

APPENDIX C
Characterization and Development of Alternatives
(Phase 2)

APPENDIX C8

Ecological Characterization

APPENDIX C8-1

Ecological Field Methods

APPENDIX C8

ECOLOGICAL CHARACTERIZATION METHODOLOGY

1 METHODS FOR CHARACTERIZATION OF BIOTIC COMMUNITIES

A Schedule B Municipal Class EA was completed on German Mills Creek upstream of Steeles Avenue (immediately upstream of this current project's study area) in 2018. This EA was undertaken to assess the level of risk to infrastructure and the environment and provide preliminary design alternatives. As part of the EA, a background review and field investigations were undertaken to determine the existing conditions of the site and ecological constraints. Information from this study will be applied to the current project as they are directly related.

1.1 Background Review Methods

To understand and evaluate the natural heritage of the study area a background review was conducted. This background review will support the field investigations and provide information as to what may be encountered onsite. Secondary sources, previous studies, and agency consultation were all included in the background review.

Initial background requests regarding terrestrial sensitivities and SAR were submitted to the Ontario Ministry of the Environment, Conservation and Parks (MECP) and to the TRCA. Available databases were also reviewed to compile known and identify potential natural heritage features within the study area. These data sources were also used to determine potential species of conservation concern (SCC) and SAR whose occurrence ranges overlap with the study area. The data sources reviewed are outlined in Table C8a. Agency correspondence is documented in Appendix H2.

TABLE C8a Background Data Sources Reviewed

Name	Type	Description
Aquatic Species at Risk (SAR) Distribution of Fish Species at Risk Maps (DFO 2019)	Online Database	Aquatic SAR mapping is made available online by Fisheries and Oceans Canada for species listed endangered, threatened, or special concern under the <i>Species at Risk Act</i> .
Natural Heritage Information Center (NHIC) Natural Heritage Areas Make a Map (NHA MaM; MNRF 2021a)	Online Database	A web application that provides information on provincial parks, conservation reserves, and natural heritage features (i.e., Areas of Natural and Scientific Interest (ANSI), wetlands, woodlands, and natural heritage systems related to provincial policy plan areas, such as the Niagara Escarpment, Oak Ridges Moraine, and Greenbelt Plans.) The NHA MaM also provides NHIC data, which is organized into 1 km ² map squares and includes information on species of conservation concern (SCC) and SAR records.

Name	Type	Description
Lands Information Ontario (LIO) Geospatial Data (MNR 2021b)	Online Database	LIO data is maintained by the Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNR; previously the Ontario Ministry of Natural Resources and Forestry; MNR) and provides key provincial geospatial data for Ontario. Shapefiles obtained from the LIO open datasets were used to show the natural features within the study area. Key datasets that were reviewed for the study area include policy plan areas, municipal land use designations, ANSI, provincial parks and conservation areas, wetlands, woodlands, and watercourses.
<i>Atlas of the Mammals of Ontario</i> (Dobbyn 1994)	Online Atlas	The <i>Atlas of the Mammals of Ontario</i> shows the geographic distribution of mammals for three time periods: pre-1900, 1900 to 1969, and 1970 to 1993. A review of the 1970 to 1993 period was completed.
<i>Ontario Reptile and Amphibian Atlas</i> (ORAA; Ontario Nature 2019)	Online Atlas	The ORAA provides known ranges of reptiles and amphibian species in Ontario based on historic and current species occurrences.
<i>Ontario Breeding Bird Atlas</i> (OBBA; OBBA 2001)	Online Atlas	The OBBA provides a list of bird species that have been observed during surveys completed between 1981 and 1985, and 2001 and 2005. Species that were documented between 2001 and 2005 were considered as part of this study.
<i>Ontario Butterfly Atlas</i> (OBA; TEA 2019)	Online Atlas	The OBA collects observations of butterflies within Ontario. Sightings were reviewed from 2016 onward.
<i>Important Bird and Biodiversity Areas in Canada</i> (IBA; IBA 2019)	Online Atlas	The IBA was reviewed to determine if there are any important bird areas within the study area.
Ministry of Environment, Conservation and Parks (MECP)	Agency Correspondence	A project screening request was sent to the MECP on August 9, 2021, for information related to natural heritage features and SAR potential within the study area. The MECP responded on August 11, 2021, indicating SAR bats should be considered in relation to the project (Anderson 2021, Pers. Comm., Appendix H2).
Toronto and Region Conservation Authority (TRCA)	Open Source	Information was sourced from the TRCA Open Source portal as well as from the Schedule B Municipal Class Environmental Assessment (TRCA 2019a).

1.2 Field Survey Methods

Matrix staff completed field inventories within the study area during the summer of 2021 to characterize the terrestrial and aquatic resources within the study area. The names and field inventories completed by each staff are provided in Table C5b.

TABLE C8b Summary of 2021 Field Surveys

Field Inventory	Date	Matrix Staff
Vegetation (Ecological Land Classification, Botanical Inventory, Invasive Species)	August 5, 2021	E. Wilkinson and K. Reich
Aquatic Habitat Mapping	August 27, 2021 September 1, 2021	E. Wilkinson and K. Reich K. Reich and Z. Zhang
Incidental Observations	August 5, 2021 August 27, 2021 September 1, 2021 September 3, 2021 ⁽¹⁾ September 8, 2021 ⁽¹⁾ September 9, 2021 ⁽¹⁾	E. Wilkinson and K. Reich E. Wilkinson and K. Reich K. Reich and Z. Zhang E. Wilkinson and K. Reich K. Reich and A. Nicoll E. Wilkinson and K. Reich

Notes:

(1) Indicates observations were made while conducting aquatic monitoring

1.2.1 Vegetation Communities

Ecological Land Classifications (ELC) maps were obtained from the TRCA which covered the extent of the study area. The codes were used for a high-level TRCA community confirmation of the general study area and a detailed TRCA community confirmation for the areas that will be directly impacted. The standard ELC system for southern Ontario (Lee 2008; Lee et al. 1998) as well as the TRCA *Ecological Land Classification Codes and Common Names* (TRCA 2019b) was applied. Details of the vegetation communities were recorded including species composition and dominance, community structure, uncommon species or features, and evidence of anthropogenic disturbance. Vegetation community status rarity was assessed through Natural Heritage Information Centre (NHIC) vegetation community rankings (MNRF 2021a) and the local rarity rankings in the *Annual Local Occurrence Score and Local Rank Update* (TRCA 2017).

1.2.2 Flora

A botanical inventory was completed during the field inventories for each of the vegetation communities if it was directly adjacent to the watercourse or the trail. Any vegetation communities within the general study area, but not directly adjacent to the watercourse or trail, were visited and the vegetation community designation was confirmed but no botanical inventory was completed. The field investigations were only completed during the summer. A list of species was compiled to determine the presence of SCC, SAR, and invasive species. Habitats of SCC, SAR, and invasive species identified during the field inventories were mapped for the ELC community in which they encompassed.

Plants were identified to family, genus, species, subspecies, and hybrid level according to the Newmaster (1998) *Ontario Plant List* and cross-referenced with the *Database of Vascular Plants of Canada* (VASCAN; Brouillet et al. 2020) for scientifically accepted nomenclature. Species status was assessed at a provincial level (S-rankings; MNRF 2021a) and a local level based on the L-ranks in the *Annual Local Occurrence Score and Local Rank Update* (TRCA 2017).

1.2.3 Wildlife and Wildlife Habitat

No species-specific surveys were completed as part of this project; however, each site visit for other surveys included general notes about overall habitat throughout the study area and the recording of any incidental wildlife.

To assess the potential for significant wildlife habitat (SWH) and potential SAR habitat within the study area was conducted during the field surveys. The study area was assessed for habitat identified within the criteria outlined in the *Significant Wildlife Habitat Technical Guide* (SWHTG; MNR 2000) and the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015). Natural areas were also assessed for their potential to provide habitat for those SAR and SCC identified during background review or observed during field investigations. All wildlife observations were documented on all field visits. This included actual direct observations (including vocalizations) of individuals and signs of wildlife presence (i.e., tracks, scats, dens, nests, etc.).

The MNDFMNR (previously the Ontario Ministry of Natural Resources and Forestry; MNRF) provides specific guidance on identifying and assessing wildlife habitat in the SWHTG (MNR 2000), the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015), and the *Natural Heritage Reference Manual* (NHRM; MNR 2010). The MNDFMNR recognizes five main categories of wildlife habitat, each with several wildlife habitat types, each with criteria to evaluate significance. A description of each of the wildlife habitat categories is provided below.

- Seasonal concentration areas of animals: defined as “areas where animals occur in relatively high densities for the species at specific periods in their life cycles and/or in particular seasons” and areas that are “localized and relatively small in relation to the area of habitat used at other times of the year” (MNR 2010).
- Rare vegetation communities: defined as “areas that contain a provincially rare vegetation community and areas that contain a vegetation community that is rare within the planning area” (MNR 2010).
- Specialized habitat for wildlife: defined as “areas that support wildlife species that have highly specific habitat requirements, areas with high species and community diversity, and areas that provide habitat that greatly enhances species' survival” (MNR 2010).
- Habitat for SCC: defined as “habitats of species that are designated at the national level as Endangered or Threatened by COSEWIC [the Committee on the Status of Endangered Wildlife in Canada], which are not protected in regulation under Ontario's ESA [the *Endangered Species Act*]; habitats of species listed as Special Concern under the ESA on the SARO [Species at Risk in Ontario] List (formerly referred to as "Vulnerable" in the SWHTG); and habitats of species that are assigned a provincial (i.e., sub-national) conservation status rank of S1, S2 and/or S3 and are not on the SARO List” (MNR 2010).
- Animal Movement Corridors: defined as “elongated areas used by wildlife to move from one habitat to another. They are important to ensure genetic diversity in populations, to allow seasonal migration

of animals and to allow animals to move throughout their home range from feeding areas to cover areas” (MNR 2010).

1.3 Aquatic Habitat

Aquatic habitat was assessed at two levels for this project, a full length high-level aquatic habitat assessment mapping exercise and a detailed aquatic habitat assessment as part of the aquatic monitoring program. The high-level aquatic habitat assessment methodology is discussed here, and the aquatic monitoring methodology is discussed in Section 1.3.1.

The objective of the high-level assessment was to map and characterize the local aquatic habitat and assign a qualitative habitat potential ranking. Characteristics of high-quality aquatic habitat include natural sinuosity with a well-defined riffle/pool sequence, variability in water depth and bed substrate, naturally occurring woody debris, undercut banks, and natural riparian vegetation overhanging the banks that provides food for various aquatic organisms. The greater the quantity of preferred habitat features present, the higher potential aquatic habitat ranking. The creek was inventoried throughout the reach for a variety of geomorphic features (i.e., riffles, pools, and runs). The data collection included documentation and assessment of the following watercourse conditions:

- general watercourse characteristics (i.e., stream pattern, general gradient, and flow)
- channel characteristics (i.e., wetted width and depth, bankfull width and depth, and depth of riffles/pools/run)
- substrate and bank materials
- other pertinent habitat features (i.e., spawning, nursery, and refuge areas, barriers to fish movement, and macrophyte growth)
- disturbances and evidence of past habitat alterations (i.e., channelization, channel hardening or straightening)

After the completion of the high-level aquatic habitat assessment, field data were summarized to determine the overall habitat potential.

1.3.1 Aquatic Monitoring Methods

The aquatic monitoring program comprised detailed aquatic habitat mapping of the three monitoring stations each located in the three monitoring areas, benthic invertebrate sampling and both a wet and dry water quality grab sample within the three monitoring reaches (Figures C8a to C8c, under C8 - Maps). Monitoring components were completed within the three monitoring reaches by Matrix staff during the late summer of 2021. The names and field surveys completed by each staff is provided in Table C8c. It is anticipated that the aquatic monitoring program will be repeated in 2022 to allow for an analysis of water quality and aquatic habitat over time and a separate standalone monitoring memorandum will be issued.

TABLE C8c Summary of 2021 Aquatic Monitoring

Monitoring Component	Date	Matrix Staff
Benthic Macroinvertebrates Collection	September 3, 2021	E. Wilkinson and K. Reich
Water Quality Collection - Dry Grab	September 3, 2021	E. Wilkinson and K. Reich
Water Quality Collection - Wet Grab	September 8, 2021	K. Reich and A. Nicoll
Modified Ontario Stream Assessment Protocol (OSAP)	September 9, 2021	E. Wilkinson and K. Reich

1.3.1.1 Aquatic Habitat

A qualitative assessment of the aquatic habitat potential based on a modified *Ontario Stream Assessment Protocol* (OSAP; Stanfield 2017) was conducted on the three monitoring reaches within German Mills Creek within the study area. Each sample site within the monitoring reach was determined based on a representation of at least one riffle-pool sequence, is at least 40 m in length, and begins and ends at a crossover point. A Site Identification Form was completed for each station and included location coordinates, site description, and site marker details. A Site Features Form was also completed for each station and included evidence of ongoing and historic site features as well as dominant vegetation observations. Lastly, a Rapid Assessment Methodology Field Form was completed for each station and included the recording of channel structure (i.e., pool, glide, slow riffle and fast riffle), water depth, type of cover, and assessment of bank stability. The rapid assessment was completed for ten transects evenly spaced throughout each monitoring station. All field forms for the three reaches are provided within this technical appendix. .

1.3.1.2 Water Quality

Discrete water quality samples were collected at the run feature within each of the three monitoring reaches. The dry water samples were collected on September 3, 2021, and the wet water samples were collected on September 8, 2021, after a significant rain (i.e., > 5 mm of rain). These samples were taken in the center of the run feature at approximately 40% of the overall depth in that spot to collect water from the flow that is the least impacted by surface characteristics (i.e., detritus). The sample jars were filled without an air space and sent to ALS Environmental for analytical testing for total suspended solids (TSS). In addition to the water samples, in-situ water quality parameters were recorded from a YSI Multimeter during both visits and included:

- water temperature
- dissolved oxygen
- conductivity
- pH
- turbidity

1.4 Benthic Macroinvertebrates

1.4.1 Sampling Methodology

Benthic invertebrate sampling followed methodology outlined in Stream Sampling Methods section of the Ontario Benthos Biomonitoring Network (OBBN) manual (Jones et al. Y. 2007). A modified

Travelling-Kick-and-Sweep method was utilized to collect benthic invertebrates within each of the monitoring stations. This method involves placing a D-net along the bed downstream of the samples who is disrupting the substrate with their feet to dislodge benthic invertebrates which then flow into the net. The sample travels along a predetermined transect and samples for a total of 3 minutes. In the case of German Mills Creek, a zig-zag pattern was travelled as the creek width was too small to travel in one direction along the transect for a full 3 minutes. This process was repeated for each of the three replicate stations located within each monitoring reach; replicate stations were collected for one riffle, one pool, and one run feature to gain an understanding of the overall benthic invertebrate community.

All samples were field processed to remove excess sediment and organic material. Any woody debris and larger detritus collected were scrubbed and/or picked over to ensure retention of all organisms. Samples were then transferred into 1 L plastic sample containers, labelled and field preserved with an ethanol solution. Benthic invertebrate samples were then submitted to an experienced taxonomist for taxonomic enumeration and identification to the lowest practical level. OBBN field sheets are located within this technical appendix.

All sites were GPS referenced. Supplemental field parameters were recorded including dominant substrate class, organic matter-aerial coverage, riparian vegetation community, aquatic macrophytes and algae. Discrete surface water quality field measurements were collected for pH, dissolved oxygen, turbidity, conductivity, and temperature as noted above in the water quality section.

1.4.2 Analytical Methodology

Benthic macroinvertebrate samples were submitted to ZEAS Incorporated for processing. Specimens were identified to the lowest practical level, including species where possible. The resulting data was tabulated in a Microsoft® Excel spreadsheet to facilitate data analysis.

From the laboratory data, metrics were calculated to better understand the composition of the benthic invertebrate community. The following metrics and indices were calculated: Taxa Richness, Percent Dominant, Percent EPT (Ephemeroptera [mayflies], Plecoptera [stoneflies], and Trichoptera [caddisflies]), number of EPT, Shannon-Weiner Diversity Index, and Hilsenhoff Biotic Index. Description of each index can be found below.

1.4.2.1 Taxa Richness

Taxa Richness refers to the number of distinct taxa represented in a sample, excluding immature specimens unless they are the sole representation of a particular taxon. In southern Ontario, the expected range for unimpaired gravel bottom creeks is 20 to 40 taxa per site (Griffiths 1999) with higher values typically being representative of good stream health.

1.4.2.2 Percent Dominant

An assessment of dominance involves determination of the most numerous taxon in a sample. Where the dominant species constitute greater than 50% of a sampled community, they are considered to be the characterizing species and this can act as a means to assess the cause of impairment (Griffiths 1999).

A high dominance percentage generally indicates a less diverse community, and therefore a potentially more impaired community.

1.4.2.3 Percent EPT

Percent EPT is a subset of Taxa Richness, which measures the proportion of specific pollution intolerant orders to determine stream health. It is calculated here as the total number of EPT individuals present as a proportion of the total count for the sample. Lower percentages of EPT are generally representative of poor water quality.

1.4.2.4 Number of EPT

The number of EPT species represented in a sample is simply summed to calculate this metric. However, to interpret this metric using the table below, only distinct families of EPT are summed, not individual species. The number of EPT species is presented in the results but both the number of species and families were considered for interpretation. Table C8d illustrates the water quality associated with the number of families of EPT (Mackie 2004).

TABLE C8d EPT Value Index

EPT Value	Water Quality Assessment
> 10	Non- impacted
6 - 9	Slightly Impacted
3 - 5	Moderately Impacted
0 - 2	Severely Impacted

EPT - Ephemeroptera [mayflies], Plecoptera [stoneflies], and Trichoptera [caddisflies]

1.4.2.5 Shannon-Weiner Diversity Index

The Shannon-Weiner Diversity Index (H') is a single metric that used both abundance and evenness of the species present. In aquatic communities the H' varies between 0 and 5 with larger values demonstrating more diverse (healthier) communities. This index provides equal weight to all species within a sample. H' is calculated using the following formula:

$$H' = - \sum p_i \log p_i$$

$$\text{where } p_i = \frac{n_i}{N}$$

Where:

P_i is the proportion of the total number of individuals occurring in species i

n is the number of individuals occurring in species i

N is the total number of taxa in a sample

The number and distribution of taxa increase in relation to H' . Table C8e illustrates the degree of organic pollution representative for different ranges of H' values (modified from Griffiths [1999]). This index provides equal weight to all species present in a sample.

TABLE C8e Shannon-Weiner Diversity Index

Shannon-Weiner Diversity Index (H')	Degree of Organic Pollution
> 3	Unpolluted, good water quality (diverse, healthy community)
1 - 3	Moderate pollution
<1	Substantial pollution, poor water quality (organically enriched)

1.4.2.6 Hilsenhoff Biotic Index

The Hilsenhoff Biotic Index (HBI) is used to assign a single tolerance value to a community to provide an indication of nutrient and organic pollution in the system. This index provides an estimate of water quality for each site using established pollution tolerance values for each taxon. The single value is a mean of all the tolerance values of the taxa represented in a sample. Tolerance values, taken from Hilsenhoff (1987) are a measure of an organism's tolerance to organic pollution and range from 0 (very intolerant) to 10 (highly tolerant). Based on the taxon level for this analysis, the equation for the HBI is:

$$HBI = \frac{\sum(n_i \times t_i)}{N}$$

Where:

n_i is the number of individuals of taxon i

t_i is the tolerance value of taxon i

N is the total number of individuals in the sample

For each monitoring reach, the HBI (mean of three replicates) was compared to the values in Table C8f to provide a scoring and rating of water quality with respect to organic enrichment.

TABLE C8f Hilsenhoff Biotic Index

HBI Score	Water Quality	Implied Degree of Organic Enrichment
0.0-3.5	Excellent	No organic enrichment
3.51-4.5	Very Good	Slight organic enrichment
4.51-5.5	Good	Some organic enrichment
5.51-6.5	Fair	Fairly substantial enrichment
6.51-7.5	Fairly Poor	Significant organic enrichment
7.51-8.5	Poor	Very significant organic enrichment
8.51-10.0	Very Poor	Severe organic enrichment

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APPENDIX C8-2

Correspondence

Victoria Crouchman

From: Species at Risk (MECP) <SAROntario@ontario.ca>
Sent: August 11, 2021 3:11 PM
To: Kelsey Reich
Subject: [External] RE: SAR Information Request

Follow Up Flag: Follow up
Flag Status: Flagged

Kelsey;

MECP staff have nothing further to offer save consideration for species at risk Bats.

Regards;

JJA

JEFF J. ANDERSEN

MANAGEMENT BIOLOGIST
PERMISSIONS AND COMPLIANCE SECTION, SPECIES AT RISK BRANCH
LAND AND WATER DIVISION
ONTARIO MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS

50 Bloomington Road, Aurora ON L4G 0L8 | jeff.andersen@ontario.ca | 289-221-1705



From: Kelsey Reich <kreich@matrix-solutions.com>
Sent: August 9, 2021 12:25 PM
To: Species at Risk (MECP) <SAROntario@ontario.ca>
Cc: Erica Wilkinson <ewilkinson@matrix-solutions.com>
Subject: SAR Information Request

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hello,

I am helping out with the natural heritage portion of the German Mills Geomorphic Systems Master Plan being conducted by the City of Toronto and as such we are conducting a background natural heritage review. The study area is roughly from Steeles Ave E and Leslie St to Cummer Ave where it crosses the Don River. Below is a map of the study area.



We have conducted a preliminary SAR search through various databases (NHIC, OBBA, OBA, ORAA, DFO mapping). Below is a table of what we have found to date.

Species	ESA Status	SARA Status
Bank Swallow	Threatened	Threatened
Barn Swallow	Threatened	Threatened
Blanding's Turtle	Threatened	Threatened
Bobolink	Threatened	Threatened
Chimney Swift	Threatened	Threatened
Common Nighthawk	Special Concern	Threatened
Eastern Meadowlark	Threatened	Threatened
Eastern Wood-pewee	Special Concern	Special Concern
Monarch Butterfly	Special Concern	Special Concern
Northern Map Turtle	Special Concern	Special Concern
Peregrine Falcon	Special Concern	Special Concern
Redside Dace	Endangered	Endangered
Snapping Turtle	Special Concern	Special Concern
Wood Thrush	Special Concern	Threatened

I was hoping you would be able to provide any additional information that was not recorded in the database search. Thank you in advance for you time and help in this matter.

Sincerely,

Kelsey Reich
MATRIX SOLUTIONS INC.
 Environmental Technician
kreich@matrix-solutions.com

APPENDIX C8-3

Field Forms

Site Identification

Stream Code GM	Site Code MON1	Sample 1	Date (yyyy-mm-dd) 2021 10 03
Stream Name German mills	Alternate Site Code 	Site Length (m) 187.66	
*** Record using NAD83 datum	Zone 17	Easting 0851.4	Northings 51395.0
Uncorr. UTM 17	Zone 17	Corr. UTM 	OR Lat. 43 78 14 57
			Long 79 22 23 77
Source of Uncorrected UTM Coordinates GPS/DGPS <input checked="" type="checkbox"/> GIS <input type="checkbox"/> OBM <input type="checkbox"/>	Source of Corrected UTM Coordinates FWIS <input type="checkbox"/> Ortho-photos <input type="checkbox"/> GIS <input type="checkbox"/>	Name of Layer Used for Correction 	

Access Route

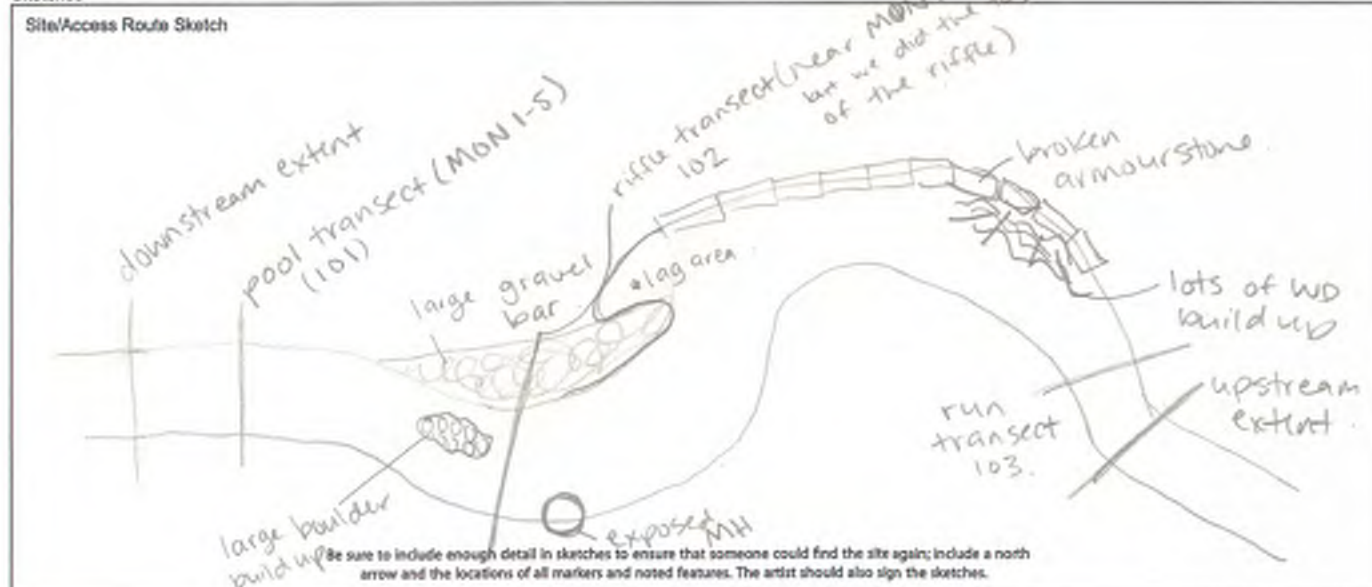
Down stairs at Pineway and go right on trail. When you get to small pedestrian bridge enter creek and walk upstream. When stream gets close to parking lot you are at DS extent.
UTM 17T 630851.00mE, 4851395.00mN

Site Description

Narrower riparian area along left bank (buildings are close). Woody debris (WD) build up in some areas due to recent and historic fallen trees. Exposed manhole infrastructure. Some boulders in stream. Large area of broken armourstone.

☐ Site Was Unsampleable - add reason(s) on reverse

Sketches



Comments

pool transect @ MON1-5
riffle transect @ approx MON1-4
run not @ geomorph transect.

Crew Leader (initial & last name)

E **Wilkinson**

Crew

K. Reich

Recorder

Entered

Verified

Corrected

Site Marker Details

UPSTREAM SITE MARKER
(measure from stake to site)

Bearing (D)

Distance (m)

Description

upstream of bend to armchair stone, in run.
pin in avenge.

DOWNSTREAM SITE MARKER
(measure from stake to site)

Bearing (D)

Distance (m)

Description

in run just DS of pool where we sampled.
pin in avenge.

ADDITIONAL SITE MARKER
(measure from stake to site)

Bearing (D)

Distance (m)

Description

Photos

Photo No.

Photo Name

Photo Description

Upstream

Upstream

✓

looking at WD and run.

Downstream

Downstream

✓

looking at pool and broken armchair stone

Downstream

Upstream

✓

looking at pool and boulder bar

Downstream

Downstream

✓

looking at long run

Other Features

Site is Unsampleable Reason(s)

- ☐ Stream dry
- ☐ Insufficient water to sample effectively
- ☐ Stream is no longer present at location (tied or relocated, etc.)
- ☐ Naturally unwadeable (i.e. > 1.5 m deep)
- ☐ Unwadeable due to ponding from a permanent barrier
- ☐ Unwadeable due to ponding from temporary barrier (eg. beaver dam)
- ☐ Landowner could not be contacted
- ☐ Landowner refused access
- ☐ Inaccessible for safety reasons (add details in comments below)
- ☐ Stream is wadeable but not appropriate for the intended sampling

What is the permanent barrier?

What is the temporary barrier?

Modules to have been used (e.g. S2.M1, S3.M1):

Comments

Site Features

Mandatory Fields in Grey
Must be filled out for processing

Stream Code GM	Site Code MONI	Sample 	Date (yyyy-mm-dd) 2021 09 09
Stream Name German mills			

For each landuse, check box that applies. Be sure to include comments explaining the particulars, including names and numbers of contacts

Site Features	Ongoing & Active	Historical Evidence	No Evidence but Reported	No Evidence	Unknown	Comments
Potential Point or Non-point Source Contaminant Sources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Multiple outlets flowing into streams. (not in this reach).
Major Nutrient Sources Upstream	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Hardening or Straightening	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Armourstone
Adjacent Landuses that Destabilize Banks	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Trails & paved sections near waterway.
Sediment Loading or Deprivation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Loading - sand bars.
Instream Habitat Modifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Barriers and/or Dams in the Vicinity of the Site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
High Fishing Pressure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Log Jam Deflectors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Springs or Seeps at the Site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Impervious Substrate Limiting Burrowing Depth of Fish	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Watercress present.
Fish Stocked Near Sample Site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Other Activities that Could Influence Biota or Habitat	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Walking trail & residences surrounding stream. Debris in reach.
Intensive Logging Activities within the Riparian Zone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Visual Immediate ☒ Visual Extended ☐ Interview ☐ Maps & Photos ☒

Riparian Vegetation Community
Only check one box for each bank and zone.

Temperatures		Dominant Vegetation Type														
Time (24hr)	Air Temp (°C)	Left Bank					Right Bank									
Water Temp (°C)	Max Air Temp (°C)	Riparian Zone	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest lands	Wet-lands	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest lands	Wet-lands
11:35	18.0	1.5-10m	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		10-30m	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		30-100m	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments

Crew Leader (initial & last name)

E Wilkinson

Crew Initials

K. Reich

Recorder

Entered

Verified

Corrected

Rapid Assessment Methodology Field Form

Mandatory Fields in Grey
Must be filled out for processing

Stream Code: GM Site Code: MONI Sample:

YYYY: 2021 MM: 11 DD: 09

Site Type
☐ Calibration ☒ Survey

Stream Name: German Mills

Crew Leader (initial & last name): E Wilkinson

Crew: K. Reich

Recorder: KR

Channel Structure

Depth (mm)	Pools (Hydraulic Head = 0-3 mm)				Glides (Hydraulic Head = 4-7 mm)				Slow Riffles (Hydraulic Head = 8-17 mm)				Fast Riffles (Hydraulic Head > 17 mm)			
	No Cover	Total	Cover Present	Total	No Cover	Total	Cover Present	Total	No Cover	Total	Cover Present	Total	No Cover	Total	Cover Present	Total
0 - 100 mm				1								3				1
101 - 600 mm		11		9		1		9		1		2				5
601 - 1000 mm		5		2				1		1		1				
> 1000 mm		5		1												
Total # Points		21		13		1		10		2		6				7

=60

Islands

Instream Cover

Cover Types	Flat Rock	Round Rock	Wood	Macrophytes	Bank	Other
Number of Points		7	27	3	2	

Can have more than 1 per obs point. Points be more than 100.

Substrate Types

Point Particle	Fines (<2 mm)	Gravel (2-100 mm)	Cobble (100-1000mm)	Bedrock (>1000mm)	Gavia Feces	Concrete
Point Particle		23	36	1		
Maximum Particle		18	31	11		

10 dots per transect

Bank Stability

Mean Stream Width (m): 7.3 Mean Depth at Crossover (mm): 250 Maximum Particle Size (mm): 290

Eroding Bank	13	Angle > 45°, erodible soil, undercut or bare soil
Vulnerable Bank		Angle > 45°, erodible soil, no sign of recent erosion
Protected Bank	1	Angle > 45°, non-erodible material/soil
Deposition Zone	6	Angle < 45°, (gradual slope from river), fine grained sediments

20 total

Comments

MONI, Transect 1-Glide, pool LB
Transect 7-6m cobble bar RB.

Entered: 1 Verified: Corrected:

8m x 10 = 80m

10 transects
6 observation points

Stream width
T1: 6.82m
T2: 7.15m
3-8.85m
4-9m approx
5-4.47x2
6
7-3.2
8
9
10

21
13
36
31
11
6

Site Identification

Stream Code GM	Site Code MON2	Sample 	Date (yyyy-mm-dd) 2021 10 03
Stream Name German mills	Alternate Site Code 	Site Length (m) 96.78	
<div> <div>*** Record using NAD83 datum</div> <div> <div>Uncorr. UTM</div> <div>Zone 17</div> <div>Easting 0510.5</div> </div> <div> <div>Corr. UTM</div> <div>Zone 17</div> <div>Easting </div> </div> </div>	<div> <div>Uncorr. Northing</div> <div>Zone </div> <div>Northing 51100</div> </div> <div> <div>Corr. Northing</div> <div>Zone </div> <div>Northing </div> </div>	<div> <div>OR</div> <div>Lat. 43 48 52.2</div> </div> <div> <div>Long. 79 22 39.28</div> </div>	
Source of Uncorrected UTM Coordinates GPS/DGPS <input checked="" type="checkbox"/> GIS <input type="checkbox"/> OBM <input type="checkbox"/>	Source of Corrected UTM Coordinates FWIS <input type="checkbox"/> Ortho-photos <input type="checkbox"/> GIS <input type="checkbox"/>		
Other 		Name of Layer Used for Correction 	

Access Route

Walk down stairs @ Pinery and walk right on trail under pedestrian bridge. Approx 15m turn into gulch and walk along outlet til you reach creek.
UTM: 17T 630510.53mE, 4851100.68mN

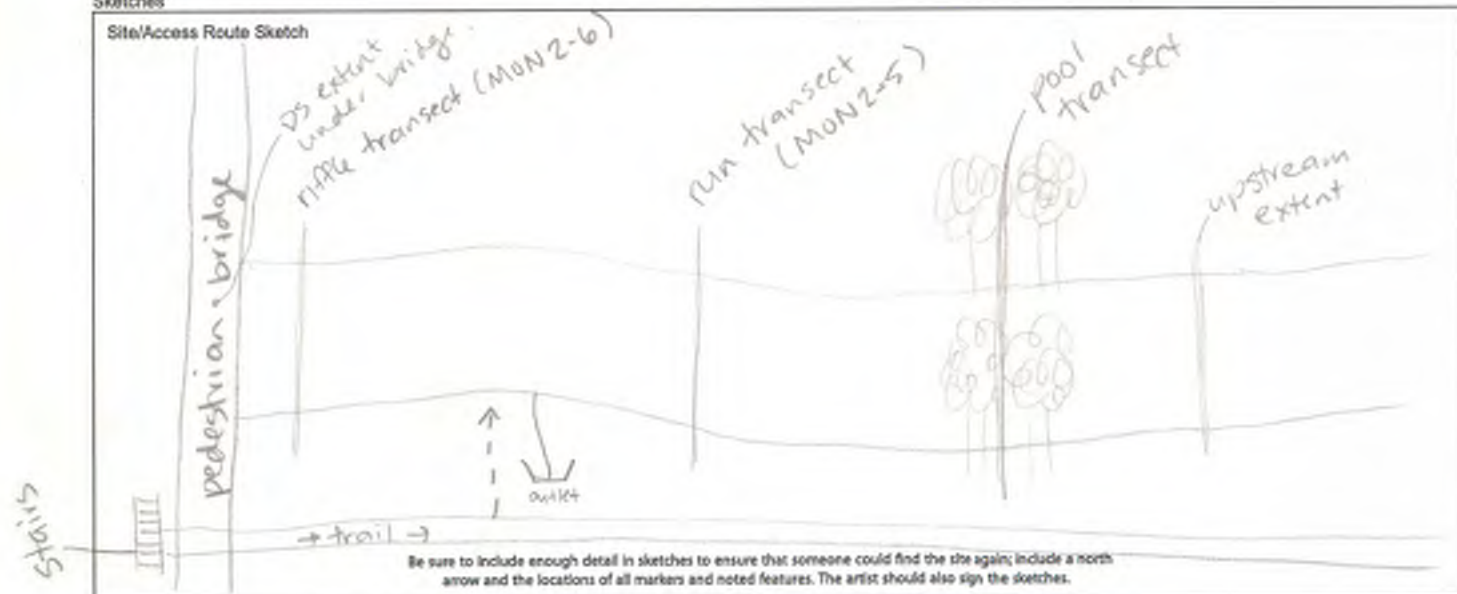
Site Description

DS → US riffle → run → pool. Straight away section of creek. Has riffle/pool sequence but the transitions between are extended. More overhanging trees/veg through this section. Some minor undercut banks.

☐ Site Was Unsampleable - add reason(s) on reverse

Sketches

Site/Access Route Sketch



Comments

riffle transect in line w MON2-6
run transect in line w MON2-5
pool transect does not match geomorph monitoring.
most of monitoring site has canopy cover shading creek.

Crew Leader (initial & last name)

E Wilkinson

Crew

K. Reich

Recorder

Entered

Verified

Corrected

Site Marker Details

UPSTREAM SITE MARKER (measure from stake to site)

Bearing (D)

Distance (m)

Description

@ top end of large willow patch.
pin in avenue.

DOWNSTREAM SITE MARKER (measure from stake to site)

Bearing (D)

Distance (m)

Description

under peat bridge • DS of riffle
pin in avenue.

ADDITIONAL SITE MARKER (measure from stake to site)

Bearing (D)

Distance (m)

Description

Photos

Photo No.

Photo Name

Photo Description

Upstream

Upstream

X

too deep to take photo.

Downstream

✓

looking at cross over and run DS.

Downstream

Upstream

✓

looking at riffle US

Downstream

✓

looking at riffle and pool DS

Other Features

Site is Unsampleable Reason(s)

- ☐ Stream dry
- ☐ Insufficient water to sample effectively
- ☐ Stream is no longer present at location (flooded or relocated, etc.)
- ☐ Naturally unwadeable (i.e. > 1.5 m deep)
- ☐ Unwadeable due to ponding from a permanent barrier
- ☐ Unwadeable due to ponding from temporary barrier (eg. beaver dam)
- ☐ Landowner could not be contacted
- ☐ Landowner refused access
- ☐ Inaccessible for safety reasons (add details in comments below)
- ☐ Stream is wadeable but not appropriate for the intended sampling

What is the permanent barrier?

What is the temporary barrier?

Modules to have been used (e.g. S2.M1, S3.M1):

Comments

Site Features

Mandatory Fields in Grey
Must be filled out for processing

Stream Code

GM

Site Code

MON2

Sample

Date (yyyy-mm-dd)

2021 10 03

Stream Name

German Mills

For each landuse, check box that applies. Be sure to include comments explaining the particulars, including names and numbers of contacts

Site Features	Ongoing & Active	Historical Evidence	No Evidence but Reported	No Evidence	Unknown	Comments
Potential Point or Non-point Source Contaminant Sources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Outlet #1 flowing into waterway.
Major Nutrient Sources Upstream	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Hardening or Straightening	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Adjacent Landuses that Destabilize Banks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Sediment Loading or Deprivation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Instream Habitat Modifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Barriers and/or Dams in the Vicinity of the Site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
High Fishing Pressure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Log Jam Deflectors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Springs or Seeps at the Site	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Presence of watercress.
Impervious Substrate Limiting Burrowing Depth of Fish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Fish Stocked Near Sample Site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Other Activities that Could Influence Biota or Habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Intensive Logging Activities within the Riparian Zone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Visual Immediate ☒

Visual Extended ☐

Interview ☐

Maps & Photos ☐

Riparian Vegetation Community
Only check one box for each bank and zone.

Temperatures Time (24hr)

13:32

Air Temp (°C)

19.0

Water Temp (°C)

Max Air Temp (°C)

Max. Water Temp (°C)

Source of Max. Air Temp

Dominant Vegetation Type

Riparian Zone	Left Bank					Right Bank						
	None	Lawn	Crop-land	Mea-dow	Scrub-land	Wet-lands	None	Lawn	Crop-land	Mea-dow	Scrub-land	Wet-lands
1.5-10m	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10-30m	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30-100m	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments

Red bridge at downstream extent.
Train bridge upstream of reach.

Crew Leader (initial & last name)

E Wilkinson

Crew Initials

K. Reich

Recorder

KR

Entered

Verified

Corrected

Rapid Assessment Methodology Field Form

Mandatory Fields in Grey
Must be filled out for processing

Stream Code: GM Site Code: MON2 Sample:

YYYY: 2021 MM: 09 DD: 08

Site Type
☐ Calibration ☒ Survey

Stream Name: German Mills

Crew Leader (initial & last name): E Wilkinson

Crew: K. Reich

Recorder: KR

Channel Structure

Depth (mm)	Pools (Hydraulic Head = 0-3 mm)				Glides (Hydraulic Head = 4-7 mm)				Slow Riffles (Hydraulic Head = 8-17 mm)				Fast Riffles (Hydraulic Head > 17 mm)			
	No Cover	Total	Cover Present	Total	No Cover	Total	Cover Present	Total	No Cover	Total	Cover Present	Total	No Cover	Total	Cover Present	Total
0 - 100 mm												4				
101 - 600 mm	<input checked="" type="checkbox"/>	12	<input checked="" type="checkbox"/>	17	<input checked="" type="checkbox"/>	5	<input checked="" type="checkbox"/>	2				8				3
601 - 1000 mm	<input checked="" type="checkbox"/>	4														
> 1000 mm	<input checked="" type="checkbox"/>	5														
Total # Points		21		17		5		2				12				3

Islands

☐

Instream Cover

Cover Types	Flat Rock	Round Rock	Wood	Macrophytes	Bank	Other
Number of Points	1	25	8	6		

Substrate Types

Point Particle	Fines (<2 mm)	Gravel (2-100 mm)	Cobble (100-1000mm)	Bedrock (>1000mm)	Gavia Feces	Concrete
Maximum Particle	<input checked="" type="checkbox"/>	30	24	6		
	<input checked="" type="checkbox"/>	19	27	14		

Bank Stability

Mean Stream Width (m): 8.6 Mean Depth at Crossover (mm): 300 Maximum Particle Size (mm): 140

Eroding Bank	15	Angle > 45°, erodible soil, undercut or bare soil
Vulnerable Bank	4	Angle > 45°, erodible soil, no sign of recent erosion
Protected Bank		Angle > 45°, non-erodible material/soil
Deposition Zone	1	Angle < 45°, (gradual slope from river), fine grained sediments

Comments

Snakewort growing on banks.
Generally straight stretch of waterway.

Entered: Verified: Corrected:

$$9.5 \times 10 = 95.0$$

Stream width:
1.7.22m
2.7.22m
3.
4.
5.10.10
6."
7.9.40
8.9.40
9.8.40
10.

(20)

Site Identification

Stream Code GM	Site Code MON3	Sample 	Date (yyyy-mm-dd) 2021 10 03
Stream Name German Mills	Alternate Site Code 	Site Length (m) 108.42	
<div> <div>*** Record using NAD83 datum</div> <div> <div>Uncorr. UTM</div> <div>Zone 17</div> <div>Easting 0300.1</div> </div> <div> <div>Corr. UTM</div> <div>Zone 1</div> <div>Easting </div> </div> </div>	<div> <div>Northings</div> <div>50458.7</div> </div>	<div> <div>OR Lat</div> <div>DD 43 MM 48 SS.sss 059</div> </div> <div> <div>Long</div> <div>DD 79 MM 22 SS.sss 4880</div> </div>	
<div>Source of Uncorrected UTM Coordinates</div> <div> <div>GPS/DGPS <input checked="" type="checkbox"/></div> <div>Other <input type="checkbox"/></div> </div>		<div>Source of Corrected UTM Coordinates</div> <div> <div>FWIS <input type="checkbox"/></div> <div>Other <input type="checkbox"/></div> </div>	
<div> <div>GIS <input type="checkbox"/></div> <div>OBM <input type="checkbox"/></div> </div>		<div> <div>Name of Layer Used for Correction</div> <div></div> </div>	

Access Route

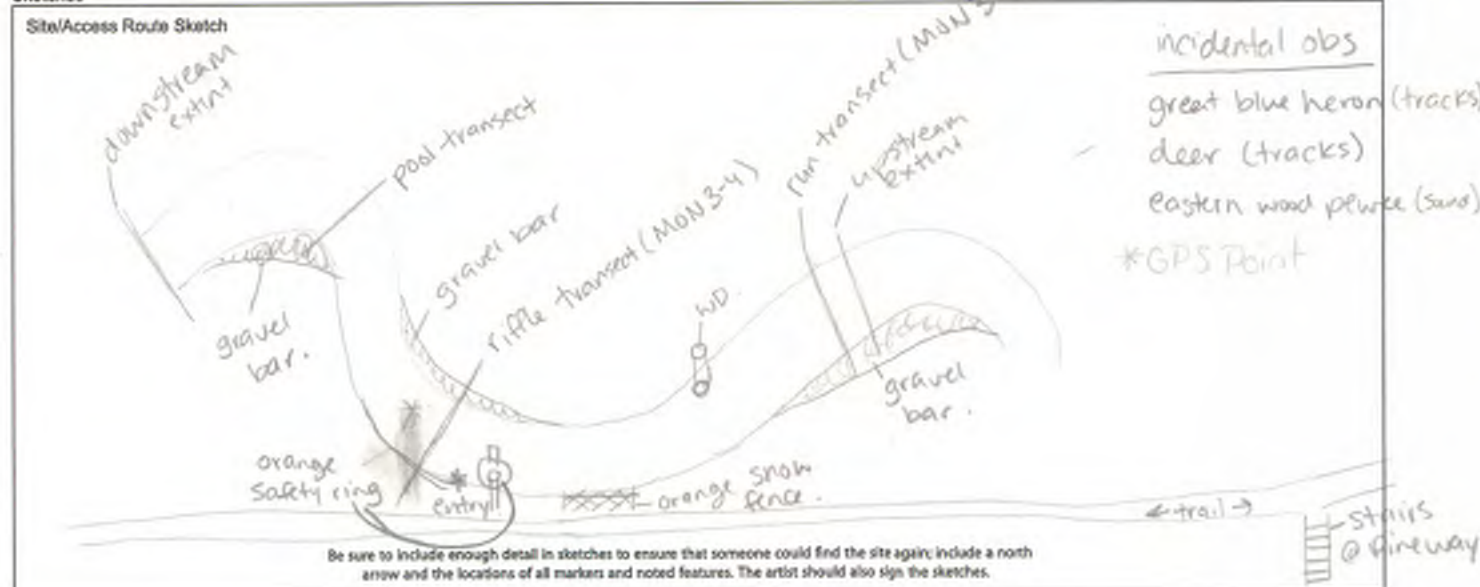
Walk down stairs at Pineway St. and go left on trail. On right there will be orange snow fencing, go past it. You will see orange safety ring, go down into creek @ this spot.
UTM 17T 630300.15m 4850953.75mN

Site Description

from DS to US → pool → riffle → run. There are eroded vertical banks on outside meander bends and 2 ~~small~~ gravel bars on inside of bends. Some woody debris along toe. Run and pool have little visible flow, riffle has visible flow.

☐ Site Was Unsampleable - add reason(s) on reverse

Sketches



Comments

run @ MON3-3
pool does not line up w geomorph monitoring
riffle @ MON3-4
- many fish visible in creek

Crew Leader (initial & last name)

E Wilkinson

Crew

K. Reich

Recorder

Entered

Verified

Corrected

Site Marker Details

UPSTREAM SITE MARKER (measure from stake to site)

Bearing (D)

Distance (m)

Description

@ run, approx 3/4 way up the gravel bar.
pin in azenza

DOWNSTREAM SITE MARKER (measure from stake to site)

Bearing (D)

Distance (m)

Description

just at extent of fallen tree branches DS
of pool. Located upstream of distinct riffle
pin in azenza.

ADDITIONAL SITE MARKER (measure from stake to site)

Bearing (D)

Distance (m)

Description

Photos

Photo No.

Photo Name

Photo Description

Upstream

Upstream

☒

looking @ pool upstream

Downstream

Downstream

☒

looking @ remaining run.

Downstream

Upstream

☒

look @ pool where we did benthic samples

Downstream

Downstream

☒

look @ riffle

Other Features

☐

☐

Site is Unsampleable Reason(s)

- ☐ Stream dry
- ☐ Insufficient water to sample effectively
- ☐ Stream is no longer present at location (dried or relocated, etc.)
- ☐ Naturally unwadeable (i.e. > 1.5 m deep)
- ☐ Unwadeable due to ponding from a permanent barrier
- ☐ Unwadeable due to ponding from temporary barrier (eg. beaver dam)
- ☐ Landowner could not be contacted
- ☐ Landowner refused access
- ☐ Inaccessible for safety reasons (add details in comments below)
- ☐ Stream is wadeable but not appropriate for the intended sampling

What is the permanent barrier?

What is the temporary barrier?

Modules to have been used (e.g. S2.M1, S3.M1):

Comments

took picture @ each transect
put pin in azenza for each transect.

Site Features

Mandatory Fields in Grey
Must be filled out for processing

Stream Code Gm	Site Code MON3	Sample <input type="checkbox"/>	Date (yyyy-mm-dd) 20211003
Stream Name German Mills			

For each landuse, check box that applies. Be sure to include comments explaining the particulars, including names and numbers of contacts

Site Features	Ongoing & Active	Historical Evidence	No Evidence but Reported	No Evidence	Unknown	Comments
Potential Point or Non-point Source Contaminant Sources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Major Nutrient Sources Upstream	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Hardening or Straightening	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Adjacent Landuses that Destabilize Banks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Sediment Loading or Deprivation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sandy/gravel bars.
Instream Habitat Modifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Barriers and/or Dams in the Vicinity of the Site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
High Fishing Pressure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Log Jam Deflectors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Springs or Seeps at the Site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Impervious Substrate Limiting Burrowing Depth of Fish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Fish Stocked Near Sample Site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Other Activities that Could Influence Biota or Habitat	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Residential housing and paved walkways nearby.
Intensive Logging Activities within the Riparian Zone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Visual Immediate ☒ Visual Extended ☐ Interview ☐ Maps & Photos ☒

Riparian Vegetation Community
Only check one box for each bank and zone.

Temperatures		Dominant Vegetation Type														
Time (24hr)	Air Temp (°C)	Left Bank					Right Bank									
		Riparian Zone	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-lands	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-lands
14:50	20.0															
Water Temp (°C)	Max Air Temp (°C)															
Max. Water Temp (°C)	Source of Max. Air Temp															

Comments

Crew Leader (initial & last name)
E Wilkinson

Crew Initials Recorder Entered Verified Corrected
K. Reich KR

Rapid Assessment Methodology Field Form

Mandatory Fields In Grey
Must be filled out for processing

Stream Code: GM Site Code: MON3 Sample:

YYYY: 2021 MM: 08 DD: 03

Site Type
☐ Calibration ☒ Survey

Stream Name: German Mills

Crew Leader (initial & last name): E Wilkinson

Crew: K. Reich

Recorder: KR

Channel Structure

Depth (mm)	Pools (Hydraulic Head = 0-3 mm)				Glides (Hydraulic Head = 4-7 mm)				Slow Riffles (Hydraulic Head = 8-17 mm)				Fast Riffles (Hydraulic Head > 17 mm)			
	No Cover	Total	Cover Present	Total	No Cover	Total	Cover Present	Total	No Cover	Total	Cover Present	Total	No Cover	Total	Cover Present	Total
0 - 100 mm		1		2		1		1								
101 - 600 mm	<input checked="" type="checkbox"/>	10	<input checked="" type="checkbox"/>	13		2	<input checked="" type="checkbox"/>	8			<input checked="" type="checkbox"/>	7				
601 - 1000 mm	<input checked="" type="checkbox"/>	5		2				1								
> 1000 mm	<input checked="" type="checkbox"/>	16		1												
Total # Points		22		18		3		10				7				

Islands

☐

Instream Cover

Cover Types	Flat Rock	Round Rock	Wood	Macrophytes	Bank	Other
Number of Points	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Substrate Types

Point Particle	Fines (<2 mm)	Gravel (2-100 mm)	Cobble (100-1000mm)	Bedrock (>1000mm)	Gavia Feces	Concrete
Maximum Particle	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Bank Stability

Mean Stream Width (m): 9.2 Mean Depth at Crossover (mm): 240 Maximum Particle Size (mm): 310

Eroding Bank	<input checked="" type="checkbox"/>	Angle > 45°, erodible soil, undercut or bare soil
Vulnerable Bank	<input checked="" type="checkbox"/>	Angle > 45°, erodible soil, no sign of recent erosion
Protected Bank	<input checked="" type="checkbox"/>	Angle > 45°, non-erodible material/soil
Deposition Zone	<input checked="" type="checkbox"/>	Angle < 45°, (gradual slope from river), fine grained sediments

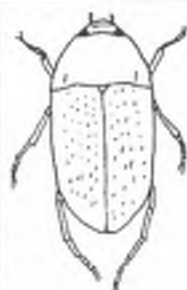
Comments

T10: Clay vertical toe on RB

Entered: Verified: Corrected:

$$10.5 \times 10 = 105m$$

Ontario Benthos Biomonitoring Network Field Sheet: STREAMS



Date: 2021/10/03

Time

Agency: Matrix Solutions

Investigators: E. Wilkinson/K. Reich

Stream name: German Mills

Site #: MONI

Location: centroid of 3 replicates; Lat/Long or UTM

Elevation (m asl):

Datum/zone:

Water Quality

Water Temperature (°C): 17.9°C

Conductivity (uS/cm): 1.094

pH: 8.36

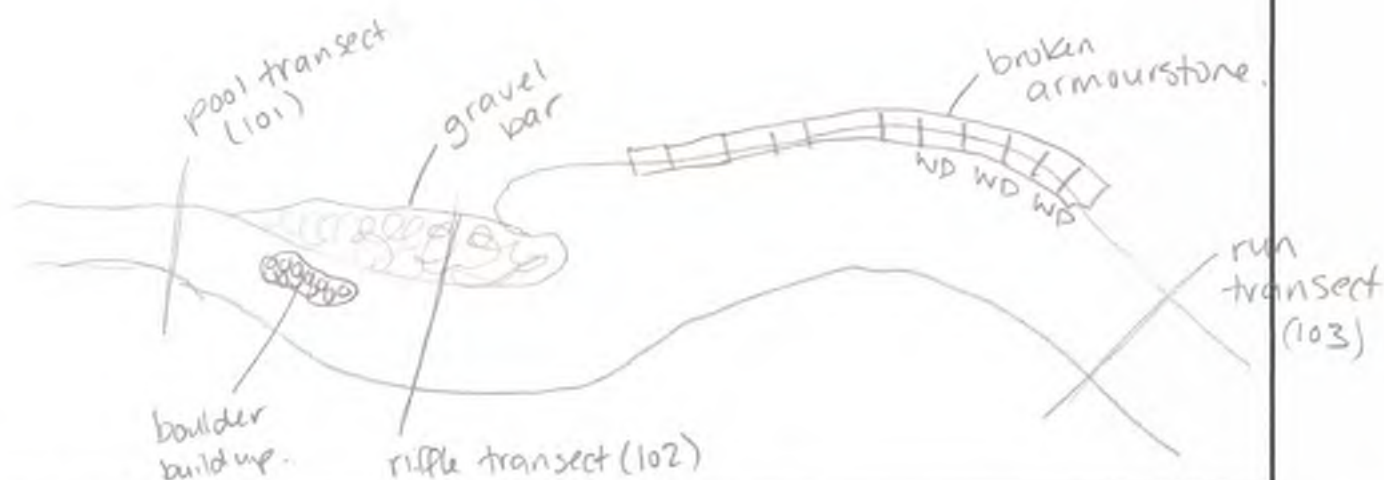
DO (mg/l): 12.70

Alkalinity (mg/l as CaCO₃): Turbidity (NTU): 2.64

Site Description and Map

Draw a map of the site (with landmarks) and indicate areas sampled. Attach photograph (optional)

Show north arrow.



Benthos Collection Method (circle one):

• Traveling Kick & Sweep

• Grab Sample

• Other (specify):

Gear Type (circle one)

• D-net

• Ponar

• Other (specify):

• Ekman

• Rock Baskets

Mesh Size: 500 micron (or specify)

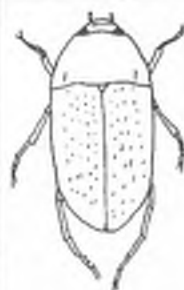
Sub-samples	Sampling distance covered (m)	Time (min.)	Max. Depth (m)	Wetted Width (m)	Max. Hydraulic Head (mm)	# Grabs pooled per sample
102 Sample 1: Riffle (cross-over)	18m	3	0.16	7.19	6	
101 Sample 2: Pool	13m	3	0.93	9.92	0	
103 Sample 3: Riffle (cross-over) Run	15m	3	0.24	5.80	1	

KICK AND SWEEP ONLY

GRAB SAMPLING ONLY

Substrate				Class	Description
Enter dominant substrate class and second dominant class for each sub-sample				1	Clay (hard pan)
				2	Silt (gritty, < 0.06 mm particle diameter)
				3	Sand (grainy, 0.06 - 2 mm)
				4	Gravel (2 - 65 mm)
				5	Cobble (65 - 250 mm)
				6	Boulder (> 250 mm)
				7	Bed Rock
Dominant	Sample 1 101	Sample 2 102	Sample 3 103		
	3	4	5		
2nd Dominant	4	5	4		
Substrate Notes					
lots of cobble is algae covered					
Organic Matter-Areal Coverage				Sample 1 101	Sample 2 102
Use: 1: Abundant, 2: Present, 3: Absent					
Woody Debris				3	3
Detritus				3	3
Riparian Vegetative Community					% Canopy Cover (circle one)
Use: 1 (None), 2 (cultivated), 3 (meadow), 4 (scrubland), 5 (forest, mainly coniferous), 6 (forest, mainly deciduous)					
Zone (dist. from water's edge)					
Left Bank					
Right Bank (facing downstream)					
1.5-10 m	3	6			0-24
10-30 m	parking - 1	6			25-49
30-100 m	lot - 1	6			75-100
					If instrument used, record type:
Aquatic Macrophytes and Algae (Use: 1 (Abundant), 2 (Present), 3 (Absent). Circle dominant type.)					
Macrophytes			Algae		
Emergent	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2
	3	3	3	3	3
Rooted Floating	3	3	3	3	3
Submergent	3	3	3	3	3
Free Floating	3	3	3	3	3
Stream Size/Flow					
Bank Full Width (m):		Discharge (m ³ /s, optional, indicate method):			
12m					
River Characterisation (circle one)					
Perennial					
Intermittent					
Unknown					
Notes (esp. related to land-use, habitat, obvious stressors)					
distinct riffle/pool sequence.					
a expected substrate in each feature.					
Candidate reference Site - Minimally Impacted? (circle one)					
Yes					
No					
General Comments					
lag area vs of large gravel bar					

Ontario Benthos Biomonitoring Network Field Sheet: STREAMS



Date: 2021 / 10 / 03

Time

Agency: Matrix Solutions

Investigators: E. Wilkinson / K. Reich

Stream name: German Mills

Site #: MON2

Location: centroid of 3 replicates; Lat/Long or UTM

Elevation (m asl):

Datum/zone:

Water Quality

Water Temperature (°C): 15.6°C

Conductivity (uS/cm): 1.033

pH: 8.17

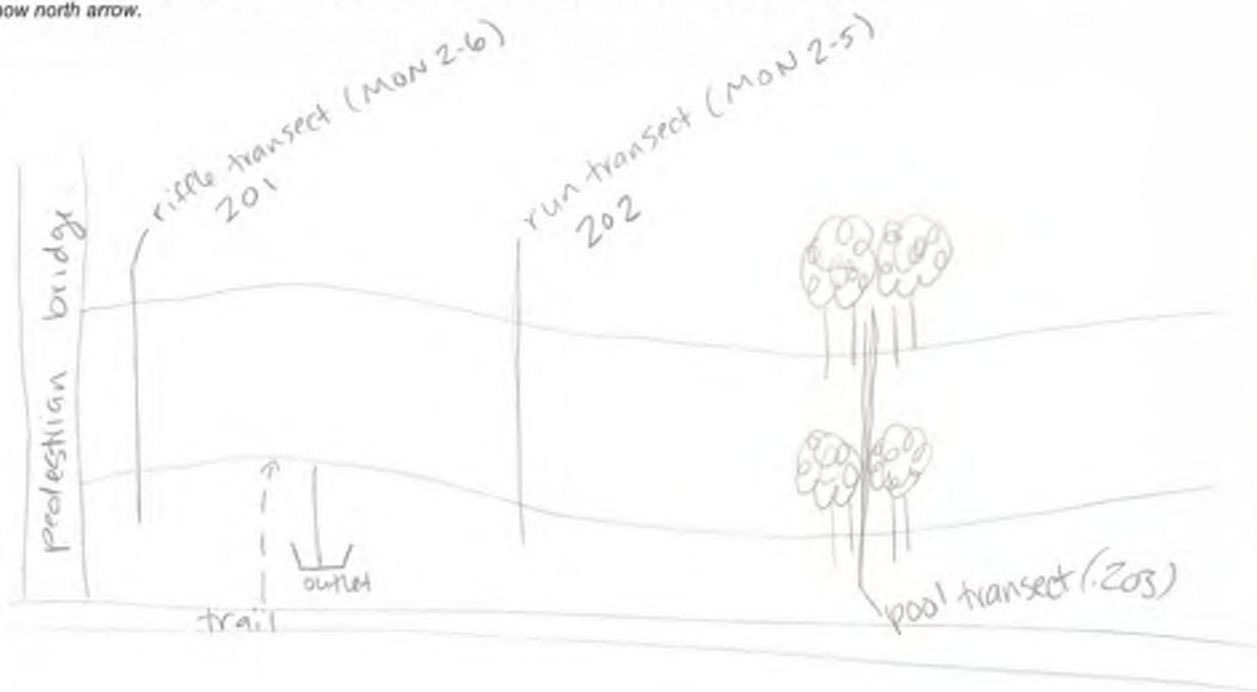
DO (mg/l): 10.64

Alkalinity (mg/l as CaCO₃): Turbidity (NTU) 3.69

Site Description and Map

Draw a map of the site (with landmarks) and indicate areas sampled. Attach photograph (optional)

Show north arrow.



Benthos Collection Method (circle one):

☒ Traveling Kick & Sweep

☐ Grab Sample

☐ Other (specify):

Gear Type (circle one)

☒ D-net

☐ Ponar

☐ Other (specify):

☐ Ekman

☐ Rock Baskets

Mesh Size: 500 micron (or specify)

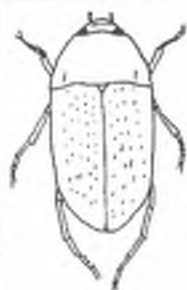
	Sub-samples	Sampling distance covered (m)	Time (min.)	Max. Depth (m)	Wetted Width (m)	Max. Hydraulic Head (mm)	# Grabs pooled per sample
201	Sample 1: Riffle (cross-over)	20m	3	0.24	7.58	5	GRAB SAMPLING ONLY
203	Sample 2: Pool	11m	3	0.79	6.09	0	
202	Sample 3: Riffle (cross-over) Run	17	3	0.36	10.14	0	

KICK AND SWEEP ONLY

Substrate				Class	Description		
Enter dominant substrate class and second dominant class for each sub-sample							
	Sample 1 201	Sample 2 202	Sample 3 203				
Dominant	5	3	3	1	Clay (hard pan)		
				2	Silt (gritty, < 0.06 mm particle diameter)		
				3	Sand (grainy, 0.06 - 2 mm)		
				4	Gravel (2 - 65 mm)		
				5	Cobble (65 - 250 mm)		
2nd Dominant	4	4	2	6	Boulder (> 250 mm)		
				7	Bed Rock		
Substrate Notes							
Organic Matter-Areal Coverage							
Use 1: Abundant, 2: Present, 3: Absent		Woody Debris	Sample 1 201	Sample 2 202	Sample 3 203		
		Detritus	2	3	2		
Riparian Vegetative Community					% Canopy Cover (circle one)		
Use: 1 (None), 2 (cultivated), 3 (meadow), 4 (scrubland), 5 (forest, mainly coniferous), 6 (forest, mainly deciduous)							
Zone (dist. from water's edge)	Left Bank	Right Bank (facing downstream)					
1.5-10 m	6	3	0-24				
10-30 m	6	6	50-74				
30-100 m	/	/	75-100				
					If instrument used, record type:		
Aquatic Macrophytes and Algae (Use: 1 (Abundant), 2 (Present), 3 (Absent). Circle dominant type.)							
Macrophytes	Sample 1	Sample 2	Sample 3	Algae	Sample 1	Sample 2	Sample 3
Emergent	3	3	3	Floating Algae	3	3	3
Rooted Floating	3	3	2 along tree	Filaments	3	3	3
Submergent	3	3	3	Attached Algae	2	3	3
Free Floating	3	3	3	Slimes or Crusts	3	3	3
Stream Size/Flow							
Bank Full Width (m):		Discharge (m ³ /s, optional, indicate method):					
12m							
River Characterisation (circle one)							
Perennial							
Notes (esp. related to land-use, habitat, obvious stressors)							
in natural valley							
Candidate reference Site - Minimally Impacted? (circle one)							
Yes							
No							
General Comments							
ducks feeding in riffle.							
visible fish.							
pool transect has large boulder and lots of exposed roots on LB							

taken @ run (MON 3-3)

Ontario Benthos Biomonitoring Network Field Sheet: STREAMS



Date: 2021/10/03
 Time: 9:00 am -
 Agency: Matrix Solutions
 Investigators: E. Wilkinson / K. Reich

Stream name: German mills
 Site #: MON3
 Location: centroid of 3 replicates: Lat/Long or UTM
 pin in a vena. Elevation (m asl):
 Datum/zone:

Water Quality

Water Temperature (°C): 15.1°C
 DO (mg/l): 9.73

Conductivity (uS/cm): 1.020 pH: 8.05
 Alkalinity (mg/l as CaCO₃): Turbidity (NTU): 3.53

Site Description and Map

Draw a map of the site (with landmarks) and indicate areas sampled. Attach photograph (optional)
 Show north arrow.



Benthos Collection Method (circle one):

- ☒ Traveling Kick & Sweep
- ☐ Grab Sample
- ☐ Other (specify):

Gear Type (circle one)

- ☒ D-net
- ☐ Ponar
- ☐ Other (specify):
- ☐ Ekman
- ☐ Rock Baskets

Mesh Size: 500 micron (or specify)

Sub-samples	Sampling distance covered (m)	Time (min.)	Max. Depth (m)	Wetted Width (m)	Max. Hydraulic Head (mm)	# Grabs pooled per sample
302 Sample 1: Riffle (cross-over)	19m	3	0.23	8.62	3	GRAB SAMPLING ONLY
301 Sample 2: Pool	14m	3	0.99	6.01	0	
303 Sample 3: Riffle (cross-over) Run	12m	3	0.46	4.90	0	

Substrate				Class	Description		
Enter dominant substrate class and second dominant class for each sub-sample				1	Clay (hard pan)		
				2	Silt (gritty, < 0.06 mm particle diameter)		
				3	Sand (grainy, 0.06 - 2 mm)		
				4	Gravel (2 - 65 mm)		
				5	Cobble (65 - 250 mm)		
				6	Boulder (> 250 mm)		
				7	Bed Rock		
Dominant	Sample 1 (301)	Sample 2 (302)	Sample 3 (303)				
	3	4	3				
2nd Dominant	4	5	2				
Substrate Notes							
Organic Matter-Areal Coverage				Sample 1 (301)	Sample 2 (302)		
Use 1: Abundant, 2: Present, 3: Absent							
Woody Debris				2	3		
Detritus				3	3		
Riparian Vegetative Community					% Canopy Cover (circle one)		
Use: 1 (None), 2 (cultivated), 3 (meadow), 4 (scrubland), 5 (forest, mainly coniferous), 6 (forest, mainly deciduous)							
Zone (dist. from water's edge)	Left Bank	Right Bank (facing downstream)					
1.5-10 m	5	5		0-24	25-49		
10-30 m	5	5		50-74	75-100		
30-100 m	1	5		If instrument used, record type:			
Aquatic Macrophytes and Algae (Use: 1 (Abundant), 2 (Present), 3 (Absent). Circle dominant type.)							
Macrophytes	Sample 1	Sample 2	Sample 3	Algae	Sample 1	Sample 2	Sample 3
Emergent	3	3	3	Floating Algae	3	3	3
Rooted Floating	3	2	3	Filaments	3	3	3
Submergent	3	3	3	Attached Algae	2	2	3
Free Floating	3	3	3	Slimes or Crusts	3	3	3
Stream Size/Flow							
Bank Full Width (m): 15 m ~				Discharge (m ³ /s, optional, indicate method):			
River Characterisation (circle one) Perennial Intermittent Unknown							
Notes (esp. related to land-use, habitat, obvious stressors)							
natural river valley							
lots of areas of erosion							
riffle/pool sequence present.							
Candidate reference Site - Minimally Impacted? (circle one) Yes No							
General Comments							
Canopy cover not over watercourse							

APPENDIX C8-4

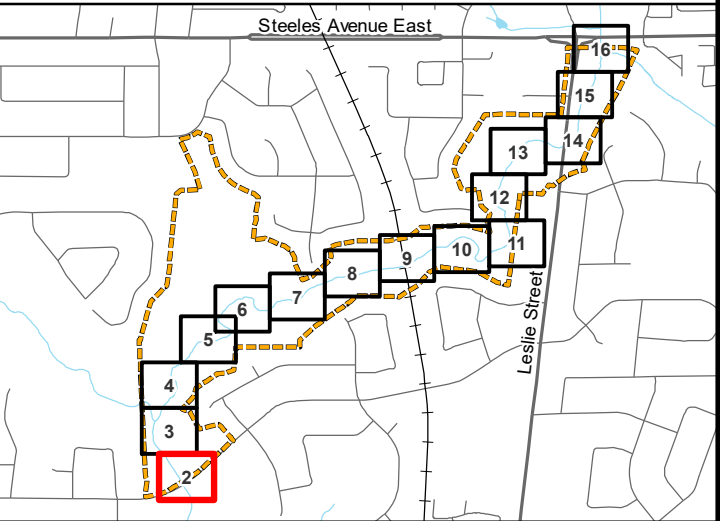
Maps

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- German Mills Creek GSMP Critical Area
- Watercourse
- Road
- Field Note
- Channel Units**
 - Pool
 - Riffle
 - Run
- Habitat Element**
 - Bar
 - Woody Debris

Notes:
1. Pool with a wetted width of 10.1m and wetted depth of 79cm. Armour stone on left bank, right bank heavily vegetated. Sandy with consolidated substrate.



1:500

metres

5

0

5

10

NAD27 MTM zone 10

Matrix Solutions Inc.

ENVIRONMENT & ENGINEERING

City of Toronto

German Mills Creek GSMP

General Aquatic Habitat

Date: July 2022

Project: 32227








Submitter: E. Wilkinson

Reviewer: R. Leppington

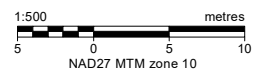
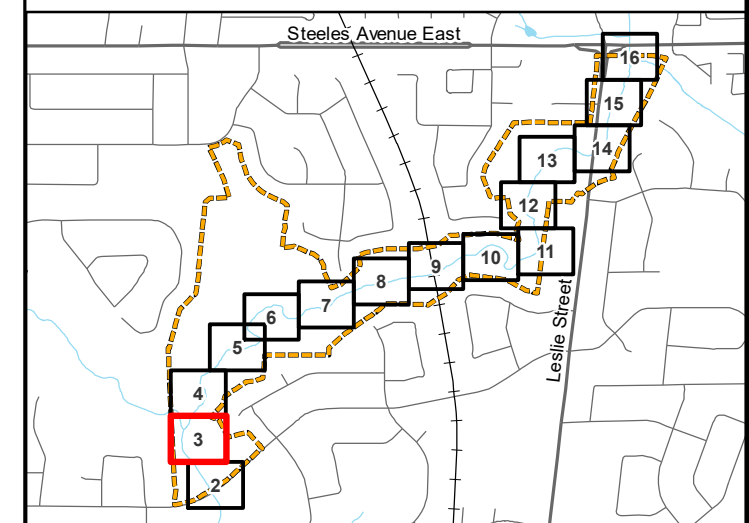
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Figure C8b



-  German Mills Creek GSMP Critical Area
 Watercourse
 Field Note
Channel Units
 Pool
 Riffle
 Run
Habitat Element
 Undercut Bank

Notes:
2. Riffle with a wetted depth of 18 cm. Left bank heavily vegetated with undercut, right bank heavily vegetated. Large cobble substrate.



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City of Toronto
German Mills Creek GSMP










General Aquatic Habitat

Date:	July 2022	Project:	32227	Submitter:	E. Wilkinson	Reviewer:	R. Leppington
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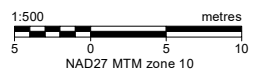
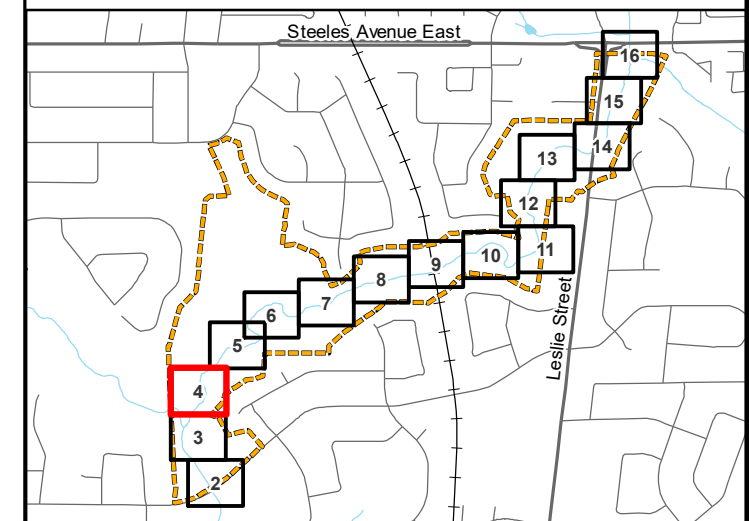
C8c



-  German Mills Creek GSMP Critical Area
-  Watercourse
-  Field Note
- Channel Units**
-  Pool
-  Riffle
-  Run
- Habitat Element**
-  Backwater Area
-  Concrete Debris Build Up
- RW** Rootwad
-  Woody Debris

Notes:

3. Run with a wetted width of 7.6m and wetted depth of 25cm. Both banks heavily vegetated. Sandy gravel substrate.
4. Pool with a wetted depth of approximately 1m. Banks vegetated with embedded concrete chunks. Sand substrate with concrete chunks.



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City of Toronto
German Mills Creek GSMP

General Aquatic Habitat

Date:	July 2022	Project:	32227	Submitter:	E. Wilkinson	Reviewer:	R. Leppington
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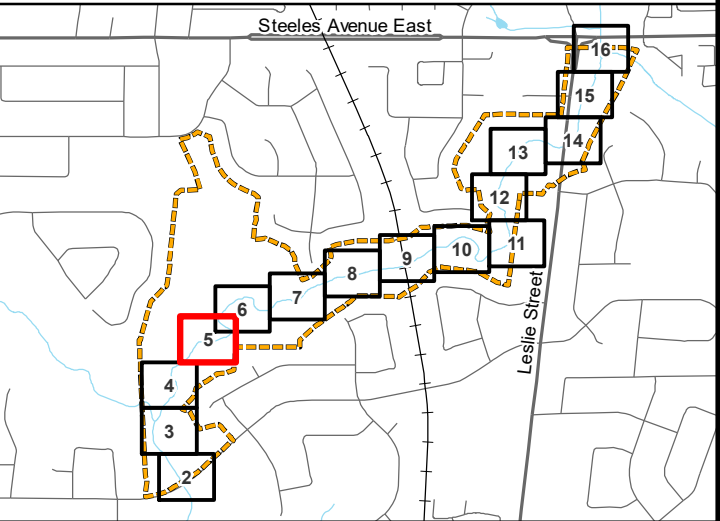
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- German Mills Creek GSMP Critical Area
- Watercourse
- Field Note
- Channel Units**
 - Pool
 - Riffle
 - Run
- Habitat Element**
 - Bar
 - Potential Fish Barrier
 - Undercut Bank
 - Woody Debris

Notes:
5. Potential fish barrier: A boulder weir with a drop of 65cm from top of water to upstream level.
6. Pool with an inlet with a wetted depth of approximately 1.2m. Banks eroded and vegetated. Substrate unconsolidated.



City of Toronto
German Mills Creek GSMP

General Aquatic Habitat

Date:	July 2022	Project:	32227	Submitter:	E. Wilkinson	Reviewer:	R. Leppington
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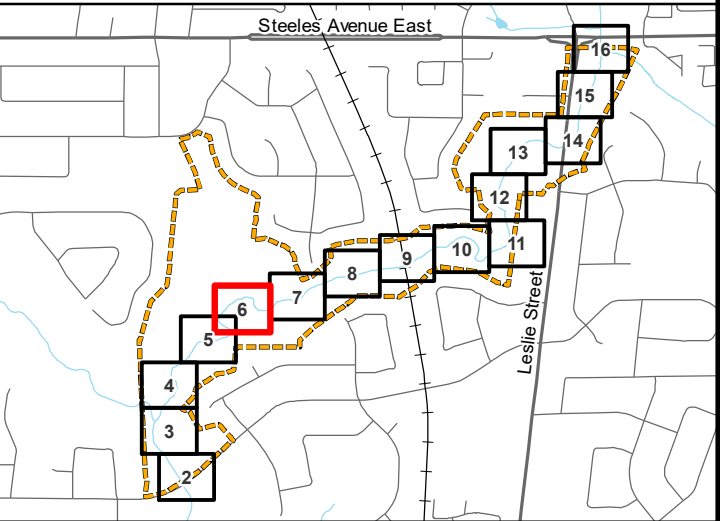
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- German Mills Creek GSMP Critical Area
- Watercourse
- Field Note
- Channel Units**
 - Pool
 - Riffle
 - Run
- Habitat Element**
 - Bar
 - Undercut Bank
 - Woody Debris

Notes:
7. A riffle (left side) with a wetted depth of 13 cm, and a pool (right side) with a depth of 50 cm and a total wetted width of 8.6m. Banks eroded and vegetated. Substrate large gravel to the left and sand to the right side.
8. Run with a wetted depth of 22cm. Eroded left bank. Sandy gravel substrate.



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City of Toronto
German Mills Creek GSMP

General Aquatic Habitat

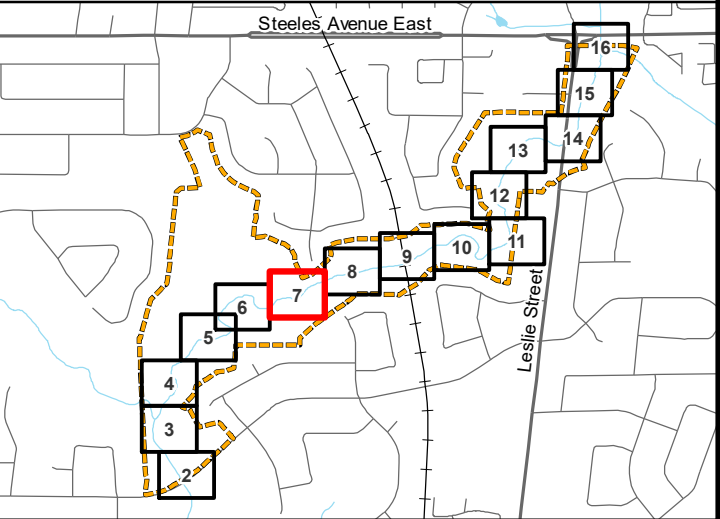
Date:	July 2022	Project:	32227	Submitter:	E. Wilkinson	Reviewer:	R. Leppington
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- German Mills Creek GSMP Critical Area
- Watercourse
- Field Note
- Channel Units**
 - Pool
 - Riffle
 - Run
- Habitat Element**
 - Bar
 - Instream Vegetation
 - Woody Debris

Notes:
9. Riffle with a wetted width of 9.5 m and a wetted depth of 11cm. Banks vegetated. Small cobble and gravel substrate.



City of Toronto
German Mills Creek GSMP

General Aquatic Habitat

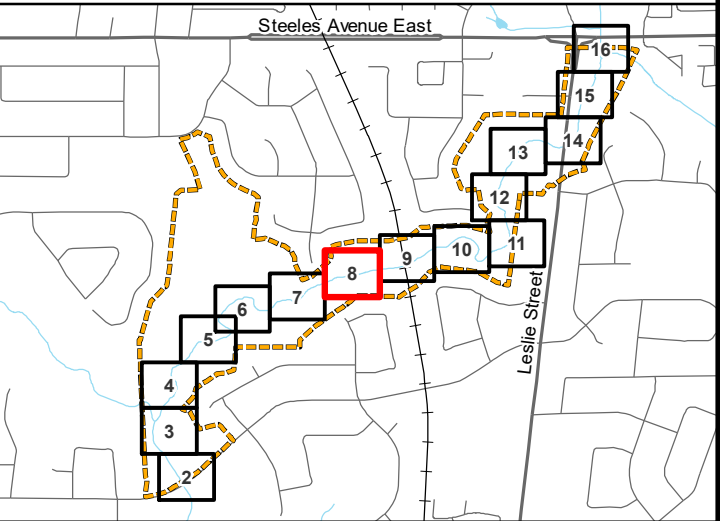
Date:	July 2022	Project:	32227	Submitter:	E. Wilkinson	Reviewer:	R. Leppington
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- German Mills Creek GSMP Critical Area
- Watercourse
- Field Note
- Channel Units**
- Pool
- Riffle
- Run
- Habitat Element**
- Instream Vegetation
- Undercut Bank
- Woody Debris

Notes:
10. Pool with a wetted depth of 95cm. Overhanging deciduous vegetation on banks.
Sandy gravel substrate.



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City of Toronto
German Mills Creek GSMP

General Aquatic Habitat

Date:	July 2022	Project:	32227	Submitter:	E. Wilkinson	Reviewer:	R. Leppington
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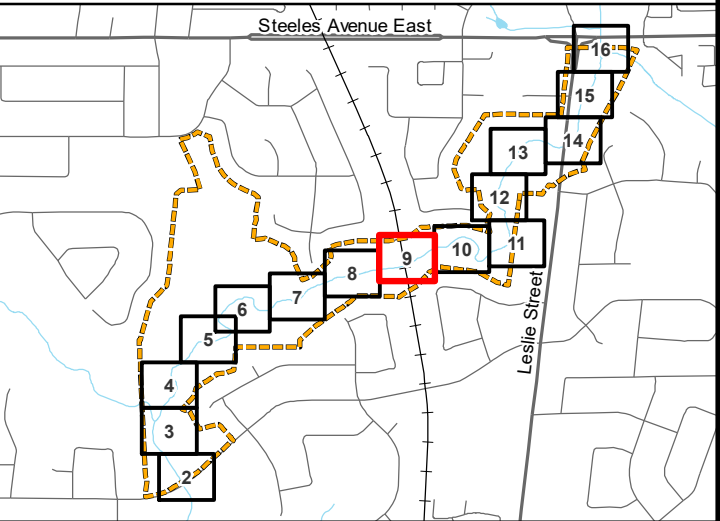
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- German Mills Creek GSMP Critical Area
- Watercourse
- Railway
- Field Note
- Channel Units**
 - Pool
 - Riffle
 - Run
- Habitat Element**
 - Bar
 - Boulder/Boulder Cluster

Notes:
11. Riffle with a wetted width of 5.1m and a wetted depth of 15cm. Small cobble bar on the left bank. Small boulders and large cobble substrate.



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ENVIRONMENT & ENGINEERING

City of Toronto
German Mills Creek GSMP

General Aquatic Habitat

Date: July 2022 Project: 32227 Submitter: E. Wilkinson Reviewer: R. Leppington

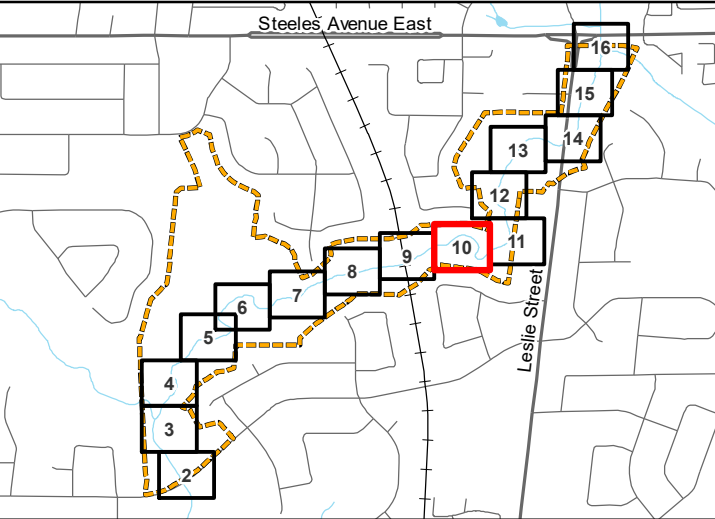
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Figure C8h



- German Mills Creek GSMP Critical Area
- Watercourse
- Field Note
- Channel Units**
 - Pool
 - Riffle
 - Run
- Habitat Element**
 - Bar
 - Boulder/Boulder Cluster
 - Exposed Tree Roots
 - Woody Debris

Notes:
12. Pool with a wetted depth of over 1m. Banks eroded. Sandy substrate.



1:500metres

50 0 5 10

NAD27 MTM zone 10

Matrix Solutions Inc.

ENVIRONMENT & ENGINEERING

City of Toronto

German Mills Creek GSMP

General Aquatic Habitat

Date: July 2022

Project: 32227

Submitter: E. Wilkinson

Reviewer: R. Leppington

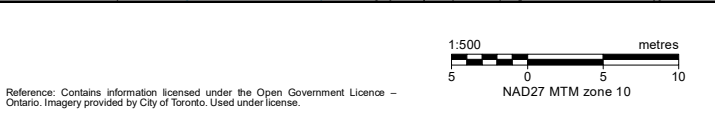
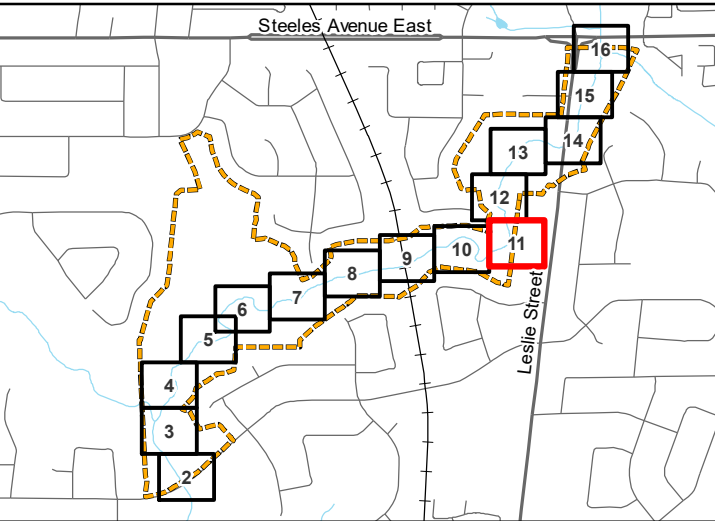
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Figure C8i



- German Mills Creek GSMP Critical Area
- Watercourse
- Field Note
- Channel Units**
 - Pool
 - Riffle
 - Run
- Habitat Element**
 - Bar
 - Boulder/Boulder Cluster
 - Exposed Tree Roots
 - Woody Debris

Notes:
13. Run with some pools concentrated along the banks with a wetted depth of 24-34 cm. Sandy gravel substrate.



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General Aquatic Habitat

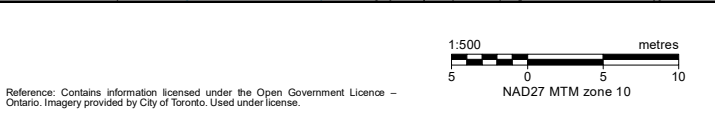
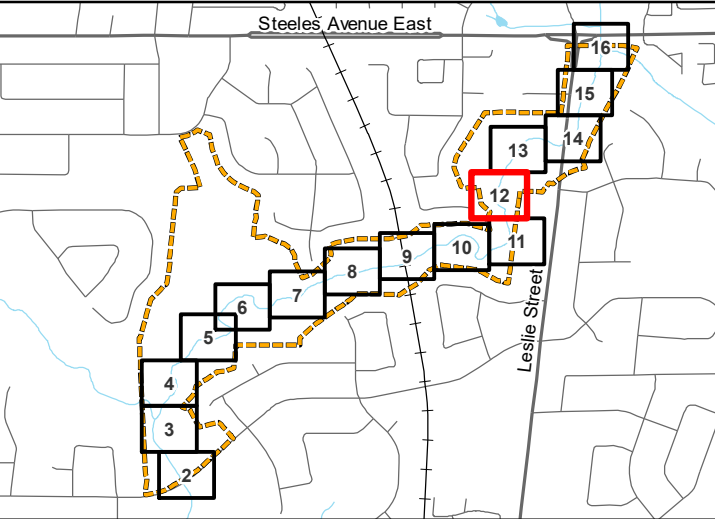
Date:	July 2022	Project:	32227	Submitter:	E. Wilkinson	Reviewer:	R. Leppington
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- German Mills Creek GSMP Critical Area
- Watercourse
- Field Note
- Channel Units**
 - Pool
 - Riffle
 - Run
- Habitat Element**
 - Bar
 - Boulder/Boulder Cluster
 - Exposed Tree Roots
 - Woody Debris

Notes:
14. Pool with a wetted depth of over 2m. Left bank armourstone, right bank eroded.
Sandy gravel substrate.



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Figure

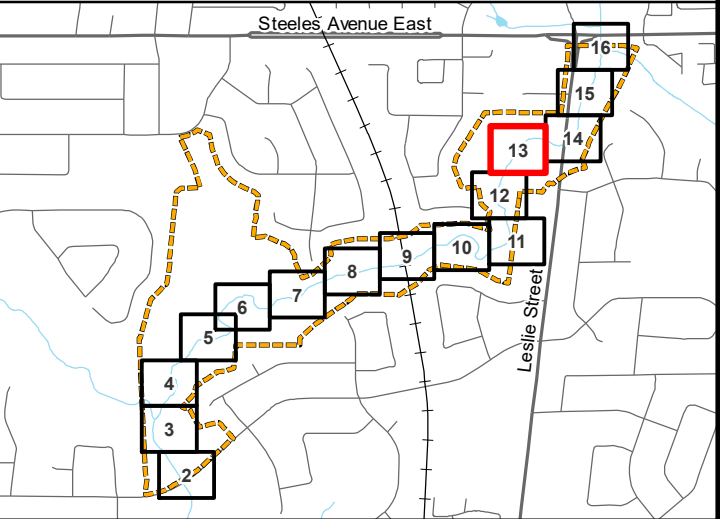
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- German Mills Creek GSMP Critical Area
- Watercourse
- Field Note
- Channel Units**
 - Pool
 - Riffle
 - Run
- Habitat Element**
 - Backwater Area
 - Exposed Tree Roots
 - Undercut Bank
 - Woody Debris

Notes:
15. Riffle with a wetted depth of 32-12cm. Vegetated banks with island near the left bank. Gravel and cobble substrate.



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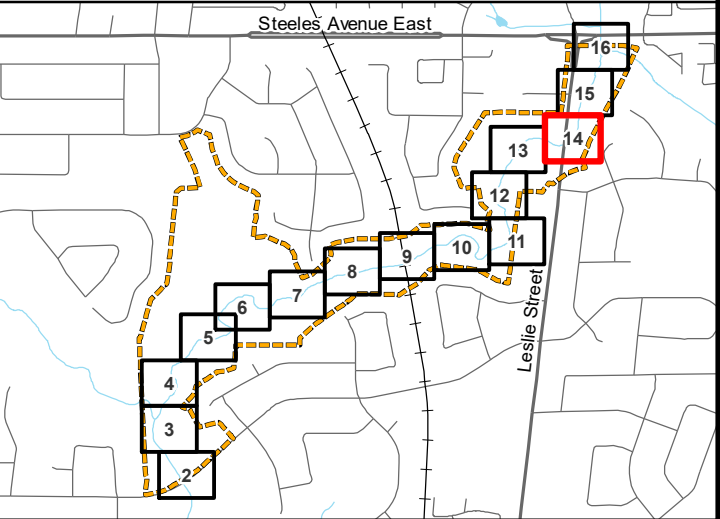
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- German Mills Creek GSMP Critical Area
- Watercourse
- Highway
- Field Note
- Channel Units**
- Pool
- Riffle
- Habitat Element**
- Backwater Area
- Boulder/Boulder Cluster
- Exposed Tree Roots
- Historic Bridge Infrastructure

Notes:
16. Pool with a wetted width of 8.80m and wetted depth of 48 cm. Banks with overhanging vegetation and a pedestrian path on the left bank. Sandy gravel substrate.



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General Aquatic Habitat

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German Mills Creek GSMP Critical Area

Watercourse

Highway

Road

Field Note

Channel Units

Pool

Riffle

Run

Habitat Element

Boulder/Boulder Cluster

Potential Fish Barrier

Woody Debris

Notes:

17. Riffle series with a wetted width of 5.30 m and a wetted depth of 16cm. Cobble and small boulder substrate.

18. Embedded armourstone forming riffles and creating a potential fish barrier with a drop of 50 cm.

1:500

metres

5 0 5 10

NAD27 MTM zone 10

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German Mills Creek GSMP

General Aquatic Habitat

Date: July 2022

Project: 32227

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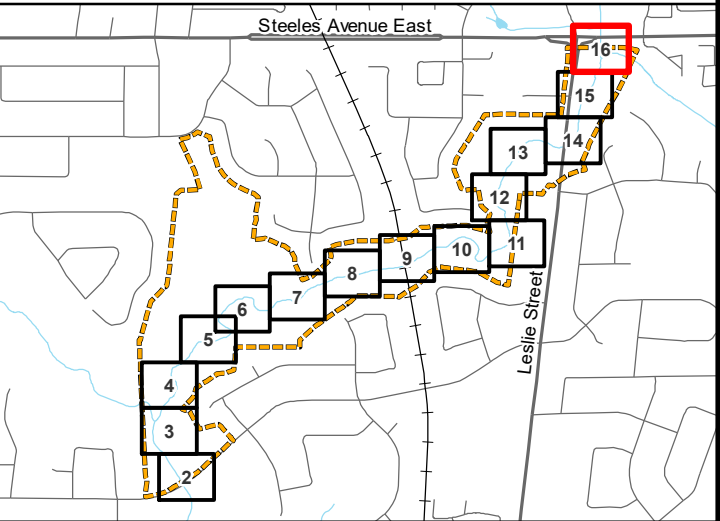
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Figure C8n



- German Mills Creek GSMP Critical Area
- Watercourse
- Highway
- Road
- Field Note
- Channel Units**
 - Pool
 - Riffle
- Habitat Element**
 - Boulder/Boulder Cluster

Notes:
19. Pool with a wetted width of 10.20 m and wetted depth of 1m. Both banks vegetated with tall grasses and shrubs. Sandy substrate.
20. Riffle with a wetted width of 2.3m and wetted depth of 19cm. Armoustone on right and left bank. Boulder and cobble substrate.



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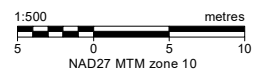
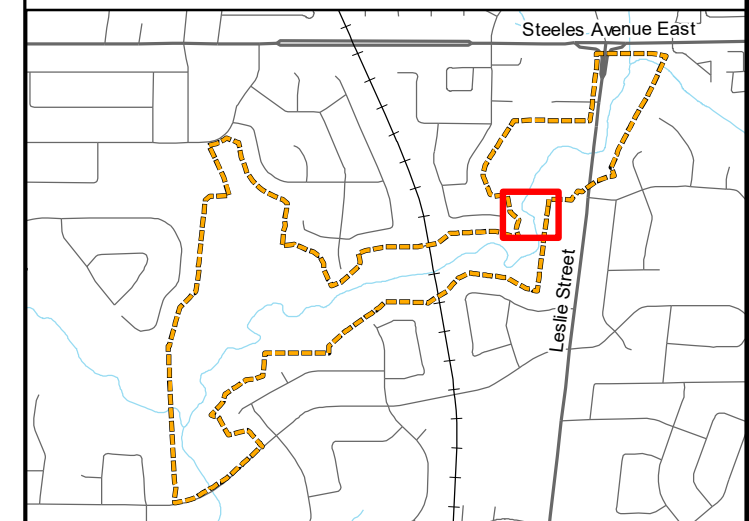
General Aquatic Habitat

Date:	July 2022	Project:	32227	Submitter:	E. Wilkinson	Reviewer:	R. Leppington
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-  German Mills Creek GSMP Critical Area
 OSAP Transect
 Upstream/Downstream Extent
 Water Quality Sample
Benthic Location
 Pool
 Riffle
 Run



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German Mills Creek GSMP

Monitoring Station 1

Date:	July 2022	Project:	32227	Submitter:	E. Wilkinson	Reviewer:	R. Leppington
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Submitter:	E. Wilkinson	R
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Reviewer: R. Leppington

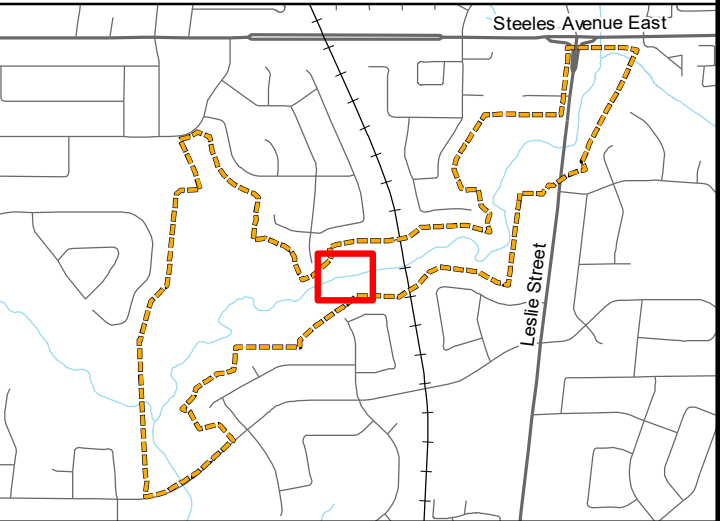
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C8p

C8p



- German Mills Creek GSMP Critical Area
- OSAP Transect
- Upstream/Downstream Extent
- Water Quality Sample
- Benthic Location**
 - Pool
 - Riffle
 - Run



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German Mills Creek GSMP

Monitoring Station 2

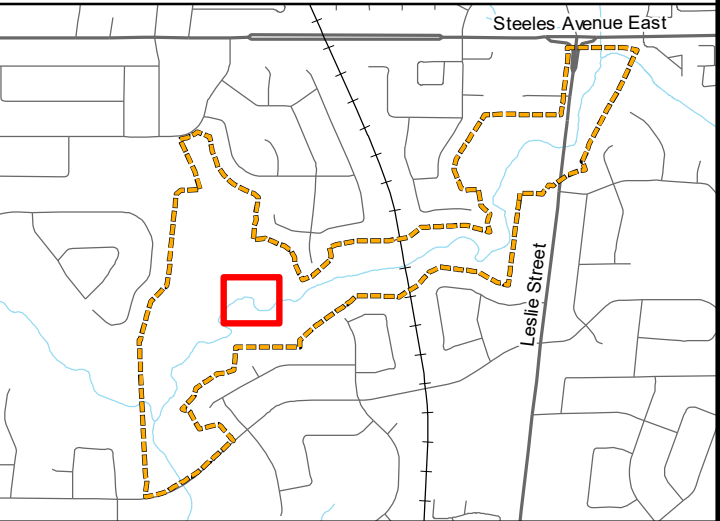
Date:	July 2022	Project:	32227	Submitter:	E. Wilkinson	Reviewer:	R. Leppington
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- German Mills Creek GSMP Critical Area
 - OSAP Transect
 - Upstream/Downstream Extent
 - Water Quality Sample
- Benthic Location**
- Pool
 - Riffle
 - Run



1:500metres
50 0 5 10
NAD27 MTM zone 10

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City of Toronto
German Mills Creek GSMP

Monitoring Station 3

Date: July 2022	Project: 32227	Submitter: E. Wilkinson	Reviewer: R. Leppington
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Figure C8r

APPENDIX C8-5

Flora

TABLE C8g Plant Species List

Scientific Name	Common Name	ESA	SARA	S-Rank	L-Rank
<i>Acer negundo</i>	manitoba maple	-	-	S5	L+?
<i>Acer platanoides</i>	norway maple	-	-	SNA	L+
<i>Acer saccharinum</i>	silver maple	-	-	S5	L4
<i>Acer saccharum</i>	sugar maple	-	-	S5	L5
<i>Ageratina altissima</i>	white snakeroot	-	-	S5	L5
<i>Alliaria petiolata</i>	garlic mustard	-	-	SNA	L+
<i>Alnus glutinosa</i>	black alder	-	-	SNA	L+
<i>Amphicarpaea bracteata</i>	american hog peanut	-	-	S5	L5
<i>Apocynum cannabinum</i>	hemp dogbane	-	-	S5	L5
<i>Arctium minus</i>	common burdock	-	-	SNA	L+
<i>Artemisia absinthium</i>	wormwood	-	-	SNA	L+
<i>Asclepias syriaca</i>	milkweed	-	-	S5	L5
<i>Clematis occidentalis</i>	Mountain Clematis	-	-	S4	LX
<i>Betula papyrifera</i>	white birch	-	-	S5	L4
<i>bromus inermis</i>	smooth brome grass	-	-	SNA	L+
<i>Cardamine impatiens</i>	narrow leaved bittercress	-	-	SNA	L+
<i>Catalpa speciosa</i>	northern catalpa	-	-	SNA	L+
<i>Cichorium intybus</i>	Wild Chicory	-	-	SNA	L+
<i>Solanum dulcamara</i>	bittersweet nightshade	-	-	SNA	L+
<i>Cirsium arvense</i>	canada thistle	-	-	SNA	L+
<i>Cornus racemosa</i>	grey dogwood	-	-	S5	L5
<i>Cornus sericea</i>	red osier dogwood	-	-	S5	L5
<i>Crataegus douglasii</i>	black hawthorn	-	-	S4?	-
<i>crataegus sp.</i>	hawthorn sp	-	-	-	-
<i>Daucus carota</i>	queen anne's lace	-	-	SNA	L+
<i>Dipsacus fullonum</i>	Wild Teasel	-	-	SNA	L+
<i>Elymus canadensis</i>	canada wild rye	-	-	S5	L4
<i>Elymus virginicus</i>	virginia wild rye	-	-	S5	L5
<i>Epilobium coloratum</i>	Purple-veined Willowherb	-	-	S5	L5
<i>Erigeron sp.</i>	fleabane sp	-	-	-	-
<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod	-	-	S5	L5
<i>Eutrochium purpureum</i>	joe pye weed	-	-	S4	L2
<i>Fagus gradifolia</i>	American Beech	-	-	S4	L4
<i>fraxinus sp</i>	ash sp	-	-	-	-
<i>Heracleum maximum</i>	cow parsnip	-	-	S5	L5
<i>Hypericum canadense</i>	Lesser St. John's-wort	-	-	S4?	L2
<i>Impatiens capensis</i>	Spotted Jewelweed	-	-	S5	L5
<i>juglans nigra</i>	black walnut	-	-	S4?	L5
<i>Juniperus virginiana</i>	eastern red cedar	-	-	S5	L5
<i>Lonicera sp</i>	honey suckle	-	-	-	-
<i>Lotus corniculatus</i>	birds foot treefoil	-	-	SNA	L+
<i>Lythrum salicaria</i>	purple loosestrife	-	-	SNA	L+
<i>Malus sp</i>	apple sp	-	-	-	-
<i>Morus alba</i>	White Mulberry	-	-	SNA	L+
<i>Ostrya virginiana</i>	Eastern Hop-hornbeam	-	-	S5	L5
<i>Oxalis stricta</i>	Upright Yellow Wood-sorrel	-	-	SNA	L5
<i>Parthenocissus quinquefolia</i>	Virginia Creeper	-	-	S4?	L5
<i>Phragmites australis ssp. australis</i>	European Reed	-	-	SNA	L+
<i>Physocarpus opulifolius</i>	Eastern Ninebark	-	-	S5	L3
<i>Picea glauca</i>	white spruce	-	-	S5	L3
<i>Picaoides pubescens</i>	downy woodpecker	-	-	S5	L5
<i>Pinus strobus</i>	Eastern White Pine	-	-	S5	L4
<i>Plantago major</i>	Common Plantain	-	-	SNA	L+
<i>Podophyllum peltatum</i>	May-apple	-	-	S5	L5
<i>Polemonium reptans</i>	Creeping Jacob's-ladder	-	-	SNA	-
<i>Polypodiopsisida sp</i>	fern sp	-	-	-	-
<i>Populus balsamifera</i>	Balsam Poplar	-	-	S5	L5
<i>Populus tremuloides</i>	Trembling Aspen	-	-	S5	L5
<i>Populus Sp</i>	popular sp	-	-	-	-
<i>Prunus serotina</i>	Black Cherry	-	-	S5	L5
<i>Prunus sp</i>	cherry sp	-	-	-	-
<i>Prunus virginiana</i>	Chokecherry	-	-	S5	L5
<i>Pyrus sp</i>	pear sp	-	-	-	-
<i>Quercus alba</i>	White Oak	-	-	S5	L3
<i>Quercus macrocarpa</i>	Bur Oak	-	-	S5	L4
<i>Rhamnus frangula</i>	glossy buckthorn	-	-	SNA	L+
<i>Rhus aromatica</i>	Fragrant Sumac	-	-	S4	L+
<i>Rhus typhina</i>	Staghorn Sumac	-	-	S5	L5
<i>Robinia pseudoacacia</i>	Black Locust	-	-	SNA	L+
<i>Rosa multiflora</i>	Multiflora Rose	-	-	SNA	L+
<i>Rubus idaeus</i>	Red Raspberry	-	-	S5	L5
<i>Rubus occidentalis</i>	Black Raspberry	-	-	S5	L5
<i>Rubus parviflorus</i>	thimble berry	-	-	S4	-
<i>salix sp</i>	willow shrub sp	-	-	-	-
<i>salix sp</i>	willow sp	-	-	-	-
<i>Sambucus canadensis</i>	Common elderberry	-	-	S5	L5
<i>Schoenoplectus tabernaemontani</i>	Soft-stemmed Bulrush	-	-	S5	L4
<i>Scirpus atrovirens</i>	Dark-green Bulrush	-	-	S5	L5
<i>Securigera varia</i>	Purple Crown-vetch	-	-	SNA	L+
<i>Solidago canadensis</i>	Canada goldenrod	-	-	S5	L5
<i>Solidago gigantea</i>	Giant goldenrod	-	-	S5	L5
<i>Syringa vulgaris</i>	Common Lilac	-	-	SNA	L+
<i>Tanacetum vulgare</i>	Common Tansy	-	-	SNA	L+
<i>Taraxacum officinale</i>	Common Dandelion	-	-	SNA	L+
<i>Thuja occidentalis</i>	Eastern White Cedar	-	-	S5	L4
<i>Tilia americana</i>	Basswood	-	-	S5	L5
<i>Typha angustifolia</i>	Narrow-leaved Cattail	-	-	SNA	L+
<i>Ulmus americana</i>	White Elm	-	-	S5	L5
<i>Urtica dioica</i>	Stinging Nettle	-	-	SNA	L5
<i>Verbascum thapsus</i>	Common Mullein	-	-	SNA	L+
<i>Viburnum opulus</i>	Cranberry Viburnum	-	-	S5	L2
<i>Vincetoxicum rossicum</i>	European Swallowwort	-	-	SNA	L+
<i>Vitis riparia</i>	Riverbank Grape	-	-	S5	L5
<i>Xanthium strumarium</i>	Rough Cocklebur	-	-	S5	L5

S-Rank	Total	L-rank	Total
S4	5	L+	29
S4?	4	L+?	1
S5	43	L2	3
SNA	31	L3	3
No Rank	11	L4	8
		L5	35
		LX	1
		No Rank	14
Grand Total (94 Plant Species)		94	94

EXPLANATION OF TERMINOLOGY

ESA Status

Endangered Species Act (ESA), 2007. Extirpated - EXP, Endangered - END, Threatened - THR, Special Concern - SC

SARA Status

Species at Risk Act (SARA), 2002. Extirpated - EXP, Endangered - END, Threatened - THR, Special Concern - SC

Provincial Status S Rank

Natural Heritage Information Centre (NHIC), 2021 Provincial status of plants, wildlife and vegetation communities database. <https://www.ontario.ca/page/natural-heritage-information-centre#section-3>. OMNR, Peterborough.

Provincial ranks are used by the NHIC to set protection priorities for rare species and natural communities. Provincial ranks are used by the NHIC to set protection priorities for rare species and natural communities. These rankings are based on the total number of extant Ontario populations and the degree to which they are potentially or actively threatened with destruction. These ranks are not legal designations. S4 and S5 species are generally uncommon to common in the province. Species ranked S1-S3 are considered to be rare in Ontario.

S1: Critically Imperiled - Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.

S2: Imperiled - Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.

S3: Vulnerable - Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4: Apparently Secure - Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5: Secure - Common, widespread, and abundant in the nation or state/province.

SH: Possibly Extirpated (Historical)—Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20–40 years

A species or community could become NH or SH without such a 20–40 year delay if the only known occurrences in a nation or state/province were destroyed or if it had been extensively and unsuccessfully looked for. The NH or SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.

SR: Reported in Ontario, but without persuasive documentation.

SX: Presumed Extirpated—Species or community is believed to be extirpated from the nation or state/province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.

SE: Exotic; not believed to be a native component of Ontario's flora. Numerical rankings after SE follow designations described above for native species.

SNA: Unranked—Status not assigned.

SU: Unranked—Nation or state/province conservation status not yet assessed.

Rank ranges, e.g. S2S3, indicate that the rank is either S2 or S3, but that current information is insufficient to differentiate.

"?" following a rank indicates uncertainty about the assigned rank.

Q: Questionable taxonomy—Taxonomic distinctiveness of this entity is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or the inclusion of this taxon in another taxon, with the resulting taxon having a lower-priority conservation status.

LOCAL STATUS RANKS - TRCA Rankings (2017)

Toronto and Region Conservation Authority (TRCA), 2017. Annual local occurrence and local rank update for 2017: terrestrial species and vegetation communities

L5: able to withstand high levels of disturbance; generally secure throughout the jurisdiction, including the urban matrix. May be of very localized concern in highly degraded areas.

L4: able to withstand some disturbance; generally secure in rural matrix; of concern in urban matrix.

L3: able to withstand minor disturbance; generally secure in natural matrix; considered to be of regional concern.

L2: unable to withstand disturbance; some criteria are very limiting factors; generally occur in high-quality natural areas, in natural matrix; probably rare in the TRCA jurisdiction; of concern regionally.

L1: unable to withstand disturbance; many criteria are limiting factors; generally occur in high-quality natural areas in natural matrix; almost certainly rare in the TRCA jurisdiction; of concern regionally.

LX: extirpated from our region with remote chance of rediscovery Presumably highly sensitive.

LH: hybrid between two native species. Usually not scored unless highly stable and behaves like a species (e.g. *Equisetum x nelsonii*).

L+: exotic. Not native to TRCA jurisdiction. Includes hybrids between a native species and an exotic.

L+?: origin uncertain or disputed, i.e. may or may not be native

pL: found in natural cover, but only as planted, not regenerating

APPENDIX C8-6 Significant Wildlife Habitat Evaluation

TABLE C8h Significant Wildlife Habitat Evaluation

Significant Wildlife Habitat Feature	Candidate Significant Wildlife Habitat Description	Presence/Absence Within Study Area
Season Concentrations of Animals		
Waterfowl Stopover and Staging Areas (Terrestrial)	Fields (CUM and CUT) with sheet water during spring	Absent: Meadow and thicket habitats are present; however, no sheet water was present during field investigations.
Waterfowl Stopover and Staging Areas (Aquatic)	Ponds, marshes, lakes, bays, coastal inlets, and watercourses with abundant food supply used during migration (includes MAS, SAS, SAM, SAF, and SWD communities).	Absent: MAS, SWD, MAM present but limited in area.
Shorebird Migratory Stopover Area	Shorelines of lakes, rivers and wetlands that are seasonally flooded, muddy, and have an unvegetated shoreline (includes BBO, BBS, SDO, SDS, SDT, and MAM communities)	Absent: This habitat is not present in the study area.
Raptor Wintering Area	Requires a combination of upland (CUM/CUT/CUS/CUW) and forested area (FOD/FOM/FOC) with a combined area of >20 ha. Fields must be wind swept with limited snow accumulation.	Potential: Combination of upland and forested area present but limited in size.
Bat Hibernacula	Hibernacula can be found in caves, mine shafts, and karts (includes CCR1, CCR2, CCA1, CCA2 communities).	Absent: This habitat is not present within the study area.
Bat Maternity Colonies	Maternity colonies are found in mature deciduous (FOD/SWD) or mixed (FOM/SWM) forest communities with >10/ha large diameter snag trees. Trees in early stage of decay (class 1-3) are preferred by female bats.	Potential: FOD and SWD communities are present within the study area however an additional survey is required to determine the number of snags per ha at each applicable site.
Turtle Wintering Areas	Permanent waterbodies, large wetlands, and bogs or fens with soft substrate that are deep enough to not freeze over the winter. Wintering areas are in the same general area as their core habitat. Includes SW, MA, OA, SA, FEO and BOO communities.	Absent: Water bodies deep enough not to freeze over winter are not present.
Reptile Hibernaculum	Hibernation occurs in sites located below the frost line in burrows, rock crevices in any ecosite other than very wet ones. Additionally, conifer or shrub swamps (or depressions in bedrock terrain with sparse trees) may be used as reptile hibernaculum.	Absent: This habitat is not present within the study area.
Colonially - Nesting Bird Breeding Habitat (Bank/Cliff)	Any site with undisturbed or naturally eroding exposed soil banks including watercourse banks, sandy hills, steep slopes, sand piles, cliff faces, bridge abutments, silos and barns found within CUM, CUT, CUS, BLO, BLS, BLT, CLO, CLS, and CLT communities.	Absent: The study area did not contain naturally eroding banks, and no colonial species were noted within the study area.
Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)	Nest in live or dead standing trees in wetlands, lakes, islands, and peninsulas that are 11-15 m from the ground (including SWM, SWD and FET communities).	Absent: This habitat is not present within the study area.
Colonially - Nesting Bird Breeding Habitat (Ground)	Any rocky island or peninsula within a lake or large river.	Absent: This habitat is not present within the study area.
Migratory Butterfly Stopover Area	Requires a combination of fields (CUM/CUT/CUS) and forested area (FOD/FOM/FOC/CUP) that is a minimum of 10 ha and is located within 5 km of Lake Erie or Lake Ontario.	Absent: This habitat is not present within the study area.

Significant Wildlife Habitat Feature	Candidate Significant Wildlife Habitat Description	Presence/Absence Within Study Area
Landbird Migratory Stopover Areas	All ecosites associated with these community series; FOC, FOM, FOD, SWC, SWM, SWD that are >5 ha in size and are within 5 km of Lake Erie or Lake Ontario.	Absent: This habitat is not present within the study area.
Deer Winter Congregation Areas	Woodlots (FOC/FOM/FOD/SWC/SWM/SWD) >50 ha in size. However, deer winter congregation areas considered significant are mapped by the Ministry of Natural Resources and Forestry.	Absent: No mapped Deer Winter Congregation Areas within the study area.
Rare Vegetation Communities		
Cliff and Talus Slopes	A cliff is vertical to near vertical bedrock >3 m in height. A talus slope is rock rubble at the base of a cliff made up of coarse rocky debris. Any Ecological Land Classification (ELC) ecosite within community series TAO, TAS, TAT, CLO, CLS, and CLT.	Absent: This habitat is not present within the study area.
Sand Barren	Areas of exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion greater than 0.5 ha in size. Usually located within other types of natural habitat such as forests or savannah.	Absent: This habitat is not present within the study area.
Alvar	Typically, a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. Must be >0.5 ha in size.	Absent: This habitat is not present within the study area.
Old Growth Forest	Characterized by heavy mortality or turnover of over-storey trees resulting in a mosaic of gaps that encourage development of multilayered canopy. Woodland area is >0.5 ha and contains no recognizable forestry activities.	Absent: This habitat is not present within the study area.
Savannah	A tallgrass prairie that has a tree cover between 25% to 60%. No minimum size required.	Absent: This habitat is not present within the study area.
Tall Grass Prairie	A tallgrass prairie that has ground cover dominated by prairie grasses and has a tree cover of <25%.	Absent: This habitat is not present within the study area.
Other Rare Vegetation Communities	Provincially Rare S1, S2, and S3 vegetation communities as listed in Appendix M of the Significant Wildlife Habitat Technical Guide.	Present: Vegetation Community FOD7-4 present.
Specialized Habitat for Wildlife		
Waterfowl Nesting Area	Upland habitat that is adjacent, and within 120 m, to a wetland (includes ecosites MAS, SAS, SAM, SAF, MAM, SWT, and SWD). Adjacent area should be 120 m wide, so predators have difficulty finding nests.	Absent: ELC codes are present however areas are not greater than 120 m wide.
Bald Eagle and Osprey Nesting/Foraging/Perching	Nesting occurs within forested areas adjacent to lakes, ponds, rivers or wetlands. This includes FOD, FOM, FOC, SWD, SWM, and SWC directly adjacent to riparian areas.	Potential: The woodland communities at the site are directly adjacent to riparian areas. No stick nests, bald eagles or osprey observed during surveys.
Woodland Raptor Nesting Habitat	Nesting occurs in any forested ecosite that are greater than 30 ha with greater than 4 ha of interior habitat.	Absent: This habitat is not present within the study area.
Turtle Nesting Areas	Area of exposed mineral soil and gravel adjacent (<100 m) from water, including ecosites MAS, SAS, SAM, SAF, BOO, and FEO.	Absent: This habitat is not present within the study area.

Significant Wildlife Habitat Feature	Candidate Significant Wildlife Habitat Description	Presence/Absence Within Study Area
Seeps and Springs	Any forested area (with <25% meadow/field/pasture) within the headwaters of a watercourse. Seeps and Springs are identified as areas where ground water comes to the surface.	Absent: This habitat is not present within the study area.
Amphibian Breeding Habitat (Woodland)	Presence of a wetland, pond, or woodland pools >500 m ² within or 120 m adjacent to a woodland (no minimum size). This includes all ecosites associated with FOD, FOM, FOC, SWC, SWM, SWD communities.	Potential: FOD, FOM, FOC, and SWD communities are present within 120 m of a wetland or woodland pool.
Amphibian Breeding Habitat (Wetland)	Wetland >500 m ² that are typically isolated from (>120 m) from woodland ecosites. Presence of shrubs and logs increase significance. This includes SW, MA, FE, BO, OA, and SA communities.	Absent: This habitat is not present within the study area.
Woodland Area Sensitive Bird Breeding Habitat	Habitats where interior forest breeding birds are breeding. Typically occurs in large mature trees (>60 years old) in forest stands or woodlots >30 ha. Interior habitat is at least 200 m from the forest edge.	Absent: This habitat is not present within the study area.
Habitat for Species of Conservation Concern (SCC)		
Marsh Bird Breeding Habitat	All wetland habitat (i.e., MA, SAS, SAM SAF, SW FEO, BOO communities) with shallow water and emergent aquatic vegetation is considered SWH.	Potential: Wetland habitat with shallow water and emergent aquatic vegetation is present.
Open Country Bird Breeding Habitat	Large grassland areas (includes natural and cultural fields and meadows) that are >30 ha. (Active farmland does not qualify).	Absent: This habitat is not present within the study area.
Shrub/Early Successional Bird Breeding Habitat	Large field areas (i.e., CUT, CUS and CUW communities) succeeding to shrub and thicket that are >10 ha in size.	Absent: There are thicket communities, however they do not meet the size criteria.
Terrestrial Crayfish	Wet meadows and edges of shallow marshes, includes MAM, MAS, SWT, SWD, and SWM communities.	Potential: MAM, MAS, and SWD habitat communities present.
Rare Plant Species	All Special Concern and Provincially Rare (S1 to S3 ranked) plant species.	Absent: This habitat is not present within the study area.
Rare Wildlife Species	All Special Concern and Provincially Rare animal species.	Present: - Eastern Wood-Pewee (confirmed) As per the background review there is the potential for the following species: <ul style="list-style-type: none"> - Monarch Butterflies - Northern Map Turtle - Snapping Turtle
Animal Movement Corridor		
Amphibian Movement Corridor	Movement corridors may be found in all ecosites associated with water that link significant breeding habitat.	Potential: Ecosites associated with water are present but significant breeding habitat is unconfirmed.
Migratory Bat Stopover Area	No specific ELC types. However, the only stop over area present is located near Long Point.	Absent: This habitat is not present within the study area.

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APPENDIX C8-7
Species at Risk and Species of
Conservation Concern Evaluations

TABLE C8i Species at Risk and Species of Conservation Concern Habitat Screening

Endangered and Threatened Species					
Species	Source	Status	Habitat Description	Habitat Present on Site	Likelihood of Occurrence and Rationale
Plants					
Butternut <i>Juglans cinerea</i>	Matrix site visit (2021)	COSEWIC - Endangered SARA - Endangered SARO - Endangered S-Rank - S2?	"usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams. It is also found on well-drained gravel sites and rarely on dry rocky soil.This species does not do well in the shade, and often grows in sunny openings and near forest edges." (MECP 2021g).	Potential: Suitable habitat is present throughout study site.	Potential: Suitable habitat is present throughout study site.
Fish					
Redside Dace <i>Clinostomus elongatus</i>	NHIC (2021), MECP (2021i)	COSEWIC - Endangered SARA - Endangered SARO - Endangered S-Rank - S1	"Pools and slow-moving areas of small streams and headwaters with a gravel bottom. They are generally found in areas with overhanging grasses and shrubs. During spawning, they can be found in shallow parts of streams." (MECP 2021i)	Present: Pools and slow moving areas in streams with gravel bottoms are present in waterway.	Potential: Suitable habitat is present on site however sightings within the waterway remains unconfirmed.
Reptiles					
Blanding’s Turtle <i>Emydoidea blandingii</i>	NHIC (2021), MECP (2021c)	COSEWIC - Endangered SARA - Threatened SARO - Threatened S-Rank - S3	"Live in shallow water, usually in large wetlands and shallow lakes with lots of water plants. Can be found hundreds of meters from nearest water bodies and they like to forage in open woodlands, in sandy areas, along shores of lakes, and islands. They hibernate in the mud at the bottom of permanent water bodies from late October until the end of April." (MECP 2021c)	Unlikely: Shallow water is present however the wetlands present are small. Banks along waterway are steep making access to wetland and open woodlands difficult.	Unlikely: Habitat present is unlikely to be suitable.
Birds					
Bank Swallow <i>Riparia riparia</i>	OBBA (2021), MECP (2021a)	COSEWIC - Threatened SARA - Threatened SARO - Threatened S-Rank - S4B	"Bank swallows nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits. Many nests are on banks of rivers and lakes, but they are also found in active sand and gravel pits or former ones where the banks remain suitable." (MECP 2021a)	Present: Vertical faces in silt and sand deposits are present along the river banks.	Potential: Suitable habitat is present on site however sightings within the study area remains unconfirmed.
Barn Swallow <i>Hirundo rustica</i>	OBBA (2021), MECP (2021b)	COSEWIC - Threatened SARA - Threatened SARO - Threatened S-Rank - S5B	"Build their cup-shaped mud nests almost exclusively on human-made structures such as open barns, under bridges and in culverts. When building nests they are attracted to open structures with ledges and have a preference for unpainted, rough-cut wood surfaces." (MECP 2021b)	Present: Bridges and culverts are present near the waterway.	Potential: Suitable habitat is present on site however sightings within the study area remains unconfirmed.
Bobolink <i>Dolichonyx oryzivorus</i>	OBBA (2021), MECP (2021o)	COSEWIC - Threatened SARA -Threatened SARO - Threatened S-Rank - S4B	"large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields; marshes; requires tracts of grassland >50 ha" (MECP 2021o)	Absent: Meadows and marshes are present but are not greater than 50 ha.	Unlikely: Habitat is not present.

Species	Source	Status	Habitat Description	Habitat Present on Site	Likelihood of Occurrence and Rationale
Chimney Swift <i>Chaetura pelagica</i>	OBBA (2021), Government of Canada (2021)	COSEWIC - Threatened SARA - Threatened ESA - Threatened S-Rank- S4B,S4N	"Flocks can often be seen near bodies of water due to the abundance of insects. Prior to the arrival of European settlers in North America, Chimney Swifts nested mainly in the trunks of large, hollow trees, and occasionally on cave walls or in rocky crevices. However, due to the land clearing associated with colonization, hollow trees became increasingly rare, which led Chimney Swifts to move into house chimneys. Today, the species is mainly associated with urban and rural areas where the birds can find chimneys to use as nesting and resting sites. However, it is likely that a small portion of the population continues to use hollow trees." (Government of Canada 2021)	Present: Tree hollows are present in the wooded areas of the study site. Chimneys are also present outside of the study site in the surrounding residential areas.	Potential: Habitat is suitable, especially in areas adjacent to the study area.
Common Nighthawk <i>Chordeiles minor</i>	OBBA (2021), MECP (2021d)	COSEWIC - Special Concern SARA - Threatened SARO - Special Concern S-Rank - S4B	"open ground; clearings in dense forests; ploughed fields; gravel beaches or barren areas with rocky soils; open woodlands; flat gravel roofs" (MECP 2021d)	Unlikely: open areas are present but not in abundance.	Unlikely: Habitat presence is unlikely to support the species.
Eastern Meadowlark <i>Sturnella magna</i>	NHIC (2021), MECP (2021e)	COSEWIC - Threatened SARA -Threatened SARO - Threatened S-Rank - S4B	"Breed primarily in moderately tall grasslands, such as pastures and hayfields, but are also found in alfalfa fields, weedy borders of croplands, roadsides, orchards, airports, shrubby overgrown fields, or other open areas. Small trees, shrubs or fence posts are used as elevated song perches." (MECP 2021e)	Unlikely: Small open areas are present along the waterway but not in abundance.	Unlikely: Habitat presence is unlikely to support the species.
Wood Thrush <i>Hylocichla mustelina</i>	OBBA (2021), MECP (2021k)	COSEWIC - Threatened SARA - Threatened SARO - Special Concern S-Rank - S4B	"Carolinian and Great Lakes-St. Lawrence forest zones; undisturbed moist mature deciduous or mixed forest with deciduous sapling growth; near pond or swamp; hardwood forest edges; must have some trees higher than 12 m" (MECP 2021k).	Unlikely: Area is frequently disturbed by human activity.	Unlikely: Due to frequent disturbances by human activity.
Mammals					
Little Brown Myotis <i>Myotis lucifugus</i>	MECP (2021l)	COSEWIC - Endangered SARA - Endangered SARO - Endangered S Rank-S3	"hibernates during winter in mines or caves; during summer males roost alone and females form maternity colonies of up to 60 adults; roosts in houses, manmade structures but prefers hollow trees or under loose bark; hunts within forests, below canopy" (MECP 2021l)	Present: Suitable habitat is present throughout study site.	Potential: Suitable habitat is present throughout study site.
Northern Myotis <i>Myotis septentrionalis</i>	(MECP 2021l)	COSEWIC - Endangered SARA - Endangered SARO - Endangered S-Rank - S3	"hibernates during winter in mines or caves; during summer males roost alone and females form maternity colonies of up to 60 adults; roosts in houses, manmade structures but prefers hollow trees or under loose bark; hunts within forests, below canopy" (MECP 2021n)	Present: Suitable habitat is present throughout study site.	Potential: Suitable habitat is present throughout study site.
Eastern Small-footed Myotis <i>Myotis leibii</i>	MECP (2021l)	COSEWIC - Endangered SARA - Not Ranked SARO - Endangered S-Rank - S2	"hibernates during winter in mines or caves; during summer males roost alone and females form maternity colonies of up to 60 adults; roosts in houses, manmade structures but prefers hollow trees or under loose bark; hunts within forests, below canopy" (MECP 2021j)	Present: Suitable habitat is present throughout study site.	Potential: Suitable habitat is present throughout study site.

Species	Source	Status	Habitat Description	Habitat Present on Site	Likelihood of Occurrence and Rationale
Tricolored Bat <i>Perimyotis subflavus</i>	MECP (2021l)	COSEWIC - Endangered SARA - Endangered SARO - Endangered S-Rank - S3	"During the summer, the Tri-colored Bat is found in a variety of forested habitats. It forms day roosts and maternity colonies in older forest and occasionally in barns or other structures. They forage over water and along streams in the forest. Tri-colored Bats eat flying insects and spiders gleaned from webs. At the end of the summer they travel to a location where they swarm; it is generally near the cave or underground location where they will overwinter. They overwinter in caves where they typically roost by themselves rather than part of a group." (MNRF 2020)	Present: Suitable habitat is present throughout study site.	Potential: Suitable habitat is present throughout study site.
Special Concern Species					
Insects					
Monarch <i>Danaus plexippus</i>	OBA (2021), ECCC (2016)	COSEWIC - Endangered SARA - Special Concern SARO - Special Concern S-Rank - S2N, S4B	Breeding habitat is confined to where milkweed grows, since the leaves of these plants are the sole food of the caterpillars. Different species of milkweed grow in a variety of environments, including meadows, along roadsides and in ditches, open wetlands, dry sandy areas, short and tall grass prairies, river banks, irrigation ditches, arid valleys and south facing hillsides. Nectaring habitat ranges from native grasslands to home gardens with adult butterflies nectaring on a wide variety of flowers including Goldenrods, Asters and Milkweeds. (ECCC 2016)	Present: Milkweed is present in limited quantities throughout the study site. Flowers such as goldenrod, aster, and milkweed are also present.	Present: Breeding habitat and nectaring habitat is present. Species was observed on site.
Reptiles					
Northern Map Turtle <i>Graptemys geographica</i>	ORAA (2021), MECP (2021g)	COSEWIC - Special Concern SARA - Special Concern SARO - Special Concern S-Rank - S3	"Inhabits rivers and lakeshores where it basks on emergent rocks and fallen trees throughout the spring and summer. In winter, the turtles hibernate on the bottom of deep, slow-moving sections of river. They require high-quality water that supports the female’s mollusc prey. Their habitat must contain suitable basking sites, such as rocks and deadheads, with an unobstructed view from which a turtle can drop immediately into the water if startled." (MECP 2021g)	Present: Suitable habitat is present in wetted area.	Potential: Suitable habitat is present in wetted area.
Snapping Turtle <i>Chelydra serpentina</i>	ORAA (2021), MECP (2021j).	COSEWIC - Special Concern SARA - Special Concern SARO - Special Concern S-Rank - S4	“Permanent, semi-permanent fresh water; marshes, swamps or bogs; rivers and streams with soft muddy banks or bottoms; often uses soft soil or clean dry sand on south-facing slopes for nest sites; may nest at some distance from water; often hibernate together in groups in mud under water; home range size ~28 ha” (MECP 2021j).	Present: Suitable habitat is present in wetted area.	Potential: Suitable habitat is present in wetted area.
Birds					
Eastern Wood-Pewee <i>Contopus virens</i>	OBBA (2021), MECP (2021f)	COSEWIC - Special Concern SARA - Special Concern SARO - Special Concern S-Rank - S4B	“Open, deciduous, mixed or coniferous forest; predominated by oak with little understory; forest clearings, edges; farm woodlots, parks” (MECP 2021f).	Present: Suitable habitat is present throughout wooded area.	Present: Vocalizations observed during fieldwork and suitable habitat is present.

Species	Source	Status	Habitat Description	Habitat Present on Site	Likelihood of Occurrence and Rationale
Peregrine Falcon <i>Falco peregrinus</i>	OBBA (2021), MECP (2021h)	COSEWIC - Special Concern SARA - Special Concern SARO - Special Concern S-Rank - S4B	"Nest on tall, steep cliff ledges close to large bodies of water. Although most people associate Peregrine Falcons with rugged wilderness, some of these birds have adapted well to city life. Urban peregrines raise their young on ledges of tall buildings, even in busy downtown areas." (MECP 2021h)	Absent: Steep cliffs/tall buildings and large water bodies are not present in study area.	Unlikely: Suitable habitat is absent.

Notes:

Please note that only endangered and threatened species are provided protection under Sections 9 and 10 of the *Endangered Species Act* , but special concern species have been included at the request of the Ministry of the Environment, Conservation and Parks and to provide a comprehensive review so that impact

Orange highlight indicates the species is considered as a potential record for the Area of Investigation for the project.

COSEWIC - Committee on the Status of Endangered Wildlife in Canada

SARA - *Species at Risk Act*

SARO - Species at Risk in Ontario

ESA - *Endangered Species Act*

AOI - Area of Invesitgation

MECP - Ministry of the Environment, Conservation and Parks

LSRCA - Lake Simcoe Region Conservation Authority

MMM - MM Group Ltd.

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APPENDIX C8-8

Bethnics

[illegible][illegible]

TABLE C8j Bethnic Macroinvertebrates Collected from German Mills Creek 2021 (densities express

	Station 1			Station 2			Station 3		
	101	102	103	201	202	203	301	302	303
	pool	riffle	run	riffle	run	pool	pool	riffle	run
BEETLES									
O. Coleoptera									
F. Elmidae									
<i>Dubiraphia</i> larvae	-	8	-	-	-	-	-	-	-
<i>Optioservus</i> larvae	-	8	-	-	-	-	-	-	-
<i>Stenelmis crenata</i>	-	24	-	8	-	-	-	8	-
<i>Stenelmis</i> larvae	1	128	8	56	-	-	-	32	1
MAYFLIES									
O. Ephemeroptera									
F. Baetidae									
<i>Baetis flavistriga</i>	-	16	2	16	-	-	-	4	-
O. Megaloptera									
ALDERFLIES									
F. Sialidae									
<i>Sialis</i>	-	8	-	-	-	-	-	-	-
O. Odonata									
DAMSELFLIES									
F. Coenagrionidae									
<i>Nehalennia</i>	-	-	-	-	1	-	-	-	-
immature	-	-	4	-	-	1	-	4	-
DRAGONFLIES									
F. Aeshnidae									
<i>Boyeria</i>	-	-	-	1	-	-	-	-	-
CADDISFLIES									
O. Trichoptera									
F. Hydropsychidae									
<i>Cheumatopsyche</i>	1	392	40	304	2	-	-	140	1
<i>Hydropsyche betteni</i>	-	80	2	136	-	1	-	24	-
<i>Hydropsyche bronta</i>	-	496	44	192	2	1	-	204	5
<i>Hydropsyche slossonae</i>	-	128	4	40	-	-	-	40	-
<i>Hydropsyche sparna</i>	-	40	-	32	-	-	-	-	-
<i>Hydropsyche</i> immature	-	200	12	96	-	1	-	84	-
pupae	-	32	-	-	-	-	-	-	-
immature	-	-	-	16	-	-	-	-	-
F. Hydroptilidae									
<i>Hydroptila</i>	-	16	-	24	-	-	-	8	-
pupae	-	16	-	-	-	-	-	4	-
TRUE FLIES									
O. Diptera									
BITING-MIDGE									
F. Ceratopogonidae									
<i>Atrichopogon</i>	-	-	-	-	-	-	-	4	-
MIDGES									
F. Chironomidae									
chironomid pupae	3	120	8	64	1	-	-	24	4
S.F. Chironominae									
<i>Chironomus</i>	2	-	2	-	2	3	4	4	6
<i>Cryptochironomus</i>	-	8	4	-	2	-	1	-	-
<i>Dicrotendipes</i>	-	-	4	8	1	-	-	16	6
<i>Micropsectra</i>	-	8	-	-	-	-	-	24	-

TABLE C8j Bethnic Macroinvertebrates Collected from German Mills Creek 2021 (densities express

	Station 1			Station 2			Station 3		
	101	102	103	201	202	203	301	302	303
	pool	riffle	run	riffle	run	pool	pool	riffle	run
<i>Microtendipes</i>	-	16	-	-	-	-	-	-	-
<i>Paratanytarsus</i>	1	48	14	120	13	3	1	68	6
<i>Phaenopsectra</i>	5	8	4	-	3	3	9	4	-
<i>Polypedilum flavum</i>	-	16	6	40	-	1	-	24	-
<i>Polypedilum scalaenum</i>	-	-	2	-	6	1	-	4	2
<i>Rheotanytarsus</i>	-	-	-	-	-	-	-	44	2
<i>Stictochironomus</i>	2	8	12	-	14	-	3	4	7
<i>Tanytarsus</i>	1	16	12	56	3	2	-	24	4
S.F. Diamesinae									
<i>Pagastia</i>	-	-	-	-	-	-	-	4	-
S.F. Orthocladiinae									
<i>Brillia</i>	-	-	-	8	1	-	-	-	-
<i>Corynoneura</i>	-	-	-	8	-	-	-	-	-
<i>Cricotopus</i>	2	72	2	144	-	-	1	100	-
<i>Cricotopus bicinctus</i>	-	184	20	80	1	-	-	96	4
<i>Cricotopus trifascia</i>	-	32	-	64	1	-	-	-	-
<i>Cricotopus/Orthocladius</i>	-	104	16	128	4	-	-	108	-
<i>Eukiefferiella devonica</i> group	-	8	2	16	-	-	-	8	-
<i>Eukiefferiella</i>	-	-	-	16	-	-	-	4	-
<i>Parakiefferiella</i>	-	24	-	-	-	-	-	16	-
<i>Parametriocnemus</i>	-	80	4	112	-	-	-	20	-
<i>Thienemanniella</i>	-	-	-	-	-	-	-	4	-
indeterminate	-	-	-	-	-	-	-	4	-
S.F. Tanypodinae									
<i>Ablabesmyia</i>	-	-	-	-	-	-	1	-	-
<i>Macropelopia</i>	-	-	-	-	1	-	-	-	-
<i>Natarsia</i>	-	8	-	-	-	-	-	-	-
<i>Thienemannimyia</i> complex	-	8	14	8	-	-	-	28	-
F. Dolichopodidae	-	-	-	-	-	-	-	-	1
F. Empididae									
<i>Hemerodromia</i>	-	48	6	32	-	-	-	4	-
F. Simuliidae	-	8	-	-	-	-	-	-	-
F. Tipulidae									
<i>Antocha</i>	-	16	2	-	-	-	-	-	-
<i>Tipula</i>	-	1	-	2	-	-	-	-	-
MOLLUSCS									
P. Mollusca									
SNAILS									
Cl. Gastropoda									
F. Physidae									
<i>Physella</i>	2	-	6	8	2	-	1	-	-
CLAMS									
Cl. Bivalvia									
F. Sphaeriidae									
<i>Pisidium</i>	1	-	-	-	-	-	-	4	-
Total Number of Organisms	42	####	566	####	152	36	36	####	103
Total Number if Taxa ⁽¹⁾	14	42	34	34	23	14	12	41	19

Notes:

(1) Bold entries excluded from taxa count