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Ministry of Transportation (MTO)

Fish and Fish Habitat Existing Conditions Report: Hanlon Expressway / Wellington Road 34 Midblock Interchange (GWP No. 3059-20-00)

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AECOM: 2015-04-13

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1. Introduction

AECOM Canada Limited (AECOM) has been retained by the Ontario Ministry of Transportation (MTO) to undertake a Preliminary Design Review, Detailed Design (to a Design-Build-Ready status) under Class Environmental Assessment (EA) for Provincial Transportation Facilities (2000) for improvements to Highways 6 and 401 in the Township of Puslinch, Wellington County, and the City of Hamilton (GWP 3042-14-00). The planned transportation improvements will provide a better connection between the Highways 6 and 401 corridors which will reduce road congestion, collision potential and associated costs and encourage the utilization of Hanlon Expressway (Highway 6 north of Highway 401) which will support municipal planning initiatives.

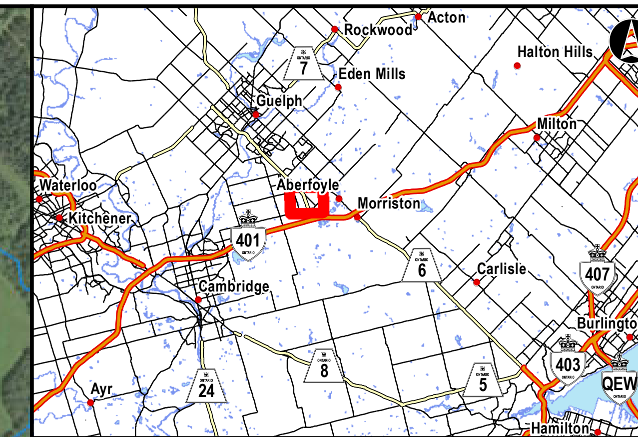
The first phase of implementing the GWP 3042-14-00 improvements will include the improvements along Hanlon Expressway north of Highway 401. This first phase, henceforth referred to as the Hanlon Expressway / Wellington Road 34 Midblock Interchange project (GWP 3059-20-00), includes the new Wellington Road 34 flyover structure at Hanlon Expressway, the new interchange on Hanlon Expressway midway between Wellington Road 34 and Maltby Road, and other associated connecting roadways.

The purpose of this report is to present the fish and fish habitat existing conditions for the Hanlon Expressway / Wellington Road 34 Midblock Interchange sites. Assessment of the potential impacts of the project to fish and fish habitat and recommended mitigation measures in accordance with the MTO Environmental Reference for Highway Design (ERHD, 2006) will be provided under separate cover. Documentation of existing fish and fish habitat conditions, as presented herein, was conducted in accordance with the MTO Environmental Guide for Fish and Fish Habitat (the Guide) (2020), and the 2020 pilot protocol entitled MTO/DFO/MNRF Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings, Version 3 (the Protocol) (2020).

The Midblock Interchange structures are located along Hanlon Expressway, Wellington Road 34 and Concession Road 7 between the Highway 401 and the Hanlon Expressway/Maltby Road intersection. See Figure 1 for the project Study Area. As per Section 3.1.2 of the ERHD, for the purposes of documenting existing fish and fish habitat conditions, the area of assessment is divided into two (2) zones: the Zone of Detailed Assessment (ZDA), which includes the area within MTO right-of-way (ROW), from 0 m to 50 m downstream of the ROW, and from 0 m to 20 m upstream of the ROW and the Zone of General Assessment (ZGA), which included from 50 m to 200 m downstream of the ROW and from 20 m to 50 m upstream of the ROW (of which only a general description of the aquatic environment is documented); however, due to property access constraints, the majority of the watercourses were assessed only within the ROW. **Table 1** (Template D1) below provides the Latitude and Longitude for the structures assessed under the Protocol in this report.

Table 1: Location of Work (Template D1)

Waterbody ID	Road/Highway	Municipality	Latitude	Longitude
401-6-23	Concession Road 4	Guelph	43.473175	-80.189839
401-6-24	Wellington Road 34	Wellington County	43.457155	-80.180820
401-6-25	Wellington Road 34	Wellington County	43.457101	-80.180870
401-6-26	Wellington Road 34	Wellington County	43.456023	-80.187423
401-6-27	Wellington Road 34	Wellington County	43.457579	-80.178354
401-6-30	Concession Road 7	Wellington County	43.464426	-80.176444
401-6-31	Hanlon Expressway	Wellington County	43.455177	-80.179957



Legend

- Watercourse Crossing
- Culvert
- Watercourse
- Municipality
- Limits of Work

0 0.375 0.75
Kilometers

Hanlon Expressway / Wellington Road 34 Midblock Interchange

Study Area

Jun, 2021	1:10,000 * when printed 11"x17"	Datum: NAD 1983 MTM 10 Source: MNRF, MMAH, AECOM, MTO
P#: 60541071	V#: 001	Figure 1

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2. Background Data Collection

Background information on the fish and fish habitat features of the Study Area were obtained through review of existing material from the following sources:

- MNRF Make-a-Map online application tool (MNRF, 2021);
- MNRF Make-a-Map: Land Information Ontario (LIO, 2021);
- MNRF Guelph District Office correspondence (2017, 2021);
- Fisheries and Oceans Canada (DFO) SAR online mapping (DFO, 2021);
- Environmental Assessment and Preliminary Design Report, Freelton Noertherly 16.9 km to Guelph (September 1995)
- Transportation Environmental Study Report (TESR), The Preliminary Design and EA for Highway 401 Improvements from Hespeler Road to Halton Region Boundary (GWP 8-00-00) (November, 2012)
- GWP 8-00-00 – Highway 401 Preliminary Design and Class Environmental Assessment Study Final Report (June 2014); and,
- Aerial photography (2021).

McCrimmons Creek and its tributaries drain primarily agricultural areas in the northern and western portions of the Study Area. The creek and several of its tributaries have been designated by the MNRF as coldwater streams. The McCrimmons Creek system's fisheries have been surveyed in at least three separate studies since the Hanlon Expressway was completed in 1976 to determine the effects of the highway facility on the watercourse and the need for habitat rehabilitation. Migratory fishes including Brown Trout (*Salmo trutta*) and Brook Trout (*Salvelinus fontinalis*) have been identified within the Study Area.

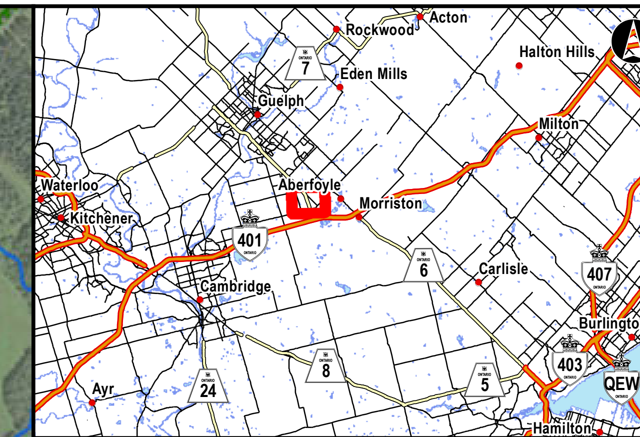
Reaches of McCrimmons Creek and its tributaries (primarily downstream of the study area) have been subject to extensive rehabilitation efforts by local fishing clubs, the MNRF and others. As part of the supplementary investigations, habitat assessments were conducted throughout the McCrimmons Creek area to document the existing conditions of watercourses potentially affected by proposed highway improvements.

The following fish species are known to occur in McCrimmons Creek: Blacknose Dace, Bluntnose Minnow, Brook Stickleback, Brook Trout, Brown Trout, Central Mudminnow, Common Shiner, Creek Chub, Fathead Minnow, Rainbow Darter, Rock Bass, White Sucker (MNRF, 2021). Additionally, MNRF has identified Brook and Brown Trout spawning habitat within McCrimmons Creek and its tributaries.

A review of the resources listed in Section 2, including DFO's online aquatic SAR mapping tool and MNRF Make-a-Map: Natural Heritage Information, did not identify any aquatic SAR within the Study Area.

A request for available background data associated with the entire Highways 401 and 6 Study Area (GWP 3042-14-00) was submitted to the Guelph district MNRF on April 27, 2017 and updated species information on March 11, 2021. The information request included the following: waterbody types, habitat information/location, fish species present including in-water work timing window, MNRF management objectives, MNRF interpretation of fish and fish habitat sensitivity, presence and location of fisheries, groundwater discharge areas and benthic invertebrate data. The background information collected from the sources listed above, including information provided by from MNRF, has been incorporated into this report. A copy of agency correspondence can be found in **Appendix A**.

Constraints and Opportunities figures summarizing existing conditions are provided in **Figure 2**.



Legend

- Coldwater Thermal Regime (MNRF, 2021)
- Warmwater Thermal Regime (MNRF, 2021)
- Culvert
- Watercourse
- Municipality
- Limits of Work
- GRCA Regulation Limits

Wetland, Not Evaluated per OWES

- Unnamed

Wetland, Provincially Significant

- Mill Creek Puslinch Wetland Complex, Evaluated-Provincial
- Cranberry Oil Well Bog Wetland Complex, Evaluated-Provincial

0 0.35 0.7
Kilometers

Hanlon Expressway / Wellington Road 34 Midblock Interchange

Opportunities and Constrains

Jun, 2021	1:10,000 * when printed 11"x17"	Datum: NAD 1983 MTM 10 Source: MNRF, MMAH, AECOM, MTO
P#: 60541071	V#: 001	**Figure 2**

AECOM

3. Fish and Fish Habitat Existing Conditions

3.1 Field Investigations

In 2017 and 2018, AECOM ecologists conducted detailed fish and fish habitat assessments of the water features within the overall Highways 401 and 6 project footprint. AECOM ecologists visited the sites to document existing habitat conditions in order to facilitate making a determination on whether or not the proposed works would result in a harmful alteration, disruption or destruction of fish habitat (HADD), or the death of fish, and therefore require a *Fisheries Act Authorization.* A photographic record was documented during the field surveys and is provided in **Appendix B**. Field notes recorded during the fish habitat assessments are provided in **Appendix C**.

Fisheries assessments were conducted in accordance with the requirements under the 2016 Protocol; however, the Protocol was updated in 2020, and as such the data collected has been assessed under the new Protocol as directed by MTO.

3.2 Fish and Fish Habitat Existing Conditions

A detailed description of the existing conditions documented during the field investigations is presented below. **Table 2** provides a summary of the existing fish habitat conditions based on Template D2A of the Guide.

3.2.1 Station 401-6-23

Within the assessed upstream and downstream reach, the drainage feature outlets west of Hanlon Expressway onto rip-rap, and is dispersed through terrestrial vegetation (meadow lands) with no defined bed or bank. No stream bed material or aquatic vegetation was observed during the 2017 field investigation. The feature functions as an ephemeral drainage-conveyance area based on the absence of stream bed material or defined banks observed during field investigations. The feature does not provide direct or supporting fish habitat. According to DFO online mapping (2020), aquatic SAR habitat has not been identified within this watercourse.

3.2.2 Station 401-6-24

Within the assessed upstream and downstream reach, the feature functions as an ephemeral drainage-conveyance channelrunning adjacent to the Hanlon Expressway. In channel vegetation consisted of cattails (*Typha* sp.) and common reed (*Phragmites* sp.[1]).The feature does not provide direct fish habitat, but contributes flow to the outlet at the southern limit of the Study Area. According to DFO online mapping (2020), aquatic SAR habitat has not been identified within this feature.

3.2.3 Station 401-6-25 [SR-7A]

This McCrimmons Creek Tributary is a coldwater system (MNRF, 2017) that flows under Wellington Road 34 to its confluence with the main branch of McCrimmons Creek downstream of the crossing.

Within the assessed upstream reach, the watercourse is representative of a naturalized system with a morphology that consists of flats (85%), runs (10%) and pools (5%). At the time of site investigation, the mean wetted width was

[1] *Phragmites australis* is an aquatic invasive species

approximately 1.4 m and the mean wetted depth approximately 0.14 m. Substrates were mainly comprised of detritus, sand, gravel and silt. Banks were slightly unstable and the associated riparian cover was high (60-90% cover), consisting of trees and shrubs. Instream cover (70% total cover) was provided primarily by organic debris (35%), instream woody debris (30%), overhanging woody debris (20%), undercut banks (10%) and boulders (5%). Groundwater upwellings and watercress were observed.

Within the assessed downstream reach, the watercourse is representative of a naturalized system with a morphology that primarily consists off runs (85%) and riffles (15%). At the time of field reconnaissance, the mean wetted width was approximately 1.1 m and the mean wetted depth approximately 0.18 m. Substrates were mainly comprised of clay and gravel. Banks were moderately unstable due to erosion and the associated riparian cover was high (60-90% cover), consisting of trees and shrubs. Instream cover (70% total cover) was provided primarily by undercut banks (40%), woody debris (30%) and organic debris (30%). Groundwater upwellings, watercress and suitable salmonid spawning habitat were observed.

The watercourse is permanent, and provides habitat for coldwater species (MNRF 2021). Fish were captured during field investigations. Fish community assemblage can be found in Error! Reference source not found.. The a ssessed reach provides habitat for migration, spawning, feeding and rearing, including Brook Trout (a sensitive species); however, the coldwater habitat with groundwater upwellings is generally non-limiting throughout the Study Area . According to DFO online mapping (2020), aquatic SAR habitat has not been identified within this watercourse.

3.2.4 Station 401-6-26 [SR-11]

This unnamed stream is presumed to be a tributary of McCrimmons Creek and flows north to south through a wetland, crossing Wellington Road 34 west of Hanlon Expressway.

Within the assessed upstream reach, the morphology consists of pools (30%), riffles (10%) and runs (10%) flowing through a greater wetland (50%). At the time of field reconnaissance, the mean wetted width of the defined channel was approximately 0.4 m and the mean wetted depth approximately 0.13 m. Substrates were mainly comprised of detritus and muck. Banks were not well defined and the associated riparian cover was moderate (30-60% cover), consisting of common reed, trees and shrubs. Instream cover (80% total cover) was provided primarily by emergent vegetation (90%) and organic debris (10%). Groundwater upwellings, organic oily sheen and iron staining were observed.

Within the assessed downstream reach, the morphology consists of flats (20%) flowing through a greater wetland (80%), with only a partially defined channel visible. At the time of field reconnaissance, the mean wetted width of the defined channel was approximately 0.5 m and the mean wetted depth approximately 0.15 m. Substrates were mainly comprised of detritus and muck. Banks were not well defined and the associated riparian cover was moderate (30-60% cover), consisting of common reed, trees and shrubs. Instream cover (80% total cover) was provided primarily by emergent vegetation (90%) and woody debris (10%). Groundwater upwellings, organic oily sheen and iron staining were observed.

The watercourse is permanent, and provides habitat for warmwater species (MNRF 2021). Fish were captured during field investigations. See Error! Reference source not found. for the fish community assemblage. The a ssessed reach provides habitat for fish migration, feeding and rearing. No sensitive or significant habitat was observed. According to DFO online mapping (2020), aquatic SAR habitat has not been identified within this watercourse.

3.2.5 Station 401-6-27 [SR-5]

This main branch of McCrimmons Creek is a coldwater system (MNRF, 2017) that flows under Wellington Road 34 to its confluence with Mill Creek downstream of the Study Area.

The upstream reach was not assessed due to property access limitations and was not visible from the ROW.

Within the assessed downstream reach, the watercourse is representative of a naturalized system with a morphology that consists of runs (40%), flats (30%), riffles (15%) and pools (15%). At the time of field reconnaissance, the mean wetted width was approximately 1.5 m and the mean wetted depth approximately 0.25 m. Substrates were mainly comprised of gravel, sand, cobble and silt. Banks were stable and the associated riparian cover was high (60-90% cover), consisting of trees and shrubs. Instream cover (70% total cover) was provided primarily by undercut banks (30%), woody debris (30%), cobble (20%) and organic debris (20%). Groundwater upwellings, watercress and suitable salmonid spawning habitat were observed.

The watercourse is permanent, and provides habitat for coldwater species (MNRF 2021). Fish were captured during field investigations. The fish community assemblage can be found in Error! Reference source not found.. T he assessed reach provides habitat for migration, spawning, feeding and rearing, including Brook Trout (a sensitive species); however, the coldwater habitat with groundwater upwellings is generally non-limiting throughout the Study Area . According to DFO online mapping (2020), aquatic SAR habitat has not been identified within this watercourse.

3.2.6 Station 401-6-30 [CR7-1 and CR7-2]

The main branch of McCrimmons Creek (CR-1) crosses Concession Road 7 west of Hanlon Expressway and confluences with a small side tributary (CR7-2) within the MTO ROW.

Within the assessed upstream and downstream reaches, the feature consists of a Provincially Significant Wetland (PSW) with no defined channel. Substrates were mainly comprised of detritus and muck. Banks were not defined and the associated riparian cover was moderate (30-60% cover), consisting of common reed, trees and shrubs. Instream cover (80% total cover) was provided primarily by emergent vegetation (90%) and organic debris (10%). Iron staining was observed.

The watercourse is permanent, and provides habitat for coldwater species (MNRF 2021). Fish were captured during field investigations. The fish community assemblage can be found in Error! Reference source not found.. T he assessed reach provides habitat for migration, spawning, feeding and rearing, including Brook Trout (a sensitive species); however, the coldwater habitat with groundwater upwellings is generally non-limiting throughout the Study Area . According to DFO online mapping (2020), aquatic SAR habitat has not been identified within this watercourse.

3.2.7 Station 401-6-31 [H6-2]

This main branch of McCrimmons Creek crosses the Hanlon Expressway at the southern limit of the Study Area south of Wellington Road 34.

The downstream reach could only be assessed for approximately 10 m within the ROW due to property access limitations. Within the assessed downstream reach, the watercourse is representative of a naturalized system with a morphology that consists of runs (50%), flats (40%), and riffle (10%). At the time of field assessment, the mean wetted width was approximately 1.3 m with a bankfull depth of 1.5 m and a mean wetted depth of 0.15 m and bankfull depth of 0.45 m. Substrates were mainly comprised of sand with lesser amounts of clay, and cobble and

gravel with sparse boulders at the culvert outlet. Banks were slightly unstable with undercut banks and the associated riparian cover was high (60-90% cover), consisting of herbaceous vegetation and vascular macrophytes at the culvert outlet and trees and shrubs further downstream. Instream cover (90% total cover) was provided primarily by instream vascular macrophytes (50%), undercut banks (30%), and cobble (10%). Groundwater upwellings, watercress and suitable salmonid spawning habitat were observed

The upstream reach was not assessed due to property access limitations and was not visible from the ROW. The watercourse is permanent and provides habitat for coldwater species (MNRF 2021). The fish community assemblage is the same as 401-6-27 and can be found in Error! Reference source not found..

3.3 Fish Community

Sufficient information was not available within the background information review and through initial MNRF correspondence to characterize the fish community in Study area; **Table 2** summarizes the existing fish community assemblage identified through AECOM field investigations (2017, 2018), and recent MNRF correspondence (2021) at the above noted stations based on Template D2B of the Guide.

Table 2: Existing Fish and Fish Habitat Conditions Summary Table (Template D2A)

Waterbody ID	Date	Flow	Thermal Regime*	Fish Habitat*	Substrate Type	Channel Morphology	Vegetation	Constraints & Opportunities	Significant Fish Habitat
Station 401-6-23 Unnamed	25-Jul-17	Ephemeral	N/A	Not fish habitat	N/A	N/A	Meadow species; No aquatic vegetation present	None	None
Station 401-6-24 Unnamed	25-Jul-17	Ephemeral	N/A	Not fish habitat	N/A	N/A	Cattails, Common Reed	None	None
Station 401-6-25 McCrimmons Creek Tributary	25-Jul-17	Permanent	Cold	Direct	Clay, gravel, boulder, sand, silt, detritus	Upstream: Flats (85%) Runs (10%) Pools (5%) Downstream: Runs (85%) Riffles (15%)	Watercress	None	Spawning areas*
Station 401-6-26 McCrimmons Creek Tributary	26-Jul-17	Permanent	Warm	Direct	Muck, detritus	Upstream: Greater wetland (50%) Pools (30%) Riffles (10%) Runs (10%) Downstream: Greater wetland (80%) Flats (20%)	Cattails	None	Groundwater upwelling
Station 401-6-27 McCrimmons Creek	27-Jul-17	Permanent	Cold	Direct	Silt, sand, clay, cobble, gravel, detritus	Downstream: Runs (40%) Flats (30%) Riffles (15%) Pools (15%).	Watercress	None	Spawning areas*
Station 401-6-30 McCrimmons Creek Tributary	25-Jul-17	Permanent	Cold	Direct	Muck, silt, detritus	N/A	Cattails	Mill Creek Puslinch Wetland Complex PSW	None
Station 401-6-31 McCrimmons Creek	26-Jul-17	Permanent	Cold	Direct	Sand, clay, cobble, gravel, boulder	Downstream Run (50%) Flats (40%) Riffle (10%)	Watercress, Cattails	None	Trout spawning habitat*

*Information provided by MNRF (2021).

Table 3: Existing Fish Community Summary Table (Template D2B)

Waterbody ID	Fish Species Present	Year Class(es)	Species at Risk Present	In-water Works Timing Window*
401-6-23 Unnamed	None (AECOM, 2018; MNRF, 2021)	N/A	None	Roadside conveyance only
401-6-24 Unnamed	None (AECOM, 2018)	N/A	None	Roadside conveyance only
401-6-25 McCrimmons Creek Tributary	Blacknose Dace, Bluntnose Minnow, Brook Stickleback, Brook Trout, Brown Trout, Central Mudminnow, Common Shiner, Creek Chub, Fathead Minnow, Rainbow Darter, Rock Bass, White Sucker (MNRF, 2021)	All	None	July 1st- Sept 30th
401-6-26 McCrimmons Creek Tributary	Central Mudminnow (AECOM, 2018)	Adult	None	July 1 – March 31
401-6-27 McCrimmons Creek	Blacknose Dace, Bluntnose Minnow, Brook Stickleback, Brook Trout, Brown Trout, Central Mudminnow, Common Shiner, Creek Chub, Fathead Minnow, Rainbow Darter, Rock Bass, White Sucker (MNRF, 2021) Brook Trout, Brown Trout (AECOM, 2018)	All	None	July 1st- Sept 30th
401-6-30 McCrimmons Creek Tributary	Blacknose Dace, Bluntnose Minnow, Brook Stickleback, Brook Trout, Brown Trout, Central Mudminnow, Common Shiner, Creek Chub, Fathead Minnow, Rainbow Darter, Rock Bass, White Sucker (MNRF, 2021)	N/A	None	July 1st- Sept 30th
401-6-31 McCrimmons Creek	Blacknose Dace, Bluntnose Minnow, Brook Stickleback, Brook Trout, Brown Trout, Central Mudminnow, Common Shiner, Creek Chub, Fathead Minnow, Rainbow Darter, Rock Bass, White Sucker (MNRF, 2021)	All	None	July 1st- Sept 30th

3.4 Summary of Existing Fish and Fish Habitat

Through the background information review, consultation with MNRF and fish habitat field investigations, it was determined that one (1) of the watercourses within the Study Area is an ephemeral feature, not suitable for fish use. Five (5) watercourses within the Study Area are permanent features that provide direct fish habitat. Significant habitat is present at McCrimmons Creek and its tributaries (401-6-24, 401-6-25 and 401-6-27) due to the trout spawning habitat and coldwater thermal regime.

4. General Assessment of Potential Impacts of the Project

Table 4 (Template D3) provides a high-level overview of the project and associated works that could potentially affect fish and fish habitat.

Table 4: Design Considerations Table (Template D3)

Factors to Consider	Design Considerations Provided by the Fisheries Assessment Specialist	Describe How Each Factor Was Addressed Through Design
In-water Works Timing Window	▪ Confirmed by MNRF that McCrimmon Creek and its tributaries are considered cold water, except 401-6-26 which is warmwater. Timing Window where work can occur is July 1st- Sept 30th for the coldwater features, and July 1st – March 31st for the warmwater feature. ▪ In-water work is required.	▪ This column will be updated in the Impact Assessment Report.
Fish Passage	▪ Migratory fish present include Brook Trout and Brown Trout. ▪ Currently no fish impediments are present within the Study Area.	▪ This column will be updated in the Impact Assessment Report
Significant Fish Habitat*	▪ The assessed reaches provide habitat for migration, spawning, feeding and rearing. ▪ Sensitive spawning habitat is present in McCrimmons Creek and its tributaries. ▪ No habitat classified as critical by the *Species at Risk Act* (SARA) was identified. ▪ Groundwater upwellings were observed in the assessed reaches. ▪ Culvert works should be designed to maintain groundwater upwellings that provide ground to surface water connection for Brook Trout spawning.	▪ This column will be updated in the Impact Assessment Report
Constraints and Opportunities	Constraint: A PSW was identified within Study Area. Opportunity: Incoporation of design best management practices (BMP)s for culvert works (e.g. refuge pools, low-flow channels, etc.).	▪ This column will be updated in the Impact Assessment Report
Other considerations	▪ Should stream bed protection be proposed in detail design, it should consist of native material where possible and any rock protection below the highwater mark should be round riverstone in accordance with Ontaio Provincial Standard Sepecification (OPSS)1005 and Non Standard Special Provision (NSSP)008. ▪ Aquatic invasive species have been found within the Study Area (*Phragmites australis).*	▪ This column will be updated in the Impact Assessment Report

5. Potential Enhancement/Offsetting Measures

Mill Creek Puslinch Wetland Complex is a PSW found within the Study Area. This area needs to be protected during the construction phase of the project. Design considerations shall be incorporated during detailed design, and mitigation measures shall be implemented prior to and during the construction to ensure no harm occurs to this significant feature.

Watercourse crossings should be designed to keep the destruction of fish habitat to a minimum by avoiding and/or reducing in-water works to the extent possible and completing in-water works within the MNRF timing windows provided in **Table 3** (Template D2B). This includes minimizing the footprint of the crossing structures (e.g. open bottom culverts in trout spawning stream, natural channel design), and minimizing the temporary disturbance associated with construction.

From a review of proposed works, the design considerations identified in **Table 4** (Template D3), potential fish habitat enhancements could include the provision of utilizing native stream bed material where possible. Any rock protection below the highwater mark should be round riverstone in accordance with OPSS1005 and OPSS 825. Additionally, culvert works should be designed in away that maintain groundwater upwellings to provide ground to surface water connection for Brook Trout spawning.

6. Conclusions

Through the background information review, consultation with MNRF and the 2017-2018 fish and fish habitat field investigations, it has been determined that McCrimmons Creek and its tributaries within the Study Area are permanently flowing, coldwater and warmwater features that support a diverse fish community including sensitive spawning habitat for trout. As such, the in-water work timing window, as determined by MNRF, for the coldwater features is from July 1 and September 31; or conversely restricted (i.e., not allowed) between October 1 and June 30, while the warmwater feature in-water work timing window is from July 1 – March 31 (i.e., no in-water work is permitted from April 1 – June 30), of any given year,.

AECOM Fisheries Biologists approved in the MTO Registry, Appraisal and Qualification System (RAQS) as Fisheries Assessment Specialists will assess the potential negative impacts of the proposed work as part of preliminary impact assessment (under separate cover) on the detail design available prior to tendering the design build contract. A final Fisheries Impact Assessment should be completed by a RAQs qualified Fisheries Assessment Specialists under the Design Builder once detail design is complete and prior to construction to ensure the full impacts of the planned undertaking are considered and align with legislation.

7. Literature Cited

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Ontario Ministry of Transportation, 2000:
Class Environmental Assessment for Provincial Transportation Facilities.

Ontario Ministry of Transportation, 2016:
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Ontario Ministry of Transportation, 2020:
Interim Environmental Guide for Fish and Fish Habitat. Queen's Printer of Ontario.

AECOM Imagine it. Delivered.

Appendix A

Agency Correspondence

From: Piette, Jessica
Sent: April-27-17 9:00 AM
To: 'melinda.thompson@ontario.ca'; annemarie.laurence@ontario.ca
Cc: Kime, Heather; Leech, Fred; Schmied, Sarah; Ellis, Julie; Buck, Graham (MNR) <Graham.Buck@ontario.ca> (Graham.Buck@ontario.ca)
Subject: FW: Request for Informatino - Hwy 401/Hwy 6 Improvements Project
Attachments: LET-60541071-RfI-20170424_Final.pdf; MNRF Request for Info Letter-2017-04-21(2)-401-6_Final.docx; WIP_HWY6_401_BackgroundReview_20170323.pdf

Good morning Melinda and Anne Marie,

Please find below and attached a request for background information for the preliminary design review, detailed design and class environmental assessment for improvements to Highways 6 & 401 from Hamilton North Limits to Guelph South Limits in the Township of Puslinch, Highway 6 (Hanlon Expressway) from Maltby Road northerly to the Speed River in the City of Guelph and Guelph/Eramosa Township. Please refer to the attached request for information letters and map for the precise locations of the Study Areas.

Please do not hesitate to contact me should you have any questions.

Thank you and have a great day.

Jessica

Jessica Piette, (Hon) B.ES.
Terrestrial Ecologist, Water & Natural Resources, Environment
D +1-519-650-8618
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Kitchener, Ontario, N2P 0A4, Canada
T +1-519-650-5313
aecom.com

From: Ellis, Julie
Sent: Tuesday, April 25, 2017 6:54 PM
To: graham.buck@ontario.ca
Cc: Piette, Jessica; Kime, Heather; Leech, Fred; Schmied, Sarah
Subject: Request for Informatino - Hwy 401/Hwy 6 Improvements Project

Good Evening Graham,

The Ministry of Transportation (MTO) has retained AECOM Canada Ltd. to undertake preliminary design review, detailed design and class environmental assessment for improvements to Highways 6 & 401 from Hamilton North Limits to Guelph South Limits in the Township of Puslinch, Highway 6

Guelph/Eramosa Township.

We are conducting a background review of the natural environment existing conditions present within the Study Areas of these two Projects. Please refer to the attached request for information letters and map for the precise locations of the Study Areas.

I am directing the request for information to you because as it is my understanding that my colleague Jessica Piette has contacted you previously regarding this project. If you have any questions about the project or require any clarifications please feel free to contact either Jessica or myself.

Should these requests need to be sent to another individual at the Guelph District please advise and I'll redirect them asap.

Thanks,

Julie Ellis B.Sc.
Terrestrial Ecologist
D 1-905-747-7610
M 1-416-476-6413
julie.ellis@aecom.com

Date April 25, 2017

Ministry of Natural Resources and Forestry
Guelph District
Ontario Government Bldg,
1 Stone Rd W, Guelph, ON N1G 4Y2

Re: Request for Information

Attention: Graham Buck

In accordance with the *MTO/DFO/MNRF Protocol for Protecting Fish and Fish Habitat on Provincial Highway Undertakings - Version 3,* 2016, this letter is to request fisheries information from the Ministry of Natural Resources and Forestry (MNRF) for the Ministry of Transportation's (MTO) undertaking of Natural Heritage Features and Species at Risk Records Request for Information for the Highways 6 & 401 from Hamilton North Limits to Guelph South Limits.

The Ministry of Transportation (MTO) has retained AECOM Canada Ltd. to undertake preliminary design review, detailed design and class environmental assessment for improvements to Highways 6 & 401 from Hamilton North Limits to Guelph South Limits in the Township of Puslinch, Highway 6 (Hanlon Expressway) from Maltby Road northerly to the Speed River in the City of Guelph and Guelph/Eramosa Township.
The proposed highway improvements are expected to include: new bridges, replacement of culverts and/or extensions, culvert rehabilitation and maintenance, and potential wingwall improvements.

In a north to south progression from College Avenue in the City of Guelph to the 401 along the Hanlon Parkway, the identified crossings within the study area include:

- Hanlon's Creek
- Mill Creek
- Aberfoyle Creek

In an east to west progression from the eastern study limits along the 401 to the western study limits, the identified crossings within the study area include:

- Irish Creek
- Unnamed tributary (1)
- Mill Creek
- Aberfoyle Creek
- Unnamed tributary (2)
- Unnamed tributary (3)
- Mountsberg Creek

In a north to south progression from the 401 to the southern study limits along the Highway 6 through Morriston, the identified crossings within the study area include:

- Bronte Creek

Other watercourses identified within the study area include:

- Fletcher Creek

Fisheries and Oceans Canada (DFO) provides a Distribution of Aquatic SAR mapping for the study area. The DFO mapping provides a general indication of the potential habitat, but does not confirm presence or absence from the site. The DFO mapping for the drainage features within the study area do not have any SAR listed.

As per Step 2 of the MTO/DFO/MNR Fisheries Protocol, we request that MNRF complete the attached table that includes information on fish communities and habitat.

Please see the attached for details regarding the watercourses within the project limits.

We look forward to MNRF's response to our request within **30 working days**, as specified in the Protocol.

Michael Godard
Fisheries Biologist

c.c. James Corcoran, Senior Environmental Planner, MTO
Fred Leech, Senior Environmental Planner, AECOM
Sarah Schmied, Environmental Planner, AECOM

Waterbody Name and location (GPS coordinates & Google Earth map)	Watercourse classification (i.e. warmwater, coldwater)	Habitat information/ locations (fish passage barriers, known spawning habitats, groundwater upwellings, migratory corridors etc.)	Historical data on fish species present, including whether the subject waterbody(s) [SPECIFY LOCATION] are considered to support any vulnerable, threatened or endangered aquatic species	MNR fisheries management objectives, if applicable	In-water timing windows for construction
Hanlon's Creek – 43.50343 °N 80.22878 °W					
Mill Creek - 43.45538°N 80.17928°W					
Aberfoyle Creek - 43.49912°N 80.17276°W					
Irish Creek – 43.42678°N 80.26972°W					
Unnamed Trib (1) – 43.43960°N 80.21879°W					
Bronte Creek – 43.44700°N 80.11442°W					
Unnamed tributary (2) –43.46352°N 80.09111°W					
Unnamed tributary (3) - 43.46438°N 80.08682°W					
Mountsberg Creek -43.46843°N 80.07257°W					

Fletcher Creek - 43.41967°N 80.09150°W					

NOTE:

- The applicant shall complete the waterbody name and location (column 1) and attach a Google Earth map or MTO project map identifying each waterbody and submit to MNRF.
- MNRF is required as per Step 2 of the Fisheries Protocol to provide the applicant with the information outlined in the table above (columns 2-6) within **30 working days**.

Ministry of Natural Resources And Forestry

Ministère des Richesses naturelles et des Forets

Guelph District
1 Stone Road West
Guelph, Ontario
N1G 4Y2

Telephone: (519) 826-4955
Facsimile: (519) 826-4929

Ontario

June 30, 2017

Jessica Piette, (Hon) B.ES.
Terrestrial Ecologist, Water & Natural Resources, Environment
AECOM
50 Sportsworld Crossing Road, Unit 290
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1-519-650-8618
jessica.piette@aecom.com

Dear Jessica,

Thank you for your inquiry regarding the presence of species at risk and natural heritage features for Highway 6, Maddaugh Road to Highway 401 in the cities of Hamilton and Guelph, Ontario.

Digital mapping for some natural heritage features is available from Land Information Ontario (LIO). MNRF recommends contacting LIO to obtain relevant feature mapping. Datasets of potential interest (and the corresponding LIO dataset) include – wetlands ('Wetland Unit' dataset), ANSI ('ANSI dataset), wooded areas ('Wooded Areas'), wintering areas ('Wintering Areas'), and fish spawning areas ('Spawning Areas').

The Ministry of Natural Resources and Forestry (MNRF) has had an opportunity to review the natural heritage records and information available at the Guelph District Office, for the above noted file. Please see below for the following information and comments to address your questions noted in the email correspondence.

Wetlands

There are five Provincially Significant Wetland Complexes within the study area, including Beverly Swamp Wetland Complex, Cranberry Oil Well Bog Wetland Complex, East Morriston Swamp, Fletcher Creek Swamp, and Mill Creek Puslinch Wetland Complex.

Digital mapping of wetlands can be obtained from Land Information Ontario (LIO). The Warehouse Dataset Name is 'Wetlands' within LIO. LIO manages key provincial datasets, and is responsible for housing most of the Ministry's digital natural heritage and resource data. The LIO Warehouse also includes spatial data from a variety of other sources and agencies, including federal ministries and conservation authorities. The LIO website provides instructions on how to request/obtain data, and a full listing of all data in the Warehouse. The link to the LIO website is as follows: http://www.mnr.gov.on.ca/en/Business/LIO/index.html. LIO staff can also be contacted at lio@ontario.ca or at (705) 755-1878 for assistance.

ANSI

Fletcher Creek Swamp Forest Regional Life Science ANSI and Galt Moraine Regional Earth Science ANSI are within the study area,

Digital mapping of Areas of Natural and Scientific Interest can be obtained from Land Information Ontario (LIO). The Warehouse Dataset Name is 'ANSI' within LIO. LIO manages key provincial datasets, and is responsible for housing most of the Ministry's digital natural heritage and resource data. The LIO Warehouse also includes spatial data from a variety of other sources and agencies, including federal ministries and conservation authorities. The LIO website provides instructions on how to request/obtain data, and a full listing of all data in the Warehouse. The link to the LIO website is as follows: http://www.mnr.gov.on.ca/en/Business/LIO/index.html. LIO staff can also be contacted at lio@ontario.ca or at (705) 755-1878 for assistance.

Species at Risk

The Ministry notes that there are several species at risk (SAR) records for the area.

Species Name	Scientific Name	STATUS
Bank Swallow	*Riparia riparia*	THR
Barn Swallow	*Hirundo rustica*	THR
Bobolink	*Dolichonyx oryzivorus*	THR
Eastern Meadowlark	*Sturnella magna*	THR
Eastern Ribbonsnake	*Thamnophis sauritus*	SC
Eastern Small-footed Myotis	*Myotis leibii*	END
Grasshopper Sparrow	*Ammodramus savannarum*	SC
Jefferson Salamander	*Ambystoma jeffersonianum*	END
Little Brown Myotis	*Myotis lucifugus*	END
Monarch	*Danaus plexippus*	SC
Northern Myotis	*Myotis septentrionalis*	END
Redside Dace	*Clinostomus elongatus*	END
Snapping Turtle	*Chelydra serpentina*	SC
Tri-colored Bat	*Perimyotis subflavus*	END
Unisexual Ambystoma (Jefferson Salamander dependent)	*Ambystoma laterale – (2) jeffersonianum*	END

Please note that because the province has not been surveyed comprehensively for the presence of species at risk (SAR), the absence in the NHIC database of an EO in a particular geographic area does not indicate the absence of the species in that area. Consequently, the presence of an EO is useful to flag the presence of the species in the area, but is not an appropriate tool to determine whether a species is absent, or whether it should be surveyed for or not in a particular area.

Consequently, we provide the following advice with respect to determining the presence of species at risk on a property for which a land-use change or on-the-ground activity is being proposed (note that some of the following may not apply to a given type of proposed activity, or for a given study area):

I. Habitat Inventory

The District recommends undertaking a comprehensive botanical inventory of the entire area that may be subject to direct and indirect impacts from the proposed activity. The vegetation communities and aquatic habitats in the study area should be classified as per the “Ecological Land Classification (ELC) for Southern Ontario” system, to either the “Ecosite” or “Vegetation Type” level. With respect to aquatic habitats in the study area, we recommend you collect data on the physical characteristics of the waterbodies and inventory the riparian zone vegetation, so that these habitats can be classified as per the Aquatic Ecosites described in the ELC manual.

II. Potential SAR on the property

A list of species at risk that have the potential to occur in the area can be produced by cross- referencing the ecosites described during the habitat inventory with the habitat descriptions of species at risk known to occur in the county or regional municipality within which the area is located. The species-specific COSEWIC status reports (www.cosewic.gc.ca) are a good source of information on species at risk habitat needs and will be helpful in determining the suitability of the property’s ecosites for a given species.

Please note that the Species at Risk in Ontario list (SARO) is a living document and is amended periodically as a result of species assessment and re-assessments conducted by the Committee on the Status of Species at Risk in Ontario (COSSARO). The SARO list can be accessed on the webpage http://www.ontario.ca/environment-and-energy/species-risk-ontario-list

COSSARO also maintains a list of species to be assessed in the future. It is recommended to take COSSARO's list of anticipated assessments into consideration, especially when the proposed start date of the activity is more than 6 months away, or the project will be undertaken over a period greater than 6 months. The list can be viewed by going to http://www.ontario.ca/page/how-comment-protecting-species-risk.

III. SAR surveys

The District is of the opinion that each species at risk identified under Step II should be surveyed for, regardless of whether or not the species has been previously recorded in the area, or whether previous records are historical in nature. The survey report should describe how each species at risk was surveyed for, and provide a rationale for why, if any, certain species appearing on the county/ regional municipal list were not the subject of the survey. These rationales must be based on evidence demonstrating either that: suitable habitat for the species is not present on the property or; the project will not have any impacts -including indirect impacts- on the species. Some SAR surveys require an authorization under the *Endangered Species Act 2007* and/or a Scientific Collector's Permit; please contact the Guelph District office if you require further direction regarding these.

Guelph District additionally recommends contacting the municipal planning approval authority and the conservation authority to determine if they have any additional information or records of interest for the study area. Please contact our office if your investigations reveal the presence of species at risk on the subject property. MNRF will be happy to provide further advice regarding the provisions of the *Endangered Species Act* at that time.

We require more detailed information on the proposed project in order to assess the impacts of the works on Species at Risk. *When project details have been determined*, please fill out an Information Gathering Form (IGF) for any *threatened* or *endangered* species listed in the provided letter and submit it to our office (to ESA.Guelph@ontario.ca). The IGF can be found here (along with its associated guide). Please include detailed descriptions of the undertakings such as proposed timing and phasing of the project and details on what is required at each phase.

All sections and tables should be filled out in their entirety – incomplete forms will be returned and may delay the review process. Any applicable supplemental information that will assist with the review process should also be submitted with the IGF (e.g. field survey results, site plan/drawings, ELC mapping, etc.). Please note that forms are reviewed in the order in which they are received by MNRF and we will contact you with our response once the review is complete.

Sincerely,

Melinda Thompson

MELINDA J. THOMPSON

MANAGEMENT BIOLOGIST
ONTARIO MINISTRY of NATURAL RESOURCES and FORESTRY
melinda.thompson@ontario.ca

cc. Anne Marie Laurence, Management Biologist
Tara McKenna, District Planner

From: Bonaldo, Michelle (MNRF) <michelle.bonaldo@ontario.ca>
Sent: April-26-17 9:08 AM
To: Godard, Michael
Subject: FW: Fish Collection Licenses?

Good morning Michael. No worries but I did receive your email. The response is below. ☺

Warm regards,
Michelle

From: Bonaldo, Michelle (MNRF)
Sent: April 18, 2017 9:26 AM
To: 'Godard, Michael'
Subject: RE: Fish Collection Licenses?

Thank you Michael,

I will send your application along for approvals.

Michelle

Michelle Bonaldo
Resource Clerk
Resource Operations Team
Ministry of Natural Resources and Forestry
Guelph District
Ph. 519 826-4909 Fx 519 826-4929
Michelle.bonaldo@ontario.ca

From: Godard, Michael [mailto:Michael.Godard@aecom.com]
Sent: April 17, 2017 2:27 PM
To: Bonaldo, Michelle (MNRF)
Subject: RE: Fish Collection Licenses?

Hi Michelle!

Things are good. Super busy but that's the world we live in I think ☺

From: Godard, Michael
Sent: April-26-17 8:05 AM
To: Bonaldo, Michelle (MNRF)
Subject: RE: Fish Collection Licenses?

Morning Michelle,

Just curious as to whether or not the file came through ok? I sent it from my phone while I was in the field and wasn't 100% of its size.

Thanks!

Michael

Michael Godard, B.Sc. (Hons)
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From: Godard, Michael [mailto:michael.godard@aecom.com]
Sent: Monday, April 24, 2017 10:28 AM
To: Bonaldo, Michelle (MNRF)
Cc: Hodges, Nick
Subject: Re: Fish Collection Licenses?

Hi Michelle.

We received a new more accurate study area figure. Can we please add it to the FCL as my last one wasn't overlay accurate.

Thank you!

Michael

-------- Original message --------

From: Godard, Michael
Sent: April-17-17 2:27 PM
To: Bonaldo, Michelle (MNRF)
Subject: RE: Fish Collection Licenses?
Attachments: 401-6 FCL Application-2017-04-17-compiled.pdf

Hi Michelle!

Things are good. Super busy but that's the world we live in I think ☺

I am sending a bit of a vague Fish Collection License application as we will be sending an information request separately but are hoping to get out and start with the aquatic habitat assessments and fish collections in early May in order to meet our project timelines. Please see attached.

Thanks for all of your help! I hope you had (and maybe are still having) a fantastic long weekend!

Michael

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michael.godard@aecom.com

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From: Bonaldo, Michelle (MNRF) [mailto:michelle.bonaldo@ontario.ca]
Sent: Thursday, April 13, 2017 2:39 PM
To: Godard, Michael
Subject: RE: Fish Collection Licenses?

Hi Michael, I am doing well, thank you. How are things with you?

If you have LCF applications to send along, you can send them to me.

I hope you have a wonderful long weekend.

Michelle ☺

From: Godard, Michael [mailto:Michael.Godard@aecom.com]
Sent: April 13, 2017 2:29 PM

Subject: Fish Collection Licenses?

Hi Michelle,

How are you?

I was wondering who I should be sending Fish Collection Licenses to since Art Timmerman's retirement?

Thanks!!!

Michael

Michael Godard, B.Sc. (Hons)
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Waterbody Name and location (GPS coordinates & Google Earth map)	Watercourse classification (i.e. warmwater, coldwater)	Habitat information/ locations (fish passage barriers, known spawning habitats, groundwater upwellings, migratory corridors etc.)	Historical data on fish species present, including whether the subject waterbody(s) [SPECIFY LOCATION] are considered to support any vulnerable, threatened or endangered aquatic species	MNR fisheries management objectives, if applicable	In-water timing windows for construction *Prohibited Time Period*
Hanlon's Creek – 43.50343 °N 80.22878 °W	Coldwater		Bluntnose Minnow Brook Stickleback Brook Trout Central Mudminnow Creek Chub Eastern Blacknose Dace Fathead Minnow Longnose Dace Mottled Sculpin Northern Redbelly Dace Pumpkinseed White Sucker		October 1 – June 30
Mill Creek - 43.45538°N 80.17928°W	Cold	Brook trout spawning Brown trout spawning	Bluntnose Minnow Brook Stickleback Brook Trout Brown Trout		October 1 to June 30

			Central Mudminnow Common Shiner Creek Chub Eastern Blacknose Dace Fathead Minnow Rainbow Darter Rock Bass White Sucker		
Aberfoyle Creek - 43.49912°N 80.17276°W	No information in our records for this coordinate				
Irish Creek – 43.42678°N 80.26972°W	Warm	Northern Pike Spawning	White Sucker Northern Pike Central Mudminnow Brook Stickleback Pumpkinseed		March 15 – June 30
Unnamed Trib (1) – 43.43960°N 80.21879°W	Cold		Bluntnose Minnow Brook Stickleback Brook Trout Brown Trout Central Mudminnow Common Shiner Creek Chub Eastern Blacknose Dace Fathead Minnow Rainbow Darter Rock Bass		October 1 – June 30

			White Sucker		
Bronte Creek –43.44700°N 80.11442°W	No fisheries information on file				
Unnamed tributary (2) – 43.46352°N 80.09111°W	No fisheries information on file				
Unnamed tributary (3) - 43.46438°N 80.08682°W	No fisheries information on file				
Mountsberg Creek - 43.46843°N 80.07257°W	Cold	Northern Pike spawning area downstream	Banded Killifish Brassy Minnow Brook Stickleback Brook Trout Central Mudminnow Creek Chub Eastern Blacknose Dace Fathead Minnow Largemouth Bass Northern Hog Sucker Northern Pike Pearl Dace Pumpkinseed White Sucker		October 1 – June 30
Fletcher Creek - 43.41967°N 80.09150°W	Cold	Brook Trout spawning area downstream	Brook Stickleback Brook Trout Central Mudminnow Creek Chub Eastern Blacknose Dace		October 1 – June 30

			Largemouth Bass Mottled Sculpin Northern Pike Northern Redbelly Dace Pearl Dace Pumpkinseed Spottail Shiner White Sucker Yellow Perch		

From: Wedgewood, Jamie R. (MNRF) <Jamie.R.Wedgewood@ontario.ca>
Sent: July-28-17 12:32 PM
To: Godard, Michael
Cc: Laurence, Anne Marie (MNRF); Buck, Graham (MNRF)
Subject: RE: Request for Informatino - Hwy 401/Hwy 6 Improvements Project
Attachments: Fisheries Info.pdf

Hi Michael,

I've attached the completed Fisheries Information Table. Feel free to contact me if you have further questions related to this information.

Jamie Rose Wedgewood

Jamie Rose Wedgewood
A/Management Biologist
Ontario Ministry of Natural Resources and Forestry
Guelph District
1 Stone Rd. W.
N1G 4Y2
(P): 519-826-4936
Jamie.R.Wedgewood@ontario.ca

From: Godard, Michael [mailto:Michael.Godard@aecom.com]
Sent: July-28-17 11:29 AM
To: Buck, Graham (MNRF); Wedgewood, Jamie R. (MNRF)
Cc: Piette, Jessica; Hodges, Nick; Mendoza, Jessica
Subject: FW: Request for Informatino - Hwy 401/Hwy 6 Improvements Project

Hi Graham and Jamie!

I sent the email below to both Anne - Marie and Melinda and got out of offices from both of them in which they suggested to contact you two in their absences.

Can you please let me know if you're able to provide a response in their absence?

Many thanks!

Michael

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From: Godard, Michael
Sent: Friday, July 28, 2017 11:15 AM
To: 'Melinda.Thompson@ontario.ca'; annemarie.laurence@ontario.ca
Cc: Piette, Jessica; Hodges, Nick; Mendoza, Jessica
Subject: FW: Request for Informatino - Hwy 401/Hwy 6 Improvements Project

Good morning Melinda and Anne Marie,

Thank you very much for your response for the 401/6 project earlier in June. We were recently going through all of the data and noticed no fisheries information was included with the response. I have attached the original email with the files which were included in the original submission. Will there be a separate email with regards to fisheries? If you could please let us know the status for this information it would be greatly be appreciated.

Please do not hesitate to contact me should you require further information or have any questions.

Thank you,

Michael

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LinkedIn Twitter Facebook Instagram

From: Thompson, Melinda (MNRF) [mailto:Melinda.Thompson@ontario.ca]
Sent: Friday, June 30, 2017 3:15 PM
To: Piette, Jessica
Cc: McKenna, Tara (MNRF)
Subject: RE: Request for Informatino - Hwy 401/Hwy 6 Improvements Project

Hello Jessica

Please see the attached screening for the area in question

AECOM
30 Leek Crescent, Floor 4
Richmond Hill, ON, Canada L4B 4N4
www.aecom.com

905 882 4401 tel
905 882 4399 fax

October 24, 2017

Tara McKenna
District Planner
Ministry of Natural Resources and Forestry, Guelph District
1 Stone Road West
Guelph, ON N1G 4Y2
Tara.mckenna@ontario.ca

Dear Ms. McKenna:

RE: Highways 6 & 401 Improvements from Hamilton North Limits to Guelph South Limits including a New Alignment of a Segment of Highway 6 Detailed Design and Class Environmental Assessment (G.W.P. 3042-14-00)

The Ministry of Transportation (MTO) has retained AECOM Canada Ltd. to undertake a preliminary design review, followed by the development of a detailed design for two coordinated projects:

- Highways 6 & 401 improvements from Hamilton North Limits to Guelph South Limits including the new alignment of a segment of Highway 6 (G.W.P 3042-14-00), in the Township of Puslinch; and,
- Improvements to Highway 6 (Hanlon Expressway) from Maltby Road northerly to the Speed River (G.W.P 14-00-00), in the City of Guelph and Guelph/Eramosa Township.

It is anticipated that one or both of these projects will be delivered as a design build project.

In addition, AECOM Canada has been retained to develop a conventional detail design contract package for replacement of the Concession Road 7 bridge over Highway 401.

AECOM has been in contact with the Ministry of Natural Resources and Forestry (MNRF) for these projects as follows:

- G.W.P. 3042-14-00:
  - Study commencement notification on June 9, 2017;
  - Request for information on April 27, 2017 with responses on June 30, 2017 and July 28, 2017; and,
  - Introductory Agency Meeting at the MNRF Guelph Office on June 30. 2017.
- G.W.P. 14-00-00:
  - Study commencement notification on August 4, 2017;

- Request for information on April 27, 2017 with responses on June 30, 2017 and July 28, 2017; and,
- Introductory Agency Meeting to be scheduled.

For G.W.P 3042-14-00, AECOM is in the process of completing preliminary field investigations within the study area and at this time is working to determine next steps with regard to species-specific surveys for a number of species at risk that may occur within the study area. MTO and AECOM would like to request a meeting with MNRF in order to discuss 2017 findings and discuss our next steps.

Discussion points include but would not be limited to:

- Site-specific methods for identification of suitable maternity roost trees, snag density surveys and acoustic surveys for bat species at risk;
- Jefferson salamander surveys and DNA testing requirements;
- Potential up-listing of monarch and brook trout;
- Clearing of forested areas to accommodate the section of new Highway 6 alignment, interchanges and connecting roads;
- Mitigation expectations with respect of SAR and forest impacts.

Further, MTO and AECOM would like to discuss the anticipated project delivery model with MNRF in order to determine the appropriate design stage at which potential permitting documents or permit applications should be submitted.

Sincerely,

AECOM Canada Ltd.

Heather Kime, B. Sc. (Hons.)
Consultant Terrestrial Ecologist

Cc:	C. Organ	- MTO Senior Project Manager
	S. Jewell	- MTO Project Manager
	J. Corcoran	- MTO Senior Environmental Planner
	E. Roadhouse	- MTO Environmental Planner
	P. Puccini	- AECOM Project Manager
	G. Coy	- AECOM Deputy Project Manager
	F. Leech	- AECOM Senior Environmental Planner
	S. Schmied	- AECOM Environmental Planner

AECOM Imagine it. Delivered.

Appendix B

Field Data Sheets

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60054071	40/16	11	05	2017

Is STREAM REALIGNMENT required for this section:
O Yes O No ⊗ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
ML + JP	Overcast	10:30	

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
8°C	11.0	0.62 mS

PHOTO NUMBERS AND DESCRIPTIONS: ~~IMG~~ 1-13 (8.86 pH)

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Aberfoyle Creek		P027-1	

LOCATION OF CROSSING:
W of 401

GPS COORDINATES:	566934 4811012	MTO CHAINAGE:
TOWNSHIP:	566925 4811106	MNR DISTRICT: Guelph

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Forest/wetland/401	overland flow - highway

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert ⊗	Open Foot Culvert O	CSP O	N/A O

Other O Describe:
Size (w x h) m^2 15 x 1.5

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (Include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	⊗	O	⊗	O	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50	0.5 m/s

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	⊗	O	⊗	⊗	O	
Percentage of area	30			70		
Mean depth wetted (m)	0.25			0.30		
Mean width wetted (m)	15			15		
Mean bankfull width (m)	18			18		
Mean bankfull depth(m)	1.0			1.0		
Substrate	Co/gr/Sa/Si			Co/gr/Sa/Si		

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	⊘	O	O	O
Right Upstream Bank	⊘	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	10	10	15	Instream 30 Overhanging 20		Instream 15 Overhanging	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	⊘	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent 20	None
Predominant Species			watercress	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent Culvert ?

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	2+ culvert	watercress	

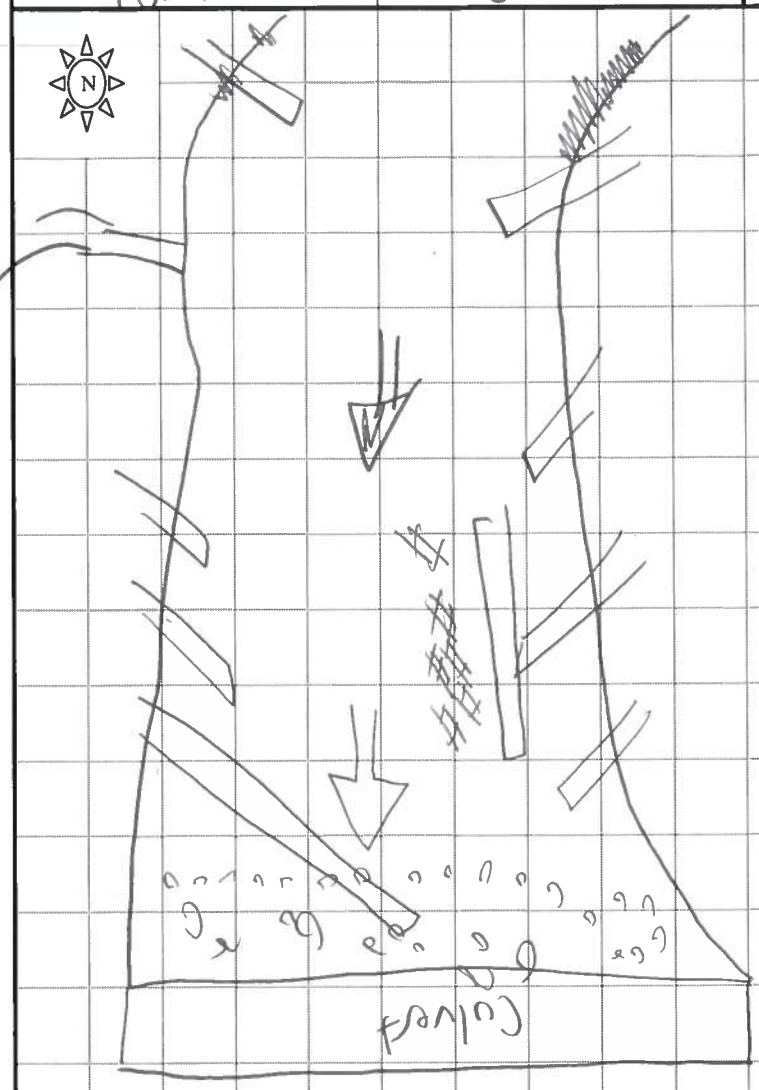
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

- cool/cold water trib.
- large culvert 2+ crossings
- minimal anthropogenic influences upstream
- brook trout?

Additional Notes Appended? ⊘ No O Yes number of pages 1

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
P027-1	US	65	



To wetland

PROJECT #:	60541071
MAPPER:	MG
NAME OF WATERBODY:	Aberfoyle Creek
CROSSING #:	
STATION #:	
DATE: DD-MMM-YY	11/05/17

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

⁘ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

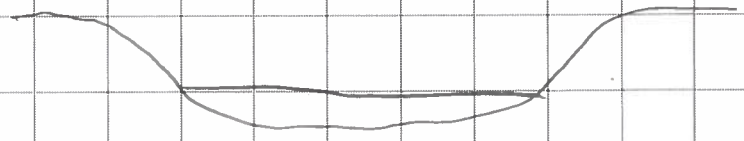
® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⌴ Culvert

PROFILE:	Horz. Scale	Vert. Scale



GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION: 401-6	DAY: 11	MONTH: 05	YEAR: 2017
COLLECTORS: MG + JP		TIME STARTED:	TIME FINISHED:	
WEATHER CONDITIONS: Overcast 50°	AIR TEMP (°C): 10°C	SURFACE CONDITIONS:		
		Calm: ⊘	Rippled: O	Wavy: O	Rough: O
PHOTO NUMBERS AND DESCRIPTIONS:				

LOCATION

NAME OF WATERBODY: P027-2	
LOCATION OF STATION:	
GPS COORDINATES:	MTO CHAINAGE:
TOWNSHIP:	MNR DISTRICT:

LAND USE / TERRAIN AND POLLUTION

SURROUNDING LAND USE / TERRAIN:	SOURCES OF POLLUTION:

SECTION TYPE AND MORPHOLOGY

TYPE:	Large Lake	Small Lake	Pond	Reservoir	Dug-out
	O	O	⊘	O	O

Intermittent	Run-off	Spring-fed	Not Connected	By-pass	In-stream
O	O	O	O	O	O

LAKE / POND DIMENSIONS:	Length (m)	Mean Width (m)

WATER CHEMISTRY

WATER COLOUR:	Colourless	Yellow/brown	Blue/green	Other
	⊘	O	O	O

SECCHI DEPTH (m):	pH (as required):

CONDUCTIVITY (µS/cm):	Surface:	Bottom:

DISSOLVED OXYGEN / TEMPERATURE PROFILE

Depth:	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Water Temperature (°C):											
Dissolved Oxygen (mg/L):											

Depth:	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	
Water Temperature (°C):											
Dissolved Oxygen (mg/L):											

Max Depth (m):		BOTTOM SUBSTRATE:	

Substrate:	Bedrock (Br)	Sand (Sa)	Silt (Si)	Clay (Cl)	Muck (Mu)	Marl (Ma)	Detritus (D)

BANK HABITAT							
BANK COVER (% Surface area):	Undercut Banks	Boulders	Cobble	Woody Debris	Organic Debris	Vascular Macrophytes	None

NEAR SHORE SLOPE (%):

SHORELINE SUBSTRATE (%):

Bedrock	Boulder	Cobble	Gravel	Sand	Silt	Clay	Muck	Marl	Detritus

SHORE COVER (% Shaded):	100 – 90 %	89 – 60 %	59 – 30 %	29 – 1%	None
	o	o	o	o	o

IN-WATER HABITAT

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominate Species:				

UNDERWATER COVER (% Surface area):	Undercut Banks	Boulders	Cobble	Woody Debris	Organic Debris	Macrophytes	None

MIGRATORY OBSTRUCTIONS

None	Seasonal	Permanent

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Additional Notes Appended? o No o Yes number of pages _____

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:

Is STREAM REALIGNMENT required for this section:
O Yes O No ⊘ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
MG + JP			

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
	11.2	0.65 ms

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
P027-3			

LOCATION OF CROSSING:
Hwy 6

GPS COORDINATES:	MTO CHAINAGE:
566696/4811397	
TOWNSHIP: ~~S~~ 566547/4811269	MNR DISTRICT:

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Wetland/Hwy 6	Hy 6 Culvert

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP ⊘	N/A O

Other O Describe:
Size (w x h) m^2 1 x 1

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (Include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	O	O	O	O	⊘	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	O	
Percentage of area						
Mean depth wetted (m)						
Mean width wetted (m)						
Mean bankfull width (m)						
Mean bankfull depth(m)						
Substrate						

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY				
	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	O	O	O
Right Upstream Bank	O	O	O	O

HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris Instream Overhanging	Organic debris	Vascular Macrophytes Instream Overhanging	None

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species				

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Additional Notes Appended? O No O Yes **number of pages** _____

PTE = YES

Ministry of Transportation — Section 4: Field Investigations
Environmental Guide for Fish and Fish Habitat — Appendix 4.A: Watercourse Field Record Form

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60541071	Hwy 401 / Hwy 6	05	07	2017

Is STREAM REALIGNMENT required for this section:
O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
DB AO	clear, hot	10:18	10:50

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
23°	14.7	850

PHOTO NUMBERS AND DESCRIPTIONS:
1-9

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Unnamed trib			401-6-01 d/s

LOCATION OF CROSSING:
Hwy 401 west of Hwy 6 N, POW

GPS COORDINATES:	MTO CHAINAGE:
564405 4810246	—
TOWNSHIP: Guelph	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Hwy, deciduous forest	runoff

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert ⊗	Open Foot Culvert O	CSP O	N/A O

Other O Describe: — Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	O	O	O	⊗	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
200	N/A

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	O	marginal pools of standing water
Percentage of area						100
Mean depth wetted (m)						0.05
Mean width wetted (m)						N/A
Mean bankfull width (m)						N/A
Mean bankfull depth(m)						N/A
Substrate						Mu

undefined channel

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	O	O	O
Right Upstream Bank	O	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	—	—	—	Instream — Overhanging —	—	Instream 70 Overhanging 30	—

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	—	—	100	—
Predominant Species	—	—	cat-tails	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	intermittent flow	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

- remove cat-tail choke

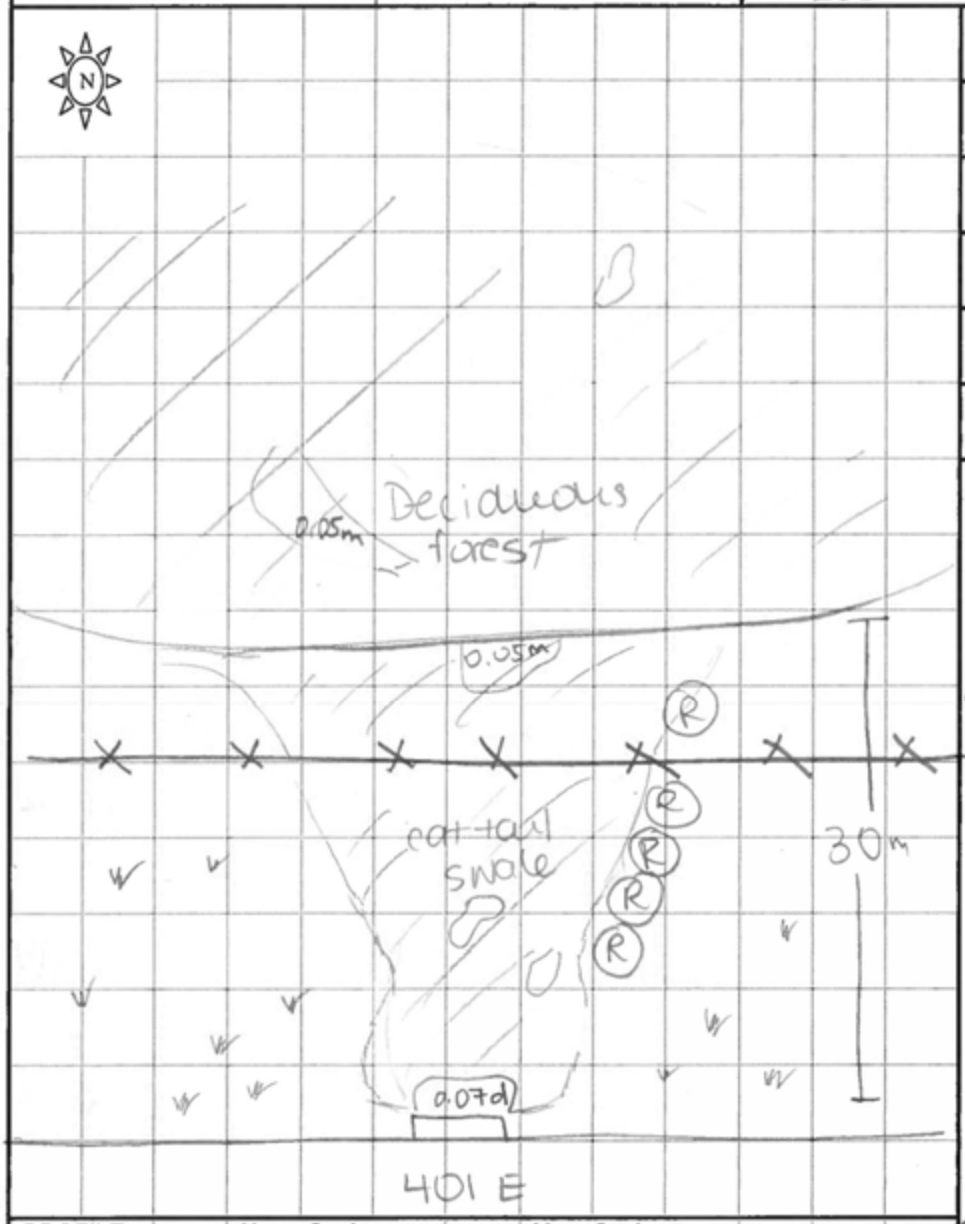
COMMENTS:

- drainage feature with marginal standing water in cat-tails stand and deciduous forest; intermittent flow pools
- no defined channel
- soft substrate
- not fish habitat
- riparian vegetation - various grasses, deciduous trees
- steep embankment from hwy

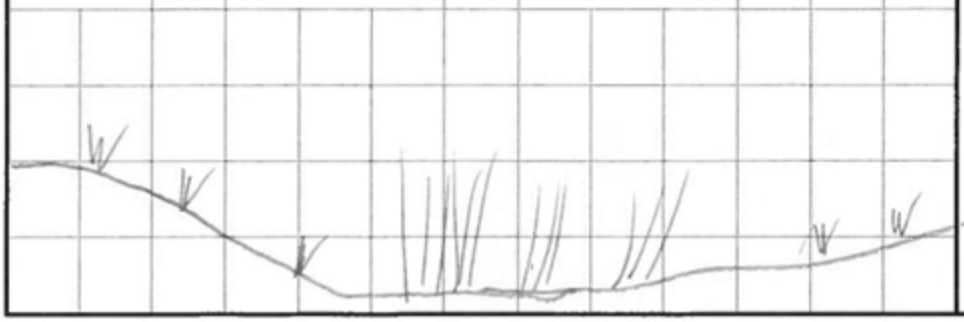
Additional Notes Appended? O No O Yes number of pages _____

d, w in m

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
		200	



PROFILE: **Horz. Scale** **Vert. Scale**



PROJECT #: 60541071

MAPPER: OB

NAME OF WATERBODY: unnamed trib

CROSSING #:

STATION #: 401-6-01 d/s

DATE: DD-MMM-YY 05-07-17

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60541071	401-6	26	07	2017

Is STREAM REALIGNMENT required for this section:

O Yes O No X Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
AC. OB.	Cloudy	1445	1500

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
21°C	16.5	620

PHOTO NUMBERS AND DESCRIPTIONS: 151-166.

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
	—	—	401-6-1U/S

LOCATION OF CROSSING: West of Hwy 6 on 401W.

GPS COORDINATES:	MTO CHAINAGE:
17T 0564390 4810302	—
TOWNSHIP: Guelph	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Hwy, agricultural	Hwy runoff

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert X	Open Foot Culvert O	CSP O	N/A O

Other O Describe: Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
—	—

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	O	O	O	X	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50	—

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	O	Standing water
Percentage of area						0.5%
Mean depth wetted (m)						0.10
Mean width wetted (m)						0.30
Mean bankfull width (m)						undefined
Mean bankfull depth(m)						undefined
Substrate						75% Mu 25% ?

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	Ø	O	O	O
Right Upstream Bank	Ø	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	/	/	/	Instream / Overhanging /	/	Instream 100 Overhanging	/

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	Ø	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species	/	/	100% Cattails	

MIGRATORY OBSTRUCTIONS:	None /	Seasonal /	Permanent
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning /	Evidence of Groundwater /	Other /

POTENTIAL ENHANCEMENT OPPORTUNITIES:

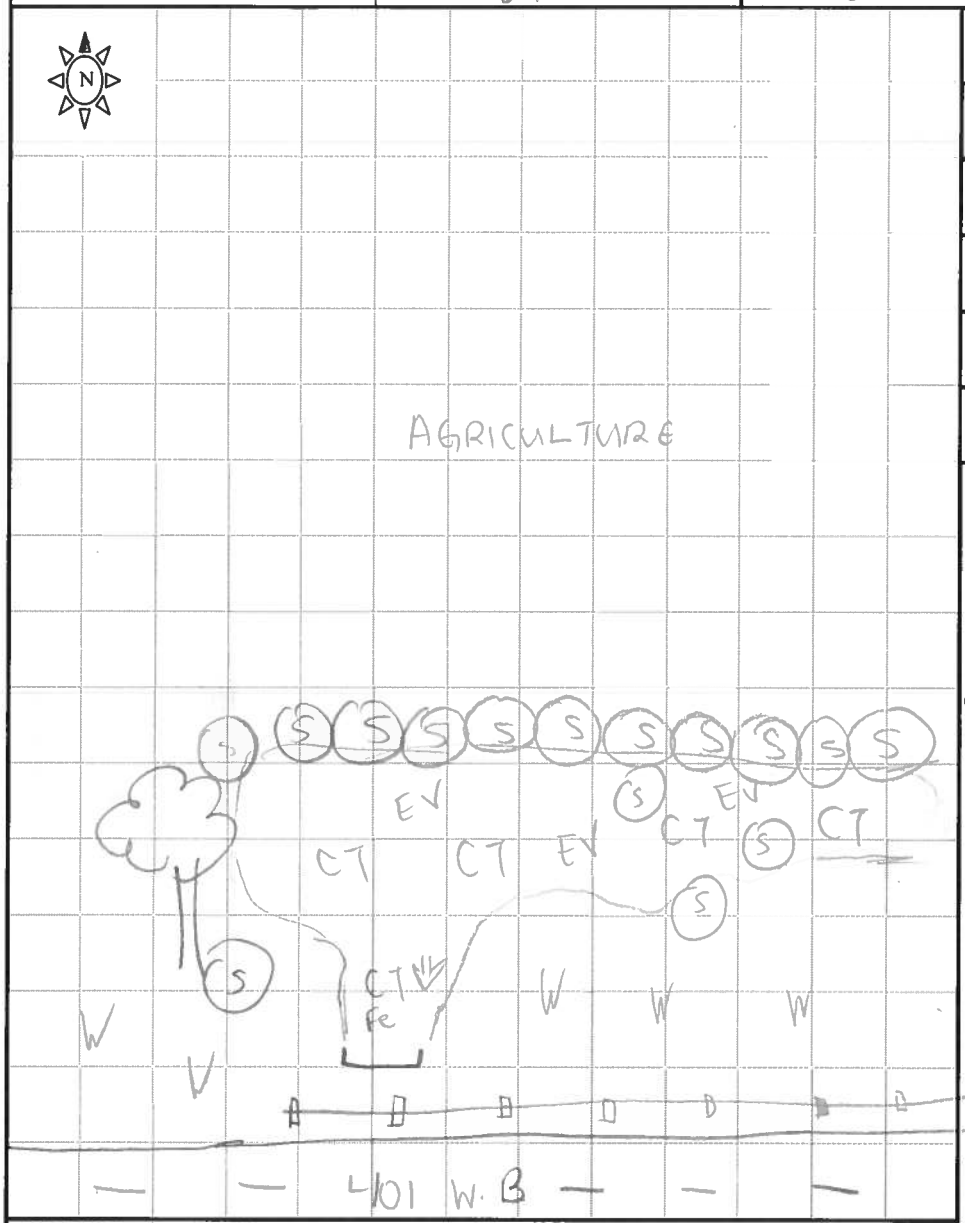
None

COMMENTS:

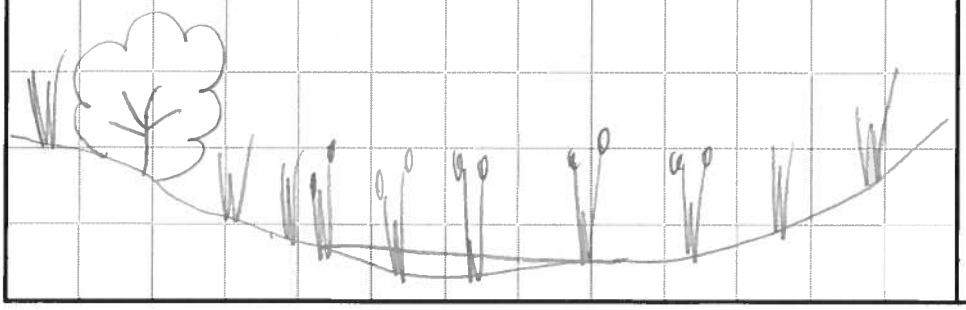
Wetland feature north of 401W, west of hwy 6. Intermittently flowing. No water in study area except small puddle at headwall. Wetland is choked by cattails and not suitable fish habitat. During periods of flow, water is conveyed through a cattail choked swale to the east.

Additional Notes Appended? O No O Yes **number of pages** _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
—	401	50	—



PROFILE: **Horz. Scale** **Vert. Scale**



PROJECT #: 60541071

MAPPER: O Butty

NAME OF WATERBODY: Unnamed

CROSSING #: —

STATION #: 401-6-01 US

DATE: DD-MMM-YY 26-Jul-17

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⌴ Culvert

PTE = NO

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60541071	Hwy 401 / Hwy 6	05	07	2017

Is STREAM REALIGNMENT required for this section:

O Yes O No Ø Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
DB AO	clear, warm	11:00	11:20

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
23°	14.9	630

PHOTO NUMBERS AND DESCRIPTIONS:
10 – 20

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Unnamed trib			401-6-2 d/s

LOCATION OF CROSSING:
Hwy 401 W of Hwy 6 N, P045

GPS COORDINATES: 0564730 4818341	MTO CHAINAGE: N/A
TOWNSHIP: Guelph	MNR DISTRICT: Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
hwy, deciduous forest	runoff

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert Ø	Open Foot Culvert O	CSP O	N/A O

Other O Describe: Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (Include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	O	O	O	Ø	O	—

TOTAL SECTION LENGTH (m): 200	CURRENT VELOCITY (m/s): None

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	O	standing water
Percentage of area						100
Mean depth wetted (m)						0.25
Mean width wetted (m)						0.8
Mean bankfull width (m)						undefined channel/swale
Mean bankfull depth(m)						
Substrate						100 Mu

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	X	O	O	O
Right Upstream Bank	X	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	—	—	—	Instream — Overhanging —	—	Instream 50 Overhanging 50	—

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	X	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	—	—	100	
Predominant Species	—	—	cattails	—

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent choked vegetation, intermittent flow,
	—	—	

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

- remove choked vegetation, garbage

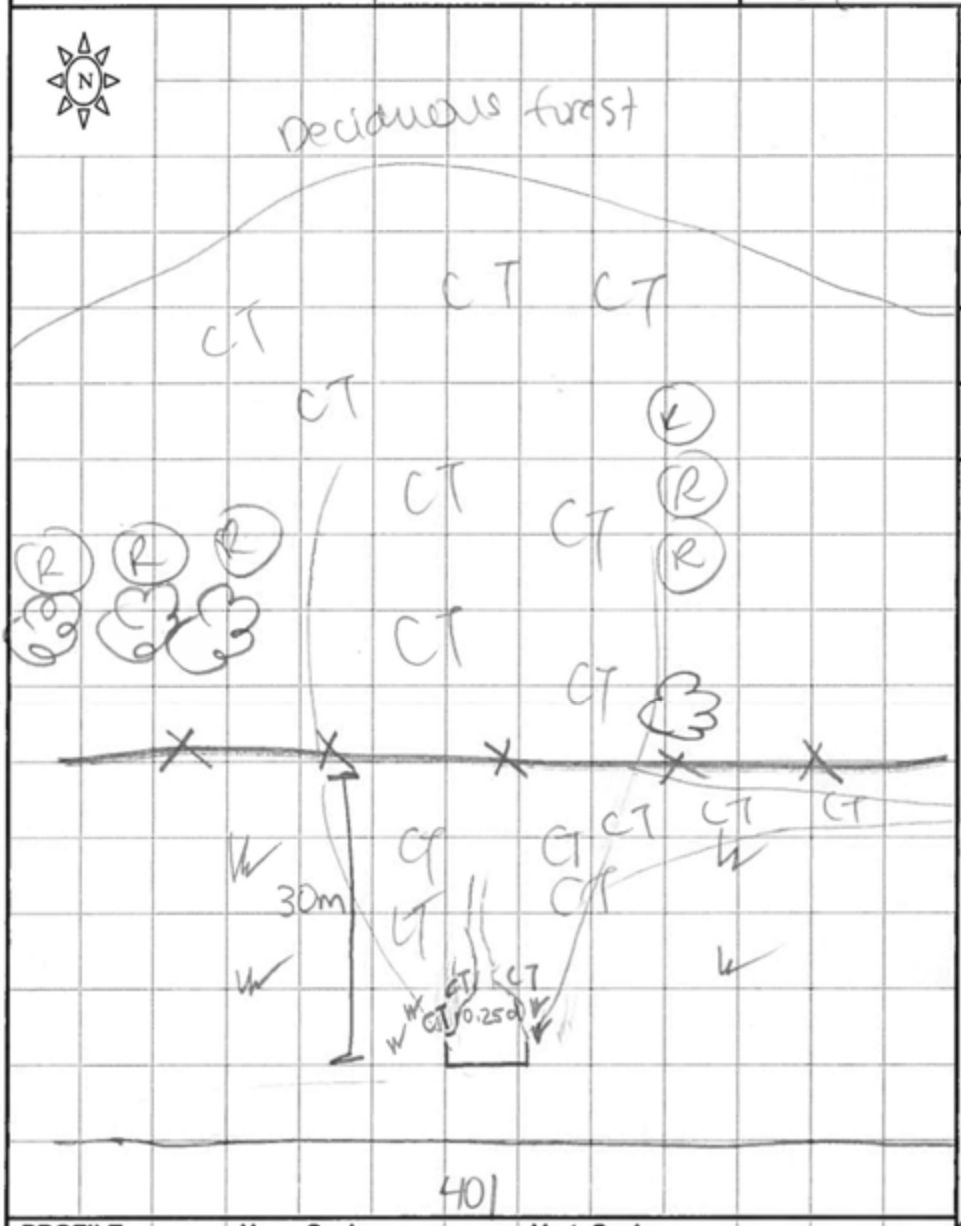
COMMENTS:

- cattail swale at Hwy 401 with limited standing water at culvert mouth
- swale extends past property boundary into deciduous forest
- not fish habitat, birds observed
- no PTE - site assessed 30m to fence, then visually assessed remainder of site

Additional Notes Appended? O No O Yes number of pages _____

a, w in m
shrub

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m): 200 (30m to fence)	SCALE (cm / m):



PROFILE: Horz. Scale: Vert. Scale:

PROJECT #: 60541071

MAPPER: OB

NAME OF WATERBODY: unnamed trib

CROSSING #:

STATION #: 401-6-02d/s

DATE: DD-MMM-YY 05/07/17

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60541671	401-6	26	07	2017

Is STREAM REALIGNMENT required for this section:

O Yes O No Ø Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
A.O. OB	Cloudy	1430	1445

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
21°C	16.9	619

PHOTO NUMBERS AND DESCRIPTIONS: 133-150

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Unnamed.	—	—	401-6-2415

LOCATION OF CROSSING: Hwy 401W, west of Hwy 6.

GPS COORDINATES:	MTO CHAINAGE:
17T 0564719 4810392	—
TOWNSHIP: Guelph	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Hwy 401W	Hwy runoff

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert Ø	Open Foot Culvert O	CSP O	N/A O

Other O Describe: Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
—	—

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	O	O	Ø	O	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50	—

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	O	Standing water
Percentage of area						100%
Mean depth wetted (m)						0.10
Mean width wetted (m)						1.4
Mean bankfull width (m)						undefined
Mean bankfull depth(m)						undefined
Substrate						Mu 80% D 20%

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	O	O	O
Right Upstream Bank	O	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	/	/	/	Instream / Overhanging	30	Instream 100% Overhanging	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	40%		100%	
Predominant Species	grasses	/	cattails	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	/	/	(Permanent)

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	/	/	/

POTENTIAL ENHANCEMENT OPPORTUNITIES:

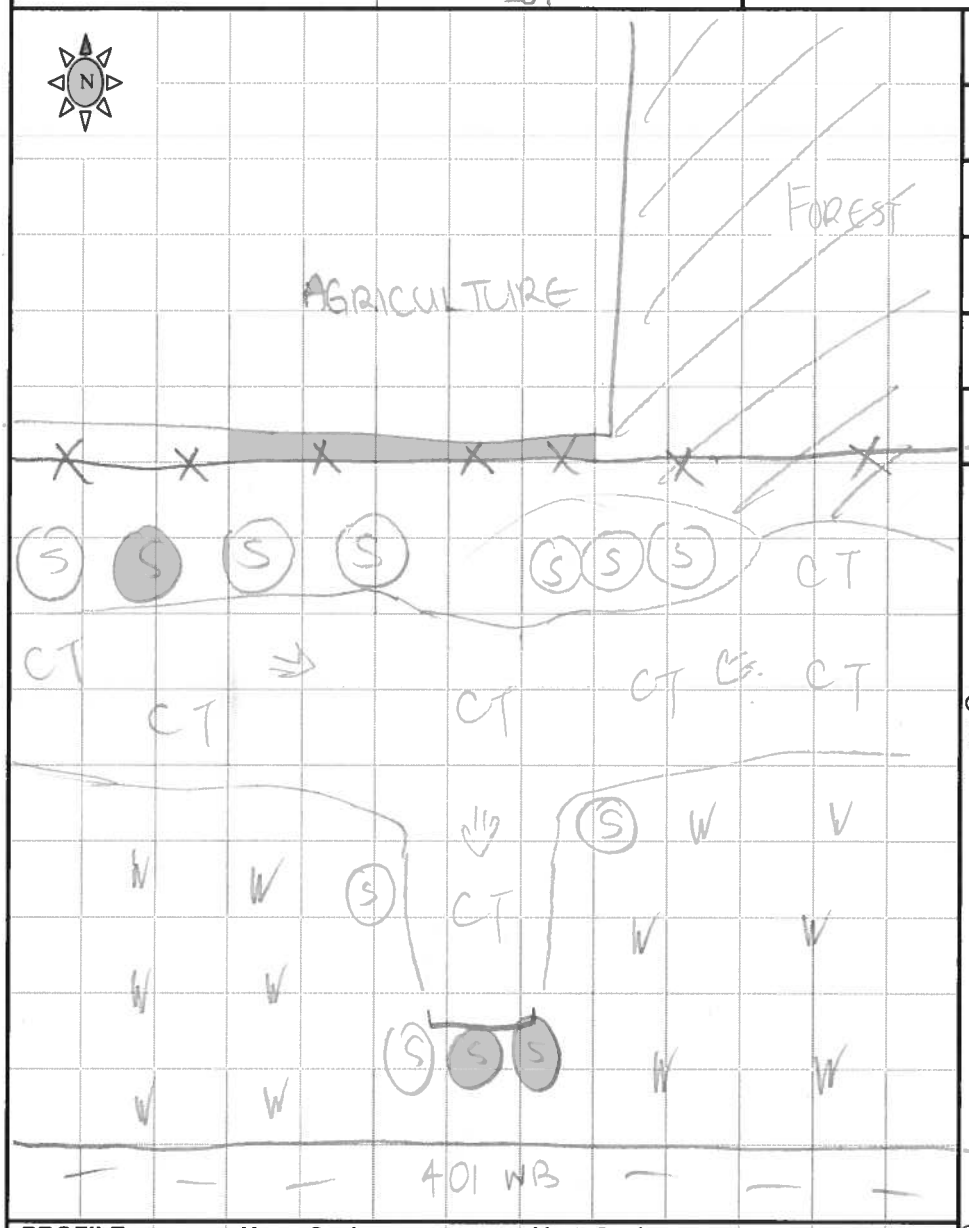
None

COMMENTS:

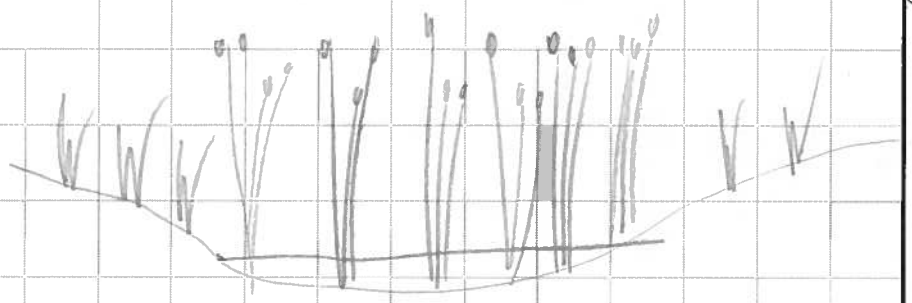
Permanent wetland feature draining flows from east and west swales. Feature is choked w cattails and grasses with standing water over substrate of muck + detritus. Not suitable fish habitat as cattails pose permanent migration obstruction. Bankfull is undefined within the study area.

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
—	401	50	—



PROFILE: **Horz. Scale** **Vert. Scale**



PROJECT #: 60541071

MAPPER: O. Buttry

NAME OF WATERBODY: unnamed.

CROSSING #: —

STATION #: 401-6-2 us

DATE: DD-MMM-YY 26-Jul-17

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

⁘ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

PTE = NO

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60541071	Hwy 401 / Hwy 6	05	07	2017

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
OB, AO	clear, warm	11:28	11:55

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
23°	16.3	636

PHOTO NUMBERS AND DESCRIPTIONS:
21 - 28

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
unnamed trib			401-6-03 d/s

LOCATION OF CROSSING:
Hwy 401 W of Hwy 6N, P046

GPS COORDINATES:	MTO CHAINAGE:
0565160 4810454	—
TOWNSHIP: Guelph	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Hwy, forest	Runoff

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert ☒	Open Foot Culvert O	CSP O	N/A O

Other O Describe: Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (Include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	O	O	O	☒	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
200	—

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	O	Sampling Error
Percentage of area				100		
Mean depth wetted (m)				0.25		
Mean width wetted (m)				0.8		
Mean bankfull width (m)				1.5		
Mean bankfull depth(m)				0.7		
Substrate				70 Mu 30 Si		

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	X	O	O	O
Right Upstream Bank	X	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
100	—	—	—	Instream — Overhanging 80	—	Instream — Overhanging 20	—

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	X	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	—	—	—	
Predominant Species	—	—	—	100

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	—	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

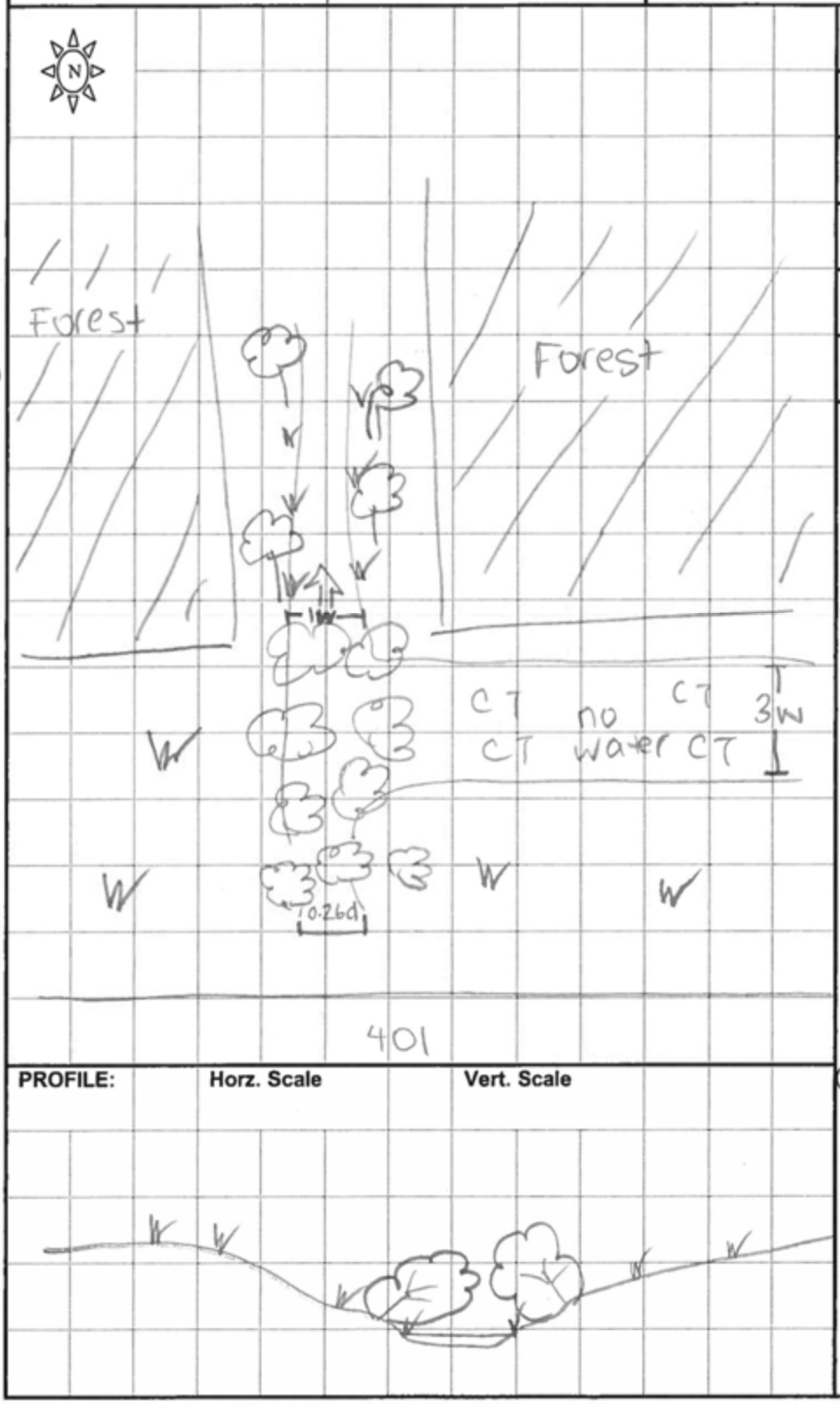
- none

COMMENTS:

- channel very slowly flowing through dense shrubs at Hwy 401 with drainage swale contributing from west (currently dry)
- no PTE - assessed to property boundary
- potential fish habitat
- overgrown shrubs completely shade watercourse 0-15m d/s of culvert, opens up slightly with overhanging trees and grasses
- downstream amphibian survey site

Additional Notes Appended? O No O Yes **number of pages** _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROJECT #: 60541071

MAPPER: OB

NAME OF WATERBODY: unnamed trib

CROSSING #:

STATION #: 401-6-03 d/s

DATE: DD-MMM-YY 05/07/17

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60541071	401-6	26	07	2017

Is STREAM REALIGNMENT required for this section:

O Yes O No ⊗ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
AO, DB.	Cloudy	1400	1430

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
21°C	17.8	692

PHOTO NUMBERS AND DESCRIPTIONS: 109-132

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
	—	—	401-6-3415

LOCATION OF CROSSING: 401W, west of Hwy 6

GPS COORDINATES:	MTO CHAINAGE:
17T 0565147 4810508	—

TOWNSHIP:	MNR DISTRICT:
Guelph	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Hwy 401W	Hwy runoff

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert ⊗	Open Foot Culvert O	CSP O	N/A O

Other O Describe: Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
—	—

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	⊗	O	⊗	O	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50	—

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other Standing water
Percentage of area	—	—	—	70%	—	30%
Mean depth wetted (m)	—	—	—	0.04	—	0.05
Mean width wetted (m)	—	—	—	1.0m	—	1.2
Mean bankfull width (m)	—	—	—	3.0m	—	3.4
Mean bankfull depth(m)	—	—	—	0.40	—	0.50
Substrate	—	—	—	100% Muck	—	100% Mu.

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	O	O	O
Right Upstream Bank	O	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	/	/	/	Instream 50% Overhanging 50%	80%	Instream 10% Overhanging	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species	/	/		/

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	(None)		

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	/	(Evidence of Groundwater) Spring	/

POTENTIAL ENHANCEMENT OPPORTUNITIES:

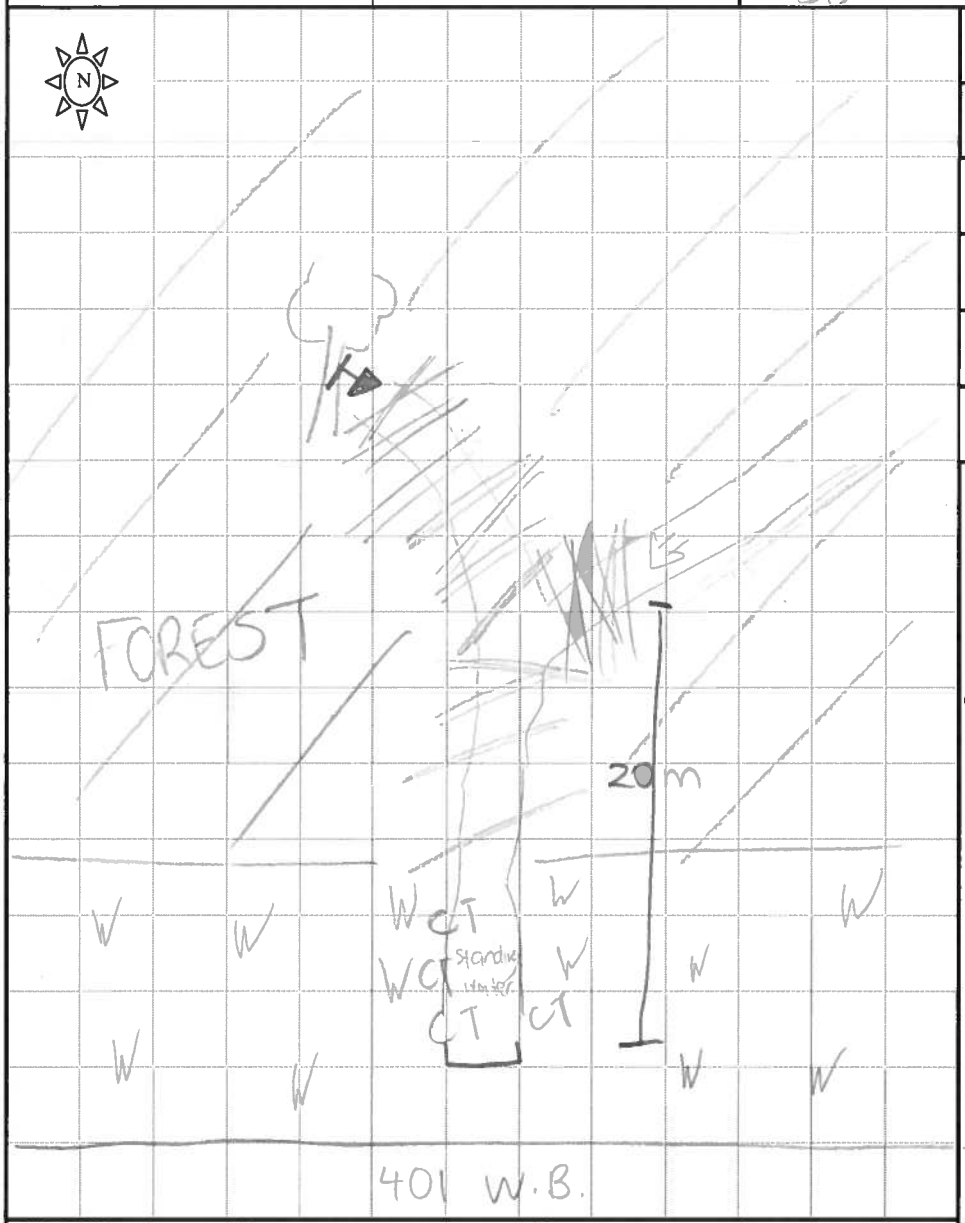
None

COMMENTS:

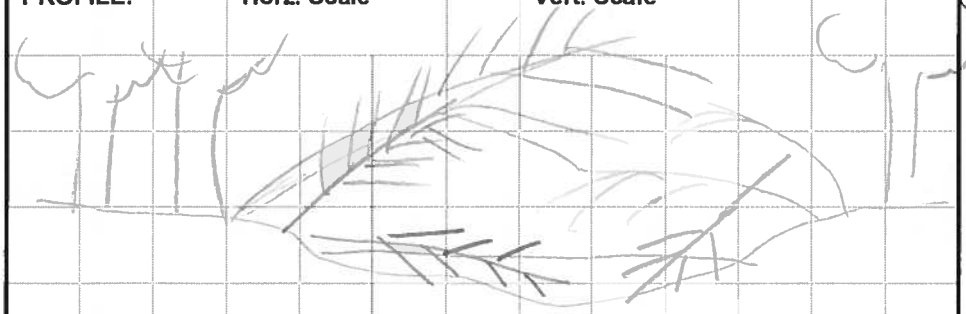
Permanent defined, shallow flow with heavy organic substrate. Slow flow throughout watercourse. Confluence at 2 channels occurs ~20m upstream. West channel directly fed by Spring. East channel could not be assessed due to dense woody debris. Potential for fish habitat. Both channels were flowing and displayed similar morphology to the main channel.

Additional Notes Appended? O No O Yes **number of pages** _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
—	—	50	—



PROFILE: **Horz. Scale** **Vert. Scale**



PROJECT #: 60541071

MAPPER: O Rutty

NAME OF WATERBODY: unnamed

CROSSING #: —

STATION #: 401-6-03 us

DATE: DD-MMM-YY 26-Jul-17

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

⁘ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⌴ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60541071	Hwy 401 / Hwy 6	05	07	2017

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
DB, AO	clear, warm	12 05	12 38

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
24°	14.7	620

PHOTO NUMBERS AND DESCRIPTIONS:
29 - 40 ,

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Mill Creek trib (Puddle Creek)		—	401-6-04 d/s

LOCATION OF CROSSING:
Hwy 401 W of Hwy 6 N off-ramp, P048

GPS COORDINATES: 0565851 4810638	MTO CHAINAGE: —
TOWNSHIP: Guelph	MNR DISTRICT: Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Hwy, wetland/shrub, forest	Runoff

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert ☒	Open Foot Culvert O	CSP O	N/A O

Other O Describe: Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	☒	O	☒	O	O	—

TOTAL SECTION LENGTH (m): 200	CURRENT VELOCITY (m/s): moderate

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	85	—	15	—		
Mean depth wetted (m)	0.40	—	0.15			
Mean width wetted (m)	1.15	—	0.07			
Mean bankfull width (m)	4.0	—	3.0			
Mean bankfull depth(m)		—				
Substrate	50 Cl 30 Si 20 Mu	—	90 Gr 10 Sa			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	Ø	O	O	O
Right Upstream Bank	Ø	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
60	5	—	—	Instream — Overhanging 3	—	Instream 87 Overhanging 10	—

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	Ø	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	80	—	20	—
Predominant Species	water cress	—	grasses	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	—	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	water cress	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

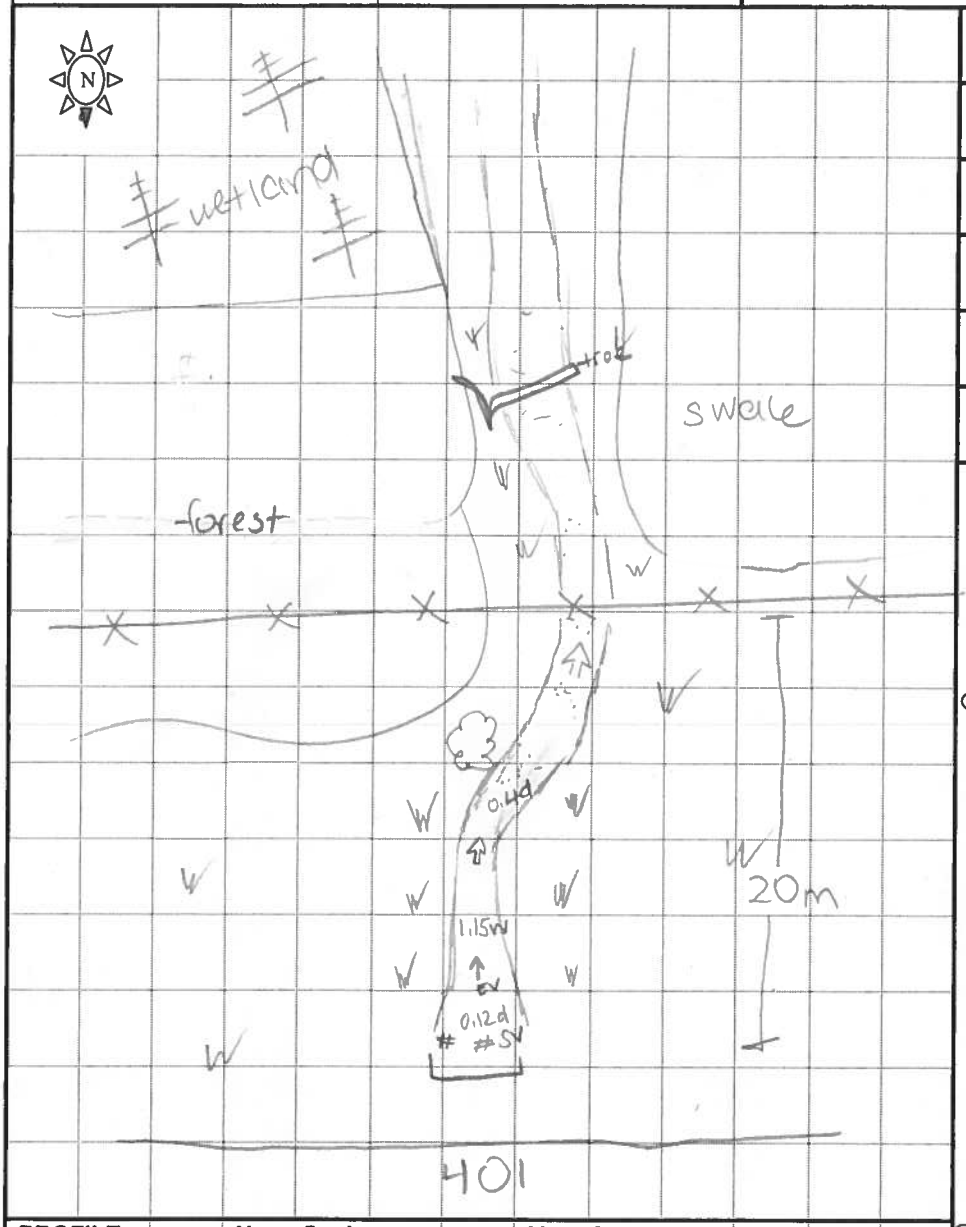
- None

COMMENTS:

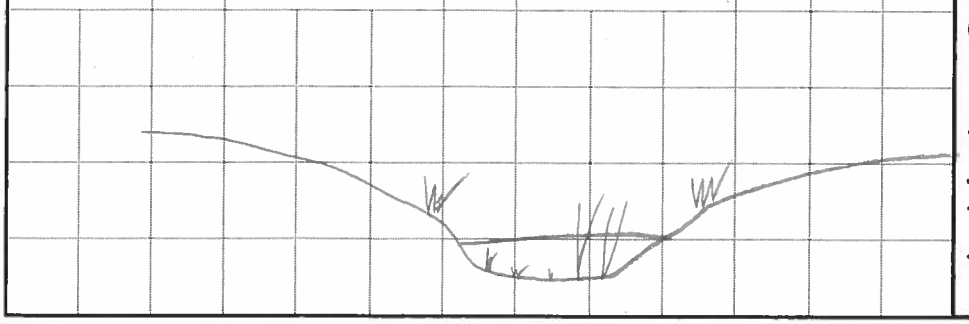
- tributary to Mill creek crossing Hwy 401 west of Hwy 6N off-ramp
- fish habitat (Pond Creek)
- water exits culvert in riffle, slows at meander ~7m d/s where gravel substrate transitions to soft clay/silt/muck.
- flows through forest before joining Mill/Aberfoyle creek

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
		200	



PROFILE: Horz. Scale: Vert. Scale:



PROJECT #: 60541071

MAPPER: OB

NAME OF WATERBODY: Mill Creek tributary (Pond Creek)

CROSSING #: —

STATION #: 401-6-04 d/s

DATE: DD-MMM-YY 05/07/17

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60541071	Hwy 401/Hwy 6	05	07	2017

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
OB, AO	clear warm	14:50	15:10

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
24	15.4	602

PHOTO NUMBERS AND DESCRIPTIONS: 72 - 80

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Mill creek tributary			401-6-04 u/s

LOCATION OF CROSSING: Hwy 401 W of Hwy 6 N, P036

GPS COORDINATES: 0565838 4810693	MTO CHAINAGE:
TOWNSHIP: Guelph	MNR DISTRICT:

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Hwy, forest	runoff, input from drainage swale (dry at time of assessment)

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other O Describe: Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	O	O	O	O	O	

TOTAL SECTION LENGTH (m): 50	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	85		15			
Mean depth wetted (m)	0.25		0.25			
Mean width wetted (m)	0.6		0.6			
Mean bankfull width (m)	3.0		3.0			
Mean bankfull depth(m)	1.1		1.1			
Substrate	40 Si 30 Mu 30 Gr					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	O	X eroding + soft	O
Right Upstream Bank	O	O	X	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
60	—	—	—	Instream 20 Overhanging 30	—	Instream 30 Overhanging 10	10

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	X	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	20	—	30	
Predominant Species	grasses	—	cattails terrestrial grasses, herbaceous	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	—	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

- stabilize eroding banks

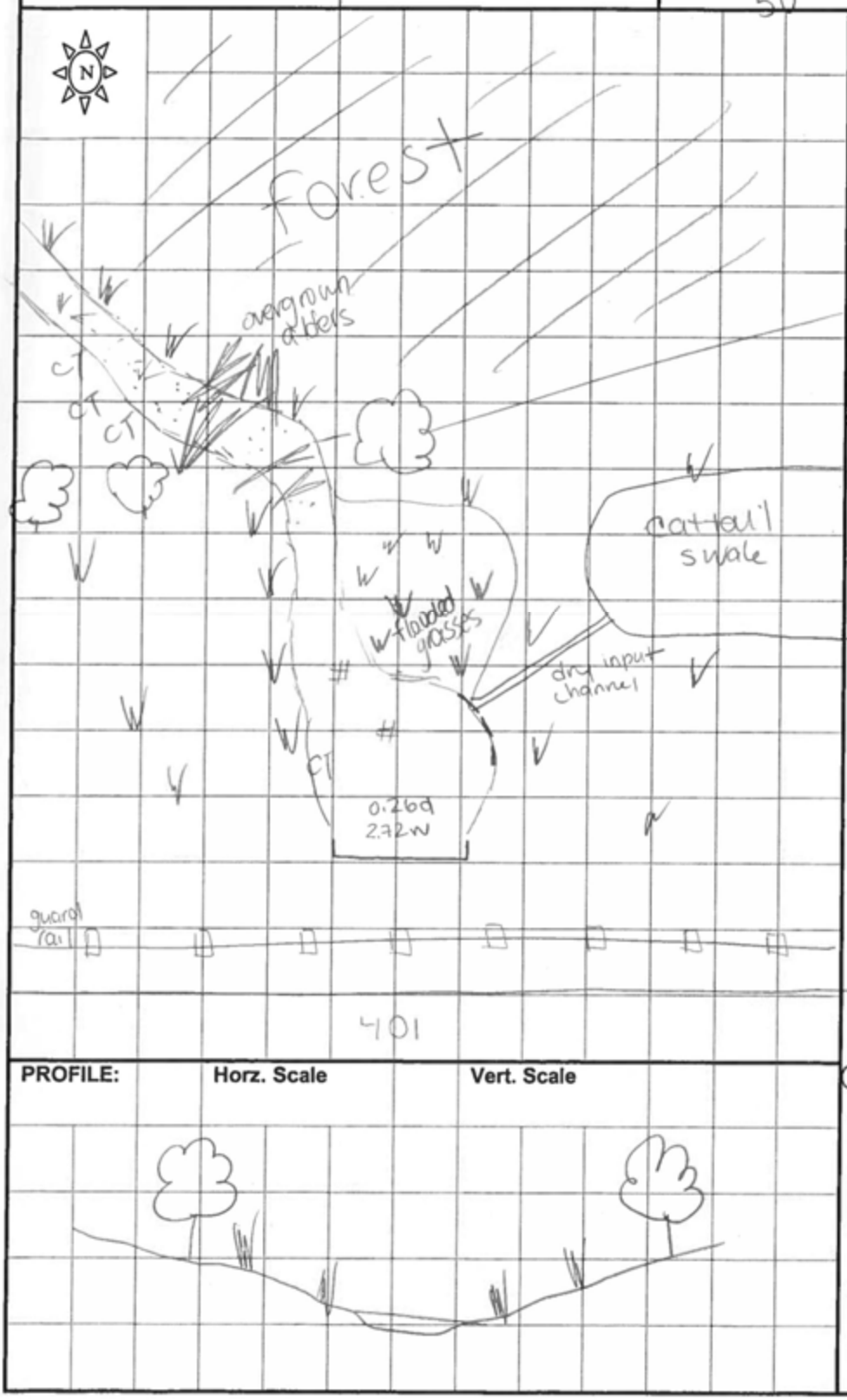
COMMENTS:

- tributary of mill creek flowing through deciduous forest into thicket
- sediment build up over gravel substrate – eroding banks + topsoil resulting in "islands" of sediment + unstable soft bank
- potential input from easterly drainage swale (small dry runoff channel)
- fish, amphibian, benthic habitat

Additional Notes Appended? O No O Yes number of pages _____

d, w in m

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
		50	



broody material

PROFILE: **Horz. Scale** **Vert. Scale**

PROJECT #: 60541071
MAPPER: CButty
NAME OF WATERBODY: Mill creek tributary
CROSSING #:
STATION #: 401-6-04 u/s
DATE: DD-MMM-YY 05/07/17

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

PTE = YES

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60541071	Hwy 401 / Hwy 6	05	07	2017

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
VB	Clear, warm	12:45	13:20

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
24	13.7	805

PHOTO NUMBERS AND DESCRIPTIONS:
41 - 62

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Mill creek			401-6-05 d/s

LOCATION OF CROSSING:
Hwy 401 at Hwy 6N off ramp, P048

GPS COORDINATES: 0966202 4810730	MTO CHAINAGE: —
TOWNSHIP: Guelph	MNR DISTRICT: Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Hwy, forest	Runoff

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert X	Open Foot Culvert O	CSP O	N/A O

Other O Describe: Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	X	O	O	O	O	—

TOTAL SECTION LENGTH (m): 200	CURRENT VELOCITY (m/s): —

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	100					
Mean depth wetted (m)	0.8					
Mean width wetted (m)	8					
Mean bankfull width (m)	9.5					
Mean bankfull depth(m)	1.8					
Substrate	40 Br 40 Mu 10 Sa 10 Si					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	O	O	O
Right Upstream Bank	O	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	—	—	—	Instream 15 Overhanging 40	—	Instream 30 Overhanging 15	—

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	85	—	15	—
Predominant Species	grasses	—	grasses	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	✓	—	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	YOY cyprinids observed	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

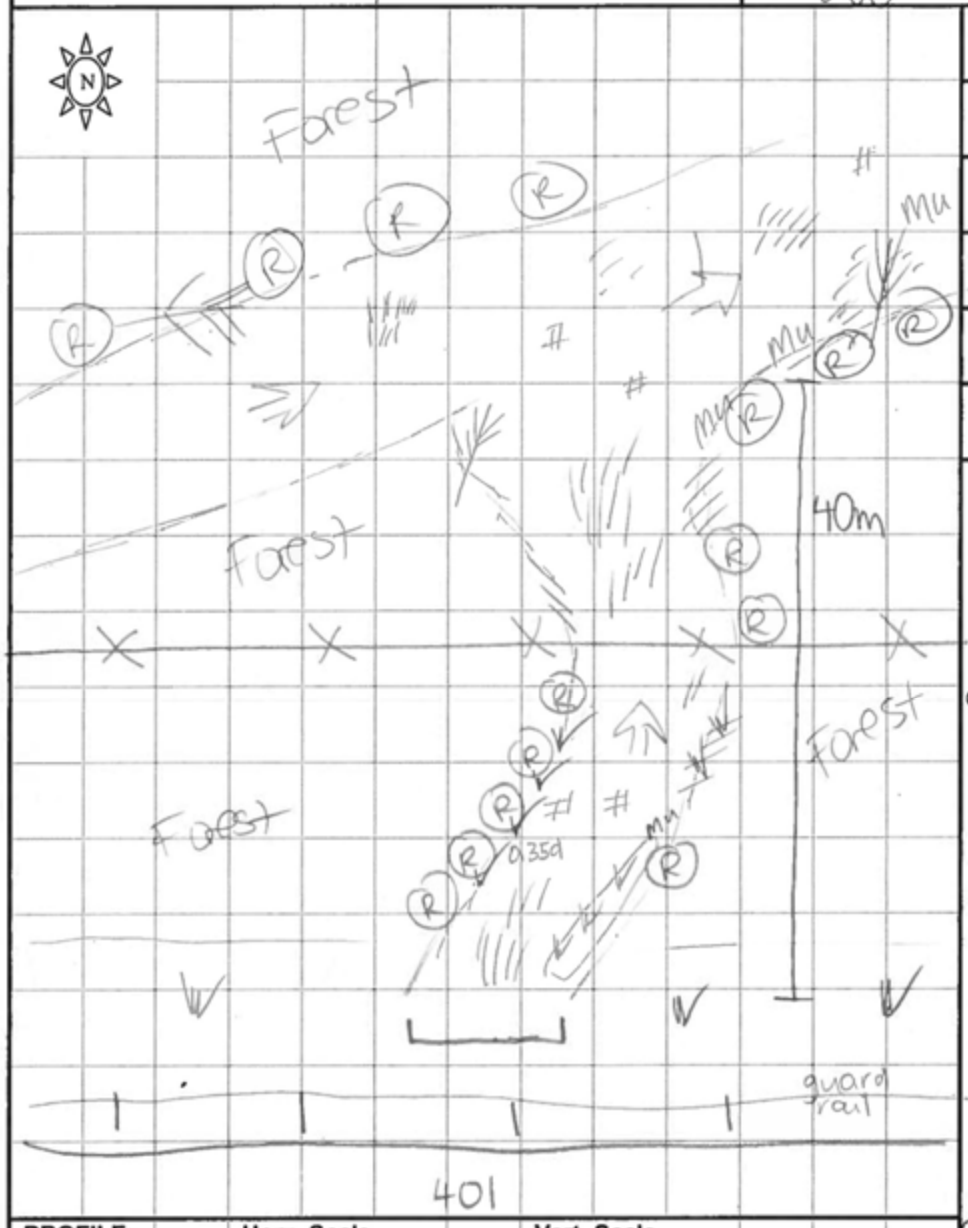
- expand culvert to reduce flow & bank erosion

COMMENTS:

- Hill Creek – permanent stream flowing through deciduous forest
- tributary(?) joins at ~40 m d/s of culvert
- fish, amphibian, benthic habitat.
- YOY fish (cyprinids) observed, darters observed
- 1m on either bank soft depositied muck/silt, gravel substrate centre of channel, potentially from high flows eroding bank/ top soil

Additional Notes Appended? O No O Yes **number of pages** _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
		200	



PROFILE: **Horz. Scale** **Vert. Scale**

PROJECT #: 60541071

MAPPER: OB

NAME OF WATERBODY: mill creek

CROSSING #:

STATION #: 401-6-05d/s

DATE: DD-MMM-YY 05/07/17

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⌴ Culvert

PTE = NO

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60541071	Hwy 401 / Hwy 6	05	07	2017

Is STREAM REALIGNMENT required for this section:

O Yes O No ⊗ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
OB AO	clear, warm	14:00	14:40

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
24	15.3	802

PHOTO NUMBERS AND DESCRIPTIONS: 63–71

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Mill Creek			401-6-05 u/s

LOCATION OF CROSSING: Hwy 401 at Hwy 6 N on-ramp ; P029

GPS COORDINATES: 566247 4810817	MTO CHAINAGE:
TOWNSHIP: Guelph	MNR DISTRICT: Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
forest, hwy	runoff

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert ⊗	Open Foot Culvert O	CSP O	N/A O

Other O Describe: Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	⊗	O	⊗	O	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50m (15 to km10)	N/A

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	100					
Mean depth wetted (m)	0.3					
Mean width wetted (m)	2.4					
Mean bankfull width (m)	4.1					
Mean bankfull depth(m)	0.7					
Substrate	50Gr 20Sa 25i 2Co					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	X	O	O
Right Upstream Bank	O	X	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	5	—	25	Instream Overhanging 5	—	Instream 50 Overhanging 10	5

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	X	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	5	—	95	—
Predominant Species	watercress	—	terrestrial – herbaceous	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	—	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	watercress	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

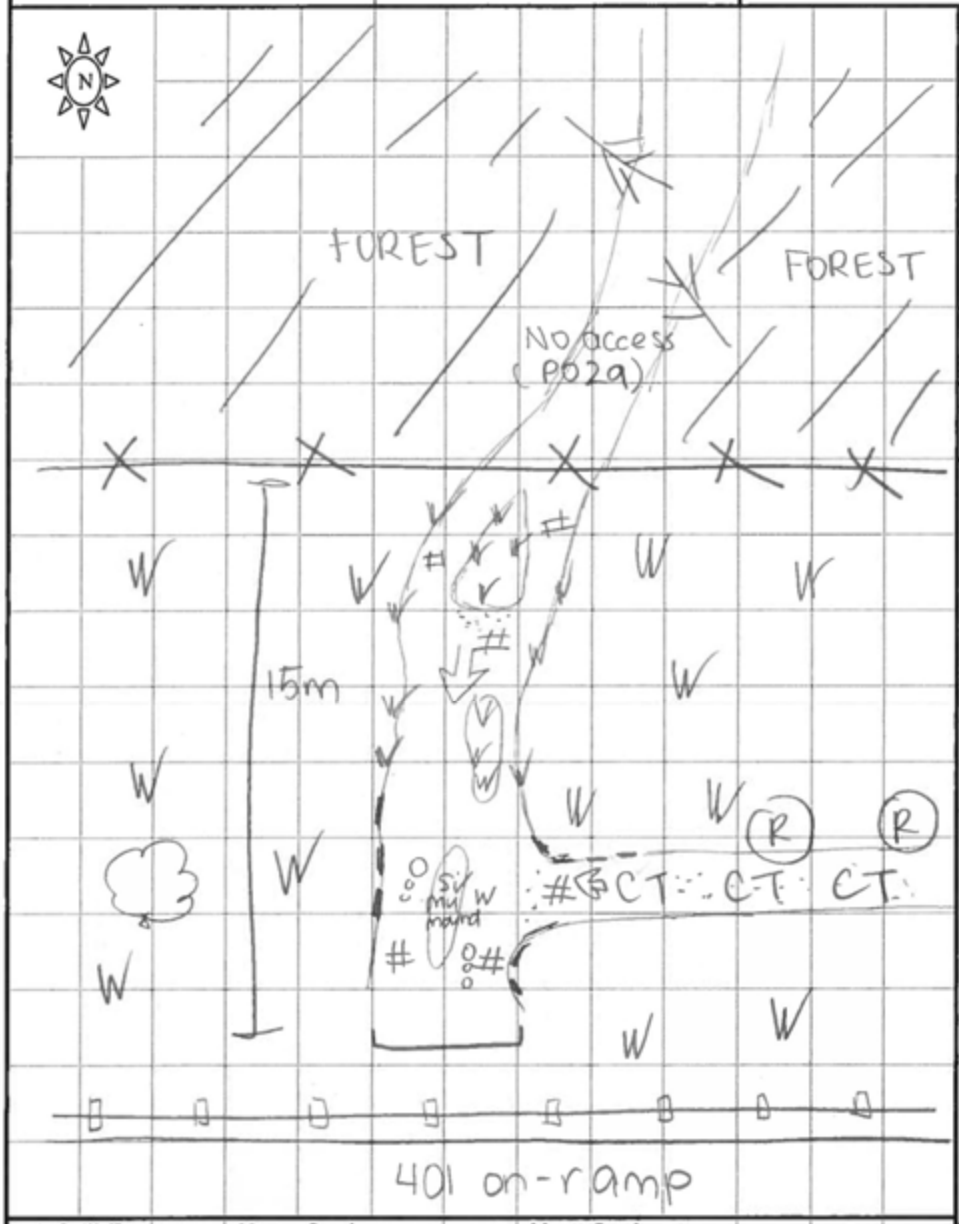
Stabilize eroding banks

COMMENTS:

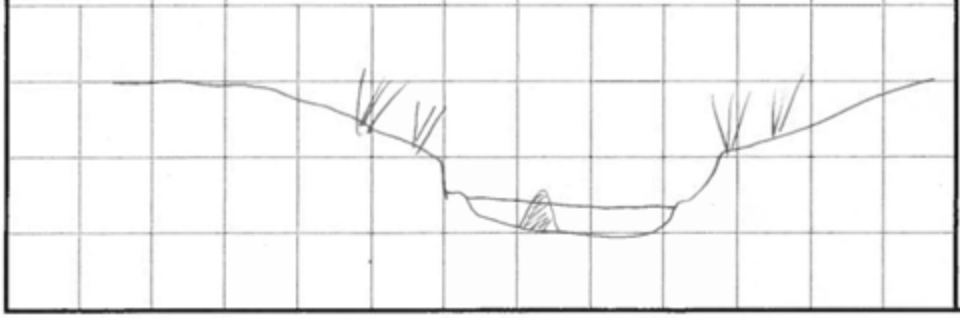
- Mill Creek crossing Hwy 401 at Hwy 6 N on-ramp
- eroding banks resulting in silt + muck build up in stream
- dense forest cover begins at property boundary (no access – assessed from fence)
- fish, benthics observed
- cat tail swale (drainage feature) contributing from east
- moderate flow

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE: **Horz. Scale** **Vert. Scale**



PROJECT #: 60541071

MAPPER: OB

NAME OF WATERBODY: Mill creek

CROSSING #:

STATION #: 401-6-05 u/s

DATE: DD-MMM-YY 05-07-17

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

Ⓡ Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⌴ Culvert

previously assessed ROW → full reach assessment w/ aggregate pit access

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60541071	401-6	19	07	2017

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
OB RvR	humid, cloudy, fog	10:30	11:25

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
17	18.4	635

PHOTO NUMBERS AND DESCRIPTIONS: 36-55 d/s extent to culvert pics (walked u/s during assessment)

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Aberfoyle Creek			401-6-7 d/s

LOCATION OF CROSSING: Aberfoyle/Mill creek at 401 & aggregate property (PO 48)

GPS COORDINATES: 566901 4810924	MTO CHAINAGE:
TOWNSHIP: Milton	MNR DISTRICT:

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
mixed forest, highway, aggregate pits	Hwy, aggregate runoff

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert ⊗	Open Foot Culvert O	CSP O	N/A O

Other O Describe: 3 barrel culvert — Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	⊗	O	⊗	O	O	—

TOTAL SECTION LENGTH (m): 200	CURRENT VELOCITY (m/s): moderate

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	75	5	20			
Mean depth wetted (m)	0.06	0.85	0.3			
Mean width wetted (m)	8	12.5	8			
Mean bankfull width (m)	9	12.5	9			
Mean bankfull depth(m)	1.5	1.5	1.5			
Substrate	30G 50Bo 30Gr 5Si 30Sa	40Sa 40Si 20Gr	30Bo 50Bo 30Gr 5Si 30Sa			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	Ø	O	O	O
Right Upstream Bank	Ø	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
100	—	10	70	Instream 20 Overhanging 60	—	Instream 5 Overhanging	—

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	Ø	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	5	—	—	—
Predominant Species		—	—	—

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	—	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	✓ Brook Trout spawning (Personal comm. from property manager)	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

- Remove degraded fence
- historically enhanced already.

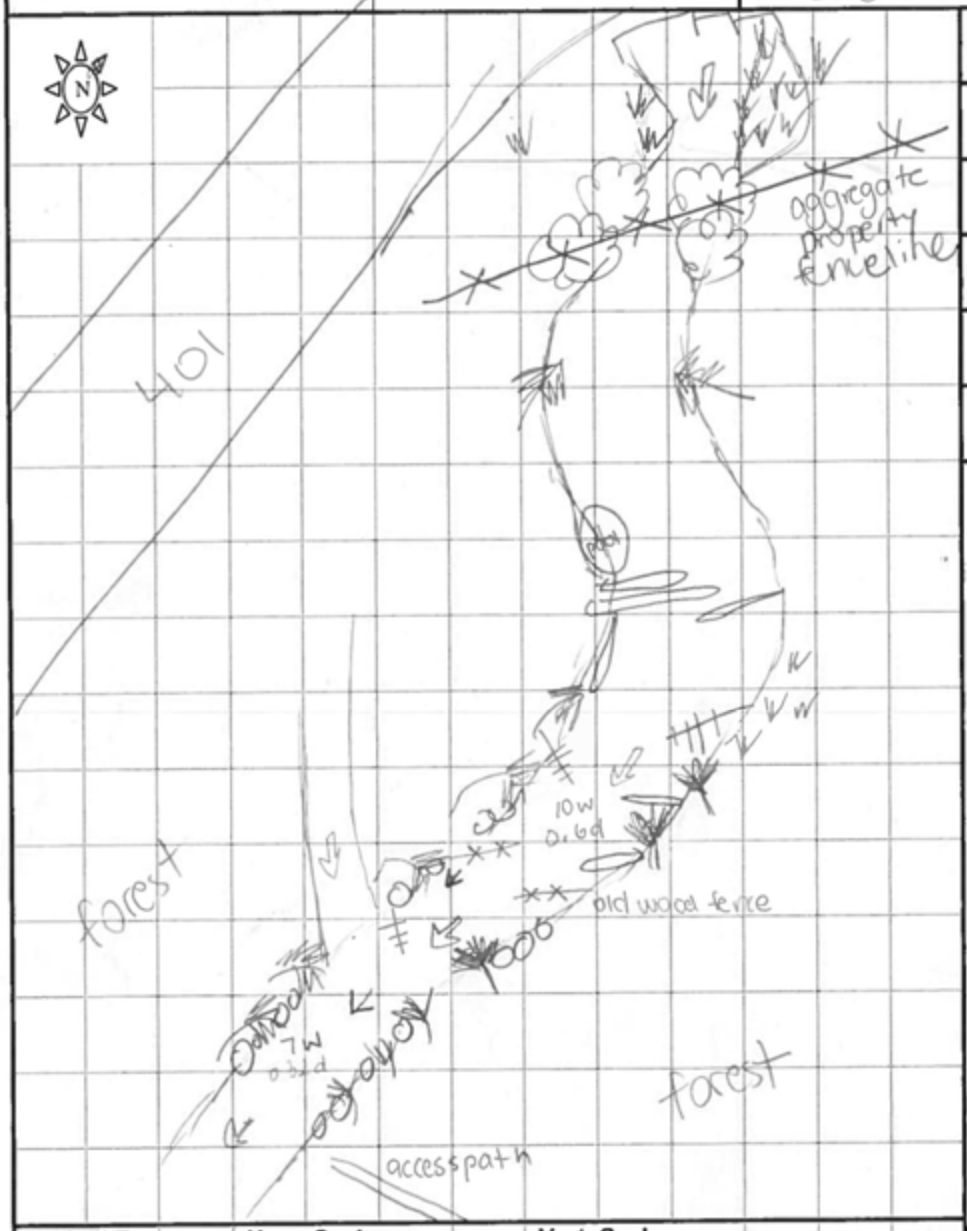
COMMENTS:

- Aberfoyle/Mill Creek crosses Hwy 401 E of Hwy 6N bypass and flows SW where it confluences with Pond creek (401-6-04) and McClimmons Creek (401-6-05).
- historically modified (fish habitat improvement) — personal comm from aggregate property manager
  - placed boulder
- good fish habitat
- flows through mixed forest w/ abundant shore cover, primarily overhanging trees and woody material
- some silt deposition at banks though much less from d/s at 401-6-5 & 401-6-4
- cobble not embedded
- water exits culvert and heads SW within 10m

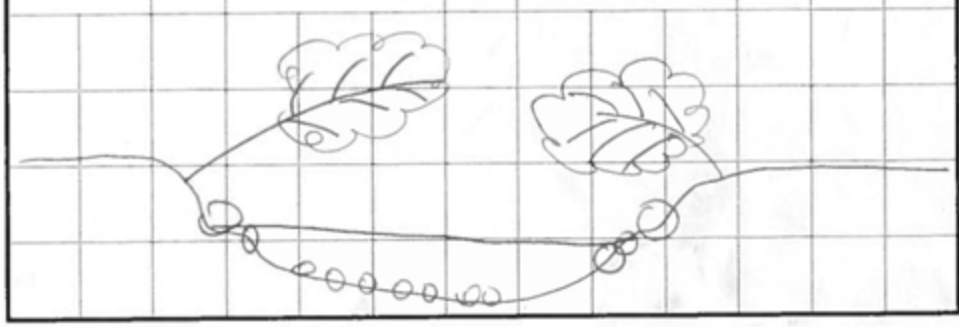
Additional Notes Appended? O No O Yes **number of pages** _____

- ~~Water~~ Substrate at banks primarily gravel/sand w/ cobble in centre of channel

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
		200	



PROFILE: **Horz. Scale** **Vert. Scale**



PROJECT #: 60541071

MAPPER: OB

NAME OF WATERBODY: Aberfoyle Ck

CROSSING #:

STATION #: 401-6-07

DATE: DD-MMM-YY 14-07-17

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60SH1071	401-6	14	07	2017

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
OB RvR	partly cloudy, warm	13:00	

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
20	19.7	621

PHOTO NUMBERS AND DESCRIPTIONS: 64-83

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Averhoyle Creek			401-6-07 u/s

LOCATION OF CROSSING: Hwy 401 W @ Hwy 6 N on-ramp

GPS COORDINATES:	MTO CHAINAGE:

TOWNSHIP:	MNR DISTRICT:
Guelph	

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
forest, highway	highway, overland runoff

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other O Describe: 3 barrel

Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
—	—

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	X	O	X	O	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50	—

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	100					
Mean depth wetted (m)	0.35					
Mean width wetted (m)	8					
Mean bankfull width (m)	10					
Mean bankfull depth(m)	0.8					
Substrate	40 Sa 30 Gr 30 Co					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O (X)	O	O	O
Right Upstream Bank	O (X)	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	—	—	50	Instream 30 Overhanging 40	—	Instream 20 Overhanging —	—

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O (X)	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	50	—	50	—
Predominant Species	—	—	terrestrial herb.	

MIGRATORY OBSTRUCTIONS:	None (circled)	Seasonal	Permanent
		—	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	suitable spawning habitat	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

None – good fish habitat.

~200m u/S there is a small beaver dam, permanent barrier (pic 84) (567041 4811179)

COMMENTS:

- permanent watercourse flowing through forest to Hwy 401 (N to S)
- abundant stream cover
- good fish habitat, fish observed
- substrate primarily sand/gravel with loose cobble on top
  - → no silt deposition like found in Aberfoyle Ck d/s of 401
- stable banks, no evidence of erosion
- trout, darters observed, cyprinids
- woody material providing coverage for fish
- green frogs observed.
- damselflies, water striders

Additional Notes Appended? O No O Yes number of pages ________