APPENDIX A
Data Gap Analysis and Problem Identification

EAST MORRISON CREEK EROSION MITIGATION ENVIRONMENTAL ASSESSMENT
PHASE 1: DATA GAP ANALYSIS AND PROBLEM CONFIRMATION
APPENDIX A

Prepared for: **TOWN OF OAKVILLE**

Prepared by: **MONTROSE ENVIRONMENTAL SOLUTIONS CANADA INC.**

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Oakville, Ontario

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EAST MORRISON CREEK EROSION MITIGATION ENVIRONMENTAL ASSESSMENT

PHASE 1: DATA GAP ANALYSIS AND PROBLEM CONFIRMATION

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Prepared for the Town of Oakville, January 2025

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VERSION CONTROL

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1 INTRODUCTION

Montrose Environmental Solutions Canada Inc. (Montrose) is pleased to submit this Phase 1 technical memorandum to document our review of background information, assess data gaps, and confirm project goals and objectives. It is expected that the Phase 2 work plan will fill all critical data gaps and strategies to mitigate any missing or outstanding information, including associated data uncertainties, will be developed.

The study area of East Morrison Creek was identified as a high-priority "long" reach area of concern in the *Town of Oakville 2021 Creek Inventory and Assessment* (Aquafor Beech 2022). From this assessment, the subject reaches are considered to be under stress from hydromodification within the urbanized watershed, causing excessive erosion through fluvial processes of widening and degradation within the soft shale bedrock and weathered alluvium. With historical erosion control measures in place to protect properties, trails, pedestrian bridges, and other infrastructure, many of the existing protection measures have become degraded and dysfunctional (e.g., gabion baskets, riprap), potentially increasing the risks of erosion on adjacent property and resources. A total of 23 erosion sites were identified in the 2021 inventory and assessment study (Aquafor Beech 2022), including 2 stormwater outfalls, approximately 8 trail encroachments and pedestrian bridges, and a range of valley slope-related risks to upland properties. To address the identified erosion risk within the study area, the Town of Oakville (the Town) is proposing to carryout a Schedule B Municipal Class Environmental Assessment (EA). The purpose of the study is to develop, evaluate, and recommend preferred alternatives for erosion control within reaches 39 to 45 of East Morrison Creek and will be completed through four main tasks:

- Task A: Phase 1 Services, Problem Definition
- Task B: Phase 2 Services, Development and Review of Options
- Task C: Phase 3 Services, Preferred Alternatives Selection and Preliminary Design
- Task D: Phase 4 Services, Preparation of Environmental Study Report

Montrose is undertaking the necessary technical studies to accurately define the problems, support the development and evaluation of alternative solutions, produce conceptual designs, and complete the necessary consultations with regulatory agencies, Indigenous groups, and the public. The key technical studies include analysis of the geomorphology, hydraulics, and ecological systems within the study area and areas potentially impacted by construction and consideration of geotechnical slope stability and flood reduction. An archaeological screening and Stage 1 archaeological assessment have been completed.

The Town has also provided a long list of potential structural and non-structural alternatives, which Montrose will refine to address the site-specific conditions on East Morrison Creek. Of particular importance, the plan aims to better evaluate the degree of short- and long-term risks across the study area. It is expected that the degree of risk at many identified sites may be relatively low in the short to intermediate term (i.e., not urgent), and as such direct interventions immediately following the EA may not be the highest priority capital investment for the Town. While some sites may require more immediate action, other management strategies can be recommended within the EA process that involve 5-year monitoring programs and EA addendums to confirm the urgency of works within the 10-year expiry of the original EA study.

Of the 23 erosion sites identified in the 2021 inventory and assessment study (Aquafor Beech 2022), initial screening undertaken at the outset of the current assignment identified three primary erosion sites of concern within the study area based on their apparent risk to infrastructure; these include Site 4 (slope adjacent to residential properties) and Site 6 and Site 7 (eroded outfall and slope adjacent to parking lot, respectively).

FIGURE 1 Study Area (Source: Town of Oakville 2023)

1.1 Project Status

With reference to the Phase 1 work plan of the EA study for problem definition, the following tasks have been completed or are in progress, leading to a full assessment report in Phase 2 as part of Progress Report No. 1:

- Task A1: Project Initiation, Notice of Commencement, and Background Review: completed, this report
- Task A2: Topographic Survey and Geomorphic Assessment: completed October/November 2023
- Task A3: Hydraulic Model Review and Update: in progress
- Task A4: Existing Channel Conditions Analysis: in progress

- Task A5: Ecological Studies and Tree Inventories: scoped ecological data collection completed in 2023; supplementary tree inventory data to be collected in 2024
- Task A6: Geotechnical Investigation: draft desktop assessment report completed in November 2023 (by Thurber Engineering Ltd. [Appendix D of Phase 1 Report])
- Task A7: Agency Pre-consultations: initial pre-consultation meeting held in September 2023
- Task A8: Indigenous Engagement Plan: to be developed following the project Notice of Commencement and identification of Indigenous stakeholders by the Ontario Ministry of the Environment, Conservation and Parks (MECP)
- Task A9: Archaeological Resources Screening: screening and draft Stage 1 archaeological assessment completed in November 2023 (by TMHC Inc.; Appendix E of Phase 1 Report]).

2 BACKGROUND REVIEW

To fulfill the requirements of Phase 1 (Issue Assessment and Problem Confirmation), a comprehensive background review has been completed. The following subsections provide a data gap assessment, with lists of all data available by discipline/task, and any high-priority data gaps with a strategy for how they will be filled through the Phase 2 work plan.

2.1 Previous Reports

Previous reports on erosion and riverine-related projects are essential for not only gathering an understanding of prior decisions, characterization, and recommendations, but they also generally have similar objectives and complex issues to be addressed. Those previous reports within and adjacent to the immediate study area may provide additional context in terms of channel process, ongoing issues, and mitigation strategies specific to local channel reaches.

The following subsections provide a current summary of available reporting and schematics that have been supplied by the Town or by Conservation Halton (CH) for the current study or gathered based on previous knowledge by the study team.

2.1.1 Information Available

The Town provided the following reports to Montrose for review:

- *Town of Oakville 2021 Creek Inventory and Assessment* (Aquafor Beech 2022; refer to Section 2.1.6)
- geotechnical reports (refer to Section 2.1.5)
    - *Geotechnical Investigation Pedestrian Bridge and Stair Structure Replacements, McCraney Valley Park, Town of Oakville, Ontario* (Terraprobe 2012)
    - *Taplow Creek Reaches 24 and 25 Valley Wall Erosion Rehabilitation, Oakville, Ontario* (Terraprobe 2016)
    - *Munn's Creek Reaches 34 to 35 Erosion Mitigation, Oakville, Ontario* (Terraprobe 2020)

Montrose collected and reviewed the following publicly available reports (see Section 2.1.8):

- *Flood Risk Mapping and Spill Quantification - Morrison-Wedgewood Diversion Channel, Volume I: Hydrologic Modelling Report* (MH 2020a)
- *Flood Risk Mapping and Spill Quantification - Morrison-Wedgewood Diversion Channel, Volume II: Hydraulic Modelling Report* (MH 2020b)

The Town and CH supplied the following guidance documents to define the requirements of the current study:

- *The Town of Oakville's Request for Proposal East Morrison Creek Erosion Mitigation Study RFP-27-2023* (Town of Oakville 2023a) and the accompanying Addendum No. 1. (Town of Oakville 2023b)
    - The RFP documents set out the objectives and parameters for the current study.
- In September 2023, the Town provided a PDF map of the study area entitled *East Morrison Creek EA Study Area*" (Figure 1),which confirms the limits of the subject lands.
    - The study area includes the East Morrison Creek corridor and tributary to East Morrison Creek. The study area extends from the confluence with the Wedgewood Diversion Channel to Postridge Drive.
- CH provided an EA checklist outlining CH's applicable requirements for the current study.

2.1.2 Data Gaps

No reporting data gaps have been identified.

2.2 Base Mapping and Aerial Imagery

After the project was initiated, Montrose submitted data requests for current and historical aerial imagery, as well as relevant base mapping data (e.g., property boundaries, roads, previous erosion inventory mapping, etc.), to the Town. Most of the Town's mapping has been received; however, Regional Municipality of Halton (Halton Region) mapping has not been received. The remaining data requirements critical to the study will be addressed through the Phase 2 work plan.

Easting (m)

603200 604000 604800 605600 606400

Northing (m)

4816000 4815200 4814400 4813600

Sixteen Mile Creek

Joshua's Creek

Lower Wedgewood Creek

Lower Morrison Creek

N

- Parcel
- Easement
- Natural Heritage System
- Watercourse
- Waterline
- Wetland Boundary
- Traffic Signal Interconnect
- Town Fiber
- Communication Line
- Sidewalk
- Trail
- Road
- Contour
- Catch Basin
- Maintenance Hole
- Interconnect Point
- Pedestrian
- Transport Signal

Storm Channel

- Concrete Lined
- Ditch
- Natural Channel

Storm Main

- Culvert
- Main
- Foundation Drain
- Storm Lateral

1:15,000 metres

150 0 150 300

NAD 1983 UTM Zone 17N

Matrix Solutions Inc.
A Montrose Environmental Company

Corporation of the Town of Oakville
East Morrison Creek

Compiled Base Mapping

Date:	Project:	Submitter:	Reviewer:
December 2023	36236	A. Nicoll	R. Phillips

Figure 2

I:\Town\Oakville\36236\Figures\And Tables\GMY\2023\InHouse\Figure-2-Compiled_Base_Mapping.mxd - Tablold_L - 21-Dec-23, 02:03 PM - sylam - TID005

2.2.1 Information Available

Montrose has compiled and reviewed base mapping layers, aerial imagery, and spatial datasets from the following sources:

- general base mapping layers, Town of Oakville:
    - current ortho imagery of the study area
    - watercourses, roads, paths/trails, pedestrian bridges, culverts (filename: *East Morrison Data.gdb*)
    - infrastructure mapping (refer to Section 2.3; filename: *East Morrison Data.gdb*)
    - parcels, easements (filename: *East Morrison Data.gdb*)
- topographic data, Town of Oakville:
    - LiDAR of the study area, including Hillshade, 1 m contour, and 50 cm contour layers

2.2.2 Data Gaps

At the time of writing, Montrose has not received the following base mapping data:

- Halton Region infrastructure mapping, including watermains, laterals, and maintenance holes, as well as sanitary mains, laterals, and maintenance holes (refer to Section 2.2)
- third-party utilities mapping (refer to Section 2.3)
- mapping of Town assets, including bridges and culverts within the East Morrison Creek valley (refer to Section 2.3)
    - Note that the mapping of pedestrian bridges and bank protection features was provided as part of the 2021 inventory and assessment (Aquafor Beech 2022) mapping.

2.3 Infrastructure and Utilities

The project team has reviewed the available infrastructure data provided to date. In addition to the data that has been received from the Town, the Town open data portal was also reviewed to check for available information. While design information has been received for the sanitary crossing at Erosion Site E11, mapping and design data for any other regional infrastructure within the valley was identified as an important data gap in the course of the review. Going forward, the team will contact Halton Region to request outstanding regional infrastructure data/to verify that no other regional infrastructure is present within the valley.

The study team will also circulate a request for utilities data to all third-party owners in the project vicinity. The request will provide a map of the study aera and a brief description of the project requirements and will request markups, as-builts, and plans for any future works in the area. The utilities data will be compiled with available infrastructure data to prepare a comprehensive plan of infrastructure and utilities. Observations made during the autumn 2023 site assessments will be used to verify the infrastructure and utilities mapping.

2.3.1 Information Available

- The Town provided GIS mapping of the following infrastructure data in a geodatabase with the filename *East Morrison Data.gdb*:
    - roadway and signals: road segment, transport signal, pedestrian, traffic signal, traffic signal interconnect, intersection power
    - communication: communication lines, Town fiber
    - sidewalks, trails, walkways
    - storm channel: concrete lined, ditch, natural channel
    - stormwater management: storm main, culvert, foundation drain, catchbasins, maintenance holes, storm laterals
- The Town provided infrastructure drawings (.tif) and detail for constructed infrastructure within and adjacent to the study area. Geotechnical information available and data gaps are documented in more detail in Section 2.4:
    - Glaneshton Drive bridge improvements and localized re-channelization of Morrison Creek

      The accompanying geotechnical report was not provided.
    - Penex property subdivision plan details and geotechnical analysis west of Morrison Creek
    - Spruce Needle Court geotechnical reporting and geotechnical analysis west of Glenashton Drive and Eighth Line
- On October 30, 2023, the Town confirmed by email that the sanitary sewer crossing of the tributary to East Morrison Creek is active, per communication with Halton Region. On December 4, 2023, the Town provided Montrose with a design drawing of the sanitary sewer crossing.

2.3.2 Data Gaps

- Mapping and design data (if available) for Town assets within valley, including bridges and culverts, has not been received, apart from pedestrian bridge and bank protection mapping.
- Mapping of regional assets has not been provided to date. Regional assets include water mains, laterals, and maintenance holes and sanitary mains, laterals, and maintenance holes.
- Third-party utilities data will be requested by letter. The following data is required:
    - Just Energy Electricity & Natural Gas company data (hydro, gas); at least one high-pressure pipeline appears to run through the valley north of Glenashton Drive
    - telecommunication utilities mapping

2.4 Geotechnical

Most geotechnical reports requested by Montrose have been received. Montrose reviewed these reports at a high level and were circulated to the project geotechnical subconsultant to inform the geotechnical assessment.

2.4.1 Information available

The Town provided the following geotechnical reports:

- *Munn's Creek Reaches 33 to 35 Erosion Mitigation Oakville, Ontario* (Terraprobe 2020)
    - Geotechnical slope stability and erosion risk assessment for eight areas located within reaches 33 to 35 of Munn's Creek. The study assessed the existing slope conditions, long-term stability and erosion risks, and recommended remediation options.
- Morrison Creek Stabilization, Environmental Study Report (ESR), Town of Oakville (Amec 2016)
    - Geotechnical assessment of West Morrison Creek from Upper Middle Road to McCraney Street (excluding the creek on Sheridan College lands). The study included a review of background information, slope stability assessment, and recommendations on preventative and protection measures.
- *Taplow Creek Reaches 24 and 25 Valley Wall Erosion Rehabilitation Oakville, Ontario* (Terraprobe 2016)
    - Geotechnical slope stability and erosion risk assessment for three areas (located behind 1119 Mayfair Road, 1091 Mayfair Road, and 1089 Manchester Crescent) within Reach 25 and one area (located behind 1071 and 1075 Manchester Crescent) within Reach 24 of Taplow Creek. The study assessed the existing slope conditions, long-term stability and erosion risks, and recommended remediation options.
- *Geotechnical Investigation Pedestrian Bridge and Stair Structure Replacements McCraney Valley Park Town of Oakville, Ontario* (Terraprobe 2012)
    - Geotechnical investigation of soil and groundwater conditions carried out to inform the replacement of three pedestrian bridges in McCraney Valley Park.
- Penex property subdivision plan details and geotechnical analysis west of Morrison Creek (Soil-Eng 1995)
- Spruce Needle Court geotechnical reporting and geotechnical analysis west of Glenashton Drive and Eighth Line (Landtek 2001)

Thurber was retained to complete a geotechnical slope stability hazard and risk assessment desktop study and site inspection in support of the East Morrison Creek Erosion Mitigation Study. Montrose received the draft geotechnical report on November 11, 2023, which Montrose will review and integrate into Phase 2 of the EA study. The draft geotechnical report is provided in Appendix D of Phase 1 Report.

2.4.2 Data Gaps

Geotechnical report accompanying the Glenashton bridge improvements and localized re-channelization of Morrison Creek

2.5 Geomorphology and Erosion

Background reporting (Section 2.1) and digital mapping and imagery (Section 2.2) provide essential information in developing a historical and contemporary geomorphic characterization of watercourses. At the onset of this project, some specific data was requested to provide our understanding of documented instability and management at issue sites. Additionally, some data was available at the proposal stage (e.g., Aquafor Beech [2021]).

2.5.1 Information available

- The location of erosion sites on East Morrison Creek was provided as a PDF in the RFP (Town of Oakville 2023a) for this project.
- Previous erosion assessment mapping layers from the *Town of Oakville 2021 Creek Inventory and Assessment* (Aquafor Beech 2022) have been provided. The mapping is complete per the 2021 assessment report and includes creeks reaches, erosion sites (including provisional field scores for erosion risk), creek events (debris obstructions, dumping in corridor, encroachment issue, fish barrier, maintenance site, minor erosion, and restoration opportunity), and infrastructure (type: bank treatment, channel treatment, drop structure, pedestrian crossing, orifice stormwater management control, and outfall; subtype: armourstone, bioengineering, boulder, cablecrete, concrete-in-practice [CIP], gabion basket, pedestrian crossing, riprap, and other; condition: very poor to very good).
    - It is noted that the identification numbers for erosion sites presented in the Aquafor Beech (2022) mapping differ from those presented in the RFP. Montrose will carry forward the numbering set out in the RFP during the current study.
- The Town provided records of correspondence related to slope instability and erosion at 1359 White Oaks Boulevard. This included written correspondence between residents committee of 1359 White Oaks Boulevard, the mayor's office, the Town, and consultants to the Town.
- Mos of the key data has been received for understanding the horizontal and vertical proximity of valley features to infrastructure and adjacent properties is critical to evaluating erosion risk:
    - The vertical alignment of the sanitary sewer crossing at erosion site E11 can be interpolated from the available construction drawing.
    - Parcel mapping is available to confirm the horizontal proximity of private lands to valley features.
    - The available LiDAR data has been supplemented with topographic site survey of the watercourse, floodplain, valley slopes, and key infrastructure completed by Montrose in the autumn of 2023.
- Design drawings (dated 1987) pertaining to the local channel realignment at the Glenashton Bridge.

2.5.2 Data Gaps

- Mapping and vertical alignments of any additional water infrastructure or other regional assets within the valley, if present, have not been received to date.

- Verification, mapping and vertical alignment data regarding the high-pressure pipeline near Glenashton Drive have not been received, as described in Section 2.3. Although not necessarily required for base mapping, an accurate depiction of the pipeline elevations at the creek crossings or proximal to zones of channel migration is invaluable when evaluating current and potential risk, prioritizing sites, and developing plans. Design information will be requested as part of the utilities request, as described in Section 2.3. It should be noted that this site was not previously identified as an erosion site.
- Pedestrian bridge design drawings, if available, would assist the characterization and geomorphic assessment.
- *OakvilleReachPhotoSites2021.gdb,* provided as part of the Aquafor Beech (2021) mapping, contained no data or mapping files.

2.6 Ecology

At the onset of the project, background information for terrestrial and aquatic ecology was collected from multiple opensource databases and through agency requests.

In addition, Montrose completed field work to conduct high-level Ecological Land Classification community mapping, assess species at risk (SAR) habitat assessment, and carry out aquatic habitat characterization to add to the existing background information to describe existing conditions.

2.6.1 Information available

Montrose requested natural heritage data from the Town and CH. Available data were also accessed from open municipal, provincial, and federally hosted sources.

- The Town provided GIS mapping of the natural heritage system limits in a geodatabase entitled *East Morrison Data.gdb*.
- CH provided fisheries and terrestrial data in Microsoft® Excel spreadsheets containing location coordinates for point observations of fish species (fisheries data) and of bird and vegetation species (terrestrial data). CH staff noted that the terrestrial data was drawn from within a 2 km radius of the study area, and as such some of the provided data extends beyond the limits of the study. Fisheries data included an extended reach, as the Morrison-Wedgewood Diversion Channel is diverted into occupied SAR habitat within Sixteen Mile Creek.
- Wetland boundaries and watercourse mapping was accessed through publicly available datasets (MNRF 2023a)
- Terrestrial and aquatic species findings are from Aquafor Beech (2021).
- Terrestrial and aquatic SAR, wetlands, areas of natural and scientific interest (ANSIs), and environmentally significant areas (ESAs) were accessed through the Natural Heritage Information Centre database (MNRF 2023b).
- Aquatic fisheries data were accessed through publicly available datasets (MNRF 2023a).
- Aquatic SAR records were accessed from Fisheries and Oceans Canada (DFO; 2023)

- Bird species recordings (including SAR) were accessed from the *Atlas of the Breeding Birds of Ontario, 2001-2005* (Cadman et al. 2007)
- Insect species recordings (including SAR) were accessed from the *Ontario Butterfly Atlas* (TEA 2023)
- Reptile and amphibian recordings (including SAR),were accessed from the *Ontario Reptile and Amphibian Atlas* (Ontario Nature 2023)
- Data Gaps
- The natural heritage mapping provided by the Town did not include ELC mapping. ELC mapping within the subject lands is requested, if available.
- Open data from the Town indicates that some tree inventory has occurred within the Morrison Creek riparian corridor. Any information or data relating to tree presence within the corridor is requested (species, size, condition, location, etc.).

2.7 Hydrology and Hydraulics

2.7.1 Information Available

CH provided a HEC-RAS model of base conditions on East Morrison Creek. The model includes associated files and a memorandum titled, *Morrison-Wedgewood Floodplain Mapping Documentation for Use of Modelling* dated July 22, 2020. GIS mapping of HEC-RAS cross-section locations, as well as spills and flood hazards, was included in the package (data.gdb).

The HEC-RAS model includes Morrison Creek from Dundas Street East to the confluence with the Morrison-Wedgewood Diversion Channel. Within the study area, between Upper Middle Road East and the confluence, there are approximately 34 existing cross sections, based on CH's 2018 LiDAR data.

The peak flows used in the HEC-RAS model are based on a Morrison Hershfield (2020a) hydrologic study. The hydrology study encompassed East Wedgewood Creek, West Wedgewood Creek, East Morison Creek, West Morison Creek, and Munn's Creek. The hydrological modelling was performed using Visual OTTHYMO 5 software. East Morrison represents a catchment area of 678 ha and is broken into 7.8 ha to 73.2 ha subcatchments within the hydrologic model. The land use within the catchment is primarily medium-density residential, with scattered rural land use in the upstream reaches. Peak flow rates for the 1:2-year through Regional storm events are modelled and input into the HEC-RAS model at three flow change locations within the study area. The flow rates within the study area are shown in Table 1.

TABLE 1 Peak Flow Rates

Location	1:2 year	1:5 year	1:10 year	1:25 year	1:50 Year	1:100 year	Regional
Downstream of Upper Middle Road East (Section 2227.4)	10.68	21.91	25.77	33.26	39.07	45.73	55.56
Confluence with Northern Tributary (Section 1331.4)	9.7	18.68	24.57	31.16	36.6	42.59	55.68
West of Hillview Crescent (Section 969.4)	10.99	19.17	26.86	34.27	39.95	46.22	62.47

As part of the planned works, Montrose will update and add new sections to the base HEC-RAS model to represent existing conditions for a basis of comparison (BOC) scenario. Montrose conducted two in field surveys on October 23 to 27, 2023, and November 30, 2023 collecting a total of 1,414 survey points. The BOC model will form the foundation of analysis.

2.7.2 Data Gaps

The tributary between Kathleen Crescent and Golden Meadow Trail was not included in the base HEC-RAS model.

2.8 Archaeological Assessment

A draft Stage I archaeological assessment has been completed. The request for this study was submitted by Montrose, identifying the limits of the project study as part of the data compilation and base mapping activities.

The Stage I assessment is conducted to provide information about a property's geography, land use history, previous archaeological fieldwork, and current land conditions as per the Standards and Guidelines for Consultant Archaeologists (MTC 2011). The assessment will evaluate in detail the property's archaeological potential, which will support recommendations for Stage II archaeological assessments, if required.

Montrose received the draft Stage 1 archaeological assessment report for the East Morrison Creek Erosion Mitigation Study on November 10, 2023. Concurrently with Phase 2 of the study, the study team will review the report and consult with the Town regarding the communications plan, Indigenous community engagement, and the requirements for future studies. The archeological screening form and Stage 1 archeological assessment draft report are provided in Appendix E of Phase 1 Report.

2.9 Summary of Data Gaps

Table 2 provides as summary of the data gaps identified in the report and how they will be addressed through the Phase 2 work plan, additional data requests, or other strategies.

TABLE 2 Summary of Data Gap Assessment

Topic or Discipline	Data Gap	Mitigation Strategy
Previous Reports	-	-
Base Mapping and Aerial Imagery	• bridge and culvert mapping • regional assets (watermains, sewers)	• request from Town • request from Town
Infrastructure and Utilities	• private utilities mapping (hydro, gas, oil, telecommunications)	• request by letter
Geotechnical	• Glenashton bridge geotechnical report	• if available; not critical to study
Geomorphology and Erosion	• pedestrian bridge design drawings • 2021 site photographs (Aquafor Beech)	• not critical to study • forthcoming if available; if not, not critical to study
Ecology	• Ecological Land Classification mapping • tree inventory mapping	• request from Town • request from Town
Hydrology and Hydraulics	• tributary to East Morrison Creek HEC-RAS modelling	• not critical to study, can complete using LiDAR and topographic survey

3 ISSUES ASSESSMENT AND PROBLEM CONFIRMATION

The goals and objectives of the study have been confirmed through Phase 1 of the study, including review of background information and data and based on discussions with Town staff during the project kickoff meeting and site walk in September 2023. The primary and secondary goals of the study have been identified as follows:

- Primary Goal 1: to address the identified erosion risk within the study area by completing a Schedule B Municipal Class EA. The purpose of the study is to develop, evaluate, and recommend preferred alternatives for erosion control within Reaches 39 to 45 of East Morrison Creek.
- Secondary Goal 2: to enhance local aquatic and riparian ecosystems using natural channel design principles where erosion remediation works are required.
- Secondary Goal 3: to ensure the project addresses social and stakeholder requirements, including indigenous stakeholders, residents, park users.

To achieve the above goals, the following three objectives have been discussed with the Town, which fulfill the Municipal ClassEA process:

- Project Objective 1 - Existing Conditions and Risk Assessment: undertake the analyses required to assess and characterize past and existing conditions for stream morphology, hydrology and hydraulics, aquatic habitat, terrestrial habitat, and Town and Halton Region infrastructure along East Morrison Creek.
- Project Objective 2 - Evaluate Alternatives to Meet Project Goals: identify and evaluate rehabilitation alternatives that will contribute to the long-term protection of Toronto Water infrastructure while minimizing the effects on the riparian ecosystem and improving aquatic habitat.
- Project Objective 3 - Select Preferred Solutions through Municipal Class EA and Consultation Processes: select preferred solution(s) following an evaluation of environmental, social, and economic factors that will protect Town and regional infrastructure.

3.1 Discussion of Key Issues

As described in Section 1, the study area of East Morrison Creek has been identified as a high-priority “long” reach area of concern in the Aquafor Beech (2021) study. A total of 23 erosion sites were identified in the 2021 inventory study, including 2 stormwater outfalls, about 8 trail encroachments and pedestrian bridges, and a range of valley slope related risks to upland properties. The Town has also provided a long list of potential structural and non-structural alternatives.

Montrose will refine the list of alternatives to address the site-specific conditions on East Morrison Creek. Of particular importance, the study aims to better evaluate the degree of short- and long-term risks across the study area. It was expected that the degree of risk at many identified sites may be relatively low in the short to intermediate term (i.e., not urgent), and as such direct interventions immediately following the EA may not be the highest priority capital investment for the Town. While some sites may require more immediate action, other management strategies can be recommended within the EA process that involve 5-year monitoring programs and EA addendums to confirm the urgency of works within the 10-year expiry of the original EA study.

Initial screening undertaken at the outset of the current assignment identified three primary erosion sites of concern within the study area based on their apparent risk to infrastructure; these include Site 4 (slope adjacent to residential properties) and Site 6 and Site 7 (eroded outfall and slope adjacent to parking lot, respectively).

The subsequent background review and field program have supported the initial screening, and based on this work the study team anticipate that the number and extent of sites to be considered by the EA is likely to be less than the Aquafor Beech erosion inventory. As such, the design requirements may be adapted to address several specific problem sites, mostly at downstream end of the study area, rather than the reach long solution that was initially proposed through the previous study.

In addition, verification of the presence, configuration, and depth of cover of the potential high-pressure pipeline crossing will verify if this site requires evaluation as a new site not identified in the previous study. The formal evaluation and prioritization of all erosion sites will be completed in the next phase of work.

3.2 Next Steps

The next steps of the East Morrison Creek EA are to submit data requests as described in Section 2.9 to Halton Region, the Town, and private utilities and to proceed with the Phase 2 work plan. A comprehensive assessment of the Phase 1 results will be reported during the Phase 2 process in Progress Report No. 1 scheduled for March 2024.

4 REFERENCES

Amec Foster Wheeler Environment & Infrastructure, a division of Amec Foster Wheeler Americas Limited (Amec). 2016. *Morrison Creek Stabilization, Environmental Study Report (ESR), Town of Oakville*. Prepared for Town of Oakville. Burlington, Ontario. October 2016.

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APPENDIX B
Erosion Site Scoring

APPENDIX B – EROSION SITE SCORING (AQUAFOR BEECH 2022)

TABLE B1 Scoring for Risk Types and their Classification

Risk	Score
Critical Infrastructure	45
Minor Roads/Bridge	35
Private Property/Crossings	25
Secondary Infrastructure	15
Open Space, Parks, Trails	5
Green Space (no risk)	0

TABLE B2 Scoring for Distance to Risk

Distance	Score
In Channel	20
0 – 2 m	16
2 – 5 m	12
5 – 10 m	8
10 – 20 m	4
> 20 m	0

TABLE B3 Scoring for Erosion Site Length

Length	Score
> 100 m	5
50 – 100 m	4
20 – 50 m	3
10 – 20 m	2
< 10 m	1

TABLE B4 Scoring for Erosion Site Height

Height	Score
> 10 m	5
5 – 10 m	4
2 – 5 m	3
1 – 2 m	2
< 1 m	1

TABLE B5 Scoring for Erodibility

Erodibility	Score
Very high (sand, silt, fill)	10
High (gravel)	8
Moderate (cobble, riprap, weathered shale)	6
Low (competent shale bedrock)	4
Very low (boulder, concrete	2

TABLE B6 Scoring for Erosion Potential (Stress)

Stream Power	Flow Regime		
	Flashy (Urban)	Transitional	Undeveloped (Rural)
High	5	4	3
Moderate	4	3	2
Low	3	2	1

TABLE B7 Scoring for Riparian Quality

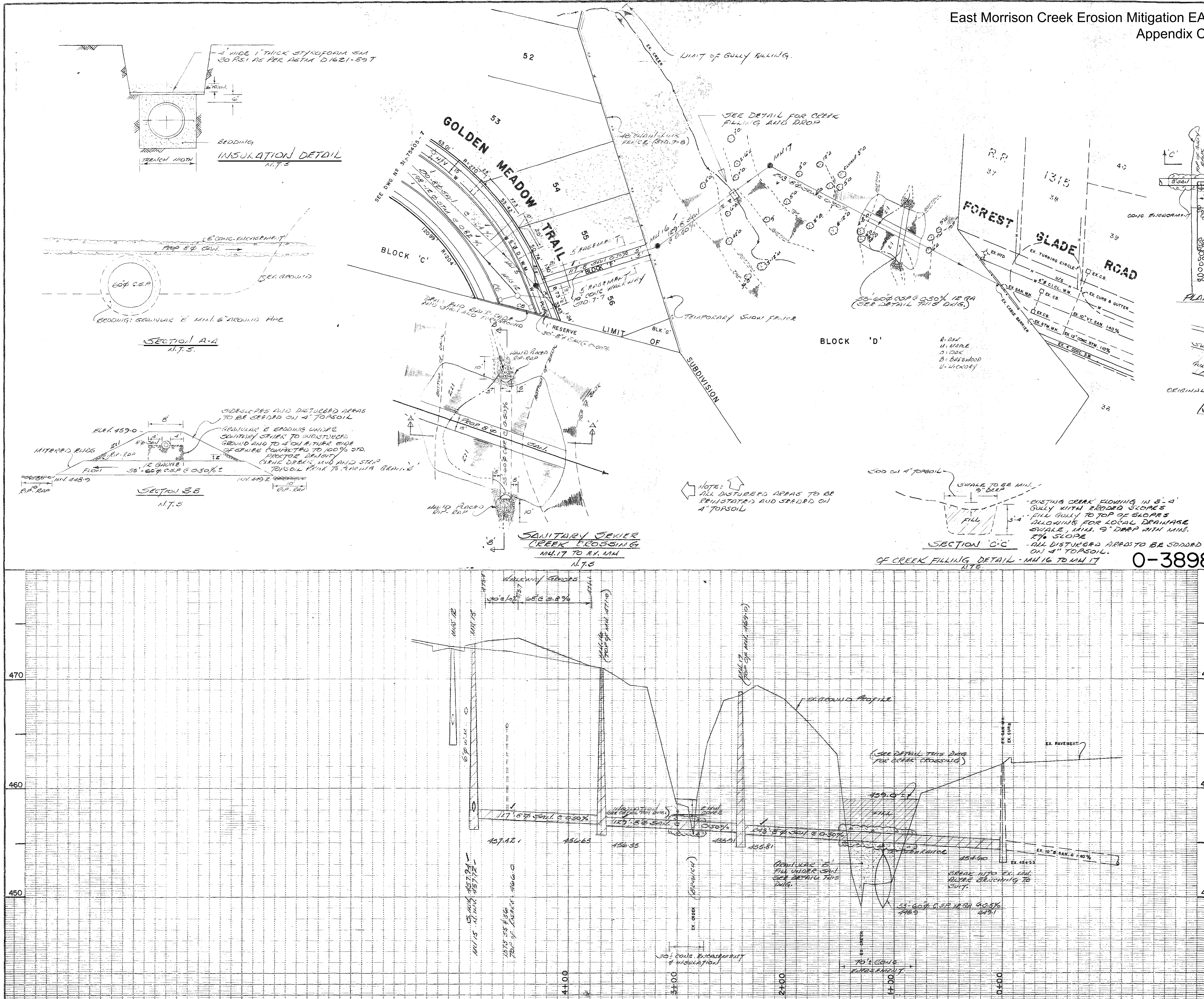
Riparian	Score
Sensitive, Native, ESA Species	0
High Quality, Canopy Trees	1
Moderate Quality	3
Low Quality, No Buffer	5

TABLE B8 Scoring for Aquatic Habitat Quality

Aquatic Habitat	Score
High Quality, Sensitive	0
High Quality, Native Substrate	1
Moderate – High Quality	2
Moderate Quality	3
Low – Moderate Quality	4
Low Quality, Engineered	5

APPENDIX C
E11 Sewer Drawing

East Morrison Creek Erosion Mitigation EA
Appendix C



SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		

REVISIONS

DATE	DETAILS	INIT.
SEPT 13/78	EX SAN SEWER INV.	RHG.
SEPT 21/78	BLOCKS C & G	RHG.
DEC. 11/78	RISERS ADDED.	RHG.
DEC 18/78	REVISE SECTION B-B' (NOTE)	RHG.
OCT 3/79	AS CONSTRUCTED	RHG.
81-2-3	TRANS. WM. & SAN. TO OM. & SB.	CDS

HALTON REGION FILE No. D.O. 0099

DESIGN OF SANITARY AND WATER SERVICES APPROVED SUBJECT TO DETAIL CONSTRUCTION CONFORMING TO HALTON REGION STANDARDS AND SPECIFICATIONS AND LOCATION APPROVAL FROM AREA MUNICIPALITY

SIGNED ________ DATE 78-04-24
DIRECTOR OF PUBLIC WORKS – HALTON REGION

GENERAL NOTES

- ALL DRIVEWAYS GRAVEL UNLESS OTHERWISE NOTED.
- ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN FIELD.
- ● DENOTES BUILDING – NOT LOCATED.
- ⊏ DENOTES BUILDING LOCATED.
- T.T.B.M. No. ELEV.
- TEMP. BENCH MARK ELEV. DESCRIPTION

TOWN OF OAKVILLE
FILE No. SD-227

APPROVED IN PRINCIPLE SUBJECT TO DETAIL CONSTRUCTION DESIGN CONFORMING TO TOWN OF OAKVILLE STANDARDS AND SPECIFICATIONS

DESIGNED BY ________ CHKD. ____
MARSHALL MACKLIN MONAGHAN LIMITED

APPROVED BY
SIGNED ________ DATE ____
DIRECTOR OF PUBLIC WORKS

RIDGEBACK DEV. LTD.

Marshall Macklin Monaghan Limited
CONSULTING ENGINEERS SURVEYORS PLANNERS
DON MILLS OAKVILLE

TOWN OF OAKVILLE
REGION OF HALTON

SANITARY SEWER OUTFALL

STN. TO STN.

SCALE HOR: 1" = 40' VERT. 1" = 4'	AREA	PROJECT NO. 31-75405
DRAWN BY R.H.G.	CHECKED BY	REGIONAL FILE Nº D.O. 0099
DATE OCT. / 77	SHEET 12 OF	

0-3898