Geomorphic Assessment for Part of Lots 19, 20 and 21 Concession 5, Town of Caledon, Region of Peel

Prepared For:

Mayfield Golf Course Inc. and
Tullamore Industrial GP Limited

Prepared By:

Beacon Environmental Limited

Date:	*Project:*
2024-09-05	**222239**

BEACON ENVIRONMENTAL

GUIDING SOLUTIONS IN THE NATURAL ENVIRONMENT

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1. Introduction

Beacon Environmental Limited (Beacon) was retained by Mayfield Golf Course Inc. and Tullamore Industrial GP Limited to undertake a geomorphic assessment for the lands known municipally as Part of Lots 19, 20 and 21 Concession 5, in the Town of Caledon, Regional Municipality of Peel (subject lands; **Figure 1**). The subject lands include the former Mayfield Golf Course (12580 and 12552 Torbram Road), and a parcel of undeveloped land with no municipal address, directly to the south.

The subject lands, which are situated within the West Humber River Watershed, are located within the jurisdiction of the Toronto and Region Conservation Authority (TRCA). A North-South Tributary bisects the subject lands, conveying flow to the West Humber River Tributary which abuts the southwest corner of the site. The Ontario Ministry of the Environment, Conservation and Parks (MECP) has classified both of these tributaries as occupied habitat for Redside Dace (*Clinostomus elongatus*). The North-South Tributary and the West Humber River Tributary are also mapped as critical habitat for Redside Dace in the federal species Recovery Strategy (Fisheries and Oceans Canada; DFO 2024).

The purpose of this geomorphic assessment is to characterize existing geomorphic conditions for the portions of watercourse relevant to the subject lands, contribute to the determination of development limits through the delineation of Redside Dace habitat limits (referencing 30 m from the meander belt) for the West Humber River Tributary and North-South Tributary, evaluate potential impacts associated with the proposed development plan and provide geomorphic span recommendations for proposed watercourse road crossings.

Specifically, the following tasks were completed in support of the study:

- Background review of available materials including topographic mapping, aerial photography, relevant studies and proposed development plan;
- Desktop assessment to delineate watercourse reaches based on underlying geomorphic controls;
- Historical assessment to determine current and past extents of watercourse planform, as well as historical land-use changes and channel modifications;
- A field investigation to characterize existing geomorphic conditions and document evidence of active channel processes on a reach basis;
- Following applicable policies and guidelines, delineation the meander belt on a reach basis to determine regulated/ critical Redside Dace habitat limits for the West Humber River Tributary referencing recent aerial imagery, field observations, valley floor dimensions and historical trends in channel planform;
- In accordance with Ontario Regulation 832/21 and the DFO (2024) Recovery Strategy, delineation of Redside Dace habitat, referencing 30 m from the meander belt; and
- Evaluate the proposed development concept plan from a geomorphic perspective, and provision of geomorphic span recommendations for road crossings.

2. Policy Context

2.1 Federal Species at Risk Act (2002)

The federal *Species at Risk Act* (SARA; 2002) is intended to prevent federally endangered or threatened wildlife (including plants) from becoming extinct in the wild, and to help in the recovery of these species. The Act is also intended to help prevent species listed as Special Concern from becoming endangered or threatened. To ensure the protection of Species at Risk, SARA contains prohibitions that make it an offence to kill, harm, harass, capture, take, possess, collect, buy, sell, or trade an individual of a species listed in Schedule 1 of SARA as endangered, threatened, or extirpated.

SARA applies primarily to lands under federal jurisdiction and relies on provincial laws to protect federal SAR habitat. On private land, SARA prohibitions apply only to aquatic species and migratory birds that are also listed in the *Migratory Birds Convention Act* (1994). The intent of SARA is to protect critical habitat as much as possible through voluntary actions and stewardship measures.

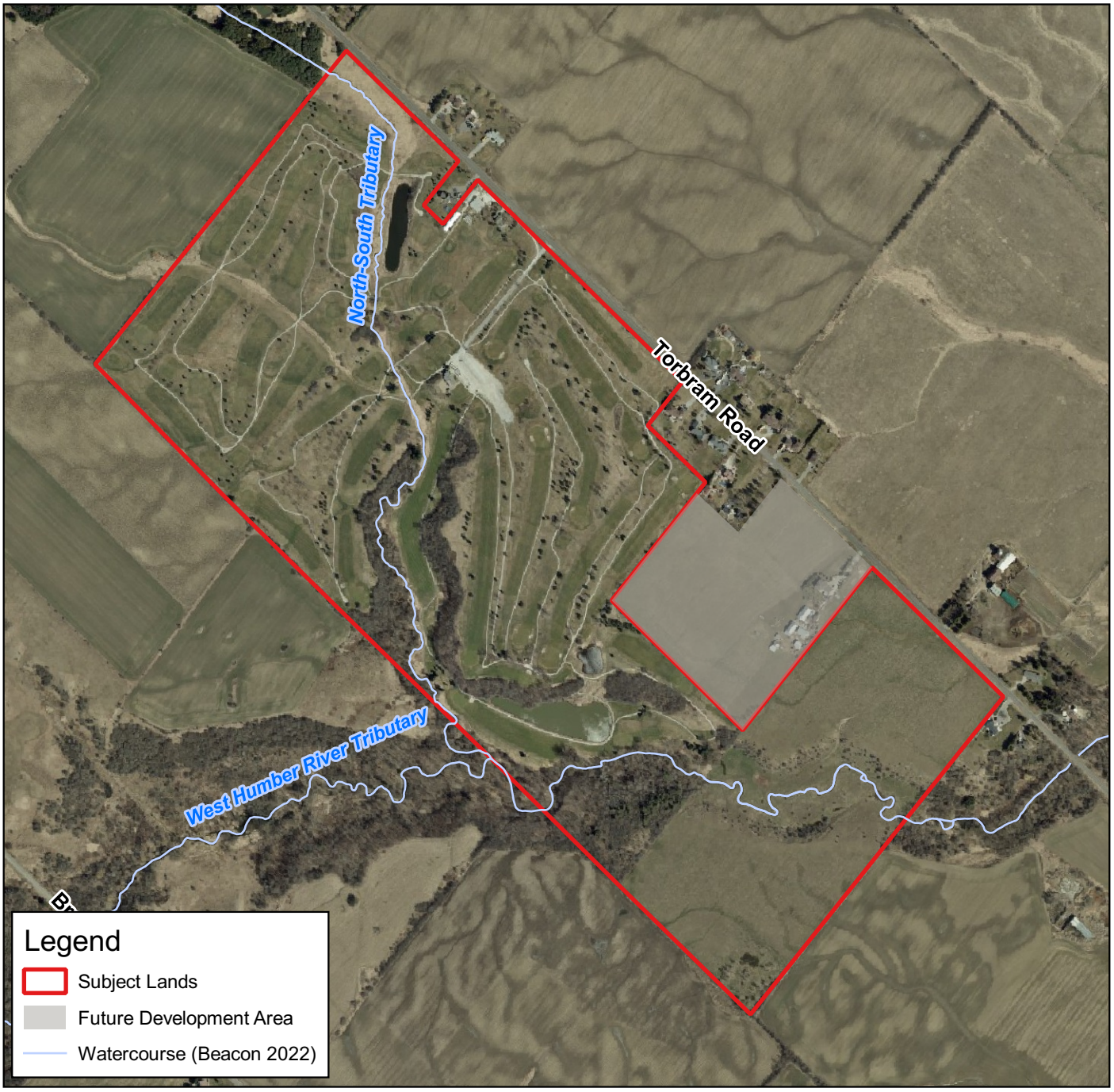
2.2 Federal *Fisheries Act* (1985)

Fish and fish habitat are protected under the federal *Fisheries Act,* which was last amended on August 28, 2019, and is administered by the Fish and Fish Habitat Protection Program within Fisheries and Oceans Canada (DFO). The protection provisions of the *Fisheries Act* apply to all fish and fish habitat throughout Canada and the Act sets out authorities for the regulation of works, undertakings or activities that risk harming fish and fish habitat.

Fish habitat is defined in subsection 2(1) of the *Fisheries Act* to include "*all waters frequented by fish and any other areas upon which fish depend directly or indirectly to carry out their life processes*." The types of areas that can directly or indirectly support life processes include, but are not limited to, spawning grounds and nursery, rearing, food supply and migration areas. Critical habitat is defined in subsection 2(1) of SARA as the *habitat necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species*. Also, SARA defines habitat for aquatic species as "*spawning grounds and nursery, rearing, food supply, migration, and any other areas on which aquatic species depend directly or indirectly in order to carry out their life processes, or areas where aquatic species formerly occurred and have the potential to be reintroduced*."

Section 35 of the *Fisheries Act*, which prohibits the carrying out of any work, undertaking, or activity that results in the harmful alteration, disruption, or destruction of fish habitat, applies to all fish habitat, including critical habitat for Redside Dace. Critical habitat for the Redside Dace will also be legally protected through a SARA critical habitat order made under subsections 58(4) and (5), which will invoke the prohibition in subsection 58(1) against the destruction of identified critical habitat.

The Fish and Fish Habitat Protection Program ensures compliance with relevant provisions under the *Fisheries Act* and *Species at Risk Act* (SARA) by reviewing proposed works, undertakings and activities that may impact fish and fish habitat.



Site Location	Figure 1
12522 & 12306 Torbram Road Geomorphic Assessment	
BEACON ENVIRONMENTAL	Project: 222239 Last Revised: October 2023
Client: Mayfield Golf Course Inc. and Tullamore Industrial GP Limited	Prepared by: SZ Checked by: MA
N 1:10,000	Inset Map: 1:50,000

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If a project is taking place in or near water, the proponent is responsible for understanding project related impacts on fish and fish habitat and applying measures to avoid and/or mitigate potential impacts (i.e., harmful, alteration, disruption, or destruction) to fish and fish habitat. Per Section 73(3)(c) of SARA an activity would be considered to jeopardize the survival or recovery of a species at risk if it would prevent the *attainment of the population and distribution objectives described within the recovery strategy*. It is DFO's responsibility to complete an assessment to determine whether an activity would jeopardize the survival or recovery of the species on a case-by-case basis.

2.3 Provincial *Endangered Species Act* (2007)

Ontario's ESA came into effect on June 30, 2008 and replaced the former 1971 Act. The ESA protects species listed as endangered and threatened by the Committee on the Status of Species at Risk in Ontario (COSSARO). The purposes of the ESA are:

- To identify species at risk based on the best available scientific information, including information obtained from community knowledge and aboriginal traditional knowledge;
- To protect species that are at risk and their habitats, and to promote the recovery of species that are at risk; and
- To promote stewardship activities to assist in the protection and recovery of species that is at risk.

Section 9 of the ESA prohibits the killing, harming, harassing, possession, collection, buying and selling of extirpated, endangered, and threatened species on the Species at Risk in Ontario (SARO) List; and Section 10 prohibits the damage or destruction of protected habitat of species listed as extirpated, endangered, or threatened on the SARO List.

2.4 Provincial Policy Statement (2020)

The Provincial Policy Statement (MMAH 2020) issued under the *Planning Act* (1990) outlines areas of provincial interest with respect to natural hazards. In support of the Policy Statement, a Technical Guide - Rivers and Streams: Erosion Hazard Limit document was prepared by MNR (2002) to outline standardized procedures for the delineation and management of riverine erosion hazards in the Province of Ontario. The guide presents erosion hazard protocols based on two generalized landform systems through which watercourses flow: confined and unconfined valley systems. Through this approach, the meander belt width plus an erosion access allowance is defined to determine the erosion hazard limit of an unconfined valley system. For confined valley systems, the erosion hazard limit is governed by geotechnical considerations, including the stable slope allowance and an applicable toe erosion allowance (i.e., channel migration component).

2.5 *Conservation Authorities Act* (1990)

The *Conservation Authorities Act* provides the legislative, operational jurisdictional and regulatory framework for Conservation Authorities. Under the Act, Conservation Authorities have the authority to regulate activities in areas under their jurisdiction through issuance of permits.

2.5.1 Ontario Regulation 41/24

Ontario Regulation 41/24 has resulted in regulatory changes under the *Conservation Authorities Act*. The changes have been made to narrow the scope of Conservation Authorities to focus on regulating natural hazards, removing any requirement to comment on or provide support to municipal partners on natural heritage matters that do not involve regulated lands. The Regulation allows TRCA to regulate development activities in and adjacent to wetlands, watercourses and valleylands. A permit must be obtained from TRCA prior to development or site alteration within regulated areas.

2.6 TRCA Belt Width Delineation Procedures (2004)

It is the policy of TRCA:

> *That erosion hazard limits will be determined through site specific field investigations and technical reports where required, in accordance with the text of TRCA's Regulation and Provincial and TRCA standards. Where erosion hazard limits are required and not available, or where existing erosion hazard information does not meet current Provincial or TRCA standards, TRCA may require the erosion hazard to be determined by a qualified professional, at the expense of the proponent, to the satisfaction of TRCA.*

The Belt Width Delineation Procedures (TRCA 2004) document outlines standards for delineating the meander belt width in TRCA jurisdiction.

2.7 TRCA Crossings Guideline for Valley and Stream Corridors (2015)

The *Crossings Guideline for Valley and Stream Corridors* (TRCA 2015) was developed "to support municipalities and other agencies and proponents in the management of natural hazards and natural heritage issues associated with crossings" (TRCA 2015). In order to ensure that a proposed crossing considers watercourse erosion hazards (channel migration over time) and avoids impacts to channel form and function, the following design criteria were developed:

- Minimize the risks of damage to the crossing infrastructure from watercourse channel migration, erosion and scour through proper crossing siting and design;
- Avoid the need for future channel realignment or hardening by minimizing the probability of channel contact with the crossing infrastructure; and
- Improve existing crossing structures, where possible, to reduce erosion hazards.

More specifically,

- *Crossings should be located away from geomorphically active and unstable areas, and be designed to span the zone of potential future channel migration, as defined by the meander belt or the 100-year erosion limit, to reduce risks from channel migration over time.*

- *For large, rapidly eroding or unstable watercourses, crossing structure openings should "span the watercourse meander belt, where possible, and at a minimum, span the 100-year erosion limit of the watercourse in order to minimize the risk of channel contact with abutments, footings and fill slopes."*
- *For small and stable watercourses, other alternatives exist for proponents to manage these risks including a combination of crossing opening configuration and erosion protection in anticipation of channel migration.*
- *Alternatively, the channel could be realigned to create a stable, naturalized alignment that will not result in contact between the channel and road infrastructure over the life of the crossing.*

3. Background Review

3.1 Climate

Climate provides the driving energy for a fluvial system and directly influences basin hydrology and rates of channel erosion, particularly through precipitation. Precipitation records obtained from climate normals (1981-2010) recorded at Georgetown Wastewater Treatment Plant, located west of the subject lands, averaged 70.5 mm per month in winter (November through February), 76 mm in summer (July through August; Environment Canada 2023). This increase over the summer months is likely a result of convective thunderstorms. While total precipitation amounts are greater during the summer months, snowmelt and rain-on-snow events tend to produce the highest flows within a watershed.

3.2 Watershed Conditions

In 2008, the TRCA prepared a State of the Watershed Report for the Humber River Watershed as a key reference document for land use planning decisions within and adjacent to the Humber River watershed. This report provided the basis for the Watershed Management Plan and provided an overview of existing environmental conditions within the watershed. The Humber River drains a total area of 903 km^2 and captures portions of the Town of Caledon, City of Brampton, Township of King, City of Vaughan, Town of Richmond Hill and City of Toronto (TRCA 2008). The subject lands are situated within the West Branch of the West Humber River Subwatershed. A portion of a North-South Tributary and a West Humber River Tributary are located within the subject lands.

3.2.1 Geology

The planimetric form of a watercourse is fundamentally a product of the channel flow regime and the availability of sediments (i.e., surficial geology) within the valley corridor. The 'dynamic equilibrium' of these inputs governs channel planform. These factors are influenced in smaller systems by physiography, riparian vegetation and land use. The subject lands fall within the South Slope physiographic region which is characterized by a "topography that gently slopes southward towards Lake Ontario and consists of a smooth, faintly drumlinized, clay till plain that contains deeply incised stream valleys (TRCA 2008)".

3.2.2 Fluvial Geomorphology

The State of the Watershed Report summarized existing fluvial geomorphic conditions throughout the watershed based on long-term monitoring results from representative sampling stations set up through the Regional Watershed Monitoring Program. Monitoring of the sites was initiated in 2001 to establish baseline conditions within the watershed (TRCA 2008); no monitoring stations were located in the vicinity of the subject lands. The Watershed Report classified the portions of watercourse within the subject lands as fourth order streams. On-going pressures on stream corridors associated with urbanization throughout the watershed were identified as a major management challenge (TRCA 2008).

The drainage area associated with the North-South Tributary at the confluence with the West Humber River Tributary is 9.8 km^2 with a mean slope of 2.3% (OWIT, MNRF 2022). The drainage area associated with the West Humber River Tributary at the downstream property extent is approximately 24 km^2. The average slope of West Humber River Tributary at the downstream property extent is 2.5% (MNRF 2022).

3.2.3 Aquatic Habitat

Within the subject lands, the North-South Tributary falls within Fish Management Zone (FMZ) 8 – Upper West Humber and the West Humber River Tributary falls within FMZ 7 (TRCA 2008). These zones delineate areas within which fish communities, thermal regimes and underlying environmental controls remain relatively consistent. Both tributaries are considered small riverine warmwater and intermediate riverine warmwater habitat, respectively (MNR & TRCA 2005).

Both the North-South Tributary and the West Humber River Tributary are mapped as critical habitat for Redside Dace in the recently published Recovery Strategy and Action Plan for the Redside Dace (DFO 2024). Provincial mapping (MNRF 2023) provides records for Redside Dace in the West Humber River Tributary. In accordance with Ontario Regulation 832/21 of the ESA and the federal Redside Dace Recovery Strategy (DFO 2024), protection of Redside Dace habitat extends to the meander belt plus an additional 30 m of vegetated area extending from the meander belt width for both the North-South Tributary and the West Humber River Tributary.

3.3 Historical Assessment

The following section presents an overview of historic conditions in the vicinity of the subject lands with respect to land use, land cover and channel conditions. Historical analyses provide insight into the scale of natural and human-induced changes within a watershed, particularly the degree to which channel planform adjustment and land use has changed over time. In support of the historical assessment, black and white aerial photographs and digital colour imagery were analysed and compared to obtain a simple, qualitative assessment of the degree of land use and channel planform change over time (**Appendix A**). **Table 1** provides a summary of specific observations regarding change in land use and channel morphology based on available historical aerial imagery.

Table 1. Summary of Key Historical Observations

Time Period	Scale, Source	Observations
1978	1:10,000 Northway/Photomap/Remote Sensing Ltd.	With the exception of hedgerows and valley corridors, forested areas have been converted to agricultural fields. A few farmhouses and structures are observed along major roadways in the vicinity of the subject lands. The golf course appears to be under construction in the central portion of the subject lands. Maintenance building have been constructed on the eastern boarder of the subject lands along Torbram Road. The North-South Tributary displays a sinuous planform. Evidence of active morphologic processes include the formation of oxbow features and presence of multiple flow paths. Existing disturbances included two informal crossings (one associated with the golf course and one associated with farming activities), and the presence of an online pond. Several minor drainage features can be observed draining to the North-South Tributary. The West Humber River Tributary generally displays a sinuous channel planform; however, in the vicinity of an offline pond constructed adjacent to the tributary, channel appears to have been straightened. Evidence of active channel processes included bank erosion and chute/oxbow feature formation.
1991	1:8,000 Northway/Photomap/Remote Sensing Ltd.	Minimal change in surrounding land use. Within the subject lands, the golf course, including greens, club house, parking lot, cart paths, and two crossings of the North-South Tributary, has been constructed. Tree cover is limited to valley slopes and immediate riparian areas. In the vicinity of the clubhouse, the North-South Tributary appears to have been channelized. Multiple flow paths/channels can no longer be observed. Minimal change in channel planform can be observed along the West Humber River Tributary, though evidence of bank erosion and slumping can be observed.
2002	1:5,000 First Base Solutions	Minimal change in surrounding land use. Within the subject lands, expansion of the golf course in the form of grading and additional crossings of the North-South Tributary can be observed. Minimal change in channel planform can be observed along the West Humber River Tributary, though evidence of bank erosion and slumping can be observed.
2021	1:5,000 First Base Solutions	Minimal change in surrounding land use. Within the subject lands, expansion of the golf course has been completed. Upstream of the offline pond, the North-South Tributary appears to have been straightened. Along the West Humber River Tributary, evidence of channel widening, chute formation, and bank erosion and slumping can be observed.

4. Existing Conditions

4.1 Reach Delineation

To facilitate a systematic evaluation of the North-South Tributary and West Humber River Tributary within the subject lands, the watercourses were delineated into reaches. Reaches are homogenous sections of channel with regard to form and function and can, therefore, be expected to behave consistently along their length to changes in hydrology and sediment inputs, as well as to other modifying factors (Montgomery and Buffington 1997; Richards *et al.* 1997).

For the purposes of this study, the portion of West Humber River Tributary relevant to the subject lands was delineated two reaches (Reaches WHT-1A and WHT-1, see **Figure 2**). The portion of North-South Tributary within the subject lands was delineated into two reaches (Reaches WHT-2 and WHT-3), as shown on **Figure 2**. The determination of reach extents was initially based on a desktop assessment of transitions in riparian vegetation, degree of valley confinement and meander geometry (channel planform) based on available aerial imagery and topographic mapping. Field verification of reach extents was subsequently undertaken in the field to confirm that mapped reach extents accurately reflect existing conditions and underlying geomorphic controls.

4.2 Rapid Assessments

4.2.1 Methods

In order to characterize existing geomorphic conditions, rapid field assessments were conducted on November 8, 2022 (Reaches WHT-1, WHT-2, WHT-3) and May 5, 2023 (Reach WHT-1A). The following standardized rapid visual assessment methods were applied:

i. Rapid Geomorphic Assessment (RGA – MOE 2003)

The RGA documents observed indicators of channel instability by quantifying observations using an index that identifies channel sensitivity. Sensitivity is based on evidence of aggradation, degradation, channel widening and planimetric form adjustment. The index produces values that indicate whether the channel is stable/in regime (score <0.20), stressed/transitional (score 0.21-0.40) or in adjustment (score >0.41).

ii. Rapid Stream Assessment Technique (RSAT – Galli 1996)

The RSAT uses an index to quantify overall stream health and includes the consideration of biological indicators (Galli 1996). Observations concerning channel stability, channel scouring/sediment deposition, physical in-stream habitat, water quality, and riparian habitat conditions are used to calculate a rating that indicates whether the channel is in poor (<13), fair (13-24), good (25-34), or excellent (35-42) condition.

Legend

- Subject Lands
- Future Development Area
- Photo Location
- Reach Break

Aquatic Features (Beacon 2023)

- Intermittent
- Ephemeral
- Permanent

Reach and Photo Locations

Figure 2

12522 & 12306 Torbram Road
Geomorphic Assessment

BEACON ENVIRONMENTAL

Project: 222239
Last Revised: October 2023

Client: Mayfield Golf Course Inc. and Tullamore Industrial GP Limited

Prepared by: SZ
Checked by: MA

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iii. Downs Classification Method (Downs 1995)

The Downs (1995, outlined in Thorne *et al.* 1997) classification method infers present and future potential adjustments based on physical observations, which indicate the stage of evolution, and type of adjustments that can be anticipated based on the channel evolution model. The resultant index classifies streams as stable, laterally migrating, enlarging, undercutting, aggrading, or recovering.

4.2.2 Results

Results of the rapid assessments are summarized in **Table 2** and **Table 3** below. A photographic record of site conditions at the time of the assessment is provided in **Appendix B**.

4.2.2.1 Reach WHT-1A

Reach WHT-1A was characterized as a highly sinuous, well-defined channel situated within a confined valley setting. The reach displayed a low gradient and a low degree of entrenchment. The riparian buffer was characterized as continuous, measuring one to five channel widths in dimension. Riparian vegetation consisted of mainly grasses and herbaceous species on both left and right banks. Bank angles were generally steep but ranged between 30 to 90 degrees with 60 to 100% of banks exhibiting evidence of active erosion, such as slumping and basal scour. Bank materials were dominated by clay/silt, sand. Riffle substrate consisted of sand, large gravel, cobble and erratic boulders. Pool substrate consisted of clay, sand and gravel. Existing channel disturbances include fence crossings at both upstream and downstream at reach extents. Woody debris was observed within the overbank/floodplain area.

RGA results indicated that Reach WHT-1A was 'in transition', with a score of 0.29. Widening was identified as the dominant mode of adjustment, with evidence of aggradation and planimetric form adjustment also observed. Evidence of widening included leaning/fallen fence posts, occurrence of large woody debris, fracture lines observed along top of bank, basal scour on inside meander bends, on both sides of channel through riffle, and extending greater than 50% of the reach length. Planimetric form adjustment was observed in the form of cut off channels and chute formation. Aggradation was observed through siltation in pools and deposition in the overbank zone. An RSAT score of 24.5 indicated a 'fair' degree of overall ecological health, with channel stability and riparian habitat conditions as the primary limiting factors. The Downs (1995) model reflected the RGA evaluation of this reach through a classification of M – 'lateral migration' based on evidence of bank erosion on outside bend and deposition on inside bends.

4.2.2.2 Reach WHT-1

Reach WHT-1 was characterized as a moderately sinuous, well-defined channel situated within a confined valley setting. The reach displayed a moderate gradient and a low degree of entrenchment. The riparian buffer was characterized as fragmented, measuring less than one to five channel widths in dimension. Riparian vegetation consisted of mainly trees, shrubs on the right bank and herbaceous plants with golf course on the left bank. Bank angles ranged between 30 to 90 degrees with 30 to 60% of banks exhibiting evidence of active erosion, such as undercut banks (up to 0.30 m) and mass failure at valley wall contact points.

Bank materials were dominated by clay/silt, sand, gravel and boulders. Bankfull widths and depths ranged from 4.8 to 5.7 m and 0.45 to 0.6 m, respectively. Riffle substrate consisted of gravel, cobble, erratic boulders and exposed till. Pool substrate consisted of sand and gravel. Channel morphology was influenced locally by the presence of large woody debris and one relic crossing.

RGA results indicated that Reach WHT-1 was 'in transition', with a score of 0.28. Widening was identified as the dominant mode of adjustment, with evidence of degradation, aggradation and planimetric form adjustment also observed. Evidence of widening included leaning/fallen trees, exposed tree roots, exposed length of previously buried pipe, basal scour on inside meander bends and greater than 50% of reach length. Evidence of degradation consisted of exposed bridge footings and exposed undisturbed overburden (till) observed at the valley toe. Planform adjustment was observed through misaligned thalweg and poorly formed bars. Aggradation was observed through lateral bar formation. An RSAT score of 28.5 indicated a 'good' degree of overall ecological health, with channel scouring/sediment deposition and riparian habitat conditions as the primary limiting factors. The Downs (1995) model reflected the RGA evaluation of this reach through a classification of M – 'lateral migration' with U – 'undercutting' based on evidence of bank erosion on outer banks and bar formation on the inner banks, with scoured bed with and exposed till.

4.2.2.3 Reach WHT-2

Reach WHT-2 was characterized as a moderately sinuous, well-defined channel situated within a confined valley setting. The reach displayed a moderate gradient and a moderate degree of entrenchment. The riparian buffer was characterized as fragmented, measuring one to five channel widths in dimension on the right bank and less than 1 channel widths on the left bank. Riparian vegetation consisted of mainly trees on the right bank and golf course green on the left bank. Bank angles ranged between 30 to 60 degrees with 30 to 60 % of banks exhibiting evidence of active erosion, such as slumping, undercutting and mass failure at valley wall contact points. Bank materials were dominated by clay/silt and sand with some gravel. Bankfull widths and depths ranged from 4.3 to 6.5 m and 0.4 to 0.9 m, respectively. Riffle substrate consisted of sand, gravel, cobble, erratic boulders and exposed till. Pool substrate consisted of clay/silt, sand and gravel. Channel morphology was influenced locally by the presence of large woody debris in the channel.

RGA results indicated that Reach WHT-2 was 'in transition', with a score of 0.22. Widening was identified as the dominant mode of adjustment, with minor evidence of planimetric form adjustment, degradation and aggradation also observed. Evidence of widening included leaning/fallen trees, exposed tree roots, slumping banks, exposed length of previously buried pipe, basal scour on both sides through riffle. Planform adjustment was observed through misaligned thalweg. Evidence of degradation was observed in the form of exposed undisturbed overburden (till) and aggradation was observed through evidence of lateral bar formation. An RSAT score of 25.5 indicated a 'good' degree of overall ecological health, with riparian habitat conditions and physical instream habitat as the primary limiting factor. The Downs (1995) model reflected the RGA evaluation of this reach through a classification of U – 'undercutting' based on evidence of bank erosion on outer banks and bar formation on the inner banks with a scoured bed.

4.2.2.4 Reach WHT-3

Reach WHT-3 was characterized as a minimally sinuous, heavily modified (straightened) channel situated within a confined valley setting. The reach displayed a moderate gradient and a moderate degree of entrenchment. The riparian buffer was characterized as fragmented, measuring less than one channel width for the downstream portion and greater than five channel widths at the upstream portion. Riparian vegetation consisted of mainly grasses and manicured golf course. Bank angles ranged between 30 to 90 degrees with 60 to 100% of banks exhibiting evidence of active erosion, such as scour and slumping. Bank materials were dominated by clay, silt and sand. Channel dimensions displayed minimal variation with bankfull widths and depths ranging from 3.3 to 3.8 m and 0.8 to 0.6 m, respectively. Poorly developed riffle-pool morphology was observed. Where defined, riffle substrate consisted of sand, gravel, cobble and erratic boulders and pool substrate consisted of clay/silt and sand. Channel morphology was influenced locally by the presence of in stream riparian vegetation. Existing channel disturbances include an online pond outlet and four (4) golf cart crossings.

RGA results indicated that Reach WHT-3 was 'in transition', with a score of 0.26. Widening was identified as the dominant mode of adjustment, with evidence of planimetric form adjustment, degradation and aggradation also observed. Evidence of widening included large organic debris, slumping banks, exposed length of previously buried pipe outlet, scour on both sides through riffle and greater than 50% of reach length. Planform adjustment was observed through chute formation and thalweg alignment out of phase with meander form. Evidence of degradation was observed in the form of bridge footings exposed. Aggradation was observed through evidence of poor longitudinal sorting of bed materials. An RSAT score of 24 indicated a 'fair' degree of overall ecological health, with physical instream habitat and riparian habitat conditions as the primary limiting factor. The Downs (1995) model reflected the RGA evaluation of this reach through a classification of R – 'recovering' based on evidence of sinuous channel development within a straightened channel.

Table 2. General Reach Characteristics – West Humber River Tributaries

Reach	Bankfull Width (m)	Bankfull Depth (m)	Riffle Substrate	Riparian Vegetation	Notes
WHT-1A	4.5-6.9	0.65-0.75	Sand, gravel, cobble, erratic boulder	Grasses	• Valley wall contacts • Cut off channel • Basal scour, undercutting • Woody debris in overbank
WHT-1	4.8-5.7	0.45-0.6	Cobble, gravel, till, erratic boulder	Trees, shrubs, herbaceous, manicured golf turf	• Moderate woody debris • Valley wall contact with mass failure • Basal scour, undercutting • Gravel point bar development, lateral bar formation
WHT-2	4.3-6.5	0.4-0.9	Gravel, sand, till, erratic boulder and cobble	Trees, shrubs, manicured golf turf	• Valley wall contacts with mass failure • Woody debris
WHT-3	3.3-3.8	0.6-0.8	Gravel, sand, erratic boulder and cobble	Grasses, manicured golf turf	• Heavily modified reach • Poorly developed riffle-pool morphology • Slumping, undercutting • Vegetation encroachment • Cart crossings

Table 3. Rapid Assessment Results – West Humber River Tributaries

Reach	Rapid Geomorphic Assessment			Rapid Stream Assessment Technique			Downs Classification Method
	Score	Condition	Dominant Mode of Adjustment	Score	Condition	Limiting Feature	
WHT-1A	0.29	In Transition	Widening	24.5	Fair	Riparian habitat conditions; Channel stability	M- 'lateral migration'
WHT-1	0.28	In Transition	Widening	28.5	Good	Channel scouring/sediment deposition; Riparian habitat conditions	M- 'lateral migration'/ U – 'undercutting'
WHT-2	0.22	In Transition	Widening	25.5	Good	Riparian habitat conditions; Physical instream Habitat	U – 'undercutting'
WHT-3	0.26	In Transition	Widening	24	Fair	Riparian habitat conditions; Physical instream habitat	R – 'recovering'

5. Analysis

5.1 Meander Belt

The meander belt width is generally defined as the lateral extent that a meandering channel has historically occupied and will likely occupy in the future. Where the watercourse is confined, such as sections of the West Humber River Tributary within the subject lands, the valley wall acts a constraint to channel migration along portions of the corridor.

According to the *Technical Guide – Rivers and Streams: Erosion Hazard Limit* document (MNR 2002), in the case of unconfined river systems, the meander belt width plus an erosion access allowance is defined to determine the erosion hazard limit. Conversely, in the case of confined valley systems, the erosion hazard is governed by geotechnical considerations, including the stable slope allowance and an applicable toe erosion allowance (i.e., channel migration component). As Ontario Regulation 832/21 and the DFO (2024) Recovery Strategy do not distinguish between confined and unconfined systems, delineation of the meander belt referenced historical and current channel processes, but also considered valley floor (floodplain dimensions), as applicable, to determine Redside Dace habitat limits.

Following the TRCA (2004) *Belt Width Delineation Procedures* document, the meander belt for Reaches WHT-1 and WHT-1A of the Humber River Tributary and Reaches WHT-2 and WHT-3 of the North-South Tributary were delineated based on the lateral extent of the outermost meander bends along each reach over the available historical record. The resultant meander belt dimensions are recommended:

- Reach WHT-1A: 55 m;
- Reach WHT-1: 40 m;
- Reach WHT-2: 50 m; and
- Reach WHT-3: 35 m.

These dimensions were reviewed relative to available topographic mapping and field observations to ensure that they considered valley floor dimensions and were sufficient to capture the active (bankfull) channel, as well as evidence of lateral occupation of the floodplain at the reach scale. **Figures 3A** and **3B** illustrate meander belt limits as delineated for Reaches WHT-1A, WHT-1 WHT-2 and WHT-3.

5.2 Redside Dace Habitat

Figures 3A and **3B** identify areas within 30 m of the meander belt as delineated for Reaches WHT-1A, WHT-1 WHT-2 and WHT-3 in relation to the subject lands.

6. Proposed Development

The description of the proposed redevelopment is based on the Draft Plan of Subdivision prepared by Malone Given Parsons (MGP 2023) and the FSSR (SCS 2023).

The redevelopment plan for the north parcel (Mayfield Golf Course), outside of the Greenbelt, proposes 196 Single Detached Residential Units (8.27 ha), 385 Townhouse Units (6.13 ha), an Elementary School Block (3.36 ha), Parkland (0.9 ha), a Commercial Block (0.6 ha) and a Firehall (0.81 ha). Approximately 8 ha will be designated for Roads and Laneways. Lands inside the Greenbelt have been designated for Parkland (5 ha), three (3) Stormwater Management (SWM) Blocks (3.77 ha), the Street A and Street C Road crossings of the NHS (0.69 ha), the widening of Torbram Road (0.22 ha) and the NHS (32.4 ha).

The south parcel, outside of the Greenbelt, will be developed into 10 Single Detached Residential Units (0.43 ha), an unknown amount of Townhouse Units (1.99 ha) and approximately 0.88 ha will be designated for Roads and Laneways. Lands inside the Greenbelt have been designated for Parkland (4.32 ha), a Stormwater Management (SWM) Block (0.95 ha), the widening of Torbram Road (0.6 ha) and the NHS.

6.1 Stormwater Management

As described in the FSSR prepared by SCS (2023), end-of-pipe and lot level controls will be implemented to manage stormwater runoff from the proposed development. End-of-pipe control will be provided by four (4) underground wet stormwater management facilities to meet stormwater erosion control, quantity and quality objectives. The extended detention volumes will be sized based on the detention of the 25 mm – 4-hour Chicago rainfall event. The volumes calculated for the extended detention will be attenuated for a minimum of 48 hours. However, due to the small size of the SWM Facility 4 catchment, extended detention cannot be provided for 48 hours. In addition, rear yard infiltration trenches were evaluated as lot level controls to meet 5 mm on-site retention and water balance targets for the subject property. Low impact development opportunities will be further reviewed at the detailed design stage.

6.2 Road Crossings

Two road crossings of the Natural Heritage System (NHS) are proposed for connectivity, neighborhood structure and traffic flow: Street A will cross the North-South Tributary and Street C will cross drainage feature HDF-3 (refer to **Figure 4**).

Redside Dace Occupied Habitat Limits (Meander Belt + 30m)

Figure 3A

12522 & 12306 Torbram Road
Geomorphic Assessment

Legend

- Subject Lands
- Proposed Development
- Reach Break

Historical Watercourses

- 1978 Watercourse
- 1991 Watercourse
- 2002 Watercourse
- 2022 Watercourse

Subject to Historic Fill Activities

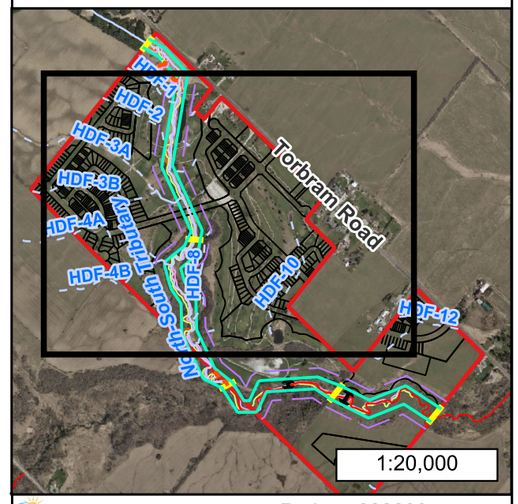
- 1978
- 1991
- 2002

Aquatic Features (Beacon 2023)

- Intermittent
- Ephemeral

Meander Belt

- Meander Belt+30m
- Meander Belt



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BEACON ENVIRONMENTAL

Project: 222239
Last Revised: August 2024

Client: Mayfield Golf Course Inc. and Tullamore Industrial GP Limited

Prepared by: SS
Checked by: CN

DRAFT

N

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0 90 180 m

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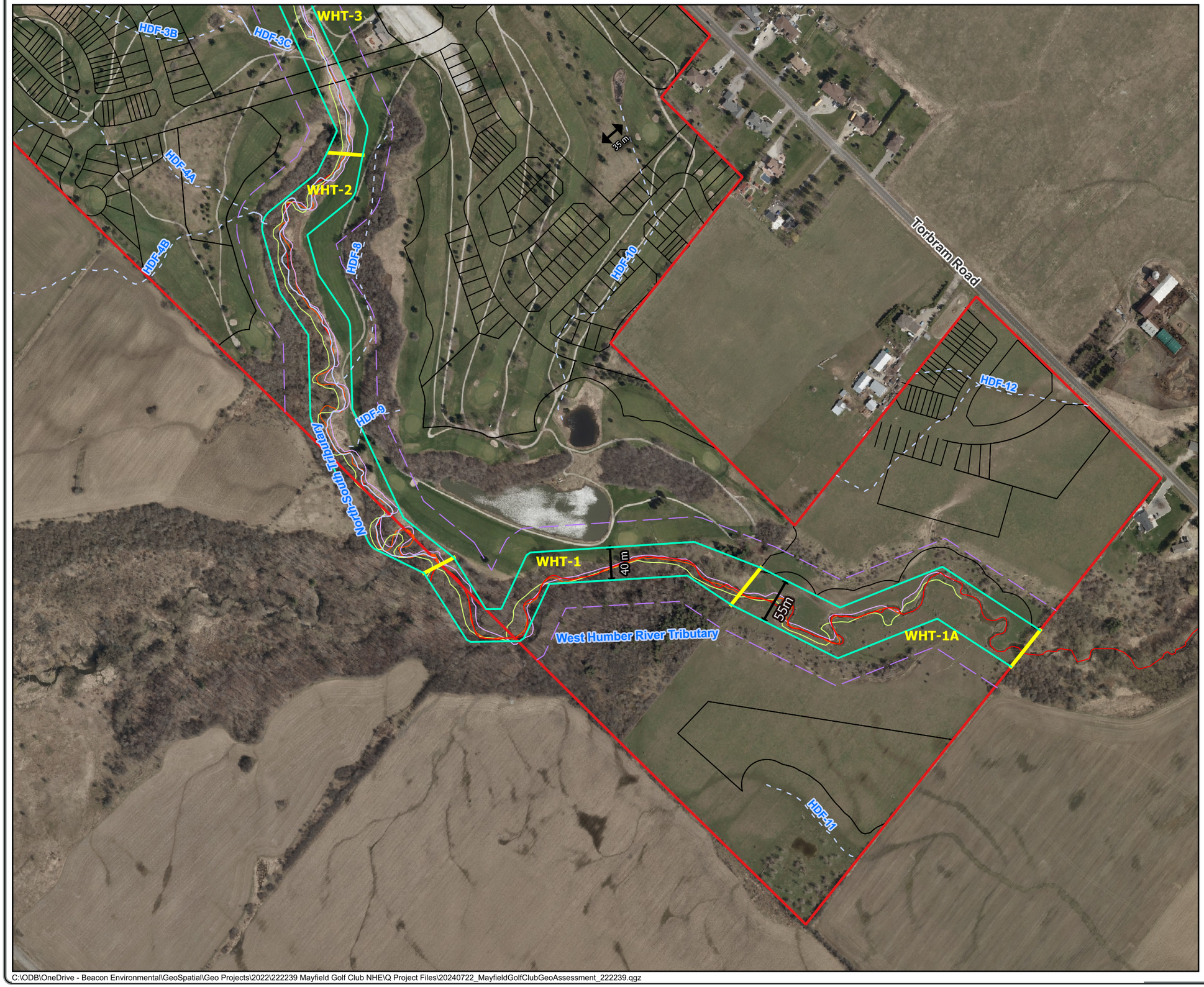
Redside Dace Occupied Habitat Limits (Meander Belt + 30m)

Figure 3B

12522 & 12306 Torbram Road
Geomorphic Assessment



Legend

- Subject Lands
- Proposed Development
- Reach Break

Historical Watercourses

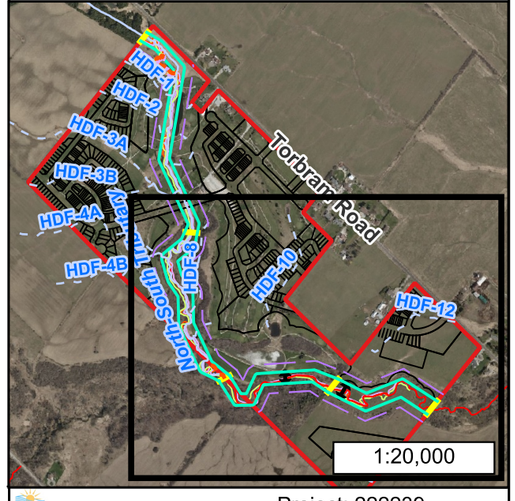
- 1978 Watercourse
- 1991 Watercourse
- 2002 Watercourse
- 2022 Watercourse

Aquatic Features (Beacon 2023)

- Intermittent
- Ephemeral

Meander Belt

- Meander Belt+30m
- Meander Belt



BEACON ENVIRONMENTAL

Project: 222239
Last Revised: August 2024

Client: Mayfield Golf Course Inc. and Tullamore Industrial GP Limited

Prepared by: SS
Checked by: CN

DRAFT

N

1:4,400

0 90 180 m

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Crossing Assessment

Figure 4

12522 & 12306 Torbram Road
Geomorphic Assessment

North-South Tributary
HDF-1
HDF-2
HDF-3A
HDF-3B
HDF-3C
HDF-4A
HDF-5
HDF-6
HDF-7
HDF-8
HDF-10
Proposed Crossing
Proposed Crossing
Torbram Road
Street C
Street A

Legend

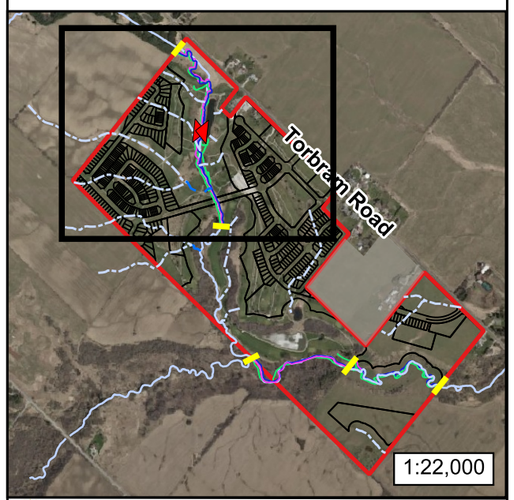
- Subject Lands
- Proposed Development
- Governing Meander Amplitude (11.5 m)
- Reach Break

Aquatic Features (Beacon 2023)

- Intermittent
- Ephemeral

Historical Watercourses (Beacon 2023)

- 2022 Watercourse
- 2002 Watercourse
- 2002 Historical Floodplain Feature
- 1991 Watercourse
- 1991 Historical Floodplain Feature
- 1978 Watercourse
- 1978 Historical Floodplain Feature



BEACON ENVIRONMENTAL

Project: 222239
Last Revised: January 2024

Client: Mayfield Golf Course Inc. and Tullamore Industrial GP Limited

Prepared by: SZ
Checked by: MA

DRAFT

N

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0 60 120 m

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6.2.1 Street A

The proposed Street A road alignment is considered to be optimal from a geomorphic perspective, as the road crosses the NHS on a relatively straight section of the North-South Tributary at an angle that is perpendicular to the watercourse. In order to provide recommendations with respect to crossing span, existing geomorphic conditions along Reach WHT-3 were considered. Results of the field assessment noted minor evidence of channel instability (RGA score of 0.26, state of transition) along Reach WHT-3, and an average bankfull width of 3.5 m.

Given the historically modified nature of Reach WHT-3, the determination of a geomorphic span recommendation referenced an upstream section of the reach that had retained a more natural, sinuous planform. The meander amplitude (inclusive of the historic record and bankfull channel) associated with this section of channel was measured to be 11.5 m (**Figure 4**). As lateral migration rates could not be determined, a 20% factor of safety (2.3 m) was applied to this amplitude, resulting in a 100-year erosion limit span recommendation of 14 m. The proposed 14.9 m span arch open bottom culvert identified in the FSSR (SCS 2023) is sufficient to accommodate this recommendation, which should be reviewed and refined, as appropriate, through subsequent detailed design stages.

6.2.2 Street C

As drainage feature HDF-3 lacks a defined channel, geomorphic span recommendations have not been provided for this structure. Crossing span requirements will be determined based on relevant hydraulic and ecological design considerations. This approach is consistent with the TRCA (2015) *Crossings Guideline for Valley and Stream Corridors* guideline which notes that that geomorphic studies are not required for very small (drainage area approximately 1 km^2 or less), rural, vegetation-dominated watercourses. That stated, the proposed road Street C alignment is considered to be optimal from a geomorphic perspective as it crosses HDF-3 at an angle that is perpendicular to the drainage feature. The FSSR (SCS 2023) proposes to convey HDF-3 via a 6.4 m wide by 1.5 m high concrete box culvert.

7. Policy Conformance

It is our opinion that the findings of this report are in conformance with the Provincial Policy Statement (2020), Ontario Regulation 41/24, TRCA (2004) Belt Width Delineation Procedures, TRCA (2015) Crossings Guideline for Valley and Stream Corridors, Ontario Regulation 832/21 and the DFO (2024) Recovery Strategy and Action Plan for the Redside Dace (*Clinostomus elongatus*) in Canada.

8. Conclusion

Beacon was retained by Mayfield Golf Course Inc. and Tullamore Industrial GP Limited to undertake a geomorphic assessment for the lands known municipally as Part of Lots 19, 20 and 21 Concession 5, in the Town of Caledon, Regional Municipality of Peel. The subject lands include the former Mayfield Golf Course (12580 and 12552 Torbram Road), in addition to a parcel of undeveloped land with no municipal address directly to the south.

The purpose of this geomorphic assessment was to characterize existing geomorphic conditions for the portions of watercourse relevant to the subject lands, contribute to the determination of development limits through the delineation of Redside Dace habitat limits (referencing 30 m from the meander belt) for the West Humber River Tributary and North-South Tributary, evaluate potential impacts associated with the proposed development plan and provide geomorphic span recommendations for proposed watercourse road crossings.

The following points summarize the findings of this study:

- A review of available mapping indicated that Reaches WHT-1A and WHT-1 of the West Humber Tributary, and Reaches WHT-2 and WHT-3 of the North-South Tributary consisted of a well-defined channel situated within a confined valley system;
- An historical assessment of land use and channel planform identified evidence of significant modification (straightening) along the North-South Tributary over the available historical record;
- Rapid geomorphic assessment results identified Reaches WHT-1A, WHT-1, WHT-2 and WHT-3 as being in a transitional state (RGA scores of 0.29, 0.28, 0.22 and 0.26, respectively) with observed evidence of widening;
- The RSAT assessment indicated that Reaches WHT-1 and WHT-2 displayed a good degree of overall ecological health and Reaches WHT-1A and WHT-3 displayed fair conditions;
- The following meander belt dimensions were recommended on a reach basis:
  - Reach WHT-1A: 55 m;
  - Reach WHT-1: 40 m;
  - Reach WHT-2: 50 m; and
  - Reach WHT-3: 35 m.
- In conformity with applicable legislation, lands within 30 m of the meander belt (have been identified to delineate Redside Dace habitat limits as they pertain to the subject lands; and
- A geomorphic span recommendation of 14 m was identified for the Street A crossing of Reach WHT-3.

Should you have any questions or require any additional information please contact the undersigned.

Prepared by:
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Reviewed by:
Beacon Environmental Ltd.

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Appendix A

Historical Aerial Imagery

Legend

Subject Lands

Historical Aerial Imagery	**1978**
12522 & 12306 Torbram Road Geomorphic Assessment	
BEACON ENVIRONMENTAL	Project: 222239 Last Revised: October 2023
Client: Mayfield Golf Course Inc. and Tullamore Industrial GP Limited	Prepared by: SZ Checked by: MA
N 1:6,000	0 100 200 m

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Legend

Subject Lands

Historical Aerial Imagery	**1991**
12522 & 12306 Torbram Road Geomorphic Assessment	
BEACON ENVIRONMENTAL	Project: 222239 Last Revised: October 2023
Client: Mayfield Golf Course Inc. and Tullamore Industrial GP Limited	Prepared by: SZ Checked by: MA
N 1:6,000	0 100 200 m

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Legend

Subject Lands

Historical Aerial Imagery	**2002**
12522 & 12306 Torbram Road Geomorphic Assessment	
BEACON ENVIRONMENTAL	Project: 222239 Last Revised: October 2023
Client: Mayfield Golf Course Inc. and Tullamore Industrial GP Limited	Prepared by: SZ Checked by: MA
N 1:6,000	0 100 200 m

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Legend

Subject Lands

Historical Aerial Imagery	**2022**
12522 & 12306 Torbram Road Geomorphic Assessment	
BEACON ENVIRONMENTAL	Project: 222239 Last Revised: October 2023
Client: Mayfield Golf Course Inc. and Tullamore Industrial GP Limited	Prepared by: SZ Checked by: MA
N 1:6,000	0 100 200 m

Appendix B

Photographic Record

Photograph 1. Location 1. **Reach WHT-1A West Humber River Tributary** Upstream view from property limit. Note bank erosion on left bank (photo right) and valley wall contact and outer bank erosion on right bank (photo left).	**View: US**
Date Taken: May 5, 2023	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 2. Location 2. **Reach WHT-1A West Humber River Tributary** Upstream view of valley wall contact and riffle feature. Bank erosion observed on right bank.	**View: US**
Date Taken: May 5, 2023	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 3. Location 3. **Reach WHT-1A West Humber River Tributary** Downstream view of meander bend and valley wall contact.	**View: DS**
Date Taken: May 5, 2023	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 4. Location 4. **Reach WHT-1A West Humber River Tributary** Upstream view of oxbow (cut off channel) formation at meander bend (arrows).	**View: US**
Date Taken: May 5, 2023	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 5. Location 5. **Reach WHT-1A West Humber River Tributary.** Upstream view of channel conditions. Note multiple flow paths observed.	**View: US**
Date Taken: May 5, 2023	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 6. Location 6. **Reach WHT-1A West Humber River Tributary** Downstream view of channel meander bend. Gravel point bar observed on inner bank with outer bank erosion.	**View: DS**
Date Taken: May 5, 2023	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 7. Location 7. **Reach WHT-1A West Humber River Tributary.** Downstream view of meander bend. Scour observed on inside meander bend.	**View: DS**
Date Taken: May 5, 2023	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 8. Location 8. **Reach WHT-1A West Humber River Tributary** Downstream view of channel from reach break. Note right bank erosion and instream debris.	**View: DS**
Date Taken: May 5, 2023	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

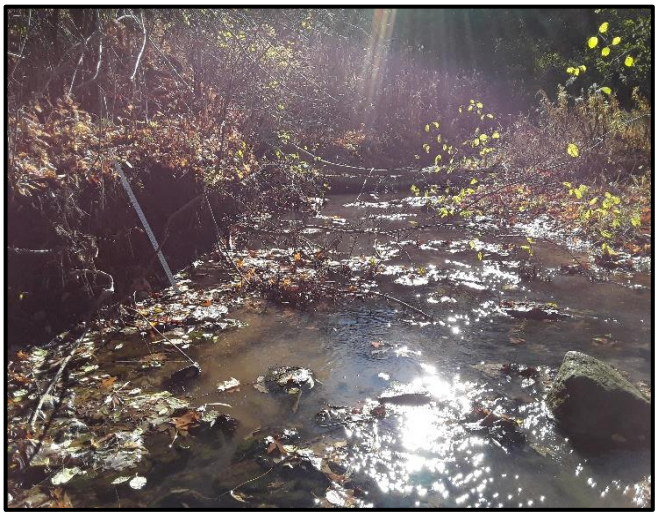
Photograph 9. Location 9. **Reach WHT-1 West Humber River Tributary** Gate crossing at the downstream reach extent.	**View: DS**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 10. Location 9. **Reach WHT-1 West Humber River Tributary** Upstream view of channel from downstream reach break.	**View: US**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 11. Location 10. **Reach WHT-1 West Humber River Tributary** Downstream view – evidence of widening.	**View: DS**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 12. Location 11. **Reach WHT-1 West Humber River Tributary** Upstream view of general channel conditions. Note proximity of left bank to Golf Course green.	**View: US**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 13. Location 12. Reach WHT-1 West Humber River Tributary. Upstream view of right bank under pedestrian bridge. Bridge footings exposed.	**View: US**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	



Photograph 14. Location 13. Reach WHT-1 West Humber River Tributary Upstream view of valley wall contact on right bank. Scour on inside meander bend was observed.	**View: US**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 15. Location 14. Reach WHT-1 West Humber River Tributary Downstream view of general conditions and valley wall contact on right bank.	**View: DS**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 16. Location 14. Reach WHT-1 West Humber River Tributary Upstream view of confluence of tributaries at reach extent.	**View: US**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 17. Location 15. **Reach WHT-2 North-South Tributary** Downstream view of historical flow path. Standing water present during time of survey.	**View: DS**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 18. Location 16. **Reach WHT-2 North-South Tributary** Downstream view of general channel conditions.	**View: DS**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 19. Location 17. **Reach WHT-2 North-South Tributary** Downstream view of riffle. Note presence of instream vegetation.	**View: DS**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 20. Location 18. **Reach WHT-2 North-South Tributary** Upstream view of channel meander bend. Note erratic boulder present instream.	**View: US**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 21. Location 18. **Reach WHT-2 North-South Tributary** Downstream view of channel bank erosion. Note leaning trees and exposed tree roots on left bank.	**View: DS**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 22. Location 19. **Reach WHT-2 North-South Tributary** Downstream view of channel conditions. Note entrenchment and falling/leaning trees on left bank.	**View: DS**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 23. Location 20. **Reach WHT-2 North-South Tributary** Downstream view of meander bend. Point bar development on right bank. Entrenchment observed on left bank.	**View: DS**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 24. Location 21. **Reach WHT-2 North-South Tributary** Downstream view of valley wall contact on right bank. Undercutting and till observed at the valley toe.	**View: US**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 25. Location 22. **Reach WHT-2 North-South Tributary** Upstream view of channel conditions at reach break. Note change in riparian vegetation.	**View: US**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 26. Location 23. **Reach WHT-2 North-South Tributary** **Upstream view of channel conditions at reach break. Note change in riparian vegetation**	**View: US**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 27. Location 24. **Reach WHT-3 North-South Tributary** Downstream view of channel conditions. Multiple flow paths observed; poorly developed riffle-pool morphology.	**View: DS**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 28. Location 25. **Reach WHT-3 North-South Tributary** Upstream view of channel conditions from golf cart crossing. Note narrow riparian buffer.	**View: US**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 29. Location 26. **Reach WHT-3 North-South Tributary** Upstream view of channel conditions from golf cart crossing. Note riparian grasses and vegetation encroachment.	**View: US**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 30. Location 27. **Reach WHT-3 North-South Tributary** Downstream view of channel from golf cart crossing.	**View: DS**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 31. Location 28. **Reach WHT-3 North-South Tributary** Downstream view of pool feature. Note overhanging grasses and herbaceous species.	**View: DS**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 32. Location 29. **Reach WHT-3 North-South Tributary** Online pond outlet on channel left bank.	**View: US**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 33. Location 30. **Reach WHT-3 North-South Tributary** Downstream view of valley corridor. Note riparian grasses and herbaceous species.	**View: DS**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	

Photograph 34. Location 31. **Reach WHT-3 North-South Tributary** Upstream view of channel conditions at upstream reach extent.	**View: US**
Date Taken: November 8, 2022	
Site: 12522 & 12306 Torbram Rd, Caledon ON	