



McKINLEY
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Stormwater Swale (Tributary #4)
Headwaters Drainage Feature Assessment
Brigil Kanata North Development



August 2022
Prepared for Brigil Homes

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1.0 INTRODUCTION

1.1 Background and Site Overview

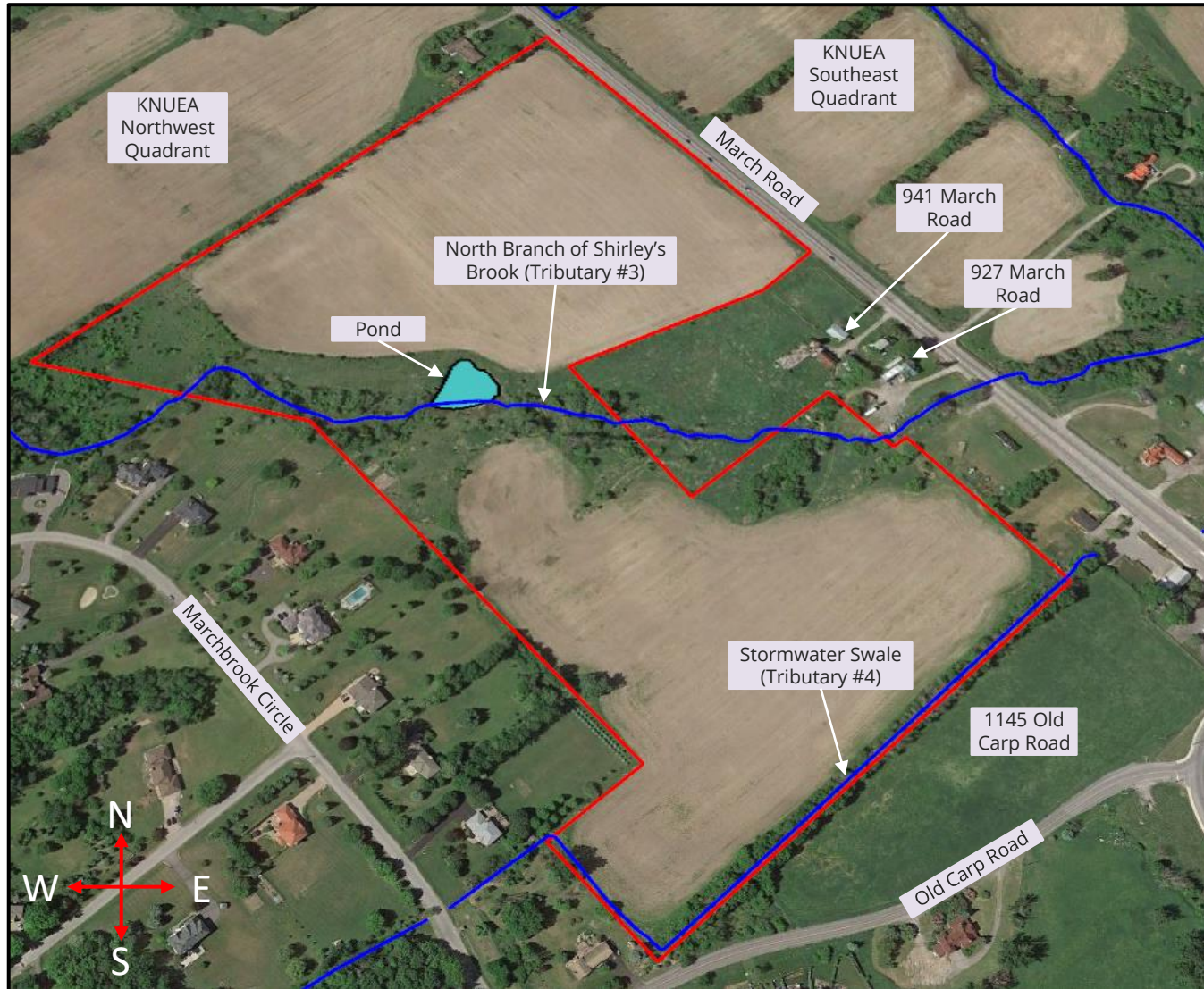
The Site is part of the approved Kanata North Urban Expansion Area (KNUEA), which is an urban expansion area located northwest of the developed portion of Kanata (Ottawa, Ontario). The KNUEA includes approximately 181 hectares on either side of March Road, which is currently being developed to accommodate approximately 3,000 residential dwellings, a mixed-use core, schools, and various parks and trails (Novatech 2016a). During the urban expansion process, the KNUEA was divided into four (4) quadrants, each of which corresponded to the major landowners for that portion of the KNUEA. The Southwest Quadrant of the KNUEA includes the property owned by Brigil Homes, as well as several adjacent developed and undeveloped properties located at 927 March Road, 941 March Road, and 1145 Old Carp Road. The portions of the KNUEA Southwest Quadrant which are owned by Brigil Homes and which form part of the current undertaking are shown in Figure 1 (the Site). The Site includes a portion of the 927 March Road property, which was previously severed into several parts. The Site is approximately 19.98 ha in size.

The Site is located along the west side of March Road, with the KNUEA Northwest Quadrant located directly to the north, and the KNUEA Southeast Quadrant located on the opposite side of March Road. Both of the adjacent KNUEA quadrants are currently being developed as residential subdivisions. An existing rural estate subdivision (the Marchbrook Circle subdivision) is located west of the Site. The 1145 Old Carp Road property, which consists of a vacant field, is located south of the Site. March Road, as well as the existing developed portions of 927 March Road and 941 March Road, are located east of the Site. The Site is within the urban area of the City of Ottawa.

The majority of the Site consists of agricultural lands that are actively cultivated. This includes Cultivated Fields that were planted with soybeans in the summer of 2022, as well as recently Fallow Fields (Graminoid Meadow). Treed habitats within the Site include two (2) Deciduous Hedgerows, a Cultural Thicket, and three (3) small Tree Stands. There are no forested areas within the Site. The North Branch of Shirley's Brook (Tributary #3) currently flows through the Site in a northwest to southeast direction. A Stormwater Swale (Tributary #4) also flows through the Site in a southwest to northeast direction.

FIGURE 1: SITE OVERVIEW

Brigil Kanata North Development Stormwater Swale (Tributary #4) Headwaters Drainage Feature Assessment



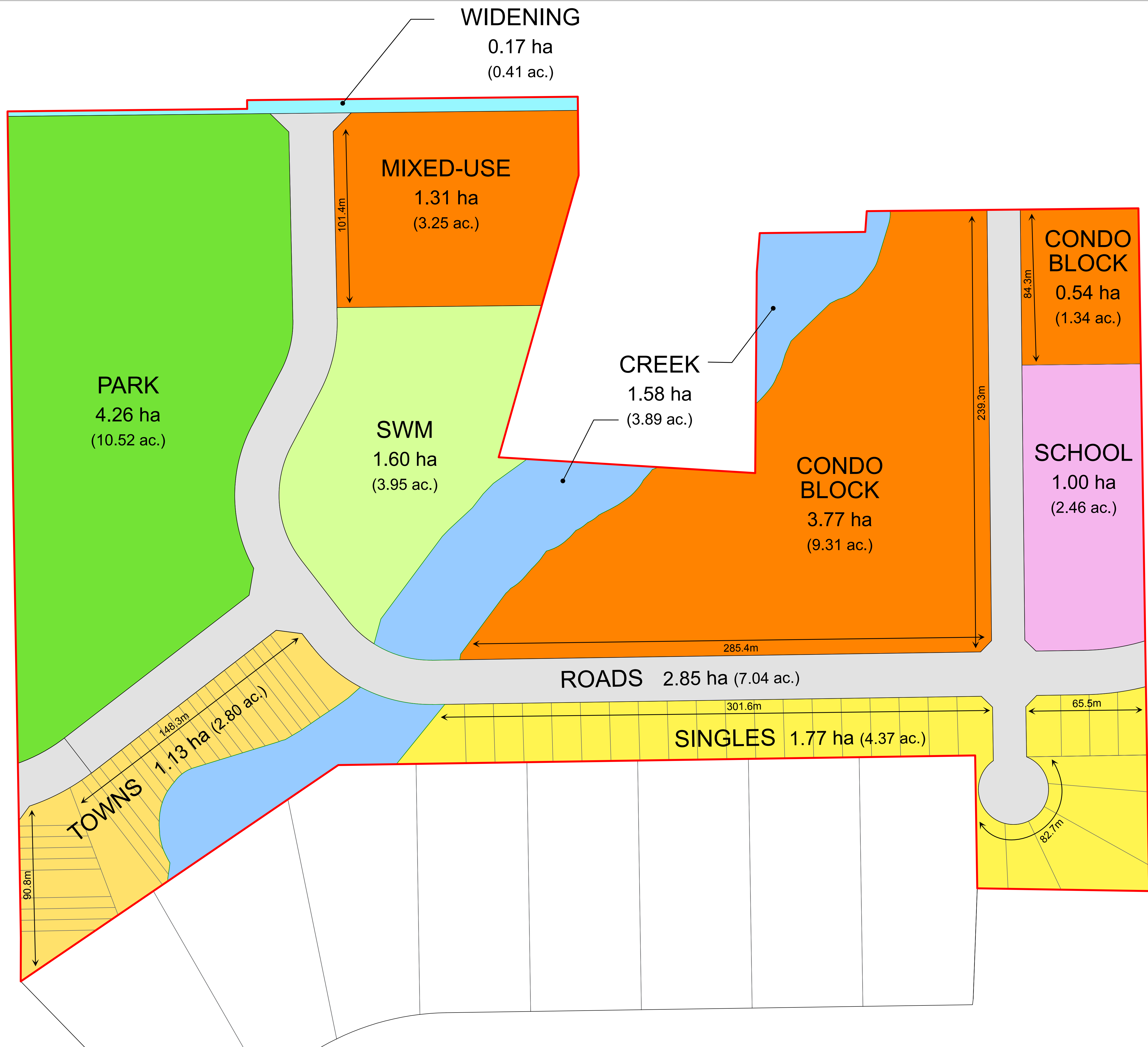
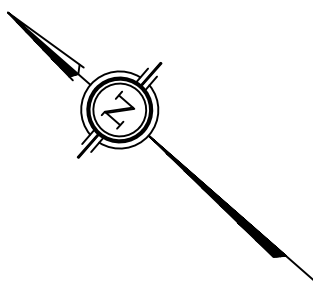
— - Site Boundary — - Tributaries of Shirley's Brook

Please Note:
This is not a
legal land
survey. All
dimensions
and locations
are shown as
approximate.

1.2 Description of Development

The Community Design Plan (CDP) and the associated Environmental Management Plan (EMP) for the Kanata North Urban Expansion Area (KNUEA) were approved by Ottawa City Council in 2016 (Novatech 2016a; Novatech 2016b). Notably, the KNUEA EMP establishes minimum 40 m wide watercourse corridors which are to be retained and/or enhanced surrounding the tributaries of Shirley's Brook (Novatech 2016b). Within the Site, this corridor was identified to retain the North Branch of Shirley's Brook (Tributary #3) (discussed below). As shown in the Concept Land Use Plan, the minimum 40 m wide watercourse corridor within the Site is approximately 1.58 ha in size.

The Concept Land Use Plan is included below. The Site will be developed to accommodate several condo and residential mixed use blocks. The development will also include a mixture of single detached homes and townhomes, as well as a 1.00 ha School Block, a 4.26 ha Community Park, and a 1.60 ha Stormwater Management Pond. The development of the Site will also include the construction of several roads. The main road through the Site will cross the North Branch of Shirley's Brook (Tributary #3) and will require the installation of a wildlife passage culvert (discussed below). A 6 m wide recreational pathway will be included along the northern edge of the minimum 40 m wide watercourse corridor. The Site will receive municipal services. Stormwater runoff will be addressed by the new Stormwater Management (SWM) Pond. The new SWM Pond will outlet clean water to the North Branch of Shirley's Brook (Tributary #3).



| | |
|----------------------------|--|
| KNUEA CONCEPT | |
| BRIGIL LANDS MARCH ROAD | |
| FIGURE | BRIGIL "Proud to build a better quality of life" |
| 2019-10-28 | |
| 1:1000 | |

1.3 Scope of the Headwaters Drainage Feature Assessment

1.3.1 North Branch of Shirley's Brook (Tributary #3) & Blanding's Turtle Habitat

The habitat of Blanding's Turtle (threatened) is known to occur within the Site (MES 2020). The future development of the Site has been authorized by an Ontario Endangered Species Act (ESA) Overall Benefit Permit (#ER-C-008-21). The Ontario ESA Overall Benefit Permit and the Kanata North Urban Expansion Area (KNUEA) Environmental Management Plan (EMP) identify that the North Branch of Shirley's Brook (Tributary #3) will be preserved within the 40 m wide watercourse corridor (Novatech 2016b). The North Branch of Shirley's Brook (Tributary #3) will not be realigned as part of the proposed development. In order to offset potential impacts to Blanding's Turtle habitat, habitat enhancement features will be installed within the 40 m wide watercourse corridor. The development of the Site will also include the reshaping of the inline pond that is currently present along the North Branch of Shirley's Brook (Tributary #3). In addition, the construction of the main road through the Site will require the installation of a new wildlife passage culvert where the future road will cross the North Branch of Shirley's Brook (Tributary #3).

The 40 m wide watercourse corridor surrounding the North Branch of Shirley's Brook (Tributary #3), the reshaping of the inline pond, the construction of a new wildlife passage culvert, and the installation of the habitat enhancement features has been authorized by the Ontario ESA Overall Benefit Permit and through the obtainment of a Letter of Advice under the Fisheries Act (#22-HCAA-00220).

A Combined Environmental Impact Statement (EIS) and Tree Conservation Report (TCR) was prepared in 2020 to support the Draft Plan of Subdivision application process for the Brigil Homes Kanata North development (MES 2020). The Combined EIS and TCR provided a detailed description of the North Branch of Shirley's Brook (Tributary #3) and the proposed works within the 40 m wide watercourse corridor. The Combined EIS and TCR was reviewed by the Mississippi Valley Conservation Authority (MVCA) in early 2021. It is anticipated that approval from the MVCA under Ontario Regulation 153/06 will be required to support the proposed works within the North Branch of Shirley's Brook (Tributary #3) 40 m wide watercourse corridor. The MVCA review and permitting process under Ontario Regulation 153/06 will be undertaken at the detailed design stage.

The existing studies and authorizations have previously addressed the North Branch of Shirley's Brook (Tributary #3) and its 40 m wide watercourse corridor, and therefore an assessment of the North Branch of Shirley's Brook (Tributary #3) has not been included within the scope of this Headwaters Drainage Feature Assessment.

1.3.2 Stormwater Swale (Tributary #4)

The Kanata North Urban Expansion Area (KNUEA) Community Design Plan (CDP) and associated Environmental Management Plan (EMP) identified that the Stormwater Swale (Tributary #4) will be decommissioned as part of the future development of the Site. The flows that are currently conveyed by the Stormwater Swale (Tributary #4) will be intercepted at the property line and piped to the North Branch of Shirley's Brook (Tributary #3) through a new stormwater sewer (Novatech 2016a; Novatech 2016b).

A description of the Stormwater Swale (Tributary #4) and its habitat functions was included in the Combined Environmental Impact Statement (EIS) and Tree Conservation Report (TCR) that was prepared in 2020 to support the Draft Plan of Subdivision application process for the Brigil Homes Kanata North development (MES 2020). In their review comments dated April 7th, 2021, the Mississippi Valley Conservation Authority (MVCA) identified that a Headwaters Drainage Feature Assessment addressing the Stormwater Swale (Tributary #4) was necessary in order to fulfill the requirements outlined in the KNUEA EMP (Novatech 2016b). As required by the KNUEA EMP, the current Headwaters Drainage Feature Assessment provides an assessment of the features and functions of the Stormwater Swale (Tributary #4).

It should be noted that the approved Ontario Endangered Species Act (ESA) Overall Benefit Permit and the Fisheries Act Letter of Advice for the Site authorize the decommissioning of the Stormwater Swale (Tributary #4) under the rules and regulations of the Ontario ESA and the Fisheries Act (respectively).

2.0 METHODOLOGY

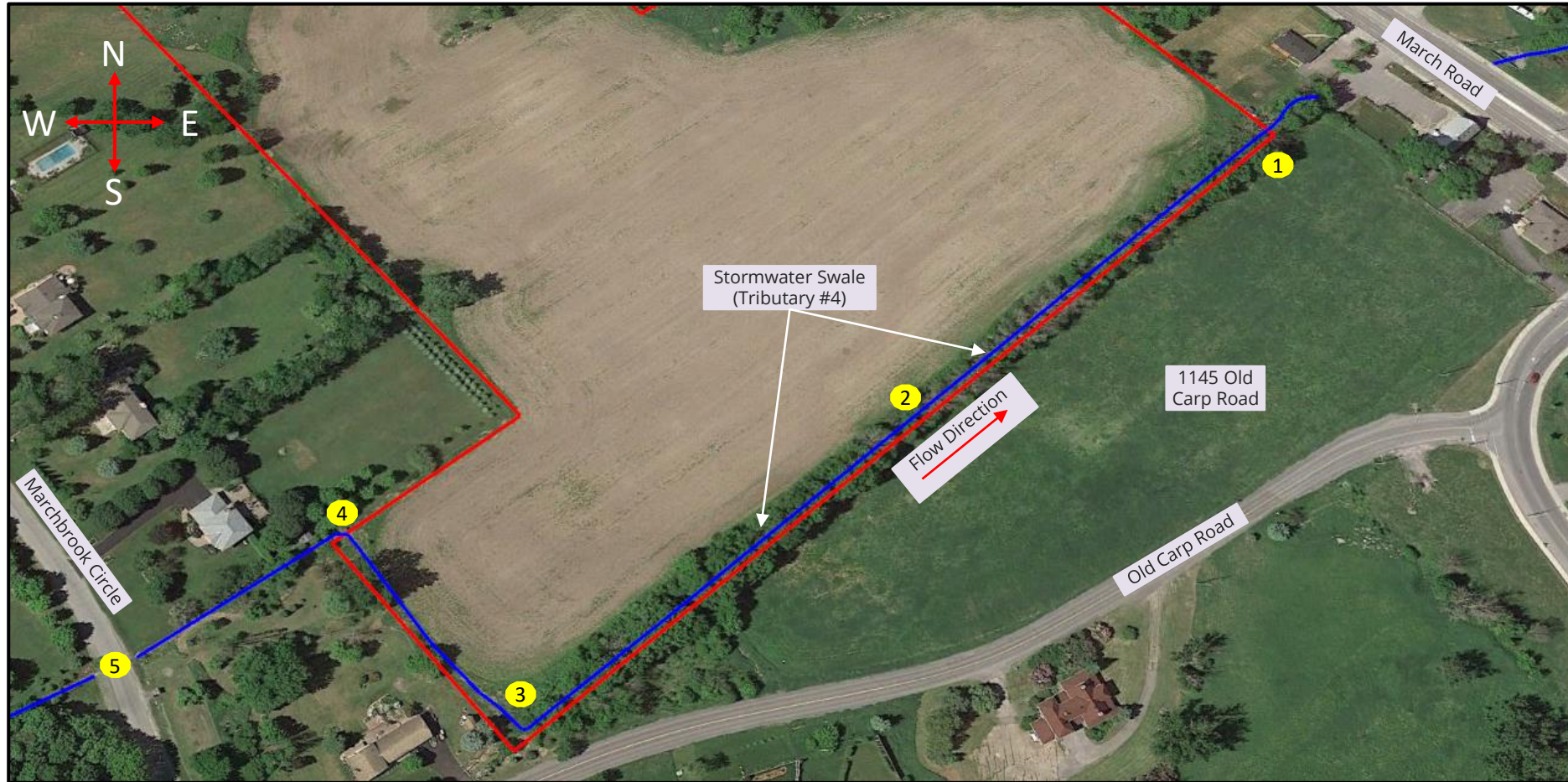
The field component of the Headwaters Drainage Feature Assessment was undertaken following the *Evaluation, Classification and Management of Headwater Drainage Features Guideline* (TRCA 2014). The Survey Sites included 40 m upstream and 40 m downstream of each constriction, confluence, and/or each location with divergent ecological conditions. As shown in Figure 2, five (5) Survey Sites were required. Upstream and downstream drainage feature segments were measured at each of the five (5) Survey Sites. The field surveys included the following:

- **Ontario Stream Assessment Protocol (OSAP) Module S4.M10 – Assessing Headwaters Drainage Features (Stanfield et al. 2013):** OSAP Module S4.M10 includes an assessment of hydrological and physical functions. The parameters measured are summarized in Tables A, B and C. The parameters measured included the watercourse type, flow regime, wetted width, water depth, hydraulic head, bankfull width, channel depth, substrate, and riparian corridor vegetation. The flow and water measurements were completed on April 4th (spring freshet), May 25th (late spring), and July 11th, 2022 (mid-summer). The channel measurements were completed during the April 4th, 2022 Site visit.
- **Marsh Monitoring Program – Amphibian Call Count Surveys (Konze and McLaren 1998):** Amphibian breeding habitat was identified according to the *Marsh Monitoring Program – Amphibian Call Count Surveys Method* (Konze and McLaren 1998). This method includes three (3) night time surveys in April, May, and June, during which the presence of amphibian breeding habitat is assessed by listening for frog calls. The surveys were completed on April 22nd, May 23rd, and June 20th, 2022. The weather conditions on April 22nd included clear skies and temperatures of 9 °C. The weather conditions on May 23rd included temperatures of 14 °C and overcast skies. The weather conditions on June 20th included clear skies and temperatures of 22 °C. The amphibian call count surveys were conducted in the upstream and downstream segments of each Survey Site. The amphibian survey results are included in Table D.

Muncaster Environmental Planning (MEP) completed fish sampling in 2013 at one (1) location along the Stormwater Swale (Tributary #4) (MEP 2016). No fish were captured within the Stormwater Swale during the 2013 surveying, and MEP concluded that the feature is not ecologically significant (MEP 2016). As described below in Section 3.5, no fish were observed within the Stormwater Swale (Tributary #4) during the 2022 surveying.

FIGURE 2: SURVEY SITES

Brigil Kanata North Development Stormwater Swale (Tributary #4) Headwaters Drainage Feature Assessment



— - Site Boundary
 — - Tributaries of Shirley's Brook
 # - Survey Sites

Please Note: This is not a legal land survey. All dimensions and locations are shown as approximate.

3.0 EXISTING CONDITIONS

3.1 Drainage Feature Overview

The Stormwater Swale (Tributary #4) flows through the Site in a southwest to northeast direction. The Stormwater Swale (Tributary #4) occurs within Deciduous Hedgerow B (refer to MES 2020), and is fed by stormwater outflow from the adjacent Marchbrook Circle subdivision. The majority of the water that flows through the Stormwater Swale (Tributary #4) comes from upstream areas (e.g. the Marchbrook Circle subdivision). However, the feature receives minor inputs from the Old Carp Road roadside ditch and agricultural tile drains that provide drainage from the fields within the Site. The Stormwater Swale (Tributary #4) enters the survey area through a 75 cm diameter CSP culvert under Marchbrook Circle. The Stormwater Swale (Tributary #4) exits the survey area through a concrete pipe beneath March Road. The concrete pipe is approximately 75 m long and 1.3 m in diameter. Refer to Appendix A for photographs of the Stormwater Swale (Tributary #4).

3.2 Hydrological Characteristics

The hydrological characteristics of the Stormwater Swale (Tributary #4) are summarized below in Table A. Shallow water depths that varied between 47 mm and 90 mm (e.g. <10 cm) were observed throughout the Stormwater Swale (Tributary #4) during the spring freshet. Flow volumes were minimal throughout the feature during the spring freshet, with the exception of Site #3 upstream and Site #4 downstream, where no flow was observed. Water depths throughout the feature declined moderately by the late spring, with measurements varying between 30 mm and 67 mm. Flow volumes were minimal in the upstream and downstream segments of Site #1, Site #2, and Site #5 in the late spring, whereas Site #3 and Site #4 were stagnant in the late spring. The feature was entirely dry by mid-summer, with no standing water observed.

The survey results indicate that the Stormwater Swale (Tributary #4) has very limited hydrological functions. Under most circumstances, the Stormwater Swale (Tributary #4) is likely hydrated only in the early spring and/or following major storm events. It should be noted that the spring of 2022 was exceptionally wet, which may have extended the normal hydro-period of the Stormwater Swale (Tributary #4) compared to a typical year. However, even in a comparatively wet year, the Stormwater Swale (Tributary #4) had a maximum water depth of 67 mm by late May. Even during the spring freshet, water levels were <5 cm in portions of the feature, and water levels did not exceed 10 cm anywhere within the survey area.

TABLE A: HYDROLOGICAL MEASUREMENTS

| SITE | SEGMENT | FEATURE TYPE | FLOW REGIME* | | | WETTED WIDTH (cm) | | | AVERAGE WATER DEPTH (mm) | | | AVERAGE HYDRAULIC HEAD (mm) | | |
|---------|------------|------------------|--------------|---------|---------|-------------------|--------|---------|--------------------------|--------|---------|-----------------------------|--------|---------|
| | | | April 4 | May 25 | July 11 | April 4 | May 25 | July 11 | April 4 | May 25 | July 11 | April 4 | May 25 | July 11 |
| Site #1 | Downstream | Stormwater Swale | Minimal | Minimal | Dry | 220 | 170 | 0 | 77 | 53 | 0 | 5 | 3 | Dry |
| | Upstream | Stormwater Swale | Minimal | Minimal | Dry | 120 | 90 | 0 | 67 | 37 | 0 | 10 | 2 | Dry |
| Site #2 | Downstream | Stormwater Swale | Minimal | Minimal | Dry | 138 | 125 | 0 | 87 | 37 | 0 | 3 | 1 | Dry |
| | Upstream | Stormwater Swale | Minimal | Minimal | Dry | 210 | 140 | 0 | 90 | 37 | 0 | 3 | 1 | Dry |
| Site #3 | Downstream | Stormwater Swale | Minimal | No Flow | Dry | 150 | 75 | 0 | 73 | 37 | 0 | 3 | 0 | Dry |
| | Upstream | Stormwater Swale | No Flow | No Flow | Dry | 220 | 130 | 0 | 47 | 67 | 0 | 0 | 0 | Dry |
| Site #4 | Downstream | Stormwater Swale | No Flow | No Flow | Dry | 120 | 60 | 0 | 90 | 33 | 0 | 0 | 0 | Dry |
| | Upstream | Stormwater Swale | Minimal | No Flow | Dry | 320 | 180 | 0 | 63 | 30 | 0 | 1 | 0 | Dry |
| Site #5 | Downstream | Stormwater Swale | Minimal | Minimal | Dry | 190 | 85 | 0 | 63 | 53 | 0 | 2 | 3 | Dry |
| | Upstream | Stormwater Swale | Minimal | Minimal | Dry | 170 | 105 | 0 | 73 | 40 | 0 | 2 | 3 | Dry |

*Flow Regime categories are defined as Substantial = Surface Flow >0.5 L/sec; Minimal = Surface Flow <0.5 L/Sec; No Flow = Stagnant Surface Water; Dry = No Surface Water

3.3 Channel Morphology and Riparian Characteristics

The channel morphology and riparian characteristics of the Stormwater Swale (Tributary #4) are summarized below in Table B and Table C (respectively). The Stormwater Swale (Tributary #4) is a channelized drain throughout the survey area. The bankfull width of the Stormwater Swale (Tributary #4) varies between approximately 2.3 m and 4.9 m, and the average channel depth is approximately 350 mm. From the downstream segment of Site #1 to the downstream segment of Site #3, the Stormwater Swale (Tributary #4) is contained within Deciduous Hedgerow B (refer to MES 2020). The riparian zone between the downstream segment of Site #1 and the downstream segment of Site #3 includes Deciduous Hedgerow B, beyond which there is a cultivated agricultural field (to the north) and meadow (to the south). The substrate between the downstream segment of Site #1 and the downstream segment of Site #3 is dominated by clay, wood debris, and detritus. The substrate of the channel is overgrown with terrestrial grasses from the upstream segment of Site #3 to the upstream segment of Site #5. The upstream segment of Site #3 and the downstream segment of Site #4 occur within a thin strip of meadow vegetation, beyond which there is a cultivated agricultural field (to the east) and lawn (to the west). The upstream segment of Site #4 and both the upstream and downstream segments of Site #5 are surrounded by residential yards, with lawn dominating the riparian zone.

The riparian zone surrounding the Stormwater Swale (Tributary #4) includes a mixture of deciduous hedgerow, meadow, cultivated agricultural fields, and lawn. More than half of the riparian zone consists of either cultivated agricultural fields or lawn, and therefore the riparian habitat is generally of poor quality and highly disturbed.

TABLE B: CHANNEL MEASUREMENTS

| SITE | SEGMENT | FEATURE TYPE | BANKFULL WIDTH (m) | CHANNEL DEPTH (mm) | SUBSTRATE | FEATURE ROUGHNESS** | CONSTRICTIONS AND INPUTS |
|---------|------------|------------------|--------------------|--------------------|-----------------------------|---------------------|---|
| Site #1 | Downstream | Stormwater Swale | 4.2 | 540 | Grass, Detritus | Extreme | Waterflow exits the Site through an approximately 75 m long and 1.3 m wide concrete pipe under March Road. |
| | Upstream | Stormwater Swale | 4.0 | 740 | Clay, Wood Debris, Detritus | High | |
| Site #2 | Downstream | Stormwater Swale | 2.6 | 480 | Clay, Wood Debris, Detritus | Moderate | |
| | Upstream | Stormwater Swale | 2.9 | 260 | Clay, Wood Debris, Detritus | Moderate | |
| Site #3 | Downstream | Stormwater Swale | 3.6 | 620 | Clay, Wood Debris, Detritus | Moderate | Minor flow inputs enter Tributary #4 from an agricultural tile drain, which drains the fields located to the northeast. |
| | Upstream | Stormwater Swale | 4.9 | 300 | Grass | Extreme | Minor flow inputs enter Tributary #4 from the Old Carp Road roadside ditch. |
| Site #4 | Downstream | Stormwater Swale | 2.4 | 200 | Grass, Detritus | Extreme | |
| | Upstream | Stormwater Swale | 4.1 | 150 | Grass, Detritus | Extreme | |
| Site #5 | Downstream | Stormwater Swale | 2.3 | 100 | Grass, Detritus | Extreme | Tributary #4 passes through a 75 cm CSP culvert under Marchbrook Circle. The majority of waterflow enters the Site from upstream areas. |
| | Upstream | Stormwater Swale | 3.5 | 150 | Grass, Detritus | Extreme | |

**Feature Roughness categories are defined by OSAP Module 4.10 as; Minimal = Less than 10% of the areal coverage of the channel contains materials that diffuse flows; Moderate = 10-40% of the areal coverage of the channel contains materials that diffuse flows; High = 40-60% of the areal coverage of the channel contains materials that diffuse flows; Extreme = More than 60% of the areal coverage of the channel contains materials that diffuse flows.

TABLE C: RIPARIAN CLASSIFICATION

| SITE | SEGMENT | FEATURE TYPE | LEFT BANK* | | | RIGHT BANK* | | |
|---------|------------|------------------|------------|------------|-----------|-------------|------------|-----------|
| | | | 0 - 1.5 m | 1.5 - 10 m | 10 - 30 m | 0 - 1.5 m | 1.5 - 10 m | 10 - 30 m |
| Site #1 | Downstream | Stormwater Swale | Hedgerow | Hedgerow | Meadow | Lawn | Lawn | Lawn |
| | Upstream | Stormwater Swale | Hedgerow | Hedgerow | Meadow | Hedgerow | Hedgerow | Crop |
| Site #2 | Downstream | Stormwater Swale | Hedgerow | Hedgerow | Meadow | Hedgerow | Hedgerow | Crop |
| | Upstream | Stormwater Swale | Hedgerow | Hedgerow | Meadow | Hedgerow | Hedgerow | Crop |
| Site #3 | Downstream | Stormwater Swale | Hedgerow | Hedgerow | Hedgerow | Hedgerow | Crop | Crop |
| | Upstream | Stormwater Swale | Meadow | Lawn | Lawn | Meadow | Crop | Crop |
| Site #4 | Downstream | Stormwater Swale | Meadow | Lawn | Lawn | Meadow | Crop | Crop |
| | Upstream | Stormwater Swale | Meadow | Lawn | Lawn | Lawn | Lawn | Lawn |
| Site #5 | Downstream | Stormwater Swale | Meadow | Meadow | Lawn | Hedgerow | Lawn | Lawn |
| | Upstream | Stormwater Swale | Lawn | Lawn | Lawn | Lawn | Lawn | Lawn |

*Left and right bank are relative to an observer facing upstream.

3.4 Amphibian Habitat

Table D summarizes the results of the amphibian call count surveys. No frogs were observed calling within the Site during the survey period. Spring Peepers were heard calling in the distance west of Site #5 on April 22nd, 2022. Spring Peepers were also heard calling in the distance east of Site #1 on May 23rd, 2022. The survey results indicate that the Stormwater Swale (Tributary #4) does not provide significant amphibian breeding habitat functions.

3.5 Fish Habitat

Muncaster Environmental Planning (MEP) completed fish sampling in 2013 at one (1) location along the Stormwater Swale (Tributary #4) (MEP 2016). No fish were captured within the Stormwater Swale during the 2013 surveying, and MEP concluded that the feature is not ecologically significant (MEP 2016). As described above in Section 3.2, water depths were <10 cm throughout the 2022 survey period, and the Stormwater Swale (Tributary #4) was entirely dry by mid-summer. The Stormwater Swale (Tributary #4) was searched with a dip net during the 2022 surveying, and no fish were found. The survey results indicate that the Stormwater Swale (Tributary #4) does not provide significant fish habitat functions.

It should be noted that the Fisheries Act Letter of Advice for the Site authorizes the decommissioning of the Stormwater Swale (Tributary #4). Fisheries and Oceans Canada has confirmed that the decommissioning of the Stormwater Swale (Tributary #4) will not require any permit and/or habitat compensation under the Fisheries Act.

TABLE D: AMPHIBIAN SURVEY RESULTS

| SITE | SEGMENT | FEATURE TYPE | AMPHIBIAN CALL ACTIVITY | | |
|---------|------------|------------------|---|---|----------|
| | | | April 22 | May 23 | June 20 |
| Site #1 | Downstream | Stormwater Swale | None | Spring Peepers heard in the distance to the east of Site #1 | None |
| | Upstream | Stormwater Swale | None | None | None |
| Site #2 | Downstream | Stormwater Swale | None | None | None |
| | Upstream | Stormwater Swale | None | None | None |
| Site #3 | Downstream | Stormwater Swale | None | None | Killdeer |
| | Upstream | Stormwater Swale | None | None | None |
| Site #4 | Downstream | Stormwater Swale | None | None | None |
| | Upstream | Stormwater Swale | None | None | None |
| Site #5 | Downstream | Stormwater Swale | None | None | None |
| | Upstream | Stormwater Swale | Spring Peepers heard in the distance to the west of Site #5 | None | None |

3.6 Summary of Habitat Quality

The survey results indicate that the Stormwater Swale (Tributary #4) is a degraded channelized drain which provides negligible ecological functions. As described above, the hydrological functions of the Stormwater Swale (Tributary #4) are very limited. Under most circumstances, the Stormwater Swale (Tributary #4) is likely hydrated only in the early spring and/or following major storm events. Even during the spring freshet, water levels were <5 cm in portions of the feature, and water levels did not exceed 10 cm anywhere within the survey area. The riparian zone surrounding the Stormwater Swale (Tributary #4) includes a mixture of deciduous hedgerow, meadow, cultivated agricultural fields, and lawn. More than half of the riparian zone consists of either cultivated agricultural fields or lawn, and therefore the riparian habitat is generally of poor quality and highly disturbed. No evidence of amphibian breeding habitat and/or fish habitat was observed. The Stormwater Swale (Tributary #4) is not an ecologically significant habitat feature, although it makes minor hydrological and nutrient contributions to downstream areas.

4.0 CLASSIFICATION AND MITIGATION

4.1 Classification Criteria

The Classification Criteria for Headwaters Drainage Feature Assessments are provided by the Toronto and Region Conservation Authority (TRCA) (2014). Refer to TRCA (2014) for further detail regarding the Classification Criteria. The Classification Criteria for the Stormwater Swale (Tributary #4) are as follows:

- **Hydrological Classification:** Contributing Functions - Ephemeral. TRCA definition: *Provides ephemeral flow or water storage functions during and (for a short time) after spring freshet and following large rain events only.*
- **Riparian Classification:** Contributing Functions. TRCA definition: *The riparian corridor is dominated by lawn (and cropped land) and there are no important or valued riparian functions.*
- **Fish and Fish Habitat Classification:** Contributing Functions. TRCA definition: *Transport of allochthonous materials to downstream fish bearing reaches provides sources of food.*
- **Terrestrial Habitat Classification:** Limited Functions. TRCA definition: *No terrestrial habitat (amphibian habitat) and/or movement corridors present.*
 - **Determination:** Mitigation. Following the TRCA (2014) guidelines, mitigation is required for drainage features with contributing hydrological functions, no important and/or valued fish habitat, no valued terrestrial habitat, and no important riparian vegetation.



4.2 Impact Mitigation & Habitat Compensation

The Kanata North Urban Expansion Area (KNUEA) Community Design Plan (CDP) and associated Environmental Management Plan (EMP) identified that the Stormwater Swale (Tributary #4) will be decommissioned as part of the future development of the Site (Novatech 2016a; Novatech 2016b). As described above, the Stormwater Swale (Tributary #4) is not an ecologically significant habitat feature, although it makes minor hydrological and nutrient contributions to downstream areas.

The KNUEA CDP and EMP identified that the flows that are currently conveyed by the Stormwater Swale (Tributary #4) will be intercepted at the property line and piped to the North Branch of Shirley's Brook (Tributary #3) through a new stormwater sewer (Novatech 2016a; Novatech 2016b). This arrangement will maintain the Stormwater Swale's minor hydrological and nutrient contributions to downstream areas. In their review comments dated April 7th, 2021, the Mississippi Valley Conservation Authority (MVCA) identified that further information regarding the outlet from the new stormwater sewer and any associated water quality treatment should be provided. Further information with respect to the new stormwater sewer's design and outlet will be provided as part of the development's Stormwater Management Plan. No setbacks and/or vegetated buffers are required surrounding the Stormwater Swale (Tributary #4), as the feature will be decommissioned.

In their review comments dated April 7th, 2021, the MVCA stipulated that the Headwaters Drainage Feature Assessment for the Stormwater Swale (Tributary #4) must identify habitat compensation requirements (if any) related to the future decommissioning of the Stormwater Swale (Tributary #4). As described above, the Stormwater Swale (Tributary #4) does not provide any significant amphibian breeding habitat and/or fish habitat functions. The Stormwater Swale (Tributary #4) also does not provide any significant Blanding's Turtle habitat functions (MES 2020). The decommissioning of the Stormwater Swale (Tributary #4) will not remove any significant amphibian breeding habitat, fish habitat, and/or Blanding's Turtle habitat functions, and therefore no habitat compensation should be required in relation to the decommissioning of the Stormwater Swale (Tributary #4). It should be noted that the approved Ontario Endangered Species Act (ESA) Overall Benefit Permit and the Fisheries Act Letter of Advice for the Site authorize the decommissioning of the Stormwater Swale (Tributary #4) under the rules and regulations of the Ontario ESA and the Fisheries Act (respectively). The Ontario ESA Overall Benefit Permit identifies Blanding's Turtle habitat compensation requirements, which will be fulfilled by enhancing the aquatic habitat within and surrounding the North Branch of Shirley's Brook (Tributary #3) (e.g. within the 40 m wide watercourse corridor). The Fisheries Act Letter of Advice did not identify any fish habitat compensation requirements.

4.3 Construction Stage Mitigation

A Sediment and Erosion Control Plan will be required to ensure that the North Branch of Shirley's Brook (Tributary #3) and any adjacent stormwater/sewer systems are not negatively impacted by sediment and erosion during the development of the Site. The Sediment and Erosion Control Plan must address the sediment and erosion control requirements during the decommissioning of the Stormwater Swale (Tributary #4).

The Combined Environmental Impact Statement (EIS) and Tree Conservation Report (TCR) provides a detailed description of the construction stage mitigation requirements for Species at Risk (SAR) and other wildlife, including mitigation requirements during tree clearing (MES 2020). For brevity, only those mitigation requirements which pertain directly to the decommissioning of the Stormwater Swale (Tributary #4) are listed below. In addition to the mitigation requirements outlined in MES (2020), the following requirements apply when decommissioning the Stormwater Swale (Tributary #4):

- **Timing Window:** The decommissioning of the Stormwater Swale (Tributary #4) should be undertaken outside of the sensitive in-water work timing window, which is from March 15th to June 30th each year. As described above, the Stormwater Swale (Tributary #4) is likely to be dry by July 1st each year. If the decommissioning of the Stormwater Swale (Tributary #4) is completed in the late summer (e.g. after July 1st), in-water works, dewatering, and/or fish and wildlife relocation should not be required.

5.0 SUMMARY

The survey results indicate that the Stormwater Swale (Tributary #4) is a degraded channelized drain which provides negligible ecological functions. The Stormwater Swale (Tributary #4) is not an ecologically significant habitat feature, although it makes minor hydrological and nutrient contributions to downstream areas.

The Kanata North Urban Expansion Area (KNUEA) Community Design Plan (CDP) and associated Environmental Management Plan (EMP) identified that the Stormwater Swale (Tributary #4) will be decommissioned as part of the future development of the Site (Novatech 2016a; Novatech 2016b). The KNUEA CDP and EMP identified that the flows that are currently conveyed by the Stormwater Swale (Tributary #4) will be intercepted at the property line and piped to the North Branch of Shirley's Brook (Tributary #3) through a new stormwater sewer (Novatech 2016a; Novatech 2016b). This arrangement will maintain the Stormwater Swale's minor hydrological and nutrient contributions to downstream areas. The decommissioning of the Stormwater Swale (Tributary #4) will not remove any significant amphibian breeding habitat, fish habitat, and/or Blanding's Turtle habitat functions, and therefore no habitat compensation should be required in relation to the decommissioning of the Stormwater Swale (Tributary #4).

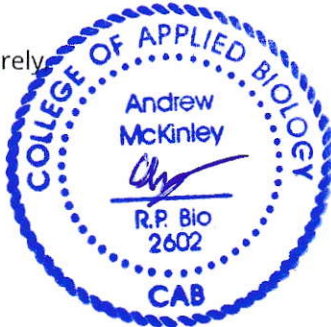
The proposed decommissioning of the Stormwater Swale (Tributary #4) will require approval from the Mississippi Valley Conservation Authority (MVCA) under Ontario Regulation 153/06. As described above, the approved Ontario Endangered Species Act (ESA) Overall Benefit Permit and the Fisheries Act Letter of Advice for the Site authorize the decommissioning of the Stormwater Swale (Tributary #4) under the rules and regulations of the Ontario ESA and the Fisheries Act (respectively).

Provided that the mitigation requirements described above are implemented appropriately, the decommissioning of the Stormwater Swale (Tributary #4) is not anticipated to significantly negatively impact the natural features and functions of the Site.

6.0 CLOSURE

We trust that the above information is sufficient; should you have any questions or require further information, please do not hesitate to contact the undersigned, at your convenience.

Sincerely,



Dr. Andrew McKinley, EP, RP Bio.
Senior Biologist, McKinley Environmental Solutions



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7.0 REFERENCES

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APPENDIX A – SITE PHOTOGRAPHS



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Photograph 1: Looking downstream at the 1.3 m wide concrete pipe under March Road (April 4th, 2022).



Photograph 2: Looking upstream at the downstream segment of Survey Site #1 (April 4th, 2022).





Photograph 3: Looking upstream at the upstream segment of Survey Site #1 (April 4th, 2022).



Photograph 4: Looking upstream at the downstream segment of Survey Site #2 (April 4th, 2022).





Photograph 5: Looking upstream at the upstream segment of Survey Site #2 (April 4th, 2022).



Photograph 6: Looking upstream at the downstream segment of Survey Site #3 (April 4th, 2022).





Photograph 7: Looking upstream at the upstream segment of Survey Site #3 (April 4th, 2022).



Photograph 8: Looking upstream at the downstream segment of Survey Site #4 (April 4th, 2022).





Photograph 9: Looking upstream at the upstream segment of Survey Site #4 (April 4th, 2022).



Photograph 10: Looking upstream at the downstream segment of Survey Site #5 (April 4th, 2022).





Photograph 11: Looking upstream at the 75 cm CSP culvert under Marchbrook Circle (April 4th, 2022).



Photograph 12: Looking upstream at the upstream segment of Survey Site #5 (April 4th, 2022).





Photograph 13: Looking upstream at the downstream segment of Survey Site #1 (May 25th, 2022).



Photograph 14: Looking upstream at the upstream segment of Survey Site #1 (May 25th, 2022).





Photograph 15: Looking upstream at the downstream segment of Survey Site #2 (May 25th, 2022).



Photograph 16: Looking upstream at the upstream segment of Survey Site #2 (May 25th, 2022).





Photograph 17: Looking upstream at the downstream segment of Survey Site #3 (May 25th, 2022).



Photograph 18: Looking upstream at the upstream segment of Survey Site #3 (May 25th, 2022).





Photograph 19: Looking upstream at the downstream segment of Survey Site #4 (May 25th, 2022).



Photograph 20: Looking upstream at the upstream segment of Survey Site #4 (May 25th, 2022).





Photograph 21: Looking upstream at the downstream segment of Survey Site #5 (May 25th, 2022).



Photograph 22: Looking upstream at the upstream segment of Survey Site #5 (May 25th, 2022).





Photograph 23: Looking upstream at the downstream segment of Survey Site #1 (July 11th, 2022).



Photograph 24: Looking upstream at the upstream segment of Survey Site #1 (July 11th, 2022).





Photograph 25: Looking upstream at the downstream segment of Survey Site #2 (July 11th, 2022).



Photograph 26: Looking upstream at the upstream segment of Survey Site #2 (July 11th, 2022).





Photograph 27: Looking upstream at the downstream segment of Survey Site #3 (July 11th, 2022).



Photograph 28: Looking upstream at the upstream segment of Survey Site #3 (July 11th, 2022).





Photograph 29: Looking upstream at the downstream segment of Survey Site #4 (July 11th, 2022).



Photograph 30: Looking upstream at the upstream segment of Survey Site #4 (July 11th, 2022).





Photograph 31: Looking upstream at the downstream segment of Survey Site #5 (July 11th, 2022).



Photograph 32: Looking upstream at the upstream segment of Survey Site #5 (July 11th, 2022).

