



URBANTECH®

Memorandum

To: Kristina Parker, M.A.Sc., P.Eng.
Manager, Development Services
Town of Oakville

Date: 2023-08-16

From: Steve A. Hader

Project #: 20-657

Re: **Bio-Filtration Facility and Ravine System Operations and Maintenance**
Bronte River Subdivision
Town of Oakville, Halton Region

1 BIO-FILTRATION FACILITY

The proposed bio-filtration facility (LID) is proposed to be owned and operated/maintained by the condominium corporation. The LID design is consistent with Sustainable Technologies Evaluation Program (STEP) for bioretention systems which temporarily store runoff, specifically a biofilter design which includes an impermeable liner and underdrain. Design of a bioretention facility can include distributing concentrated flows from pipes between multiple inlets, pre-treatment using OGS devices, overflow outlets and underdrains.

The incorporation of the pre-treatment devices will mitigate the sediment build-up within the facility. STEP guidelines also recommend that the drainage area to the facility be 5 to 30 times the footprint area to avoid clogging. LID 1 has a footprint of 0.12 ha with an impervious drainage area of 1.52 ha so the drainage area is 10 times the size of the LID. LID 2 has a footprint of 0.13 ha with an impervious drainage area of 2.91 ha so the drainage area to be treated is 22 times the size of the footprint.

In accordance with the recommendations in the STEP LID guidelines, the proposed LID will require bi-annual inspections/maintenance in addition to cleanouts based on sediment accumulation in the OGS and LID facility. Cleanout requirements for the SWM BMPs would include a vacuum truck to clean the OGS (every ~5 years) and sweeping out the inside of the LID/using a bobcat to remove accumulated sediment (every ~8 years). Access to both the LID and OGS devices will be available from a private condo road and/or in conjunction within trails/paths in the NHS (access from Bronte Road). The LID floor will be designed with a permeable liner (ex. Georunner) that will support light machinery, such as a bobcat, to remove sediment without impact the soil media below.

CGH has modelled the required pickup truck and trailer needed to transport the bobcat into the development as well as the vacuum truck to verify the proposed road and access block are

adequate for truck turning movements. Refer to attached Turning Movement Analysis figures for further details.

Inspection is the first step for the maintenance work. Based on the inspection reports, the necessity of the maintenance works can be decided and scheduled. Inspection of the LID can be broadly divided into two types. The details of the inspection types are described below.

- A) **Construction Inspections** - During and following construction of the LID, the LID should be inspected to ensure that the construction process has not compromised its effectiveness. Construction inspections take place during several points in the construction sequence, specific to the type of LID BMP, but at a minimum should be done weekly and include the following:
1. During site preparation, prior to BMP excavation and grading to ensure the contributing drainage area is stabilized or that adequate ESCs or flow diversion devices are in place and confirm that construction materials meet design specifications.
 2. At the completion of excavation and grading, prior to backfilling, ensure depths, slopes and elevations are acceptable.
 3. After final grading, prior to planting to ensure depths, slopes and elevations are acceptable.
 4. Prior to hand-off points in the construction sequence when the contractor responsible for the work changes (i.e., hand-offs between the storm sewer servicing, paving, building, and landscaping contractors).
 5. After every large storm event (e.g., 15 mm rainfall depth or greater) to ensure ESCs and pretreatment or flow diversion devices are functioning and adequately maintained.
- B) **Routine Inspections** - Regular inspections (twice annually, at a minimum) completed as part of routine maintenance tasks over the operating phase of the BMP life-cycle to determine if maintenance task frequencies are adequate. After the construction, the LID should be monitored regularly to identify the maintenance requirement and monitor the performance. The routine inspection works are done mainly by visual inspection. The maintenance work will be carried out based on the inspection report.

Table 1 describes routine maintenance tasks for the LID, organized by the BMP component.

Table 1: Bio-Filtration Facility Routine Maintenance Tasks

Component	Maintenance Tasks
Contributing Drainage Area	- Remove trash, debris, and sediment from pavements - Replant or seed bare soil areas
Inlets	- Keep free of obstructions. - Remove trash, debris, and sediment - Measure sediment depth or volume during each cleaning or annually to estimate the accumulation rate and optimize the frequency of maintenance
Perimeter	- Remove trash, debris, and accumulated sediment - Repair the side slope if erosion occurs
Vegetation	- Water the sod on the first growing season - Remove weeds and undesirable plants - Replace dead plantings annually to achieve 80% cover by the third growing season - Do not apply chemical fertilizers
Filter Bed	- Remove trash bi-annually to quarterly; - Rake every 5 years to remove thatch and prevent sediment crusts; - Aerate and dethatch to maintain soil permeability and dense grass cover every 5 years. - Repair sunken areas when ≥ 10 cm deep and barren/eroded areas when ≥ 30 cm long; - Remove sediment when > 5 cm deep
Subdrain and Monitoring Port	Flush out accumulated sediment with hose or pressure washer

The estimated cost of the cleanout is as follows:

- OGS - \$3,000 – including a vacuum truck and disposal of material.
- LID facility - \$25,000 – including crew and equipment, sediment disposal, consulting/testing and camera inspection of the outlet pipes.

An Operation and Maintenance manual will be provided for the LID as part of detailed design and all work will be in accordance with the Town of Oakville Stormwater Management Facilities (SWMF): Monitoring, Inspection, and Maintenance, Guidelines (August 2021).

Table 2 outlines the maintenance requirements for the proposed LID.

Table 2: Maintenance Requirements Bio-Filtration Facility

Metrics	Bio-filtration Facility
Annual Maintenance	Remove trash and debris from LID, check vegetation cover.
Cleanout Requirements	Vacuum truck to clean OGS. Sweep floor of LID or use bobcat to scrape accumulated sediment. Haul away.
Cleanout Frequency	Subdivision will generate 10.09 m ³ /year of sediment based on annual loading rates for various levels of imperviousness in the MOE SWM Planning & Design Manual. 2 OGS' will remove 60% or 6 m ³ /yr – OGS' have a storage of 26.57 m ³ requiring clean out every ~ 5 years Remaining 40% or 4 m ³ /yr will enter LID – assuming 73% removal per STEP guidelines, the LID requires clean-out every 8 years assuming 5 cm sediment depth triggers cleanout.
Cleanout Cost	\$3,000 OGS Cleanout which includes: - Vacuum truck - Disposal of material offsite \$25,000 for LID cleanout which includes: - 2 Crew/equipment Days - Sediment Disposal - Consulting/Testing - Camera Inspection of outlet pipes
Commentary	Bio-filtration facility requires reduced maintenance effort as private or public facility compared to a wet pond. Bio-filtration facility addresses requests by review agencies to implement more LID features in development applications

2 RAVINE SYSTEM

It is assumed that the ravine system will be assumed by the Town of Oakville, but will be operated/maintained by the condominium corporation. Although it is anticipated that maintenance and repair activities will be infrequent and minor in nature, GEO Morphix has prepared a BCT-1 Ravine Monitoring and Maintenance Plan Memo, attached.

For the ravine maintenance, a rubber tracked skidsteer and mini excavator (~4-6 ton) would be required. The size of the vehicle used to move these is variable, but they can be moved with a heavy duty pickup truck and ~16' trailer. If needed, they could also be dropped off at the main roadway and then walked down the residential road to gain access to the LID and ravine. For additional delivered materials / removals we would assume a variety of landscape trucks up to a tri-axle dumptruck could be used.

CGH has modelled the turning movements for the proposed pickup truck and trailer as well as the dumptruck. Refer to attached Turning Movements Analysis figures for further details.

An easement is proposed in favour of the condominium corporation south of the LID to the extent of the minor tributary (BCT-1), on the subject property to allow for maintenance. The preliminary easement location is illustrated in Attachment A of the GEO Morphix memo.

Respectfully submitted:



Steven A. Hader, P. Eng.
Senior Project Manager

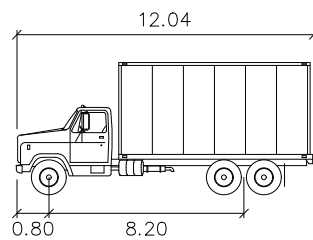


Janna Ormond B.Eng., EIT
Project Manager

ATTACHMENTS

Turning Movement Analysis
Ravine Monitoring and Maintenance Plan Memo

Notes:



Vac Truck

	Width	Track	Lock to Lock Time	Steering Angle
	: 2.60	: 2.60	: 6.0	: 40.0

01	Issued For Review	BB	2023-08-14
REV:	DESCRIPTION:	BY:	DATE:
STATUS:			



CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: ARGO Development Group
4900 Palladium Way, Suite 105
Burlington, ON.
L7M 0W7

ARCHITECT:

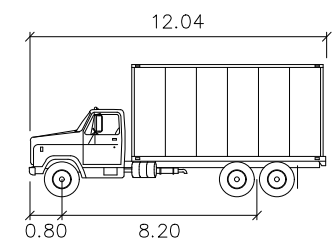
SITE:
Bronte River

TITLE: Turning Movement Analysis
Vac Truck to LID (1)

SCALE AT A3: NTS	DATE: 2023-08-14	DRAWN: BB	CHECKED: MC
PROJECT NO: 2023-101	DRAWING NO: 001	REVISION: 01	

EXISTING RESIDENTIAL

Notes:



Vac Truck

	Width	Track	Lock to Lock Time	Steering Angle
	: 2.60	: 2.60	: 6.0	: 40.0

01	Issued For Review	BB	2023-08-14
REV:	DESCRIPTION:	BY:	DATE:
STATUS:			



CGH Transportation

628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

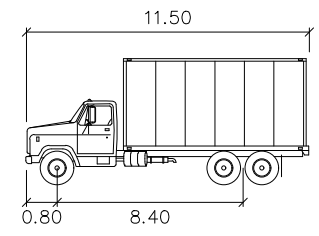
CLIENT: ARGO Development Group
4900 Palladium Way, Suite 105
Burlington, ON.
L7M 0W7

SITE: Bronte River

TITLE: Turning Movement Analysis
Vac Truck to LID (2)

SCALE AT A3: NTS	DATE: 2023-08-14	DRAWN: BB	CHECKED: MC
PROJECT NO: 2023-101	DRAWING NO: 002	REVISION: 01	

Notes:



HSU

	Width	Track	Lock to Lock Time	Steering Angle
	: 2.60	: 2.60	: 6.0	: 40.0

01	Issued For Review	BB	2023-08-14
REV:	DESCRIPTION:	BY:	DATE:
STATUS:			



CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: ARGO Development Group
4900 Palladium Way, Suite 105
Burlington, ON.
L7M 0W7

ARCHITECT:

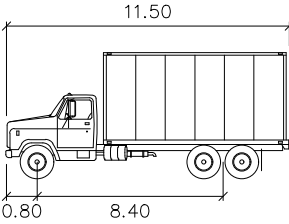
SITE: Bronte River

TITLE: Turning Movement Analysis
Dump Truck to LID (1)

SCALE AT A3: NTS	DATE: 2023-08-14	DRAWN: BB	CHECKED: MC
PROJECT NO: 2023-101	DRAWING NO: 003	REVISION: 01	



Notes:



HSU	
	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.0

01	Issued For Review	BB	2023-08-14
REV:	DESCRIPTION:	BY:	DATE:
STATUS:			



CGH Transportation

628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: ARGO Development Group
4900 Palladium Way, Suite 105
Burlington, ON.
L7M 0W7

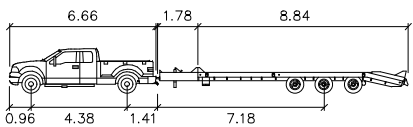
ARCHITECT:

SITE:
Bronte River

TITLE: Turning Movement Analysis
Dump Truck to LID (2)

SCALE AT A3: NTS	DATE: 2023-08-14	DRAWN: BB	CHECKED: MC
PROJECT NO: 2023-101	DRAWING NO: 004	REVISION: 01	

Notes:



Big Tex 5XPH-24+5 Heavy Hitch

	car	trailer
Car Width	: 2.03	
Trailer Width	: 2.59	
Car Track	: 2.41	
Trailer Track	: 2.59	
Lock to Lock Time	: 6.0	
Steering Angle	: 34.2	
Articulating Angle	: 70.0	

01	Issued For Review	BB	2023-08-14
REV:	DESCRIPTION:	BY:	DATE:
STATUS:			



CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: ARGO Development Group
4900 Palladium Way, Suite 105
Burlington, ON.
L7M 0W7

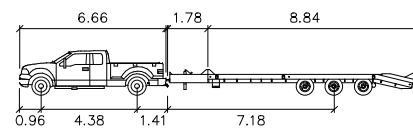
ARCHITECT:

SITE:
Bronte River

TITLE: Turning Movement Analysis
Pickup & Heavy Trailer to LID (1)

SCALE AT A3: NTS	DATE: 2023-08-14	DRAWN: BB	CHECKED: MC
PROJECT NO: 2023-101	DRAWING NO: 005	REVISION: 01	

Notes:



Big Tex 5XPH-24+5 Heavy Hitch

	Car Width	Trailer Width	Car Track	Trailer Track	Lock to Lock Time	Steering Angle	Articulating Angle
	: 2.03	: 2.59	: 2.41	: 2.59	: 6.0	: 34.2	: 70.0

01	Issued For Review	BB	2023-08-14
REV:	DESCRIPTION:	BY:	DATE:
STATUS:			



CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: ARGO Development Group
4900 Palladium Way, Suite 105
Burlington, ON.
L7M 0W7

ARCHITECT:

SITE:
Bronte River

TITLE: Turning Movement Analysis
Pickup & Heavy Trailer to LID (2)

SCALE AT A3: NTS	DATE: 2023-08-14	DRAWN: BB	CHECKED: MC
PROJECT NO: 2023-101	DRAWING NO: 006	REVISION: 01	

August 15, 2023

Bronte River Limited Partnership
4900 Palladium Way, Suite 105
Burlington, ON
L7M 0K9

Attention: Jessica Byers

**Re: BCT-1 Ravine Monitoring and Maintenance Plan
Bronte River Limited Partnership Lands
Town of Oakville
GEO Morphix Ltd. Project No. 23026**

This Monitoring and Maintenance Plan outlines a comprehensive approach to ensure the continued stability and functionality of the BCT-1 ravine. Notwithstanding the provision of this Plan, we assume that maintenance and repair activities will be infrequent and minor in nature, with the goal of preventing major disruptions to the ravine's functionality or risks to the environment. By conducting regular monitoring and timely maintenance, we aim to preserve the integrity of the ravine's geomorphology, vegetation, and overall stability. The Plan encompasses thorough visual assessments of erosion, sediment accumulation, vegetation success, and debris removal, all of which contribute to maintaining a balanced and stable ravine.

The ravine feature is assumed to be owned by the Town of Oakville following implementation and maintained by the condominium corporation. It is understood that ongoing monitoring and maintenance will be the responsibility of the condominium corporation.

The primary components of the Ravine Monitoring and Maintenance Plan are as follows:

- **Geomorphological Integrity:** Monitor and address any changes in ravine morphology to prevent problematic erosion and maintain the ravine
- **Vegetation Success:** Assess the establishment and growth of vegetation to enhance bank stability and ecological value
- **Erosion Control:** Detect significant bank or grade control treatment loss to prevent erosion and maintain stability
- **Sediment Accumulation:** Quantify and mitigate sediment buildup to prevent downstream impacts
- **Debris Removal:** Removal or break up of debris, as required, to maintain unobstructed flow and reduce erosion risk

A comprehensive visual inspection will be conducted every four (4) years by a qualified geomorphologist. The visual inspection will be completed following spring freshet and prior to leaf out conditions. Additional inspections will also be conducted after significant flood events (greater than a 10-year storm event). Inspections will include the following visual observations:

- Assessment of the ravine's geomorphology, noting any evidence of erosion or degradation
- Review of vegetation health and success, considering plant establishment along banks during the monitoring period
- Identify sediment accumulation, with a focus on significant accumulation that may create potential erosion risk
- Visual assessment to document the presence of large wood debris, trash, and any other obstructions

- Detailed reports will be compiled for each inspection to document findings and proposed response actions, and will also include a monumented photographic record of all major components of the restoration

We have developed a series of triggers that should be assessed during each inspection to ensure an appropriate response is undertaken to address potential maintenance requirements. All response activities should ensure no future issues and/or address immediate risk to infrastructure. Triggers and an associated response plan are outlined in the table below.

Trigger for Action	Response Plan
Erosion (i.e., significant bank loss or grade control treatment loss)	• Review whether intervention is required • If intervention required, implement appropriate bank stabilization measures using rubber-treaded or small-track equipment
Unsatisfactory vegetation establishment	• Review whether intervention is required • If intervention required, enhance vegetation through planting and management using hand labour
Significant sediment accumulation	• Review whether intervention is required • If intervention required, initiate sediment removal procedures using rubber-treaded or small-track equipment to maintain feature capacity
Presence of debris causing flow redirection, obstructed flow, and/or erosion indicators	• Review whether intervention is required • If intervention required, removal or break up of debris through hand labour to ensure unobstructed flow path

To support ravine maintenance activities, a rubber tracked skid steer and mini excavator (approximately 4-6 ton) would be required. The size of the vehicle used to move these is variable, but they can be moved with a heavy-duty pickup truck and approximately 16-foot trailer. If needed, they could also be dropped off at the main roadway and then walked down the residential road to gain access to the LID and ravine. For additional delivered materials and/or removals, we would assume a variety of landscape trucks up to a tri-axle dump truck could be used. Note that CGH Transportation completed a Turning Movement Analysis to ensure that required maintenance equipment outlined here could be accommodated on site. The proposed general easement location is shown under **Attachment A**, for reference.

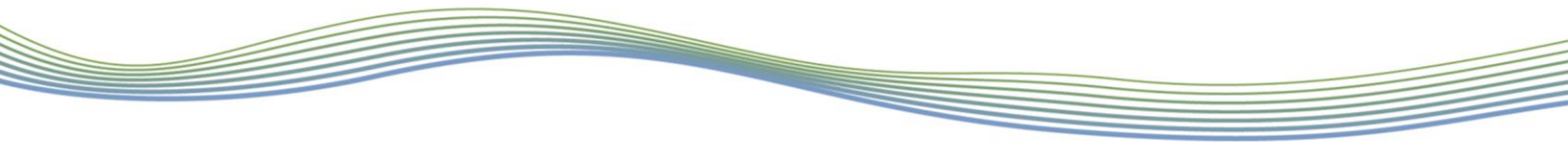
As noted, it is assumed that maintenance and repair activities will be infrequent and minor in nature, with the overall goal of preventing major disruptions to the ravine's functionality or risks to the environment.

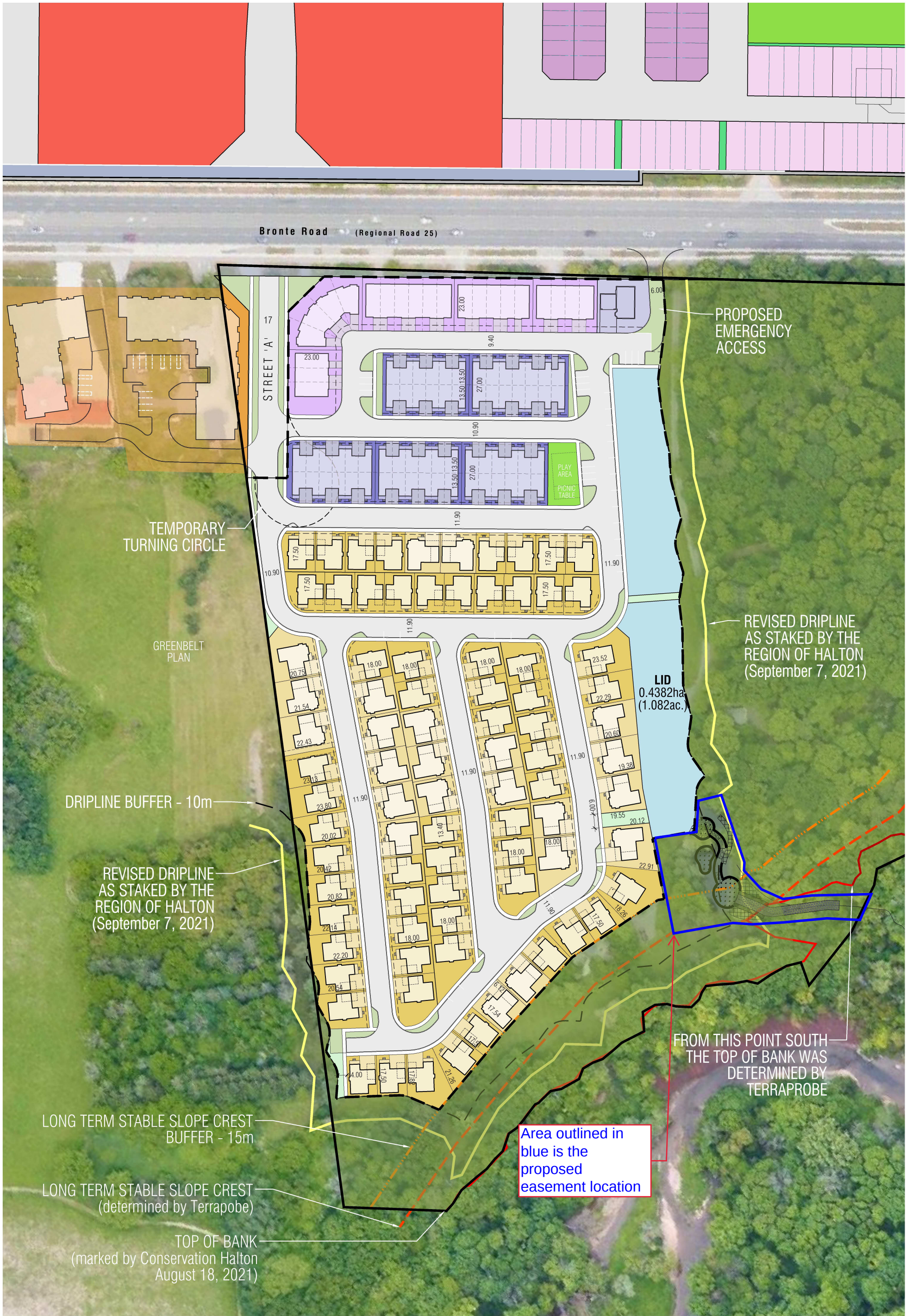
Respectfully submitted,



Paul Villard Ph.D., P.Geo., CAN-CISEC
Director, Principal Geomorphologist

Attachment A





CONFIDENTIAL WITHOUT PREJUDICE

- All Units In Metric Unless Otherwise Noted.
- Base Information Obtained From Various Sources And Is Approximate.
- Schedule / Plan Information Is Conceptual And Requires Verification By Appropriate Agency.
- Aerial Photo: Google

GERRARD
DESIGN

BRONTE RIVER | Oakville, ON
CONCEPTUAL DEVELOPMENT PLAN (Based on SK-95)



PROJECT 1637
DATE AUG 03, 2023
SCALE 1:1500

SK-96