

## **Appendix E: Natural Heritage Resources Technical Memorandum**



# NATURAL HERITAGE RESOURCES TECHNICAL MEMORANDUM

Whiskey Creek Drainage Improvements  
City of Barrie  
December 2020



RIVERSTONE





**RIVERSTONE**  
ENVIRONMENTAL SOLUTIONS INC.

December 8, 2020  
RS#2020-070

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**SUBJECT: Natural Heritage Resources Technical Memorandum - Whiskey Creek Drainage  
Improvements Environmental Assessment, City of Barrie**

Dear Mr. Twigger:

RiverStone Environmental Solutions Inc. is pleased to provide you with the attached report.

Please contact us if there are any questions regarding the report, or if further information is required.

Best regards,

RiverStone Environmental Solutions Inc.

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## **ENVIRONMENTAL ASSESSMENT NON-TECHNICAL SUMMARY**

|                                                                         |                                                                                                                      |                                                                            |
|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| <b>Type of Study</b><br>Natural Heritage Resources Technical Memorandum |                                                                                                                      | <b>Date</b><br>December 11, 2020                                           |
| <b>Project Manager</b><br>Al Shaw                                       | <b>Project Location</b><br>Whiskey Creek – adjacent<br>Minet’s Point Part                                            | <b>Development Proposed</b><br>Municipal Class Environmental<br>Assessment |
|                                                                         | <b>Planning Authorities</b><br>Lake Simcoe Region<br>Conservation Authority,<br>City of Barrie, County of<br>Simcoe. | <b>Owner/Agent</b><br>City of Barrie/Tatham Engineering<br>Limited         |

### **Report Summary**

As directed by the 2019 Drainage Master Plan (DMP), an Environmental Assessment (EA) has been initiated to consider drainage improvements along Whiskey Creek. The DMP recommended 100 year conveyance improvements at The Boulevard, Brennan Avenue and watercourse improvements north of The Boulevard to Lake Simcoe (**Figure 1**). The objective of the EA is to evaluate alternatives in completing drainage improvements through an understanding of the natural environment, social environment, and financial considerations, until a preferred solution is accepted. This study documents the natural features present in the area and evaluates the potential impacts to the natural environment based on various project options. Natural features reviewed included fish habitat, ecological communities, significant wildlife habitat, Species at Risk (SAR) and an inventory of trees.

Through our assessment, discussions with the project team and communication with the LSRCA, it is clear that the various project alternatives have very distinct potential impacts on Whiskey Creek and habitat for at risk Bat species. It is also clear that the potential impacts increase dramatically with increased direct manipulation of Whiskey Creek. This is complicated by the primary goal of the project, which is to better contain the flows within Whiskey Creek that regularly cause localized flooding. It seems that some degree of manipulation of the creek to increase flow capacity will be necessary to have any meaningful improvement to the flooding issue, which will have an impact to the creek biology and ecology. The presence of Brook Trout, indicating a cold/cool water thermal regime, does add an elevated level of concern due to their sensitivity.

Regardless of the alternative, it is very likely that permits will be required by the LSRCA (Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses, O Reg 179/0), and the MNR (Lakes and Rivers Improvement Act). A request for project review will also likely be required through DFO (Fisheries Act). Submissions to these agencies will require that the alternative be chosen and a detailed plan for avoiding and minimizing impacts be presented.

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## 1. **BACKGROUND**

As directed by the 2019 Drainage Master Plan (DMP), an Environmental Assessment (EA) has been initiated to consider drainage improvements along Whiskey Creek. The DMP recommended 100 year conveyance improvements at The Boulevard, Brennan Avenue and watercourse improvements north of The Boulevard to Lake Simcoe. Difficulties were recognized in the area around Kempenfelt Bay do to water levels, as well, Minet's Point Park facilities and existing private/public structures in the area make it challenging to implement any improvements while maintaining existing transportation linkages. The objective of the EA is to evaluate alternatives in completing drainage improvements through an understanding of the natural environment, social environment, and financial considerations, until a preferred solution is accepted.

The purpose of this technical memorandum is to summarize the results of our assessments of the natural environment which involved a review of background information and on-site reconnaissance of existing terrestrial, aquatic, and species at risk resources, to provide sufficient information to assess the potential for negative impacts on natural features. This report describes our evaluation of the environmental conditions surrounding the project area and assesses each of the project options in terms of their potential negative impacts to natural features and functions, both aquatic and terrestrial.

## 2. **APPROACH AND METHODS – NATURAL ENVIRONMENT**

The general approach used to carry out this natural features assessment involved the following:

1. Assemble background information to identify the existing biophysical features and functions of the subject property prior to the site investigation.
2. Conduct a site investigation to field-verify the biophysical features and functions identified during background information gathering and to collect additional field data (e.g., habitat information, tree inventory, etc.) that will assist with completing the report.
3. Determine the extent to which existing biophysical features and functions constrain the property as it relates to the proposed development.
4. Provide an overall assessment of conformance of the proposed development with all applicable municipal, provincial, and federal environmental requirements.

### 2.1. **Information Sources Used to Assess Site Conditions**

Information pertaining to the natural features of the property and the surrounding lands was obtained from several sources including the following:

- **City of Barrie Official Plan** (Office Consolidation January 2018) for natural heritage feature mapping within and adjacent to the Subject Property, including:
  - Schedule A – Land Use
  - Schedule F – Conservation Authority Regulation Limits and Watercourses
  - Schedule H – Natural Heritage Resources
- **Lake Simcoe Region Conservation Authority (LSRCA) Interactive Mapping** to identify potential features of conservation interest on the Subject Property and determine whether LSRCA's

regulated area extends onto the Subject Property (accessed October 8, 2020 at <https://maps.lsrca.on.ca/EH5Viewer/index.html?viewer=LSRCARegulations>).

- **Ministry of Natural Resources and Forests (MNRF) Natural Areas Mapping and Natural Heritage Information Centre (NHIC) database** regarding information on occurrences of Species at Risk (SAR) provincially tracked species and natural heritage features (squares: 17PK0614; accessed October 7, 2020, at: <http://www.gisoeapp.lrc.gov.on.ca/web/MNR/NHLUPS/NaturalHeritage/Viewer/Viewer.htm>
- **iNaturalist** database regarding all natural heritage species records near the Subject Property (squares: accessed October 8, 2020, at: <https://www.inaturalist.org/>).
- **Ontario Breeding Bird Atlas (OBBA) Online** Database and Atlas of the Breeding Birds of Ontario, 2001–2005 (Cadman et al. 2007) regarding birds that were documented to be breeding in the vicinity of the subject lands during the 2001–2005 period (atlas square numbers: 17PK01) <http://www.birdsontario.org/atlas/squareinfo.jsp>
- **Ontario Reptile and Amphibian Atlas** database regarding records of reptiles and amphibians that have been observed within the vicinity of the Subject Property (square: 17PK01; accessed October 7, 2020 at [http://www.ontarioinsects.org/herpatlas/herp\\_online.html](http://www.ontarioinsects.org/herpatlas/herp_online.html)).
- **Atlas of the Mammals of Ontario** (Dobbyn 1994) regarding records of mammals in the vicinity of the Subject Property.
- **Ontario Butterfly Atlas** database regarding butterflies recorded in the vicinity of the Site (square: 17PK01; accessed October 8, 2020, at: [http://www.ontarioinsects.org/atlas\\_online.htm](http://www.ontarioinsects.org/atlas_online.htm)).
- **Physiography of Southern Ontario** (Chapman and Putnam 2007) for information pertaining to the physiography and soils within the vicinity of the Subject Property.
- **Great Lakes Conservation Blueprint for Terrestrial Biodiversity, Volume 2** (Henson and Brodribb 2005a) regarding terrestrial biodiversity within Ecodistrict 6E-6 (Barrie).
- **Great Lakes Conservation Blueprint for Aquatic Biodiversity, Volume 2** (Phair et al. (2005) regarding aquatic biodiversity within tertiary watershed 2EC (Black River-Lake Simcoe).
- **Historical and Current Aerial Photographs** of the Project Area.
- **Digital Ontario Base Maps** (OBMs; 1:10,000) to ascertain topography.
- RiverStone's in-house databases and reference collections.
- On-site investigations by RiverStone staff.

## 2.2. Site Investigation

### 2.2.1. General Approach

The results of the screening exercise outlined above, helped direct data collection activities associated with a site investigation carried out on September 23, 2020, by C. Mann (Ecologist, Arborist) and G. Cunnington (Senior Ecologist, Species at Risk Specialist). The site investigation focused within the vicinity of proposed watercourse improvements to characterize (1) topography and drainage, (2) vegetation communities, (3) tree species, (4) aquatic habitat conditions, (5) features of conservation interest, and (6) habitat for species of conservation concern. Data collection activities were restricted to publicly accessible areas and properties where permission to enter had been attained. Targeted species surveys were not completed as part of the onsite assessment as these were beyond the scope of work

associated with this project. Representative site photographs taken during this investigation are assembled in **Appendix 1**.

Evidence for the presence of a species or use of an area was determined from visual and/or auditory observation (e.g., song, call) and observation of nests, tracks, burrows, browse, skins, and scats. Ecological Land Classification vegetation mapping (**Section 3.3.**) that was completed also provides information regarding the likelihood that plant species of conservation interest may be present (for example, most rare plants have strong affinities for specific ecological communities). Additionally, if a potentially rare plant not in flower was encountered, then a second site visit would have been conducted during the appropriate season for flowering or fruiting to confirm identification. This approach acceptably minimizes the risk that rare plant species would have gone undetected.

Natural features of interest (e.g., SAR habitat, vegetation community boundaries) were delineated in the field with a tablet with built-in high accuracy GPS. Features of interest were photographed and all information collected was catalogued for future reference.

### **2.2.2. Terrain, Drainage, and Soils**

Geology is a significant factor in the formation of soil, the physical characteristics of a watershed, and ultimately surface water quality. The bedrock and overlying deposits influence surface runoff and infiltration, directly influencing the nutrient balance of receiving water bodies. Knowledge of the existing terrain in a project area is important in understanding how a property and its associated natural environment will respond to development pressures. The geophysical setting of the project area was reviewed using OBMs, soils mapping, and aerial photography, and subsequently verified on-site.

### **2.2.3. Vegetation Community Characterization**

Vegetation communities were delineated according to Ecological Land Classification (ELC) community tables (Lee et al. 1998). ELC defines ecological units or communities based on bedrock, climate (temperature, precipitation), physiography (soils, slope, aspect), and corresponding vegetation. Use of the system permits biologists and other land managers to use a common language to describe vegetation communities, which in turn facilitates the identification of communities likely to support features or functions of conservation interest. The ELC system is an organizational framework that can be applied at different scales. The ecological units most useful for site-specific evaluations are ecosites and vegetation types (also known as ecoelements). Vegetation types are the finest level of resolution in the ELC system and are recurring patterns found in the plant species assemblages that are associated with a particular ecosite (Lee et al. 1998). Where identified, the boundaries of wetland communities that occur on the subject property were delineated in the field according to the “50% wetland vegetation rule” specified by the Ontario Wetland Evaluation System (OWES).

### **2.2.4. Natural Heritage Resources**

The City of Barrie Natural Heritage Resource Network includes the following:

- Provincially Significant Wetlands
- Non-provincially significant wetlands greater than 0.5 ha
- Significant Woodlands greater than 10 ha
- Significant habitat of endangered and threatened species
- Watercourses, minimum vegetation protection zones and connectivity linkages

- Environmental Protection Lands

The subject property and adjacent lands were assessed for the presence of the above features with reference to data collected via the desktop-based and on-site investigations as described herein. Features of interest were photographed, and all information collected was catalogued for future reference.

#### 2.2.4.1 Endangered and Threatened Species

RiverStone's primary approach to site assessment is habitat-based. This means that our field investigations focus on evaluating the potential for features within an area of interest to function as habitat for species considered potentially present, rather than searching for live specimens. An area is considered potential habitat if it satisfies a number of criteria, usually specific to a species, but occasionally characteristic of a broader group (e.g., several turtles of conservation interest use sandy shorelines for nesting, numerous fish species use areas of aquatic vegetation for nursery habitat). Physical attributes of a site that can be used as indicators of its potential to function as habitat for a species include structural characteristics (e.g., physical dimensions of rock fragments or trees, water depth), ecological community (e.g., meadow marsh, rock barren, coldwater stream), and structural connectivity to other habitat features required by the species. Species-specific habitat preferences and/or affinities are determined from status reports produced by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Cadman et al. (2007), published and unpublished documents, and direct experience.

For the purposes of identifying species that warrant consideration during design and implementation of the proposed development plan, endangered and threatened species include those designated as "Endangered" or "Threatened" under O. Reg. 230/08 pursuant to the provincial *Endangered Species Act, 2007*. The results of these assessments, as well as descriptions of the methodology and rationale employed are provided in **Appendix 2**.

#### 2.2.5. **Watercourse**

The watercourse in the project area is Whiskey Creek, a tributary to Lake Simcoe that flows in a northwest direction. Starting at the south edge of the project area, the watercourse flowing through forested lands before going under The Boulevard Road via ~1.8 m x 1.0 m corrugated steel culvert. The watercourse proceeds in roadside ditch adjacent White Oaks Road for ~ 172 m before going under Brennan Avenue via concrete box ~ 3.6m X 1.8 m in size. There watercourse continues adjacent residential properties through second growth riparian habitat for ~475 m before out letting into Lake Simcoe. The last ~150 m of the watercourse has been stabilized with armour stone with residential lawn to the southwest. Many of the drainage improvements contemplated as part of the EA include potential changes to Whiskey Creek.

### 2.3. Applicable Environmental Policies

To assess whether the application satisfies relevant municipal, provincial, and federal requirements with respect to the natural environment, the following policies (e.g., statutes, regulations, plans, guidance documents, etc.) that may be applicable to the proposed application and were considered during both the field investigations and the impact analysis:

- City of Barrie Official Plan (Office Consolidation January 2018)

- Provincial *Endangered Species Act* (ESA), S.O. 2007, c. 6, including:
  - Ontario Regulation 230/08: Species at Risk in Ontario List
  - Ontario Regulation 242/08 – General (i.e. “Exemption Regulation”)
- Federal *Fisheries Act*, R.S.C. 1985, c. F-14, amended on 2019-08-28 including:
  - *Applications for Authorization under Paragraph 35(2)(b) of the Fisheries Act Regulations*, S.O.R/2013-191
  - Fish and Fish Habitat Protection Policy Statement (August 2019)
- Federal *Migratory Birds Convention Act*, S.C. 1994, c. 22, including:
  - Migratory Birds Regulations, C.R.C., c. 1035

#### **2.4. Environmental Assessment Project Alternatives**

As required by the Municipal Class Environmental Assessment process for municipal projects, each project alternative must be assessed for impacts on the natural environment. The following are the proposed alternatives for the Whiskey Creek Drainage Improvements Class EA. The six project options are listed below and shown in **Appendix 3**.

**Alternative 1** – Do nothing, Whiskey Creek remains unaltered

**Alternative 2** – Improvements to Whiskey Creek, and replace culvert under Brennan Avenue with culvert that meets 1:100 yr storm, replace culvert under The Boulevard with culvert that meets 1:100 yr storm.

**Alternative 3** – Improvements to Whiskey Creek, replace culvert under Brennan Avenue with culvert that meets a reduced level of service (less than 1:100 year storm) and replace culvert under The Boulevard.

**Alternative 4 A** – Improvements to Whiskey Creek, remove culvert under Brennan Avenue daylighting watercourse, replace culvert under The Boulevard to increase capacity and reduce flooding.

**Alternative 4B** – Improvements to Whiskey Creek, remove culvert under Brennan Avenue daylighting watercourse, replace culvert under The Boulevard and realignment of Brennan Ave through 7 Brennan Avenue to The Boulevard.

**Alternative 5A** – Improvements to Whiskey Creek, replace culvert under Brennan Avenue and remove culvert under The Boulevard daylighting watercourse.

**Alternative 5B** – Improvements to Whiskey Creek, replace culvert under Brennan Avenue to increase capacity and reduce flooding, remove culvert under The Boulevard daylighting watercourse, and realignment of Brennan Ave through 7 Brennan Avenue to The Boulevard.

**Alternative 6A** – Improvements to Whiskey Creek, remove culvert under Brennan Avenue daylighting watercourse and remove culvert under The Boulevard daylighting watercourse.

**Alternative 6B** – Improvements to Whiskey Creek, remove culvert under Brennan Avenue daylighting watercourse, remove culvert under The Boulevard daylighting watercourse, and realignment of Brennan Ave through 7 Brennan Avenue to The Boulevard.

**Alternative 6B** – Improvements to Whiskey Creek, remove culvert under Brennan Avenue daylighting watercourse, remove culvert under The Boulevard daylighting watercourse, realignment of Brennan Ave through 7 Brennan Avenue to The Boulevard, new transportation link through property at 201 Southview Road.

**Alternative 7** – Establishment of flow diversion culvert under white Oaks Road, and establishment of flow diversion channel from culvert into Lake Simcoe.

These options are individually evaluated in **Section 4** for potential impacts on the natural environment, and determination of permitting needs and likely success.

### **3. BIOPHYSICAL FEATURES - EXISTING CONDITIONS**

#### **3.1. General Site Conditions**

At the time of RiverStone's onsite assessment (September 23, 2020) the project area consisted of residential area with remnant forest communities, landscape trees, second growth riparian vegetation and parkland. Structures within the project area consist of a dwelling at 7 Brennan Avenue, change building, utility building, play structure and parking associated with Minet's Point Park. The project area is relatively level with a moderate slope towards the northeast and Lake Simcoe.

#### **3.2. Terrain, Drainage, and Soils**

The project area is situated in the central portion of Ecodistrict 6E-6 (Barrie). Glaciolacustrine deposits cover over approximately half of the ecodistrict from remnant lake beds (Webster et al. 2018). Generally, the former lake bed material consists of deep and fine-textured material with cobble terraces and shore cliffs that indicate island features in the glacial lakes (Chapman and Putnam 1984). The dominant surface soil type is gray brown luvisol, which is characterized by fine textures, an abundance of lime in the parent material and moderate fair holding capacity (Chapman and Putnam 1984). Bedrock is limited across this landscape.

The overland drainage pattern of the entire project area is generally towards the Lake Simcoe. Direct overland flow toward the lake occurs in the southwest and north east portion of the project area, while areas adjacent to Whiskey Creek first drain toward the creek before flowing into Lake Simcoe in a south to north direction. The drainage area for Whiskey Creek extends beyond Highway 400 to the southwest, approximately 7.5 km from the shoreline of Lake Simcoe, ranging in elevation from 218 m ASL at the lake to 316 m at the height of the watershed. The watershed area is approximately 6.5 ha in area, draining primarily residential lands toward the lake and in the upper watershed, with commercial and open space lands through the central portion of the watershed.

No other watercourses or drainage features were found within the project area.

### 3.3. Vegetation Communities

In general, the project area has been highly modified through residential development, clearing, road construction and road maintenance activities. The majority of the vegetation communities are relatively young and anthropogenic with landscape trees. The area along Whiskey Creek consists of second growth vegetation and based on the species it is assumed the riparian area has had restoration planting. As noted in **Section 2.2.3.**, vegetation communities on the subject property were classified in accordance with the Ecological Land Classification system community codes. Three (3) distinctive vegetation communities were delineated in the project area, a description of each community follows, with all communities illustrated on **Figure 2**.

#### *Fresh-Moist Lowland Deciduous Forest (FOD7)*

Located in the south portion of the project area to the east of White Oak Road and is a forested feature that is best characterized lowland deciduous forest. Located along the edges of Whiskey Creek, this community lacks wetland ground cover associated with wetland communities. However, this location is assumed to see periodic flooding. The tree composition and lack of wetland ground cover reflects this ecosite classification. With the exception of a few larger trees, this community has been historically cleared. This community is also present at the back of 7 Brennan Avenue property. Vegetation species observed: Trembling Aspen (*Populus tremuloides*), Manitoba Maple (*Acer negundo*), White Birch (*Betula papyrifera*), Green Ash (*Fraxinus pennsylvanica*), Black Walnut (*Juglans nigra*), Norway Maple (*Acer platanoides*), Red-osier Dogwood (*Cornus sericea*), Common Buckthorn (*Rhamnus cathartica*), Spotted Jewelweed (*Impatiens capensis*), Bitter-sweet Nightshade (*Solanum dulcamara*), Poison Ivy (*Toxicodendron radicans*), Virginia Creeper (*Parthenocissus inserta*) and Garlic Mustard (*Alliaria petiolate*).

#### *Dry-Fresh White Cedar Mixed Forest (FOM4)*

Located along the edge of Whiskey Creek from Brennan Road to Lake Simcoe is a narrow strip of riparian vegetation that is best characterized as mixed forest. Based on age, species diversity and the presence of erosion matting, it is assumed that this community has been revegetated. The banks of Whiskey Creek are generally sharply defined with vegetation growing in upland conditions. To the southwest of the community, residential dwelling with associated lawn and driveway are present. To the northeast is Minet's Point Park with manicured conditions present. Species present in this community include: Eastern White Cedar (*Thuja occidentalis*), Eastern Hemlock (*Tsuga canadensis*), Blue Spruce (*Picea pungens*), White Spruce (*Picea glauca*), Balsam Fir (*Abies balsamea*), Balsam Poplar (*Populus balsamifera*), Black Walnut, American Elm (*Ulmus americana*), Crack Willow (*Salix fragilis*), Siberian Elm (*Ulmus pumila*), Green Ash, Manitoba Maple, Cherry species (*Prunus sp.*), Russian Olive (*Elaeagnus angustifolia*), Red-osier Dogwood, Tatarian Honeysuckle (*Lonicera tatarica*), ragweed species (*Ambrosia sp.*), Reed Canary Grass (*Phalaris arundinacea*), Wild Carrot (*Daucus carota*), Blue Sailors (*Cichorium intybus*), Common Milkweed (*Asclepias syriaca*), Common Evening Primrose (*Oenothera biennis*), rose species (*Rosa sp.*) and Common Elderberry (*Sambucus racemose*).

#### *Anthropogenic (ANTH)*

The majority of the project area consists of Minet's Point Park and residential properties that have been modified. These areas consist primarily of manicured yard with landscape trees. The following tree species were observed within the anthropogenic communities in the project area: Green Ash, Silver

Maple (*Acer saccharinum*), Jack Pine (*Pinus banksiana*), White Birch, Crack Willow, Blue Spruce, Crabapple species (*Malus sp.*), Norway Maple, Manitoba Maple and Black Walnut.

### 3.4. Tree Inventory

The tree inventory and health assessment was carried out on September 23, 2020, by C. Mann and G. Cunnington. All trees 10 cm diameter at breast height (DBH) or greater (including multi-stemmed trees where total DBH exceeded 10 cm), were inventoried and assessed. Such trees were: (1) identified to species, (2) measured at approximately 1.37 metres above ground with a diameter tape, (3) assessed for defects and indicators of decline (e.g., open wounds, broken branches, etc.), and (4) digitized with a high-accuracy GPS receiver (**Appendix 4, Figure 3**). Based on the information collected, an overall visual assessment of tree health and structural integrity is provided. Notwithstanding the above, it must be recognized that all trees (in good health or otherwise) have the potential for failure given adverse weather, damage due to mechanical injury, or other factors that cause stress. Once the preferred alternate and design of the watercourse enhancements have been determined, information collected in the tree inventory can be used develop a preservation and compensation plan.

### 3.5. Natural Heritage Resources

Based on the biophysical information collected during background information gathering (per **Section 2**) and the onsite investigation completed by RiverStone, **Table 1** below summarizes the status of natural features of conservation interest on the subject property and adjacent lands as per the components of the City of Barrie Natural Heritage Resource Network outlined on Schedule H of the City's OP along with features identified as Natural Core Areas identified in Section 8.3.2.1 of the City's OP. RiverStone's rationale for such determinations is provided in the sections that follow. Features of conservation interest mapping is provided in **Figure 2**.

**Table 1.** Status of the components of the City of Barrie Natural Heritage Resource Network and Natural Core Area within and adjacent to the subject property.

| Features of Conservation Interest                                                    | Status of Natural Feature of Conservation Interest within the Subject Property | Status of Natural Feature of Conservation Interest within Adjacent Lands |
|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Provincially Significant Wetlands                                                    | <i>Absent.</i> See <b>Section 3.5.1.</b>                                       | <i>Absent.</i> See <b>Section 3.5.1.</b>                                 |
| Non-provincially significant wetlands greater than 0.5 ha                            | <i>Absent.</i> See <b>Section 3.5.1.</b>                                       | <i>Absent.</i> See <b>Section 3.5.1.</b>                                 |
| Significant Woodlands greater than 10 ha                                             | <i>Absent.</i> See <b>Section 3.5.2.</b>                                       | <i>Absent.</i> See <b>Section 3.5.2.</b>                                 |
| Significant habitat of endangered, threatened species and species of species concern | <i>Potential.</i> See <b>Section 3.5.3.</b>                                    | <i>Potential.</i> See <b>Section 3.5.3.</b>                              |
| Watercourses, minimum vegetation protection zones and connectivity linkages          | <i>Present.</i> See <b>Section 3.5.4.</b>                                      | <i>Present.</i> See <b>Section 3.5.4.</b>                                |
| Environmental Protection Lands                                                       | <i>Absent.</i> See <b>Section 3.5.5.</b>                                       | <i>Absent.</i> See <b>Section 3.5.5.</b>                                 |

| <b>Features of Conservation Interest</b> | <b>Status of Natural Feature of Conservation Interest within the Subject Property</b> | <b>Status of Natural Feature of Conservation Interest within Adjacent Lands</b> |
|------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| Fish Habitat                             | <i>Present. See Section 3.5.6.</i>                                                    | <i>Present. See Section 3.5.6.</i>                                              |
| Significant Valleylands                  | <i>Absent. See Section 3.5.7.</i>                                                     | <i>Absent. See Section 3.5.7.</i>                                               |
| Significant Wildlife Habitat             | <i>Absent. See Section 3.5.8.</i>                                                     | <i>Present. See Section 3.5.8.</i>                                              |
| Sand Barrens and Savannahs               | <i>Absent. See Section 3.5.9.</i>                                                     | <i>Absent. See Section 3.5.9.</i>                                               |

<sup>1</sup> - Shaded rows denote features of conservation interest for which negative impacts stemming from implementation of the proposed development plan are possible.

### 3.5.1. Wetlands

The results of the ELC vegetation mapping outlined in **Section 3.3**, no wetland communities are present on the subject property. Additionally, a review of the data available from the MNRF indicates that no Provincially Significant Wetlands are located within 120 m of the subject property.

### 3.5.2. Significant Woodlands

Based on Schedule H of the city's OP and information gathered during the site investigation there are no woodlands within the project area or on adjacent lands that would meet the requirement of significant woodland (**Figure 1**).

### 3.5.3. Species of Conservation Interest

Based on the results of RiverStone's background and desktop review, thirteen (13) threatened or endangered species, and seven (7) special concern species had the potential to occur in the project area or on adjacent lands. Following review of the aerial photography and our site assessment, two (2) threatened or endangered species (Little Brown Bat and Northern Long-eared Bat) were identified as having the potential to make use of the mature (i.e., >25 cm DBH) trees within the project area. No special concern species were identified as having the potential to be present within or adjacent to the project area. See **Appendix 2** for a detailed technical description of RiverStone's assessment. An impact assessment is provided in **Section 4** of this report.

### 3.5.4. Watercourses, minimum vegetation protection zones, and connectivity linkages

Based on the review of the available Ontario Base Mapping and the results of RiverStone's onsite assessment one (1) watercourse is present in the project area, draining an approximate 6.7 ha area from the southwest through the project area to Lake Simcoe. The watercourse enters the project area through a forest community behind residential properties and flows under The Boulevard and Brennan Avenue before its confluence with Lake Simcoe

### 3.5.5. Environmental Protection Lands

Based on a review of the City of Barrie Zoning By-law 2009-141 (Office Consolidation December 2017) the subject property does not contain any lands that fall within the Environmental Protection (EP) zone.

### 3.5.6. Fish Habitat

Fish habitat within the project area includes both the shoreline of Lake Simcoe and Whiskey Creek that drains into the lake through the subject property. Existing information indicates that Lake Simcoe is approximately 72,500 ha in area with a maximum depth of 41 m and an average depth of 17 m. The lake drains north through Lake Couchiching and into the Severn River, before eventually emptying into Georgian Bay. Lake Simcoe supports a diverse fishery that includes both warmwater and coldwater species, which includes Lake Trout (*Salvelinus namaycush*), Rainbow Trout (*Oncorhynchus mykiss*), Brook Trout (*Salvelinus fontinalis*), Brown Trout (*Salmo trutta*), and Lake Whitefish (*Coregonus clupeaformis*). Warmwater species include Northern Pike (*Esox lucius*), Muskellunge (*Esox masquinongy*), Walleye (*Sauger vitreum*), Largemouth Bass (*Micropterus salmoides*), Smallmouth Bass (*Micropterus dolomieu*), Burbot (*Lota lota*), and Yellow Perch (*Perca flavescens*). Stocking has occurred each year between 2010 and 2019, releasing fingerlings, yearlings and adults of both Lake Trout and Lake Whitefish. The invasive Spiny Water Flea (*Bythotrephes longimanus*) was first documented in Lake Simcoe in 1993. Similarly, Lake Simcoe has a population of the invasive Round Goby (*Neogobius melanostomus*), likely inadvertently introduced by anglers.

The shoreline of Lake Simcoe adjacent to the subject property is characterized by an open shoreline with consistent substrates. Nearshore substrates are dominated by gravel and small cobble over sand, which occurs across the frontage of the park and adjacent shoreline residential properties. Nearshore slopes are moderate and aquatic vegetation is entirely absent. Substrates and water depth does change at the outlet of the Whiskey Creek, where larger substrates are dominant and the erosive force of high flows has carved a channel into the lake bottom.

The project area has a single permanent watercourse, Whiskey Creek, that is the main focus of this assessment. According to the LSRCA in their 2012 Subwatershed Plan, Whiskey Creek is its small third order watershed draining approximately 6 km<sup>2</sup> of area into Lake Simcoe. The plan notes that although Whiskey Creek flows through a predominantly developed, urban areas, it maintains coldwater habitat in various locations for fish species such as Mottled Sculpin and Brook Trout. This would indicate that there is likely some groundwater influence to regulate temperature. With a moderate gradient (1.38%), Whiskey Creek has nearly the same percentage of stable and unstable banks, which should be considered during the evaluation process for any drainage improvements. The fish community in Whiskey Creek, historically has 21 different species (some identified prior to 1990). These include coldwater species (Brook trout, Mottled Sculpin) as well as warmwater species (Smallmouth Bass, Pumpkinseed). This infers a variety of habitats suitable to a number of species. The report notes that there is evidence that Brook Trout are spawning in Whiskey Creek, in the lower reaches.

Data regarding the aquatic characteristics were collected along Whiskey Creek and are presented in **Table 2** below. There was no observed aquatic vegetation within the channel of Whiskey Creek. Riparian vegetation is outlined above in **Section 3.3**. Photographs are provided in **Appendix 1**.

**Table 2.** Whiskey Creek Channel Characteristics.

| Station ID<br>(Figure 2)                                                              | Flow<br>duration  | Established<br>channel                                 | Instream<br>Vegetation                     | Temp.<br>(°C) <sup>1</sup> | Substrates                                 | Channel<br>width<br>(m) | Channel<br>depth<br>(m) | Fish<br>Observed        |
|---------------------------------------------------------------------------------------|-------------------|--------------------------------------------------------|--------------------------------------------|----------------------------|--------------------------------------------|-------------------------|-------------------------|-------------------------|
| <b>Reach 1</b> –<br>Mouth of Lake<br>Simcoe to ~50<br>m upstream                      | Flow<br>observed. | Yes – clearly<br>defined banks,<br>established channel | No – aquatic<br>vegetation<br>not observed | 17                         | sand,<br>gravel,<br>cobble and<br>organics | 5.5                     | 0.65                    | No                      |
| <b>Reach 2</b> – from<br>reach 1 to<br>Brennan Ave<br>culvert                         | Flow<br>observed. | Yes - clearly<br>defined banks,<br>established channel | No – aquatic<br>vegetation<br>not observed | 17                         | sand,<br>gravel,<br>organics               | 2.5 – 4.0               | 0.20                    | Yes –<br>forage<br>fish |
| <b>Reach 3</b> –<br>Between<br>Brennan Ave<br>culvert and The<br>Boulevard<br>culvert | Flow<br>observed  | Yes - clearly<br>defined banks,<br>established channel | No – aquatic<br>vegetation<br>not observed | 17                         | Sand,<br>gravel,<br>cobble                 | 3.0                     | 0.3                     | No                      |
| <b>Reach 4</b> –<br>Upstream of The<br>Boulevard<br>culvert                           | Flow<br>observed  | Yes - clearly<br>defined banks,<br>established channel | No – aquatic<br>vegetation<br>not observed | 17                         | Sand,<br>gravel and<br>cobble              | 3.5                     | 0.4                     | No                      |

**Notes:** <sup>1</sup> Air temperature 21°

The current level of disturbance along the observed reaches is moderate. The channel does flow through areas with limited riparian vegetation and is influenced by the adjacent roadways; however, in channel habitat remains accessible and suitable for fish. The proposed alteration to the watercourse through this process has not yet been determined and will depend on the construction alternative selected. Presently there are two structures along the watercourse with project alternatives that would permanently remove or replace, depending on the potential impacts. Overall each alternatives require the alternation of the watercourse and disturbance at both crossings and should be mindful of changes to gradient, channel stability, groundwater, and fish movement.

### 3.5.7. Significant Valleylands

The watercourse in the project area primarily flowing along roadside ditch and modified channel. Significant valleylands require the presence of a stream with a well-defined valley morphology having an average width of 25 m or more. Given the lack of well-defined valley morphology associated with the watercourse, no significant valleylands are present within the project area.

### 3.5.8. Significant Wildlife Habitat

Results of the review of background information indicated that there is no significant wildlife habitat present on the subject property. Review of the Natural Heritage Reference Manual (OMNR 2010), indicates that the proposed severance does triggers Step 1 of Section 9.3.2 of the manual:

- Shoreline consent along a large inland lake, small inland lake or large river (denoted on 1:50,000 natural Topographic System maps as being tow lined) that is within 120 metres along the shoreline of an existing lot of record or a lot described in an application for subdivision or consent.

Based on this trigger, an evaluation of the subject property for SWH is required. The site evaluation of the subject property indicated that the property is dominated by anthropogenic lands of manicured

lawn, paved driveway and hardened shoreline. With this information the following general categories of the Natural Heritage Reference Manual were taken into consideration:

- Seasonal Concentration Areas of Animals
- Specialized Habitats for Wildlife
- Habitat for Species of Conservation Concern (ex. Endangered/Threatened Species)
- Movement Corridors

Based on the criteria of the Natural Heritage Reference Manual, there are no general SWH communities that utilize anthropogenic communities as Candidate Significant Wildlife Habitat. It is the opinion of RiverStone, that there is no SWH present on the subject property.

### **3.5.9. Sand Barrens, Savannahs, and Tallgrass Prairies**

Consistent with the description of existing vegetation communities on the subject property in **Section 3.3.**, no Sand Barrens, Savannahs, or Tallgrass Prairies are present within the project area.

## **4. ASSESSMENT OF PROJECT ALTERNATIVES**

### **4.1. Construction Alternatives**

The following paragraphs detail the expected negative and positive impacts of each construction alternative based only on how each would potentially interact with the natural features and functions of the natural environment. The primary features of conservation interest assessed along the alternatives include fish habitat, Whiskey Creek, and potential habitat for SAR. The proposed project alternatives are shown in **Appendix 3**.

#### **4.1.1. Alternative 1 – Do Nothing**

This alternative is do nothing and would result in no immediate impact to natural heritage features; however, should erosion issues become exacerbated in the future, habitat within Whiskey Creek and the lake shoreline may be compromised.

#### **4.1.2. Alternative 2 – Improve Culvert/watercourse to Convey 1:100 Year Design Storm**

This alternative requires improvements along Whiskey Creek to provide a low flow channel with natural channel design along with the replacement of culverts at Brennan Avenue and The Boulavard. Culvert replacement would meet the requirements for a 100-year storm peak. Based on the final design of the watercourse improvements, it may be necessary to relocate the existing buildings within Minet's Point Park, the entrance to Minet's Point Park and removal of the dwelling at 7 Brennan Avenue. It is assumed that riparian area along Whiskey Creek and trees within Minet's Point Park would be compensated through restoration of the riparian area and planting of park trees post construction. This may be possible through the tree programs administered by the LSRCA. Construction of Alternative 2 would result in the short term lose of riparian vegetation along Whiskey Creek and landscape trees within Minet's Point Park. No long-term vegetation removal is anticipated that would not be replaced.

The removal and replacement of the existing culverts under The Boulavard and Brennan Avenue have the potential to impact Whiskey Creek with in-water works anticipated for their replacements; however, with the improvements to Whiskey Creek assuming to be completed at the same time, mitigation measure would help minimize impact to the watercourse. Implementation of a low flow,

natural channel design would be a benefit to the channelize watercourse that is presently there, offering some meander characteristics and possibly low flow back bays, where property allows.

Within the area of disturbance for this alternative, potential habitat for endangered bats is possible and a timing window for clearing of mature trees (i.e., >25 cm DBH) would be required to be completed between October 15 and April 15, outside of the peak roosting season. It is also recommended that removal of mature trees be minimized. There is also potential for Barn Swallow to utilize the concrete box culvert under Brennan Avenue, no nests were observed during the site visit, however it is recommend that the culvert be searched prior to the start of construction and appropriate mitigation applied.

Overall, the predicted impacts of **Alternative 2** are expected to provide an enhanced environment and ecological benefit through channel redesign and post construction riparian restoration. Permits are anticipated to be required for this option through the LSRCA and their Generic Regulations and MNRF under the *Lakes and Rivers Improvement Act*, which we would anticipate to be acceptable to each agency.

#### **4.1.3. Alternative 3 – Improve Culvert/watercourse to Convey Less Than 1:100 Year Design Storm**

This alternative requires improvements along Whiskey Creek to provide a low flow channel with natural channel design along with the replacement of culverts at Brennan Avenue and The Boulevard. Based on the final design of the watercourse improvements, it may be necessary to relocate the existing buildings within Minet's Point Park, the entrance to Minet's Point Park and removal of the dwelling at 7 Brennan Avenue. It is assumed that riparian area along Whiskey Creek and trees within Minet's Point Park would be compensated through restoration of the riparian area and planting of park trees post construction.

Construction of **Alternative 3** would result in same potential impacts and benefits to the natural environment as outline above for **Alternative 2**. Permits are anticipated to be required for this option through the LSRCA and their Generic Regulations and MNRF under the *Lakes and Rivers Improvement Act*.

#### **4.1.4. Alternative 4A – Remove Brennan Ave. at Whiskey Creek**

This alternative requires improvements along Whiskey Creek to provide a low flow channel with natural channel design along with the replacement of the culvert at The Boulevard and the removal and daylighting of the culvert at Brennan Avenue. Based on the final design of the watercourse improvements, it may be necessary to relocate the existing buildings within Minet's Point Park, the entrance to Minet's Point Park and removal of the dwelling at 7 Brennan Avenue. It is assumed that riparian area along Whiskey Creek and trees within Minet's Point Park would be compensated through restoration of the riparian area and planting of park trees post construction.

Construction of Alternative 4A would result in same short-term impacts to the natural environment as the previous 2 alternatives and impacts outline in **Alternative 2**; however, the daylighting of Whiskey Creek at Brennan Avenue would provide an additional benefit for fish movement and additional riparian vegetation, a long-term benefit to the watercourse.

Permits are anticipated to be required for this option through the LSRCA and their Generic Regulations and MNRF under the *Lakes and Rivers Improvement Act*.

#### **4.1.5. Alternative 4B - Remove Brennan Ave. at Whiskey Creek, and Connect Brennan and The Boulevard**

This alternative requires improvements along Whiskey Creek to provide a low flow channel with natural channel design along with the replacement of the culvert at The Boulevard, the removal and daylighting of the culvert at Brennan Avenue and the construction of a connection road from Brennan Avenue to The boulevard through the 7 Brennan property. Based on the final design of the watercourse improvements, it may be necessary to relocate the existing buildings within Minet's Point Park and the entrance to Minet's Point Park. Removal of the dwelling at 7 Brennan Avenue would be necessary. It is assumed that riparian area along Whiskey Creek, trees within Minet's Point Park and the remaining property at 7 Brennan Avenue would be compensated through restoration of the riparian area, planting of park trees post construction and revegetating of lawn area.

Construction of **Alternative 4B** would result in same short-term impacts to the natural environment along Whiskey Creek and within the park as Alternative 4A with impacts outline in Alternative 2. With the daylighting of Whiskey Creek at Brennan Avenue still providing an overall benefit. The connection road would require the permanent removal of forest community but could likely be offset by restoration of the grass lawn at 7 Brennan Avenue. Any removal of the forest community for this alternative is to satisfy compensation requirements for a net gain as outlined in the LRSA's Ecological Offsetting Policy (revised May2019). Permits are anticipated to be required for this option through the LSRCA and their Generic Regulations and MNRF under the *Lakes and Rivers Improvement Act*.

#### **4.1.6. Alternative 5A – Remove The Boulevard at Whiskey Creek**

This alternative requires improvements along Whiskey Creek to provide a low flow channel with natural channel design along with the replacement of the culvert at Brennan Avenue and the removal and daylighting of the culvert at The Boulevard. Based on the final design of the watercourse improvements, it may be necessary to relocate the existing buildings within Minet's Point Park, the entrance to Minet's Point Park and removal of the dwelling at 7 Brennan Avenue. It is assumed that riparian area along Whiskey Creek and trees within Minet's Point Park would be compensated through restoration of the riparian area and planting of park trees post construction.

Construction of **Alternative 5A** would result in same short-term impacts to the natural environment as noted above for **Alternative 4A** with similar impacts outlined in **Alternative 2**. However, the daylighting of Whiskey Creek at The Boulevard would provide an additional length of channel that is not within a culvert as well as riparian vegetation, which is a long-term benefit to the watercourse. Permits are anticipated to be required for this option through the LSRCA and their Generic Regulations and MNRF under the *Lakes and Rivers Improvement Act*.

#### **4.1.7. Alternative 5B – Remove The Boulevard at Whiskey Creek, and Connect Brennan and The Boulevard**

This alternative requires improvements along Whiskey Creek to provide a low flow channel with natural channel design along with the replacement of the culvert at Brennan Avenue, the removal and daylighting of the culvert at The Boulevard, and the construction of a connection road from Brennan Avenue to The Boulevard through the property at 7 Brennan Avenue. Based on the final design of the watercourse improvements, it may be necessary to relocate the existing buildings within Minet's Point Park and the entrance to Minet's Point Park. Removal of the dwelling at 7 Brennan Avenue would be necessary. It is assumed that riparian area along Whiskey Creek, trees within Minet's Point Park and

the remaining property at 7 Brennan Avenue would be compensated through restoration of the riparian area, planting of park trees post construction and revegetating of lawn area.

Construction of **Alternative 5B** would result in same short-term impacts to the natural environment along Whiskey Creek and within the park as Alternative 5A with impacts outline in Alternative 2. With the daylighting of Whiskey Creek at The Boulevard still providing an overall benefit. The connection road would require the permanent removal of forest community but would likely be offset by restoration of the grass lawn at 7 Brennan Avenue. Any removal of the forest community for this alternative is to satisfy compensation requirements for a net gain as outlined in the LRSA's Ecological Offsetting Policy (revised May2019). Permits are anticipated to be required for this option through the LSRCA and their Generic Regulations and MNRF under the *Lakes and Rivers Improvement Act*.

#### **4.1.8. Alternative 6A – Remove Brennan Ave and The Boulevard at Whiskey Creek**

This alternative requires improvements along Whiskey Creek to provide a low flow channel with natural channel design along with the removal of culverts at Brennan Avenue and The Boulevard and daylighting of Whiskey Creek at these locations. Based on the final design of the watercourse improvements, it may be necessary to relocate the existing buildings within Minet's Point Park, the entrance to Minet's Point Park and removal of the dwelling at 7 Brennan Avenue. It is assumed that riparian area along Whiskey Creek and trees within Minet's Point Park would be compensated through restoration of the riparian area and planting of park trees post construction.

Construction of **Alternative 6A** would result in same short-term impacts to the natural environment along Whiskey Creek and within the park as previous alternatives with impacts outline in **Alternative 2**. With the daylighting of Whiskey Creek at Brennan Avenue and The Boulevard an overall benefit would be achieved providing enhanced riparian vegetation and fish passage. Permits are anticipated to be required for this option through the LSRCA and their Generic Regulations and MNRF under the *Lakes and Rivers Improvement Act*.

#### **4.1.9. Alternative 6B – Remove Brennan Ave and The Boulevard at Whiskey Creek, and Connect Brennan and The Boulevard**

This alternative requires improvements along Whiskey Creek to provide a low flow channel with natural channel design along with the removal of culverts at Brennan Avenue and The Boulevard daylighting Whiskey Creek at these locations, and the construction of a connection road between Brennan Avenue to The Boulevard through 7 Brennan Avenue. Based on the final design of the watercourse improvements, it may be necessary to relocate the existing buildings within Minet's Point Park and the entrance to Minet's Point Park. Removal of the dwelling at 7 Brennan Avenue would be necessary. It is assumed that riparian area along Whiskey Creek, trees within Minet's Point Park and the remaining property at 7 Brennan Avenue would be compensated through restoration of the riparian area, planting of park trees post construction and revegetating of lawn area.

Construction of **Alternative 6B** would result in same short-term impacts to the natural environment along Whiskey Creek and within the park as previous alternatives with impacts outline in **Alternative 2**. With the daylighting of Whiskey Creek at Brennan Avenue and The Boulevard an overall benefit would be achieved providing enhanced riparian vegetation and fish passage. The connection road would require the permanent removal of forest community; however, it is assumed that restoration of the grass lawn at 7 Brennan Avenue would offset vegetation removal. Any removal of the forest community for this alternative is to satisfy compensation requirements for a net gain as outlined in the LRSA's Ecological Offsetting Policy (revised May2019).

#### **4.1.10. Alternative 6C – Remove Brennan Ave and the Boulevard at Whiskey Creek, Connect Brennan Avenue and The Boulevard, and New Connection to Hurst Drive**

This alternative requires improvements along Whiskey Creek to provide a low flow channel with natural channel design along with the removal of culverts at Brennan Avenue and The Boulevard and daylighting of Whiskey Creek at these locations, the construction of a connection road between Brennan Avenue to The Boulevard through 7 Brennan Avenue, and the construction of a connecting road from The Boulevard to Hurst Drive. Based on the final design of the watercourse improvements, it may be necessary to relocate the existing buildings within Minet's Point Park, the entrance to Minet's Point Park and removal of the dwelling at 7 Brennan Avenue. This alternative would also require the removal of the dwelling at 201 South View Road. It is assumed that riparian area along Whiskey Creek, trees within Minet's Point Park and vegetation removed on the 201 South View Road property would be compensated through restoration of the riparian area and planting vegetation post construction.

Construction of **Alternative 6A** would result in same short-term impacts to the natural environment along Whiskey Creek and within the park as previous alternatives with impacts outline in **Alternative 2**. With the daylighting of Whiskey Creek at Brennan Avenue and The Boulevard an overall benefit would be achieved providing enhanced riparian vegetation and fish passage. The connection road from The Boulevard to Lakeshore Drive may require the permanent removal of vegetation; however, it is assumed that restoration of the grass lawn at 201 South View Road would offset any vegetation loss. Any removal of the forest community for this alternative is to satisfy compensation requirements for a net gain as outlined in the LRSA's Ecological Offsetting Policy (revised May2019).

#### **4.1.11. Alternative 7 – Additional Conveyance Route (Flow Diversion) Through 26 White Oaks Road.**

This option requires the construction of partially open and partially closed diversion channel through the property at 26 White Oaks Road.

It is assumed that riparian area along Whiskey Creek, trees within Minet's Point Park and vegetation removed at 26 White Oaks Road would be compensated through restoration of the riparian area, planting of park trees and restoration of the 26 White Oaks Road property post construction. Any removal of the forest community for this alternative is to satisfy compensation requirements for a net gain as outlined in the LRSA's Ecological Offsetting Policy (revised May2019).

### **5. RECOMMENDED AVOIDANCE AND MITIGATION MEASURES**

The background review and study assessment details outlined above suggest that there are components of the natural environment that are present through the project area which require particular attention when considering project alternatives or a preferred alternative. Of primary significance are Whiskey Creek and its associated fish habitat, as well as habitat of species at risk (large roosting trees for Little Brown and Northern Long-eared Bats). Each of the alternatives will eventually have particular avoidance and mitigation measures that would address project specific impacts should that alternative be selected. The following details are provided that are applicable to all project alternative, with the exception of the "do nothing" alternative.

### 5.1. Whiskey Creek

As determined through our assessment and discussed in consultation with the LSRCA, Whiskey Creek is the key natural heritage feature present that may be negatively impacted by the project alternative, which are intended to better contain Whiskey Creek waters from flooding surrounding lands.

For all project alternatives, earth works are proposed adjacent to or within Whiskey Creek through channel modifications, culvert replacement or road removal. As such, sediment and erosion control will be a key component to reducing impacts and maintaining fish habitat. Although there should be a detailed ESC plan, the following items apply to all project alternatives at each work area:

- **The selected option for the alteration/realignment of Whiskey Creek must incorporate natural channel design principles that have been supported by a Fluvial Geomorphological Assessment.**
- **When the native soil is exposed, sediment and erosion control works, in the form of heavy-duty sediment fencing, should be positioned along the downgradient edge of any construction envelopes adjacent to Whiskey Creek and/or Lake Simcoe.**
- **Ideally, materials that are excavated from the project area will be immediately removed and taken offsite. Similarly, materials required for the proposed works will be brought to the site and immediately offloaded and placed where required (culvert footings, channel creation, bank stabilization). If temporary storage of aggregate is required, it would ideally be set back from Whiskey Creek Lake by no less than 30 m and be contained by heavy-duty sediment fencing. If this is not possible, the greatest setback possible should be enforced.**
- **To maintain its integrity during inclement weather events, the sediment fencing must be constructed of heavy material, solid posts, and be properly installed (trenched in).**
- **Additional sediment fencing and appropriate control measures should be stockpiled on-site so that any breach can be immediately repaired through the construction of check dams.**
- **Regular inspection and monitoring will be necessary to ensure that the structural integrity and continued functioning of the sediment control measures is maintained (i.e. proper installation is not the only action necessary to satisfy the mitigation requirements). This particularly applies to the 24 hrs prior to the onset of a storm event.**
- **Sediment control measures should be maintained in good working order until vegetation has been established on the exposed soils.**

Sediment and erosion control measures will be very important to reducing the amount of fine material entering the channel and potentially impacting physical characteristics of fish habitat, such as the filling of interstitial spaces between gravel/cobble that is used for spawning by species such as Brook Trout and Mottled or Slimy Sculpin, or changing flow dynamics around spawning features. The timing of works that will interfere with the Whiskey Creek channel will also be important to avoid/minimize impacts, as follows:

- **For construction within the channel of Whiskey Creek, the in-water portion of works are not to be completed between October 1 and May 31, to avoid potential impacts to fish during the**

**coldwater spawning season, particularly for Brook Trout. This restriction also covers the spring spawning Sculpins.**

- **For project alternatives directly impacting the channel of Whiskey Creek and where the creek will require reaches to be isolated, fish should be actively removed and relocated prior to beginning construction.**

The cold/cool water thermal status in of Whiskey Creek is primarily due to the input of groundwater that maintains a colder temperature regime. The precise location of groundwater inputs is not known; however, they are critical to maintain the local Brook Trout population. There are temperature data from the LSRCA that does indicate that reaches upstream of the project area are cold/cool water, suggesting that there is groundwater influence upstream. Regardless of the project alternative chosen, maintaining the thermal regime should be a priority for the project. Where groundwater comes to the surface within the channel bottom provides suitable conditions for Brook Trout to spawn. As such, the following recommendations are provided in relation to the water temperature of Whiskey Creek:

- **All alternatives that require culvert replacement are to utilize open bottom structures to allow for reinstatement of any ground water connections/inputs to Whiskey Creek. If open bottom structures at no possible, embedded box culverts with perforated bottoms may also be considered.**
- **Should groundwater outflow be found in proximity to the creek during construction, groundwater flow into the channel should be maintained and not redirected.**
- **Should groundwater outflow be found within the creek channel, the location should be identified and habitat suitable for Brook Trout spawning should be recreated in that location. An overall plan for fish habitat rehabilitation should be provided following the selection of the preferred project alternative.**
- **Although not as critical as groundwater input, riparian vegetation provides shade to the creek channel to maintain cooler water temperatures during the summer months. In order to maintain positive cooling effects, where project alternatives remove vegetation adjacent to the creek channel, vegetation should be reinstated following construction to similar or better conditions.**
- **A monitoring plan is to be developed and implemented post construction to monitor post construction impacts, the effectiveness of the channel design and vegetation survival.**
- **Once the preferred alternative has been selected, opportunities to increase the vegetation protection zone (VPZ) along Whiskey Creek pursued and incorporated into the detailed design.**

The ability for fish to move upstream and downstream is critical as they access feeding, spawning and rearing habitats throughout the channel length. Different species will also migrate between the lake and creek during various components of their life history.

- **Project alternatives should not introduce any additional barrier to fish movement, such as perched culverts, and further, any existing barrier should be considered for removal through the construction process.**

## 5.2. Species of Conservation Concern

As outlined above in **Section 3.5.3.**, two (2) species of endangered bats have the potential to make use of large mature trees for roosting habitat. In reviewing the proposed alternatives, there is very little difference in the potential for impacts to these two (2) species, amongst the options under consideration. All of the alternatives, with the exception of Alternative 1 (do nothing), include potential impacts to trees, which will impact roosting habitat for bats. To minimize the potential for negative impacts to endangered bats and their roosting habitat, RiverStone recommends that:

- **The number of large mature trees required for removal be minimized to what is truly necessary, and additional planting of trees be considered in close proximity to where they are removed.**
- **Where the removal of mature trees (i.e., >25 cm DBH) is deemed necessary, tree felling should occur between October 31 and April 1 to be sensitive to roosting bats. This timeframe is also sensitive to breeding and nesting birds regulated under the *Migratory Birds Convention Act*. The timing window for tree removal is to be confirmed with MECP during the detailed design process.**
- **Should construction timing request that tree removal occur during this period, addition surveys completed by a qualified biologist (i.e. acoustic monitoring) can be undertaken to determine if roosting bats are using specific trees or stands. Similarly, nest surveys can be completed to identify and locate any active nests of bird species covered by the federal *Migratory Bird Convention Act, 1994* or provincial *Fish and Wildlife Conservation Act, 1997*. If a nest is located or evidence of breeding noted, a mitigation plan should be developed to avoid any potential impacts on birds or their active nests. Mitigation may require establishing appropriate buffers around active nests or delaying construction activities until the conclusion of the nesting season.**

## 5.3. Other Natural Features and Functions

The proposed land use changes will result in disturbance to vegetation (trees) within the proposed development envelope. The following measures are recommended to reduce adverse effects of development on other natural features and functions:

- **All clearing of vegetation required to implement the proposed development plan should be restricted to times outside of the period April 1 to August 31 inclusive. This will help with the the protection of breeding birds. Under Section 6 of the Migratory Birds Regulations in the Migratory Birds Convention Act, 1994 (MBCA) that prohibits the disturbance or destruction of nests, eggs, or nest shelters of a migratory bird. The provincial Fish and Wildlife Conservation Act, 1997 (FWCA) extends the protection of bird nests and eggs to species that are not listed under the Migratory Birds Regulations (e.g., Corvids).**

## 6. CONCLUSIONS

Through our assessment, discussions with the project team and communication with the LSRCA, it is clear that the various project alternatives have very distinct potential impacts on Whiskey Creek and habitat for at risk Bat species. It is also clear that the potential impacts increase dramatically with

increased direct manipulation of Whiskey Creek. This is complicated by the primary goal of the project, which is to better contain the flows within Whiskey Creek that regularly cause localized flooding. It seems that some degree of manipulation of the creek to increase flow capacity will be necessary to have any meaningful improvement to the flooding issue, which will have an impact to the creek biology and ecology. The presence of Brook Trout, indicating a cold/cool water thermal regime, does add an elevated level of concern due to their sensitivity.

Several recommendations are provided that apply to each of the project alternatives, with the exception of the “do nothing” alternative. A specific plan should be developed once a preferred alternative is identified and all applicable recommendations identified in Section 5. must be incorporated into the detail design or the preferred option, including the use of open bottom or perforated culverts that re three (3) times the bankfull width, with a post-construction monitoring plan to be developed and implemented. Regardless of the alternative, it is very likely that permits will be required by the LSRCA (Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses, O Reg 179/0), and the MNRF (*Lakes and Rivers Improvement Act*). A request for project review will also likely be required through DFO (*Fisheries Act*). Submissions to these agencies will require that the alternative be chosen and a detailed plan for avoiding and minimizing impacts be presented.

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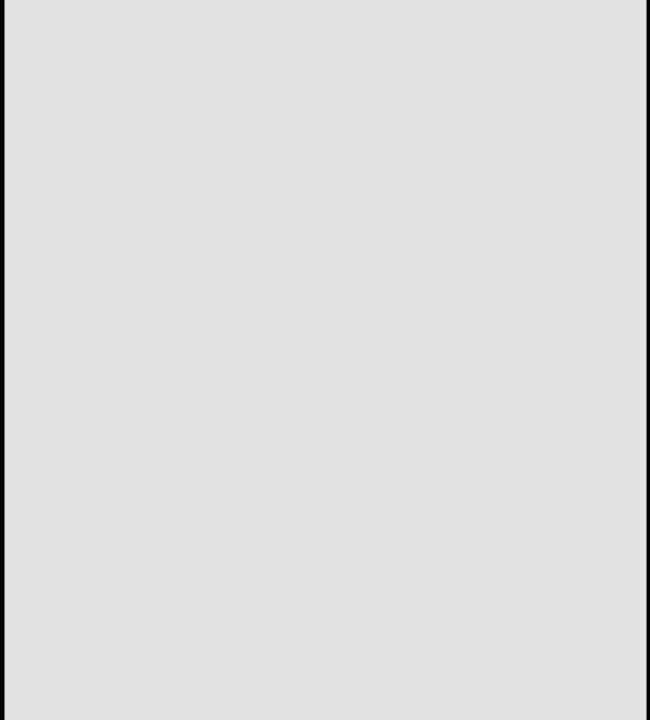
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**Legend**

**Planning Boundaries**

Subject Property



Orthorectified aerial photo - 2018

| Scale   | RS Project No. | Date Last Updated | By |
|---------|----------------|-------------------|----|
| 1:1,500 | 220-070        | Oct 8, 2020       | AS |

02040 Metres

RIVERSTONE  
INTEGRITY • TEAM • VIA • TO CLIMATE

**Figure 1. Location of Subject Property, Minet's Point, City of Barrie**

Prepared for City of Barrie c/o Tatham Engineering

**Disclaimers:**

- the scale text on this figure (e.g., 1:1000) is based on a 11x17" print. If this figure has been printed on a different page size, then only the scale bar is accurate.
- figure should not be used in place of a professional survey



**Legend**

**Ontario Base Mapping (OBM)**

— Roads

**Planning Boundaries**

▬ Subject Property

**Features with Recognized High Natural Heritage Value - Identified by the Province or the Relevant Approval Authorities**

➡ Watercourse (Whiskey Creek)

**Biophysical Features+Functions-RiverStone**

**Ecological Communities**

- 🟡 ANTH: Anthropogenic
- 🟡 FOD7: Fresh-Moist Lowland Deciduous Forest
- 🟡 FOM4: Dry-Fresh White Cedar Mixed Forest

**Features with Recognized High Natural Heritage Value - Identified by RiverStone**

▨ Potential Habitat For Woodland Bats

Orthorectified aerial photo - spring 2018

| Scale          | RS Project No. | Date Last Updated | By                                                                                    |
|----------------|----------------|-------------------|---------------------------------------------------------------------------------------|
| 1:1,045        | 220-070        | Oct 09, 2020      | JG                                                                                    |
| 0 10 20 Metres |                |                   |  |

**Figure 2. Natural Features and Functions, Minet's Point, City of Barrie**

Prepared for City of Barrie c/o Tatham Engineering

**Disclaimers:**

- the scale text on this figure (e.g., 1:1000) is based on a 11x17" print. If this figure has been printed on a different page size, then only the scale bar is accurate.
- figure should not be used in place of a professional survey



| Species                | DBH (cm)               | Tree #                 | Species                 | DBH (cm)               |                                    |
|------------------------|------------------------|------------------------|-------------------------|------------------------|------------------------------------|
| 1 Green Ash            | Fraxinus pennsylvanica | 50.2                   | 65 Silver Maple         | Acer saccharinum       | 49.7                               |
| 2 Silver Maple         | Acer saccharinum       | 38                     | 66 Silver Maple         | Acer saccharinum       | 60.0                               |
| 3 Silver Maple         | Acer saccharinum       | 46                     | 67 Silver Maple         | Acer saccharinum       | 40.0                               |
| 4 Silver Maple         | Acer saccharinum       | 62.9                   | 68 Manitoba Maple       | Acer negundo           | 21.0                               |
| 5 White Birch          | Betula papyrifera      | 26.8                   | 68 Manitoba Maple       | Acer negundo           | 14.0                               |
| 6 White Birch          | Betula papyrifera      | 31.3                   | 69 Green Ash            | Fraxinus pennsylvanica | 49.7                               |
| 6 White Birch          | Betula papyrifera      | 19.5, 18.7             | 70 Manitoba Maple       | Acer negundo           | 25.0                               |
| 7 Silver Maple         | Acer saccharinum       | 58.3                   | 71 Manitoba Maple       | Acer negundo           | 17.0                               |
| 8 White Birch          | Betula papyrifera      | 58                     | 72 Black Walnut         | Juglans cinerea        | 30.0                               |
| 8 Russian Olive        | Elaeagnus angustifolia | 10.5, 13.3, 13.0       | 72 Balsam Poplar        | Populus balsamifera    | 12.9                               |
| 9 Blue Spruce          | Picea pungens          | 16                     | 74 Balsam Poplar        | Populus balsamifera    | 33.5                               |
| 10 Eastern Hemlock     | Tsuga canadensis       | 10.3                   | 75 Norway Maple         | Acer platanoides       | 10.6                               |
| 11 Eastern Hemlock     | Tsuga canadensis       | 10.5                   | 76 White Birch          | Betula papyrifera      | 27.7                               |
| 12 Crack Willow        | Salix fragilis         | 54.7                   | 77 Manitoba Maple       | Acer negundo           | 20.3                               |
| 13 American Elm        | Ulmus americana        | 24.1                   | 78 Balsam Poplar        | Populus balsamifera    | 25.1                               |
| 14 Crack Willow        | Salix fragilis         | 54.5, 46.0, 49.5       | 79 Norway Maple         | Acer platanoides       | 15.6                               |
| 15 Crack Willow        | Salix fragilis         | 34                     | 79 Green Ash            | Fraxinus pennsylvanica | 14.0                               |
| 16 Crack Willow        | Salix fragilis         | 58.0, 49.5, 62.0       | 80 White Birch          | Betula papyrifera      | 33.5                               |
| 17 Manitoba Maple      | Acer negundo           | 12.7                   | 81 White Birch          | Betula papyrifera      | 34.5                               |
| 18 Siberian Elm        | Ulmus pumila           | 15                     | 82 Norway Maple         | Acer platanoides       | 12.3                               |
| 19 Manitoba Maple      | Acer negundo           | 25                     | 82 Trembling Aspen      | Populus tremuloides    | 25.0                               |
| 20 Balsam Fir          | Abies balsamea         | 10.3                   | 84 Trembling Aspen      | Populus tremuloides    | 17.5                               |
| 20 White Spruce        | Picea glauca           | 25.8                   | 85 Manitoba Maple       | Acer negundo           | 17.0                               |
| 21 White Spruce        | Picea glauca           | 28.5                   | 86 Trembling Aspen      | Populus tremuloides    | 18.3                               |
| 22 Balsam Fir          | Abies balsamea         | 19.5                   | 87 Black Walnut         | Juglans cinerea        | 11.7                               |
| 22 Balsam Fir          | Abies balsamea         | 22.1                   | 88 Manitoba Maple       | Acer negundo           | 12, 11.0, 14.2                     |
| 23 White Spruce        | Picea glauca           | 24.4                   | 89 Green Ash            | Fraxinus pennsylvanica | 17.0                               |
| 24 White Spruce        | Picea glauca           | 22.4                   | 90 Manitoba Maple       | Acer negundo           | 16.5                               |
| 25 Balsam Fir          | Abies balsamea         | 18.3                   | 91 Green Ash            | Fraxinus pennsylvanica | 29.0                               |
| 26 White Spruce        | Picea glauca           | 19                     | 92 American Elm         | Ulmus americana        | 43.5                               |
| 27 White Spruce        | Picea glauca           | 17.1                   | 93 Manitoba Maple       | Acer negundo           | 13.5, 14.5                         |
| 27 Manitoba Maple      | Acer negundo           | 25.2, 13.0             | 94 Green Ash            | Fraxinus pennsylvanica | 52.0                               |
| 28 Silver Maple        | Acer saccharinum       | 74, 14.3               | 95 Green Ash            | Fraxinus pennsylvanica | 31.0                               |
| 29 Manitoba Maple      | Acer negundo           | 16.1                   | 96 Green Ash            | Fraxinus pennsylvanica | 17.8                               |
| 30 Silver Maple        | Acer saccharinum       | 24.8, 18.0, 13.5, 36.5 | 97 Green Ash            | Fraxinus pennsylvanica | 42.0                               |
| 31 Manitoba Maple      | Acer negundo           | 15.2                   | 98 Green Ash            | Fraxinus pennsylvanica | 40.3                               |
| 32 Manitoba Maple      | Acer negundo           | 15.1                   | 99 Manitoba Maple       | Acer negundo           | 29.0                               |
| 33 Green Ash           | Fraxinus pennsylvanica | 24.5                   | 99 Eastern White Cedar  | Thuja occidentalis     | 26.0                               |
| 34 Balsam Poplar       | Populus balsamifera    | 53                     | 101 Manitoba Maple      | Acer negundo           | 14.0                               |
| 35 Eastern White Cedar | Thuja occidentalis     | 36                     | 102 Jack Pine           | Pinus banksiana        | 16.5                               |
| 36 Green Ash           | Fraxinus pennsylvanica | 18                     | 102 Silver Maple        | Acer saccharinum       | 39.0                               |
| 37 Eastern White Cedar | Thuja occidentalis     | 11, 13                 | 103 Silver Maple        | Acer saccharinum       | 24.8                               |
| 38 Green Ash           | Fraxinus pennsylvanica | 25                     | 104 Silver Maple        | Acer saccharinum       | 41.5                               |
| 39 Jack Pine           | Pinus banksiana        | 13                     | 105 Silver Maple        | Acer saccharinum       | 76.0                               |
| 40 Jack Pine           | Pinus banksiana        | 13.7                   | 106 Silver Maple        | Acer saccharinum       | 40.0                               |
| 42 Jack Pine           | Pinus banksiana        | 15.3                   | 107 Silver Maple        | Acer saccharinum       | 45.5                               |
| 44 Silver Maple        | Acer saccharinum       | 40.5                   | 108 Jack Pine           | Pinus banksiana        | 11.5                               |
| 45 Balsam Poplar       | Populus balsamifera    | 13.6                   | 109 Jack Pine           | Pinus banksiana        | 13.2                               |
| 46 White Birch         | Betula papyrifera      | 27.8, 17.0             | 110 Silver Maple        | Acer saccharinum       | 51.0                               |
| 47 Balsam Poplar       | Populus balsamifera    | 22.2                   | 106 Green Ash           | Fraxinus pennsylvanica | 45.0                               |
| 48 Black Walnut        | Juglans cinerea        | 13.2                   | 111 Eastern White Cedar | Thuja occidentalis     | 25, 22, 20, 20                     |
| 49 Manitoba Maple      | Acer negundo           | 13                     | 112 Eastern White Cedar | Thuja occidentalis     | 12, 22, 25                         |
| 50 Manitoba Maple      | Acer negundo           | 1306                   | 113 Manitoba Maple      | Acer negundo           | 25, 24                             |
| 51 Balsam Poplar       | Populus balsamifera    | 11                     | 113 Green Ash           | Fraxinus pennsylvanica | 20.0                               |
| 52 Manitoba Maple      | Acer negundo           | 10.5                   | 114 Eastern White Cedar | Thuja occidentalis     | 22, 25, 12                         |
| 52 White Spruce        | Picea glauca           | 26.6                   | 115 Eastern White Cedar | Thuja occidentalis     | 14, 30, 28                         |
| 53 Silver Maple        | Acer saccharinum       | 50                     | 116 Siberian Elm        | Ulmus pumila           | 31.0                               |
| 54 Silver Maple        | Acer saccharinum       | 30, 45                 | 117 Eastern White Cedar | Thuja occidentalis     | 10.0, 35.0                         |
| 55 Silver Maple        | Acer saccharinum       | 55, 25                 | 118 Sugar Maple         | Acer saccharum         | 29.0                               |
| 56 Silver Maple        | Acer saccharinum       | 40, 20                 | 119 Eastern White Cedar | Thuja occidentalis     | 15.6, 18.8, 21.1, 18.0             |
| 58 Crack Willow        | Salix fragilis         | 82, 91, 82, 64         | 120 Eastern White Cedar | Thuja occidentalis     | 15.6, 19.0, 19.0                   |
| 58 Blue Spruce         | Picea pungens          | 15.8                   | 121 Eastern White Cedar | Thuja occidentalis     | 24.8, 18.1, 23.8, 19.6             |
| 59 Crab apple          | Malus sp.              | 13.7                   | 122 Eastern White Cedar | Thuja occidentalis     | 23.2, 33.5, 10.8, 13.5, 12.2, 13.5 |
| 60 Crab apple          | Malus sp.              | 10.5                   | 123 Eastern White Cedar | Thuja occidentalis     | 28.2, 20.5, 23.6                   |
| 61 Norway Maple        | Acer platanoides       | 29.8                   | 125 Green Ash           | Fraxinus pennsylvanica | 28.9                               |
| 61 Crab Apple          | Malus sp.              | 18.2                   | 126 Green Ash           | Fraxinus pennsylvanica | 49.0                               |
| 62 Crab Apple          | Malus sp.              | 14.1                   | 126 Eastern White Cedar | Thuja occidentalis     | 31.0                               |
| 63 Norway Maple        | Acer platanoides       | 20                     | 128 Eastern White Cedar | Thuja occidentalis     | 20.9                               |
|                        |                        |                        | 129 Cherry species      |                        |                                    |
|                        |                        |                        | 130 Cherry sp           |                        |                                    |

Legend

Planning Boundaries

Subject Property

Tree Inventory

Trees (>20 cm dbh)



Orthorectified aerial photo - 2018

| Scale          | RS Project No. | Date Last Updated | By |
|----------------|----------------|-------------------|----|
| 1:1,250        | 220-070        | Oct 8, 2020       | AS |
| 0 10 20 Metres |                |                   |    |

Figure 3. Tree Inventory Results, Minet's Point, City of Barrie

Prepared for City of Barrie c/o Tatham Engineering

## **Appendix 1.** Select Photos from Site Visit



**Photo 1.** FOD forest community in the south of The Boulevard and along White Oak Drive (September 23, 2020).



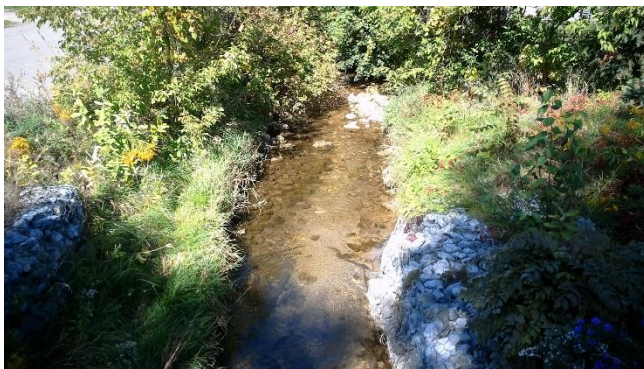
**Photo 2.** FOM community along Whiskey Creek bordered by Minet's Point Park and residential property (September 23, 2020).



**Photo 3.** Anthropogenic lands within Minet's Point Park (September 23, 2020).



**Photo 4.** Reach 1 along Whiskey Creek with harden edges and adjacent residential yard (September 23, 2020).



**Photo 5.** Reach 2 along Whiskey Creek, south of Brennan Avenue culvert (September 23, 2020).



**Photo 6.** Reach 3 along Whiskey Creek, between Brennan Avenue and The Boulevard (September 23, 2020).



**Photo 7.** Reach 4 along Whiskey Creek, south of The Boulevard (September 23, 2020).



**Photo 8.** Existing structure and entrance for Minet's Point Park, possible relocation September 23, 2020).



**Photo 9.** Existing culvert under The Boulevard (September 23, 2020).



**Photo 10.** Existing culvert under Brennan Avenue, note lack of bird nests (September 23, 2020).

## **Appendix 2.** Assessment of Provincially Endangered and Threatened Species and their Habitat

### **Habitat-based Approach**

Properly assessing whether an area is likely to contain Endangered or Threatened species for the purposes of determining whether a proposed development is likely to have a negative impact is becoming more difficult as the number of listed species increases. Approaches that depend solely on documenting the presence of individuals of a species in an area almost always underrepresent the biodiversity actually present because of the difficulty of observing species that are usually rare and well camouflaged. Given these difficulties, and the importance of protecting habitats of Endangered and Threatened species, RiverStone's primary approach to site assessment is habitat-based. This means that our field investigations focus on *evaluating the potential for features within an area of interest to function as habitat for species considered potentially present, rather than searching for live specimens*. An area is considered potential habitat if it satisfies a number of criteria, usually specific to a species, but occasionally characteristic of a broader group (e.g., several turtles use sandy shorelines for nesting, multiple bat species use dead or dying trees for roosting habitat). Physical attributes of a site that can be used as indicators of its potential to function as habitat for a species include structural characteristics (e.g., physical dimensions of rock fragments or trees, water depth), ecological community (e.g., meadow marsh, rock barren), and structural connectivity to other habitat features required by the species. Species-specific habitat preferences and/or affinities are determined from status reports produced by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Cadman et al. (2007), published and unpublished documents, and direct experience.

**Table 1** provides RiverStone's desktop screening and on-site assessment for Endangered and Threatened species. RiverStone measures species- and feature-specific distances from the boundaries of proposed lots or development area(s)—rather than from the boundary of the significant natural heritage feature—and refers to this area as *adjoining lands* (AL). Evaluating the likelihood of species' presence and the potential for negative impacts using this approach ensures that the Adjacent Lands test of the PPS will be met.

For the purposes of RiverStone's assessment, the *extent of impacts* (red lines) as shown on the Alternatives Assessment Drawings as prepared by Tatham Engineering is referred to as the Area of Interest (AOI) and the adjoining lands (AL) extents were measured from the boundaries of the AOI.

| Common Name <sup>1</sup>                                                                                                | Scientific Name               | Step 1 (Desktop): Rationale for considering | Step 2 (Desktop): Do site-specific attributes (e.g., ecological system and landscape configuration) assessed from aerial photography and other information sources indicate that potential habitat or communities might be present?<br>Area of Interest (AOI)Adjoining Lands (AL) |                                                                                                                                                                           | Step 3 (On Site): Potential and/or confirmed habitat documented during on-site assessment<br>Area of Interest (AOI)Adjoining Lands (AL)                                                     |                                                                                                                                                                         | Step 4: Is there potential for the species, its habitat, or ecological community to be negatively impacted by the activities that would be permissible within the AOI? |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Endangered & Threatened (Provincially): status from Species at Risk in Ontario List (O Reg 230/08); updated August 2018 |                               |                                             |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                           |                                                                                                                                                                                             |                                                                                                                                                                         |                                                                                                                                                                        |
| Blanding's Turtle                                                                                                       | <i>Emydoidea blandingii</i>   | Herp Atlas                                  | NO, the extent of residential development and roads, and the lack of wetland communities suggest this species is not present.                                                                                                                                                     | NO, the extent of residential development and roads, and the lack of wetland communities suggest this species is not present.                                             | NO, suitable habitat not observed.                                                                                                                                                          | NO, suitable habitat not observed.                                                                                                                                      | NO, see steps 2 and 3.                                                                                                                                                 |
| Eastern Hog-nosed Snake                                                                                                 | <i>Heterodon platirhinos</i>  | range map                                   | NO, area not likely to support species' population(s) because it is surrounded by intermediate- and high-use roads that have been in place for >10 yrs.                                                                                                                           | NO, area not likely to support species' population(s) because it is surrounded by intermediate- and high-use roads that have been in place for >10 yrs.                   | NO, area not likely to support species' population(s) because it is surrounded by intermediate- and high-use roads that have been in place for >10 yrs.                                     | NO, area not likely to support species' population(s) because it is surrounded by intermediate- and high-use roads that have been in place for >10 yrs.                 | NO, see steps 2 and 3.                                                                                                                                                 |
| Eastern Whip-poor-will                                                                                                  | <i>Caprimulgus vociferus</i>  | OBBA                                        | YES, both natural and anthropogenic openings in canopy could provide suitable breeding and foraging habitat.                                                                                                                                                                      | YES, both natural and anthropogenic openings in canopy could provide suitable breeding and foraging habitat.                                                              | NO, while anthropogenic openings are present, these areas are dominated by parking lot and heavily used recreational park areas limiting the likelihood that this species would be present. | NO, open canopy areas are not suitable for use by this species given the extent of human activities and development in the area.                                        | NO, see step 3.                                                                                                                                                        |
| Bobolink                                                                                                                | <i>Dolichonyx oryzivorus</i>  | OBBA                                        | NO, suitable grassland or agricultural communities are absent.                                                                                                                                                                                                                    | NO, suitable grassland or agricultural communities are absent.                                                                                                            | NO, suitable grassland or agricultural communities are absent.                                                                                                                              | NO, suitable grassland or agricultural communities are absent.                                                                                                          | NO, see steps 2 and 3.                                                                                                                                                 |
| Least Bittern                                                                                                           | <i>Ixobrychus exilis</i>      | OBBA                                        | YES, suitable wetland communities may be present.                                                                                                                                                                                                                                 | YES, suitable wetland communities may be present.                                                                                                                         | NO, suitable wetland communities (e.g., cattail marsh) are absent.                                                                                                                          | NO, suitable wetland communities (e.g., cattail marsh) are absent.                                                                                                      | NO, see step 3.                                                                                                                                                        |
| Chimney Swift                                                                                                           | <i>Chaetura pelagica</i>      | OBBA                                        | YES, dark sheltered hollow vertical structures (chimneys, smoke stacks, silos, large trees with cavities and rock crevices) suitable for nesting or roosting are present.                                                                                                         | YES, dark sheltered hollow vertical structures (chimneys, smoke stacks, silos, large trees with cavities and rock crevices) suitable for nesting or roosting are present. | NO, dark sheltered hollow vertical structures (chimneys, smoke stacks, silos, large trees with cavities and rock crevices) suitable for nesting or roosting are absent.                     | NO, dark sheltered hollow vertical structures (chimneys, smoke stacks, silos, large trees with cavities and rock crevices) suitable for nesting or roosting are absent. | NO, see step 3.                                                                                                                                                        |
| Barn Swallow                                                                                                            | <i>Hirundo rustica</i>        | OBBA                                        | YES, man-made or natural structures suitable for nesting may be present.                                                                                                                                                                                                          | YES, man-made or natural structures suitable for nesting may be present.                                                                                                  | NO, while man-made or natural structures suitable for nesting are present, no evidence of use by this species for nesting was observed.                                                     | NO, while man-made or natural structures suitable for nesting are present, no evidence of use by this species for nesting was observed.                                 | NO, see step 3.                                                                                                                                                        |
| Eastern Meadowlark                                                                                                      | <i>Sturnella magna</i>        | range map                                   | NO, suitable grassland or agricultural communities are absent.                                                                                                                                                                                                                    | NO, suitable grassland or agricultural communities are absent.                                                                                                            | NO, suitable grassland or agricultural communities are absent.                                                                                                                              | NO, suitable grassland or agricultural communities are absent.                                                                                                          | NO, see steps 2 and 3.                                                                                                                                                 |
| Bank Swallow                                                                                                            | <i>Riparia riparia</i>        | OBBA                                        | YES, man-made or natural structures suitable for nesting may be present.                                                                                                                                                                                                          | YES, man-made or natural structures suitable for nesting may be present.                                                                                                  | NO, man-made or natural structures suitable for nesting are absent.                                                                                                                         | NO, man-made or natural structures suitable for nesting are absent.                                                                                                     | NO, see step 3.                                                                                                                                                        |
| Eastern Small-footed Myotis                                                                                             | <i>Myotis leibii</i>          | range map                                   | NO, natural structures (e.g., talus slopes, rocky ridges, rock outcrops, cliff crevices, rock fields) suitable for roosting do not appear to be present.                                                                                                                          | NO, natural structures (e.g., talus slopes, rocky ridges, rock outcrops, cliff crevices, rock fields) suitable for roosting do not appear to be present.                  | NO, natural structures (e.g., talus slopes, rocky ridges, rock outcrops, cliff crevices, rock fields) suitable for roosting are absent.                                                     | NO, natural structures (e.g., talus slopes, rocky ridges, rock outcrops, cliff crevices, rock fields) suitable for roosting are absent.                                 | NO, see step 3.                                                                                                                                                        |
| Little Brown Bat                                                                                                        | <i>Myotis lucifugus</i>       | range map                                   | YES, dark sheltered hollow vertical structures (e.g., large trees with cavities or rock crevices) suitable for gestating or roosting may be present.                                                                                                                              | YES, dark sheltered hollow vertical structures (e.g., large trees with cavities or rock crevices) suitable for gestating or roosting may be present.                      | YES, while very limited in number, large trees with cavities suitable for gestating or roosting were observed with the AOI.                                                                 | YES, while likely limited in extent, suitable mature trees are present on AL.                                                                                           | POSSIBLE                                                                                                                                                               |
| Northern Long-eared Bat                                                                                                 | <i>Myotis septentrionalis</i> | range map                                   | YES, dark sheltered hollow vertical structures (e.g., large trees with cavities or rock crevices) suitable for gestating or roosting may be present.                                                                                                                              | YES, dark sheltered hollow vertical structures (e.g., large trees with cavities or rock crevices) suitable for gestating or roosting may be present.                      | YES, while very limited in number, large trees with cavities suitable for gestating or roosting were observed with the AOI.                                                                 | YES, while likely limited in extent, suitable mature trees are present on AL.                                                                                           | POSSIBLE                                                                                                                                                               |
| Butternut                                                                                                               | <i>Juglans cinerea</i>        | range map                                   | YES, difficult to rule out without on-site assessment.                                                                                                                                                                                                                            | YES, difficult to rule out without on-site assessment.                                                                                                                    | NO, no individuals of this species were documented during the detailed tree inventory.                                                                                                      | NO, no individuals of this species were observed within a distance that would be impacted by the proposed development during the onsite assessment.                     | NO, see step 3.                                                                                                                                                        |

<sup>1</sup>Shaded rows denote species or communities for which negative impacts have been deemed possible.

| Common Name <sup>1</sup> | Scientific Name | Step 1 (Desktop): Rationale for considering | Step 2 (Desktop):<br>Do site-specific attributes (e.g., ecological system and landscape configuration) assessed from aerial photography and other information sources indicate that potential habitat or communities might be present?<br>Area of Interest (AOI) |  |
|--------------------------|-----------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|--------------------------|-----------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

<sup>1</sup>Shaded rows denote species or communities for which negative impacts have been deemed possible.

## **Appendix 3. Project Alternatives**



# KEMPENFELT BAY LAKE SIMCOE

WHISKEY CREEK (TO REMAIN UNALTERED)

MINET'S POINT PARK

LISMER BLVD.

KEMPVIEW LN.

BRENNAN AVE.

BRENNAN AVE. CULVERT CROSSING:  
3650mm x 1500mm CONC. BOX CULVERT  
(CAPACITY = 10.4cms; 1:2 YEAR PEAK  
FLOW)

THE BOULEVARD CULVERT CROSSING: 1800mm x 1070mm CSPA  
CULVERT (CAPACITY = 3.4cms; < 1:2 YEAR PEAK FLOW)

WHITE OAKS RD.

THE BLVD.

CLIFF RD.



KEY PLAN

## LEGEND

- EX. PROPERTY LINE
- ████████ STUDY AREA
- 250.00 - EX CONTOUR
- ████████ PROPOSED PROPERTY ACQUISITION
- ████████ ROAD TO BE REMOVED
- ████████ PROPOSED TRANSPORTATION LINKAGE
- ████████ WHISKEY CREEK



## WHISKEY CREEK DRAINAGE IMPROVEMENTS

ALTERNATIVE 1 – DO NOTHING ("EXISTING CONDITIONS")

SCALE: 1:1500

DRAWN: JGH

DATE: SEPT./20

DWG. No.

**ALT-1**

JOB NO. 120114



# KEMPENFELT BAY LAKE SIMCOE

WHISKEY CREEK WATERCOURSE  
IMPROVEMENTS: TO CONVEY  
1:100-YEAR RETURN FREQUENCY  
DESIGN STORM PEAK FLOW  
(CAPACITY = 52.6cms)

MINET'S POINT PARK

REGRADE WHISKEY CREEK  
@ 0.0% (INV. 218.00)

EXISTING WASHROOM/GENERATOR  
BUILDING TO BE RELOCATED.

LISMER BLVD.

KEMPVIEW LN.

EXISTING ENTRANCE TO BE RELOCATED  
TO LISMER BLVD.

BRENNAN AVE.

7 BRENNAN AVE

EXISTING RESIDENTIAL DWELLING TO  
BE REMOVED.

REGRADE WHISKEY  
CREEK @ 0.7%

BRENNAN AVE. CULVERT CROSSING:  
REMOVE AND REPLACE EX. CULVERT  
WITH A 11000mm x 2000mm CONC.  
SPAN STRUCTURE DESIGNED TO  
CONVEY THE 1:100-YEAR RETURN  
FREQUENCY DESIGN STORM PEAK  
FLOW (CAPACITY = 52.5cms)

THE BOULEVARD CULVERT CROSSING:  
REMOVE AND REPLACE EX. CULVERT  
WITH A 11000mm x 2400mm CONC.  
SPAN STRUCTURE DESIGNED TO  
CONVEY THE 1:100-YEAR RETURN  
FREQUENCY DESIGN STORM PEAK  
FLOW (CAPACITY = 52.3cms)

WHITE OAKS RD.

THE BLVD.

199 THE BOULEVARD

CLIFF RD.



KEY PLAN

## LEGEND

- EX. PROPERTY LINE
- STUDY AREA
- 250.00 - EX CONTOUR
- PROPOSED PROPERTY ACQUISITION
- ROAD TO BE REMOVED
- PROPOSED TRANSPORTATION LINKAGE
- WHISKEY CREEK

### PROPERTY ACQUISITION:

- A) 7 BRENNAN AVE.
- B) 199 THE BOULEVARD (PORTION OF)



### WHISKEY CREEK DRAINAGE IMPROVEMENTS

ALTERNATIVE 2 – CULVERT/WATERCOURSE IMPROVEMENTS  
TO CONVEY 1:100-YEAR DESIGN STORM

DWG. No.

**ALT-2**

SCALE: 1:1500

DRAWN: JGH

DATE: SEPT./20

JOB NO. 120114



# KEMPENFELT BAY LAKE SIMCOE

WHISKEY CREEK WATERCOURSE IMPROVEMENTS: LOW FLOW CHANNEL WHERE FEASIBLE (6m WIDE x 0.4m DEEP BANKFULL CHANNEL) USING NATURAL CHANNEL DESIGN PRINCIPLES TO CONVEY BASEFLOW AND FLOODPLAIN IMPROVEMENTS TO CONVEY 1:10-YEAR RETURN FREQUENCY DESIGN STORM PEAK FLOW (27.4 cms)

MINET'S POINT PARK

REGRADE WHISKEY CREEK @ 0.4%

MINET'S POINT PUMP STATION

LISMER BLDV.

KEMPVIEW LN.

BRENNAN AVE.

7 BRENNAN AVE

EXISTING RESIDENTIAL DWELLING TO BE REMOVED

REGRADE WHISKEY CREEK @ 0.4%

199 THE BOULEVARD

WHITE OAKS RD.

THE BLVD.

CLIFF RD.

BRENNAN AVE CULVERT CROSSING: REMOVE AND REPLACE EX. CULVERT WITH 9800 mm x 1650 mm CONC. SPAN STRUCTURE DESIGNED TO CONVEY 1:10-YEAR RETURN FREQUENCY DESIGN STORM PEAK FLOW (27.4 cms)

THE BOULEVARD CULVERT CROSSING: REMOVE AND REPLACE EX. CULVERT WITH 7300 mm x 1950 mm CONC. SPAN STRUCTURE DESIGNED TO CONVEY 1:10-YEAR RETURN FREQUENCY DESIGN STORM PEAK FLOW (27.3 cms)



KEY PLAN

## LEGEND

- EX. PROPERTY LINE
- █ STUDY AREA
- 250.00 - EX CONTOUR
- PROPOSED PROPERTY ACQUISITION
- █ ROAD TO BE REMOVED
- █ PROPOSED TRANSPORTATION LINKAGE
- WHISKEY CREEK

### PROPERTY ACQUISITION:

- A) 7 BRENNAN AVE.
- B) 199 THE BOULEVARD (PORTION OF)



### WHISKEY CREEK DRAINAGE IMPROVEMENTS

ALTERNATIVE 3 - CULVERT/WATERCOURSE IMPROVEMENTS TO CONVEY LESS THAN 1:100-YEAR DESIGN STORM

SCALE: 1:1500

DRAWN: JGH

DATE: SEPT./20

DWG. No.

**ALT-3A**

JOB NO. 120114



# KEMPENFELT BAY LAKE SIMCOE

WHISKEY CREEK WATERCOURSE IMPROVEMENTS: LOW FLOW CHANNEL WHERE FEASIBLE (6m WIDE x 0.4m DEEP BANKFULL CHANNEL) USING NATURAL CHANNEL DESIGN PRINCIPLES TO CONVEY BASEFLOW AND FLOODPLAIN IMPROVEMENTS TO CONVEY 1:50-YEAR RETURN FREQUENCY DESIGN STORM PEAK FLOW (42.3 cms)

REGRADE WHISKEY CREEK @ 0.4%

MINET'S POINT PUMP STATION

BRENNAN AVE CULVERT CROSSING: REMOVE AND REPLACE EX. CULVERT WITH 13400 mm x 1650 mm CONC. SPAN STRUCTURE DESIGNED TO CONVEY 1:50-YEAR RETURN FREQUENCY DESIGN STORM PEAK FLOW (42.1 cms)

THE BOULEVARD CULVERT CROSSING: REMOVE AND REPLACE EX. CULVERT WITH 11000 mm x 1950 mm CONC. SPAN STRUCTURE DESIGNED TO CONVEY 1:50-YEAR RETURN FREQUENCY DESIGN STORM PEAK FLOW (42.0 cms)

WHITE OAKS RD.

LISMER BLDV.

KEMPVIEW LN.

BRENNAN AVE.

7 BRENNAN AVE

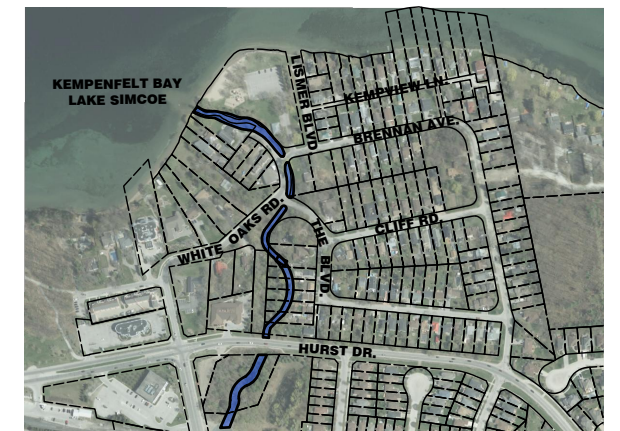
EXISTING RESIDENTIAL DWELLING TO BE REMOVED

REGRADE WHISKEY CREEK @ 0.4%

199 THE BOULEVARD

THE BLVD.

CLIFF RD.



KEY PLAN

## LEGEND

- EX. PROPERTY LINE
- STUDY AREA
- EX CONTOUR
- PROPOSED PROPERTY ACQUISITION
- ROAD TO BE REMOVED
- PROPOSED TRANSPORTATION LINKAGE
- WHISKEY CREEK

### PROPERTY ACQUISITION:

- A) 7 BRENNAN AVE.
- B) 199 THE BOULEVARD (PORTION OF)



### WHISKEY CREEK DRAINAGE IMPROVEMENTS

ALTERNATIVE 3 - CULVERT/WATERCOURSE IMPROVEMENTS TO CONVEY LESS THAN 1:100-YEAR DESIGN STORM

SCALE: 1:1500

DRAWN: JGH

DATE: SEPT./20

DWG. No.

**ALT-3B**

JOB NO. 120114



# KEMPENFELT BAY LAKE SIMCOE

WHISKEY CREEK WATERCOURSE IMPROVEMENTS: LOW FLOW CHANNEL WHERE FEASIBLE (6m WIDE x 0.4m DEEP BANKFULL CHANNEL) USING NATURAL CHANNEL DESIGN TO CONVEY BASEFLOW AND FLOODPLAIN IMPROVEMENTS TO CONVEY 1:10-YEAR RETURN FREQUENCY DESIGN STORM PEAK FLOW (27.4 cms)

MINET'S POINT PARK

REGRADE WHISKEY CREEK @ 0.4%

MINET'S POINT PUMP STATION

WHISKEY CREEK

REMOVE SECTION OF BRENNAN AVE. DAYLIGHTING WATERCOURSE

THE BOULEVARD CULVERT CROSSING: REMOVE AND REPLACE EX. CULVERT WITH 7300 mm x 1950 mm CONC. SPAN STRUCTURE DESIGNED TO CONVEY 1:10-YEAR RETURN FREQUENCY DESIGN STORM PEAK FLOW (27.3cms)

LISMER BLDV.

KEMPVIEW LN.

BRENNAN AVE.

25m PEDESTRIAN BRIDGE

7 BRENNAN AVE

REGRADE WHISKEY CREEK @ 0.4%

199 THE BOULEVARD

WHITE OAKS RD.

THE BLDV.

CLIFF RD.



KEY PLAN

## LEGEND

- EX. PROPERTY LINE
- ████████ STUDY AREA
- 250.00 - EX CONTOUR
- PROPOSED PROPERTY ACQUISITION
- ████████ ROAD TO BE REMOVED
- ████████ PROPOSED TRANSPORTATION LINKAGE
- WHISKEY CREEK

### PROPERTY ACQUISITION:

- A) 7 BRENNAN AVE.
- B) 199 THE BOULEVARD (PORTION OF)



**WHISKEY CREEK  
DRAINAGE IMPROVEMENTS**  
ALTERNATIVE 4A – REMOVE BRENNAN AVENUE AT  
WHISKEY CREEK

DWG. No.  
**ALT-4A**  
JOB NO. 120114

SCALE: 1:1500    DRAWN: JGH    DATE: SEPT./20



# KEMPENFELT BAY LAKE SIMCOE

WHISKEY CREEK WATERCOURSE  
IMPROVEMENTS: LOW FLOW CHANNEL WHERE  
FEASIBLE (6m WIDE x 0.4m DEEP BANKFULL  
CHANNEL) USING NATURAL CHANNEL DESIGN  
TO CONVEY BASEFLOW AND FLOODPLAIN  
IMPROVEMENTS TO CONVEY 1:10-YEAR  
RETURN FREQUENCY DESIGN STORM PEAK  
FLOW (27.4 cms)

MINET'S POINT PARK

REGRADE WHISKEY CREEK  
@ 0.4%

MINET'S POINT  
PUMP STATION

WHISKEY CREEK

REMOVE SECTION OF BRENNAN AVE.  
DAYLIGHTING WATERCOURSE

THE BOULEVARD CULVERT CROSSING:  
REMOVE AND REPLACE EX. CULVERT  
WITH 7300 mm x 1950 mm CONC.  
SPAN STRUCTURE DESIGNED TO  
CONVEY 1:10-YEAR RETURN  
FREQUENCY DESIGN STORM PEAK FLOW  
(27.3cms)

LISMER BLDV.

KEMPVIEW LN.

BRENNAN AVE.

25m PEDESTRIAN BRIDGE

7 BRENNAN AVE

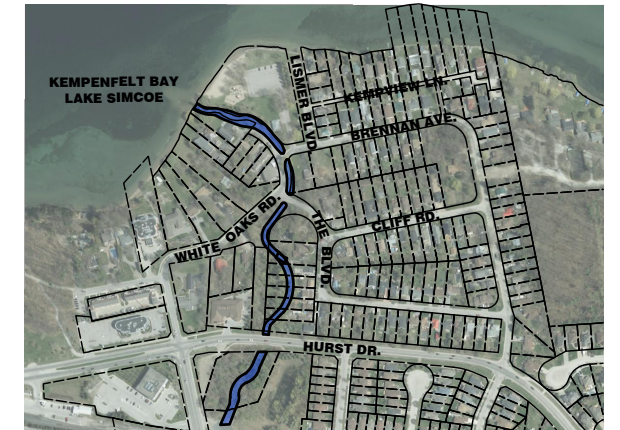
REGRADE WHISKEY CREEK  
@ 0.4%

199 THE BOULEVARD

WHITE OAKS RD.

THE BLDV.

CLIFF RD.



KEY PLAN

## LEGEND

- EX. PROPERTY LINE
- STUDY AREA
- 250.00 - EX CONTOUR
- PROPOSED PROPERTY ACQUISITION
- ROAD TO BE REMOVED
- PROPOSED TRANSPORTATION LINKAGE
- WHISKEY CREEK

### PROPERTY ACQUISITION:

- A) 7 BRENNAN AVE.
- B) 199 THE BOULEVARD (PORTION OF)



### WHISKEY CREEK DRAINAGE IMPROVEMENTS

ALTERNATIVE 4B – REMOVE BRENNAN AVE. AT WHISKEY  
CREEK AND CONNECT BRENNAN AVE. AND THE BOULEVARD

DWG. No.

**ALT-4B**

SCALE: 1:1500

DRAWN: JGH

DATE: SEPT./20

JOB NO. 120114



## KEMPENFELT BAY LAKE SIMCOE

WHISKEY CREEK WATERCOURSE  
IMPROVEMENTS: LOW FLOW CHANNEL WHERE  
FEASIBLE (6m WIDE x 0.4m DEEP BANKFULL  
CHANNEL) USING NATURAL CHANNEL DESIGN  
TO CONVEY BASEFLOW AND FLOODPLAIN  
IMPROVEMENTS TO CONVEY 1:10-YEAR  
RETURN FREQUENCY DESIGN STORM PEAK  
FLOW (27.4 cms)

REGRADE WHISKEY CREEK  
@ 0.4%

MINET'S POINT  
PUMP STATION

WHISKEY CREEK

10.0m

BRENNAN AVE CULVERT CROSSING:  
REMOVE AND REPLACE EX. CULVERT WITH  
9800 mm x 1650 mm CONC. SPAN  
STRUCTURE DESIGNED TO CONVEY  
1:10-YEAR RETURN FREQUENCY DESIGN  
STORM PEAK FLOW (27.4cms)

15m PEDESTRIAN BRIDGE

REMOVE SECTION OF THE BOULEVARD  
DAYLIGHTING WATERCOURSE

7 BRENNAN AVE

EXISTING RESIDENTIAL DWELLING TO  
BE REMOVED

REGRADE WHISKEY CREEK  
@ 0.4%

199 THE BOULEVARD

VEHICLE TURN AROUND

WHITE OAKS RD.

LISMER BLVD.

KEMPVIEW LN.

BRENNAN AVE.

THE BLVD.

CLIFF RD.



KEY PLAN

### LEGEND

- EX. PROPERTY LINE
- ████████ STUDY AREA
- 250.00 - EX CONTOUR
- ████████ PROPOSED PROPERTY ACQUISITION
- ████████ ROAD TO BE REMOVED
- ████████ PROPOSED TRANSPORTATION LINKAGE
- ████████ WHISKEY CREEK

### PROPERTY ACQUISITION:

- A) 7 BRENNAN AVE.
- B) 199 THE BOULEVARD (PORTION OF)



### WHISKEY CREEK DRAINAGE IMPROVEMENTS

ALTERNATIVE 5A – REMOVE THE BOULEVARD AT WHISKEY  
CREEK

DWG. No.

**ALT-5A**

SCALE: 1:1500

DRAWN: JGH

DATE: SEPT./20

JOB NO. 120114



# KEMPENFELT BAY LAKE SIMCOE

WHISKEY CREEK WATERCOURSE  
IMPROVEMENTS: LOW FLOW CHANNEL WHERE  
FEASIBLE (6m WIDE x 0.4m DEEP BANKFULL  
CHANNEL) USING NATURAL CHANNEL DESIGN  
TO CONVEY BASEFLOW AND FLOODPLAIN  
IMPROVEMENTS TO CONVEY 1:10-YEAR  
RETURN FREQUENCY DESIGN STORM PEAK  
FLOW (27.4 cms)

BRENNAN AVE CULVERT CROSSING:  
REMOVE AND REPLACE EX. CULVERT WITH  
9800 mm x 1650 mm CONC. SPAN  
STRUCTURE DESIGNED TO CONVEY  
1:10-YEAR RETURN FREQUENCY DESIGN  
STORM PEAK FLOW (27.4cms)

REMOVE SECTION OF THE BOULEVARD  
DAYLIGHTING WATERCOURSE

MINET'S POINT PARK

REGRADE WHISKEY CREEK  
@ 0.4%

MINET'S POINT  
PUMP STATION

WHISKEY CREEK

REGRADE WHISKEY CREEK  
@ 0.4%

15m PEDESTRIAN BRIDGE

WHITE OAKS RD.

LISMER BLDV.

KEMPVIEW LN.

BRENNAN AVE.

7 BRENNAN AVE

EXISTING RESIDENTIAL DWELLING TO  
BE REMOVED

199 THE BOULEVARD

THE BLDV.

CLIFF RD.



KEY PLAN

## LEGEND

- EX. PROPERTY LINE
- ████████ STUDY AREA
- 250.00 - EX CONTOUR
- ████████ PROPOSED PROPERTY ACQUISITION
- ████████ ROAD TO BE REMOVED
- ████████ PROPOSED TRANSPORTATION LINKAGE
- ████████ WHISKEY CREEK

### PROPERTY ACQUISITION:

- A) 7 BRENNAN AVE.
- B) 199 THE BOULEVARD (PORTION OF)



### WHISKEY CREEK DRAINAGE IMPROVEMENTS

ALTERNATIVE 5B - REMOVE THE BOULEVARD AT WHISKEY  
CREEK AND CONNECT BRENNAN AVE. AND THE BOULEVARD

SCALE: 1:1500    DRAWN: JGH    DATE: SEPT./20    JOB NO. 120114

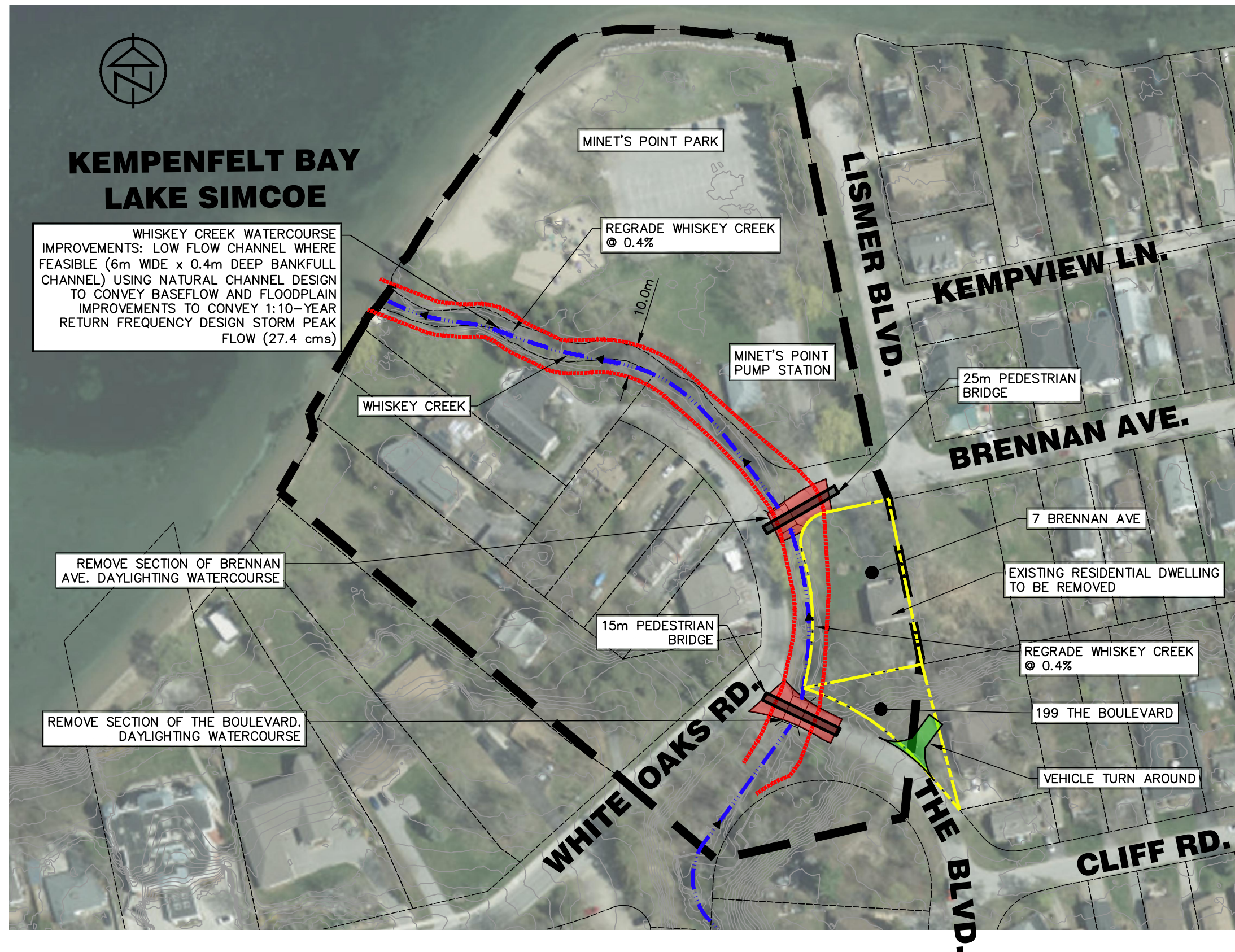
DWG. No.

**ALT-5B**



# KEMPENFELT BAY LAKE SIMCOE

WHISKEY CREEK WATERCOURSE  
IMPROVEMENTS: LOW FLOW CHANNEL WHERE  
FEASIBLE (6m WIDE x 0.4m DEEP BANKFULL  
CHANNEL) USING NATURAL CHANNEL DESIGN  
TO CONVEY BASEFLOW AND FLOODPLAIN  
IMPROVEMENTS TO CONVEY 1:10-YEAR  
RETURN FREQUENCY DESIGN STORM PEAK  
FLOW (27.4 cms)



REMOVE SECTION OF BRENNAN  
AVE. DAYLIGHTING WATERCOURSE

REMOVE SECTION OF THE BOULEVARD.  
DAYLIGHTING WATERCOURSE

REGRADE WHISKEY CREEK  
@ 0.4%

MINET'S POINT  
PUMP STATION

WHISKEY CREEK

15m PEDESTRIAN  
BRIDGE

25m PEDESTRIAN  
BRIDGE

7 BRENNAN AVE

EXISTING RESIDENTIAL DWELLING  
TO BE REMOVED

REGRADE WHISKEY CREEK  
@ 0.4%

199 THE BOULEVARD

VEHICLE TURN AROUND



KEY PLAN

## LEGEND

- EX. PROPERTY LINE
- ████████ STUDY AREA
- 250.00 - EX CONTOUR
- ████████ PROPOSED PROPERTY ACQUISITION
- ████████ ROAD TO BE REMOVED
- ████████ PROPOSED TRANSPORTATION LINKAGE
- ████████ WHISKEY CREEK

### PROPERTY ACQUISITION:

- A) 7 BRENNAN AVE.
- B) 199 THE BOULEVARD (PORTION OF)



**WHISKEY CREEK  
DRAINAGE IMPROVEMENTS**  
ALTERNATIVE 6A – REMOVE BRENNAN AVE. AND THE  
BOULEVARD AT WHISKEY CREEK

DWG. No.  
**ALT-6A**  
JOB NO. 120114



# KEMPENFELT BAY LAKE SIMCOE

WHISKEY CREEK WATERCOURSE  
IMPROVEMENTS: LOW FLOW CHANNEL WHERE  
FEASIBLE (6m WIDE x 0.4m DEEP BANKFULL  
CHANNEL) USING NATURAL CHANNEL DESIGN  
TO CONVEY BASEFLOW AND FLOODPLAIN  
IMPROVEMENTS TO CONVEY 1:10-YEAR  
RETURN FREQUENCY DESIGN STORM PEAK  
FLOW (27.4 cms)

MINET'S POINT PARK

REGRADE WHISKEY CREEK  
@ 0.4%

MINET'S POINT  
PUMP STATION

WHISKEY CREEK

15m PEDESTRIAN  
BRIDGE

REMOVE SECTION OF BRENNAN AVE.  
DAYLIGHTING WATERCOURSE

REMOVE SECTION OF THE BOULEVARD  
DAYLIGHTING WATERCOURSE

LISMER BLDV.

KEMPVIEW LN.

BRENNAN AVE.

7 BRENNAN AVE

EXISTING RESIDENTIAL DWELLING  
TO BE REMOVED

REGRADE WHISKEY CREEK  
@ 0.4%

199 THE BOULEVARD

WHITE OAKS RD.

THE BLDV.

CLIFF RD.



**KEY PLAN**

## LEGEND

- EX. PROPERTY LINE
- ████████ STUDY AREA
- 250.00 - EX CONTOUR
- ████████ PROPOSED PROPERTY ACQUISITION
- ████████ ROAD TO BE REMOVED
- ████████ PROPOSED TRANSPORTATION LINKAGE
- ████████ WHISKEY CREEK

### PROPERTY ACQUISITION:

- A) 7 BRENNAN AVE.
- B) 199 THE BOULEVARD (PORTION OF)



**WHISKEY CREEK  
DRAINAGE IMPROVEMENTS**  
ALTERNATIVE 6B - REMOVE BRENNAN AVE. AND THE  
BOULEVARD AT WHISKEY CREEK AND CONNECT BRENNAN  
AVE. AND THE BOULEVARD

DWG. No.

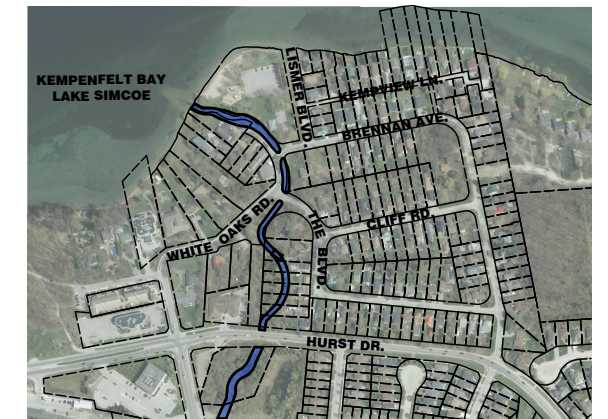
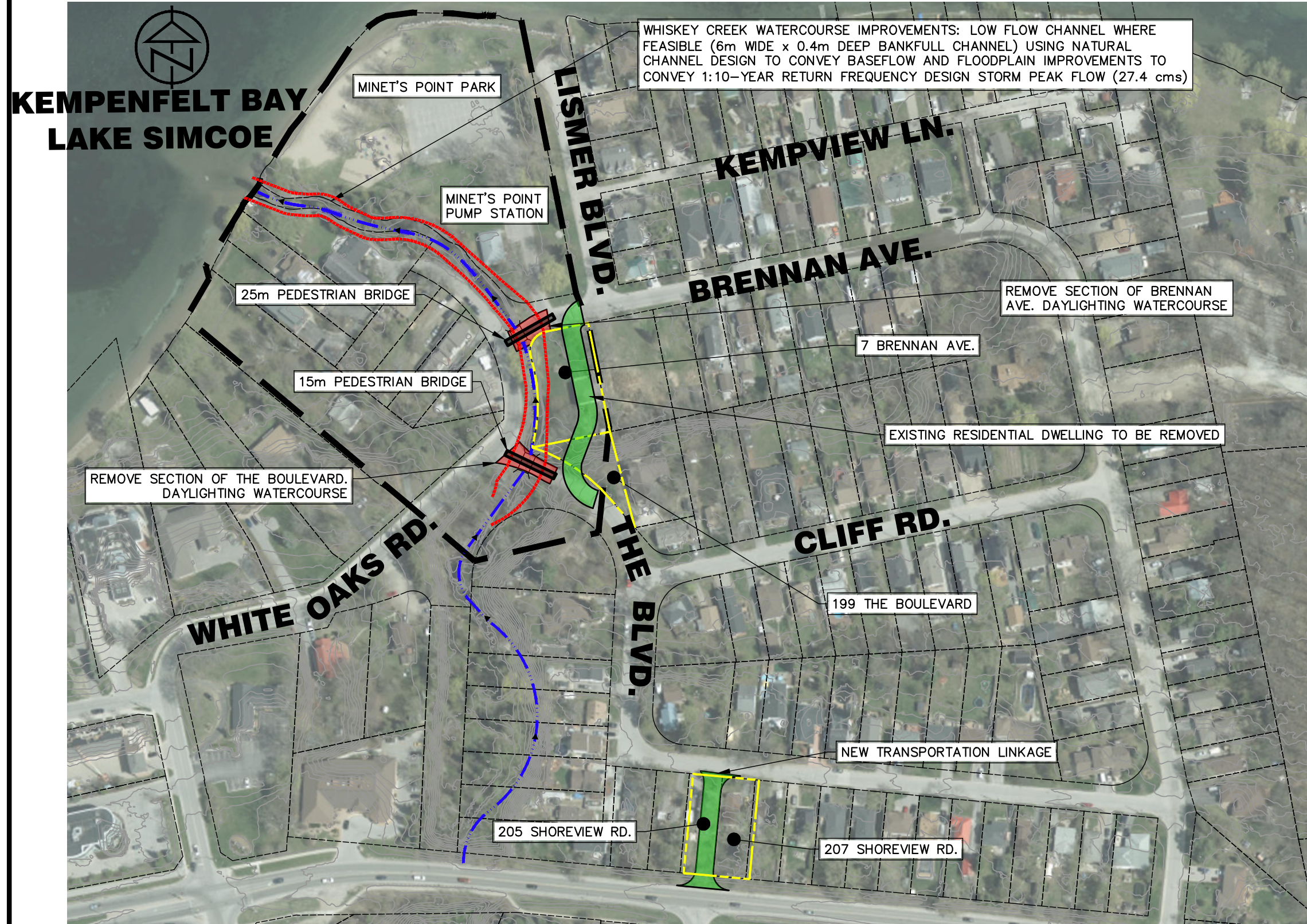
**ALT-6B**

SCALE: 1:1500

DRAWN: JGH

DATE: SEPT./20

JOB NO. 120114



**KEY PLAN**

| LEGEND     |                                 |
|------------|---------------------------------|
| ---        | EX. PROPERTY LINE               |
| █          | STUDY AREA                      |
| - 250.00 - | EX CONTOUR                      |
| ---        | PROPOSED PROPERTY ACQUISITION   |
| █          | ROAD TO BE REMOVED              |
| █          | PROPOSED TRANSPORTATION LINKAGE |
| ---        | WHISKEY CREEK                   |

**PROPERTY ACQUISITION:**

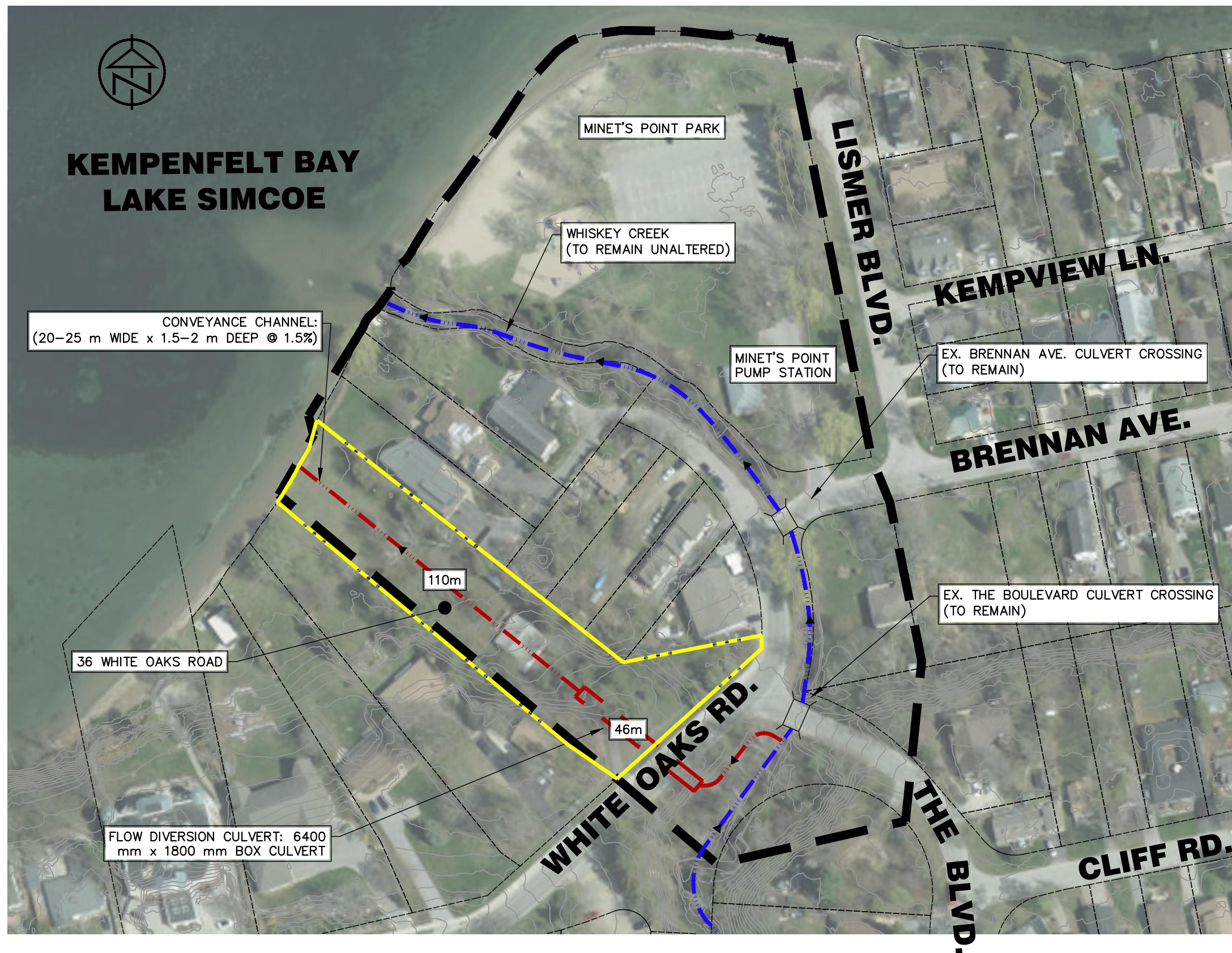
- A) 7 BRENNAN AVE.
- B) 199 THE BOULEVARD (PORTION OF)
- C) 207 SHOREVIEW RD.
- D) 205 SHOREVIEW RD.



**WHISKEY CREEK  
DRAINAGE IMPROVEMENTS**  
ALTERNATIVE 6C – REMOVE BRENNAN AVE. AND THE BOULEVARD AT WHISKEY CREEK AND CONNECT BRENNAN AVE. AND THE BOULEVARD AND NEW CONNECTION TO

SCALE: 1:2000    DRAWN: JGH    DATE: SEPT./20

DWG. No.  
**ALT-6C**  
JOB NO. 120114



KEY PLAN

LEGEND

- EX. PROPERTY LINE
- STUDY AREA
- 250.00 - EX CONTOUR
- PROPOSED PROPERTY ACQUISITION
- ROAD TO BE REMOVED
- PROPOSED TRANSPORTATION LINKAGE
- WHISKEY CREEK

PROPERTY ACQUISITION:  
A) 36 WHITE OAKS ROAD



WHISKEY CREEK  
DRAINAGE IMPROVEMENTS  
ALTERNATIVE 7 - ADDITIONAL CONVEYANCE ROUTE (FLOW  
DIVERSION) THROUGH 26 WHITE OAKS ROAD

DWG. No.

ALT-7

SCALE: 1:1500

DRAWN: JGH

DATE: SEPT./20

JOB NO. 120114