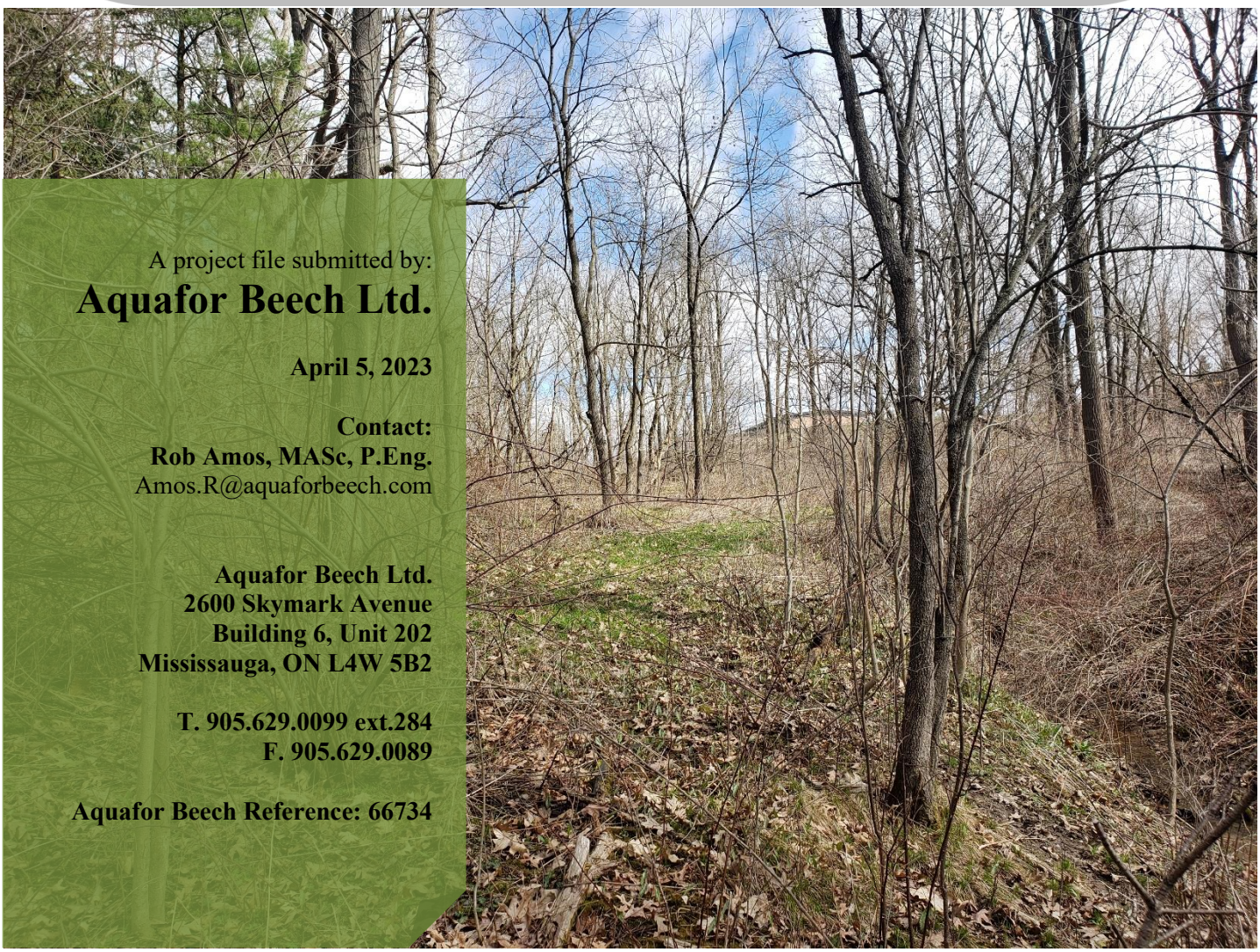
Prepared for:

**City of Brantford**

**Ms. Alex Lee-Bun, C. Tech.**
Environmental Services, Public Works Commission
City of Brantford, 324 Grand River Ave., Brantford, ON, N3T 4Y8
519.759.4150 ext. 5763
ALeeBun@brantford.ca
www.brantford.ca

## Schedule B Class Environmental Assessment – Project File

# Utility Access Route between Glenwood Drive and Peartree Court



A project file submitted by:

**Aquafor Beech Ltd.**

**April 5, 2023**

**Contact:**
**Rob Amos, MASc, P.Eng.**
Amos.R@aquaforbeech.com

**Aquafor Beech Ltd.**
**2600 Skymark Avenue**
**Building 6, Unit 202**
**Mississauga, ON L4W 5B2**

**T. 905.629.0099 ext.284**
**F. 905.629.0089**

**Aquafor Beech Reference: 66734**

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# 1 INTRODUCTION

## 1.1 Study Background

Aquafor Beech Limited (Aquafor), with subconsultant Archaeological Services Incorporated (ASI), was retained by the City of Brantford to complete a Class Environmental Assessment (EA) for an access route facilitating utility inspections and maintenance between Glenwood Drive and Peartree Court. This Municipal Class EA study was conducted as a Schedule B and included extensive stakeholder and aboriginal consultations to evaluate alternative solutions.

The study area is primarily delimited by an easement (15.2m in width) that was established along the length of a sanitary sewer running between Glenwood Drive and Peartree court, with a portion of the study area extends onto City property located west of St. Peter's School, as shown in **Figure 1-1**. The subject sanitary sewer segment begins at Glenwood drive and directs flow downwards through a naturalized valley setting before connecting to the sewer infrastructure at Peartree Court. A storm sewer pipe leading off of Glenwood Drive is also located within the study area, outletting to a local tributary of the Grand River. Since construction of the sanitary sewers in 1960s, the easement has become obstructed with overgrown vegetation, rendering much of the sewer infrastructure inaccessible to vehicles. As a result, it is difficult to perform regular inspections and maintenance of the infrastructure. Repairs to the sewers are limited to emergencies, with temporary access installed and removed each time should emergency works be required. This project in turn explores a series of alternative solutions that will provide the City with long-term access to the above noted infrastructure.

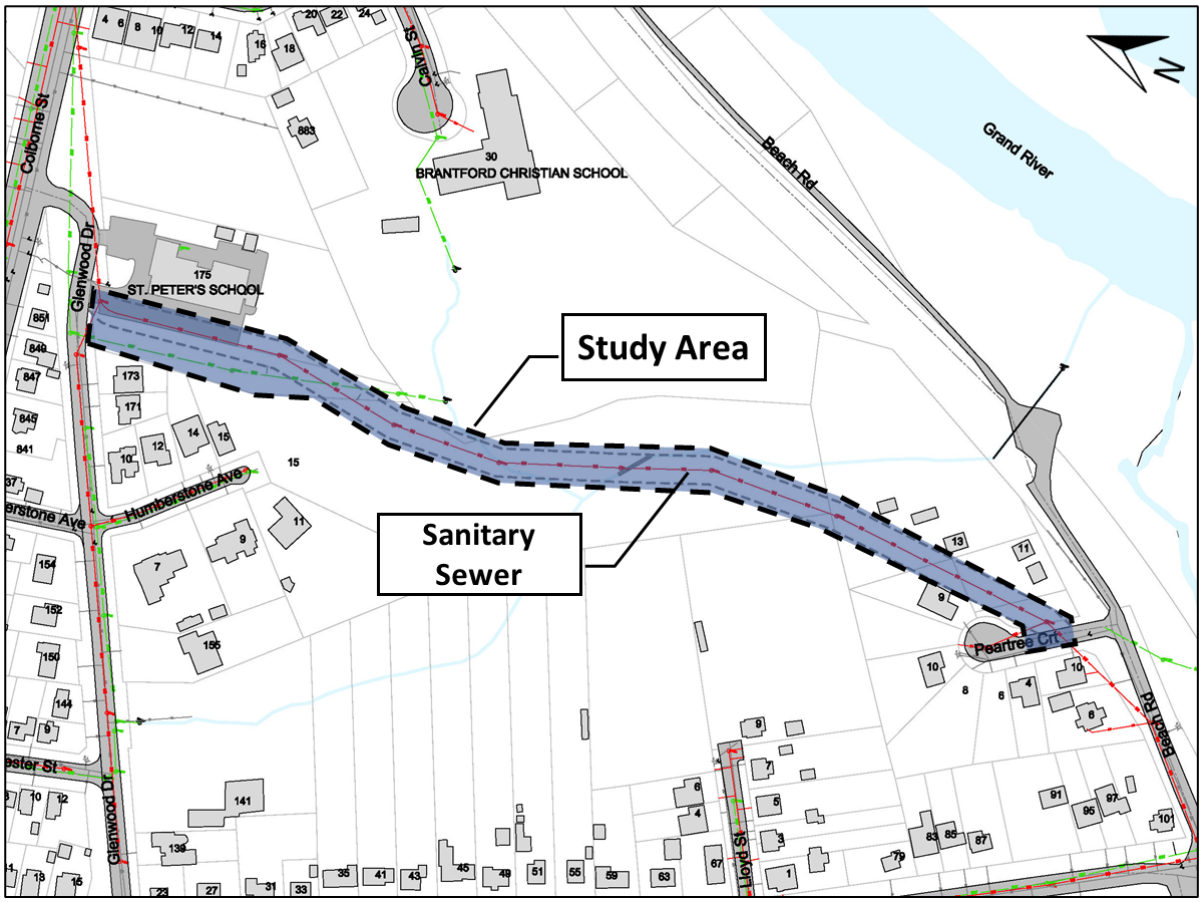



**Figure 1-1: Utility Access Route Study Area – Glenwood Drive to Peartree Court.**

## 1.2 Class Environmental Assessment Process

The Environmental Assessment Act was legislated by the Province of Ontario in 1980 to ensure that an Environmental Assessment is conducted prior to the onset of development and development related (servicing) projects. Depending on the individual project or Master Plan to be completed, there are different processes that municipalities must follow to meet Ontario's Environmental Assessment requirements.

Class Environmental Assessments (Class EAs) are prepared for approval by the Minister of the Environment, Conservation and Parks. A Class EA is an approved planning document that defines groups of projects and activities and the Environmental Assessment (EA) process which the proponent commits to for each project undertaking. Provided the process is followed, projects and activities included under the Class EA do not require formal review and approval under the EA Act. In this fashion, the Class EA process expedites the environmental assessment of smaller, recurring projects.

This Class Environmental Assessment document reflects the following five key principles of successful planning under the Environmental Assessment Act.

1. Consultation with affected parties early in and throughout the process, such that the planning process is a cooperative venture.
2. Consideration of a reasonable range of alternatives, both functionally different "alternatives to" and the "alternative methods" of implementing the solution.
3. Identification and consideration of the effects of each alternative on all aspects of the environment.
4. Systematic evaluation of alternatives in terms of their advantages and disadvantages, to determine their net environmental effects.
5. Provision of clear and complete documentation of the planning process followed, to allow "traceability" of decision-making with respect to the project.

The accompanying flow chart (**Figure 1-2**) illustrates the process followed in the planning and design of projects covered by this Class Environmental Assessment. The five phases, as defined in the flow chart, are summarized in the document as follows:

**Phase 1:** Identify the problem or deficiency.

**Phase 2:** Identify alternative solutions to the problem, by taking into consideration the existing environment, and establish the preferred solution taking into account public and agency review and input. At this point, identify approval requirements (e.g., Ontario Water Resources Act, Lakes and Rivers Improvement Act, and Environmental Protection Act) and determine the appropriate schedule for the project and proceed through the appropriate phases (**Figure 1-2**).

**Phase 3:** Examine alternative methods of implementing the preferred solution, based upon the existing environment, public and government agency input, anticipated environmental effects, and methods of minimizing negative effects and maximizing positive effects.

**Phase 4:** Document, in an Environmental Study Report, a summary of the rationale and the planning, design, and consultation process of the project as established throughout the above phases, and make such documentation available for scrutiny by review agencies and the public.

**Phase 5:** Complete contract drawings and documents, and proceed to construction and operation; monitor construction for adherence to environmental provisions and commitments. Where special conditions dictate, also monitor the operation of the completed facilities.

Public and agency consultation is also an important and necessary component of the five phases.

The Municipal Engineers Association's Class EA document classifies projects as Schedule A, B or C depending on their level of environmental impact and public concern.

- **Schedule 'A'** projects are generally routine maintenance and upgrade projects; they do not have big environmental impacts or need public input. Schedule 'A' projects are all so routine that they are generally pre-approved without any further public consultation.

- **Schedule 'B'** projects have more environmental impact and do have public implications. Examples would be stormwater ponds, river crossings, expansion of water or sewage plants beyond up to their rated capacity, new or expanded outfalls and intakes, and the like. Schedule 'B' projects require completion of Phases 1 and 2 of the Class EA process.

- **Schedule 'C'** projects have the most major public and environmental impacts. Examples would be storage tanks and tunnels with disinfection, anything involving chemical treatment, or expansion beyond a water or sewage plant's rated capacity. Schedule 'C' projects require completion of Phases 1 through 4 of the Class EA process, before proceeding to Phase 5 implementation.

The current study on the **Utility Access Route between Glenwood Drive and Peartree Court** is classified as a Schedule B project and follows Phases 1 and 2 of the planning and design process with Phase 5 to follow at a subsequent stage. This report outlines Phases 1 and 2 of the EA process.

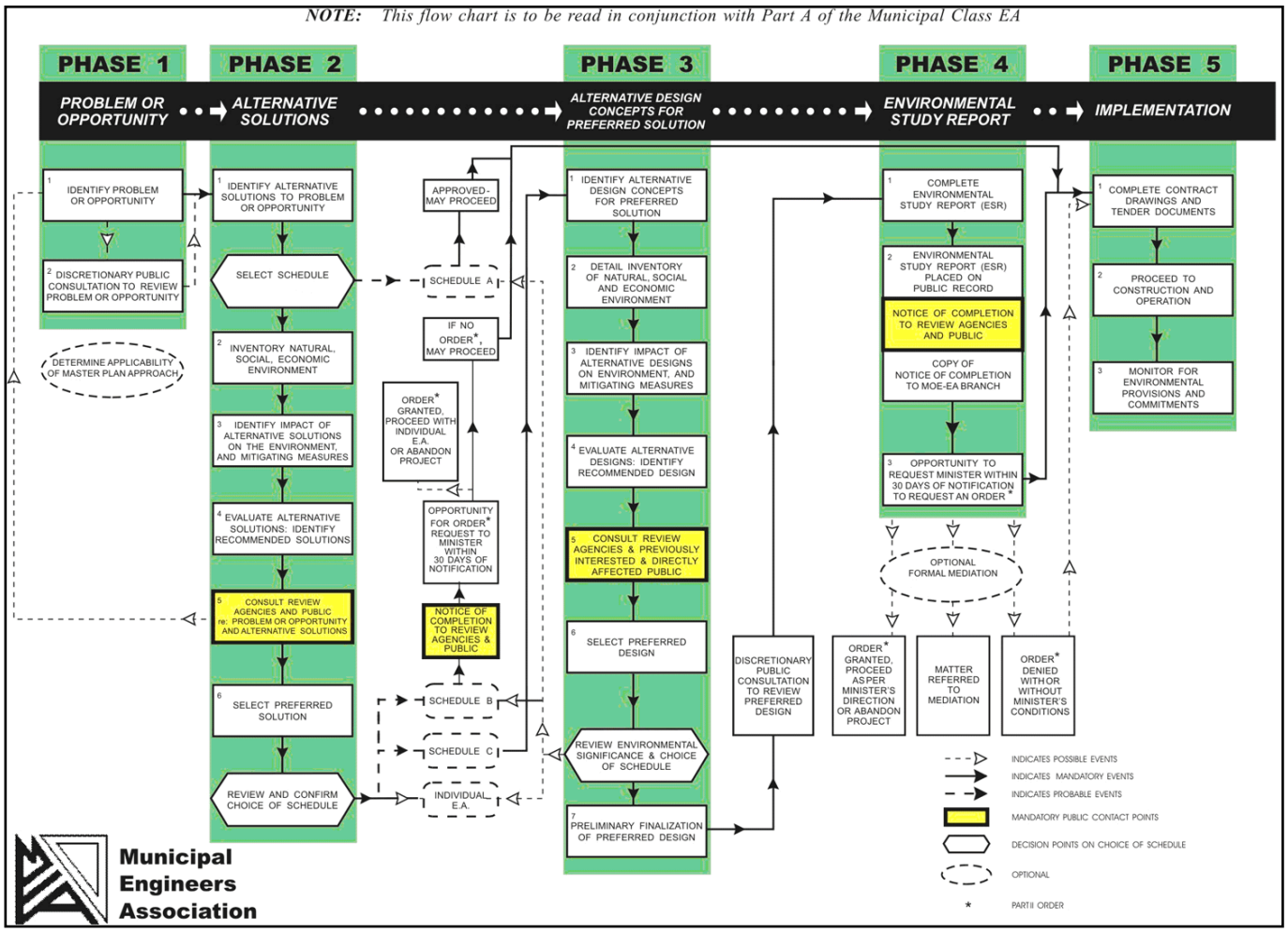



**Figure 1-2: Municipal Class Environmental Assessment Planning and Design Process (MCEA, 2015)**

# 2 PHASE 1 – IDENTIFICATION OF PROBLEMS & OPPORTUNITIES

## 2.1 Problem Identification & Background

The study area of this project primarily consists of an easement (15.2m in width) that exists along the sanitary sewer constructed in 1962 between Glenwood Drive and Peartree Court. From Glenwood Drive, the sewer runs under the St. Peter's School parking lot along the school's westerly property boundary. The sewer then crosses a narrow strip of City property and runs down into a naturalized valley setting within a private property where it also crosses two local storm channels. Upon exiting the valley, the sewer traverses five residential properties of Peartree Court and Lloyd Street.

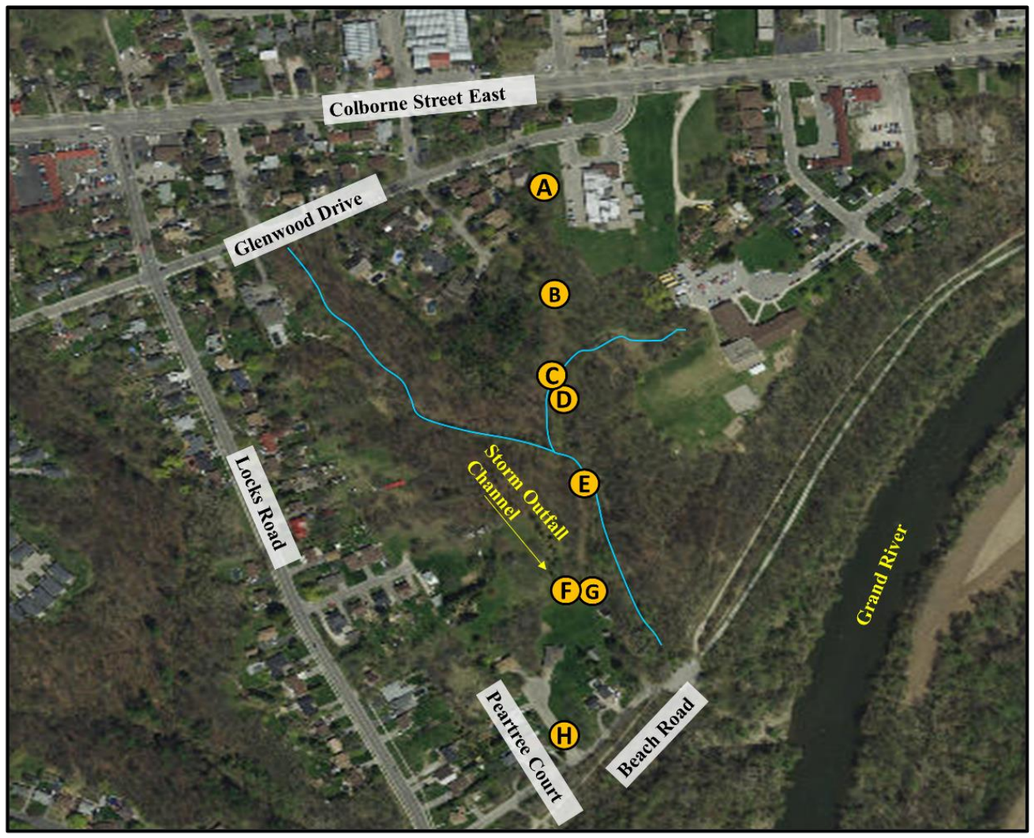
The easement over the sanitary sewer was obtained by the City intended to allow for inspections, maintenance and repairs to the infrastructure. However, the easement was not maintained and has been overgrown, which in turn provides limited opportunities for the City to undertake the intended maintenance and operation activities. This restriction of access prevents the sewer from being inspected, leaving the conditions and potential risks of the pipe unknown. Without regular maintenance, the sewer is expected to have considerable debris buildup and infiltration, elevating the potential risks of sewer blockage and reducing the health and longevity of the sewer system. Moreover, there are two local stormwater fed channels running through the valley, one originating at Glenwood Drive and the other at Calvin Street. The two channels confluence within the valley and discharge into the Grand River downstream of Beach Road. Within the study area, the sanitary sewer first crosses the easterly channel and then crosses the combined channel after the confluence underneath a 1.5m diameter corrugated metal pipe culvert. Intermittent erosion controls such as armourstone and grouted riprap were historically installed along the channel in areas to protect the sewer crossing and nearby manholes, which are now in relatively poor conditions.

As part of a previous City's Utility Easement Assessment project, the sanitary sewer segment and manhole adjacent to the first crossing were found exposed due to channel erosion. The City in turn completed an emergency repair project in 2019, for which Aquafor was retained to complete the detailed design that diverted the channel away from the manhole and installed bed and bank stabilization measures, providing cover to the exposed sewer. Due to the absence of a formal access road, significant efforts were required to perform the emergency repairs including removal of dense vegetation and mature trees within the easement and restoration of manicured sods. These efforts proved the need for a permanent route to provide the City with easy access to the infrastructure with the study area, lessening the impact and cost in the long term. The pre and post repair conditions of the sanitary sewer are shown in **Figure 2-1** and **Figure 2-2** respectively.

**Figure 2-1: Exposed Sanitary Sewer Due to Channel Erosion (Pre-Repair, 2019)**

**Figure 2-2: Sanitary Sewer Protect with Riprap Cover (Post-Repair, 2019)**

A compilation of existing conditions photographs of the study area, highlighting the key areas to be considered through the EA and further design processes, is shown in **Figure 2-3**.




A. Existing Easement Beside St. Peter's School Looking Towards Glenwood Drive

B. Steep Grade Change Along Easement Entrance to Wooded Valley

C. Emergency Back Stabilization Measures to Protect Exposed Sanitary Sewer (2019)

D. Emergency Bank Stabilization Measures to Protect At-Risk Manhole 11

E. Existing Crossing over Combined Storm Outfall Channel

F. Looking Towards Wooded Valley Corridor at Manhole 14

G. Looking Towards Peartree Court at Manhole 14

H. Easement Entrance From Peartree Court

**Figure 2-3: A Photographic Compilation of the Existing Conditions along Sanitary Easement.**

## 2.2 Study Objectives

The objective of this project is to assess the existing conditions of the easement area and explore and evaluate alternatives to provide the City with access to its sanitary and stormwater infrastructure within the study area.

The main focus of this study is to identify the preferred alterative that will provide a long-term access route at a reasonable cost, while meeting all constraints and requirements from technical, ecological, social and economical perspective.

# 3 PHASE 2 – EXISTING CONDITION INVENTORIES

To address Phase 2 of the EA process, site specific studies were conducted to support the design of the preferred alternative. A summary of site-specific inventories is provided below.

## 3.1 Topographic Survey, Infrastructure, and Utilities

At the onset of the field assessments, a detailed topographic survey was undertaken to accurately define the topographic features within the study area along the existing easement, including the existing sewer infrastructure. The survey was completed in sufficient detail for the purposes of access route conceptual design. The key parameters of the survey included:

- Municipal infrastructure, including sanitary and storm sewer manholes;
- Mature trees potentially impacted as a result of access route implementation;
- Longitudinal profile along the easement centreline (i.e., along the sanitary sewer) from Glenwood Dr to Peartree Ct;
- Ground shots within the easement;
- Storm outfalls and culvert crossings;
- Road infrastructure (edge of pavement, gutters, etc.) along Glenwood Dr and Peartree Ct.

The survey was completed using a combination of a total station and GPS techniques in order to confirm accuracy of survey consistent with UTM NAD 83 Zone 17 projection, and geodetic elevations consistent with City horizontal controls, and overlays the base-mapping provided by the City, which includes property parcels, building limits, sewer network alignment, and contours.

The topographic information was compiled to illustrate the existing conditions and utilities within the study area, as shown in **Figure 3-1**.

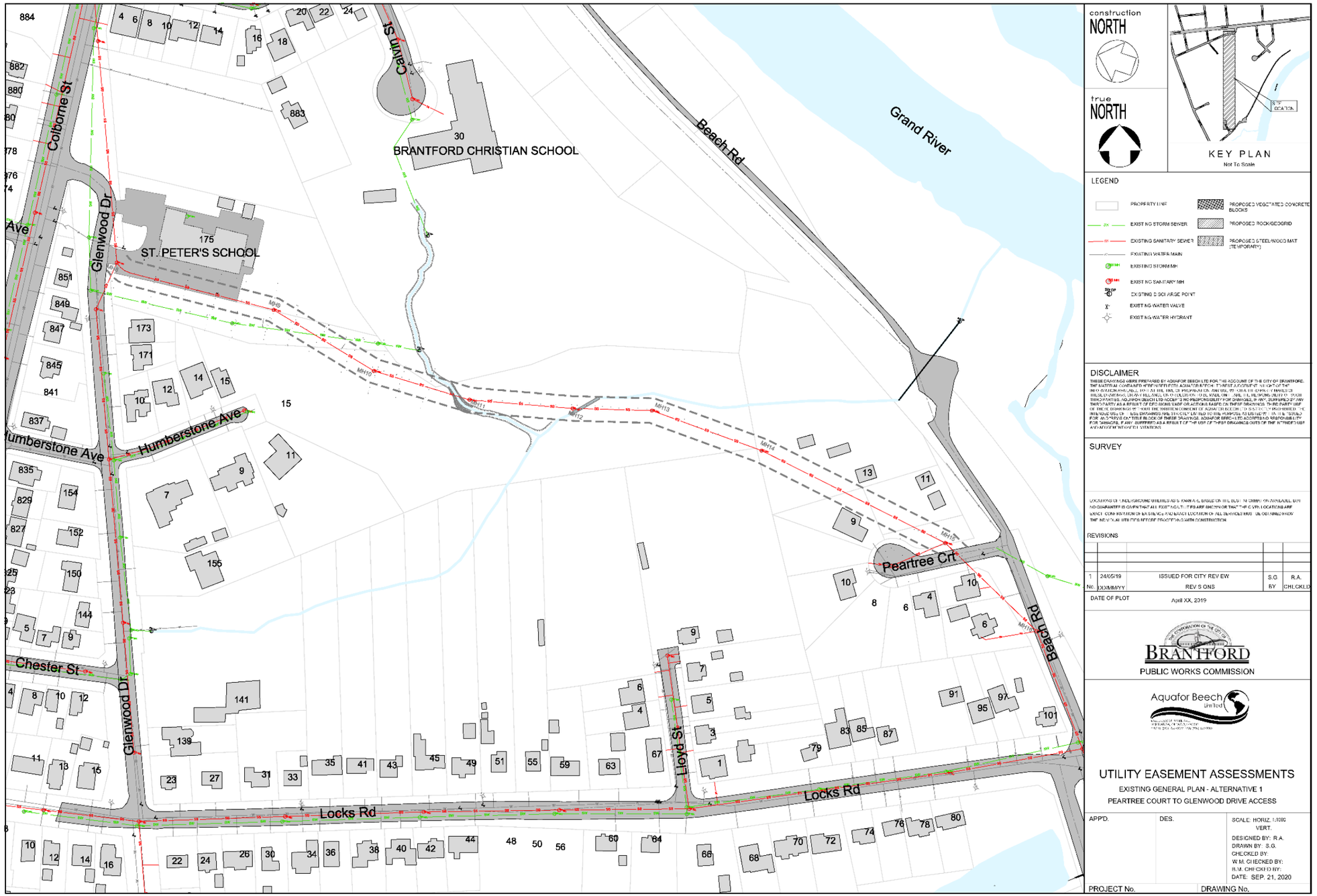



**Figure 3-1: Existing Conditions of Study Area.**

## 3.2 Hydrologic & Hydraulic Assessment

With two storm channels running through, the study area is within the Grand River Conversation Authority's (GRCA) regulated limit under O. Reg. 150/06. However, the study area does not fall within GRCA Regulatory Floodplain as depicted **Figure 3-2** in below.

For the purpose of this EA, detailed hydrologic and hydraulic modelling was not undertaken as minimal in-water works are included in the alternatives and the proposed access routes will remain within the overbank areas. However, the study recognizes the permitting requirements for future construction within the area and will continue to consult GRCA throughout the detailed design. Should any additional hydrologic and hydraulic analysis be required, it will be undertaken as the detailed design process.

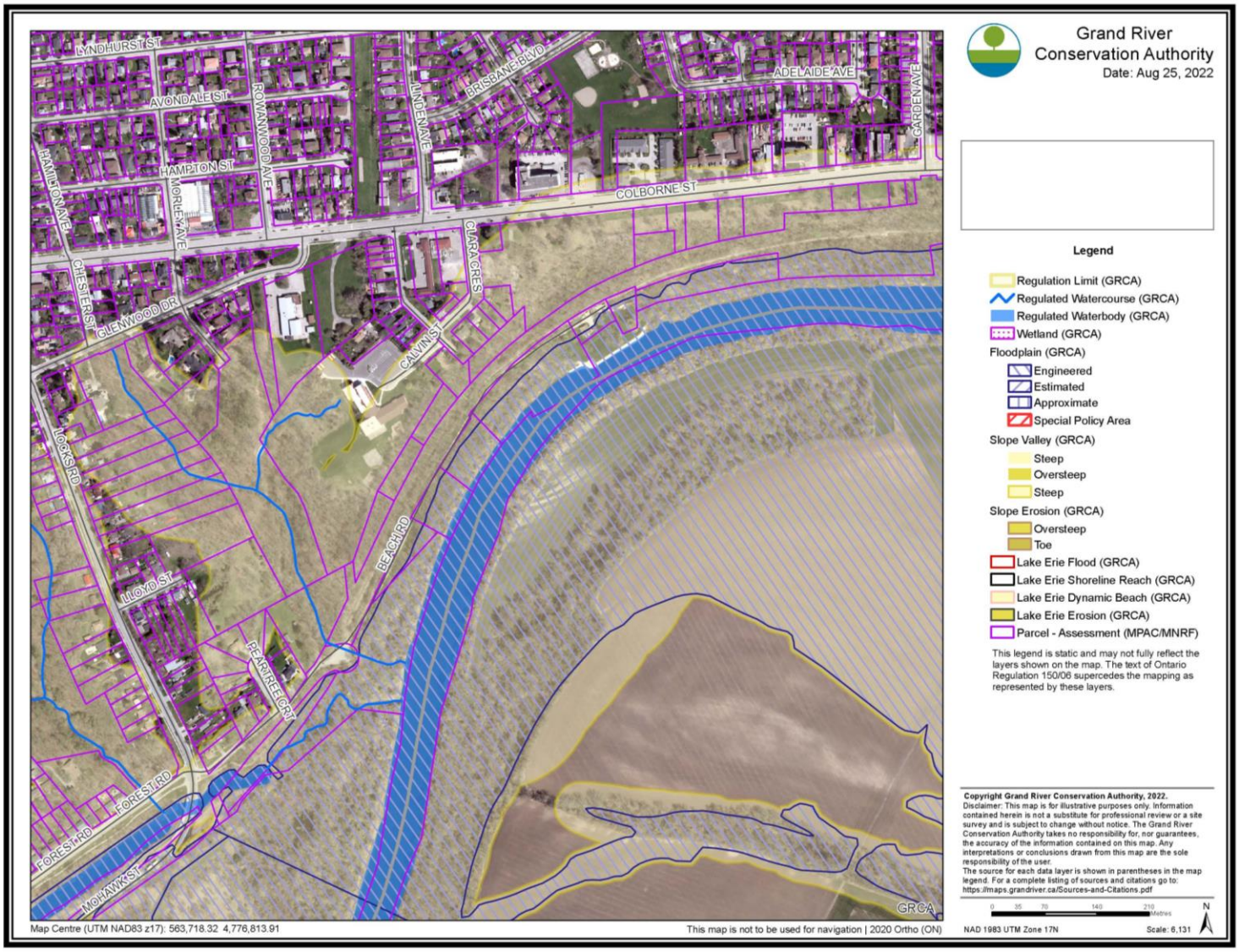



**Figure 3-2: GRCA Regulation Limit (Grand River Conservation Authority, 2022).**

## 3.3 Natural Heritage Assessment

Characterization of terrestrial natural heritage features and functions in the study area relied upon selected field surveys and available background information which included data from the following sources:

- Natural Heritage Information Centre (NHIC)/Ministry of Natural Resources and Forestry (MNRF) database (online Make-a-Map)

- City of Brantford Official Plan (revised 2020);
- Citizen science databases and related projects such as iNaturalist and eBird;
- Correspondance with the Ministry of Environment, Conservation and Parks (MECP) for Species at Risk (SAR) information;
- GRCA's Regulations and Maps; and,
- Historic and current aerial photography.

Vegetation communities, tree inventory and flora within the study area were identified during field surveys completed on September 18 and October 14, 2020 and January 18, 2021. A complete list of the trees, vegetation communities and flora recorded during field surveys are detailed in the following subsections.

### *3.3.1 Vegetation Communities*

Aquafor conducted field investigations to characterize the study area in September and October, 2020, during which vegetation community classification and a botanical inventory were conducted according to Ecological Land Classification (ELC) for Southern Ontario, First Approximation (Lee et al., 1998). Where a suitable community description was not available per the First Approximation, classification was supplemented from the 2008 Draft version for Southern ELC (most equivalent 1998 code in brackets). The study area is located along a creek corridor surrounded primarily by riparian floodplain, Walnut and Oak woodlands. Vegetation communities associated with the proposed works are described below and illustrated in **Figure 3-3**. A complete list of observed botanical species is included in **Appendix A1**.

*FOCM6 (CUP3-9): Naturalized Coniferous Plantation (Norway Spruce)*
A remnant plantation in the north portion of the study area, west of the main creek corridor. It contained primarily Norway Spruce (*Picea abies*), with occasional White Pine (*Pinus strobus*). Deciduous species were rarely present, but included Sugar Maple (*Acer saccharum),* Black Cherry (*Prunus seronita*) and Pignut Hickory (*Carya glabra*). By contrast, the subcanopy contained a high content of regenerating hardwood species, mainly including Sugar Maple, Black Cherry and Sweet Cherry (*Prunus avium*). Common Buckthorn (*Rhamnus cathartica*) was seen in both the subcanopy and shrub layer, which also included young White Mulberry (*Morus alba*), Ash (*Fraxinus* spp.), Alternate-leaved Dogwood (*Cornus alternifolia*), Chokecherry (*Prunus virginiana*), Red Elderberry (*Sambucus racemosa*), Japanese Barberry (*Berberis thunbergii*), Multiflora Rose (*Rosa multiflora*) and Thicket Creeper (*Parthenocissus vitacea*). The ground layer was relatively sparse, but contained species such as Poison Ivy (*Toxicodendron radicans*), Nipplewort (*Lapsana communis*), Garlic Mustard (*Alliaria petiolata*), Dame's Rocket (*Hesperis matronalis*), and young Maple and Hickory.

*FOD7-3: Fresh – Moist Willow Lowland Deciduous Forest Type*
This community was present at the south end of the site along the riparian area. Large White Willows (*Salix alba*) were present in the main canopy, along with Cottonwood (*Populus deltoides*), Black Walnut (*Juglans nigra*), and Norway Spruce (*Acer platinoides*). Other species such as Manitoba Maple (*Acer negundo*), White Cedar (*Thuja occidentalis),* and White Mulberry were also present in the subcanopy. The shrub layer contained a wide variety of shrubs and small trees, common examples including Common Buckthorn, Dogwoods (*Cornus* spp.), Multiflora Rose, Chokecherry, Heart-leaved Willow (*Salix eriocephala*), young Maple, Ash, and Hickory. The ground layer contained species such as Garlic Mustard, Ground Ivy (*Glechoma hederacea*), Canada Goldenrod (*Solidago canadensis*), Orchard Grass (*Dactylis glomerata*), Poison Ivy, Calico Aster (*Symphyotrichum lateriflorum)* and Curly Dock (*Rumex crispus*). Seeps were noted along the west bank, where wetland species such as Reed Canary Grass (*Phalaris arundinacea*), Spotted Joe Pyeweed (*Eutrochium maculatum*), Sensitive Fern (*Onoclea sensibilis*), Common Boneset (*Eupatorium perfoliatum*), and Narrow-leaved Cattails (*Typha angustifolia*) were common.

*WODM3-3 (CUW1): Dry White Oak Woodland Type*
A strip of this community was found in the northwest extent of the study area. Canopy coverage was between 50-60%, and was dominated by large White Oak (*Quercus alba*), followed by Red Oak (*Quercus rubra*). Black Walnut, White Spruce (*Picea glauca),* and Bitternut and Pignut Hickories were also observed in the canopy. The subcanopy was similarly comprised, with the addition of Green Ash (*Fraxinus pennslyvanica*), Black Cherry, Blue Beech (*Carpinus caroliniana*), and Shagbark Hickory (*Carya ovata*). The shrub layer was dominated by Common

Buckthorn, secondarily young Ash, but also contained a diverse mix of others such as Alternate-leaved, Gray and Silky Dogwoods (*Cornus racemosa* and *C. obliqua*), Multiflora Rose, Choke Cherry, Cranberry Viburnum (*Viburnum opulus ssp. opulus),* Black Raspberry (*Rubus occidentalis*), Allegheny Blackberry (*Rubus allegheniensis),* Hawthorn (Crataegus sp.) and Nannyberry (*Viburnum lentago*). The ground layer was also diverse, containing a variety of species, such as but not limited to, Pennsylvania Sedge (*Carex pennsylvanica*), Canada Goldenrod, Nipplewort, Avens (*Geum* spp.), Garlic Mustard, Calico Aster, Woodland Strawberry (*Fragaria vesca),* Intermediate Wood Fern (*Dryopteris intermedia*), and many others.

*WODM4-4 (CUW1): Dry - Fresh Black Walnut Deciduous Woodland Type*

This savannah-like community originates west of St. Peters school and extends south, mainly along the east riparian area. The dominant species in the canopy is mature Black Walnut, but contains occasional Norway Maple, Scots Pine (*Pinus sylvestris),* Norway Spruce, Sugar Maple, Bitternut Hickory (*Carya cordiformis*), Red and White Oak. The subcanopy contained Manitoba Maple, American Elm (*Ulmus americana*) and Hackberry (*Celtis occidentalis*). Shrubby vines such as Thicket Creeper were commonly observed climbing mature trees. The shrub layer was dense, containing a high content of brambles such including Black Raspberry and Multiflora Rose, as well as Grey Dogwood and other shrub species common throughout the study area. The ground layer contained common cultural meadow graminoids and forbs, examples including Canada Goldenrod, Calico Aster, Garlic Mustard, White Vervain (*Verbena urticifolia*), Orchard Grass, and many others. Butternut (*Juglans cinerea*) was confirmed within this community along the east bank.

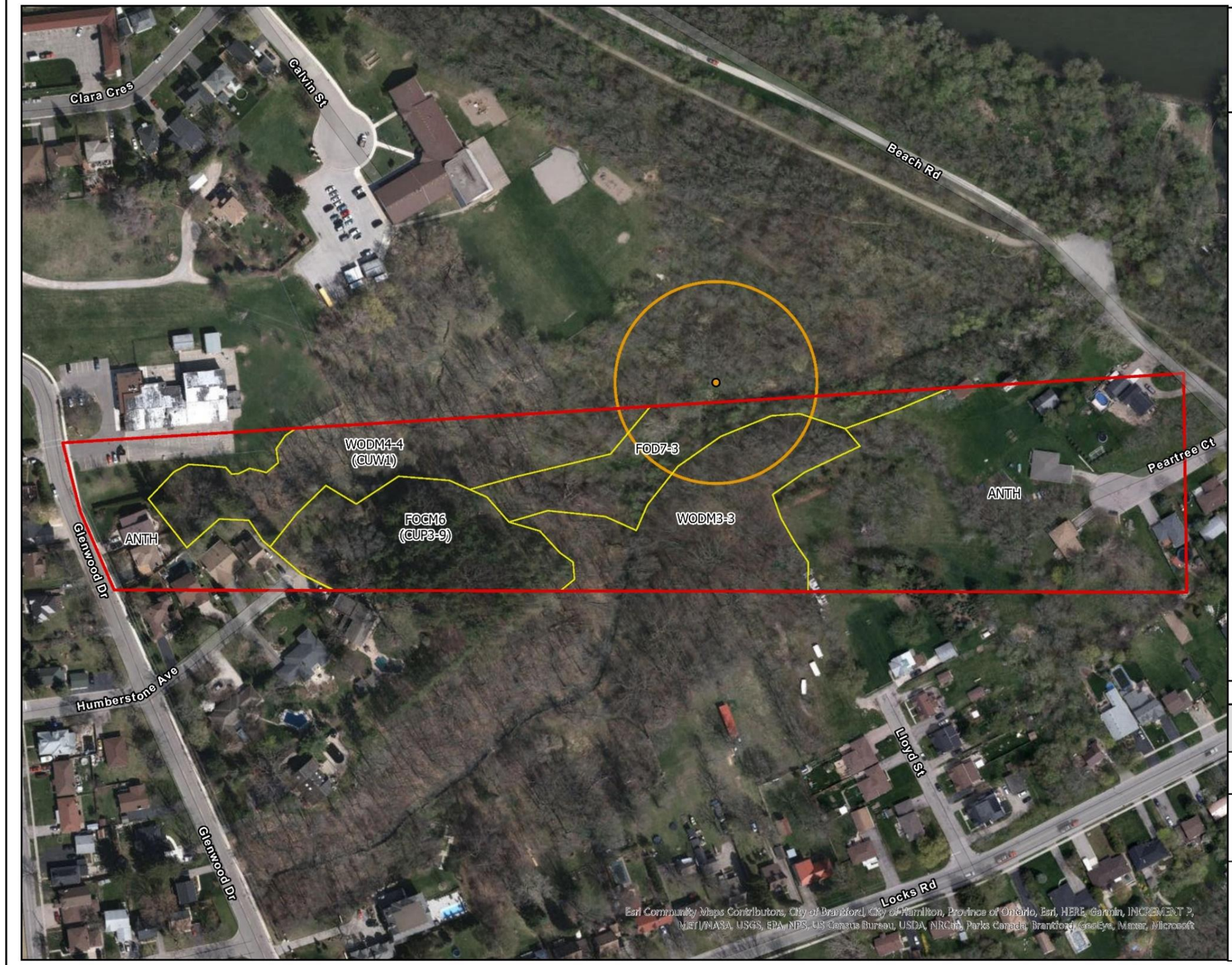



**Figure 3-3: Vegetation Communities ELC Mapping**

### *3.3.2 Flora*

A total of 130 vascular plant species were identified within the study area, including 16 species identified to genus due to a lack of diagnostic features at the time of survey**. Table 3-1** below provides an overview of the results of the botanical inventory

**Table 3-1: Botanical Inventory Characteristics**

| | | | |
|---|---|---|---|
| **Species Breakdown** | Total Species:<br>Native Species:<br>Introduced Species:<br>Species identified only to genus: | 130<br>55 (42.3%)<br>34 (26.2%)<br><br>16 (12.3%) | There are more native species than introduced species within the study area, although species composition indicates moderate disturbance. Diversity on the site is also moderate, as the majority of species are upland species, in keeping with the upland forest and riparian habitat present across the study area. There were several introduced invasive species present including Garlic Mustard, Multiflora Rose, Scots Pine, Norway Maple, Autumn Olive (*Elaeagnus umbellata*), White Mulberry, European Privet (*Ligustrum vulgare*), Winged Eponymous (*Euonymus alatus*), Purple Loosestrife, European Reed (*Phragmites australis ssp. australis*), and Common Buckthorn. |
| **Significance** | Species at Risk:<br>Provincially rare species:<br>Regionally rare species: | 1<br>2<br>9 | One Species at Risk: Butternut (*Juglans cinerea* - Endangered), was confirmed in the study area. Two species are considered provincially rare, Pignut Hickory *(Carya glabra* - S3) and Honey-locust (*Gleditsia tricanthos* - S2?), although Honey-locust is considered to be introduced in Brant County and likely to be progeny of a historically planted cultivar. See **Section 3.4.2** for further discussion.<br><br>Nine additional species are considered potentially regionally rare (R) or Uncommon (U) in Brant County:<br>• Common Hackberry (*Celtis occidentalis*) – U;<br>• Purple-veined Willow-herb (*Epilobium coloratum*) – R;<br>• Meadow Horsetail (*Equisetum Pratense*) – R;<br>• Woodland Strawberry (*Fragaria vesca*) – U;<br>• Virginia Stickseed (*Hackelia virginiana*) – U;<br>• Spotted St. John's-wort (*Hypericum punctatum*) – U;<br>• Tamarack (*Larix larcina*) – R<br><br>Oldham's List of the Vascular Plants of Ontario's Carolinian Zone (Brant County) – 2017, was used to determine species regional rarity. |

| | | | |
|---|---|---|---|
| **Coefficient of Conservatism** | Number of species with CC greater than or equal to 7: | • 6 | CC values are range from 1 to 10 and are assigned based on a species' likelihood to be found in a relatively unaltered landscape (Oldham et al. 1995). Plants with high CC values are found only in a relatively narrow range of conditions provided by specific habitats and tend to be intolerant to anthropogenic disturbances. Species with low CC values are able to persist in a wide variety of habitats and are generally more tolerant to anthropogenic disturbances. The following species within the study area have CC values greater or equal to 7:<br><br>• Pignut Hickory – *Carya glabra* (9)<br>• Common Hackberry – *Celtis occidentalis* (8)<br>• Eastern Redbud – *Cersis canadensis* (8)<br>• Meadow Horsetail – *Equisetum pratense* (8)<br>• Honey-Locust – *Gleditsia tricanthos* (8)<br>• Tamarack – *Larix laricina* (7) |
| **Floristic Quality Index** | FQI: | 32.46 | FQI is a calculated value based on species richness and quality of species (i.e., CC value), see below for the equation. A high FQI indicates a higher quality of habitat.<br><br>$FQI = average\ CC\sqrt{species\ richness}$<br><br>Calculation is based on the number of species with CC values assigned (76).<br><br>Generally, FQI greater than 50 is considered high; 30 to 39 is medium, and less than 30 is considered low. This site has an FQI of 32.46 which is medium, likely due to evidence of disturbance in the area. |

### *3.3.3 Tree Inventory*

An inventory of all trees within the area of impact was completed by a certified arborist in September and October 2020, and January 2021. During the surveys, tree location, species, crown diameter tree health and physical condition were recorded. Each tree equal to or greater than 10 cm diameter at breast height (DBH) with the potential to be impacted was evaluated and given a preservation priority status of low, moderate, or high. A total of 281 trees were inventoried consisting of 279 species, with an additional two were only identifiable to genus level based on available identifiable characteristics. **Table 3-2** summarizes the tree species identified within the tree inventory and their preservation priorities. A complete list of inventoried trees is provided in **Appendix A2**.

With regards to tree preservation priority, trees with poor health and/or structure and those currently or potentially able to damage or interfere with existing structures were given low priority status. Trees with moderate expression of the previously mentioned qualities were given moderate priority status. Trees exhibiting good health and condition, large size, high quality species, good growing conditions, or those that provided high ecological value (SAR or wildlife habitat) were given high priority status. **Figure 3-4** to **Figure** 3-6 depict the locations of all mature trees with the preservation priority status. It should be noted that due to the timing of the survey, some trees were assessed during leaf-off. As such, tree health and condition could not be easily determined unless obvious signs of stress or damage was apparent on the tree trunk or branches. Any tree without obvious afflictions was conservatively assumed to be in good health.

**Table 3-2: Summary of Tree Inventory with Preservation Priority**

| Species Name | | Native/ Introduced | Special Considerations | Number of Trees |
|---|---|---|---|---|
| **Scientific Name** | **Common Name** | | | |
| *Acer negundo* | Manitoba Maple | Native | Candidate SAR Bat habitat | 46 |
| *Acer platinoides* | Norway Maple | Introduced | Invasive | 22 |
| *Amelanchier sp.* | Serviceberry Species | - | - | 1 |
| *Carya ovata* | Shagbark Hickory | Native | - | 2 |
| *Celtis occidentalis* | Hackberry | Native | - | 4 |
| *Crataegus sp.* | Hawthorn Species | - | - | 1 |
| *Fraxinus americana* | White Ash | Native | Emerald Ash Borer | 18 |
| *Gleditsia triacanthos var. inermis* | Honey-locust (Thornless) | Native | Cultivar | 1 |
| *Juglans nigra* | Black Walnut | Native | - | 102 |
| *Morus alba* | White Mulberry | Introduced | Invasive | 7 |
| *Picea abies* | Norway Spruce | Introduced | - | 6 |
| *Pinus strobus* | White Pine | Native | - | 9 |
| *Populus deltoides* | Eastern Cottonwood | Native | - | 14 |
| *Prunus avium* | Sweet Cherry | Introduced | - | 1 |
| *Prunus serotina* | Black Cherry | Native | - | 8 |
| *Quercus alba* | White Oak | Native | Candidate SAR bat habitat | 6 |
| *Quercus rubra* | Northern Red Oak | Native | Candidate SAR bat habitat | 16 |
| *Salix alba* | White Willow | Introduced | Invasive | 9 |
| *Tilia cordata* | Littleleaf Linden | Introduced | - | 1 |
| *Syringa reticulata* | Japanese Tree Lilac | Introduced | Invasive | 1 |
| *Ulmus americana* | American Elm | Native | - | 5 |
| | | | **TOTAL** | 281 |

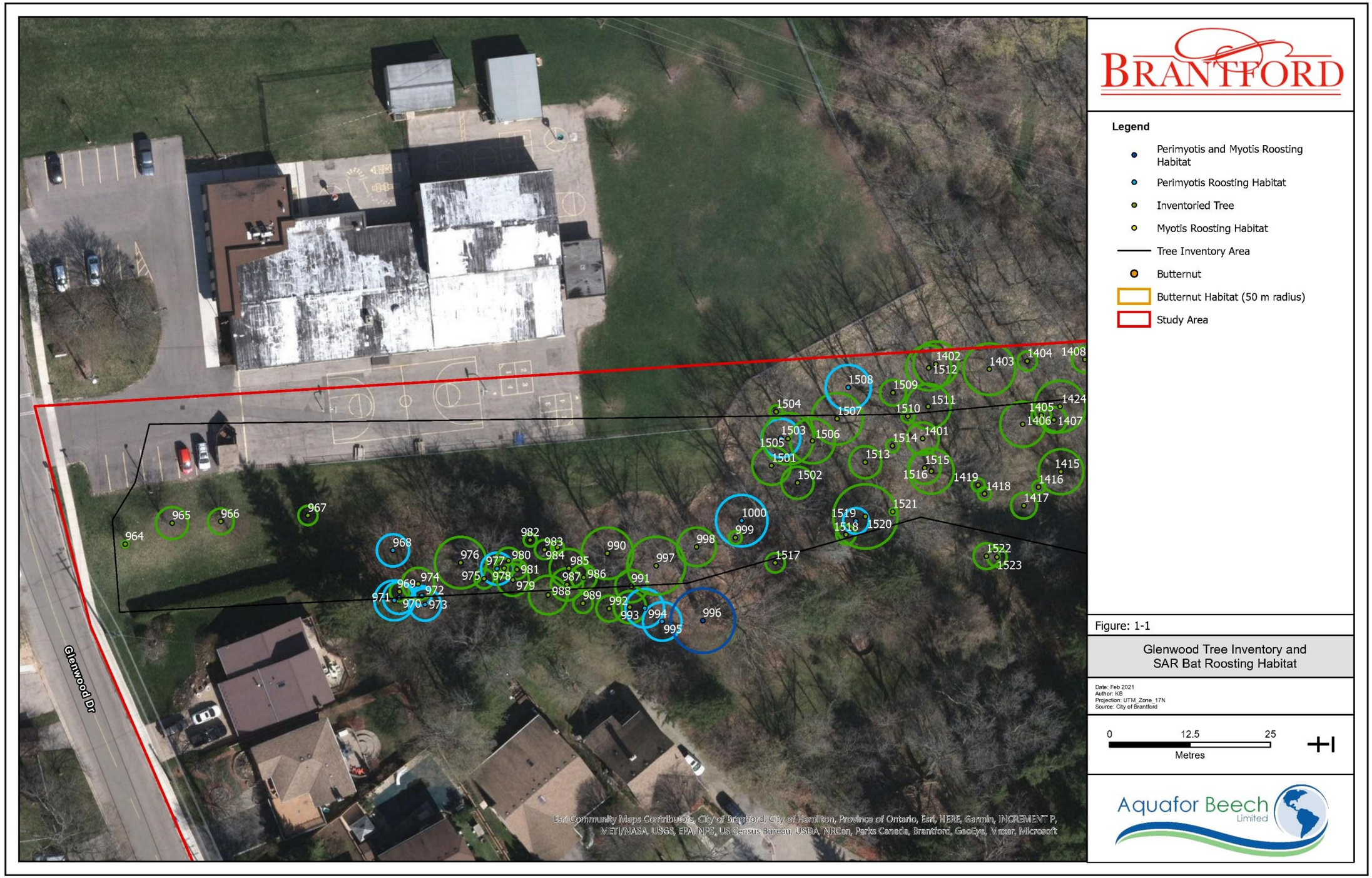



**Figure 3-4: Map of Tree Inventory Results, Part 1**

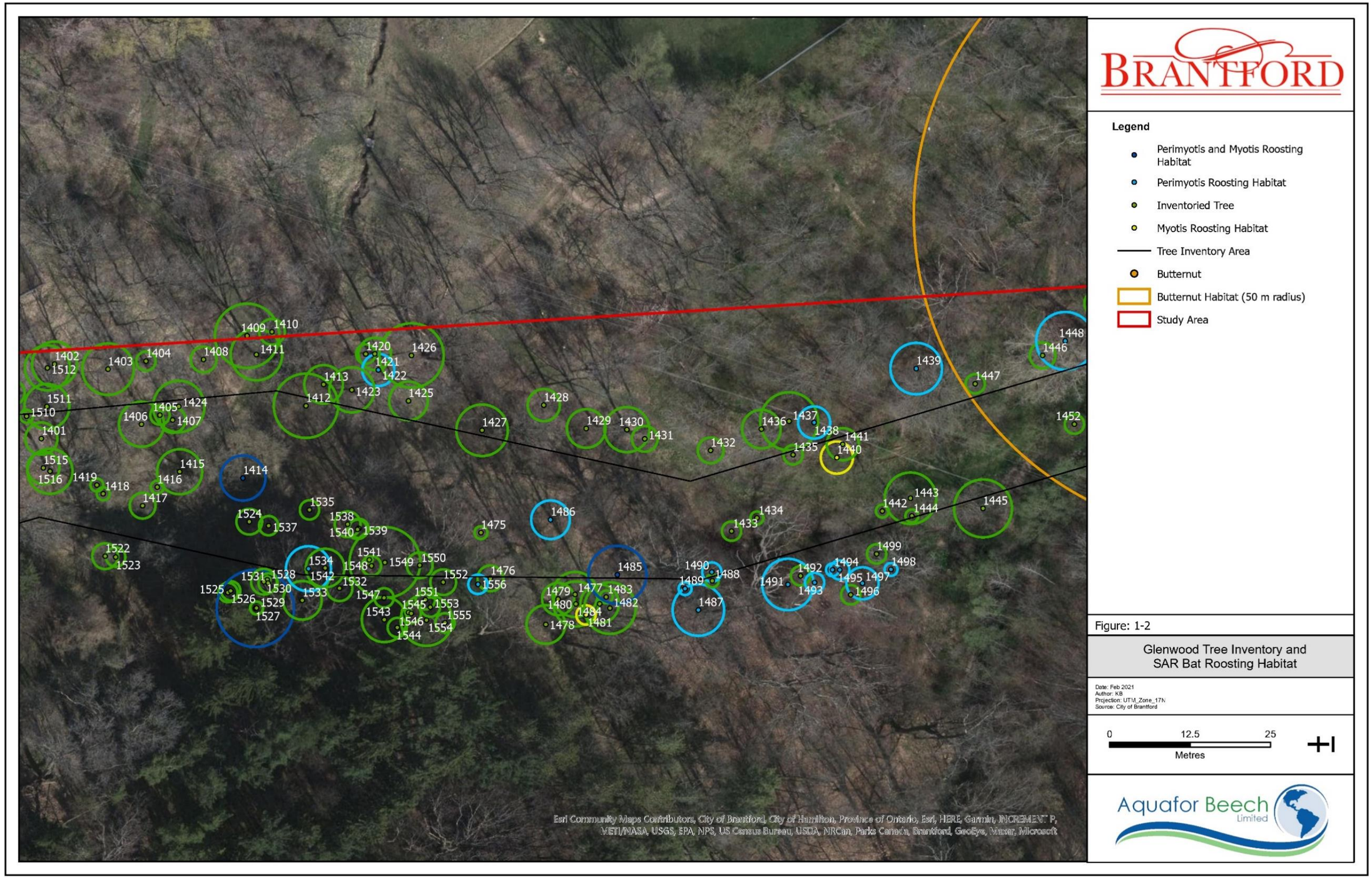



**Figure 3-5: Map of Tree Inventory Results, Part 2**

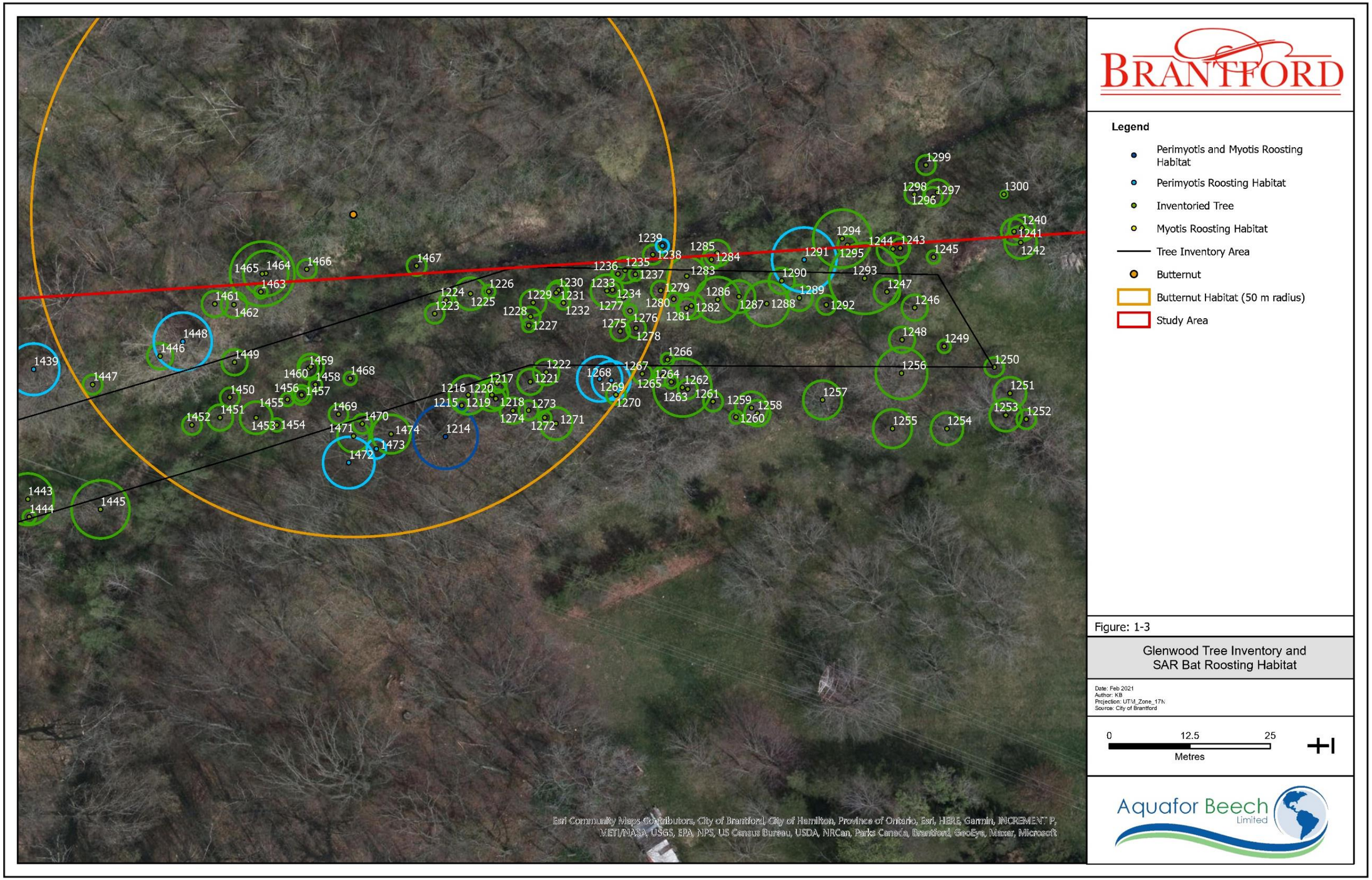



**Figure 3-6: Map of Tree Inventory Results, Part 3**

### *3.3.4 Fisheries & Aquatic Habitat*

Aquafor confirmed a small mapped tributary flowing from west to east through the study area, ultimately entering a small corrugated steel pipe culvert and passing below Beach Road, discharging into the Grand River approximately 100 m downstream. Aquatic habitat was noted during terrestrial ecology field investigations, with background information for the surrounding area used to provide insight into potential fish communities. However, fish community and aquatic habitat have not previously been reported on within the tributary directly impacted by the proposed works. As such, a fish habitat assessment was completed on June 10, 2021 using the Rapid Assessment Methodology for Channel Structure of OSAP (Section 4: Module 1, Stanfield, 2017). The site used for the OSAP assessment extended from the Beach Road culvert, upstream approximately 300 m to a confluence between two small tributaries. The site then extended up the north tributary to where it terminated south of St. Peter School. In general, the site followed the proposed layout of the proposed works. This site was selected to provide a representative view of the study area, providing insight into existing habitat conditions associated with the proposed works. Habitat assessment field sheets are in **Appendix B**.

### *3.3.5 Aquatic Habitat*

The study site is located within the Grand River watershed, in an unnamed tributary to the Grand River. The Natural Heritage Information Centre (NHIC) shows the unnamed tributary following the general layout of the OSAP reach identified in-situ by Aquafor staff, with both branches of the tributary terminating at Glenwood Drive and south of St. Peter School, as aforementioned (MNRF, 2019). A general location of the study area in relation to NHIC mapped habitat is shown in **Figure 3-7**. The tributary and study reach are bordered by a narrow swath of natural heritage cover, with the valley segment surrounded by residential developments and urban areas. As noted, two (2) schools and associated green space are located upstream of the north branch of the tributary, with a culvert servicing the tributary beneath Glenwood Drive marking the end of mapped habitat on the south branch of the tributary. At the downstream extent, a well-used pedestrian trail runs parallel with Beach Road. A culvert services the tributary beneath the path and road before entering a watercourse downstream of the Mohawk Lake canal, and the Grand River immediately downstream. At the time of sampling, the average wetted width was ~ 0.6 m. The average depth at crossovers was approximately 80 mm with an observed maximum depth of approximately 100 mm. In general, the site represented a watercourse consistent with an aligned and engineered drainage channel lined with angular stone and straightened beyond a natural form. Other observations are noted below.

In general, the aquatic habitat was representative of an urban impacted watercourse with signs of past engineering and realignment throughout the length of site. At the time of the field investigations conducted by Aquafor biology staff in 2021, flow was representative of normal conditions allowing for high visibility within the creek bed due to low turbidity levels.

Riparian vegetation was consistent throughout the site, comprised of well-established mixed deciduous forest which provided the stream with nearly 100% canopy cover and stream shading (**Figure 3-8**). Throughout the study site, multiple groundwater seeps marked by wetland plants and saturated soils were observed, particularly in areas where the valley slope was steepest (**Figure 3-9)**. The downstream extent, as previously noted, was marked by a CSP culvert servicing the tributary beneath Beach Road (**Figure 3-10**). Armourstone reinforced the banks surrounding the CSP culvert, with other reaches of armourstone shoring and bank stabilization observed throughout the reach on both banks (**Figure 3-11**). Substrate was consistent throughout the entire reach, comprised almost entirely of angular stone from past realignment and engineering efforts (**Figure 3-12**). Large woody debris was contributed by the healthy riparian area and downed deciduous trees, which crossed the tributary at multiple locations (**Figure 3-13**). Both banks displayed stability, with areas of stabilization demonstrating a lack of undercutting or erosion. Little to no instream aquatic vegetation was observed at the time of Aquafor site investigations, likely due to the large substrate and low baseflow. Partway through the reach, approximately 190m upstream of the culvert beneath Beach Road, was another CSP culvert stabilized by armourstone shoring (**Figure 3-14**). This CSP crossing appeared to have at one point provided access for large equipment navigating the valley. At the time of sampling, the CSP was perched and produced a large fish barrier. No fish species were observed throughout the reach, with multiple fish barriers present in the form the downstream CSP culvert and opening grate, the highly perched culvert mid-stream, and a lack of baseflow throughout the reach with negligent refuge amongst the angular stone. The upstream extent of the north branch also contributed to a lack of fish habitat, with

baseflow limited by a large crossing constructed out of large engineered boulders (**Figure 3-15**). The north branch of the tributary was dry both up and downstream of this boulder crossing, with baseflow contributed to the main tributary by the south branch originating from Glenwood Drive (**Figure 3-16**) and from potential groundwater sources. Sources of nutrient and/or pollutant loading could be attributed to the upstream Glenwood Drive right-of-way as well as upstream and adjacent residences and pedestrian trails.

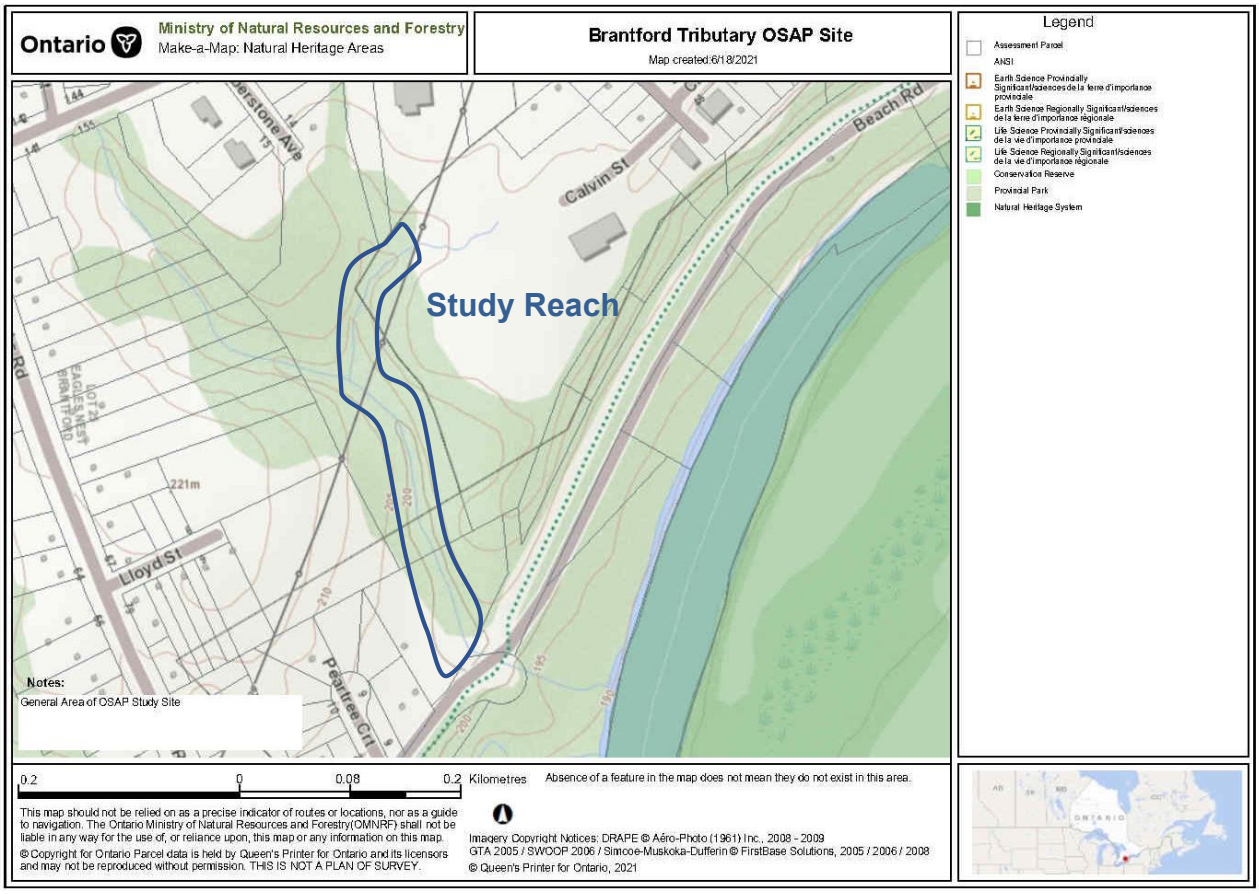



**Figure 3-7: Natural Heritage Mapping (Ministry of Natural Resources and Forestry, 2021).**

**Figure 3-8: Habitat Conditions at Downstream Extent, Looking Upstream.**

**Figure 3-9: Groundwater Seep.**

**Figure 3-10: Culvert at Downstream Extent.**

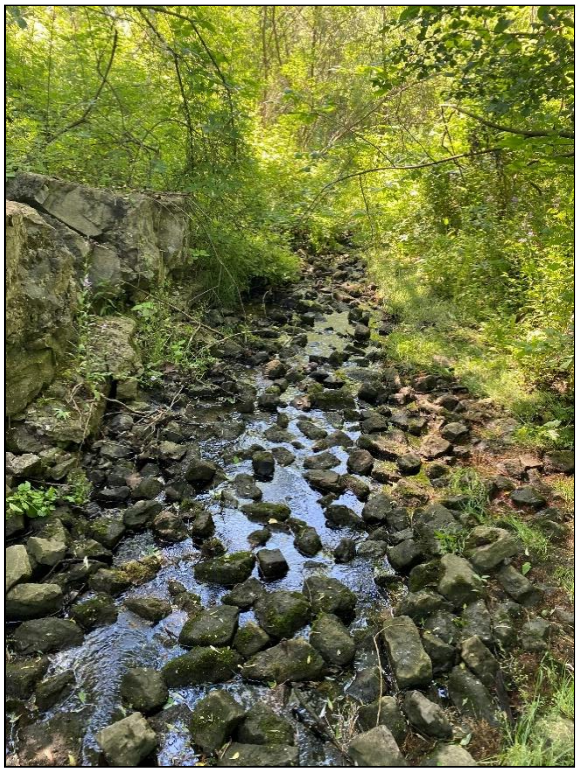


**Figure 3-11: Armourstone Shoring and Angular Substrate.**

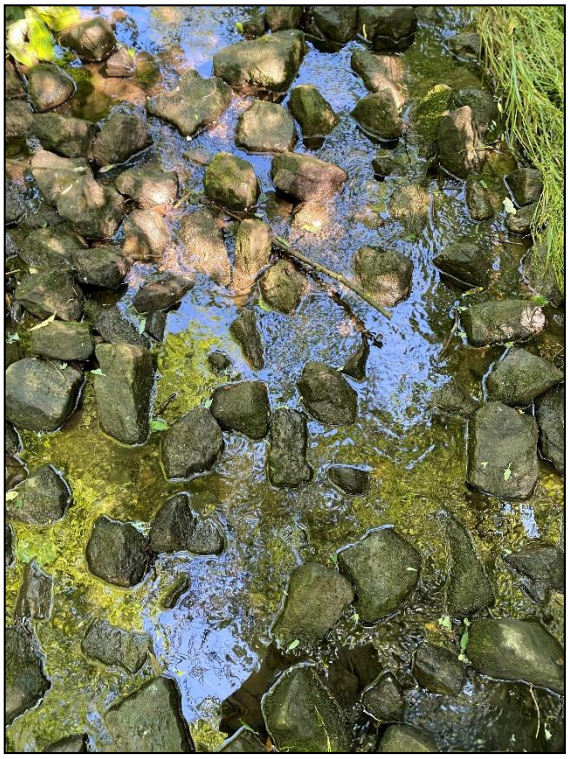


**Figure 3-12: Typical Substrate.**

**Figure 3-13: Woody Debris Jam, Looking Upstream.**

**Figure 3-14: Perched CSP Culvert.**

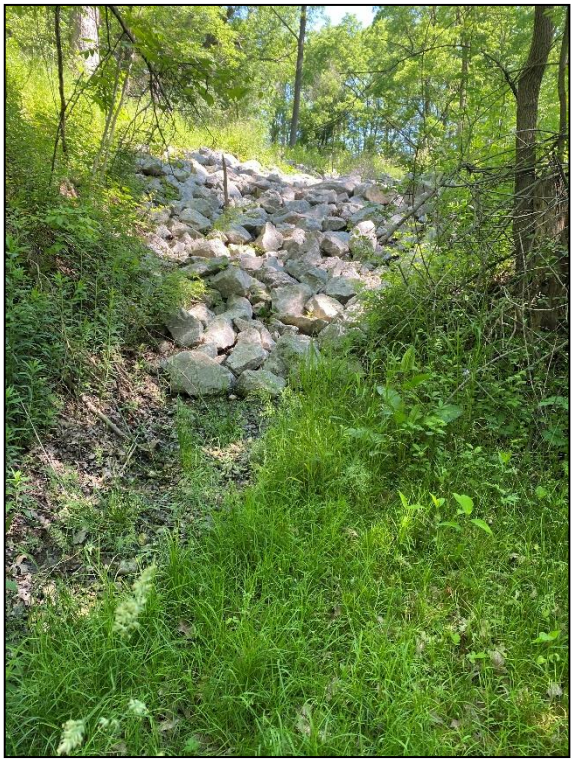


**Figure 3-15: Upstream Boulder Placement, Upstream Extent.**

**Figure 3-16: South branch, Looking Upstream from Confluence with North Branch.**

### *3.3.5.1 Fish Community Assessment*

Understanding of the fish community present or potentially present within the tributary was limited to background information provided by the MNRF, DFO and GRCA. MNRF Aquatic Resource Areas show a lack of fish records within the tributary despite having the tributary mapped as an aquatic resource, suggesting that the tributary does not contribute to direct fish habitat. Moreover, GRCA and DFO records are limited to the Grand River, located downstream of the tributary and separated by multiple fish barriers, further supporting that the tributary does not support fish. Finally, no fish were observed throughout the entire reach, with a lack of in-water habitat demonstrated throughout the entire subject site. No thermal regime data is available for the tributary, however surrounding watercourses, including the Grand River maintain a warmwater thermal regime despite supporting multiple coldwater species.

The following species have records in the Grand River associated with the study area tributary:

Alewife (*Alosa pseudoharengus*), *Ameiurus* sp., Black Crappie (*Pomoxis nigromaculatus*), Black Redhorse (*Moxostoma duquesnei*), Blackside Darter (*Percina maculata*), Bluegill (*Lepomis macrochirus)*, Bluntnose Minnow (*Pimephales notatus*), Bowfin (*Amia calva*), Brook Silverside *(Labidesthes sicculus*), Brown Bullhead (*Ameiurus nebulosus*), Carps and Minnows (*Cyprinidae*), Channel Catfish (*Ictalurus punctatus*), Chinook Salmon (*Oncorhynchus tshawytscha*), Coho Salmon (*Oncorhynchus kisutch*), Common Carp (*Cyprinus carpio*), Common Shiner (*Luxilus cornutus*), Freshwater Drum (*Aplodinotus grunniens*), Gizzard Shad (*Dorosoma cepedianum*), Golden Redhorse (*Moxostoma erythrurum*), Golden Shiner (*Notemigonus crysoleucas*), Goldfish (*Carassius auratus*), Greater Redhorse (*Moxostoma valenciennesi*), Green Sunfish (*Lepomis cyanellus*), Greenside Darter (*Etheostoma blennioides*), Johnny Darter (*Etheostoma nigrum*), Johnny Darter x Tesselated Darter, Largemouth Bass (*Micropterus salmoides*), Logperch (*Percina caprodes*), Longnose Gar (*Lepisosteus osseus*), Mimic Shiner (*Notropis volucellus*), Mooneye (*Hiodon tergisus*), *Moxostoma* sp., Muskellunge (*Esox masquinongy*), Northern Hog Sucker (*Hypentelium nigricans*), Northern Pike (*Esox lucius*), Perches, Pumpkinseed (*Lepomis gibbosus*), Quillback (*Carpiodes cyprinus*), Rainbow Darter (*Etheostoma caeruleum*), Rainbow Trout (*Oncorhynchus mykiss*), Rock Bass (*Ambloplites rupestris*), Round Goby (*Neogobius melanostomus*), Shorthead Redhorse (*Moxostoma macrolepidotum*), Silver Redhorse (*Moxostoma anisurum*), Smallmouth Bass (*Micropterus*

*dolomieu*), Spotfin Shiner (*Cyprinella spiloptera*), Spottail Shiner (*Notropis hudsonius*), Sunfishes (*Lepomis* sp.), Trout-Perch (*Percopsis omiscomaycus*), Walleye (*Sander vitreus*), White Crappie (*Pomoxis annularis*), and White Sucker (*Catostomus commersonii*).

This tributary has also been identified as non-critical habitat for several aquatic Species at Risk (Silver Shiner - *Notropis photogenis*, Black Redhorse - *Moxostoma duquesnei*, Round Pigtoe - *Pleurobema sintoxia.* Eastern Sand Darter - *Ammocrypta pellucida* and Wavy-rayed Lampmussel - *Lampsilis fasciola*), discussed in **Section 3.4.2.3**.

Despite the tributary in question representing a lack of habitat and suggesting that fish were not present throughout the reach, the tributary directly influences downstream habitat which contains fish at any time during any given year, with the MNRF mapping this tributary as an aquatic resource. This suggests that the tributary should be considered contributing fish habitat, that is habitat that contributes to baseflow, food and sediment to downstream direct fish habitat.

### *3.3.6 DFO Self-Assessment*

The federal *Fisheries Act* requires that projects avoid causing the death of fish and the harmful alteration, disruption or destruction of fish habitat unless authorized by the Minister of Fisheries and Oceans Canada (DFO). This applies to work being conducted in or near waterbodies that support fish at any time during any given year or are connected to waterbodies that support fish at any time during any given year. As noted above, the study area does not likely contain fish at any time during any given year, but contributes to downstream fish habitat with records within the Grand River showing the presence of a diverse fish community. Therefore, the *Fisheries Act* applies to works conducted in or near water at the subject site.

Upon completion of the detailed design for the channel works at the study site, the works should be cross-referenced with the DFO "Projects Near Water" online service to determine if a request for regulatory review under the federal Fisheries Act is required (Department of Fisheries and Oceans, 2021). Based on field investigations conducted by Aquafor staff and background information provided by the MNRF, the study area does not contain fish at any time during any given year, but is considered contributing habitat to downstream fish habitat. It is therefore the opinion of Aquafor Beech Limited that a request for regulatory review by Fisheries and Oceans Canada will be required if the project does not meet the conditions laid out by the DFO in the Measures to protect fish and fish habitat (Department of Fisheries and Oceans, 2021). It is recommended that the proponent exercise the measures listed by Fisheries and Oceans Canada to avoid contravention with the Federal *Fisheries Act* and exercise due diligence by further mitigating accidental death of fish and the harmful alteration, disruption or destruction of fish habitat.

### *3.3.7 In-Water Timing Window*

Based on the observations discussed above and on recommendations made by the MNRF In-water Work Timing Window Guidelines (MNRF, 2013) for Ontario's Southern Region, no in-water works should take place between March 15th and July 15th of any given year. This restriction is aimed to protect the species that maintain the potential to occur in the Grand River tributary and downstream study area during their vulnerable life stages of spawning and rearing and should be implemented to avoid contravention to the Federal *Fisheries Act*, among other mitigation measures. This timing window should be confirmed within the detailed design phase by contacting the GRCA and/or DFO.

## 3.4 Wildlife & Species at Risk

### *3.4.1 Resident Wildlife*

Targeted surveys for terrestrial wildlife were not included in Aquafor's scope of work for this assignment. Notwithstanding, incidental observations of wildlife and wildlife habitat features were recorded during 2020 and 2021 field investigations, including evidence of habitat utilization (e.g., scat, tracks, nests, fur, etc.) where available. Evidence of the species observed by Aquafor are listed in **Table 3-3** below.

**Table 3-3: Incidental Wildlife Observations**

| Species Observed | | S Rank | SAR Designation (ESA) |
|---|---|---|---|
| **Common Name** | **Scientific Name** | | |
| ***Birds*** | | | |
| American Robin | *Turdus migratorius* | S5B | - |
| Black-capped Chickadee | *Poecile atricapillus* | S5 | - |
| Blue-headed Vireo | *Vireo solitarius* | S5B | - |
| Blue Jay | *Cyanocitta cristata* | S5 | - |
| Brown Creeper | *Certhia americana* | S5B | - |
| Carolina Wren | *Thryothorus ludovicianus* | S4 | - |
| Cedar Waxwing | *Bombycilla cedrorum* | S5B | - |
| Downy Woodpecker | *Picoides pubescens* | S5 | - |
| Gray Catbird | *Dumetella carolinensis* | S4B | - |
| House Sparrow | *Passer domesticus* | SNA | - |
| Red-tailed Hawk | *Buteo jamaicensis* | S5 | - |
| Turkey Vulture | *Cathartes aura* | S5B | - |
| White Breasted Nuthatch | *Sitta carolinensis* | S5 | - |
| Yellow-rumped Warbler | *Setophaga coronata* | S5B | - |
| ***Amphibians*** | | | |
| Gray Treefrog | *Hyla versicolor* | S5 | - |
| ***Mammals*** | | | |
| Eastern Cottontail | *Sylvilagus floridanus* | S5 | - |
| White-tailed Deer | *Odocoileus virginianus* | S5 | - |

No Species at Risk (SAR) or Species of Conservation Concern (SOCC) were observed in the study area at the time of the surveys. Notwithstanding, potential exists for SAR (discussed further in **Section 3.4.2**), or additional other common wildlife species to use the habitats types found in urban river corridors. As such, the study area and surrounding habitat likely supports a wider range of wildlife than could be confirmed during Aquafor's field investigations.

### *3.4.2 Species at Risk and Species of Conservation Concern*

Aquafor conducted a Species at Risk (SAR) screening for species that may occur in or adjacent to the study area. For the purpose of this memo, SAR are defined as species listed as Endangered (END), Threatened (THR), or Special Concern (SC) under the Ontario *Endangered Species Act* (ESA) and/or the federal *Species at Risk Act* (SARA). Screening was completed by compiling a list of SAR with historical presence or potential in the study area, and cross-referencing the habitat requirements of those species with the habitat conditions on the site.

A search of the Ontario Natural Heritage Information Center (NHIC) SAR database and citizen science online resources (eBird and iNaturalist) was carried out to identify any potential SAR in the general area. A request was made to MECP for any additional SAR information (beyond the sources listed above), or provincially/locally rare species known in the study area. Locations, observation dates and any other relevant information about terrestrial and aquatic flora and fauna were requested with UTM's/accuracy codes, and/or mapping data in GIS (shapefile) format. A reply to this query was not received by the time of this report's publication. Any relevant information from the MECP may be incorporated into future phases of this project, if required.

One SAR was identified within the study area during field investigations: Butternut. The species discussed in the follow subsections were also determined to have some potential to occur within the study area based on the presence of suitable habitat features.

#### *3.4.2.1 Bats (Myotis and Perimyotis spp.) – Endangered*

Preferred maternity roost habitat of Little Brown and Northern Myotis (*Myotis lucifugus* and *M. septentrionalis*) are similar, consisting of "snags", or standing/dead trees >10 cm DBH with cracks, hollow cavities, and/or loose or naturally exfoliating bark. Large hardwoods such as Basswood, Oak or Maple often make good host trees for this species, although any tree with suitable characteristics may be used, and are often located close to a water source. Seven potential maternity roost trees were identified within the study area.

Candidate Tricolored Bat (*Perimyotis subflavus*) roost sites consist primarily of maple trees (*Acer* spp.) >25 cm DBH, maples >10 cm DBH with a broken branch with dying leaf clusters, and any oak (*Quercus* spp.) >10cm DBH. Leaf clumps such as squirrel nests are also sometimes used. 38 potential maternity roost trees were identified within the study area.

A total of 40 candidate maternity roost trees for *Myotis* spp. and Tricoloured Bat were identified within the study area (previously shown in **Figure 3-4** to **Figure 3-6). Any removal of potential bat habitat trees would need to be preceded by the submission of an Information Gathering Form to the MECP to determine if there are requirements for the project under the ESA. Tree removals should be timed to avoid the bat maternity season which generally runs April 1 – October 1.**

#### *3.4.2.2 Butternut – Endangered*

Butternut (*Juglans cinerea*) is a short-lived (<75 years), mast-bearing tree in the walnut family (*Juglandaceae*) that is currently designated as Endangered and receives general habitat protection under the ESA. The primary threat to Butternut is an introduced exotic fungal pathogen, *Sirococcus clavigignenti-juglandacearum* ("butternut canker"). Infection generally occurs through wounds, broken branches or leaf scars, causing twig dieback and eventual tree mortality. The most obvious sign of infection is a black, oozing canker on the stem or twigs.

Butternut is frequently found along floodplains, streambanks, and ravine slopes, but can occur in a wide variety of other conditions; it is more common in areas with underlying limestone and is generally absent from regions with acidic soil such as the granite-dominated areas of the Canadian Shield. Butternut is intolerant of shade and tends to be found either as a mature canopy tree or in or in openings and edges (COSEWIC, 2017). A single mature Butternut was confirmed within the study area along the east slope and additional potential habitat occurs throughout the study area.

The provincial Butternut Recovery Strategy (Poisson & Ursic, 2013) recommends that a minimum radius of 25 m from the base of the stem of all Butternuts be considered protected habitat. However, it also recommends that this protection only be applied to healthy trees (i.e., trees which are not affected by the canker to the degree they are classed as "non-retainable" by a Butternut Health Assessment). The MNRF's interim guidance on general habitat for Butternut under the ESA (2015) confirms that a 25 m radius from each tree should be considered Category 1 habitat which protects the critical root zone and other functions that support the life of that individual, but further adds that suitable areas from 25-50 m of a tree should be considered Category 2 habitat necessary for nut dispersal and seedling establishment. **Any Butternut that are found within 50 m of the proposed works should be subject to a Butternut Health Assessment to determine their status. Works affecting retainable Butternut will be subject to requirements under the ESA.**

#### *3.4.2.3 Fish and Mussels (Eastern Sand Darter, Silver Shiner, Black Redhorse, Round Pigtoe and Wavy-rayed Lampmussel) – Endangered and Threatened*

As shown on DFO's Aquatic Species at Risk Mapping tool, all five of these species are thought to occur within the small tributary found within the study area. These species are all listed as either Threatened or Endangered under the provincial *Endangered Species Act* and/or federal *Species at Risk Act*. No critical habitat is known for any of the listed species directly within the study area tributary, although the Grand River directly downstream of the study area provides critical habitat for Round Pigtoe and Eastern Sand Darter. Habitat requirements for each of these aquatic SAR varies, but all five species are generally found in deep water of lakes or large rivers. The study area habitat consists of shallow flow over coarse substrate (dominantly riprap, cobble, gravel and sand), generally between 1 to 2 m wide with little to no vegetation cover within or overhanging the creek and is unlikely

to directly support any aquatic SAR. Fish barriers are also present between the Grand River and study area tributary, which is a limiting factor for fish passage into the study area.

Notwithstanding, flows from the study area directly outlet into the Grand River, and works within the study area tributary could have potential negative impacts on connected, downstream habitat. To avoid harm to aquatic SAR residing in the Grand River downstream of the study area, appropriate mitigation measures associated with construction should be employed within 30 m of the watercourse. A fish rescue should be carried out if the proposed works intend to intersect the high-water mark and appropriate mitigation measures should be followed. **A DFO Request for Review must be submitted to the Department of Fisheries and Oceans prior to construction for any works within 30 m of the watercourse.**

#### *3.4.2.4 Eastern Wood-pewee – Special Concern*

The Eastern Wood-pewee (*Contopus virens*) occurs throughout Southern Ontario in a wide variety of wooded upland and lowland habitats, breeding most often in intermediate-age mature deciduous or mixed forests with an open understory. Eastern Wood-pewee has a strong preference for nest sites near clearings and forest edges and is most often associated with the mid-canopy of forest clearings, although it may also occur in anthropogenic habitats that provide an open forested aspect such as parks and suburban neighborhoods. In general, the size of forest fragments does not appear to be an important factor in habitat selection for this species, though the presence of residential developments surrounding woodlots does appear to decrease the likelihood that Eastern Wood-pewee will be present. The presence of dead branches that are used as hunting perches may be an additional habitat need (COSEWIC, 2012). Edge habitat as described is abundantly available in the study area.

Threats contributing to the decline of this species are not fully understood. Forest fragmentation of itself does not appear to be a major factor since the size of forest fragments was not found to significantly affect nest site selection. However, the overall amount of forest cover on the landscape and the proximity of human development to remaining woodlots may both influence habitat suitability. As noted above, Eastern Wood-pewees are less likely to be found in urban woodlots surrounding by residential developments as opposed to forests in natural or rural settings. Reductions in flying insect populations, which are the main food source for Eastern Wood-pewee, are also a likely factor (COSEWIC, 2012).

Although not confirmed during Aquafor's field investigations, eBird records of this species in the vicinity of the site indicate that this species may be using habitat in the general area. Confirmed breeding of this species would qualify the associated habitat as Significant Wildlife Habitat (SWH) according to the MNRF's SWH Criteria Schedule for Eco-Region 7E (2015), as breeding habitat would represent habitat that is key in the survival or well-being of the species (see also **Section 3.4.3.1**). Vegetation removal associated with construction would permanently reduce available nesting habitat directly within the construction footprint. However, this habitat type is not limiting in the surrounding area and the proposed removal is not expected to have a significant effect on breeding opportunity for this species provided mitigation measures are followed to avoid destruction or damage of active nests. Impacts to Eastern Wood-pewee can be reduced by avoiding vegetation clearing during the breeding bird window in any given year (April 1 to August 31).

#### *3.4.2.5 Red-headed Woodpecker – Special Concern*

Red-headed Woodpecker (*Melanerpes erythrocephalus*) breeds in open, deciduous woodland clearings or woodland edges and are often associated with beech or oak forests, beaver ponds and swamp forests with little or no understory vegetation and where snags are numerous. They may also be found in parks, cemeteries, golf courses, orchards, pastures, burns and savannahs that provided large trees for nesting. Nests are excavated in the trunks of large dead trees with at least 40 cm DBH, often within about 4 ha for a territory. As the study area woodland is connected to a larger riparian corridor and contains open woodlands such as Oak and Black Walnut (WODM3-3 and WODM4-4 respectively), as well as being in proximity to several large maintained fields, this habitat is highly suitable for the Red-headed Woodpecker.

Declines in Red-headed Woodpecker population over the past few decades has been attributed to habitat loss, mainly including deforestation for forestry use or agriculture, or the removal of snags used by this species for

breeding. Approximately 60 percent of this species' population has been reduced in the past 20 years (MECP, 2021a).

Although not confirmed during Aquafor's field investigations, eBird records of this species in the vicinity of the site indicate that this species may be using habitat in the general area. Confirmed breeding would qualify the associated habitat as SWH within Eco-Region 7E (see also **Section 3.4.3.1**). Vegetation removal associated with construction would permanently reduce available nesting habitat directly within the construction footprint. However, this habitat type is not limiting in the surrounding area and the proposed removal is not expected to have a significant effect on breeding opportunity for this species provided mitigation measures are followed to avoid destruction or damage of active nests. Impacts to Red-headed Woodpecker can be reduced by avoiding vegetation clearing during the breeding bird window in any given year (April 1 to August 31).

#### *3.4.2.6 Wood Thrush – Special Concern*

In Ontario, Wood Thrush (*Hylocichla mustelina)* breeds in moist, deciduous hardwood or mixed stands that are often previously disturbed (second-growth) or mature, with a dense deciduous undergrowth (saplings and well-developed understory layers) and with tall trees for singing perches. Favored nesting trees often include Sugar Maple or American Beech. This species prefers large forest mosaics, but may also nest in small forest fragments. Wood Thrush selects nesting sites with the following characteristics: lower elevations with trees less than 16 m in height, a closed canopy cover (>70 %), a high variety of deciduous tree species, moderate subcanopy and shrub density, shade, fairly open forest floor, moist soil, and decaying leaf litter.

Wood Thrush has experienced declines in recent years due to several factors, including habitat fragmentation from development, loss of understory diversity from deer browses or other disturbance, and nest parasitization from Brown Cowbird (MECP, 2021b).

Although not confirmed during Aquafor's field investigations, eBird records of this species in the vicinity of the site indicate that this species may be using habitat in the general area. Confirmed breeding would qualify the associated habitat as SWH within Eco-Region 7E (see also **Section 3.4.3.1**). Vegetation removal associated with construction would permanently reduce available nesting habitat directly within the construction footprint. However, this habitat type is not limiting in the surrounding area and the proposed removal is not expected to have a significant effect on breeding opportunity for this species provided mitigation measures are followed to avoid destruction or damage of active nests. Impacts to Wood Thrush can be reduced by avoiding vegetation clearing during the breeding bird window in any given year (April 1 to August 31).

#### *3.4.2.7 Honey Locust – S2?*

Honey-locust (*Gleditsia triacanthos*) is a deciduous tree in the Legume family (*Fabaceae)* that is typically associated with riparian areas. This species was confirmed in the WODM4-4 community. Although it did not appear to be planted, it did not contain thorns (an indicator that it is of the *inermis* variety rather than the native S2 plant). This is further validated by its status as "introduced" in Brant Country (Oldham, 2017). As such, this specimen is likely a progeny of landscaping trees planted in the area historically, and is not considered rare for the purposes of this study.

#### *3.4.2.8 Pignut Hickory – S3*

Pignut Hickory (*Carya glabra*) is a tree in the Walnut family (*Juglandaceae*) often found growing in association with other Hickories and Oaks, typically in the moist, fertile soils of bottomland hardwood forests, upland slopes or on valley ridges. Several large individuals were found in the WODM3-3 and at the edge of the FOCM6 community, all apparently in good health. Although these specimens fall outside of the proposed impact areas for any of the four Alternatives, it is likely that a viable seed bank exists in the surrounding area and that additional individuals exist.

#### *3.4.2.9 Locally Rare Plant Species*

Common Hackberry, Purple-veined Willow-herb (*Epilobium coloratum*), Meadow Horsetail *(Equisetum pratense*), Woodland Strawberry (*Fragaria vesca*), Virginia Stickseed (*Hackelia virginiana*), Spotted St. John's

Wort *(Hypericum punctatum*), Tamarack (*Larix laricina*), Dwarf Clearweed (*Pilea pumila*) and Large-toothed Aspen (*Populus grandidentata*) have been documented by Aquafor within the study area. These species are considered "Uncommon" or "Rare" in Brant County (Oldham, 2017) and are likely to be susceptible to habitat disturbance. Where possible, the construction footprint should avoid these species. Where disturbance cannot be avoided, transplantation to a nearby suitable habitat may be an option with agency approval.

### *3.4.3 City of Brantford – Environmental Control Policy Area*

Under the City of Brantford Official Plan (OP), Natural Heritage: Environmental Areas within the City include the following: Environmental Protection Policy Areas, Environmental Control Policy Areas, Adjacent Lands, Wetlands, and Mineral Resource Areas, which are subject to development stipulations under the plan. As per Schedule 3-1 of the OP, the study area falls within an Environmental Control Policy Area. Lands designated under the Environmental Control Policy "contain sensitive natural features such as steep slopes, streams, wetlands, areas of groundwater discharge and representative tree cover, and are designated on the basis of being comprised of fish habitat, significant woodlands, significant wildlife habitat, significant Areas of Natural and Scientific Interest, natural linkages, and locally significant prairies and savannahs" and are generally intended for conservation. Based on Aquafor's site investigations, the following attributes apply to the study area's woodland corridor:

- Significant Wildlife Habitat;
- Significant Woodland; and
- Fish habitat

Site alteration within Environmental Control Policy Areas is permitted only with the completion of an Impact Assessment demonstrating to the City, GRCA and all other applicable agencies that there will be no negative impacts to these ecological features or functions.

#### *3.4.3.1 Significant Wildlife Habitat*

Criteria schedules for Significant SWH in Eco-Region 7E (MNRF, 2015) were evaluated in relation to the study area features to determine candidate or confirmed SWH exists at the site. The following SWH designations have potential to, or do occur within the study area.

Bat Maternity Roost Colonies – Potential Candidate: The SWH criteria indicate that maternity colonies are found in forested ELC Ecosites (FOD, FOM, SWD, and SWM series) with large-diameter standing dead trees and trees containing cavities. Features meeting these criteria are present in the study area forest. However, as this category overlaps with SAR bat habitat, and as SAR habitat is generally more restrictive in terms of regulatory protection and related requirements, this habitat function will be discussed for the remainder of this report with respect to SAR instead of SWH.

- Special Concern and Rare Wildlife Species - Confirmed: Pignut Hickory, a provincially ranked S3 species, was confirmed in both WOD3-3 and FOCM6 communities within the study area. The presence of this species qualifies both ELC units and their respective habitat as SWH, with potential for additional Pignut Hickory in neighboring communities as well. The study area also potentially provides habitat for three Special Concern bird species, previously discussed in **Section 3.4.2**.

- Groundwater Seeps - Confirmed: Aquafor noted several large areas of groundwater seepage on the southwest bank of the study area ravine, within the FOD7-3 community. At least two groundwater outlets were noted, where persistent soil moisture and wetland plants were observed. One of the key associated wildlife species (White-tailed Deer) was also confirmed within the study area, suggesting use of the feature by this species.

#### *3.4.3.2 Significant Woodland*

Significant Woodlands are characterized based on several attributes, including size, ecological function, any uncommon characteristics associated with the woodland, and its economic and social function. Based on the attributes of the study area woodland, the following criteria qualify it as significant:

- Woodland Size: Due to dense residential and industrial development within the city of Brantford, and surrounding areas being mostly agriculture, woodland cover in the general area is roughly 15% of the total land cover. The particular woodland appendage associated with the study area is approximately 8.5 ha, and connects to the woodland corridor associated with the Grand River riparian zone, resulting in a much larger forest tract. According to Significant Woodland size criteria, any woodland greater than 4 ha in size that exists in an area with 5 – 15% woodland cover should be considered significant.

- Ecological Function: The study area woodland contains attributes such as being in close proximity to other woodland features (including the Grand River riparian woodland), functions as water protection (e.g. contains a fish bearing creek and several groundwater seeps) and contains steep valley slopes in its southern extent.

- Uncommon Characteristics: Tree stem count was not calculated as a part of this assignment, however, Aquafor observed areas in the WODM3-3 community where there is multiple Oak of large DBH, indicating an age of greater than 100 years. It is likely that this community may contain enough large trees to qualify as significant.

### 3.5 Archaeological Assessment

Stage 1 archaeological assessment was carried out by Archaeological Services Inc. (ASI) in October 2021. The assessment included review of background documentation and field investigations to determine if the project exhibits archaeological potential and requires Stage 2 assessment.

The Stage 1 assessment indicated that part of the study area exhibits archaeological potential and will require Stage 2 assessment by test pit survey at five-meter intervals, prior to any proposed impacts to the property, to be undertaken at the detailed design stage. A summary of the assessment results is shown in **Figure 3-17** and the full archaeological report is included in **Appendix C**.

### 3.6 Cultural Heritage Assessment

In response to Ministry of Heritage, Sport, Tourism and Culture Industries' (MHSTCI) comments regarding the Notice of Virtual PIC, a Cultural Heritage Assessment was completed by Archaeological Services Inc. (ASI) in October 2021. The assessment intended to present an inventory of known and potential built heritage resources and cultural heritage landscapes, identify existing conditions of the project study area, provide a preliminary impact assessment, and propose appropriate mitigation measures.

The results of the assessment suggested that there are eight (8) previously identified built heritage resources with cultural heritage value and one (1) cultural heritage landscape within 50m buffer of the study area. No direct impacts to the identified built heritage resources or the cultural heritage landscape are anticipated as a result of the preferred alternative. However, potential indirect impacts are anticipated as construction is to occur in close proximity to the primary buildings on the properties. It is therefore recommended that construction activities and staging should be suitably planned and undertaken to avoid impacts to identified cultural heritage resources, with proper fencing around no-go zones to mitigate any unintended impacts. A summary mapping of the identified resources is shown **Figure 3-18** and **Figure 3-19** and the full Cultural Heritage report is included in **Appendix D**.


**Figure 3-17: Results of the Stage 1 Archaeological Assessment (ASI, 2021).**

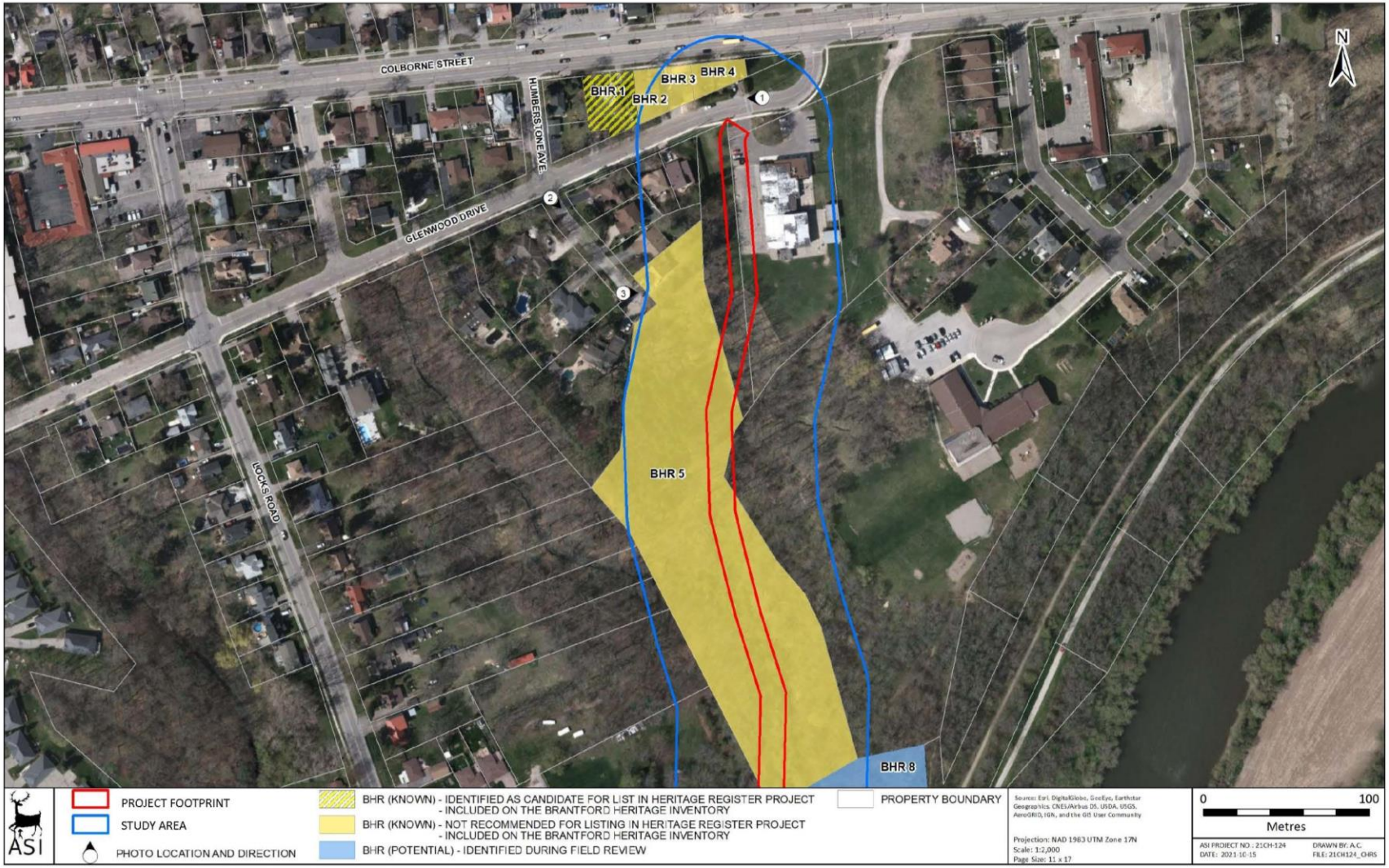



**Figure 3-18: Results of Cultural Heritage Assessment 1 of 2 (ASI, 2022).**

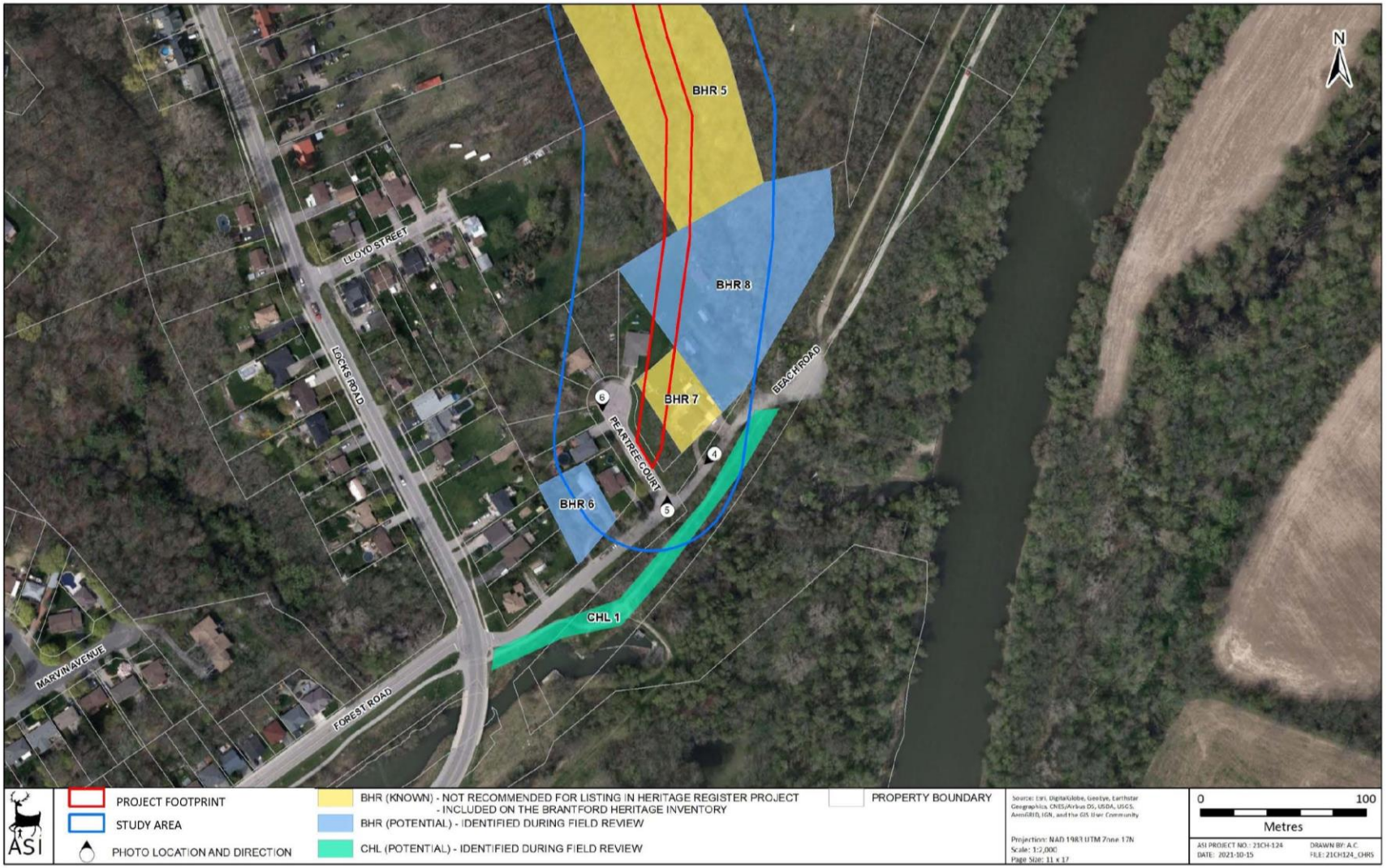



**Figure 3-19: Results of Cultural Heritage Assessment 2 of 2 (ASI, 2022).**

# 4 DEVELOPMENT OF THE PREFERRED SOLUTION

## 4.1 Alternative No.1 - Do Nothing

The 'Do Nothing' alternative involves leaving the study area, particularly the dense vegetation within the easement. As mentioned above, the area at its present state restricts access to the sanitary and storm sewer infrastructure for any vehicle or machinery to undertake inspection, maintenance and repair works. With no such works completed in the past nor intervention in the near future, the infrastructure is considered at an elevated level of risk for potential failure due to debris built-up, tree root intrusion, and infiltration.

Although no capital costs would be incurred for this alternative, monitoring of the study area and site visits after severe rainfall events would be required. Repair work would only be undertaken under emergency conditions (e.g., mass slope failure / infrastructure exposure), such as the works completed in 2019. In addition to the direct emergency repair cost for the infrastructure, costs associated with restoration efforts to mitigate negative ecological and environmental impacts are also expected.

A planform illustrating all infrastructure and landscape features under Alternative 1 is shown in **Figure 4-1**, highlighting the dense woodland setting that limits access to the sewers. Cost estimate for Alternative 1 is included in **Table 4-1**. Throughout the estimated remaining lifespan of the sewer (~50 year), a total cost of $1.6 million might be expected.

**Table 4-1: Preliminary Cost Estimates for Alternatives 1.**

| Utility Access Route Glenwood Drive to Peartree Court - Alternative 1 (Do Nothing) | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| **Item** | **Description** | **Qty** | **Unit** | **Unit Price** | **Extended Price (Excl. HST)** |
| **Section "A" - Risk Monitoring and Emergency Repairs** | | | | | |
| **1** | Ongoing Risk Monitoring | 1 | Year | $10,000.00 | $10,000.00 |
| **2** | Emergency Repairs to Manholes and Sewers | 1 | Year | $15,000.00 | $15,000.00 |
| **Subtotal Section A (Excl of HST)** | | | | | **$25,000.00** |
| | | | | | |
| **Section "C" – Contingency** | | | | | |
| **3** | Contingency (30%) | 1 | LS | $7,500.00 | $7,500.00 |
| **Subtotal Section C (Excl of HST)** | | | | | **$7,500.00** |
| | | | | | |
| | Section A - Risk Monitoring and Emergency Repairs | | | | $25,000.00 |
| | Section B - Contingency (30%) | | | | $7,500.00 |
| | | | | | |
| | Subtotal (Excl of taxes) | | | | $32,500.00 |
| | HST @ 13% | | | | $4,225.00 |
| | Total (Incl of taxes) | | | | $36,725.00 |

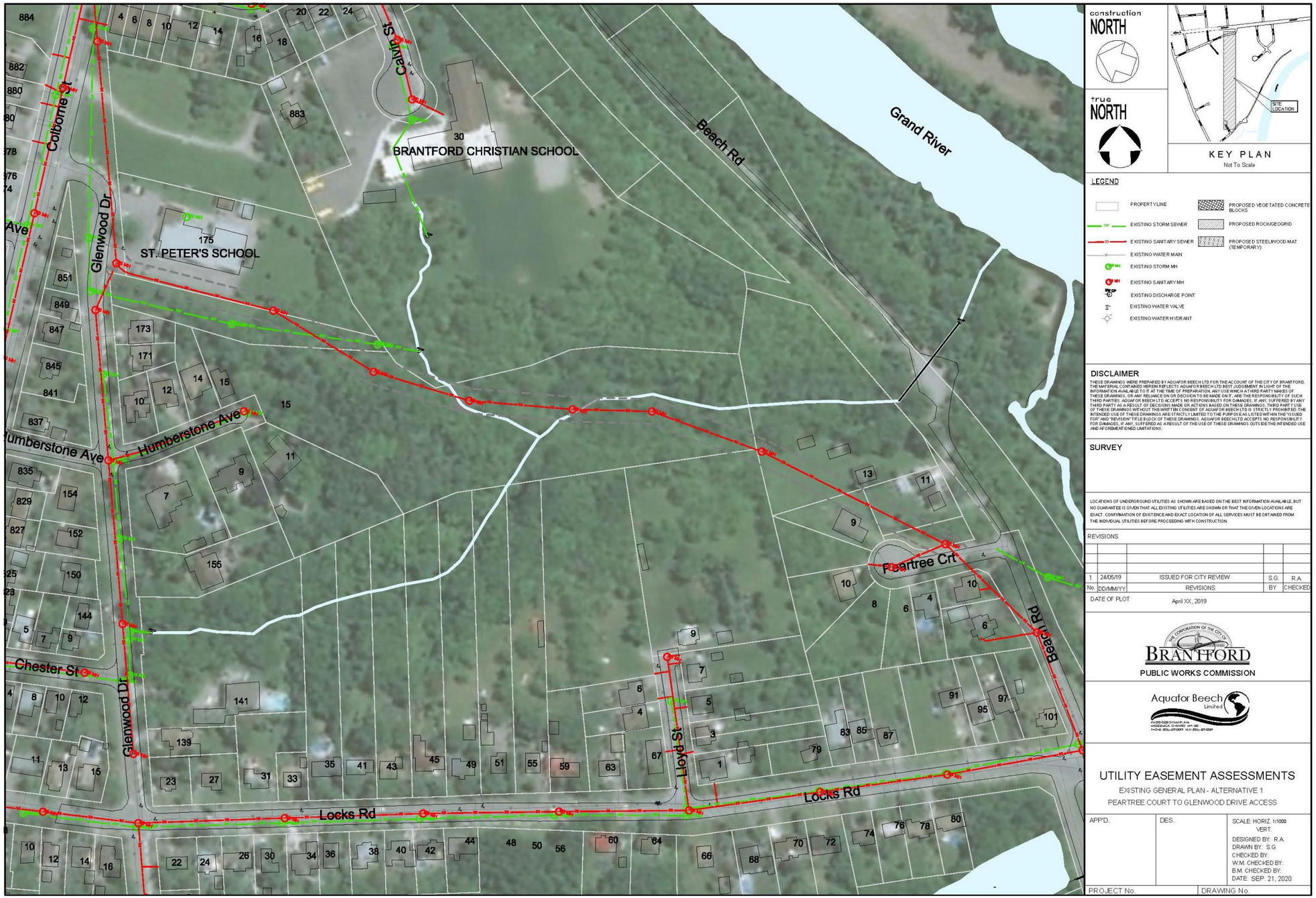



**Figure 4-1: Alternative No. 1 – Do Nothing**

### 4.2 Alternative No. 2 – Access Road from Both Ends with A Turn-around

Alternative No. 2 includes a permanent access road along the easement from Glenwood Drive and a temporary access route from Peartree Court, both within the easement limit.

The permanent section is approximately 350 m, ensuring access from Glenwood Drive to the sanitary manhole (MH 13) past the culvert crossing. A turn-around area is proposed at the end of permanent route, allowing service machinery (i.e., flusher truck) to turn around and exit through Glenwood Drive. This 5m wide route will be constructed using vegetated concrete block mats within the City maintained sod area (100m in length) intended to fit in the overall aesthetics while providing robust driving surface, with the remainder (250m in length) using riprap with geogrid base through the valley. It is noted that the existing culvert crossing will be maintained and reinforced with additional cover in Alternative 2, intended to provide additional protection to the corrugated metal pipe from service vehicles while allowing for safe crossings.

The most downstream manhole (MH 14) in the valley will be accessed from Peartree Court through private properties. Temporary wood/steel matting are proposed to protect private backyards and will be installed each time access is required. All impacted areas will be restored immediately after the work is completed.

As this alternative proposes the shortest permanent access route of all the access route alternatives, it would have moderate impacts to the naturalized valley setting. However, this alternative would pose a high level of disruption to the property owners of Peartree Court. Every time City wishes to access from Peartree, disturbance to the landowners is expected. Moreover, the turn-around area is constrained by the width of the easement (15.2m), of which the maximum turning radius is 7.6 m. This tight radius would pose a challenge to larger flush trucks.

Examples of the proposed access route materials are shown in **Figure 4-2** to **Figure 4-5**, and a preliminary design plan form of Alternative 2 is illustrated in **Figure 4-6**. The preliminary construction cost estimate for Alternative 2 is set out in **Table 4-2**.

**Figure 4-2: Example of Temporary Wood Matting with ESC Fencing.**

**Figure 4-3: Example of Rock Geogrid Access Route.**

**Figure 4-4: Example of Vegetated Concrete Block Installation (Nilex, 2022).**

**Figure 4-5: Example of Established Vegetated Concrete Blocks (Nilex, 2022).**

**Table 4-2: Preliminary Cost Estimates for Alternatives 2.**

| Utility Access Route Glenwood Drive to Peartree Court - Alternative 2 | | | | | |
|---|---|---|---|---|---|
| **Item** | **Description** | **Qty** | **Unit** | **Unit Price** | **Extended Price (Excl. HST)** |
| | **Section "A" – Site Preparation and Removal** | | | | |
| **1** | Mobilization and Demobilization | 1 | LS | $25,000.00 | $25,000.00 |
| **2** | Construction Layout and Utility Locates | 1 | LS | $10,000.00 | $10,000.00 |
| **3** | Temporary Access Route, Mud Mat, Wood Mat Protection and Staging Areas | 1 | LS | $10,000.00 | $10,000.00 |
| **4** | Clearing, Grubbing, and Tree Removals | 1 | LS | $20,000.00 | $20,000.00 |
| **5** | Supply, Install, and Remove Temporary Fencing | 1 | LS | $15,000.00 | $15,000.00 |
| | **Subtotal Section A (Excl of HST)** | | | | **$80,000.00** |
| | **Section "B" – Access Route Construction Works** | | | | |
| **6** | Excavation and Removal of Existing Soil to Subgrade Elevation | 1 | LS | $70,000.00 | $70,000.00 |
| **7** | Supply and Placement of Reinforced Gravel Road, including Geogrid and Geotextile | 250 | m | $580.00 | $145,000.00 |
| **8** | Supply and Placement of P Gate Steel Bollard | 2 | ea. | $4,000.00 | $8,000.00 |
| **9** | Supply and Installation of Vegetated Concrete Blocks, including filter fabric and granular base | 500 | m2 | $150.00 | $75,000.00 |
| **10** | Reinforcement of Existing Culvert | 1 | LS | $5,000.00 | $5,000.00 |
| **11** | Supply and Application of Grass Seed Mixture including 300mm topsoil | 1 | LS | $45,000.00 | $45,000.00 |
| **12** | Restoration Plantings of Trees and Shrubs | 1 | LS | $40,000.00 | $40,000.00 |
| **13** | Supply and Place Temporary Steel Plates | 1 | LS | $15,000.00 | $15,000.00 |
| **14** | Supply and Application of Terraseed Mixture Following Steel Plate Removal | 1 | LS | $20,000.00 | $20,000.00 |
| | **Subtotal Section B (Excl of HST)** | | | | **$423,000.00** |
| | **Section "C" – Contingency** | | | | |
| **15** | Contingency (30%) | 1 | LS | $150,900.00 | $150,900.00 |
| | **Subtotal Section C (Excl of HST)** | | | | **$150,900.00** |
| | Section A - Site Preparation and Removals | | | | $80,000.00 |
| | Section B - Access Route Construction Works | | | | $423,000.00 |
| | Section C - Contingency (30%) | | | | $150,900.00 |
| | Subtotal (Excl of taxes) | | | | $653,900.00 |
| | HST @ 13% | | | | $85,007.00 |
| | Total (Incl of taxes) | | | | $738,907.00 |

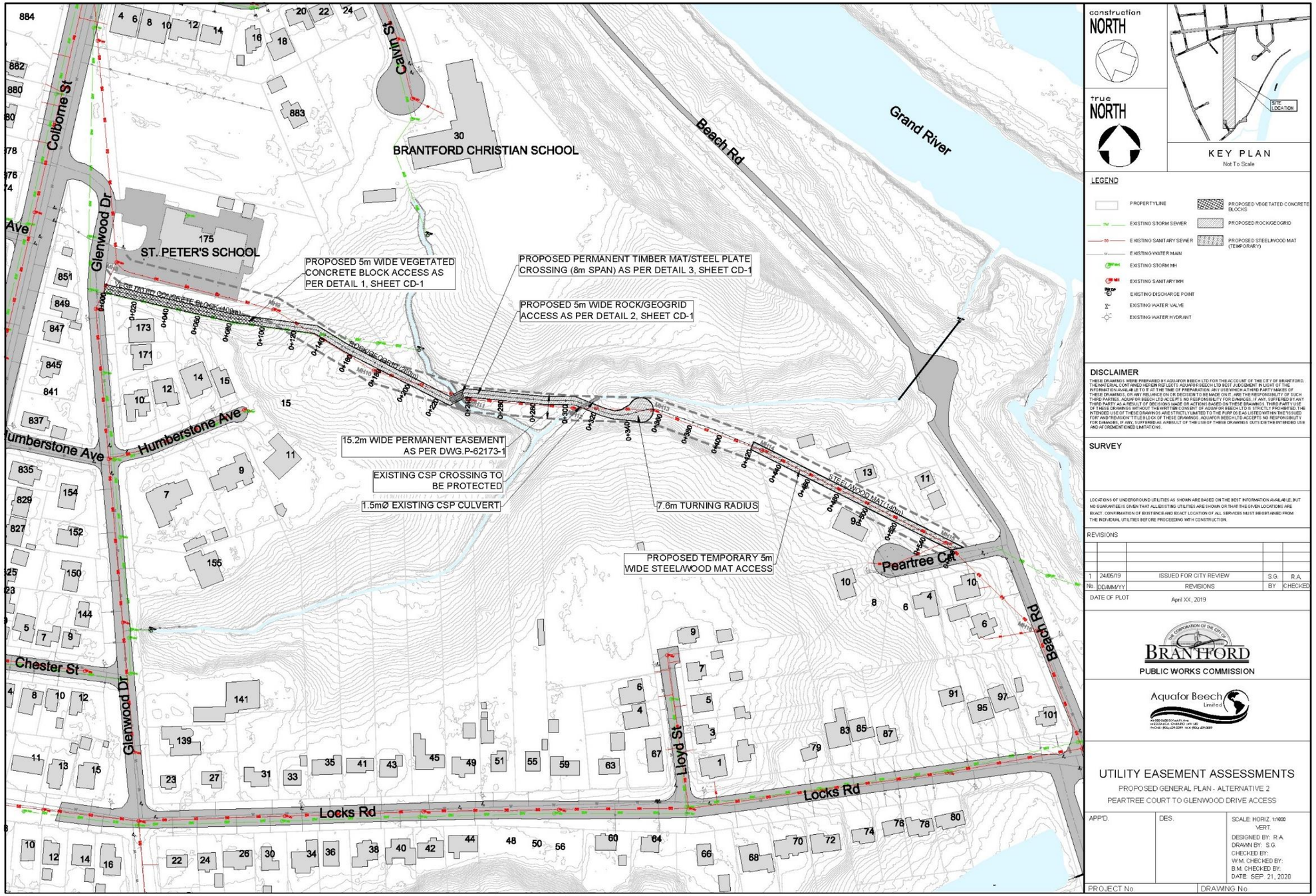



**Figure 4-6: Alternative No. 2 – Access Road from Both Ends with A Turn-around**

### 4.3 Alternative No. 3 – Access Road from Glenwood with A Turn-around

Alternative No. 3 includes construction of a permanent access route from Glenwood Drive of approximately 420m in length and a turn-around at the end, within the easement limit.

Similar to Alternative 2, the permanent route is proposed to be 5m wide, constructed using vegetated concrete block mats within the City maintained sod area (100m in length), with the remainder (320m in length) using riprap with geogrid base through the valley. This alternative provides access to all sanitary sewer manholes within the valley. The existing culvert crossing will also be maintained and reinforced with additional cover in this alternative.

As this permanent access route is slightly longer, it would have a greater impact on the naturalized valley setting. However, all disrupted areas will be restored with native plantings and seed mixes designed to provide stability and sustainability. The concerns regarding the turning radius similar to Alternative 2 also exhibits in this alternative. However, this alternative would pose no disruption to the property owners of Peartree Court, as no permanent road is proposed within the area.

A preliminary design plan form of Alternative 3 is illustrated in **Figure 4-7** and the associated preliminary cost estimate is set out in **Table 4-3**.

## Table 4-3: Preliminary Cost Estimates for Alternatives 3.

| Utility Access Route Glenwood Drive to Peartree Court - Alternative 3 | | | | | |
|---|---|---|---|---|---|
| **Item** | **Description** | **Qty** | **Unit** | **Unit Price** | **Extended Price (Excl. HST)** |
| | **Section "A" – Site Preparation and Removal** | | | | |
| **1** | Mobilization and Demobilization | 1 | LS | $25,000.00 | $25,000.00 |
| **2** | Construction Layout and Utility Locates | 1 | LS | $12,000.00 | $12,000.00 |
| **3** | Temporary Access Route, Mud Mat, Wood Mat Protection and Staging Areas | 1 | LS | $10,000.00 | $10,000.00 |
| **4** | Clearing, Grubbing, and Tree Removals | 1 | LS | $30,000.00 | $30,000.00 |
| **5** | Supply, Install, and Remove Temporary Fencing | 1 | LS | $18,000.00 | $18,000.00 |
| | **Subtotal Section A (Excl of HST)** | | | | **$95,000.00** |
| | **Section "B" – Access Route Construction Works** | | | | |
| **6** | Excavation and Removal of Existing Soil to Subgrade Elevation | 1 | LS | $90,000.00 | $90,000.00 |
| **7** | Supply and Placement of Reinforced Gravel Road, including Geogrid and Geotextile | 320 | m | $580.00 | $185,600.00 |
| **8** | Supply and Placement of P Gate Steel Bollard | 2 | ea. | $4,000.00 | $8,000.00 |
| **9** | Supply and Installation of Vegetated Concrete Blocks, including filter fabric and granular base | 500 | m2 | $150.00 | $75,000.00 |
| **10** | Reinforcement of Existing Culvert | 1 | LS | $5,000.00 | $5,000.00 |
| **11** | Supply and Application of Grass Seed Mixture including 300mm topsoil | 1 | LS | $52,000.00 | $52,000.00 |
| **12** | Restoration Plantings of Trees and Shrubs | 1 | LS | $55,000.00 | $55,000.00 |
| | **Subtotal Section B (Excl of HST)** | | | | **$470,600.00** |
| | **Section "C" – Contingency** | | | | |
| **13** | Contingency (30%) | 1 | LS | $169,680.00 | $169,680.00 |
| | **Subtotal Section C (Excl of HST)** | | | | **$169,680.00** |
| | Section A - Site Preparation and Removals | | | | $95,000.00 |
| | Section B - Access Route Construction Works | | | | $470,600.00 |
| | Section C - Contingency (30%) | | | | $169,680.00 |
| | Subtotal (Excl of taxes) | | | | $735,280.00 |
| | HST @ 13% | | | | $95,586.40 |
| | Total (Incl of taxes) | | | | $830,866.40 |

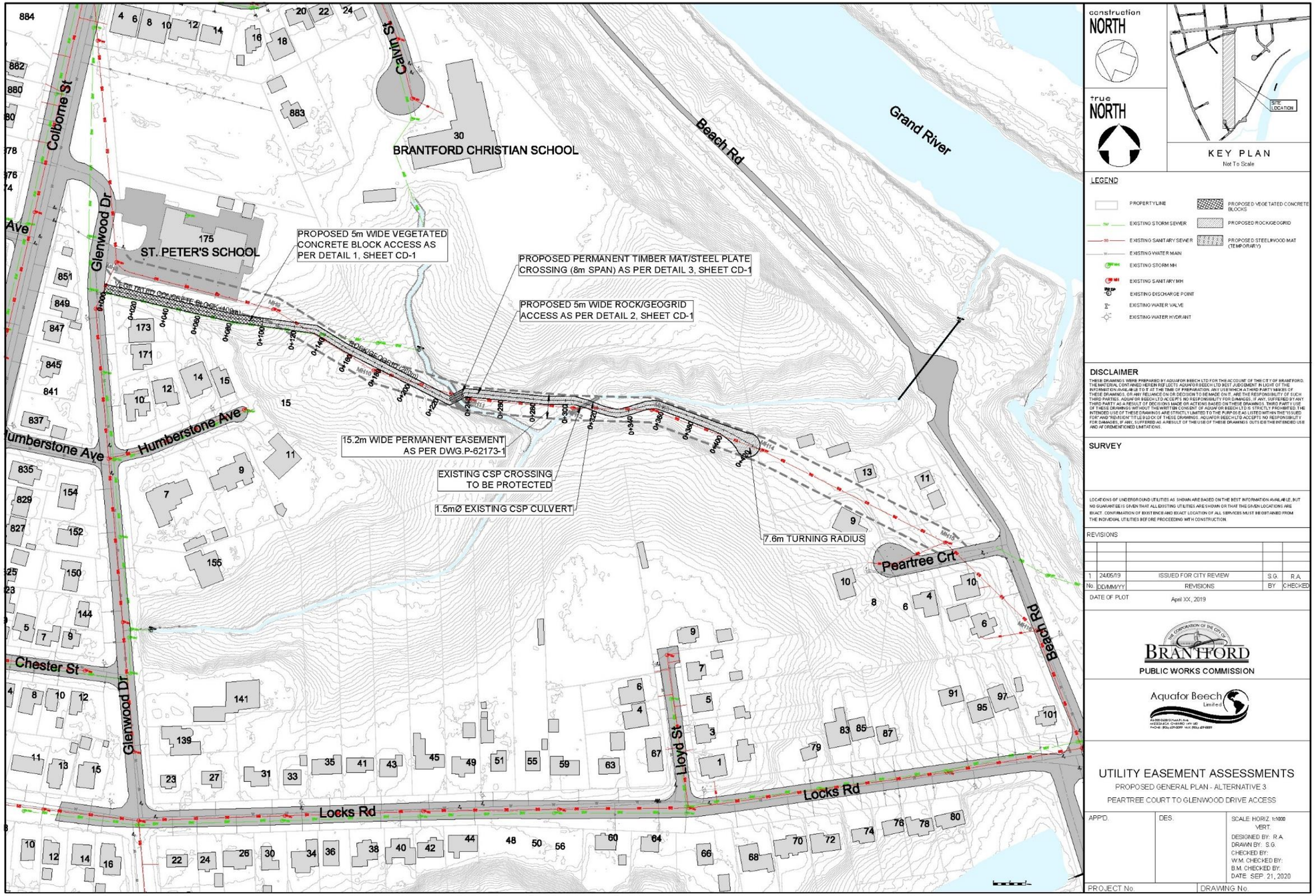



**Figure 4-7: Alternative No. 3 – Access Road from Glenwood with A Turn-around.**

## 4.4 Alternative No. 4 – A Through Access Road between Glenwood and Peartree

Alternative 4 consists of the construction of a permanent access road along the entire easement from Glenwood Drive to Peartree Court, approximately 540m in length. This permanent route will provide access to all manholes along the easement, consist of riprap road within the valley and vegetated concrete block mats within the sod areas at either end. This alternative obviates the need for a turning point within the easement and driving up the steep slope to Glenwood Drive. The proposed vegetated concrete block mats are designed to promote grass growth which will blend into the surrounding lands, particularly the maintained backyard within the private properties.

Due the extent of the proposed works, this alternative is expected to have the greatest impact on the naturalized valley setting, with vegetation removal required along the entire easement. In addition, this alternative will involve significant disruption to the landowners on Peartree Court during construction, however, minimal impacts to those properties are expected when City uses the road thus the restoration efforts.

A preliminary design plan form of Alternative 4 is illustrated in **Figure 4-8** and the preliminary construction cost estimate for Alternative 4 is set out in **Table 4-4**.

**Table 4-4: Preliminary Cost Estimates for Alternatives 4.**

| Utility Access Route Glenwood Drive to Peartree Court - Alternative 4 | | | | | |
|---|---|---|---|---|---|
| **Item** | **Description** | **Qty** | **Unit** | **Unit Price** | **Extended Price (Excl. HST)** |
| **Section "A" – Site Preparation and Removal** | | | | | |
| **1** | Mobilization and Demobilization | 1 | LS | $25,000.00 | $25,000.00 |
| **2** | Construction Layout and Utility Locates | 1 | LS | $20,000.00 | $20,000.00 |
| **3** | Temporary Access Route, Mud Mat, Wood Mat Protection and Staging Areas | 1 | LS | $15,000.00 | $15,000.00 |
| **4** | Clearing, Grubbing, and Tree Removals | 1 | LS | $40,000.00 | $40,000.00 |
| **5** | Supply, Install, and Remove Temporary Fencing | 1 | LS | $25,000.00 | $25,000.00 |
| **Subtotal Section A (Excl of HST)** | | | | | **$125,000.00** |
| **Section "B" – Access Route Construction Works** | | | | | |
| **6** | Excavation and Removal of Existing Soil to Subgrade Elevation | 1 | LS | $105,000.00 | $105,000.00 |
| **7** | Supply and Placement of Reinforced Gravel Road, including Geogrid and Geotextile | 320 | m | $580.00 | $185,600.00 |
| **8** | Supply and Placement of P Gate Steel Bollard | 2 | ea. | $4,000.00 | $8,000.00 |
| **9** | Supply and Installation of Vegetated Concrete Blocks, including filter fabric and granular base | 1200 | m2 | $150.00 | $180,000.00 |
| **10** | Reinforcement of Existing Culvert | 1 | LS | $5,000.00 | $5,000.00 |
| **11** | Supply and Application of Grass Seed Mixture including 300mm topsoil | 1 | LS | $68,000.00 | $68,000.00 |
| **12** | Restoration Plantings of Trees and Shrubs | 1 | LS | $75,000.00 | $75,000.00 |
| **Subtotal Section B (Excl of HST)** | | | | | **$626,600.00** |
| **Section "C" – Contingency** | | | | | |
| **13** | Contingency (30%) | 1 | LS | $225,480.00 | $225,480.00 |
| **Subtotal Section C (Excl of HST)** | | | | | **$225,480.00** |
| | Section A - Site Preparation and Removals | | | | $125,000.00 |
| | Section B - Access Route Construction Works | | | | $626,600.00 |
| | Section C - Contingency (30%) | | | | $225,480.00 |
| | Subtotal (Excl of taxes) | | | | $977,080.00 |
| | HST @ 13% | | | | $127,020.40 |
| | Total (Incl of taxes) | | | | $1,104,100.40 |

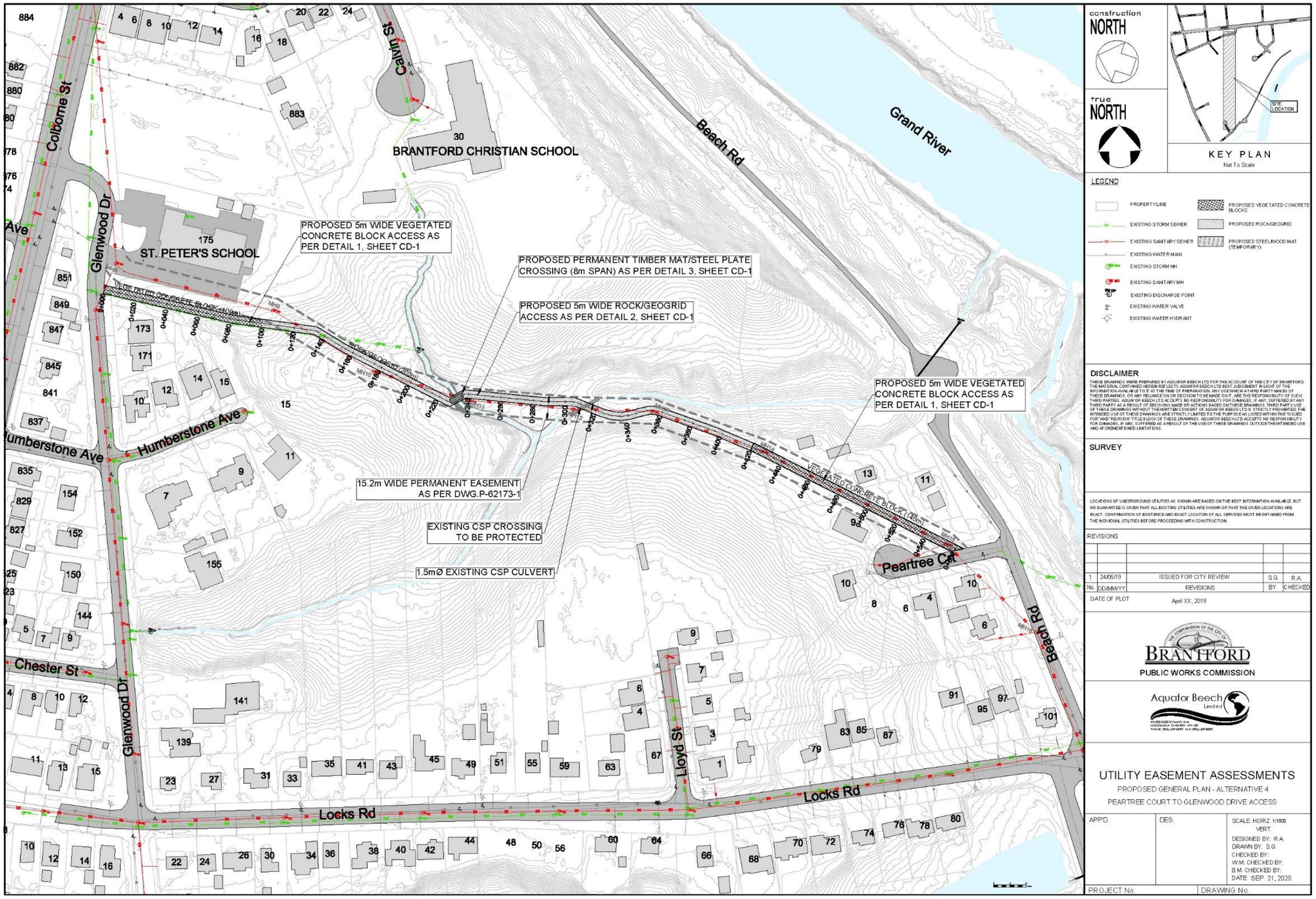



**Figure 4-8: Alternative No. 4 – A Through Access Road between Glenwood and Peartree.**

## 4.5 Evaluation of Alternatives

As part of the Municipal Class Environmental Assessment process, each alternative must be evaluated based on a set of criteria. The criteria that were used as the basis for this evaluation included:

1. Physical and Natural
    a. Impact on City infrastructure and utility
    b. Access feasibility
    c. Lifespan of works

2. Social and Cultural
    a. Landowner impacts & property intrusion
    b. Indigenous right
    c. Aesthetics value and community benefits

3. Physical and Natural Environment
    a. Terrestrial habitat and vegetation
    b. Aquatic habitat and fisheries

4. Economic
    a. Capital cost
    b. Life cycle costs

For each criterion a score was applied that ranged from 0 to 4 (**Table 4-5**), where:

- 0 = Unfavorable, no improvement or negative impact;
- 2 = Acceptable; and,
- 4 = Favorable, most improvement or most positive impact.

**Table 4-5: Ranking Scheme for Criteria Evaluation of Each Alternative.**

| Ranking Scale | | | | | | |
|---|---|---|---|---|---|---|
| **Unfavourable / No improvement / Negative impact** | 0 | 1 | 2 | 3 | 4 | **Favourable / Most improvement / Most positive impact** |

The evaluation was completed with input from Aquafor technical staff, as well as the City of Brantford and the Six Nations of the Grand River by applying a score to each alternative for each criterion. The ranking scores were then been normalized to provide equal weighting for each category of evaluation criteria. The sum of the scores related to each category of evaluation criteria was determined for each alternative and the alternative with the highest total score was deemed to be the preferred alternative. A summary of scores of all four alternatives is presented in **Table 4-6**.

**Table 4-6: Evaluation of Alternatives.**

| EVALUATION CRITERIA | | Alternative 1 - Do Nothing | | Alternative 2 - Access Road from Both Ends with A Turn-Around | | Alternative 3 - Access Road from Glenwood with A Turn-Around | | Alternative 4 - Through Access Road between Glenwood and Peartree | |
|---|---|---|---|---|---|---|---|---|---|
| | | Score | Explanation | Score | Explanation | Score | Explanation | Score | Explanation |
| **Technical and Engineering Criteria** | **Description of Criteria** | **0.0** | | **2.1** | | **2.3** | | **2.5** | |
| Impact on City Infrastructure and Utility | Inspection, maintenance, and repair access provided to City-owned infrastructure, notably sanitary and storm sewers. | **0** | Ongoing vegetation growth leading to continued access restrictions to sanitary sewers and manholes | **4** | Access provided to all manholes with the study area, either permanent or temporary | **4** | Permanent access provided to all manholes with the study area | **4** | Permanent access provided to all manholes with the study area |
| Access Feasibility | Route accessibility and ease-of-use for maintenance trucks and vehicles | **0** | No Access Route Constructed | **3** | All manholes generally accessible, but steep exit incline and tight turnaround radius poses potential accessibility limitations | **3** | All manholes generally accessible, but steep exit incline and tight turnaround radius poses potential accessibility limitations | **4** | Permanent and stable access to all manholes. |
| Lifespan of Works | Expected lifespan of works before intervention needs to be repeated | **0** | No access route constructed, repairs will continue on an emergency only basis | **3** | Lifespan of permanent access route is high, with temporary access to be assembled and disassembled as required | **4** | Lifespan of permanent access route is high. | **4** | Lifespan of permanent access route is high |
| **Physical and Natural Criteria** | **Description of Criteria** | **2.5** | | **1.9** | | **1.3** | | **1.6** | |
| Terrestrial Habitat and Vegetation | Improvements or impacts to terrestrial habitat, including loss and replacement of vegetation and natural corridor connectivity. | **4** | No impacts on terrestrial habitat or vegetation | **3** | Some vegetation loss and impacts on terrestrial habitat along a section of the easement from Glenwood Drive due to access route construction. | **1** | Most significant vegetation loss and impacts on terrestrial habitat along easement within the valley, due to extended length and the turnaround area. | **2** | Significant vegetation loss and impacts on terrestrial habitat along easement within the valley. |
| Aquatic Habitat & Fisheries | Improvements or impacts to fish and aquatic habitat, including substrate, overhanging vegetation, turbidity, and connectivity. | **4** | No impact on aquatic & fisheries habitats | **3** | Minimal impact to aquatic health | **3** | Minimal impact to aquatic health | **3** | Minimal impact to aquatic health |
| **Social and Cultural Criteria** | **Description of Criteria** | **2.3** | | **1.0** | | **1.7** | | **1.3** | |
| Landowner Impacts & Property Intrusion | Impacts or disturbance to adjacent properties due to construction and when City uses the access road, including potential damage / intrusion beyond easement limit. | **4** | No impacts to adjacent landowners | **1** | Significant disturbance to surrounding property owners due to permanent access route construction. Temporary access poses significant amount and duration of disturbance to Peartree Court landowners. Potential damage to the property beyond easement limit. | **3** | Moderate disturbance to surrounding property owners due to permanent access route construction. Minimal impacts on private lands when using the access road. | **1** | Significant disturbance to surrounding property owners due to permanent access route construction, specifically the Peartree Court landowners. Some disturbance to the Peartree landowners when using the access road, however no damage to the property is expected. |
| Indigenous Right | Impacts of altering natural environment on community beliefs and treaty rights, including access to hunting, habitat to support game, and gathering | **4** | No impact on indigenous right. | **3** | Minimal impact to indigenous right, with all direct impacts on the natural environment within City easement. | **2** | Minor impact to indigenous right, with all direct impacts on the natural environment within City easement. | **2** | Minor impact to indigenous right, with all direct impacts on the natural environment within City easement. |
| Aesthetic Values | Changes to the aesthetic value of surrounding properties | **3** | No long term change to aesthetic value, but emergency access will negatively impact short term aesthetics | **1** | The permanent access route will not negatively impact the long term aesthetics, however the temporary access will negatively impact short term aesthetics of Peartree Court properties | **3** | The permanent access route will not negatively impact the long term aesthetics of the area. | **3** | The permanent access route will not negatively impact the long term aesthetics within the valley. The proposed vegetated mats will blend into the existing grassland of Peartree properties, however, concrete blocks will still be visually present. |
| **Economic Criteria** | **Description of Criteria** | **1.3** | | **1.6** | | **1.9** | | **1.6** | |
| Capital Costs | Detailed design, permitting and construction costs for the proposed works | **4** | No capital cost to City | **3** | 3rd highest costs associated with permanent access route including turnaround | **2** | 2nd highest costs associated with permanent access route including turnaround | **1** | Highest costs associated with full-length permanent access route |
| Life Cycle Costs | Anticipated temporary/emergency access during the lifespan | **0** | Installation, removal, and restoration of emergency access to any point along the easement whenever required | **2** | Installation, removal, and restoration of temporary access route from Peartree Court whenever required | **4** | No anticipated temporary or emergency access | **4** | No anticipated temporary or emergency access |
| **TOTAL SCORE** | | **6.0** | | **6.6** | | **7.1** | | **6.9** | |

## 4.6 Climate Change Considerations

As per the Considering Climate Change in the Environmental Assessment Process Guide, two types of climate change effects have been considered for this EA and will continue to be considered throughout detailed design and construction, including climate change mitigation and climate change adaptation.

### *4.6.1 Climate Change Mitigation*

Climate change mitigation refers to the effect that the project can have on climate change and in this case, the degree to which the project can provide some climate change mitigation measures to be assessed. More specifically, mitigation includes actions that reduce the greenhouse gas emissions or improve the removal of carbon dioxide from the atmosphere, such as being energy and water efficient and preservation of plant cover.

A qualitative approach was taken to assess climate change mitigation noting that all of the proposed access route alternatives would have a similar, short-term, negative impact on the generation or the removal of greenhouse gases when compared to the do nothing alternative. Construction of the various access route alternatives would require removal of vegetation, emissions from construction activities, and the associated emissions arising from the production of construction materials (i.e., riprap stones, concrete block mats, etc.). However, the long-term the construction of any of the access routes would improve sewer accessibility which offsets the projected emissions from the construction and removal of temporary access routes for every emergency works associated with the do nothing alternative. Restoration works following construction of the access route will include replanting of native grasses, shrubs, and trees to compensate for their removal. Moreover, in consideration of long-term operation and management of the sewer infrastructure, permanent access routes would allow the City to undertake routine inspection and maintenance and timely repairs for the infrastructure, limiting infiltration and inflow and hence improving energy and water efficiency.

### *4.6.2 Climate Change Adaptation*

Climate is the weather we experience averaged over a long period of time, and the term climate change refers to long-term shifts in our climate, including temperature, precipitation, and weather patterns. The earth is about 1.1°C warmer than in the late 1800s, and the last decade (2011-2020) was the warmest on record (World Meteorological Organization, 2022). The increases in temperature have led to many environmental impacts across the globe, including increased incidences of poor air quality (e.g., from ground-level ozone, particulate matter); short-duration, high-intensity rainfall events; windstorms; wildland-urban interface fires; increased coastal erosion; storm surge flooding; decreased water quality; increased spread of invasive species and decrease in biodiversity' and the increased spread of vector-borne diseases (Warren & Lulham, 2021). These environmental impacts have in turn put further burdens over our sewer networks, posing risks such as nuisance flooding spills and odour, water quality deterioration due to increased uncontrolled discharges, and damage to infrastructure (Hughes, Heays, Olesson, Bell, & Stroombergen, 2021).

Climate change adaptation refers to actions that manage and reduce the risk of climate change impacts, such as infrastructure protection and upgrades, flood protection, disaster management, and business continuity planning. From this perspective, a reliable access route to the sewer infrastructure is critical in protecting the assets given the ever-increasing stress over the network, which also provides a readily available route for future infrastructure upgrades. Moreover, the EA has reviewed the impacts of climate change on flooding and erosion within the study area, and determined that the proposed access route designs are resilient to projected climate change impacts. Further consideration will also be given at the detailed design stage to ensure the proposed works are resilient to future changes in climate. This will include, accounting for climate change related impacts to stream bank erosion and stabilization, as well as flooding over the proposed access route.

## 4.7 Public, Stakeholder, and Agency Consultation

Consultation is an essential requirement of the Municipal Class EA process. Throughout the study process, an extensive consultation program that involved the pubic, stakeholders and representatives of the various agencies

was implemented. The process also included a virtual Public Information Centre (PIC) and site meetings with the representatives of the two adjacent schools.

These points of contact satisfied the general criteria defined within the Municipal Class EA process for Schedule B projects, where a mandatory two (2) points of public contact are required. Moreover, the following public and agency interactions were completed:

- Notice of Study Commencement;
- EA Study Information Slides (presented at the virtual PIC); and
- Notice of Completion.

An overview of the PIC and a summary of the consultation program are presented below.

### 4.8 Notice of Commencement

The Notice of Commencement for the study was published on the City of Brantford's website on November 26th, 2020.

Review agencies, indigenous groups, and key stakeholders were also notified, including Ministry of the Environment, Conservation and Parks (MECP), Fisheries and Oceans Canada (DFO), Crown-Indigenous Relations and Northern Affairs Canada, the Ministry of Heritage, Sport, Tourism and Culture Industries (MTSCI), the Ministry of Health and Long Term Care, the Ministry of Infrastructure, the Ministry of Natural Resources and Forestry (MNRF), the Grand River Conservation Authority (GRCA), First Nations, adjacent schools, and the nearby residential landowners within the area.

Copies of the notice of commencement and a list of the stakeholders that participated in the process are provided in **Appendix E1 and E2** respectively.

### 4.9 Public Information Centre

A Public Information Centre invitation was published on the City of Brantford's website and Civic News, on May 27, 2021, along with letter invitations mailed out to landowners within the study area.

A virtual Public Information Centre (PIC) was held on June 10th, 2021. The PIC consisted of a video presentation (hosted through YouTube), along with digital slides that were made available on the City of Brantford's website. The video and digital slides outlined the following items:

- Overview of the study area;
- Study purpose and problem definition;
- EA study process;
- Review of existing conditions and utilities
- Review of ecological assessments and results;
- Conceptual alternatives and preliminary evaluation; and
- Next steps in the process.

An electronic comment form, along with contact information of project leads from the City and Aquafor, were made available on the City of Brantford's website. The comment form requested public input as follows: "Please identify any comments, questions or concerns you may have regarding the Glenwood Drive and Peartree Court Utility Access Route."

Comments from MHSTCI were provided in response to the PIC, regarding the requirements to review and assess the potential cultural heritage resources and archaeological resources within the study area. City and Aquafor subsequently retained with ASI who completed a Stage 1 Archeological Assessment and a Cultural Heritage Assessment as discussed in the sections above.

All PIC material including presentation slides and blank comment form are included in **Appendix E3**. Stakeholder's comments are included in **Appendix E4**.

### 4.10 First Nations Consultation

Extended consultation was undertaken with all identified First Nations, including the Mississaugas of the Credit First Nation, the Six Nations of the Grand River, and the Haudenosaunee Confederacy Chiefs Council. All three First Nations were separately notified about the project at the time of initiation of the study and prior to the date of the PIC.

In addition, the two First Nations recognized by the City - the Mississaugas of the Credit First Nation & the Six Nations of the Grand River, were further notified of the Stage 1 Archaeological Investigation and provided with copies of the assessment report. At the detailed design stage, the two First Nations will be invited to participate in the Stage 2 Archaeological Investigation.

Draft EA Project File report were also distributed to the two First Nations for review prior to filing, with comments received from the Six Nations of the Grand River. All comments were reviewed and incorporated accordingly in the final Project File, and a separate response letter was sent to the Six Nations of the Grand River.

Notification letters sent to First Nations and a table summarizing all communication with First Nations are provided in **Appendix E5**.

# 5 SELECTION AND DESCRIPTION OF PREFERRED ALTERNATIVE

## 5.1 Selection of Preferred Alternative

Based on the evaluation criteria, consultation with the City, stakeholders and the public, the preferred alternative for the access route within the study area is **Alternative No. 3 – Access Road from Glenwood with A Turn-around.** The preferred alternative involves construction of a 5-meter-wide permanent utility access road, extending from Glenwood Drive into the valley for a total length of 420m, within the easement limit. The access road is proposed to use vegetated concrete block mats within the City maintained sod area for the first 100m, intended to fit in the overall aesthetics while providing robust driving surface. The remaining 320m will be constructed using riprap with geogrid base through the valley, with a turn-around area at the end. The existing culvert crossing will be maintained and reinforced with additional cover, to provide additional protection to the corrugated metal pipe from excess loadings while allowing for safe crossings by the service vehicles.

This alternative will provide long-term reliable access to all critical infrastructure in the study area, while limiting the disruptions to the adjacent private properties. Impacts to the existing natural environment within the valley are expected as a result of this alternative. Therefore, following construction, full vegetative restoration will be undertaken, with native grasses/sod, shrubs and trees planted within areas beyond the proposed road.

## 5.2 Conceptual Design of Preferred Alternative

The conceptual design for the preferred alternative is illustrated in **Figure 4-7**. The proposed road alignment and construction materials are highlighted in the general plan. Technical details will be refined during the detailed design process.

The concept drawings are typically of interest to the review agencies, in order to confirm that the preferred alternative will be consistent with permitting requirements.

# 6 IMPLEMENTATION PLAN

This chapter summarizes the implementation considerations associated with the various elements of the Preferred Alternative as described in Chapter 5.

The next steps for implementation of the preferred alternative include:

- Issuance of the Notice of Completion;
- Detailed design and associated investigations;
- Landowner Communications;
- Permits and Approvals;
- Contract document preparation and tender;
- Construction; and,
- Post Construction Monitoring.

The following potential impacts for implementation of the preferred alternative were identified. Recommendations for mitigation measures to be considered at the detailed design phase are provided.

## 6.1 Notice of Completion

The Notice of Completion, will be published in the website news. The notice will be also distributed to all stakeholders and agencies as noted on the distribution list.

## 6.2 Detailed Design and Investigations

The detail design package should include the preparation of 60%, 90% and final design drawings for review by the City, GRCA and relevant stakeholders. The detail design package should include, but not be limited to, the following components:

- General plan (detailing structure, property lines and services);
- Site plan (including site access, staging and stockpile area delineation);
- Plan and profile drawings (detailing location of existing utilities and existing culvert);
- Erosion and sediment control plan (as per the Erosion and Sediment Guidelines for Urban Construction, GGHACA);
- Landscape restoration plan (including tree removal, preservation and planting plan);
- Storm outfall restoration plan;
- Sanitary sewer protection plan; and
- Associated design brief

The following implementation measures must be considered at the detailed design and implementation stages:

**Construction Staging, Erosion and Sediment Control Measures**
Appropriate plans are to be included within the detailed design package, based on consultations with the City and GRCA. These plans will include information such as access route and staging areas, with comprehensive erosion and sediment control requirements to be implemented throughout construction. This will include detailed fencing and delineation of the extents of disturbance, as flow management plan if required. In this regard, all areas of disturbance will be fully restored and stabilized to prevent loss and contribution of sediments downstream.

**Tree Protection Fencing**
Tree protection fencing following the specifications in relevant GRCA Guidelines should be erected along all construction access routes and work areas. If possible, it is also recommended that planting areas are fenced off for two years to protect newly planted materials, and allow time for growth and to anchor soils.

**Utility Locations**
All utility organizations should be contacted for as-constructed drawings and field marking of all underground services within the proposed restoration area. The utilities may include, but are not limited to, electricity, natural gas, cable television, telephone, water, sanitary sewer, and storm sewer. Any utility relocation is to be completed prior to the tender of the Erosion Control Works. At storm outfalls, the structure stability and flow hydraulics of the outfall channel must be considered in the detailed design.

**Landowner Communications**
Landowner communications will be required at the detailed design and implementation stages, particularly for 15 Humberstone Ave which the majority of the easement runs through. The landowners will be contacted at the onset of the detailed design and engaged closely throughout the process. Prior to construction, notifications will also be distributed to the surrounding neighbourhood,

**Tendering Support for Construction**
All tender documentation will be completed applicable to the City of Mississauga standards, with Special Provisions and Schedule of Quantities with refined engineering cost estimates provided. The package will include Project Descriptions, Special Provisions, Specifications, Form of Tender and a Schedule of Prices. The final detailed design drawings will be issued as a set of contract drawings with the completed tender package. The contract drawings will be stamped by a professional engineer, signed, and labeled "Issued for Tender" complete with all necessary material and performance specifications. Aquafor will typically assist the City during the tendering and procurement period as required, providing responses and clarification to bidders during the procurement process.

## 6.3 Permits

Prior to construction it will be necessary to coordinate environmental approvals and permits necessary to complete the intended works. At this time, it is Aquafor's understanding that approvals from GRCA, MNRF, and DFO may be required. A brief summary of permits and approvals is included below:

GRCA – O. Reg. 150/06 Permit - This typically involves two submissions (70% & 95% design), and will include supporting design brief information.

DFO – Assessment under the Federal Fisheries Act - Aquafor's certified fisheries biologist will complete a Self-Assessment based on the detailed design for the proposed works and determine if an authorization review if required.

MNRF 17(2)(b / c) Species at Risk Permit – Depending on the results of the IGF and further field investigations, MNRF will confirm whether a SAR permit will be required.

Approvals may be also required from other utilities for working adjacent to their infrastructure.

## 6.4 Construction Services

Aquafor will provide inspection and resident services during construction under the guidance of a professional engineer who has been integrated in the design and well versed in similar construction projects. Tasks undertaken as part of the supervision role will include:

- Attend regular (bi-weekly) progress meetings, including pre-construction meeting, prepare and distribute meeting minutes within 3 days of the meeting;
- Respond to inquiries and request for information from external agencies, public stakeholders;
- Preparation of progress payment certificates and recording material quantities as they arrive to site;
- Overseeing the day-to-day construction and providing interpretation of the drawings;
- Ensuring that contractor's methodology complies with requirements of design;
- Monitor the traffic control measures to ensure they are consistent with traffic control plans;

- Inspect all layout and construction work to ensure compliance with the contract specifications and drawings;
- Provide advice to the contractor regarding the interpretation of the contract drawings and specifications and the preparation of supplemental details, instruction and clarifications as required;
- Notify the contractor of any deficiencies in the construction of the work, instructing the contractor to take appropriate corrective measures, confirm and report results of the corrective measures during construction. The deficiency list will be maintained and coordination of rectification throughout the 2-year maintenance period;
- Review, monitor and ensure compliance with contractor environmental conditions (i.e., ESC Plan).
- Preparation and issuance of substantial Performance certificate and recommendations; and
- Undertake a complete and thorough inspection of the contractor's work and prepare a report which lists all outstanding deficiencies at the end of the warranty period and coordinate and ensure that contractor corrects all warranty deficiencies expeditiously and to the satisfaction of the City.

## 6.5 As-Constructed Drawings & Analysis

This task will set baseline conditions following construction, which will enable future monitoring and comparative analysis. Specifically, Aquafor will undertake an as-built survey of completed access road to verify implementation of design within reasonable tolerances. As-constructed drawings, together with a report summarizing pre- and post-construction conditions would be provided to the City within a three-month period following substantial completion. The report would comment on significant deficiencies found with recommendations for correction or adaptive management as required.

## 7 REFERENCES

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**Appendix A – Natural Heritage Assessment Supporting Documents**

**Appendix A1 – Botanical Species List**

**Appendix A2 – Detailed Tree Inventory**

**Appendix B – Fish Habitat Assessment Field Sheets**

**Appendix C – Stage 1 Archaeological Study Report by ASI**

**Appendix D – Cultural Heritage Assessment Report by ASI**

**Appendix E – Public Consultation**

**Appendix E1 – Environmental Assessment Study Notices**

**Appendix E2 – Stakeholder List**

**Appendix E3 – Virtual Public Information Materials**

**Appendix E4 – Stakeholder Comments**

**Appendix E5 – First Nation Consultation**