232 Donald B. Munro Drive

Headwater Drainage Feature Assessment

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1.0 INTRODUCTION

Tartan Homes, here after referred to as the proponent, is proposing to develop their property at 232 Donald B. Munro Drive. This site is located on the north side of Donald Munro Drive across from Meadowridge Circle (Figure 1 and 2). It is part of Lot 17 in Concession 2 in the former Township of West Carleton. Bowfin Environmental Consulting (Bowfin) has been retained to provide the Headwater Drainage Feature Assessment Report.

2.0 METHODOLOGY

The following is the Headwater Drainage Feature Assessment Report involves the evaluation of the site's headwater drainage features based on the guidelines outlined in the *Evaluation, Classification and Management of Headwater Drainage Features Guidelines* (here after referred to as the Guidelines) (prepared by Credit Valley Conservation Authority and Toronto and Region Conservation, revised July 2014). The Guideline is divided into three parts.

- Part 1 - Evaluation and various suggested study designs/methods
- Part 2 - Classification of features
- Part 3 - Management Recommendations.

As per the definition of the catchment area for a headwater in this guideline and the relevant *Ontario Stream Assessment Protocol* (OSAP) the catchment must be at least 2.5 ha and less than 1000 ha (or <10 km^2).

The evaluation of the features requires the collection of various data: habitat descriptions, fish community sampling and amphibian surveys. The methodologies for these are described below in Section 2. A brief outline of the habitats is provided in Section 3. The detailed descriptions of stations and fish community sampling results are in Appendix A.

The field work included habitat assessment, fish community sampling, amphibian surveys and headwater assessments completed from April to September 2021.

Figure 1: General Location of Site

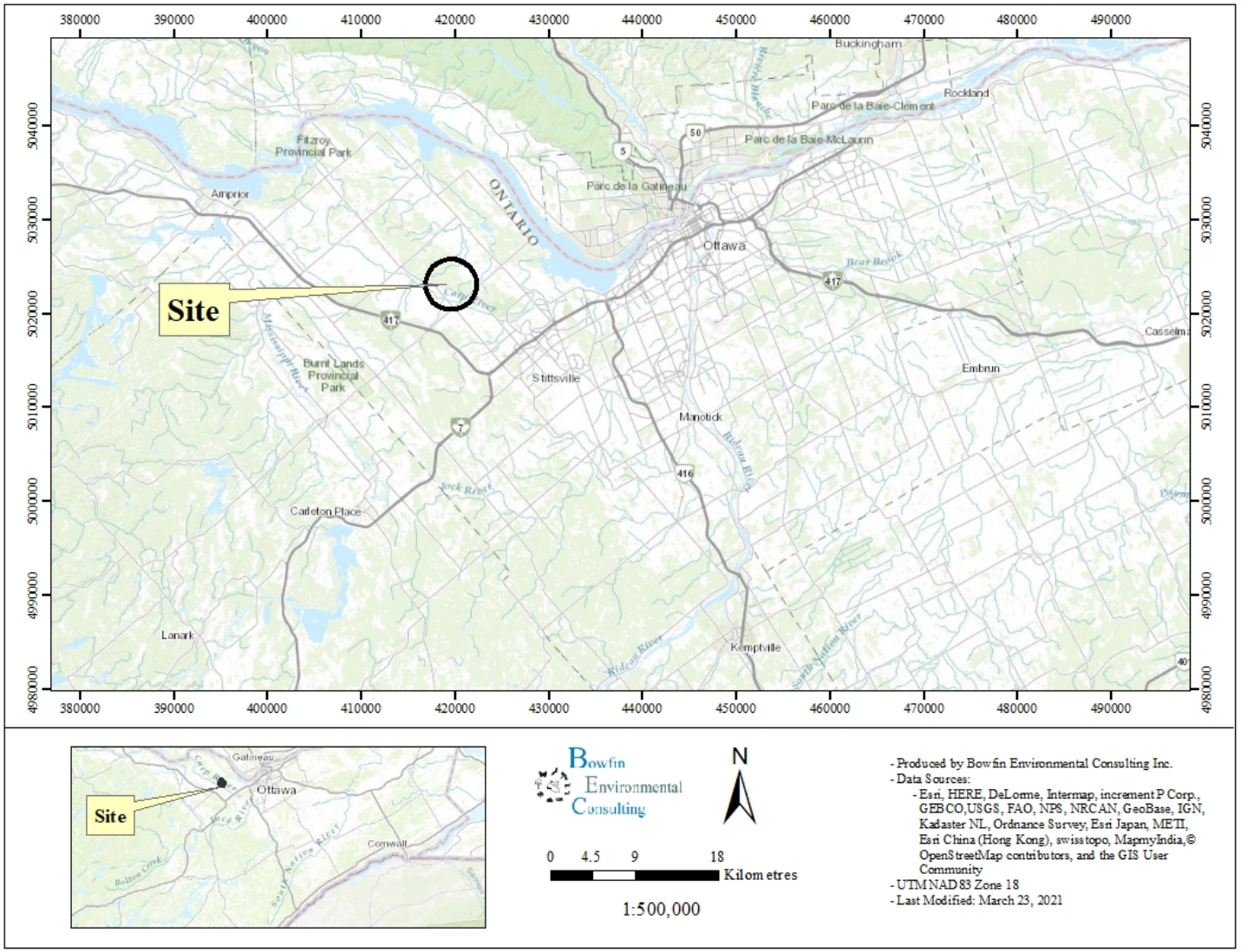
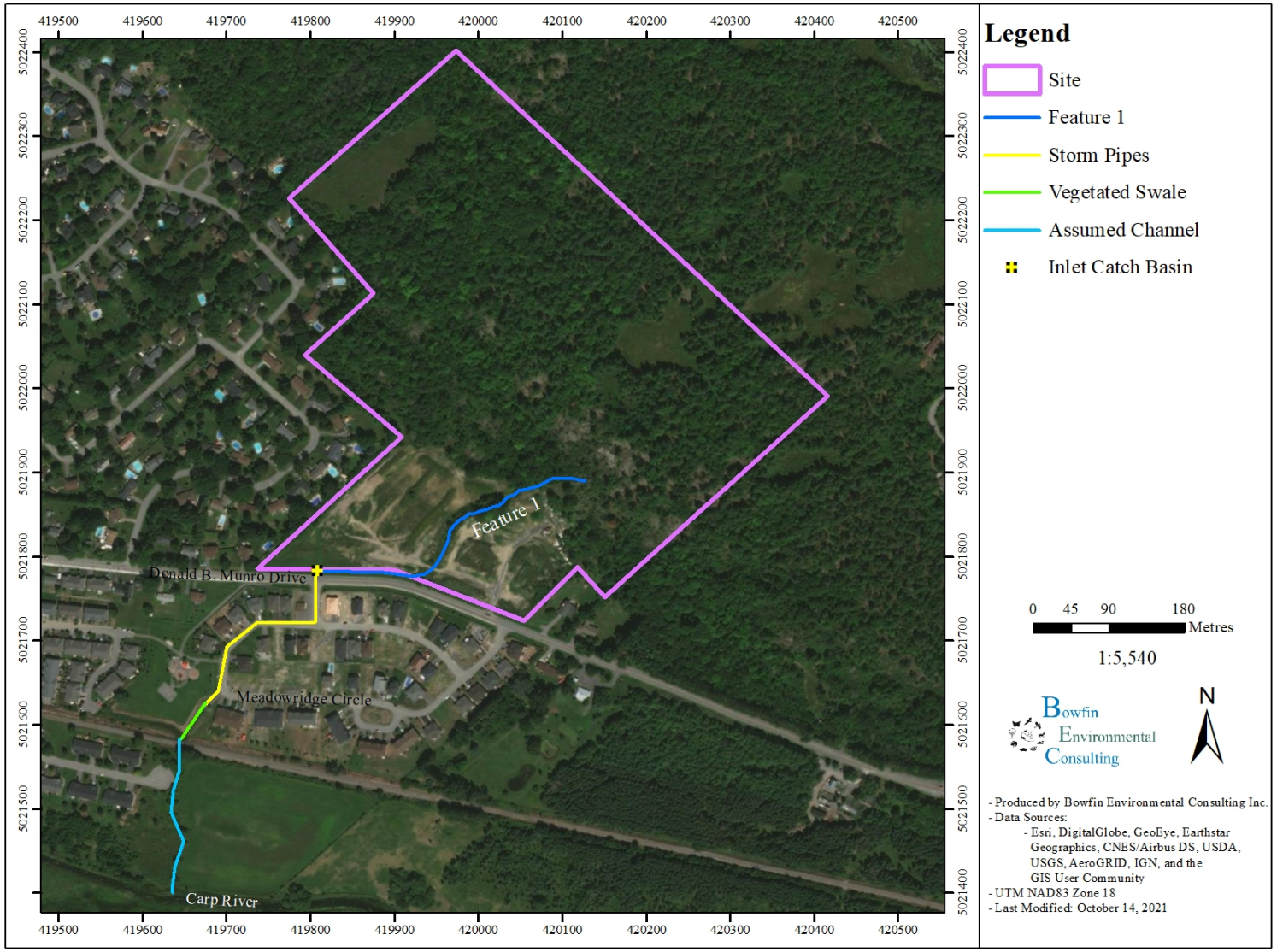


Figure 2: Location of Features and Watercourses.



2.1 Habitat Description

The features within the study area were described based on the MTO *Environmental Guide for Fish and Fish Habitat October* (2006) and the *Ontario Stream Assessment Protocol* (2013). The channel morphology was described using evenly spaced transects upon which data was recorded from evenly spaced observation points. The data collected included: channel width, wetted width, bankfull depth, water depth, substrate size, morphological units, and in-stream cover. These results are provided in the Appendix A**.**

2.2 Fish Community Sampling

A inlet catch basin is present on the downstream end (at Donald B. Munro Drive) and was anticipated to be a full barrier to fish. Fish community sampling was performed on the feature within the subject lands to confirm the lack of fish habitat. The sampling took place on March 30, 2021. Where feasible, a backpack electrofisher (Smith Root LR-24) was used. Additional sampling with only dip nets was also completed. Any fish captured would be identified, counted, measured (fork lengths (FL)), and released. The transect length, approximate width, volts, current and effort were also recorded.

2.3 Amphibian Surveys

Nighttime amphibian calling surveys were completed as per the *Environment Canada Marsh Monitoring Program* (MMP) guide. The protocol is summarized below:

- The surveys were completed 3 times during the spring, early summer, and during late summer (once during three survey periods to collect data on all species).
- Observations began 30 minutes after sunset and end before midnight.
- Each station was surveyed for 3 minutes during which time the species and the calling code were recorded for each of the following distances: 0-50m, 50-100m, and >100m. Additional notes were taken on whether amphibians were in the feature being assessed. The calling codes were recorded as one of:
    - Code 1: Calls not simultaneous, number of individuals can be accurately counted
    - Code 2: Some calls simultaneous, number of individuals can be reliably estimated
    - Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated
- Surveys were only conducted if the wind strength was Code 0, 1, 2 or 3 on the Beaufort Wind Scale.
- The MMP protocol calls for the stations to be separated by at least 500 m however, in this instance, the stations were positioned to capture the amphibian data on the drainage features.

All surveys include the recording of the following information:

- Date
- Name of observer(s) conducting field work
- Time (start and end time, duration)
- Weather conditions (temperature, % cloud cover, wind)
- GPS location
- Species presence and abundance information

3.0 RESULTS

3.1 Site Investigations

3.1.1 Habitat and Fish Community Descriptions

A single feature was identified in the study area for this site however it is noted that it flows into the City of Ottawa's stormwater system at Donald B. Munro Drive. Based on the information on geoOttawa, it would appear that the flow is piped, for roughly 300 m, along Farmridge Avenue and Meadowridge Circle and outlets via a vegetated swale in the southwest corner of Meadowridge Circle. Prior to being released, the flow is treated with an oil and grit separator. After the vegetated swale, the flow passes through a culvert under the railroad and then a channel for another 200 m before reaching the Carp River. Since the project is situated upstream of the City's stormwater infrastructure, this limits its ecological value, and the inlet catch basin prevents fish access to the site. The feature (labelled herein as Feature 1) is 320 m in length and runs from the northeast to southwest and then veers west following Donald B. Munro Drive until it enters the inlet catch basin. The sampling stations, descriptions and photographs are in Appendix A, but representative photographs are provided below.

Photo 1: Feature 1, looking upstream at the northeast end of site (March 30, 2021)

Photo 2: Feature 1, center of feature on site, during summer showing iron staining, evidence of groundwater upwelling (May 17, 2021)

Photo 3: Feature 1, looking downstream next to Donald B. Munro Drive (March 30, 2021)

Photo 4: Looking upstream by inlet catch basin (March 30, 2021)

Photo 5: Feature 1, looking downstream from Meadowridge Circle (September 9, 2021)

3.1.2 Summary of Visits and Sampling Site Locations

Several visits were completed between April and September 2021. These included: flow visits, fish community sampling, fish habitat assessments, and amphibian surveys. Environmental conditions and the primary purpose for each visit are described in Table 1 below.

Table 1: Summary of Dates, Times of Site Investigations

Date	Time (h)	Staff	Air Temperature (Min-Max)°C	Cloud Cover (%) Beaufort Wind Scale [Descriptor (scale)]	Rainfall 7 days prior to site visit (mm)	Purpose
March 30, 2021	1030-1315	M. Lavictoire S. Lafrance A. Quinsey	6.0 (-2.3-17.8)	Clear skies Wind: light breezes (2)	52.2	- Fish Community Sampling - Flow visit #1
April 7, 2021	2045-2115	S. Lafrance A. Quinsey	14.0 (0.5-18.8)	Clear skies Wind: light air (1)	n/a	- Amphibian Survey #1
April 27, 2021	1515-1545	A. Quinsey	10.0 (0.4-15.0)	Mostly Cloudy Wind: light breeze (2)	11.1	- Flow visit #2
May 31, 2021	1945-2130	A. Quinsey J. Malcolm	19.0 (5.0-23.9)	Clear skies Wind: light breeze (2)	n/a	- Amphibian Survey #2 - Fish Habitat

Date	Time (h)	Staff	Air Temperature (Min-Max)°C	Cloud Cover (%) Beaufort Wind Scale [Descriptor (scale)]	Rainfall 7 days prior to site visit (mm)	Purpose
June 17, 2021	1830-2215	S. Lafrance J. Malcolm	17-26.0 (7.8-26.6)	Clear skies Wind: gentle breeze(3)	n/a	- Amphibian Survey #3 - Fish Habitat
July 27, 2021	1000-1130	A. Quinsey J. Malcolm	21.0 (12.0-24.7)	Overcast Wind: light air (1)	66.2	- Fish Habitat - Flow Visit #3
September 9, 2021	1015-1145	S. Lafrance	18.0 (10.6-23.4)	Mainly Clear Wind: gentle breeze (3)	35.1	-Flow Visit #4

M. Lavictoire – Michelle (Nunas) Lavictoire – B. Sc. Wildlife Resources and M.Sc. Natural Resources
S. Lafrance – Sophie Lafrance – B.Sc. Biology and Graduate Certificate in Ecological Restoration
A. Quinsey – Al Quinsey – B.Sc. Environmental Biology
J. Malcolm – Janessa Malcolm – Coop Placement (BA. Environmental Studies)

*Min-Max Temp and Rainfall Taken From: Environment Canada. National Climate Data and Information Archive. Ottawa International Airport. Available http://climate.weatheroffice.gc.ca/ [October 8, 2021]

4.0 HEADWATER DRAINAGE FEATURES ASSESSMENT

4.1 Classification

4.1.1 Step 1: Hydrology Classification

In Step 1 the flow is classified based on the amounts recorded during the three flow visits. These are summarized in Table 2 (as per OSAP S4.M10). To help put the field work results into context of the conditions of 2021, the water levels in the general area have been summarized. The Mississippi Valley Conservation Authority issued water safety statements from early March to early April due to high water levels from rainfall and snowmelt. Water levels were then considered normal until June 9, 2021, when MVCA issued a minor low water status that lasted until July 19, 2021, when water levels returned to normal.

Further, it is noted that many significant rainfall events took place during the field work, especially prior to the first and third visits (Table 1). These may have increased the flow values obtained. It was noted that groundwater input was present partially down the feature. A rain event of 30.9 mm fell four days prior to the first flow visit and another 13.7 mm two days before that visit. A total of 11.1 mm fell the week preceding the second visit, of which 8.8 mm fell the day before the visit. The month of July was wet and there were several significant 24-hour events the week preceding the July 26 visit (23.9 mm on July 20, 12.9 mm on July 24, 22.5 mm on July 25). It is noted that water was present in the feature on the June 17 (fish habitat visit) but

there was still 15.0 mm rain the week before (max in a single 24-hour period was 11.2 mm on June 14, 2021). Since there was so much rain before the last flow visit of July 26, an additional check on the habitat was made on September 9. The goal had been to determine what types of benthic invertebrates were present to help better understand the hydrological classification. However, the channel was completely dry, and no benthos were found. Because of these findings and the significant rain events preceding the data collection, with one large one the day before the July visit, the hydrological results have been modified. The modifications have relied on the definitions of the functions in the Guidelines. The Important Function is to be given to areas with seepage or other flows that create a system with water year-round. The September 9, 2021 visit demonstrated that the site had been dry for some time and that this definition did not match the findings. Valued Functions still flow late in the spring, and usually have sorting and benthic invertebrates whereas Contributing Functions have limited sorting and limited or no benthic invertebrates. There is some groundwater seepage. There were no benthic invertebrates, but some sorting and some seepage. The feature is better suited to be either Valued or Contributing.

Table 2: Hydrology classification features using data from OSAP S4.

Features/ Channel	Definitions of Flow Influence	Flow Conditions	Feature Type Code	Comments	Hydrology Classification
Feature 1	Spring Freshet	Surface Flow Substantial (3)	Channelized or constrained (2)	Channel was dry upstream during May visit (See Figure 3 to Figure 5). Note that there was significant rainfall in the 7 days preceding July the visit (Table 1)	Valued or Contributing
	Late April - May	Minimal Flow (2)			
	July - August	Minimal Flow (2)			
	September	Dry (1)			

Figure 3: Summary of Flow Conditions – Freshet Visit (March 30, 2021)

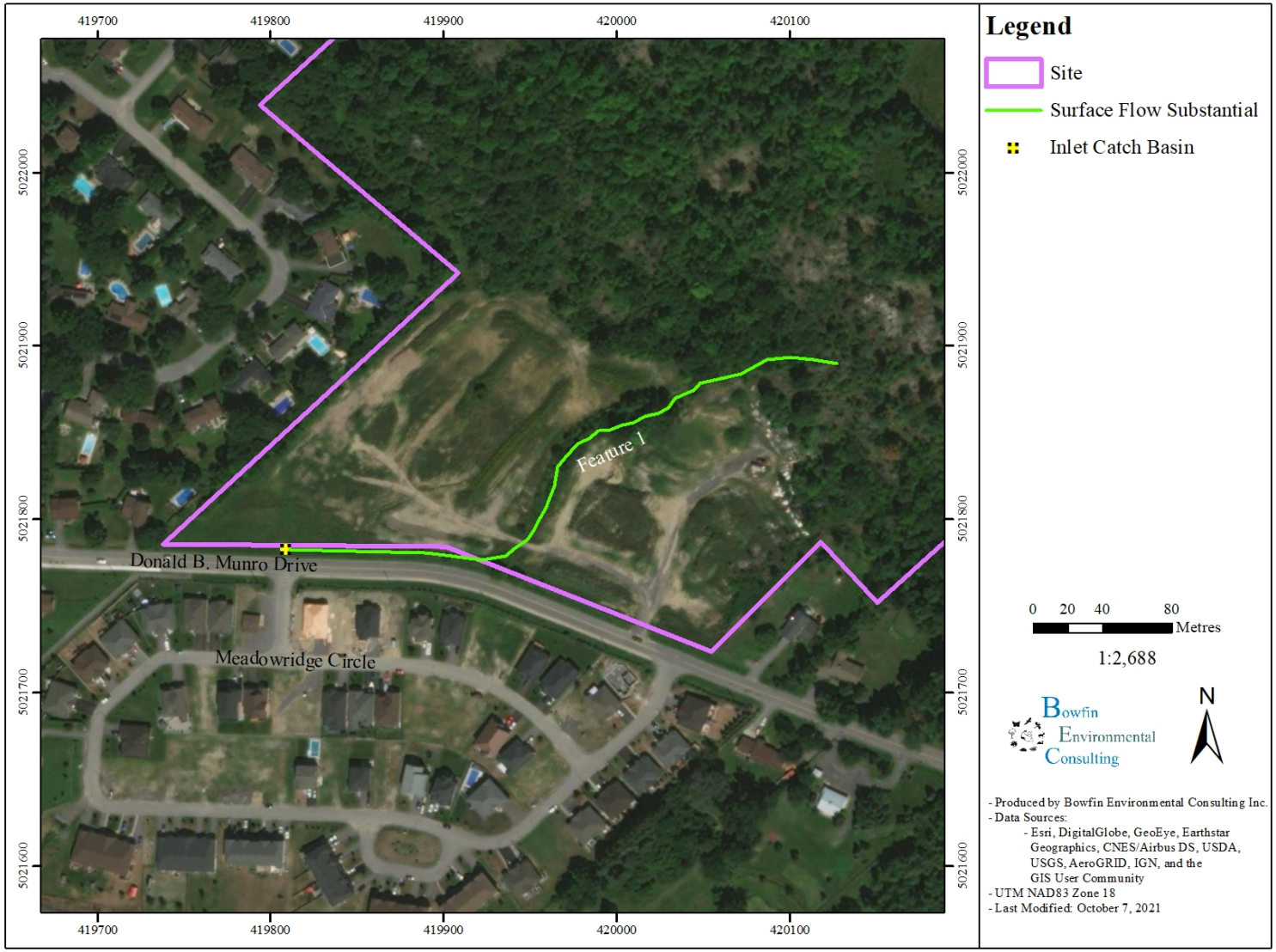


Figure 4: Summary of Flow Conditions – Late Spring (May 31, 2021) and Summer (July 17, 2021) Visits

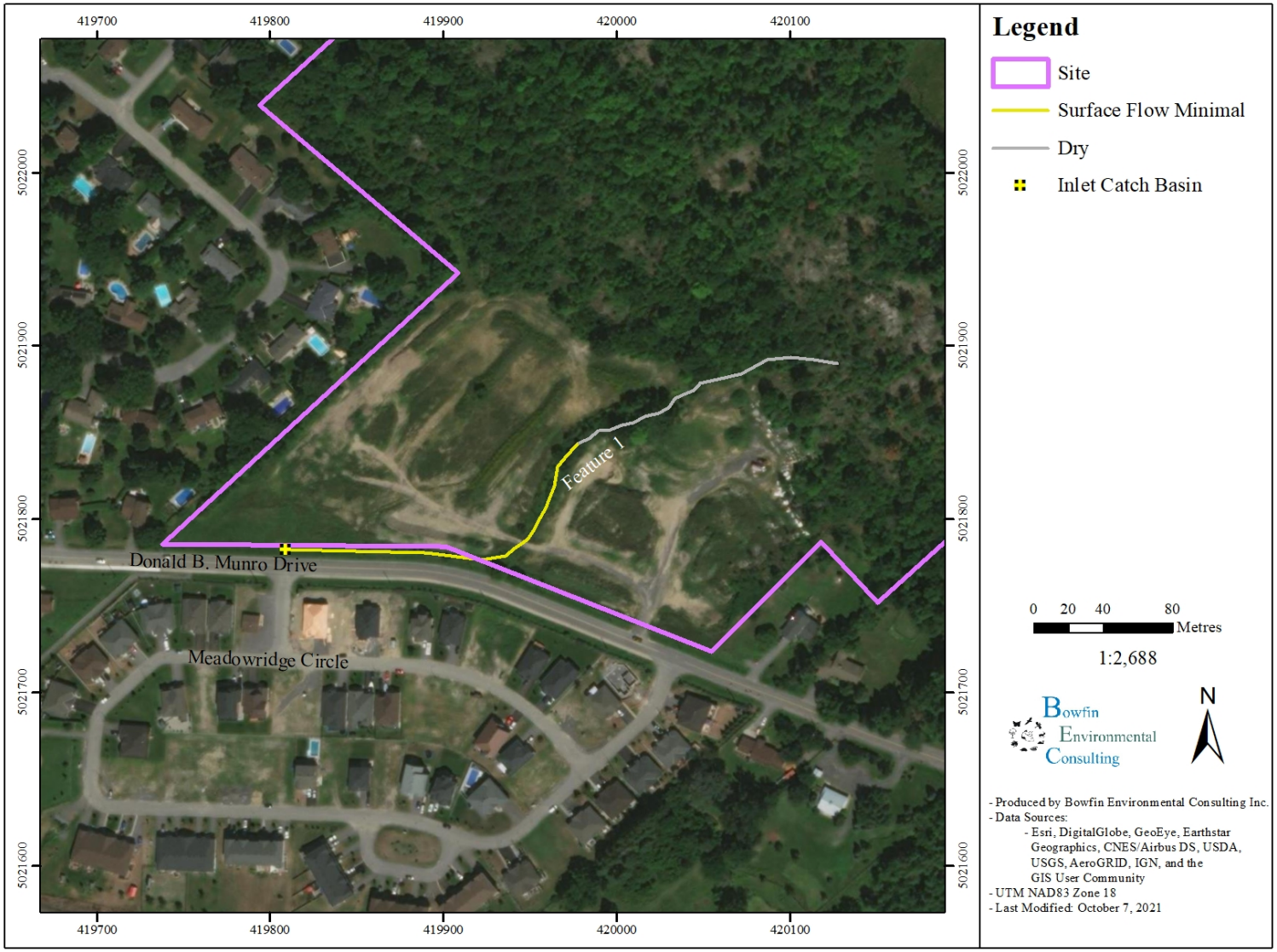
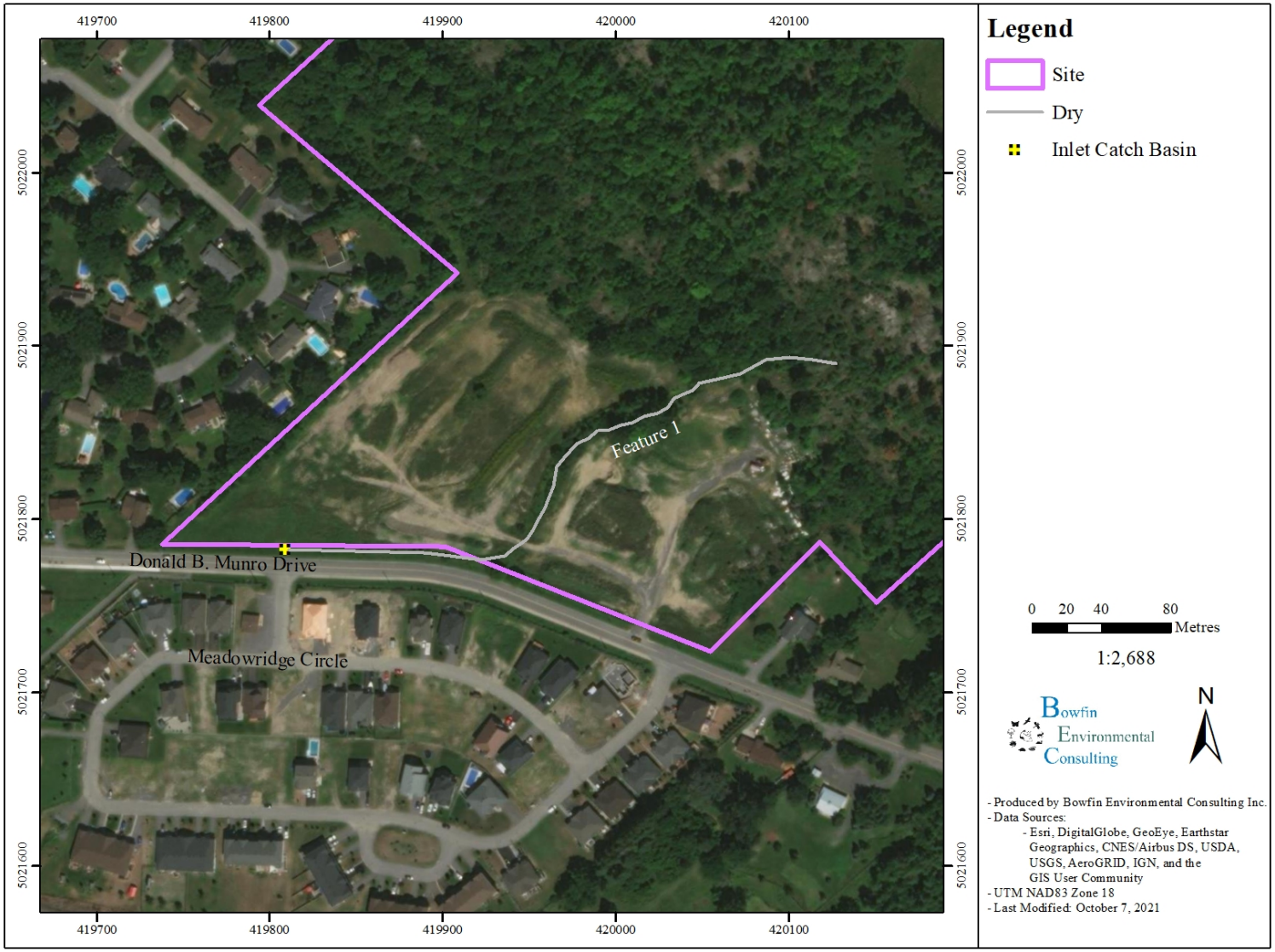


Figure 5: Summary of Flow Conditions – September 9, 2021



4.1.2 Step 2: Riparian Classification

In Step 2 the riparian habitat is classified based on the width and type of vegetation on the banks. These are summarized in Table 3.

Table 3: Riparian Classification

Features/ Channel	OSAP S4.M10 Riparian Code	Riparian Classification	Comments
Feature 1	Scrubland (5)	Valued	The feature is surrounded by shrubs and trees along a steep but shallow bank, while the vegetation is thick in places it does not extend 30 m out from the watercourse. Towards the downstream end it opens into an area of little to no riparian vegetation. The dominant riparian habitat is meadow.

4.1.3 Step 3: Fish and Fish Habitat Classification

As mentioned above, this headwater feature is situated upstream of a inlet catch basin at Donald B. Munro Drive and its flow enters the storm water system. It is piped for about 300 m before being discharged from the southwest corner of Meadowridge Circle. A vegetated swale was noted at that location and a culvert under the railroad. GeoOttawa shows an open channel, that is about 200 m long, from this railroad to the Carp River (note that the geoOttawa stream layer is inaccurate at this location, likely predating the developments in the area). Whether this open channel provides direct fish habitat is unknown but likely poor (due to anticipated seasonal flows). The inlet catch basin is a permanent barrier, and this was confirmed through spring fish community sampling on site. No fish were observed or captured. See Appendix A for the complete Fish Habitat and Community Descriptions.

Table 4: Fish and Fish Habitat Classification

Features/ Channel	Fish/Fish Habitat Classification	Comments
Feature 1	(Contributing)	No fish were captured or observed during the spring. The channel is disconnected by City's storm system (flow enters inlet catch basin at Donald B. Munro and travels through roughly 300 m of pipes). The storm pipes discharge into an open channel that flows into the Carp River after being treated

Features/ Channel	Fish/Fish Habitat Classification	Comments
		in an oil and grit separator (length of that channel is about 200 m long). The value of the flow from the Site in terms of contributing functions (allochthonous materials) to a downstream fish bearing watercourse is questionable because of the storm pipes and treatment. The potential for the open channel to provide fish habitat is unknown. Only confirmed downstream fish habitat is Carp River.

4.1.4 Step 4: Terrestrial Habitat Classification

This step is more of a classification of amphibian habitat than of the terrestrial habitat. According to the guidelines, only those features considered wetland habitats can be considered Important or Valued. This is not the case at this site. Further, amphibian surveys were completed, and none were heard calling from the feature during the survey period (Appendix B). There was one incidental observation of a single gray treefrog in the feature on June 17, 2021. Features classed as Contributing are those that may or do provide a linkage between habitats for wildlife movement and Limited is given to those that do not meet any of the above criteria. Again, the middle portion of this feature is piped and does not provide any linkages.

Table 5: Terrestrial Habitat Classification

Features/ Channel	OSAP S4.M10 Feature Type Code	Marsh Monitoring Protocol Calling Code	Comments	Classification
Feature 1	Channelized or constrained (2)	0	No wetlands present. No calls within the feature. The feature does not connect two features (upstream there is a pond (satellite imagery) but the downstream is the inlet catch basin).	Limited

4.2 Part 3 – Management Recommendations

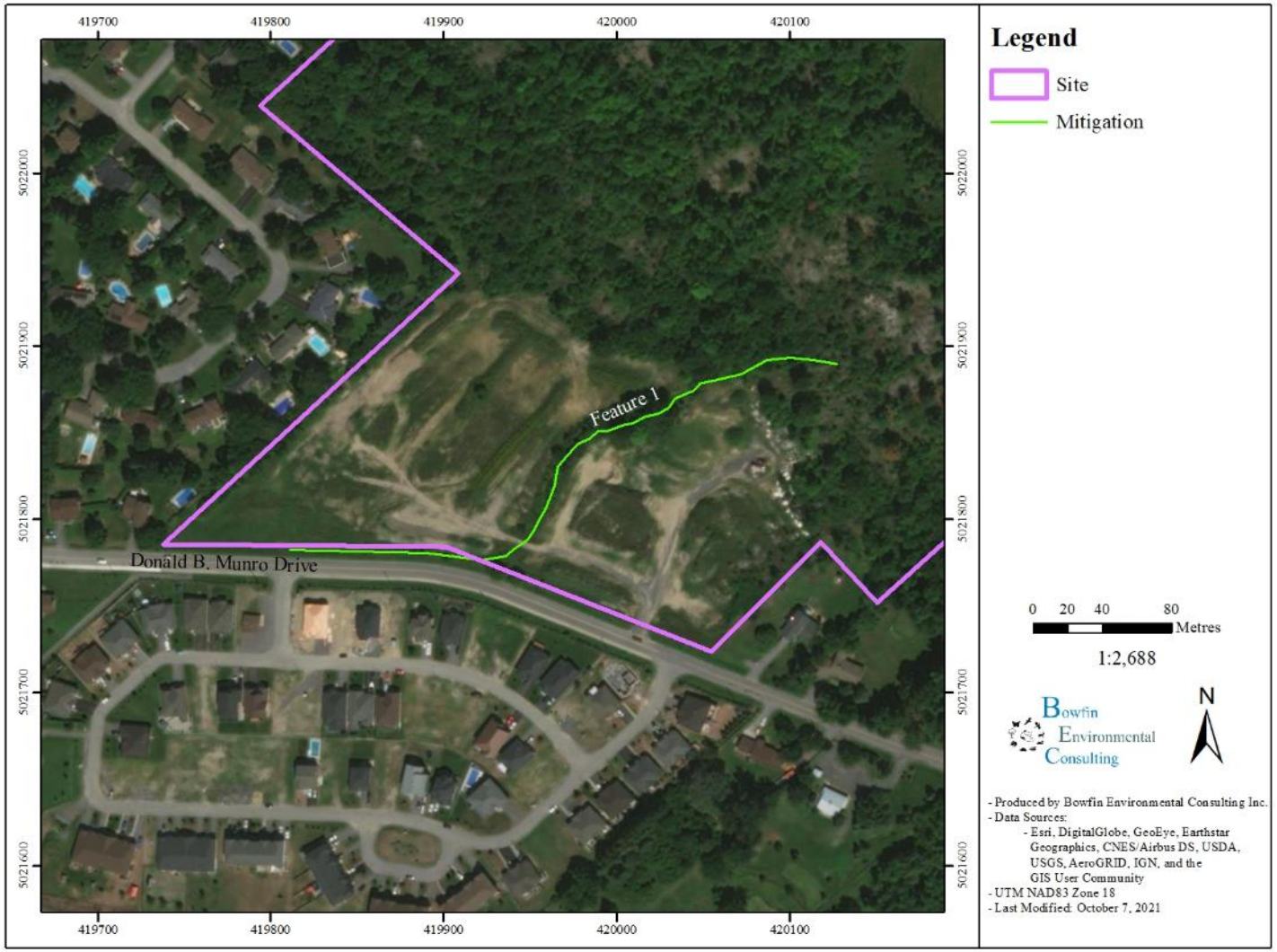
The management recommendations are grouped into six categories: Protection, Conservation, Mitigation, Maintain Recharge, Maintain/ Replicate Terrestrial Linkage, and No Management Required. The key functions that determined the management recommendations for each feature or reach are highlighted in green in Table 6, it is these functions that should be managed.

In this case, the feature did not provide amphibian or fish habitat. Seeing as the feature forms part of the City's storm water system (inlet catch basin at Donald B. Munro Drive and 300 m pipes and oil and grit separator), the value of this feature as a headwater drainage feature is questionable. A portion of the upstream end of this feature (on site) was dry after the first visit. While there was water in July, the very high rainfall the week before (including over 20 mm the day before) likely affected those findings. Confirmation that the feature was not permanent was made in early September. This modified the function to Contributing or Valued. It is noted that it never had substantial flow. The outcome is a classification of Mitigation with the only function being the hydrology component. As such, it is recommended that the development take this into consideration and ensure that the same quantity and quality of flow currently contributed to the storm water system continue to be contributed post-construction. This is because it is assumed that somewhere downstream of Meadowridge Circle, the feature could provide direct fish habitat. If feasible vegetated swales could be used in the development.

Table 6: Evaluation, Classification and Management Summary

Features/ Channel	Hydrology Classification	Riparian Classification	Fish and Fish Habitat Classification	Terrestrial Habitat Classification	Management Recommendation
Feature 1	Valued or Contributing	Valued	Contributing	Limited	Mitigation

Figure 6: Management Recommendations



5.0 REFERENCES

Bird Studies Canada, Environment Canada, and, U.S. Environmental Protection Agency. (2008). Marsh Monitoring Program Participant's Handbook Surveying Amphibians. 20 pp.

Credit Valley Conservation, and Toronto Region Conservation Authority. (2014). Evaluation, Classification and Management of Headwater Drainage Features Guidelines. 26 pp.

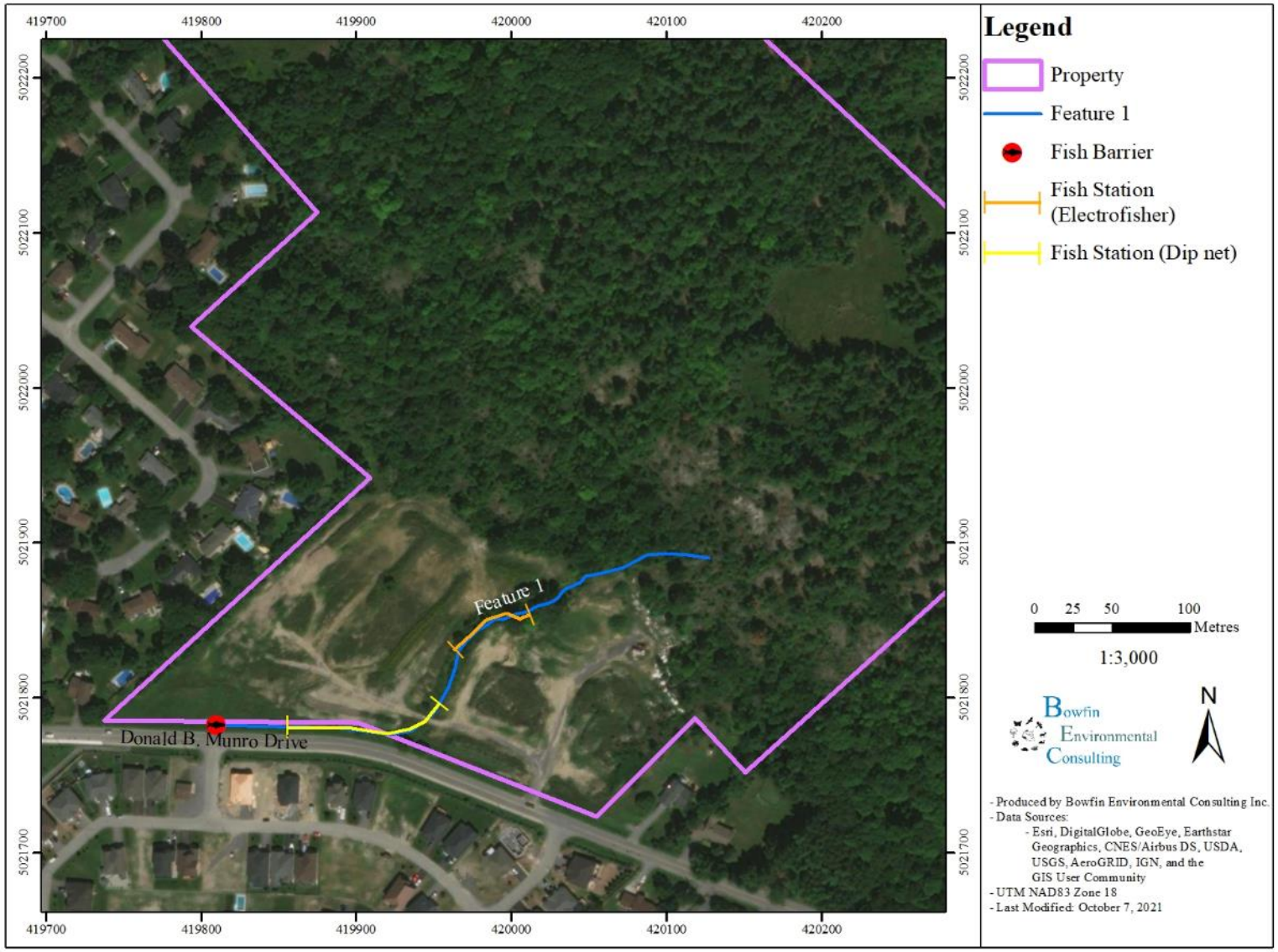
MTO (2006). *Environmental Guide for Fish and Fish Habitat, Section* 5: *Sensitivity of Fish and Fish Habitat*. Ministry of Transportation Ontario.

Stanfield, L. (editor). (2017). *Ontario Stream Assessment Protocol*. Version 10.0. Fisheries Policy Section. Ontario Ministry of Natural Resources. Peterborough, Ontario. 546 pp

Appendix A: Habitat Description of Features

The feature within the site was walked in its entirety and the vegetated swale and culvert under the railroad investigated briefly. One station (fish habitat and backpack electrofishing station) was established, but photographs and dip netting where possible elsewhere was also completed (Figure A). The station was placed in the best habitat; one was in a faster flowing channel with tree and shrub cover. The rest of the low quality habitat was sampled via dip netting during the early spring visit.

Figure A: Fish Habitat and Sampling Stations



Feature 1

There are several barriers to fish, the first being the permanent, inlet catch basin at the downstream end which prevents Feature 1 from being fish habitat (confirmed with sampling April 2021). Just upstream of the drain the channel was heavily choked with reed canary grass without a distinct channel which would make movement difficult. Further upstream there are several smaller steps that could function as barriers to fish. The entire watercourse was dip netted downstream from station 1.

Photo A Downstream end of channel (vegetation was manually removed to allow for measurements) (March 30, 2021)

Photo B: Dry upstream end of channel (September 9, 2021)

Station 1

This 60 m station was situated in the center of the feature. The average channel width was 1.8 m and the average bankfull height 13 cm. The average spring wetted width and depth were 0.9 m and 5 cm, respectively.

The substrate consisted primarily of fines with some gravel and the stream morphology was a glide. The in-water cover throughout the station was provided by overhanging vegetation. Both banks were steep in some areas and heavily vegetated throughout. Canopy cover was around 80%. Species observed were broad-leaved cattail, black walnut, basswood, American elm, trembling aspen, bur oak, shrub willow, speckled alder, Tartarian honeysuckle, sensitive fern, glossy buckthorn, reed canary grass, spotted jewelweed, sugar maple, red raspberry, and sedges.

The station was electrofished during the spring of 2021. No fish were observed or captured.

Photo C: Station 1 looking upstream (March 30, 2021)

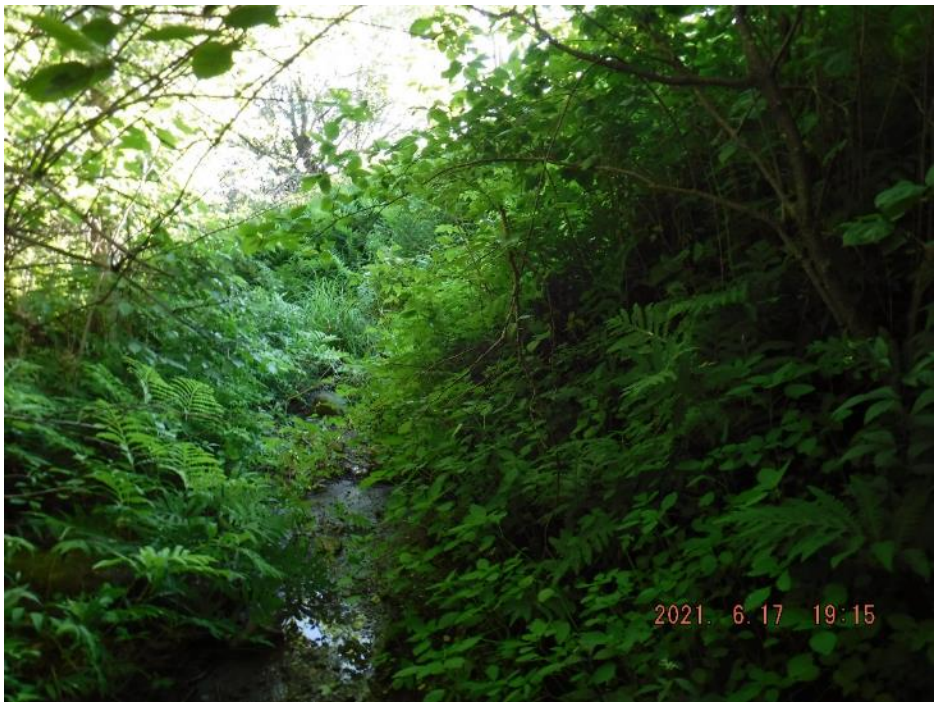


Photo D: Station 1 looking upstream (June 17, 2021)

Appendix B: Amphibian Results Summary

Features	Amphibian Station	Visit 1 April 7, 2021 (Species, #)		Visit 2 May 31, 2021 (Species, #)		Visit 3 June 17, 2021 (Species, #)	
		In feature	In adjacent habitat	In feature	In adjacent habitat	In feature	In adjacent habitat
Feature 1	**1**	NONE	SPPE, 10	NONE	GRTR, 7	NONE	NONE
Feature 1	**2**	NONE	Same frogs heard as listed above	NONE	NONE	NONE	NONE

SPPE – Spring Peeper
GRTR – Gray Treefrog

Figure 7: Amphibian Survey Stations