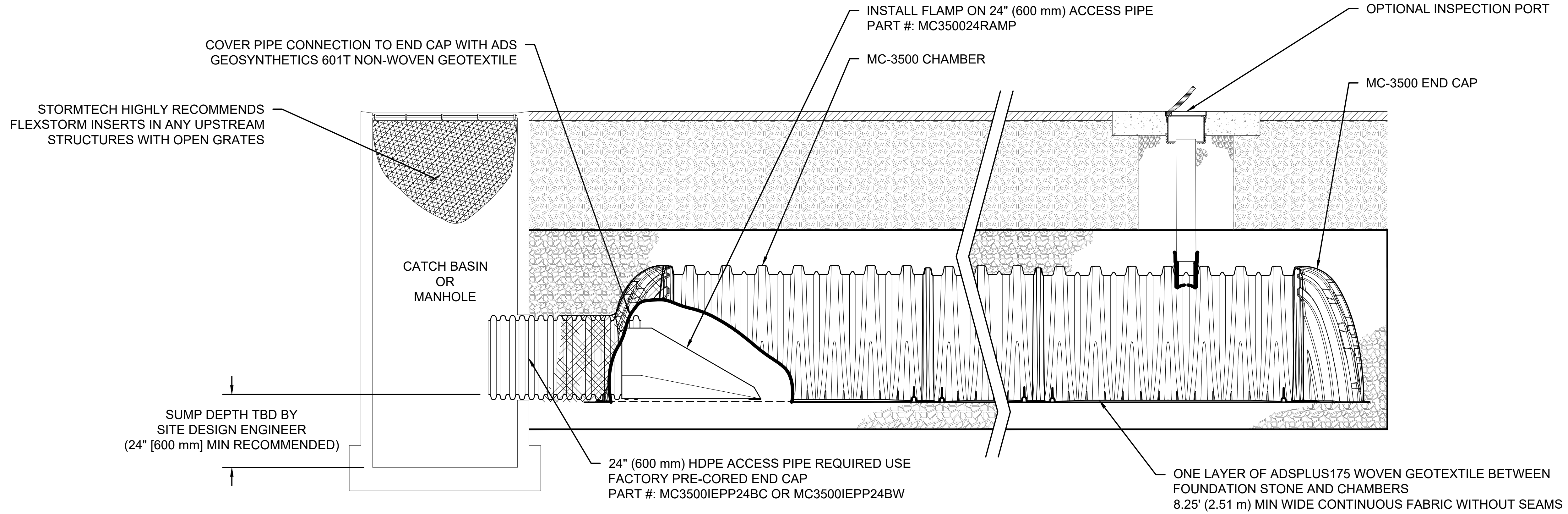

MC-3500 ISOLATOR ROW PLUS DETAIL

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SHEET
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SC-310 TECHNICAL SPECIFICATION

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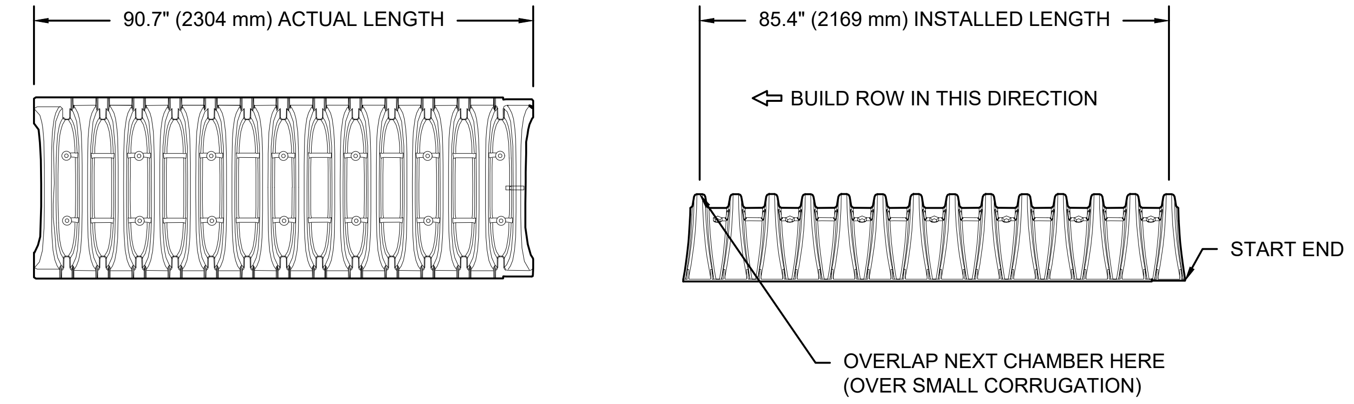
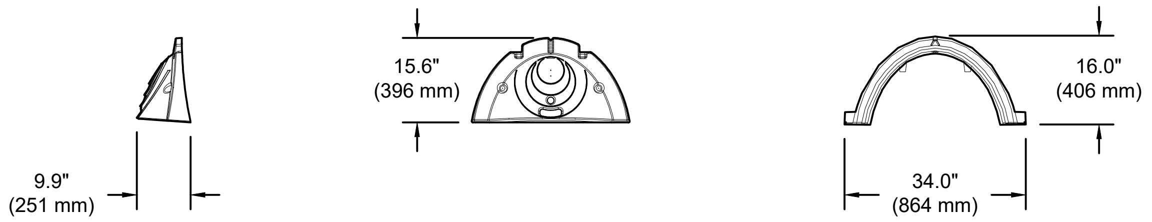
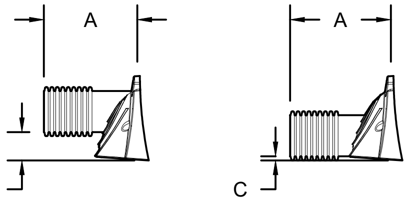




NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	34.0" X 16.0" X 85.4"	(864 mm X 406 mm X 2169 mm)
CHAMBER STORAGE	14.7 CUBIC FEET	(0.42 m^3)
MINIMUM INSTALLED STORAGE*	31.0 CUBIC FEET	(0.88 m^3)
WEIGHT	35.0 lbs.	(16.8 kg)

*ASSUMES 6" (152 mm) ABOVE, BELOW, AND BETWEEN CHAMBERS



PRE-FAB STUB AT BOTTOM OF END CAP WITH FLAMP END WITH "BR"
PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC310EPE06T / SC310EPE06TPC	6" (150 mm)	9.6" (244 mm)	5.8" (147 mm)	---
SC310EPE06B / SC310EPE06BPC			---	0.5" (13 mm)
SC310EPE08T / SC310EPE08TPC	8" (200 mm)	11.9" (302 mm)	3.5" (89 mm)	---
SC310EPE08B / SC310EPE08BPC			---	0.6" (15 mm)
SC310EPE10T / SC310EPE10TPC	10" (250 mm)	12.7" (323 mm)	1.4" (36 mm)	---
SC310EPE10B / SC310EPE10BPC			---	0.7" (18 mm)
SC310ECEZ*	12" (300 mm)	13.5" (343 mm)	---	0.9" (23 mm)

ALL STUBS, EXCEPT FOR THE SC310ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC310ECEZ THE 12" (300 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 0.25" (6 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

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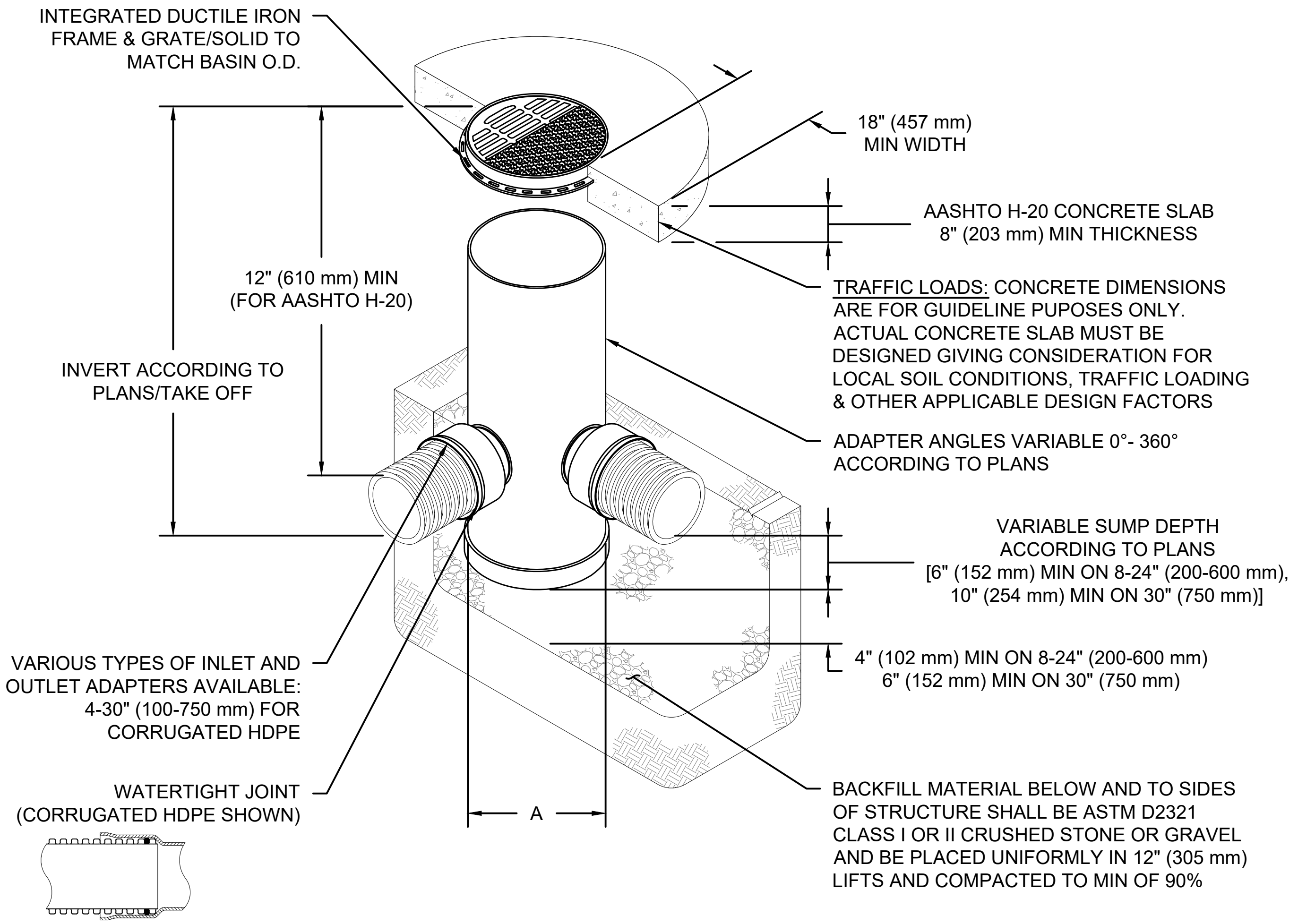
NYLOPLAST DRAIN BASIN

NTS



NOTES

1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

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UNDERDRAIN DETAIL

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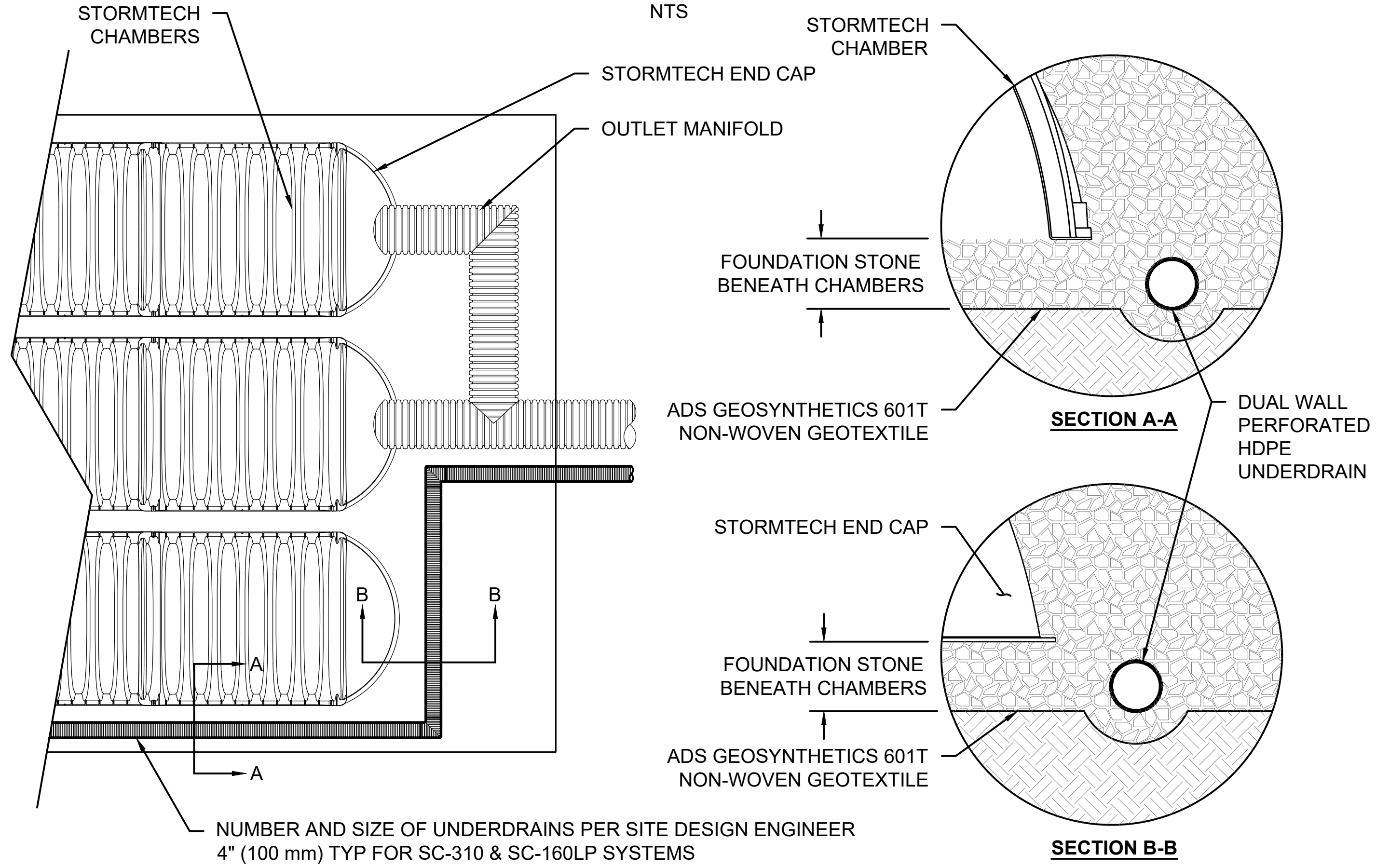
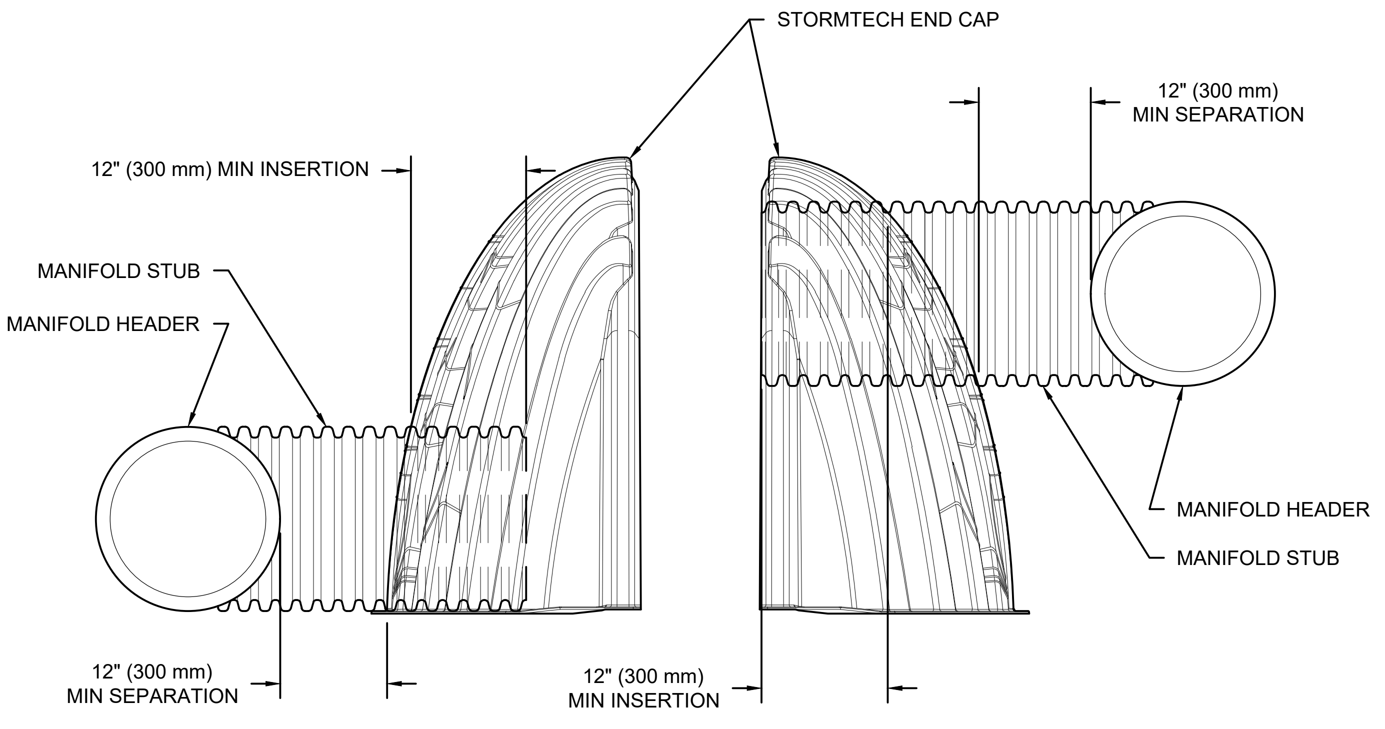


NUMBER AND SIZE OF UNDERDRAINS PER SITE DESIGN ENGINEER
4" (100 mm) TYP FOR SC-310 & SC-160LP SYSTEMS
6" (150 mm) TYP FOR SC-740, DC-780, MC-3500 & MC-4500 SYSTEMS

MC-SERIES END CAP INSERTION DETAIL

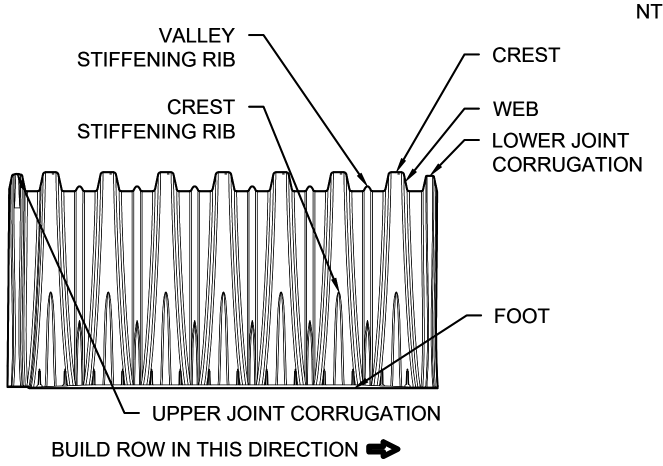
NTS

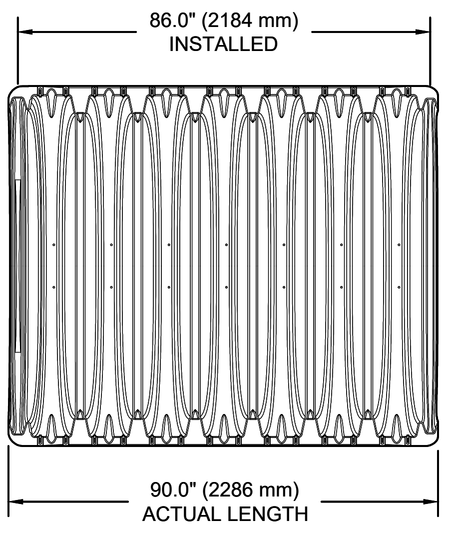


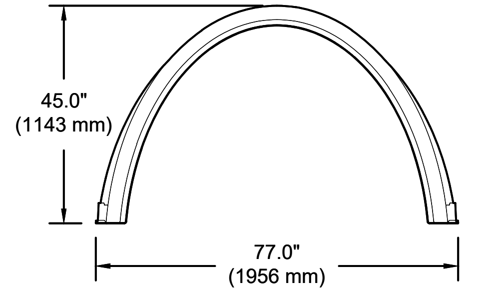
NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL
FOR A PROPER FIT IN END CAP OPENING.

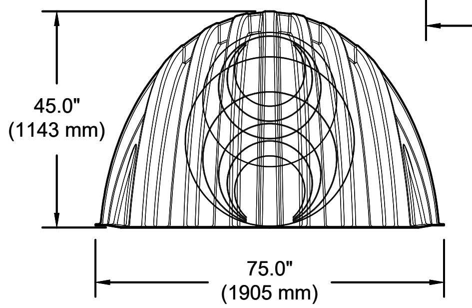
MC-3500 TECHNICAL SPECIFICATION

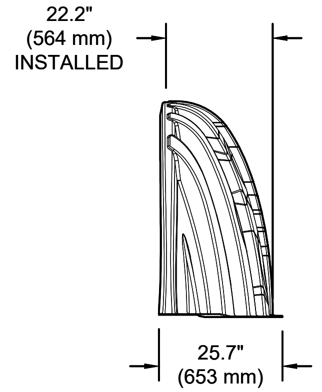
NTS











NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 86.0"	(1956 mm X 1143 mm X 2184 mm)
CHAMBER STORAGE	109.9 CUBIC FEET	(3.11 m³)
MINIMUM INSTALLED STORAGE*	175.0 CUBIC FEET	(4.96 m³)
WEIGHT	134 lbs.	(60.8 kg)

NOMINAL END CAP SPECIFICATIONS

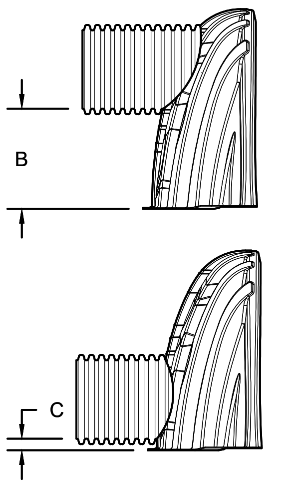
SIZE (W X H X INSTALLED LENGTH)	75.0" X 45.0" X 22.2"	(1905 mm X 1143 mm X 564 mm)
END CAP STORAGE	14.9 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	45.1 CUBIC FEET	(1.28 m³)
WEIGHT	49 lbs.	(22.2 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION, 6" SPACING BETWEEN CHAMBERS, 6" (152 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A WELDED CROWN PLATE END WITH "C"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC3500IEPP06T	6" (150 mm)	33.21" (844 mm)	---
MC3500IEPP06B		---	0.66" (17 mm)
MC3500IEPP08T	8" (200 mm)	31.16" (791 mm)	---
MC3500IEPP08B		---	0.81" (21 mm)
MC3500IEPP10T	10" (250 mm)	29.04" (738 mm)	---
MC3500IEPP10B		---	0.93" (24 mm)
MC3500IEPP12T	12" (300 mm)	26.36" (670 mm)	---
MC3500IEPP12B		---	1.35" (34 mm)
MC3500IEPP15T	15" (375 mm)	23.39" (594 mm)	---
MC3500IEPP15B		---	1.50" (38 mm)
MC3500IEPP18TC	18" (450 mm)	20.03" (509 mm)	---
MC3500IEPP18TW			
MC3500IEPP18BC		---	1.77" (45 mm)
MC3500IEPP18BW			
MC3500IEPP24TC	24" (600 mm)	14.48" (368 mm)	---
MC3500IEPP24TW			
MC3500IEPP24BC		---	2.06" (52 mm)
MC3500IEPP24BW			
MC3500IEPP30BC	30" (750 mm)	---	2.75" (70 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PRECORED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-3500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

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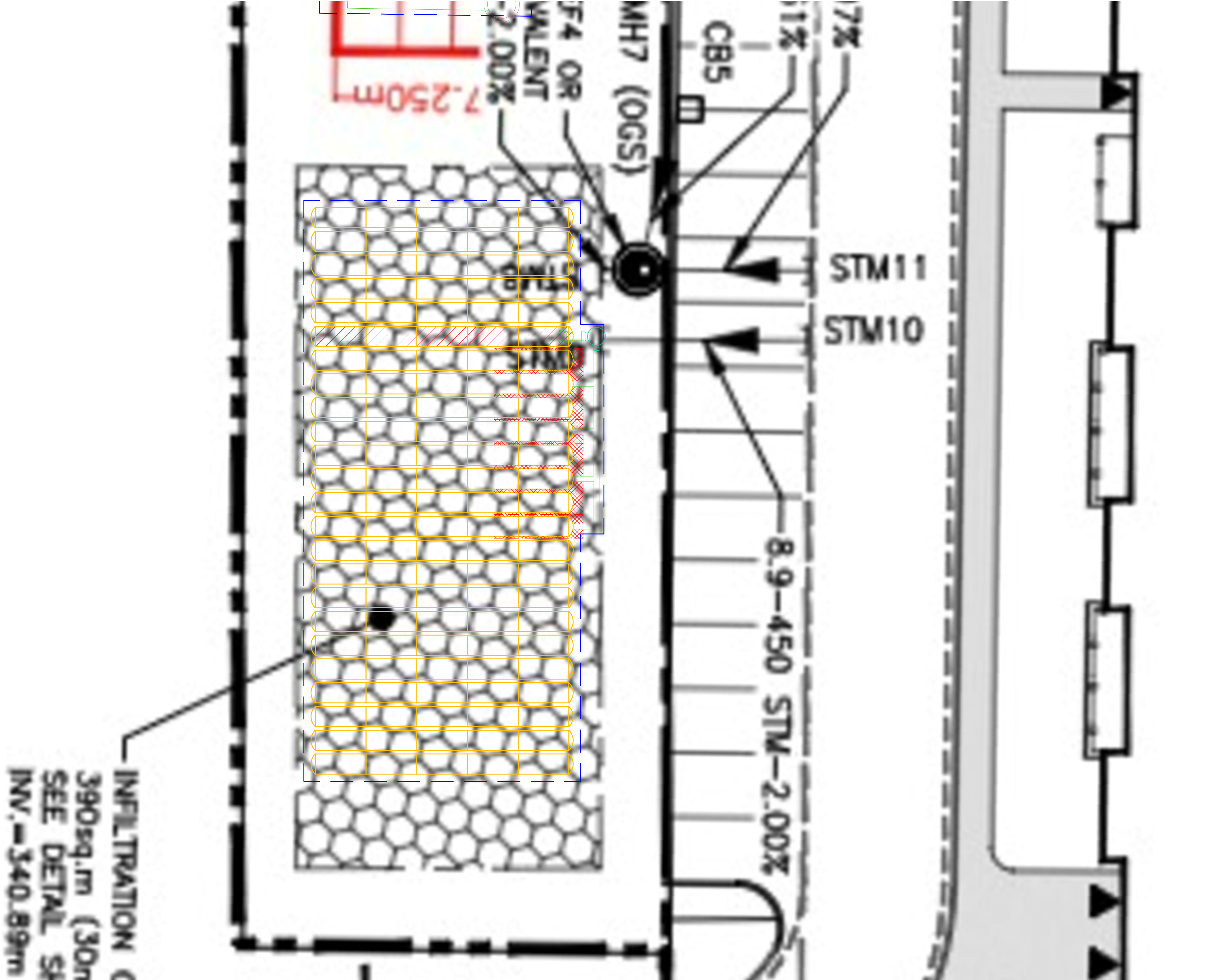
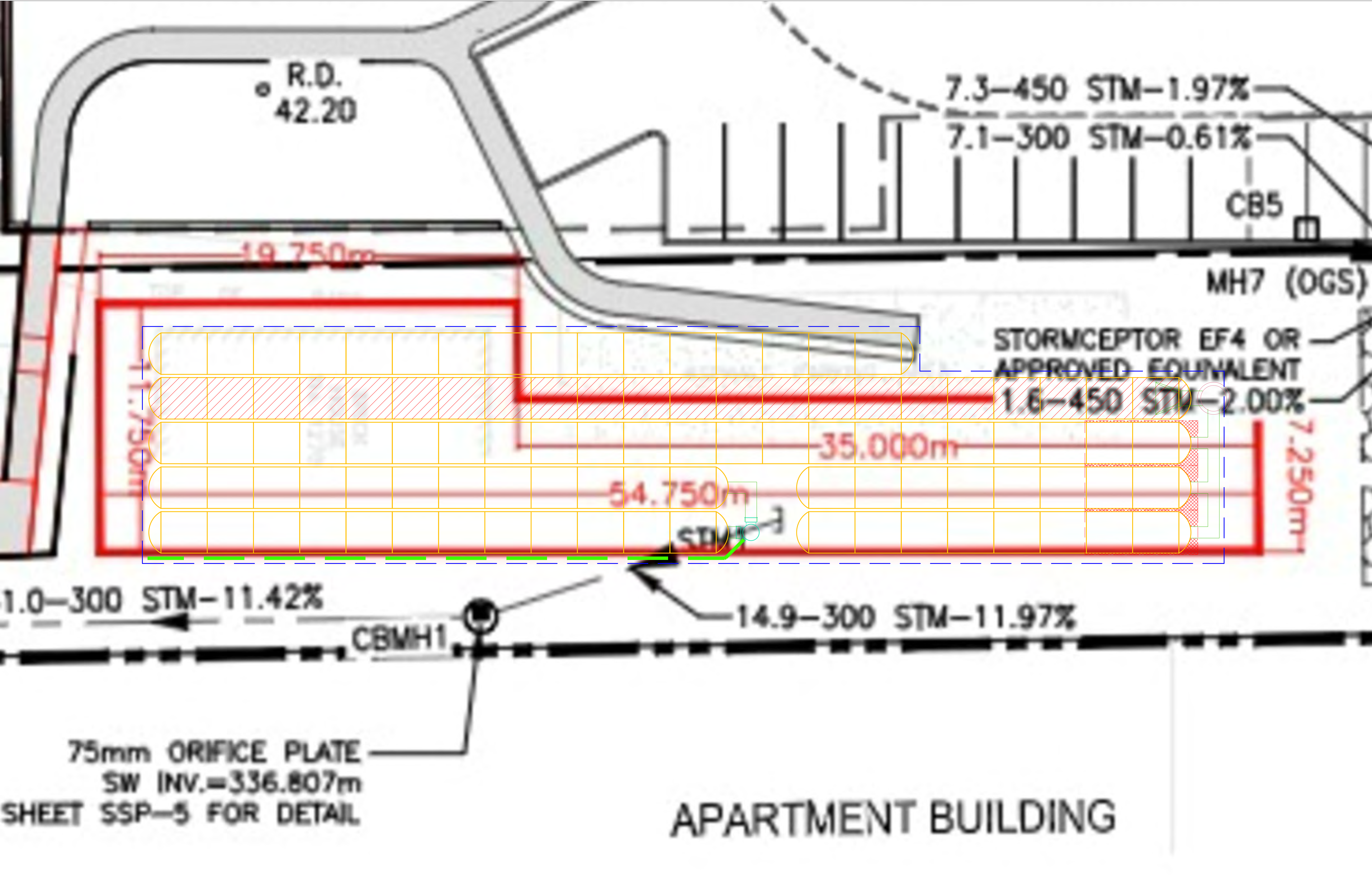
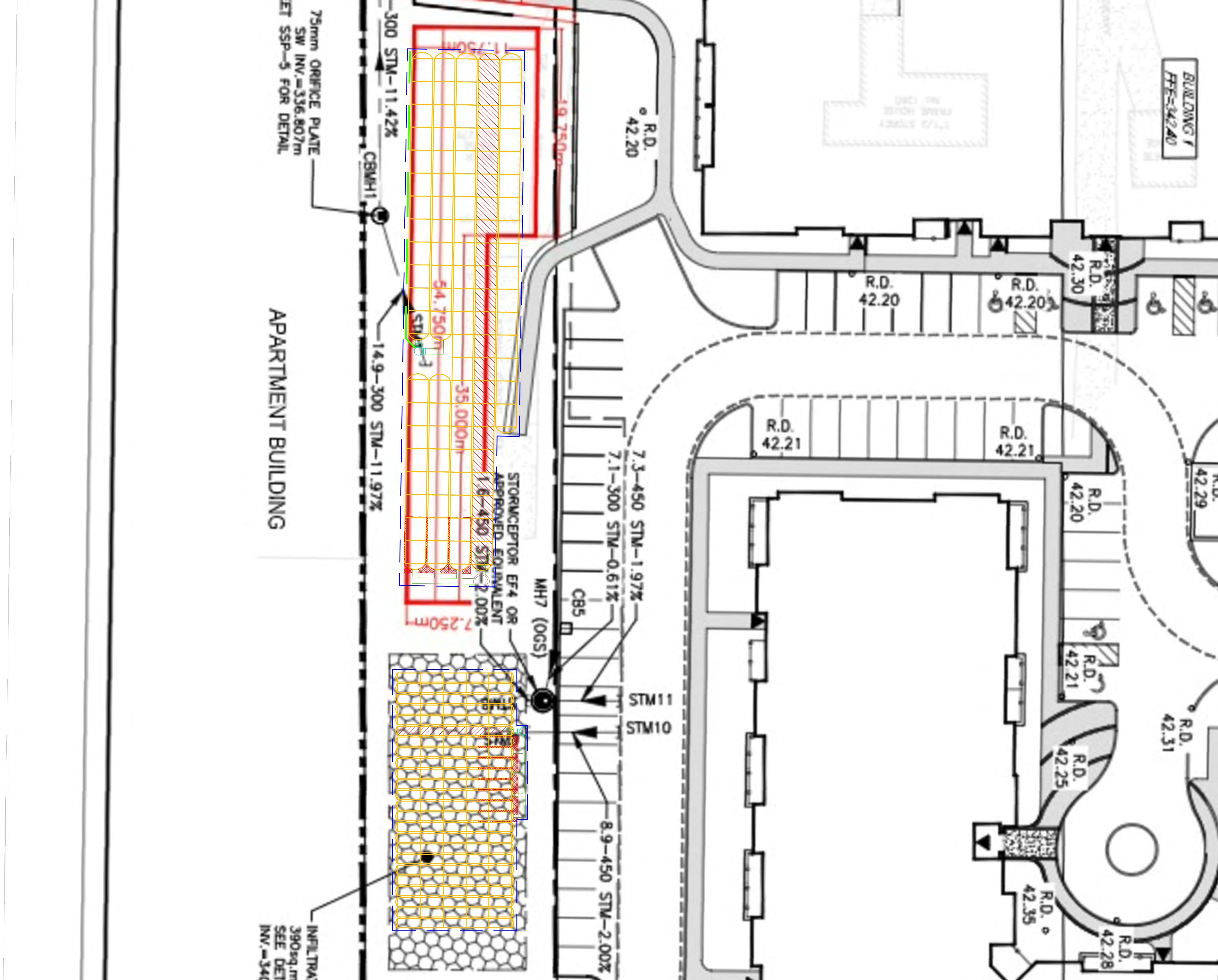


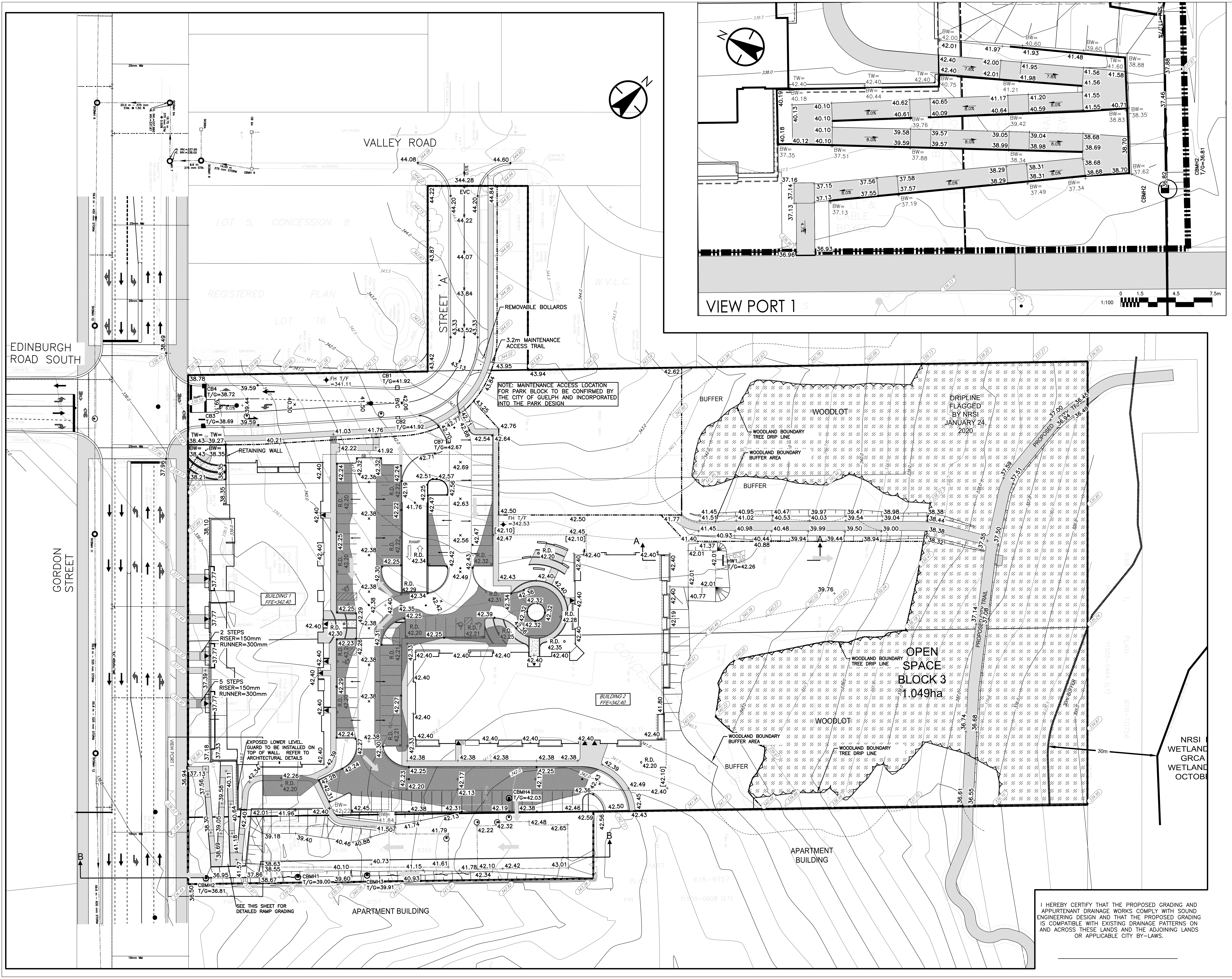
7.250m
-2.00%
F4 OR
VALENT
MH7 (OGS)
CB5
1%
7%
STM11
STM10
8.9-450 STM-2.00%
INFILTRATION C
390sq.m (30m
SEE DETAIL S
INV.=340.89m


R.D.
42.20
7.3–450 STM–1.97%
7.1–300 STM–0.61%
CB5
MH7 (OGS)
19.750m
STORMCEPTOR EF4 OR
APPROVED EQUIVALENT
1.6–450 STM–2.00%
11.750m
35.000m
54.750m
7.250m
STM
1.0–300 STM–11.42%
CBMH1
14.9–300 STM–11.97%
75mm ORIFICE PLATE
SW INV.=336.807m
SHEET SSP–5 FOR DETAIL
APARTMENT BUILDING


75mm ORIFICE PLATE
SW INV.=336.807m
SEE SSP-5 FOR DETAIL
300 STM-11.42%
CBMH1
APARTMENT BUILDING
14.9-300 STM-11.97%
11.750m
19.750m
54.750m
35.000m
7.250m
STM
1.6-450 STM-2.00%
STORMCEPTOR EF4 OR APPROVED EQUIVALENT
MH7 (OGS)
CB5
7.1-300 STM-0.61%
7.3-450 STM-1.97%
STM11
STM10
8.9-450 STM-2.00%
INFILTRA
390sq.m
SEE DET
INV.=34
R.D. 42.20
R.D. 42.20
R.D. 42.20
R.D. 42.30
R.D. 42.21
R.D. 42.21
R.D. 42.29
R.D. 42.20
R.D. 42.21
R.D. 42.31
R.D. 42.25
R.D. 42.35
R.D. 42.28
BUILDING I
FFE=342.40

APPENDIX I

GRADING AND EROSION AND SEDIMENT CONTROL PLANS



I HEREBY CERTIFY THAT THE PROPOSED GRADING AND APPURTENANT DRAINAGE WORKS COMPLY WITH SOUND ENGINEERING DESIGN AND THAT THE PROPOSED GRADING IS COMPATIBLE WITH EXISTING DRAINAGE PATTERNS ON AND ACROSS THESE LANDS AND THE ADJOINING LANDS OR APPLICABLE CITY BY-LAWS.

Stantec
600-171 Queens Avenue
London ON N6A 5J7
Tel. 519-645-2007
www.stantec.com

Liability Note:

The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay.

Notes

1. CITY OF GUELPH BENCHMARK 225 ELEVATION 338.665 LOCATION: 1221 GORDON STREET
2. EXISTING SURVEY COMPLETED BY BSR&D (NOVEMBER, 4 2014)
3. THE CONTRACTOR IS TO VERIFY ALL EXISTING ELEVATIONS AND EXISTING CONDITIONS AND TO REPORT ANY DISCREPANCIES TO THE CONSULTING ENGINEER

Legend

←	PROPOSED SWALE
⊙	PROPOSED STORM MANHOLE
⊙	PROPOSED STORM CATCH BASIN MANHOLE
●	PROPOSED SANITARY MANHOLE
⊙	EX. STORM MANHOLE
⊙	EX. SANITARY MANHOLE
□	PROPOSED CATCH BASIN
□	EX. CATCH BASIN
•75.95	PROPOSED GRADES
•75.95 (SP)	PROPOSED OVERLAND FLOW SPILL POINT
75.95	EXISTING GRADES
←	MAJOR OVERLAND FLOW ROUTE
▬ ▮ ▮ ▬	SITE BOUNDARY
•71.77 (SW)	PROPOSED SWALE GRADE
180.5	EXISTING CONTOURS
←	FLOW DIRECTION
✦	HYDRANTS

1.	PER CITY COMMENTS	JAC	CJH	22.05.31
Revision		By	Appd.	YY.MM.DD

2.	ISSUED FOR DRAFT PLAN APPROVAL	JAC	CJH	22.05.31
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Permit-Seal

C. J. HENDRIKSEN
100125181
May 31/22

Client/Project

TRICAR DEVELOPMENTS INC.

1242, 1250, 1260 GORDON STREET
& 9 VALLEY ROAD

GUELPH, ON

Title

GRADING PLAN

Project No. 161413684

Scale 1:500 0 5 15 25m

Drawing No. GP-1

Sheet 5 of 8

Revision 1

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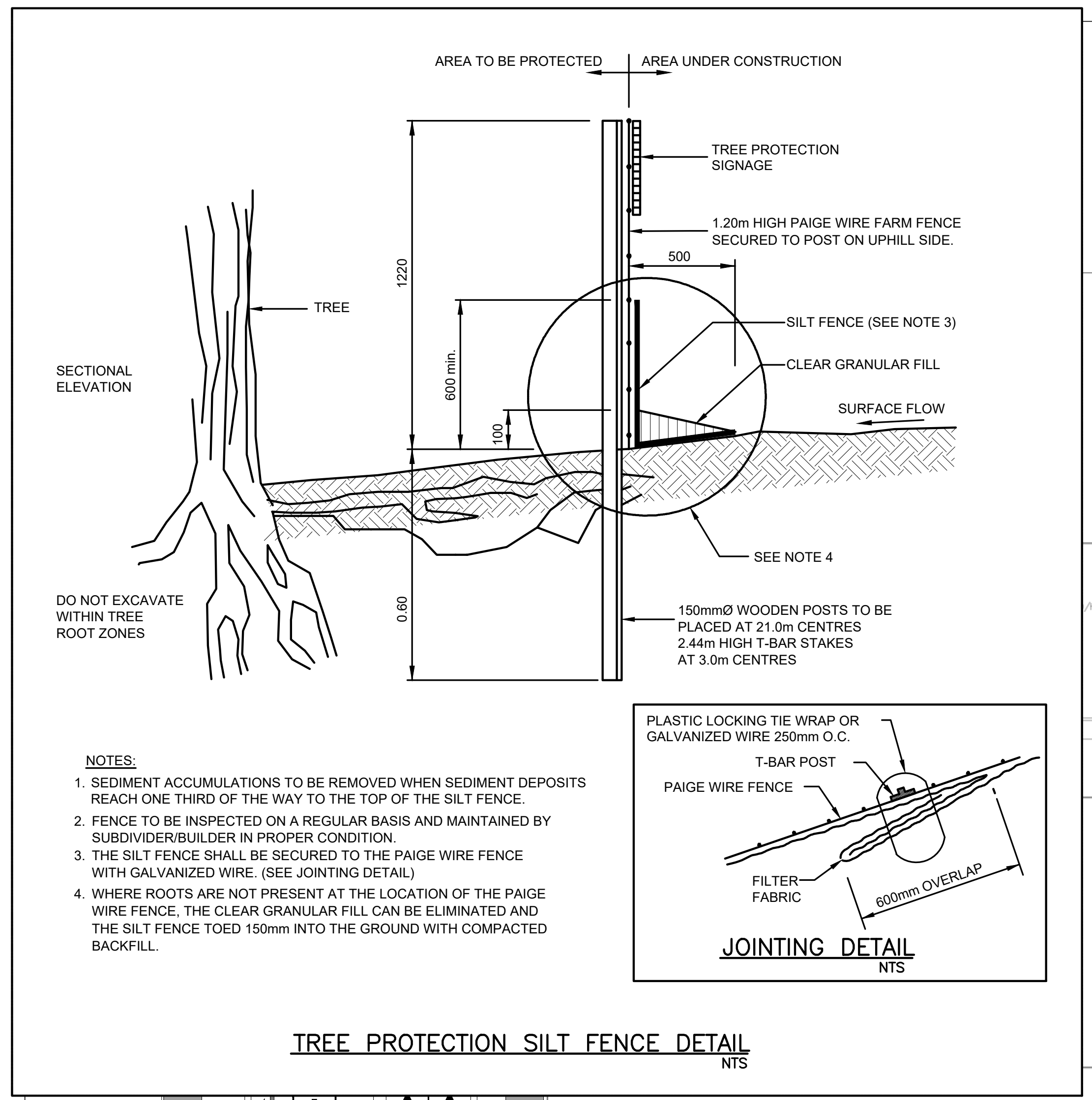
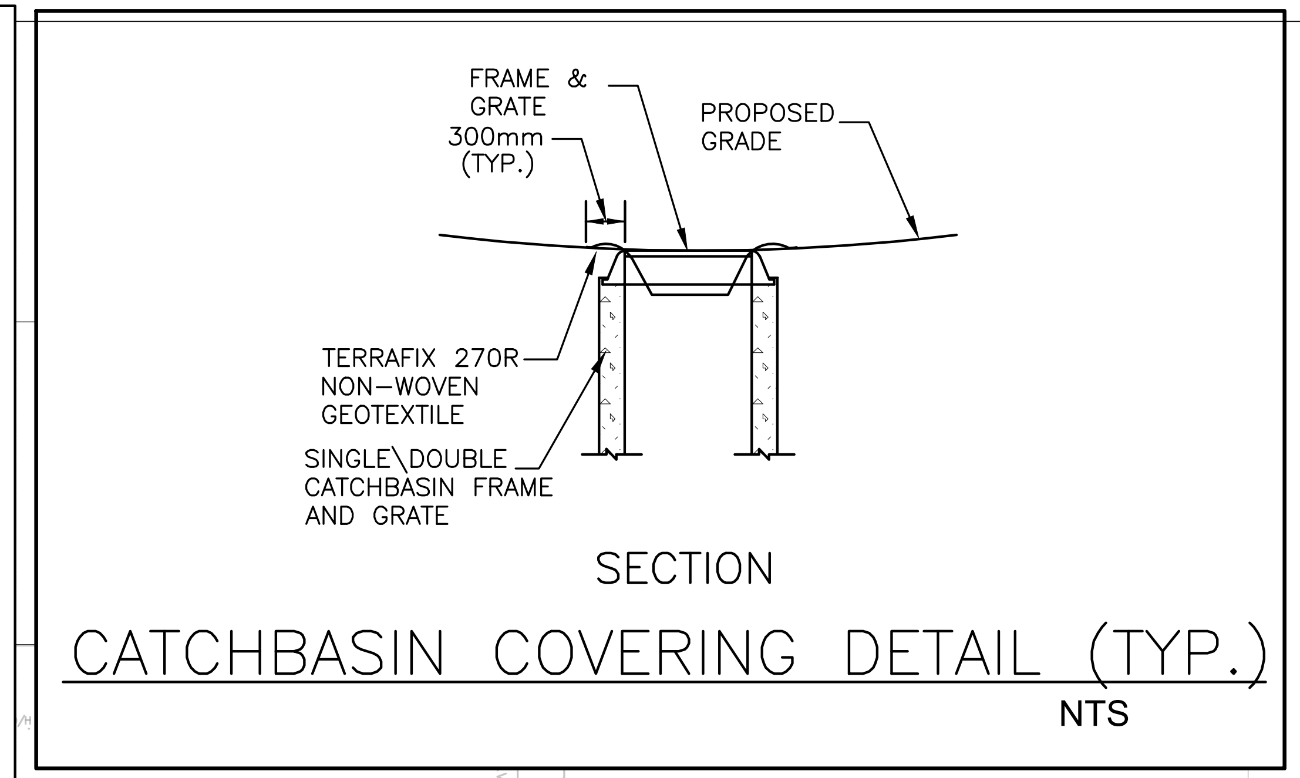


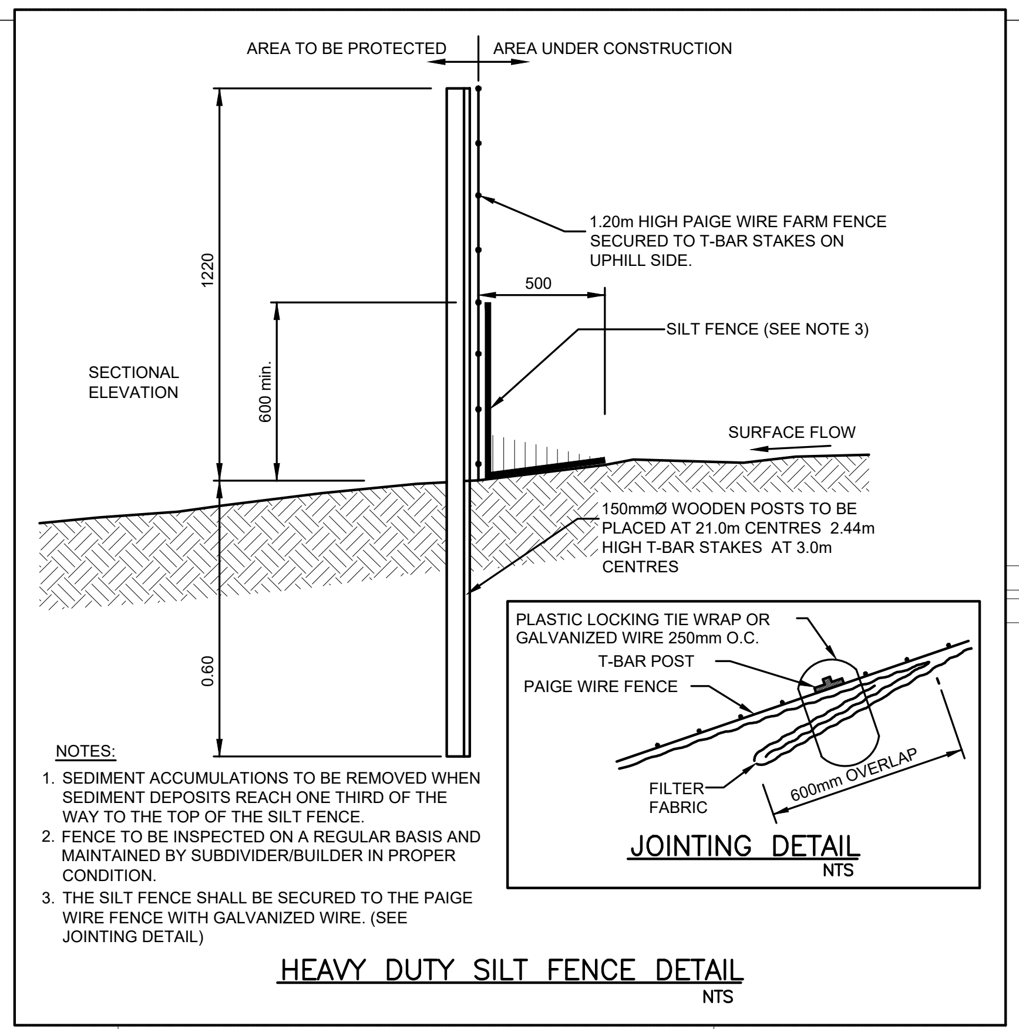
NOTES:

1. SEDIMENT ACCUMULATIONS TO BE REMOVED WHEN SEDIMENT DEPOSITS REACH ONE THIRD OF THE WAY TO THE TOP OF THE SILT FENCE.
2. FENCE TO BE INSPECTED ON A REGULAR BASIS AND MAINTAINED BY SUBDIVIDER/BUILDER IN PROPER CONDITION.
3. THE SILT FENCE SHALL BE SECURED TO THE PAIGE WIRE FENCE WITH GALVANIZED WIRE. (SEE JOINTING DETAIL)
4. WHERE ROOTS ARE NOT PRESENT AT THE LOCATION OF THE PAIGE WIRE FENCE, THE CLEAR GRANULAR FILL CAN BE ELIMINATED AND THE SILT FENCE TOED 150mm INTO THE GROUND WITH COMPACTED BACKFILL.

TREE PROTECTION SILT FENCE DETAIL
NTS



CATCHBASIN COVERING DETAIL (TYP.)
NTS



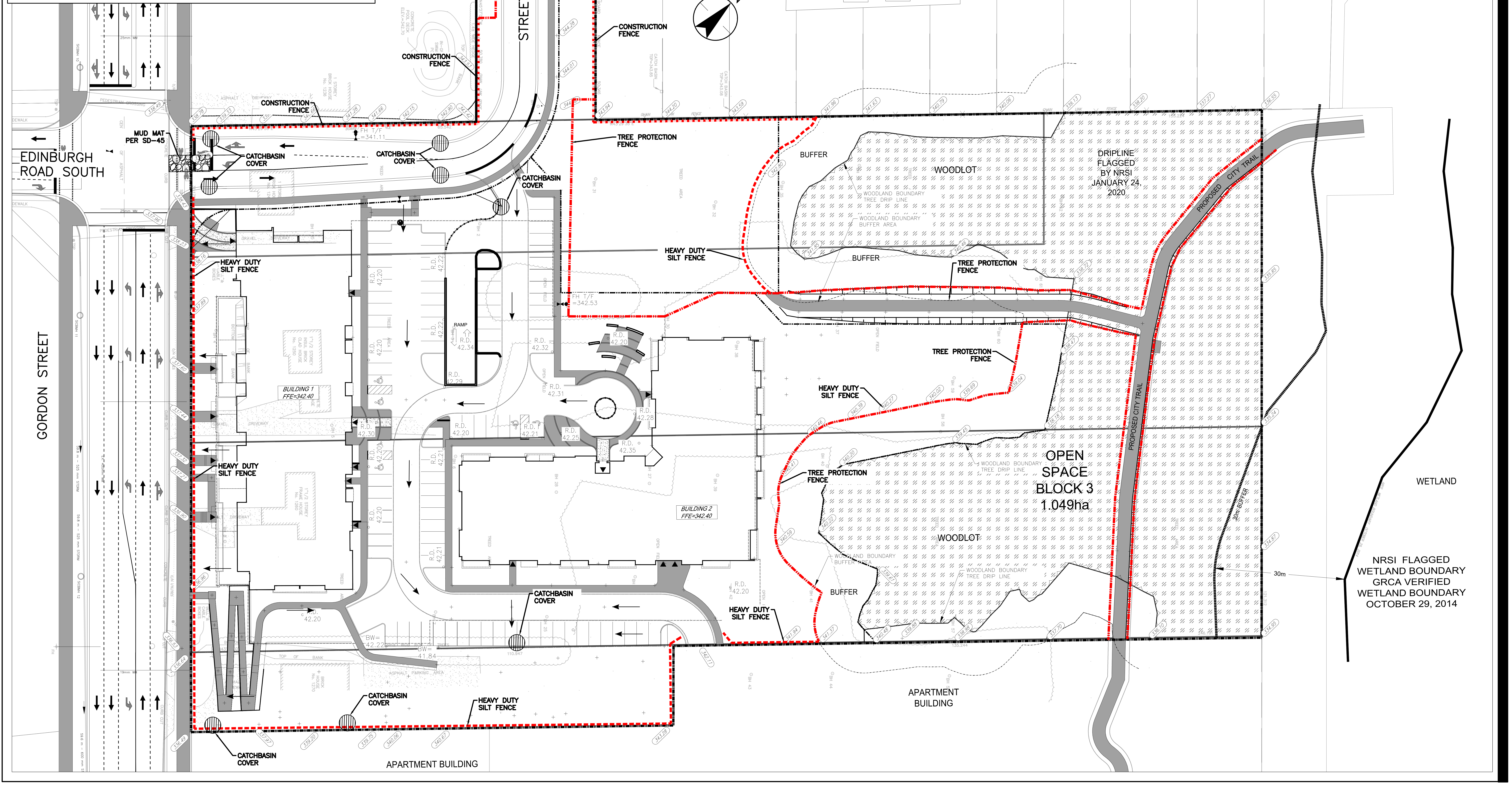
NOTES:

1. SEDIMENT ACCUMULATIONS TO BE REMOVED WHEN SEDIMENT DEPOSITS REACH ONE THIRD OF THE WAY TO THE TOP OF THE SILT FENCE.
2. FENCE TO BE INSPECTED ON A REGULAR BASIS AND MAINTAINED BY SUBDIVIDER/BUILDER IN PROPER CONDITION.
3. THE SILT FENCE SHALL BE SECURED TO THE PAIGE WIRE FENCE WITH GALVANIZED WIRE. (SEE JOINTING DETAIL)

HEAVY DUTY SILT FENCE DETAIL
NTS

IMPLEMENTATION SCHEDULE AND DETAILS FOR EROSION AND SEDIMENTATION CONTROL MEASURES

PRIOR TO ANY SITE WORKS	– INSTALL ALL SILT FENCE AND PROTECTIVE FENCING AS SHOWN ON THE PLANS AND MAINTAIN DURING CONSTRUCTION. – MONTHLY EROSION AND SEDIMENT CONTROL REPORTS (QUARTERLY DURING PERIODS OF INACTIVITY OR HOUSE CONSTRUCTION) ARE TO BE SUBMITTED TO THE AUTHORITY UNTIL THE SITE HAS BEEN BUILT OUT (90%–100%) AND STABILIZED. REPORTS TO BE BASED ON FREQUENT INSPECTIONS PARTICULARLY AFTER SIGNIFICANT EVENTS.
DURING TOPSOIL STRIPPING	– CONSTRUCT TEMPORARY SEDIMENT CONTROL BASINS, DIVERSION SWALES & BERMS – CONSTRUCT TEMPORARY DIVERSION BERMS/SWALES/ROCK CHECK DAMS – SURPLUS TOPSOIL IS BE STOCKPILED IN LOCATIONS SHOWN
DURING AREA GRADING	– ALL DIVERSION BERMS/SWALES TO BE CHECKED REGULARLY AND AFTER EACH SIGNIFICANT RAINFALL AS GRADING PROCEEDS. DIVERSION BERMS/SWALES TO BE RECONSTRUCTED/RELOCATED AS NECESSARY TO ENSURE THAT THEY DIRECT FLOWS INTO BASINS. – SILT FENCE TO BE CHECKED REGULARLY AND AFTER EACH RAINFALL FOR UNDERMINING OR DETERIORATION OF THE FABRIC. SEDIMENT SHALL BE REMOVED WHEN THE LEVEL OF SEDIMENT DEPOSITION REACHES ONE THIRD OF THE WAY TO THE TOP OF THE BARRIER. – SEDIMENT CONTROL BASINS TO BE CHECKED REGULARLY AND AFTER EACH RAINFALL AND CLEANED OUT WHEN THE LEVEL OF SEDIMENT BUILDUP HAS REDUCED THE VOLUME OF THE DEAD STORAGE BY ONE HALF.
AFTER AREA GRADING	– ALL AREAS (INCLUDING STOCKPILES) WHERE ACTIVE CONSTRUCTION IS NOT EXPECTED FOR 30 DAYS, SHALL BE REVEGETATED WITH 50mm OF TOPSOIL AND HYDROSEEDED IN ACCORDANCE WITH OPSS 572.
DURING SERVICING AND ROADWORKS CONSTRUCTION	– MAINTAIN FUNCTION OF SEDIMENT CONTROLS – ENSURE GRADED AREAS DRAIN TO SEDIMENT BASINS – INSTALL ROCK CHECK DAMS IN LOW POINT OF AREAS CUT OFF BY ROADS AS DIRECTED BY THE ENGINEER. – INSTALL STORM SERVICE OUTLETS AT ALL LOW POINTS (SEE DETAILS) – CATCHBASINS TO BE SEALED UNTIL ROADS ARE PAVED. – INSTALL FILTER FABRIC UNDER CATCHBASIN GRATES
DURING HOUSE CONSTRUCTION	– SEDIMENTATION BASINS CONFLICTING WITH HOUSE CONSTRUCTION ARE TO BE FILLED AND STORM SERVICE OUTLETS ARE TO BE INSTALLED (SEE DETAIL). – STREETS TO BE KEPT CLEAN.
FOLLOWING SITE STABILIZATION	– REMOVAL OF SEDIMENT CONTROL MEASURES AND COLLECTION OF ACCUMULATED SEDIMENT SHALL OCCUR FOLLOWING SUBSTANTIAL COMPLETION OF CONSTRUCTION (90%–100%) AND SITE STABILIZATION.



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ORIGINAL SHEET - ANSI D

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Notes

1. CITY OF GUELPH BENCHMARK 225 ELEVATION 338.665 LOCATION: 1221 GORDON STREET
2. EXISTING SURVEY COMPLETED BY BSR&D (NOVEMBER, 4 2014)
3. THE CONTRACTOR IS TO VERIFY ALL EXISTING ELEVATIONS AND EXISTING CONDITIONS AND TO REPORT ANY DISCREPANCIES TO THE CONSULTING ENGINEER

Legend

▬ ▬ ▬	SILT FENCE (SD–74B)
▬ ▬ ▬	CONSTRUCTION FENCE
▬ ▬ ▬	TREE PROTECTION FENCE (SD–90A)
←	SURFACE FLOW DIRECTION
▨	CATCHBASIN COVERING

1. PER CITY COMMENTS	JAC	CJH	22.05.31
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Permit-Seal

C. J. HENDRIKSEN
100125181
May 31/22

Client/Project

TRICAR DEVELOPMENTS INC.

1242, 1250, 1260 GORDON STREET
& 9 VALLEY ROAD
GUELPH, ON

Title

EROSION & SEDIMENT CONTROL PLAN

Project No. 161413684
Scale 1:400 0 4 12 20m
Drawing No. GP-2
Sheet 6 of 8
Revision 1

NOTES AND SPECIFICATIONS:

A. GENERAL:

1. BUILDINGS ARE NOT TO BE SITED WITH THIS DRAWING. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE SITE SERVICING PLANS (SSP SERIES) & THE GRADING PLAN (GP SERIES) PREPARED BY STANTEC CONSULTING.
2. THESE PLANS FOR CONSTRUCTION ONLY WHEN APPROVED BY THE CITY OF GUELPH AND SEALED BY THE ENGINEER.
3. THE CONTRACTOR MUST CHECK AND VERIFY DIMENSIONS; OBTAIN ALL UTILITY LOCATES AND OBTAIN ALL REQUIRED PERMITS/LICENSES AND VERIFY ELEVATIONS OF EXISTING SERVICES BEFORE PROCEEDING WITH ANY WORK.
4. ALL WORK WITHIN THE RIGHTS–OF–WAY OR CITY EASEMENTS ARE TO BE INSTALLED BY CITY OF GUELPH AT THE OWNER'S EXPENSE UNLESS OTHERWISE NOTED.
5. ANY PROPOSED CHANGES SHALL BE APPROVED BY THE ENGINEER AND CITY OF GUELPH.
6. ALL UNDERGROUND SERVICING TO BE INSPECTED BY STANTEC CONSULTING LTD. AND CERTIFIED FOR THE CITY OF GUELPH. CONTRACTOR SHALL COORDINATE WITH STANTEC AND SHALL CONTACT SAME AT LEAST 48 HOURS PRIOR TO INSTALLATION OF SERVICES.
7. CONTRACTOR SHALL COORDINATE WITH STANTEC AND SHALL CONTACT SAME AT LEAST 48 HOURS PRIOR TO INSTALLATION OF SERVICES.
8. ALL CONSTRUCTION WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS (LATEST EDITION).
9. THE PROPERTY OWNER IS RESPONSIBLE FOR RESTORATION OF ALL DAMAGED AND/OR DISTURBED PROPERTY WITHIN THE MUNICIPAL RIGHT–OF–WAY TO CITY OF GUELPH STANDARDS.
10. IF, FOR UNFORESEEN REASONS, THE OWNER AND/OR HIS/HER REPRESENTATIVE MUST ENCROACH ONTO PRIVATE LANDS TO UNDERTAKE ANY WORKS, HE/SHE MUST OBTAIN WRITTEN PERMISSION FROM THE ADJACENT PROPERTY OWNERS PRIOR TO ENTERING UPON THE PRIVATE PROPERTY TO PERFORM ANY WORKS. COPIES OF THESE LETTERS OF CONSENT MUST BE SUBMITTED TO THE DEVELOPMENT & TECHNICAL SERVICES – ENGINEERING DEVELOPMENT DIVISION, PRIOR TO ANY WORK BEING PERFORMED. FAILURE TO COMPLY WITH THE ABOVE IS AT THE PROPERTY OWNERS OWN RISK.

B. UNDERGROUND SERVICES:

1. CONTRACTOR SHALL VERIFY ELEVATION AND LOCATION OF EXISTING SANITARY AND STORM SEWERS AND WATERMAINS PRIOR TO COMMENCING SITE WORK AND SHALL NOTIFY THE ENGINEER OF ANY CONFLICTS BETWEEN EXISTING AND PROPOSED SERVICES.
2. THE CONTRACTOR TO MAKE CONNECTIONS TO SERVICES AT STUB LOCATION FOR SANITARY, STORM SEWERS, WATERMAIN AND TO RESTORE ALL OFF–SITE AFFECTED PROPERTY TO ORIGINAL CONDITION.
3. ON–SITE SERVICING SHALL NOT BE UNDERTAKEN PRIOR TO COMPLETION OF SERVICE CONNECTIONS WITHIN THE ROAD R.O.W.'S.
4. ALL UNDERGROUND SERVICES TO BE IN COMPLIANCE WITH THE LATEST REVISED BUILDING CODE, CITY OF GUELPH ENGINEERING STANDARDS, ONTARIO PROVINCIAL STANDARDS (OPSS, OPSD) AND WITH THE LATEST REGULATIONS OF THE ONTARIO PLUMBING CODE AND SUPPLEMENT SPECIFICATION FOR MUNICIPAL SERVICES (DGSSMS) AND INSPECTED BY CITY STAFF/CONSULTANT PRIOR TO BACKFILLING.
5. UNDERGROUND SERVICES TO TERMINATE 1.5m FROM BUILDING LINE, PLUGGED OR CAPPED C/W MARKER EXTENDING FROM INVERT TO 1.0M ABOVE FINISHED GRADE.
6. ALL BEDDING TO BE AS NOTED BELOW. TRENCH BACKFILL TO BE APPROVED NATIVE MATERIAL COMPACTED IN 200mm MAX. LIFTS TO 95% STANDARD PROCTOR DENSITY.
7. ALL SERVICES SHALL BE TESTED AS SPECIFIED IN THE APPLICABLE OPSS (OPSS 410 & 441).
8. ALL SERVICES, UTILITIES AND CATCHBASIN LEADS ARE TO BE SUPPORTED AS PER OPSD 1007.01 DURING TRENCHING ACTIVITIES. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES PRIOR TO AND DURING CONSTRUCTION. LOCATION OF EXISTING UTILITIES TO BE VERIFIED IN THE FIELD.
9. ANY UTILITY RELOCATION DUE TO THIS DEVELOPMENT TO BE UNDERTAKEN AT THE EXPENSE OF THE OWNER/DEVELOPER.

C. SEWERS/APPURTENANCES:

4. STORM SEWERS:
   - LESS THAN 200mmø – PVC DR–28
   - 200mmø TO 375mmø – PVC DR–35
     – PVC RIBBED PIPE (ULTRA–RIB OR EQUIVALENT)
     – CL–3 CONCRETE
   - 450mmø TO 600mmø – PVC RIBBED PIPE (ULTRA–RIB OR EQUIVALENT)
     – 65D CONCRETE
   - 450mmø TO 600mmø – 65D CONCRETE
5. SANITARY SEWERS:
   - LESS THAN 200mmø – PVC DR–28
   - 200mmø OR LARGER – PVC DR–35
   - 2.5m MINIMUM COVER FOR SANITARY SEWERS.
3. SEWER BEDDING:
   - CITY OF GUELPH SD–29
   - 150mm (MIN) GRAN 'A' TO 98% S.P.D.
4. STORM MANHOLES:
   - OPSD 701.010 (1200mmø)
   - OPSD 701.011 (1500mmø)
   - OPSD 701.012 (1800mmø)
   - OPSD 701.013 (2400mmø)
   - OPSD 701.014 (3000mmø)
6. SANITARY MAINTENANCE HOLE:
   - OPSD 701.010 (1200mmø)
7. MAINTENANCE HOLE BENCHING:
   - CITY OF GUELPH SD–44
   - CBMH'S WITH AN OUTLET PIPE GREATER THAN 450mmø SHOULD BE BENCHED. 450mmø OR LESS SHALL BE PROVIDED WITH A 600mm SUMP.
8. CATCHBASINS/CATCHBASIN LEADS:
   - OPSD 705.01 (SINGLE)
   - OPSD 705.02 (DOUBLE)
   - OPSD 705.03 (DITCH INLET – 3:1 SLOPE)
   - MINIMUM LEAD DIAMETER. 200mmø FOR SINGLE, 300mmø FOR DOUBLE CATCHBASINS.
9. FRAMES AND GRATES/COVERS:
   - OPSD 400.10 (CB'S & CBMH'S)
   - OPSD 401.01 TYPE 'A' (SANITARY AND STORM MH'S)
   - CITY OF GUELPH SD–15 (RLCB'S)
   - CITY OF GUELPH SD–16 (DICB'S)
   - CITY OF GUELPH SD–9 (SAFETY GRATE FOR MH'S)
   - ALL FRAMES ON STRUCTURES TO BE SET USING PRECAST CONCRETE ADJUSTMENT UNITS

D. WATER SERVICES/APPURTENANCES:

1. WATERMAIN
   - 100mmø TO 300mmø – AWWA C–900 PVC SDR–18
   - 350mmø TO 600mmø – AWWA C905 PVC SDR–25
   - 2.0m MINIMUM COVER
   - FITTINGS TO AWWA C–907
   - WHERE CONFLICT ARISES AT WATERMAIN/SERVICE CROSSING OTHER UNDERGROUND SERVICES, WATERMAIN/SERVICES SHALL BE LOWERED TO MAINTAIN 0.50m VERTICAL SEPARATION.
2. PIPE BEDDING:
   - CITY OF GUELPH SD–29
   - 150mm (MIN) GRANULAR 'A' 98% S.P.D.
3. THRUST BLOCKING:
   - CITY OF GUELPH SD–27
4. TRACER WIRE:
   - CITY OF GUELPH SD–54A
5. HYDRANTS:
   - CITY OF GUELPH SD–25A (OPEN RIGHT)
6. VALVES:
   - ALL VALVES TO OPEN COUNTER–CLOCKWISE AND COMPLY WITH A.W.W.A. SPEC.
   - CITY OF GUELPH SD–24
7. WATER SERVICES
   - 25mmø TYPE K COPPER PIPING WET TAPPED TO PVC WATERMAIN WITH APPROVED SADDLE
   - CITY OF GUELPH SD–54B
8. WATER METERS:
   - BUILDING UNITS TO HAVE INDIVIDUAL WATER METERS TO THE SATISFACTION OF CITY OF GUELPH WATERWORKS DEPARTMENT
9. MAINTAIN SPATIAL SEPARATION FOR SITE SERVICES PER BUILDING CODE PART 7.3.5.6
10. ALL NEW WATER PIPING INSTALLATIONS AS PER AWWA C651–05
11. CATHODIC PROTECTION IN ACCORDANCE WITH CITY OF GUELPH STANDARDS.
12. A WATERMAIN COMMISSIONING PLAN IN ACCORDANCE WITH DGSSMS WILL BE REQUIRED.

E. GRADING:

1. COMPLETE ALL EXCAVATION, GRADING, TRIMMING AND COMPACTION AS REQUIRED TO FACILITATE THE WORK, ALL SUBGRADE AREAS SHALL BE PROOF ROLLED TO 98% S.D.P. PRIOR TO GRANULAR SUBBASE PLACEMENT.
2. DISPOSE OF ALL SURPLUS AND UNSUITABLE MATERIAL OFFSITE.
3. SAWCUT ASPHALT IN NEAT LINES AT ALL MATCH LINES.
4. MATCH EXISTING GRADES AT ADJACENT PROPERTY LINES.
5. TRANSITION SLOPES TO BE MAXIMUM 3:1 (HORIZONTAL TO VERTICAL) UNLESS OTHERWISE NOTED.

F. SURFACE WORKS:

1. CURBS:
   - OPSD 600.040 (CONCRETE BARRIER CURB WITH STANDARD GUTTER)
   - OPSD 600.070 (CONCRETE BARRIER CURB WITH STANDARD GUTTER, TWO STAGE CONSTRUCTION)
   - OPSD 600.080 (CONCRETE BARRIER CURB WITH NARROW GUTTER)
   - OPSD 600.110 (CONCRETE BARRIER CURB)
2. ASPHALT PAVEMENT: (PARKING AREA)
   - 40mm HL 3 (SURFACE ASPHALT) 97% MARSHALL
   - 50mm HL4 (BASE ASPHALT) 97% S.P.D.
   - 150mm GRANULAR 'A' BASE 100% S.P.D.
   - 300mm GRANULAR 'B' SUB–BASE 100% S.P.D.
3. ASPHALT PAVEMENT: (ABOVE PARKING GARAGE)
   - CONCRETE DECK
   - ROOFING MEMBRANE
   - PROTECTION BOARD
   - 40MM HL 3 (SURFACE ASPHALT) 97% MARSHALL
   - 50MM HL4 (BASE ASPHALT) 97% S.P.D.
4. PAVEMENT: (HEAVY DUTY/FIRE ROUTE)
   - 50mm HL–3 SURFACE ASPHALT 97% MARSHALL – (WHERE IN PLACE)
   - 60mm HL–4 BASE ASPHALT 97% MARSHALL
   - 150mm GRANULAR 'A' 100% S.P.D.
   - 400mm GRANULAR 'B' 100% S.P.D.
   - SAW CUT CLEAN EDGES AT ALL MATCH LINES AND APPLY TACK COAT.
5. CONCRETE SIDEWALKS:
   - CITY OF GUELPH SD–2, 1.5m WIDE (CONCRETE SIDEWALK)
   - CITY OF GUELPH SD–4 (SIDEWALK RAMPS)
6. SITE AREAS DISTURBED BY CONSTRUCTION AND NOT INDICATED FOR REMOVAL TO BE RESTORED TO ORIGINAL CONDITIONS.

G. EROSION CONTROL:

1. ALL SILT FENCING TO BE INSTALLED PRIOR TO COMMENCEMENT OF ANY AREA GRADING, EXCAVATION OR DEMOLITION.
2. EROSION CONTROL FENCE TO BE PLACED AROUND THE BASE OF ALL STOCKPILES. ALL STOCKPILES TO BE KEPT A MINIMUM OF 2.5m FROM ALL PROPERTY LINES.
3. P–250 FILTER FABRIC UNDERLYING CONSTRUCTION VEHICLE ENTRANCE TO CONSIST OF CLEANED OR REPLACED 200mm THICK, 50mmø STONE. STONE TO BE TAKEN UP AND WHEN ACCUMULATIONS COVER 50% OF TOP OF STONE (SEE DETAIL).
4. EROSION PROTECTION TO BE PROVIDED AROUND ALL STORM AND SANITARY MANHOLES AND/OR CATCHBASINS.
5. ADDITIONAL EROSION CONTROL MEASURES MAY BE REQUIRED AS SITE DEVELOPMENT PROGRESSES. CONTRACTOR TO PROVIDE ALL ADDITIONAL EROSION CONTROL STRUCTURES.
6. EROSION CONTROL STRUCTURES TO BE MONITORED REGULARLY BY STANTEC CONSULTING LTD. AND ANY DAMAGE REPAIRED IMMEDIATELY. SEDIMENTS TO BE REMOVED WHEN ACCUMULATIONS REACH A MAXIMUM OF ONE THIRD (1/2) THE HEIGHT OF THE SILT FENCE.
7. ALL EROSION CONTROL STRUCTURES TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND SURFACES HAVE BEEN RE–STABILIZED EITHER BY PAVING OR RESTORATION OF VEGETATIVE GROUND COVER.
8. NO ALTERNATE METHODS OF EROSION PROTECTION SHALL BE PERMITTED UNLESS APPROVED BY STANTEC CONSULTING LTD. AND THE CITY OF GUELPH'S WORKS DEPARTMENT
9. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING SEDIMENTS FROM THE MUNICIPAL ROAD AND SIDEWALKS AT THE END OF EACH WORK DAY.
10. MUD MATS TO BE PROVIDED ON SITE AT ALL LOCATIONS WHERE CONSTRUCTION VEHICLES EXIT THE SITE. MUD MATS SHALL BE A MINIMUM OF 3.0m WIDE, 15.0m LONG (LENGTH MAY VARY DEPENDING ON SITE LAYOUT) AND 0.3m DEEP AND SHALL CONSIST OF 20mm CLEAR STONE MATERIAL OR APPROVED EQUIVALENT. CONTRACTOR TO ENSURE ALL VEHICLES LEAVE THE SITE VIA THE MUD MAT AND THAT THE MAT IS MAINTAINED IN A MANNER TO MAXIMIZE ITS EFFECTIVENESS AT ALL TIMES.
11. STANTEC CONSULTING LTD. TO MONITOR THE SITE DEVELOPMENT TO ENSURE ALL EROSION CONTROLS ARE INSTALLED AND MAINTAINED TO CITY REQUIREMENTS. CONTRACTOR TO COMPLY WITH THE ENGINEER'S INSTRUCTIONS TO INSTALL, MODIFY, OR MAINTAIN EROSION CONTROL WORKS.

H. RETAINING WALLS:

1. RETAINING WALL TO BE CONSTRUCTED AS DESIGNED BY OTHERS. APPROPRIATE CONSTRUCTION DETAILS SHALL BE PROVIDED FOR RETAINING WALLS HIGHER THAN 0.80m. DETAILS SHALL BE DESIGNED AND SEALED BY A PROFESSIONAL ENGINEER UPON APPROVAL. GUARD RAIL IS REQUIRED WHEN HEIGHT EXCEEDS 0.80m.
2. CONTRACTOR TO CONTACT GEOTECHNICAL ENGINEER 48 HOURS PRIOR TO CONSTRUCTION OF RETAINING WALL TO ALLOW FOR INSPECTION OF SOIL CONDITIONS.
3. ANY CHANGES IN WALL HEIGHT MUST BE APPROVED BY THE ENGINEER.
4. BUILDING PERMIT MUST BE OBTAINED FOR RETAINING WALL

I. DEWATERING NOTES:

1. PUMPED GROUNDWATER WILL BE DIRECTED OFFSITE VIA SWALE AND/OR TEMPORARY PIPE TO POPPY DRIVE EAST, WHERE THE WATER WILL BE DISCHARGED TO EITHER THE STORM OR SANITARY SEWER SYSTEM.
2. DISCHARGE TO THE STORM AND/OR SANITARY SEWER SYSTEM MUST ADHERE TO THE QUALITY REQUIREMENTS AS PER CITY OF GUELPH BY–LAW NUMBER (1996)–15202.

J. MISCELLANEOUS:

1. WHERE COVER OVER SEWERS IS LESS THAN 1.2m IN PAVED AREAS, OR LESS THAN 0.90m IN GRASSED AREAS INSTALL INSULATION AS PER DETAIL. INSULATION TO BE 60mm THICK x 1800mm WIDE UNLESS OTHERWISE NOTED. INSTALL LONGITUDINALLY OVER CENTERLINE OF PIPE WITH OVERLAPPING JOINTS.
2. IT IS THE SITE OWNERS' RESPONSIBILITY TO ENSURE THAT ALL SEDIMENT CONTROLS ARE IMPLEMENTED AND MAINTAINED IN ACCORDANCE WITH THE ABOVE CRITERIA.

UNDERGROUND STORAGE AND INFILTRATION TRENCHES

1 PRIOR TO INSTALLATION

- EFFORTS SHOULD BE MADE TO AVOID COMPACTION BY NOT USING THE FACILITY LOCATION AS:
- LAYDOWN OR STOCKPILE LOCATIONS;
- EQUIPMENT STORAGE;
- TRAFFIC FLOW OR SITE ACCESS.
- MATERIAL TO BE USED IN THE CONSTRUCTION OF THE FACILITY SHOULD NOT BE BROUGHT ON SITE PRIOR TO IT BEING NEEDED. IF THIS MATERIAL IS ON SITE PRIOR TO FINAL PLACEMENT, IT SHALL BE STOCKPILED SEPARATELY FROM ANY OTHER CONSTRUCTION MATERIALS AND ADEQUATELY PROTECTED (AS DIRECTED BY THE LID INSPECTOR).

2 INSTALLATION

- TRENCH FLOOR TO BE SCARIFIED TO A DEPTH OF 0.15M UNLESS THE LID INSPECTOR DIRECTS GREATER DEPTHS OF SCARIFICATION.
- ONCE THE AREA IS SCARIFIED, AT LEAST 2 LOCATIONS IN EACH FACILITY ARE TO BE TESTED FOR IN–SITU INFILTRATION RATE. ADDITIONAL SCARIFICATION MAY BE REQUIRED FOLLOWING THESE TESTS, AFTER WHICH THE TESTS SHOULD BE COMPLETED AGAIN IN OTHER LOCATIONS.
- SHOULD THE TRENCH WORK BE COMPLETED IN ADVANCE ON THE INSTALLATION OF THE GEOTEXTILE AND STONE, THE TRENCH SHOULD BE PROTECTED IN THE EVENT OF RAIN.
- THE OVERLAP ON THE GEOTEXTILE SHALL BE A MINIMUM OF 0.3M. THE GEOTEXTILE SHALL BE WRAPPED OVERTOP OF THE STONE STORAGE AT THE MINIMUM OVERLAP.
- ALL STONE INSTALLED IS TO BE TRIPLE WASHED TO PREVENT DUST FROM CLOGGING THE FABRIC AND SOIL PORES. STONE IS TO BE INSTALLED IN LIFTS OF 0.3M MAXIMUM. THESE LIFTS SHOULD BE LIGHTLY WORKED TO SETTLE THE STONE BUT MECHANICAL COMPACTION IS NOT TO BE USED.
- ALL UNDERDRAIN PIPES ARE TO BE WRAPPED IN A SEDIMENT SOCK.
- IF THE FACILITY IS COMPLETED PRIOR TO SITE STABILIZATION, RUNOFF SHOULD BE DIRECTED AWAY FROM THE FACILITY TO PREVENT HEAVY SEDIMENTATION. EROSION CONTROLS SHOULD BE INSTALLED AS PER THE DIRECTION OF THE LID INSPECTOR.

3 MAINTENANCE

- REMOVE ANY DEBRIS, GARBAGE, LEAVES, STICKS, OR OTHER ITEMS FROM THE FACILITY INLETS. THIS SHOULD BE DONE BIANNUALLY WITH SPECIAL ATTENTION IN FALL TO REMOVE FALLEN LEAVES;
- REMOVE ACCUMULATED SEDIMENT FROM THE BOTTOM OF THE FACILITY AS NEEDED BY FLUSHING;
- MONITOR PERFORMANCE; OBSERVE WATER DEPTHS IN THE FACILITY DURING RAIN EVENTS BIANNUALLY.

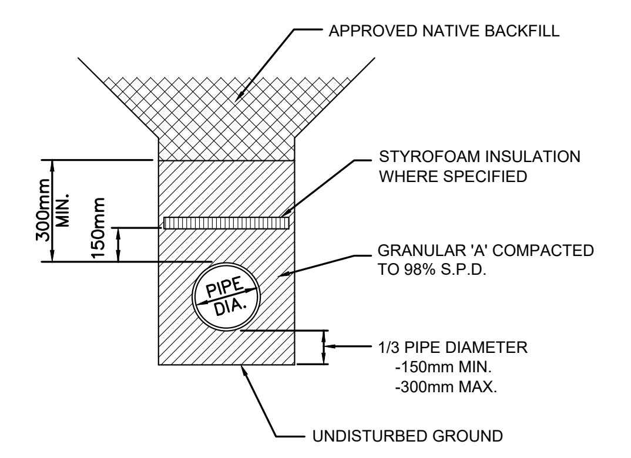
OIL GRIT SEPARATOR

1 INSTALLATION

- ONCE INSTALLED, THE INLET TO THE OGS SHOULD BE SURROUNDED BY A FILTER SOCK RING TO REMOVE THE HEAVIEST SEDIMENT LOADS. THE OGS SHOULD BE INSPECTED BIWEEKLY DURING CONSTRUCTION AND CLEANED BY VACUUM TRUCK WHEN THE SUMP IS 50% FULL OF SILT.
- WHEN CONSTRUCTION IS COMPLETE, THE OGS SHOULD BE CLEANED OF ANY SEDIMENT.

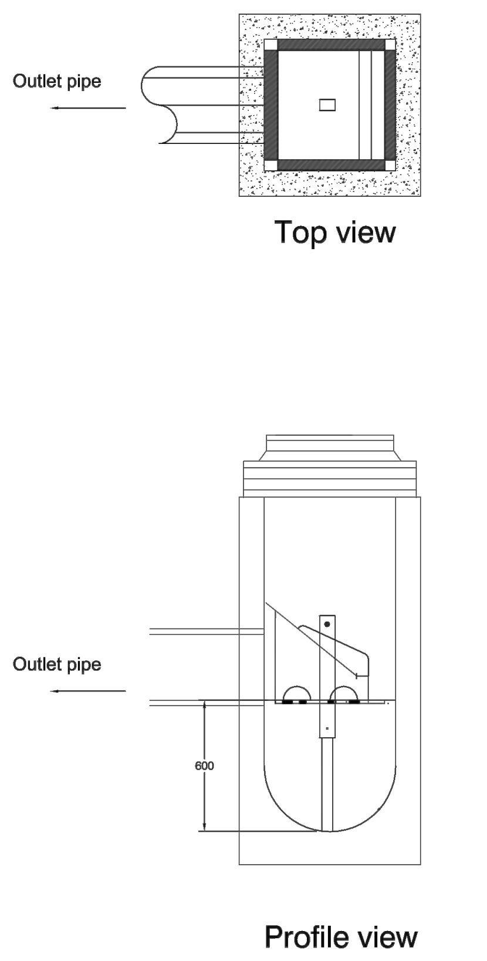
2 MAINTENANCE

- INSPECTION SHOULD BE DONE BIANNUALLY;
- REMOVE ACCUMULATED SEDIMENT FROM THE BOTTOM OF THE FACILITY WHEN 50% FULL BY VACUUM TRUCK;
- REMOVAL OF ANY OILS OR FLOATABLES AS NEEDED, WITH SPECIAL ATTENTION PAID IN THE EVENT OF A DELETERIOUS SPILL.

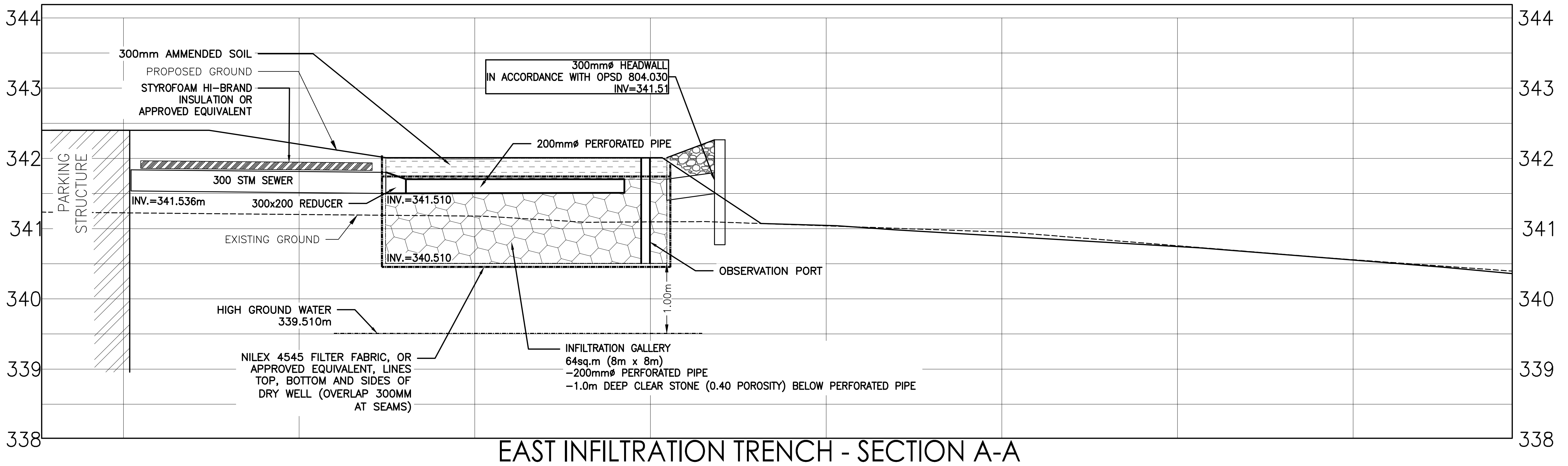


TYP. PIPE BEDDING DETAIL
NTS

Notes
1. CB Shield can be installed at any time. In a non frozen condition.
2. The frame and cover should be well aligned with the catchbasin for proper installation
3. The catchbasin sump must be clean before installation
4. The grate should be at the same level as the standing water in the sump.



CB Shield (600mm Sump)



EAST INFILTRATION TRENCH - SECTION A-A
VERT - 1:50 HORZ - 1:100

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2022-6-1 10:06 AM by: Childs, Jason

ORIGINAL SHEET - ANSI D

Stantec
600-171 Queens Avenue
London ON N6A 5J7
Tel. 519-645-2007
www.stantec.com

Liability Note:

Notes

1. CITY OF GUELPH BENCHMARK 225 ELEVATION 338.665 LOCATION: 1221 GORDON STREET
2. EXISTING SURVEY COMPLETED BY BSR&D (NOVEMBER, 4 2014)
3. THE CONTRACTOR IS TO VERIFY ALL EXISTING ELEVATIONS AND EXISTING CONDITIONS AND TO REPORT ANY DISCREPANCIES TO THE CONSULTING ENGINEER

Legend

Revision	By	Appd.	YY.MM.DD
1. PER CITY COMMENTS	JAC	CJH	22.05.31

Issued	By	Appd.	YY.MM.DD
2. ISSUED FOR DRAFT PLAN APPROVAL	JAC	CJH	22.05.31
1. ISSUED FOR DRAFT PLAN APPROVAL	JAC	CJH	21.08.24

File Name: 161413684_c-dt	Dwn.	Chkd.	Dsgn.	YY.MM.DD
	JAC	CJH	JAC	21.07.23

Permit-Seal

C. J. HENDRIKSEN
100125181
May 31/22

Client/Project

TRICAR DEVELOPMENTS INC.

1242, 1250, 1260 GORDON STREET
& 9 VALLEY ROAD
GUELPH, ON

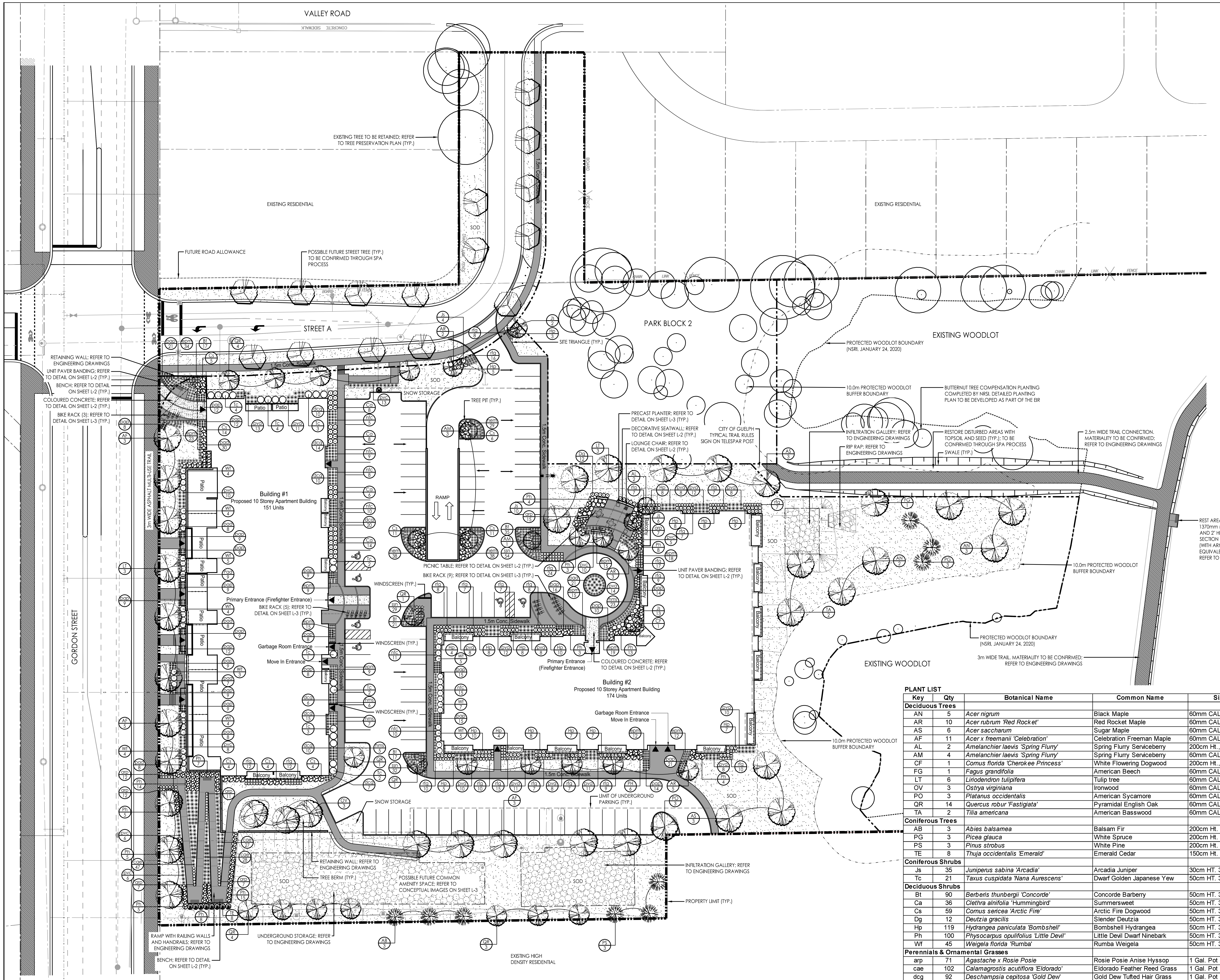
Title

NOTES & DETAILS

Project No. 161413684
Scale 1:100 0 1 3 5m

Drawing No. SSP-5
Sheet 7 of 8
Revision 1

APPENDIX J
LANDSCAPE PLAN



PLANT LIST

Key	Qty	Botanical Name	Common Name	Size & Condition	Spacing
Deciduous Trees					
AN	5	*Acer nigrum*	Black Maple	60mm CALIPER, W.B.	
AR	10	*Acer rubrum 'Red Rocket'*	Red Rocket Maple	60mm CALIPER, W.B.	
AS	6	*Acer saccharum*	Sugar Maple	60mm CALIPER, W.B.	
AF	11	*Acer x freemanii 'Celebration'*	Celebration Freeman Maple	60mm CALIPER, W.B.	
AL	2	*Amelanchier laevis 'Spring Flurry'*	Spring Flurry Serviceberry	200cm Ht., W.B., Multi-stem	
AM	4	*Amelanchier laevis 'Spring Flurry'*	Spring Flurry Serviceberry	60mm CALIPER, W.B. Treeform	
CF	1	*Cornus florida 'Cherokee Princess'*	White Flowering Dogwood	200cm Ht., W.B., Multi-stem	
FG	1	*Fagus grandifolia*	American Beech	60mm CALIPER, W.B.	
LT	6	*Liriodendron tulipifera*	Tulip tree	60mm CALIPER, W.B.	
OV	3	*Ostrya virginiana*	Ironwood	60mm CALIPER, W.B.	
PO	3	*Platanus occidentalis*	American Sycamore	60mm CALIPER, W.B.	
QR	14	*Quercus robur 'Fastigiata'*	Pyramidal English Oak	60mm CALIPER, W.B.	
TA	2	*Tilia americana*	American Basswood	60mm CALIPER, W.B.	
Coniferous Trees					
AB	3	*Abies balsamea*	Balsam Fir	200cm Ht. W.B.	
PG	3	*Picea glauca*	White Spruce	200cm Ht. W.B.	
PS	3	*Pinus strobus*	White Pine	200cm Ht. W.B.	
TE	8	*Thuja occidentalis 'Emerald'*	Emerald Cedar	150cm Ht. Potted	
Coniferous Shrubs					
Js	35	*Juniperus sabina 'Arcadia'*	Arcadia Juniper	30cm HT. 3 Gal. Pot	Approx. 1.25m O/C
Tc	21	*Taxus cuspidata 'Nana Aurescens'*	Dwarf Golden Japanese Yew	50cm HT. 3 Gal. Pot	Approx. 1.5m O/C
Deciduous Shrubs					
Bt	90	*Berberis thunbergii 'Concorde'*	Concorde Barberry	50cm HT. 3 Gal. Pot	Approx. 0.6m O/C
Ca	36	*Clethra alnifolia* 'Hummingbird'	Summersweet	50cm HT. 3 Gal. Pot	Approx. 1.0m O/C
Cs	59	*Cornus sericea 'Arctic Fire'*	Arctic Fire Dogwood	50cm HT. 3 Gal. Pot	Approx. 1.25m O/C
Dg	12	*Deutzia gracilis*	Slender Deutzia	50cm HT. 3 Gal. Pot	Approx. 0.8m O/C
Hp	119	*Hydrangea paniculata 'Bombshell'*	Bombshell Hydrangea	50cm HT. 3 Gal. Pot	Approx. 0.8m O/C
Ph	100	*Physocarpus opulifolius 'Little Devil'*	Little Devil Dwarf Ninebark	50cm HT. 3 Gal. Pot	Approx. 1.25m O/C
Wf	45	*Weigela florida* 'Rumba'	Rumba Weigela	50cm HT. 3 Gal. Pot	Approx. 1.25m O/C
Perennials & Ornamental Grasses					
arp	71	*Agastache x Rosie Posie*	Rosie Posie Anise Hyssop	1 Gal. Pot	Approx. 0.6m O/C
cae	102	*Calamagrostis acutiflora 'Eldorado'*	Eldorado Feather Reed Grass	1 Gal. Pot	Approx. 0.7m O/C
dcg	92	*Deschampsia cepitosa 'Gold Dew'*	Gold Dew Tufted Hair Grass	1 Gal. Pot	Approx. 0.6m O/C
epm	181	*Echinacea purpurea 'Merlot'*	Merlot Coneflower	1 Gal. Pot	Approx. 0.6m O/C
hem	105	Hemerocallis 'Purple D'Oro'	Purple D'Oro Daylily	1 Gal. Pot	Approx. 0.6m O/C
hms	41	Hosta 'Moonstruck'	Moonstruck Hosta	1 Gal. Pot	Approx. 0.6m O/C
nfc	68	*Nepeta faassenii* 'Cat's Pajamas'	Cat's Pajamas Catmint	1 Gal. Pot	Approx. 0.6m O/C
pva	152	*Panicum virgatum 'Apache Rose'*	Apache Rose Switch Grass	1 Gal. Pot	Approx. 0.8m O/C
pvc	58	*Panicum virgatum 'Cheyenne Sky'*	Cheyenne Sky Switch Grass	1 Gal. Pot	Approx. 0.7m O/C
pap	267	*Pennisetum alopecuroides 'Piglet'*	Dwarf Fountain Grass	1 Gal. Pot	Approx. 0.5m O/C
pad	99	*Perovskia artiplicifolia 'Denim 'n Lace'*	Denim 'n Lace Russian Sage	1 Gal. Pot	Approx. 0.6m O/C
rfg	224	*Rudbeckia fulgida 'Goldstrum'*	Black-Eyed Susan	1 Gal. Pot	Approx. 0.6m O/C
ssn	115	*Sedum spectabile 'Neon'*	Neon Showy Stonecrop	1 Gal. Pot	Approx. 0.6m O/C

NOTES:

1. THE PROPERTY DEMARCATION WILL CONSIST OF 1.5m BLACK VINYL CHAIN LINK FENCE PER CITY OF GUELPH STANDARD CONTRACT SPEC SS-24 AND/OR PROPERTY MARKERS IN ACCORDANCE WITH THE CITY'S DEMARCATION POLICY AND SPECIFICATIONS (REFER TO DETAIL ON SHEET L-2) AND CITY APPROVED DEMARCATION PLAN WILL BE INCLUDED IN EIR.
2. PLANTING SOIL DEPTHS ON PARKING DECK TO BE ACHIEVED WITH A COMBINATION OF RAISED PLANTER CURBS AND TREE PITS.
3. TREES AND SHRUBS TO BE PLANTED WITH 1m MIN. OFFSET FROM INFILTRATION GALLERIES.

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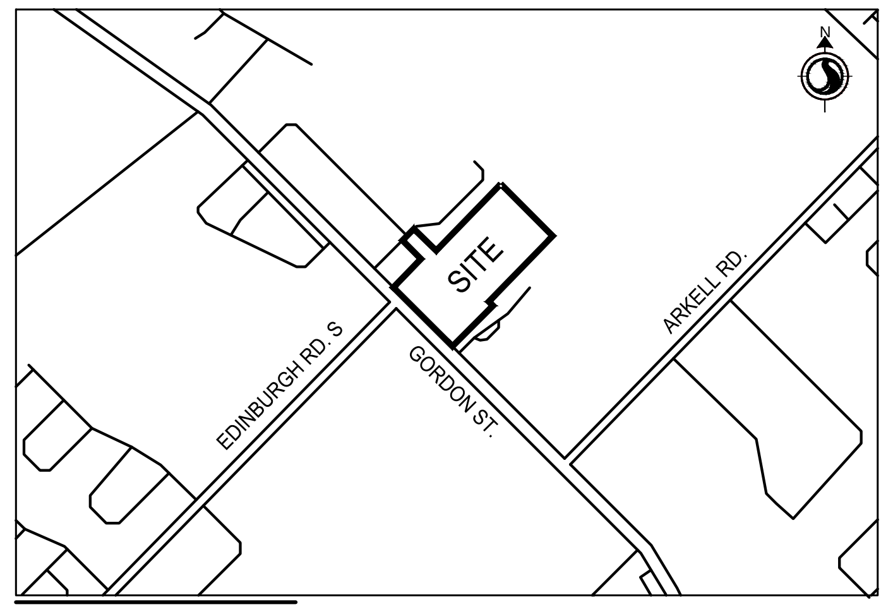
Key Map NTS.



Legend

━ ▪ ▪ ━	PROPERTY LIMIT
- · - · -	WOODLOT BUFFER
┅┅┅	PROTECTED WOODLOT BOUNDARY
⊙	EXISTING TREE
❀	DECIDUOUS TREE
✺	CONIFEROUS TREE
⬡	POSSIBLE FUTURE STREET TREE
○	SHRUBS, PERENNIALS & ORNAMENTAL GRASSES
- - - -	LIMIT OF MULCHED PLANTING BED
⬚	TREE PIT
░	SOD
▒	ASPHALT PAVING
▓	NATURAL CONCRETE PAVING
▤	COLOURED CONCRETE PAVING WITH UNIT PAVER BANDING
▬	BENCHES, LOUNGE CHAIRS, AND PICNIC TABLES
⧺	BIKE RACK
▭	DECORATIVE SEATWALL

Notes

1. ALL DRAWINGS SHOULD BE REVIEWED WITH REFERENCE TO COMPLETE CONTRACT DOCUMENTS.
2. DRAWINGS NOT INTENDED FOR CONSTRUCTION

Revision	By	Appd.	YY.MM.DD
2. PER CITY COMMENTS	SU	HS	22.05.27
1. PER UPDATED SITE PLAN	SU	HE	21.08.20

Issued	By	Appd.	YY.MM.DD
3. ISSUED FOR DRAFT PLAN APPROVAL	SU	HS	22.05.27
2. ISSUED FOR DRAFT PLAN APPROVAL	SU	HE	21.08.20
1. ISSUED FOR DRAFT PLAN APPROVAL	SU	HS	21.08.11

File Name: 161413684_l-ps	Dwn.	Chkd.	Dsgn.	YY.MM.DD
	SU	HS	HS	21.07.29

Permit-Seal

ONTARIO ASSOCIATION OF LANDSCAPE ARCHITECTS
HALEY K SADLER
OALA
MEMBER
MAY 27, 2022
1614-13684

Client/Project

TRICAR DEVELOPMENTS INC.

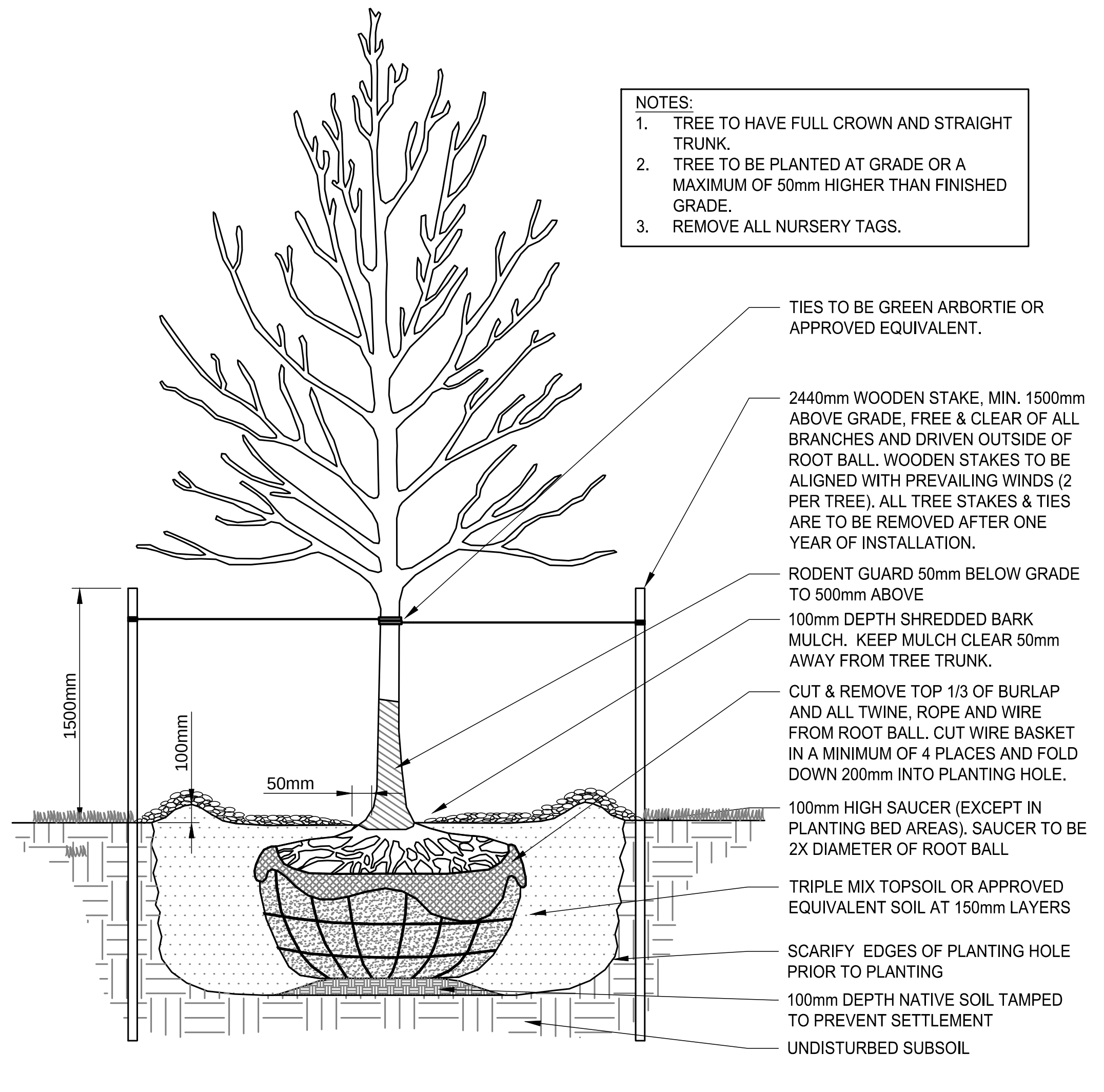
1242, 1250, 1260 GORDON STREET
& 9 VALLEY ROAD
Guelph, ON Canada

Title

LANDSCAPE PLAN

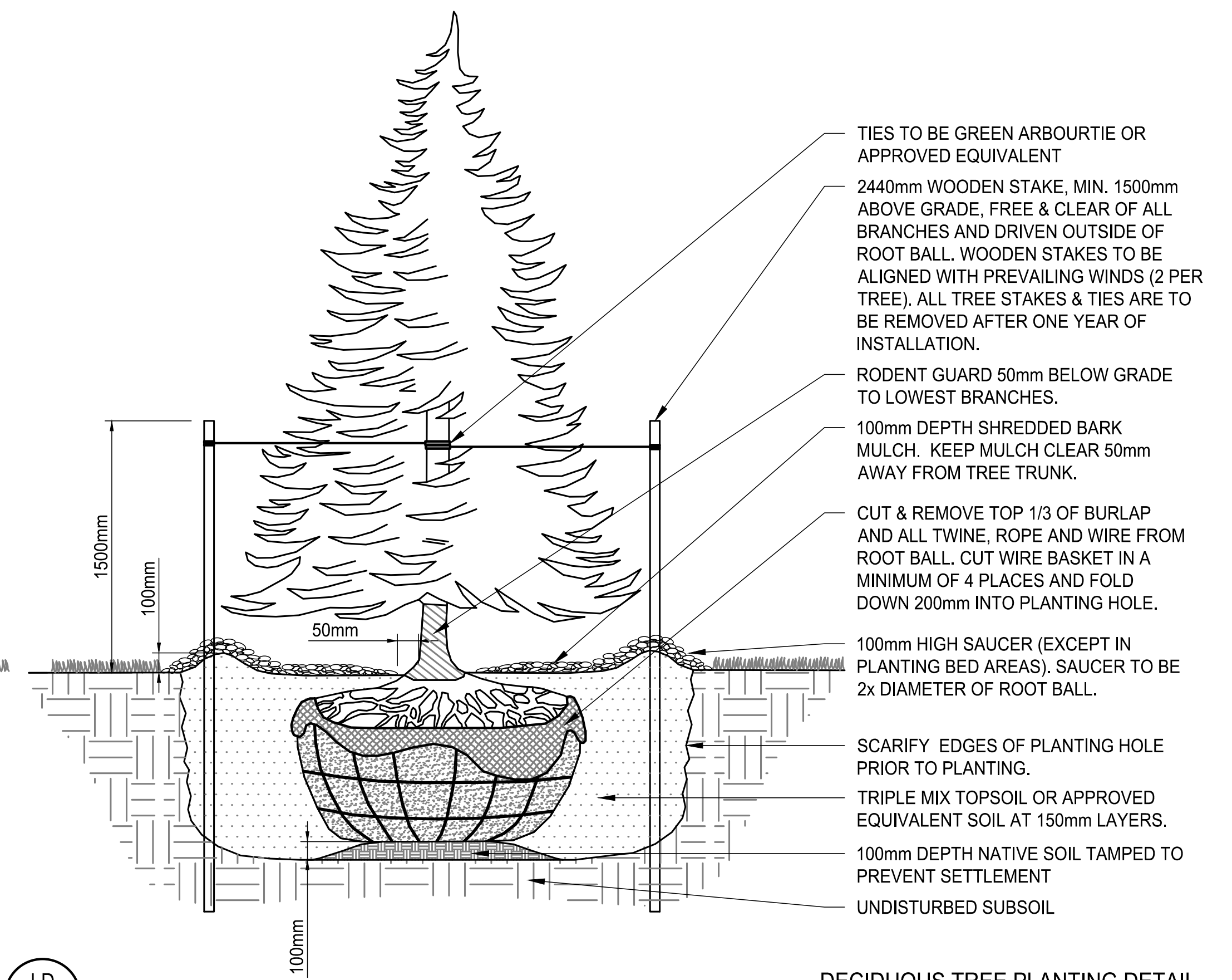
Project No. 161413684
Scale 4 0 8m 1 : 400
Drawing No. L-1
Sheet 1 of 3
Revision 2

NOTES:
1. TREE TO HAVE FULL CROWN AND STRAIGHT TRUNK.
2. TREE TO BE PLANTED AT GRADE OR A MAXIMUM OF 50mm HIGHER THAN FINISHED GRADE.
3. REMOVE ALL NURSERY TAGS.



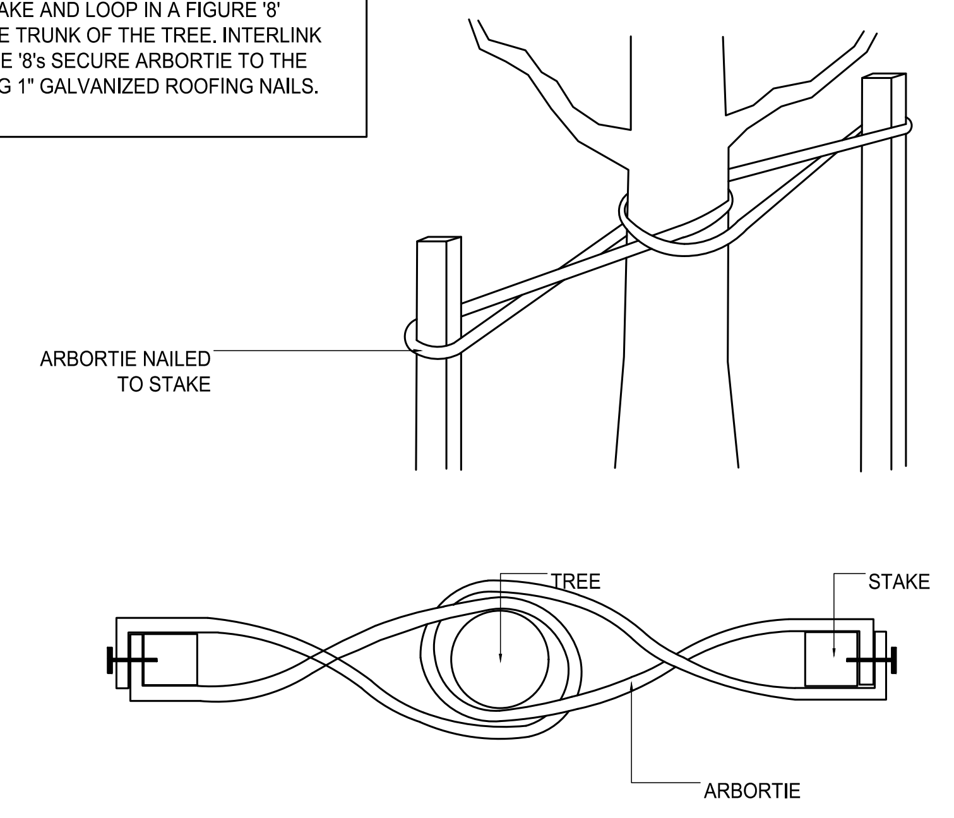
LD 1 DECIDUOUS TREE PLANTING DETAIL
N.T.S.

NOTES:
1. TREE TO HAVE FULL CROWN AND STRAIGHT TRUNK.
2. TREE TO BE PLANTED AT GRADE OR A MAXIMUM OF 50mm HIGHER THAN FINISHED GRADE.
3. REMOVE ALL NURSERY TAGS.



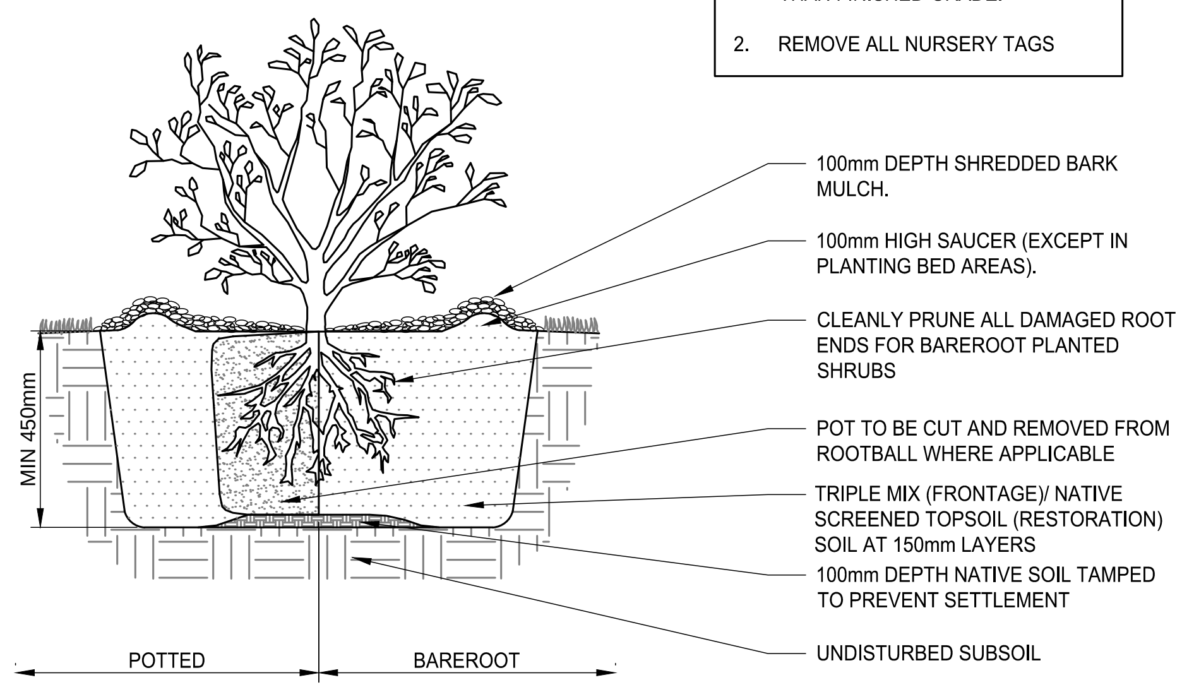
LD 2 DECIDUOUS TREE PLANTING DETAIL
N.T.S.

NOTES:
TIES TO BE GREEN ARBORTIE, OR APPROVED EQUIVALENT. TIES SHALL FORM A LOOSE LOOP AROUND STAKE AND LOOP IN A FIGURE '8' AROUND THE TRUNK OF THE TREE. INTERLINK BOTH FIGURE '8's SECURE ARBORTIE TO THE STAKE USING 1" GALVANIZED ROOFING NAILS.

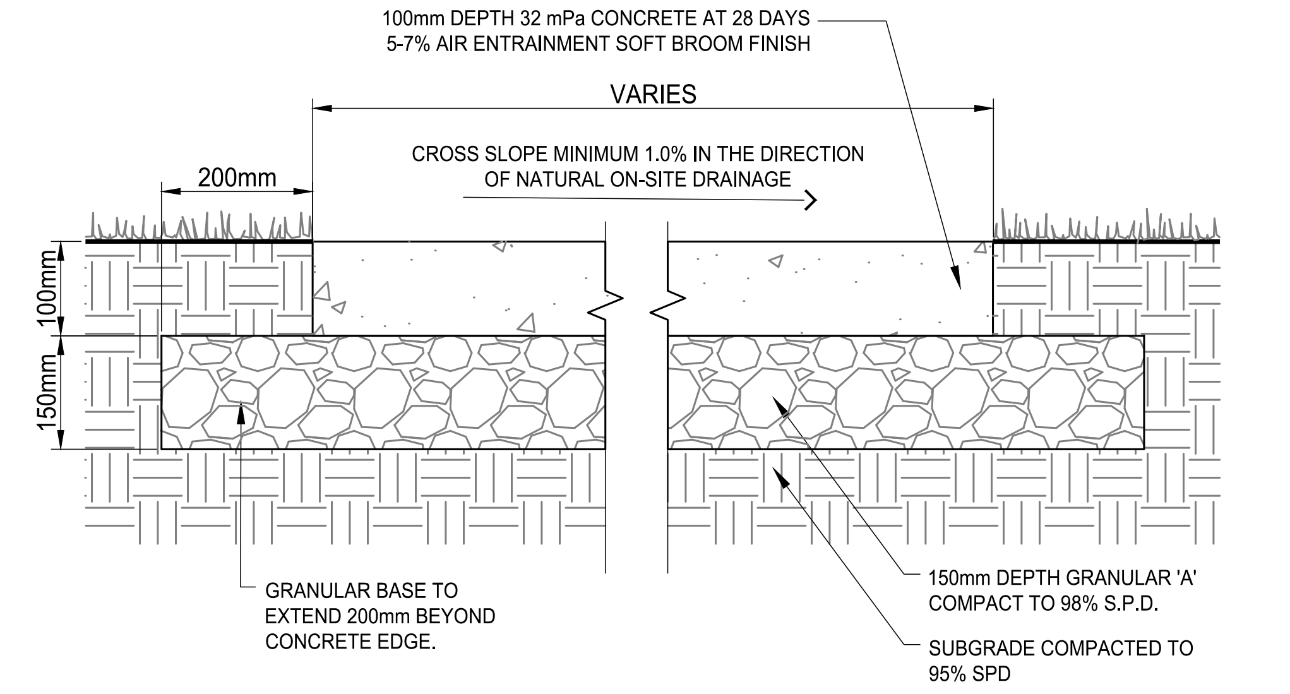


LD 3 ARBOURTIE DETAIL
N.T.S.

NOTES:
1. SHRUB TO BE PLANTED AT GRADE OR A MAXIMUM OF 50mm HIGHER THAN FINISHED GRADE.
2. REMOVE ALL NURSERY TAGS



LD 4 SHRUB PLANTING DETAIL
N.T.S.

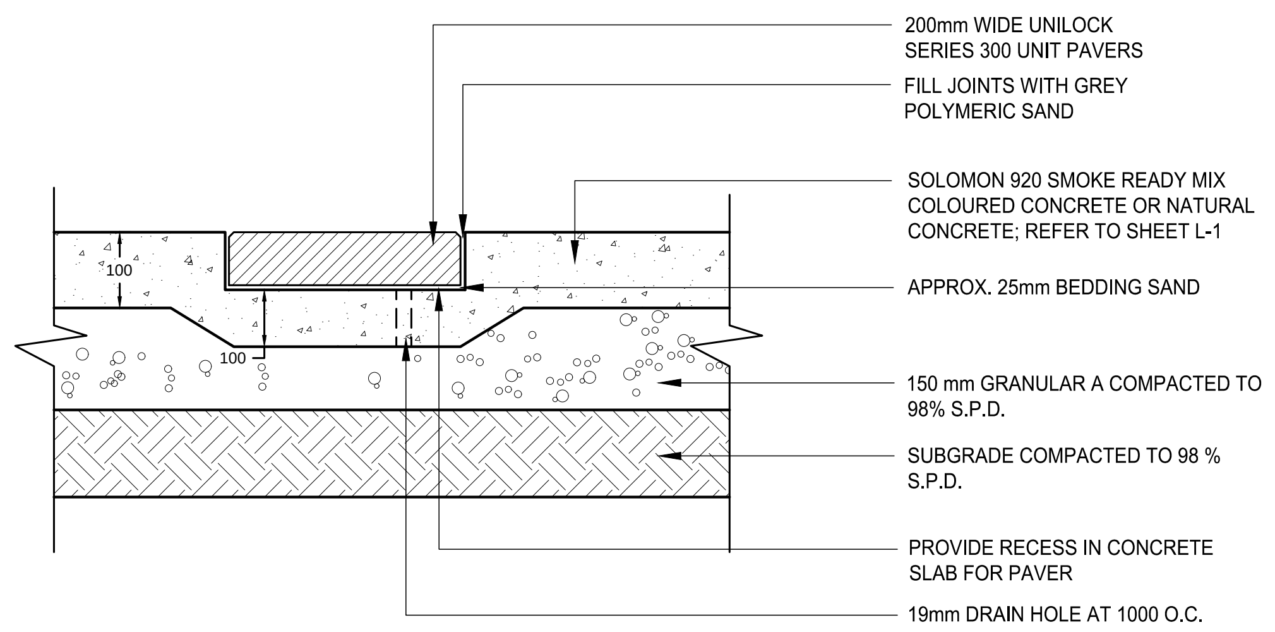


NOTES:
1. EXCAVATE SPECIFIED MINIMUM DEPTH OR GREATER TO ENSURE REMOVAL OF ALL TOPSOIL AND UNSUITABLE SUBGRADE MATERIAL.
2. REFER TO OPSD 310.010 FOR EXPANSION JOINT DETAILS.
3. ALL DIMENSIONS ARE IN MILLIMETRES.

LD 5 CONCRETE PAVING DETAIL
N.T.S.

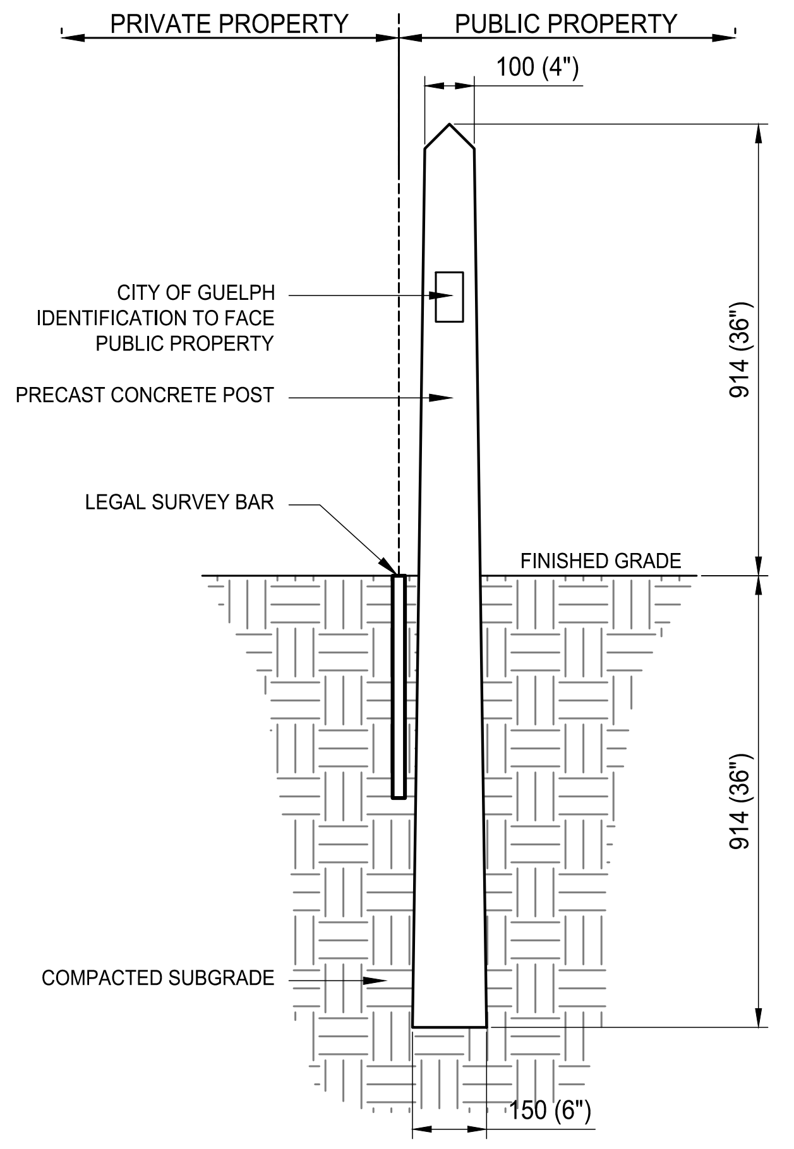
UNILOCK SERIES 70mm BLACK GRANITE PAVERS, 100mm X 200mm SIZE

SOLOMON 920 SMOKE READY MIX CONCRETE COLOUR



LD 6 CONCRETE WITH UNIT PAVING BANDING DETAIL
UNILOCK SERIES 3000 PAVERS, BLACK GRANITE COLOUR, 4" X 8" SIZE- N.T.S.

LD 7 CONCEPTUAL SEAT WALL DETAIL
N.T.S.

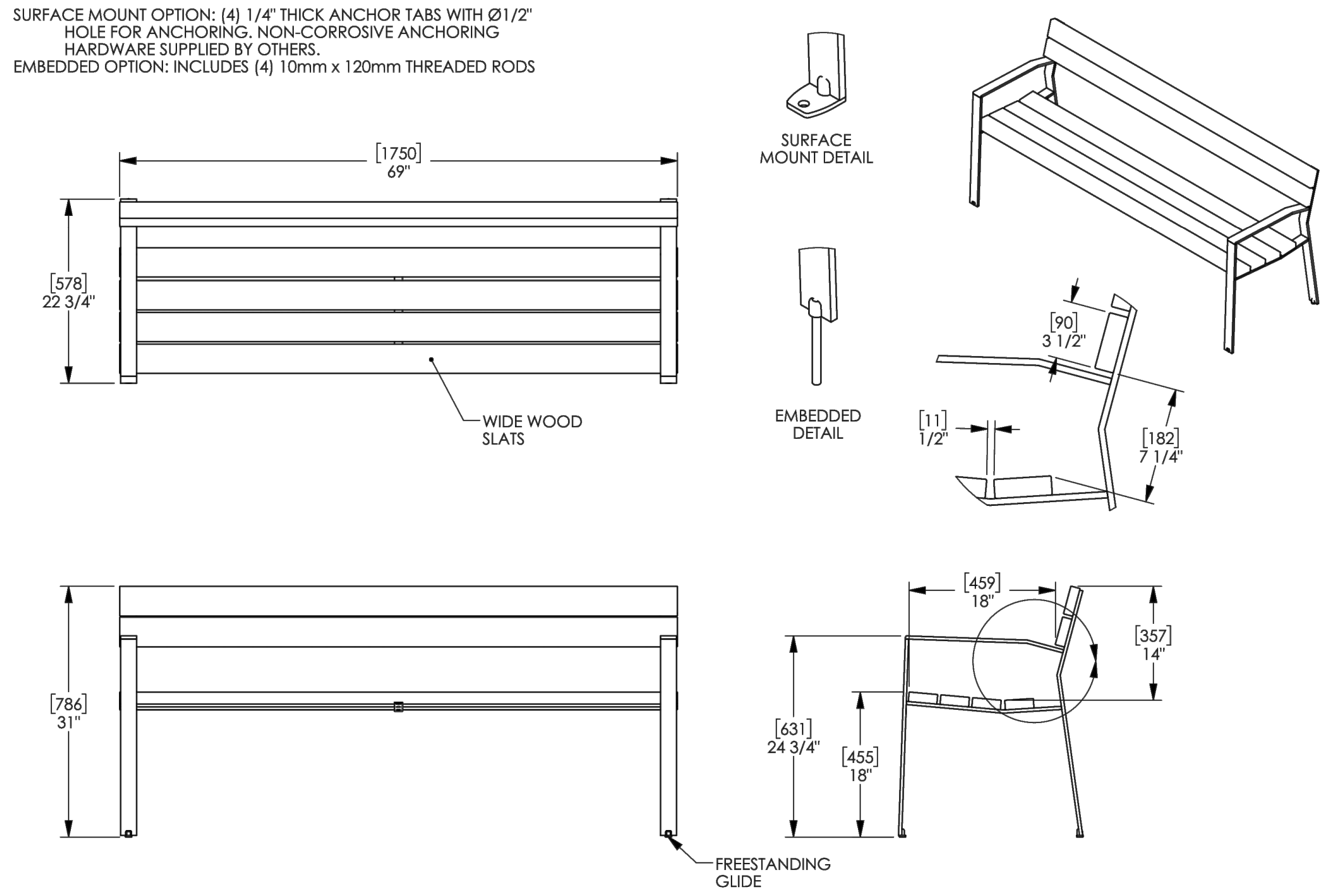


NOTES:
1. MARKERS TO BE INSTALLED AT 30M O.C. MAX. INTERVALS STARTING AT EACH END OF THE PROPERTY FABRIC AND EVERY DIRECTIONAL CHANGE OF THE PROPERTY LINE; REFER TO LANDSCAPE PLAN.
2. SHOP DRAWING TO BE PROVIDED TO THE LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO ORDERING.

LD 8 CITY OF GUELPH PROPERTY DEMARCATION POST
N.T.S.

SANTA&COLE urbidermis Harpo Backed bench, 69in length, wide wood slats
Product Drawing
Date: 9/6/2020
www.landscapeforms.com Ph: 800.521.2546

SURFACE MOUNT OPTION: (4) 1/4" THICK ANCHOR TABS WITH Ø1/2" HOLE FOR ANCHORING. NON-CORROSIVE ANCHORING HARDWARE SUPPLIED BY OTHERS.
EMBEDDED OPTION: INCLUDES (4) 10mm x 120mm THREADED RODS



landscapeforms Drawing: AX204-01
Dimensions are in inches [mm]

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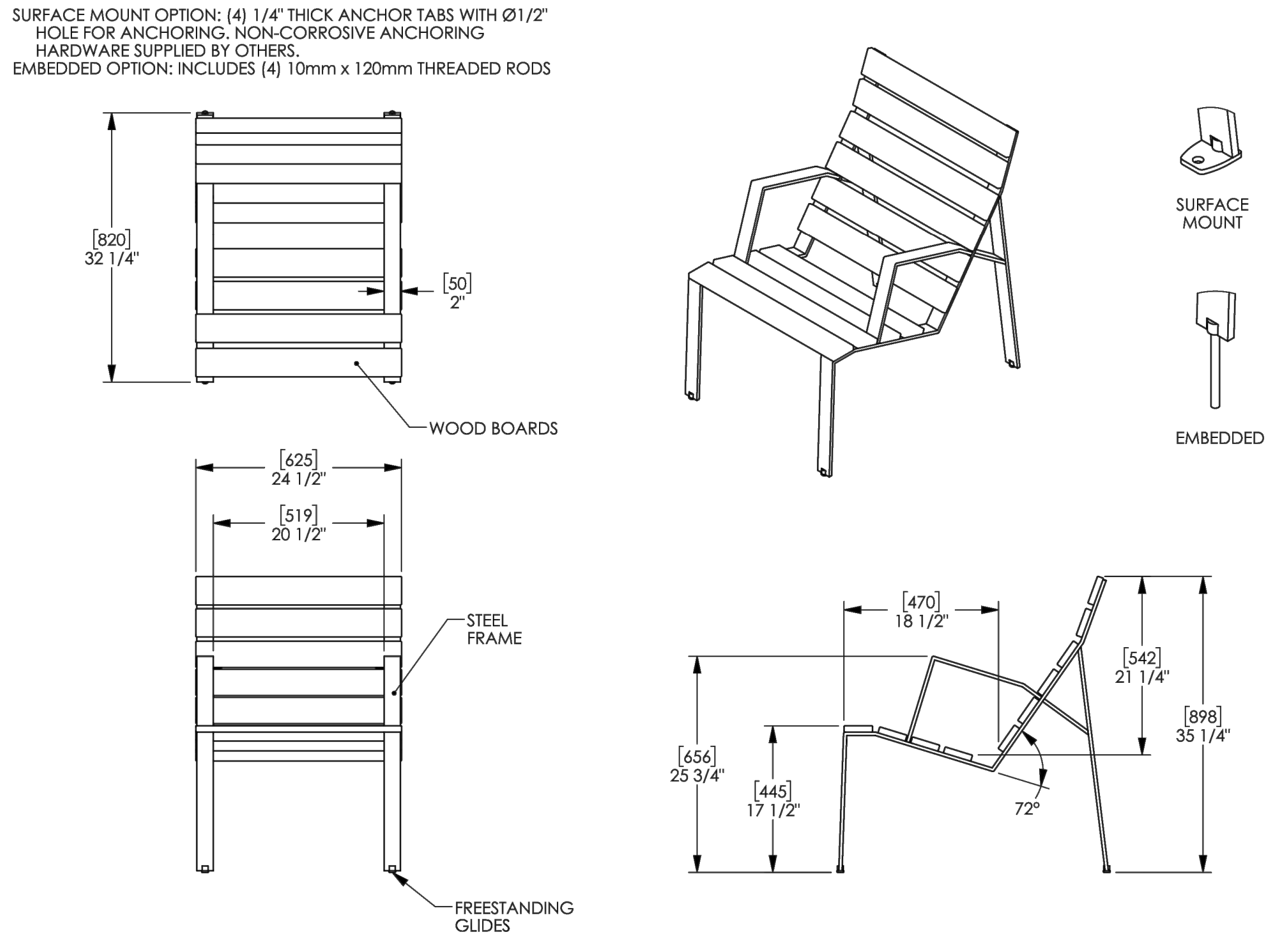
LD 9 LANDSCAPE FORMS HARPO BACKED BENCH DETAIL
JARRAH WOOD BACK AND SEAT, POWDERCOATED STEEL COLOUR, SURFACE MOUNTED - N.T.S.

SANTA&COLE urbidermis Harpo Lounge Chair
Product Drawing
Date: 09/06/2020
www.landscapeforms.com Ph: 800.521.2546

SURFACE MOUNT OPTION: (4) 1/4" THICK ANCHOR TABS WITH Ø1/2" HOLE FOR ANCHORING. NON-CORROSIVE ANCHORING HARDWARE SUPPLIED BY OTHERS.
EMBEDDED OPTION: INCLUDES (4) 10mm x 120mm THREADED RODS



landscapeforms Drawing: AX300-01
Dimensions are in inches [mm]

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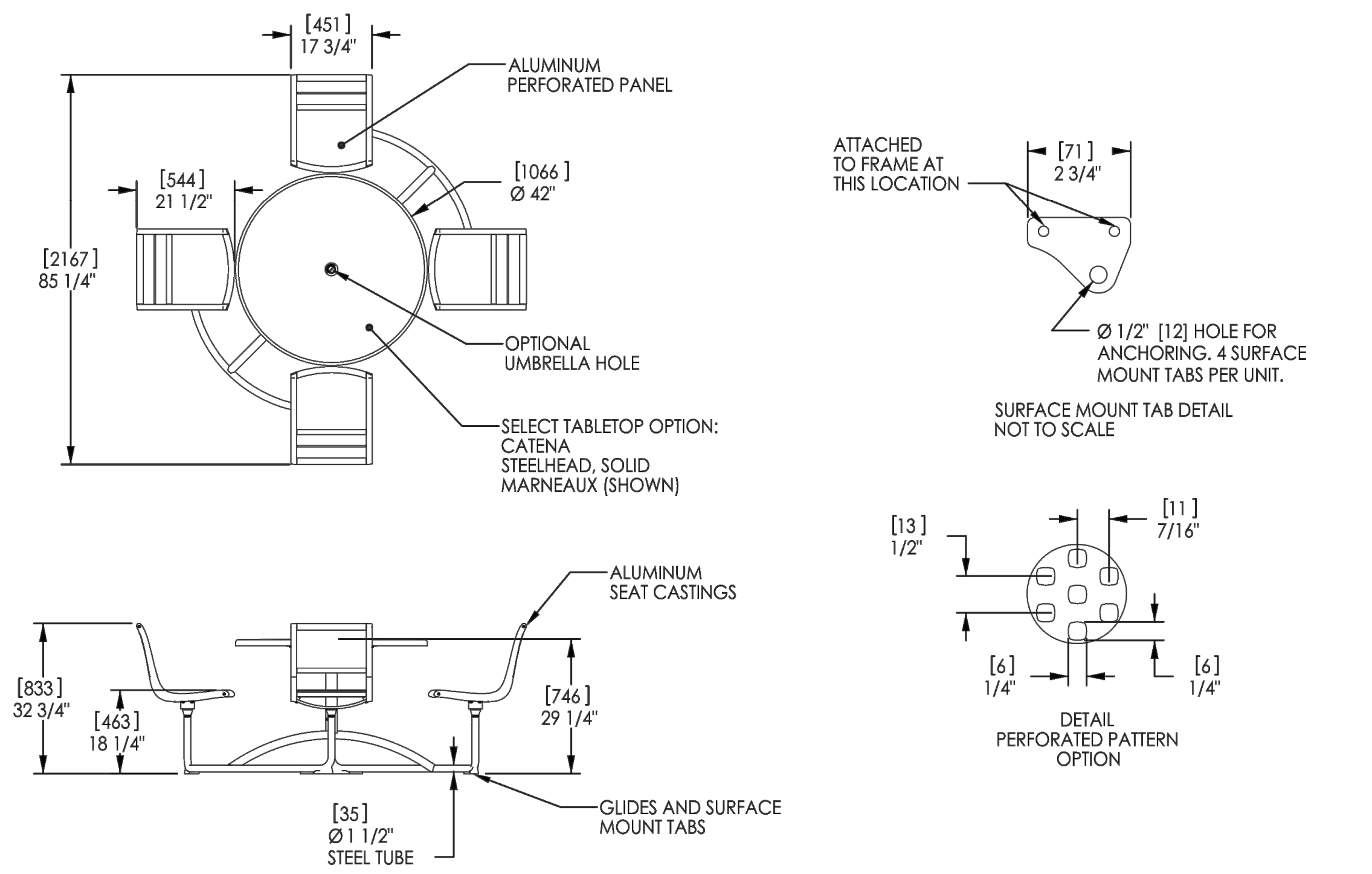
LD 10 LANDSCAPE FORMS HARPO LOUNGE CHAIR DETAIL
JARRAH WOOD BACK AND SEAT, POWDER COATED STEEL COLOUR, SURFACE MOUNTED - N.T.S.

Mingle® Table, Backed 4 seat, Surface mount, Perf
Product Drawing
Date: 12/19/2019
www.landscapeforms.com Ph: 800.521.2546



NOTE: ALL TABLES WITH NON-COLLAPSABLE UMBRELLA OPTION MUST BE SURFACE MOUNTED.

landscapeforms Drawing: MG614-04
Dimensions are in inches [mm]
U.S. Patent Nos.: D513,566; D542,060

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LD 11 LANDSCAPE FORMS MINGLE TABLE DETAIL
4 BACK SEATS, POWDER COATED STEEL COLOUR, SURFACE MOUNTED, WITH CAMPANION SHADE UMBRELLA - N.T.S.

\\Ca0217-ppfss01\work_group\01614\active\161413684\design\drawing\landscape\sheet_files\161413684_L-PS.dwg
2022-5-30 10:20 AM by: Ursprung, Shane

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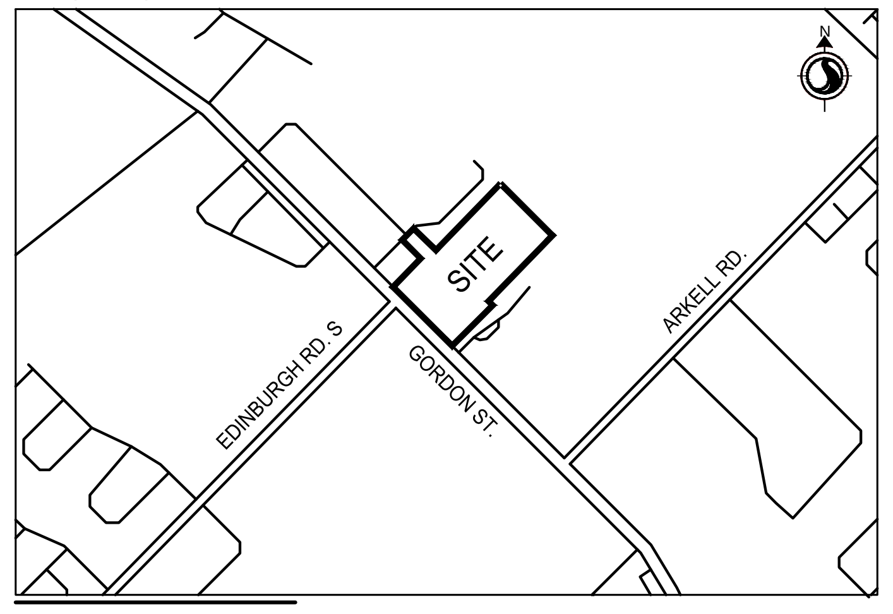
Key Map NTS.



Legend

Notes
1. ALL DRAWINGS SHOULD BE REVIEWED WITH REFERENCE TO COMPLETE CONTRACT DOCUMENTS.
2. DRAWINGS NOT INTENDED FOR CONSTRUCTION

2. PER CITY COMMENTS	SU	HS	22.05.27
1. PER UPDATED SITE PLAN	SU	HE	21.08.20
Revision	By	Appd.	YY.MM.DD

3. ISSUED FOR DRAFT PLAN APPROVAL	SU	HS	22.05.27
2. ISSUED FOR DRAFT PLAN APPROVAL	SU	HE	21.08.20
1. ISSUED FOR DRAFT PLAN APPROVAL	SU	HS	21.08.11
Issued	By	Appd.	YY.MM.DD

File Name: 161413684_l-ps	SU	HS	HS	21.07.29
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

ONTARIO ASSOCIATION OF LANDSCAPE ARCHITECTS
HALEY K SADLER
OALA
MAY 27 2022
1614-13684
MEMBER

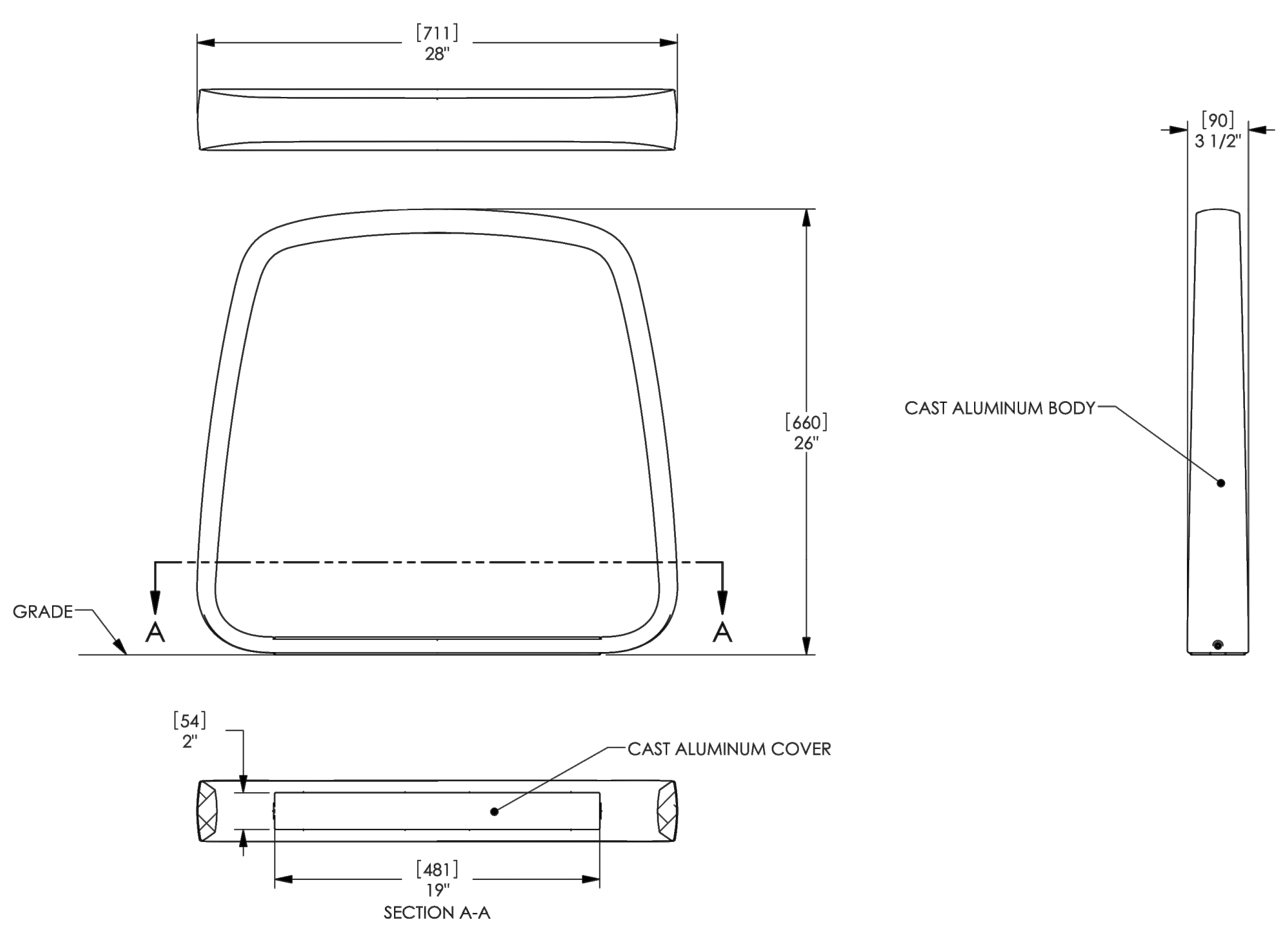
Client/Project
TRICAR DEVELOPMENTS INC.

1242, 1250, 1260 GORDON STREET
& 9 VALLEY ROAD
Guelph, ON Canada

Title
LANDSCAPE DETAILS

Project No. 161413684
Scale SCALE AS SHOWN
Drawing No. L-2
Sheet 2 of 3
Revision 2

Ride™ Bike Rack, Surface Mount
Product Drawing
Date: 5/7/2010
www.landscapeforms.com Ph: 800.521.2546

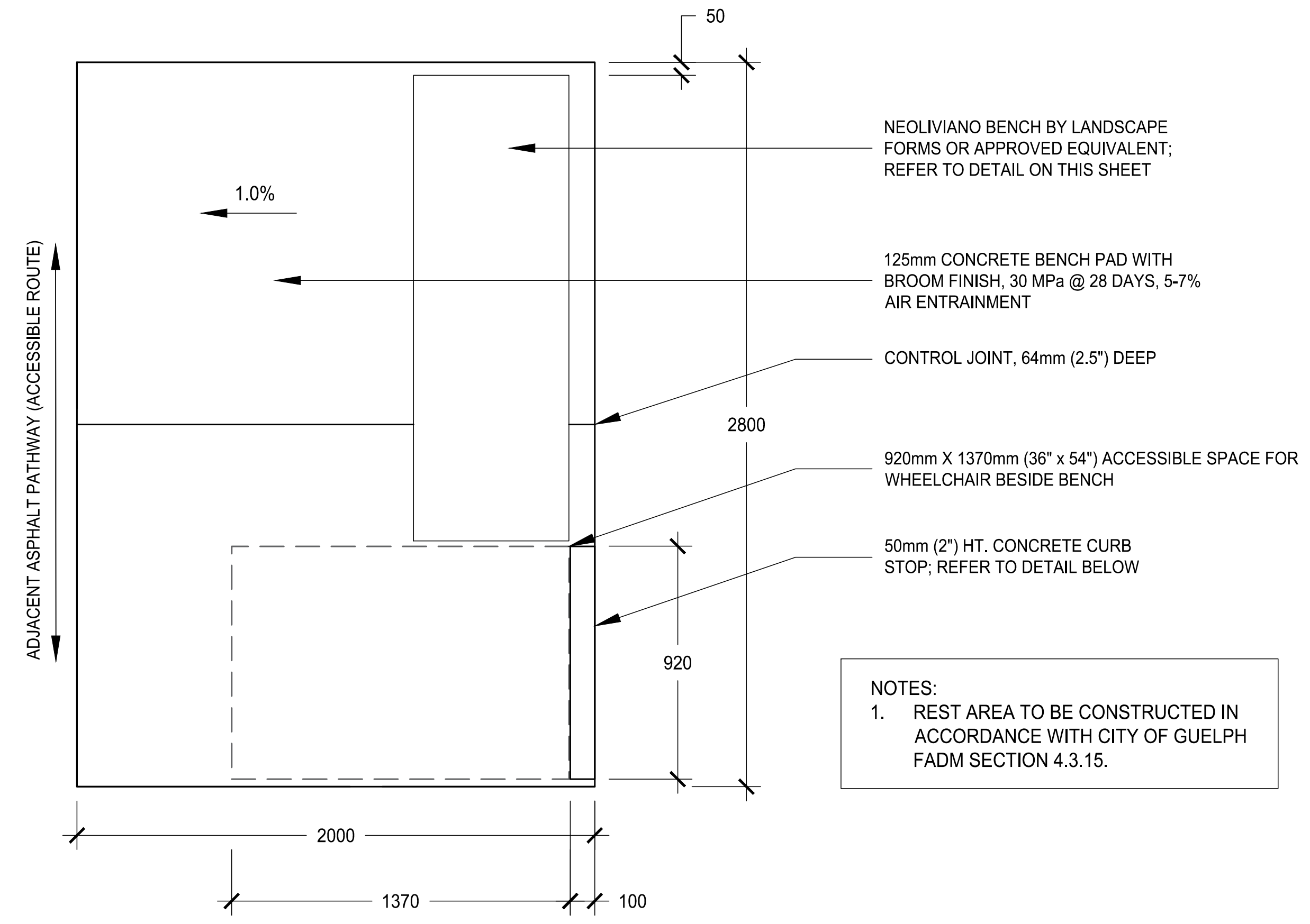


landscapeforms
Drawing: RI665-01
Dimensions are in inches [mm]
U.S. Patent No.: D613,646

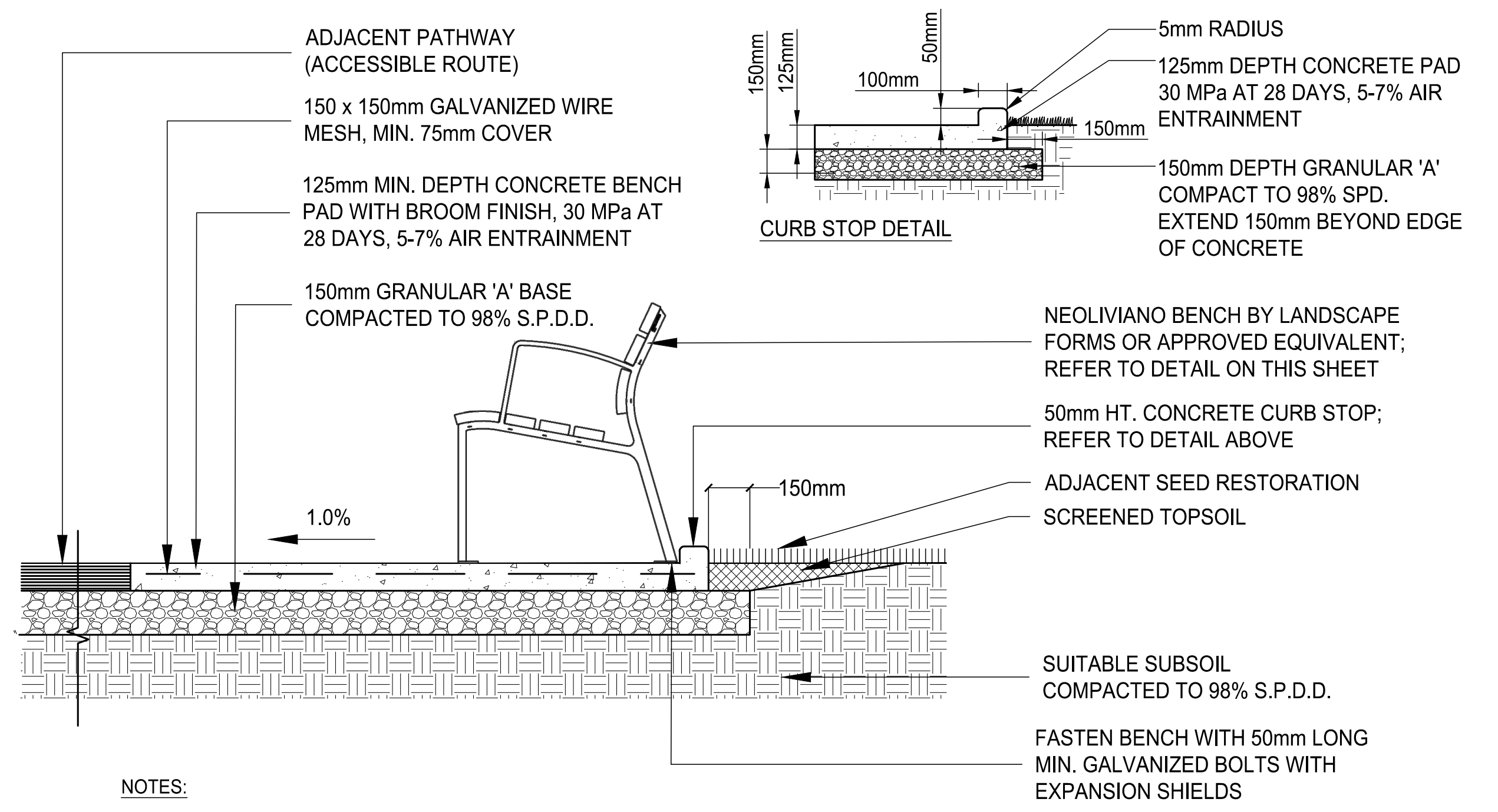
LD
12

LANDSCAPE FORMS RIDE BIKE RACK DETAIL

POWDER COATED STEEL COLOUR, SURFACE MOUNTED - N.T.S.



NOTES:
1. REST AREA TO BE CONSTRUCTED IN ACCORDANCE WITH CITY OF GUELPH FADM SECTION 4.3.15.



NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. CONCRETE PAD WITH FINISHED EDGE AND BROOM BRUSHED SURFACE.
3. CLEAN AND REINSTATE AREAS AFFECTED BY WORK.
4. CONTRACTION JOINTS TO BE SAW-CUT MIN. 1.5m APART AS PER CITY OF GUELPH STANDARD DETAIL FOR CONCRETE SIDEWALK SD-2.

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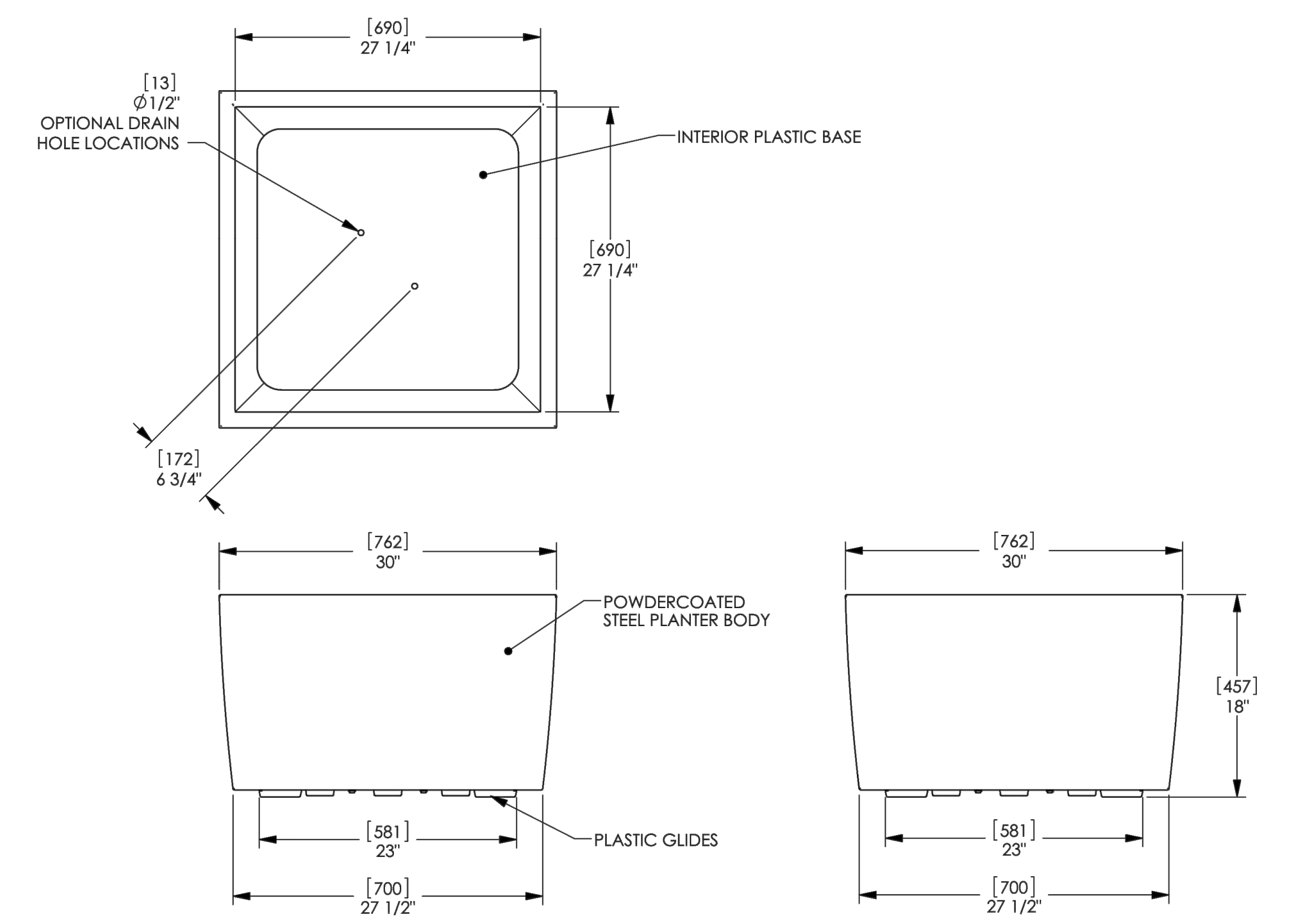
REST AREA - CONCRETE BENCH PAD DETAIL

N.T.S.

Sorella Planter, 30"w x 30"d x 18"h, powder coated steel
Product Drawing
Date: 6/9/2015
www.landscapeforms.com Ph: 800.521.2546



landscapeforms
Drawing: SR107-01
Dimensions are in inches [mm]

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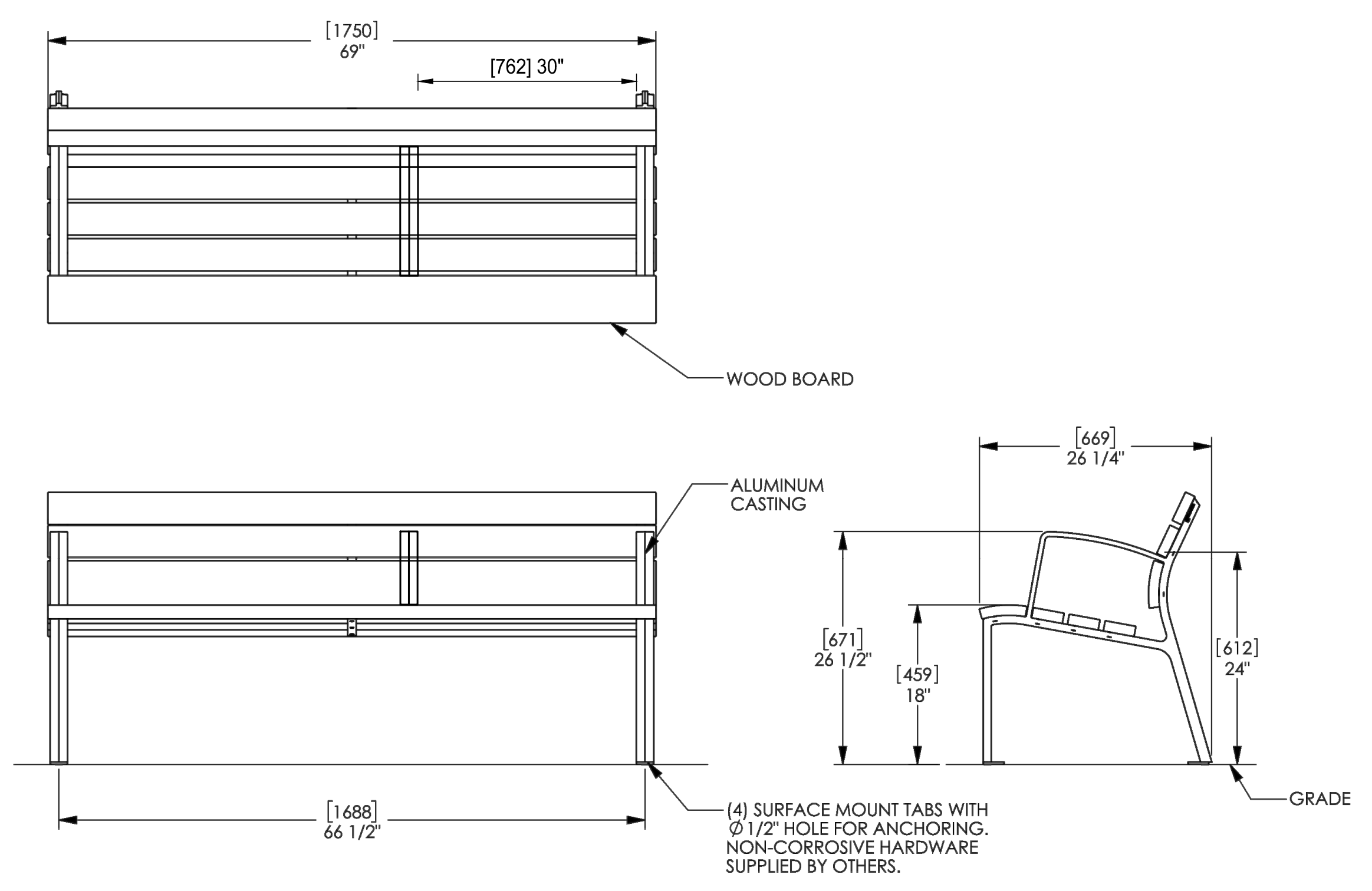
LANDSCAPE FORMS SORELLA PRECAST PLANTER DETAIL

30" X 30" X 18" SIZE, POWDER COATED STEEL COLOUR - N.T.S.

SANTA&COLE urbidermis **Neoliviano** Backed Bench, 69in, Surface Mount, Wood
Product Drawing
Date: 10/10/2019
www.landscapeforms.com Ph: 800.521.2546



landscapeforms
Drawing: NL696-02
Dimensions are in inches [mm]
Spanish Industrial Design 151.245

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LANDSCAPE FORMS NEOLIVIANO BACKED BENCH DETAIL

JARRAH WOOD BACK AND SEAT, ALUMINUM ENDS WITH CENTRE ARM REST - N.T.S.

GENERAL NOTES

1. Contractor to have existing utilities located prior to start of any construction.
2. This drawing to be read in conjunction with the written specifications, drawings and details for the project.
3. Any ambiguity in this drawing or accompanying details is to be reported to the Landscape Architect for direction. Contractor not to proceed in uncertainty.
4. Limits of work to be clearly understood by the contractor prior to any work taking place on site. Contractor to contact Landscape Architect for clarification if required.
5. Contractor to visit site to confirm all site conditions prior to submitting bids. Discrepancies to be reported to Landscape Architect for clarification.
6. Contractor to verify all dimensions and report any discrepancies to the Landscape Architect.
7. Contractor is responsible for the hoarding of all trees within or adjacent to construction areas.
8. Contractor is responsible for the adjustment of all existing catch basins, catch-basin manholes, manholes, water valves, hydrants, etc. to match proposed grades.
9. Contractor is responsible for hauling of all excess materials off the site.
10. Contractor is responsible for general site clean up.
11. Contractor is responsible for any damage to landscaped areas and must make all necessary restorations and repairs.
12. All ancillary work normally associated with this type of construction shall be deemed to be part of the contract.
13. Layout to be approved by landscape architect prior to construction starting.
14. All dimensions are in meters unless otherwise noted.
15. Contractor shall supply all materials in quantities sufficient to complete work shown on these drawings. Any discrepancies shall be reported to the Landscape Architect for direction.
16. No substitutions of materials, products or quantities without prior consent of Landscape Architect.
17. The vegetation and hard landscaping within the sight triangles must provide clear sight distance, excluding tree trunks, between an elevation of 0.8m and 2.7m above the elevation of the nearest point on the nearest adjacent roadway.

TOPSOIL NOTES:

1. Topsoil to be friable, neither heavy clay nor of very light sandy nature, containing a minimum of 4% organic matter for clay loams and 2% for sandy loams to a maximum of 20% volume. Free from subsoil, roots, grass, weeds, toxic materials, stones, foreign objects and with an acidity range / ph of 5.5 to 7.5. Topsoil containing crabgrass, coughgrass or noxious weeds is not acceptable.
2. All topsoil is to be stockpiled separately from subsoil during the excavation period.
3. All subsoil compacted during construction activities to be scarified to the satisfaction of the Landscape Architect prior to placement of topsoil.
4. All areas disturbed by construction to be restored with topsoil and seed, as required.
5. Topsoil from on-site stockpile to be placed at a minimum depth of 150mm in all disturbed areas.

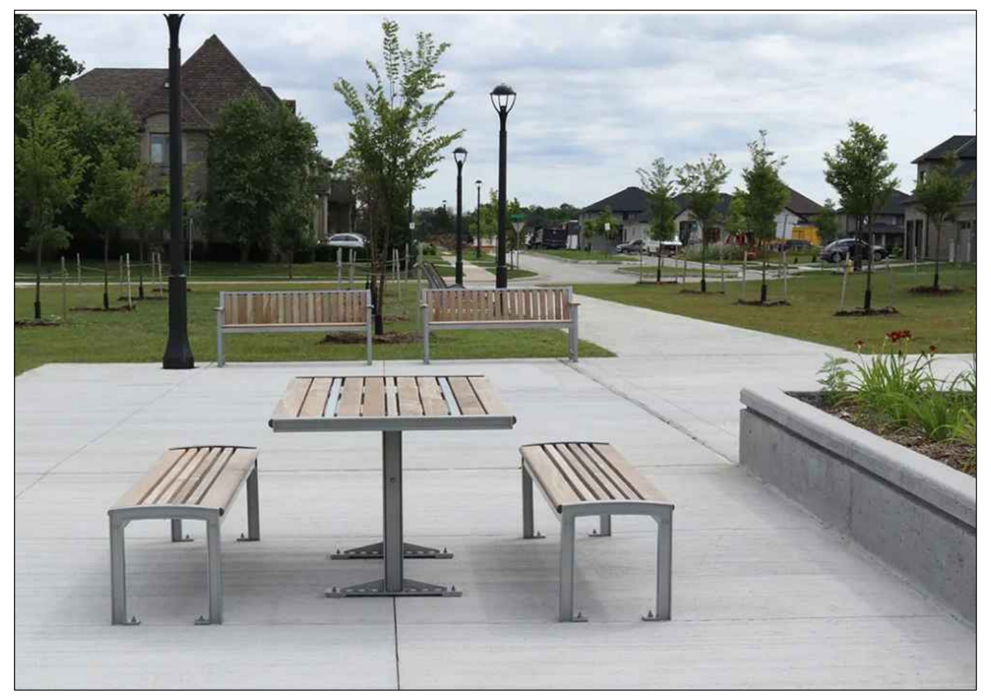
SOD NOTES:

1. Any lawn areas disturbed by construction shall be re-sodded and repaired to original condition or better.
2. Sod and sodding operations to be in accordance with OPSS 803, except as noted below.
3. Sod to be delivered to project within 24 hours of being harvested and laid within 36 hours thereafter.
4. Rough graded and compacted soil shall be scarified to a minimum depth of 150 mm free of all stones, roots, branches, larger than 25 mm diameter. Topsoil to be spread at a minimum depth of 150 mm compacted to 85% S.P.D.
5. Place sod on prepared topsoil with staggered joints and butt tightly. Machine roll to ensure contact with topsoil. Repair minor grade deficiencies and irregularities.
6. Water sod immediately after laying to obtain moisture penetration to a minimum of 100 mm depth within topsoil. Maintain sod per OPSS 803. Sod must be cut a minimum of two times for Final Acceptance at the discretion of the Landscape Architect.

PLANTING NOTES:

1. The Contractor must notify the Landscape Architect prior to the commencement of any planting. Contractor shall supply all plants and materials in quantities sufficient to complete work shown on this drawing. Any discrepancies between quantities shall be reported to the Landscape Architect for direction.
2. The Landscape Architect is to be contacted for inspection and written approval prior to plant material arriving on site. The Landscape Architect reserves the right to reject any plant materials that have not been inspected and approved.
3. Plant material collected from wild sources will not be accepted. The Landscape Architect reserves the right to require that supplier invoices be submitted for inspection and approval prior to acceptance.
4. Staking (layout) of plant materials to be approved by Landscape Architect prior to installation. Drawing may be scaled for approximate layout of individual trees and planting beds.
5. All frontage plant materials will be planted in 450mm min depth approved triple mix. All restoration plant materials will be installed in 450mm min depth approved screened native topsoil. No additional soils or additives will be permitted unless by the Landscape Architect at no additional cost to the project. Planting soil to be free from weeds, subsoil, roots, stones, lumps of clay and toxic material.
6. Plant materials specified for this project will conform to the Canadian Nursery Landscape Association (CNLA) for size, variety, and condition as indicated on the plant schedule shown on these drawings. Any plant materials that do not conform (in the sole opinion of the Landscape Architect) will be promptly removed from the site and replaced by the Contractor at no additional cost to the Owner or project.
7. Do not make substitutions of materials, products or quantities without the prior written permission of the Landscape Architect.
8. Remove dead and/or damaged branches on trees or shrubs. All pruning shall be performed in accordance with standard horticultural practices and appropriate timing for each species.
9. Plants are not to be installed during extreme heat, drought, or other undesirable conditions. Thoroughly water all plants immediately after installation. Contractor not to proceed in uncertainty. Contact Landscape Architect for direction.
10. The Contractor is required to water plant material regularly or as directed by the Landscape Architect during construction and the two year warranty period. Plants will be watered within 48 hours of a written request by the Landscape Architect. Failure to do so after the second request will result in this work being undertaken by others. The cost of this work shall be deducted from the total contract price.
11. Do not plant in drainage swales. Where proposed drainage swales conflict with proposed plantings, contact the Landscape Architect for direction.
12. All trees and shrubs are to be planted in accordance with the planting details included in this drawing set.
13. Minor field adjustments to plant material locations may be necessary to respond to the locations of existing plants. Contractor to review with Landscape Architect where relocations are necessary. Contractor must receive approval from Landscape Architect prior to installation.
14. Shredded pine mulch or an approved other will be spread uniformly in all planting beds and around the base of all trees and shrubs to a depth of 100mm. Do not place mulch in direct contact with trunks; allow a 50mm mulch free ring around trunks. Provide a sample of mulch to the Landscape Architect for approval prior to installation.
15. All landscape works will be guaranteed for a period of two years following inspection substantial completion. Plant material, which is not in a healthy growing condition two years after inspection, shall be replaced to the satisfaction of the Landscape Architect / Client.
16. The Contractor is responsible for location of all underground services prior to excavation of tree pits and shrub beds.
17. All wood stakes and associated ties to be removed at the conclusion of the warranty period.
18. Contractor to identify with owner and Landscape Architect any maintenance requirements necessary for warranty purposes.
19. The Landscape Architect reserves the right to refuse acceptance of any plant material displaying poor growth habits, injury or disease. Any plant material rejected by the Landscape Architect will be promptly removed from the site and replaced with material of acceptable quality at no additional cost to the project.
20. The Landscape Architect reserves the right to extend contractor's warranty responsibilities for an additional year if, at the end of initial warranty period, leaf development and growth is not sufficient to ensure future survival as determined by the Landscape Architect.


EDIBLE GARDEN AREA


PICNIC AND SEATING AREA


RECREATIONAL GAME TABLE AREA


RECREATIONAL BOCCE BALL COURTS

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POSSIBLE FUTURE COMMON AMENITY SPACE

N.T.S.

Stantec
600-171 Queens Avenue
London ON N6A 5J7
Tel. 519-645-2007

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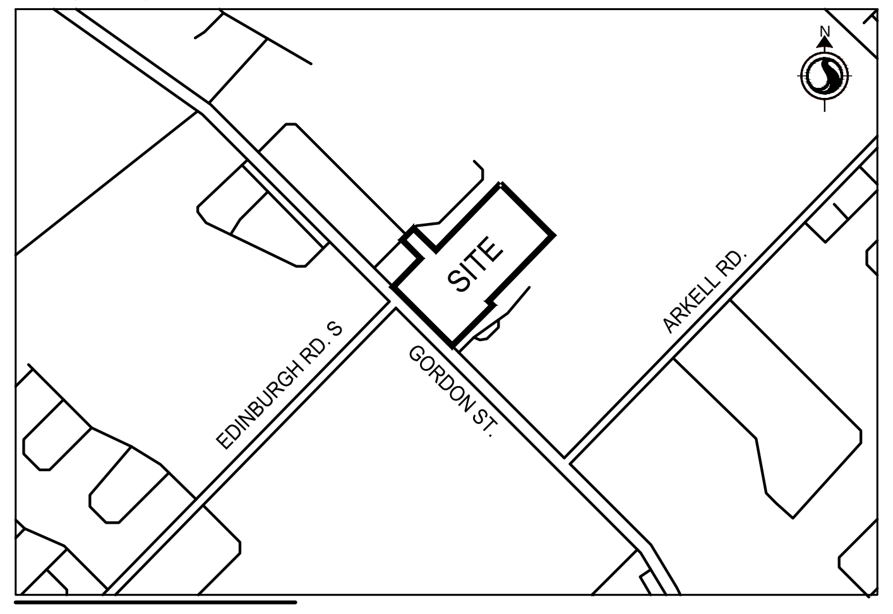
Consultants

Key Map NTS.



Legend

Notes
1. ALL DRAWINGS SHOULD BE REVIEWED WITH REFERENCE TO COMPLETE CONTRACT DOCUMENTS.
2. DRAWINGS NOT INTENDED FOR CONSTRUCTION

Revision	By	Appd.	YY.MM.DD
2. PER CITY COMMENTS	SU	HS	22.05.27
1. PER UPDATED SITE PLAN	SU	HE	21.08.20

Issued	By	Appd.	YY.MM.DD
3. ISSUED FOR DRAFT PLAN APPROVAL	SU	HS	22.05.27
2. ISSUED FOR DRAFT PLAN APPROVAL	SU	HE	21.08.20
1. ISSUED FOR DRAFT PLAN APPROVAL	SU	HS	21.08.11

File Name: 161413684_l-ps	Dwn.	Chkd.	Dsgn.	YY.MM.DD
	SU	HS	HS	21.07.29

Permit-Seal

HALEY K SADLER
MAY 27, 2022
1614-13684

Client/Project
TRICAR DEVELOPMENTS INC.

1242, 1250, 1260 GORDON STREET
& 9 VALLEY ROAD
Guelph, ON Canada

Title
LANDSCAPE DETAILS AND NOTES

Project No. 161413684
Scale SCALE AS SHOWN
Drawing No. L-3
Sheet 3 of 3
Revision 2

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ORIGINAL SHEET - ANSI D