

APPENDIX B

Background, Data Gaps, and Problem Confirmation (Phase 1)

APPENDIX B

BACKGROUND REVIEW AND PROBLEM CONFIRMATION

1 INTRODUCTION

This technical appendix documents the review of background information, and confirmation of project goals and objectives, expanding upon Sections 1 and 2 of the main Master Plan Report, which includes an overview of the project issues, approach, and objectives.

1.1 Project Goals and Objectives

As stated in the Master Plan, the primary goal of the project is to generate a list of design alternatives, which upon implementation of the preferred alternative, aim to reduce the risks of erosion threatening Toronto Water infrastructure within the study area of German Mills Creek, an area impacted by past storm events that have caused substantial damage to the stream bed, banks, and existing erosion control works. Secondary goals are to enhance local aquatic and riparian ecosystems using natural channel design principles and to ensure climate change resiliency in the erosion mitigation strategies used to protect infrastructure over an effective design life.

The three main project objectives required to achieve the goals of the study include the following:

- **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 Toronto Water infrastructure along German Mills 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 Environmental Assessment (MCEA) and Consultation Processes:** Select preferred solution(s) following an evaluation of environmental, social, and economic factors that will protect Toronto Water infrastructure.

The current study provides the City with a multidisciplinary investigation of the processes that have contributed to the physical degradation of German Mills Creek and are expected to lead to further erosion and degradation in the future. The findings of the integrated technical study are intended to guide the development of a long-term plan for rehabilitation of German Mills Creek, where appropriate, to protect Toronto Water infrastructure that has already been damaged or is at risk of being damaged in the future as a result of erosion. The City's Geomorphic Systems Master Plan (GSMP) approach has been developed to follow the MCEA process in conjunction with applying the Adaptive Management of Stream Corridors (AMSC) principles.

2 BACKGROUND REVIEW

To fulfill the requirements of EA Phase 1 (Issue Assessment and Problem Confirmation), a comprehensive background review has been completed. Table 2-1 in the Master Plan document summarizes available data and reporting that was reviewed. Data gaps originally identified through this phase were addressed through Phase 2 of the project.

2.1 Previous Reports

Previous reports on 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. Additionally, other reporting, external to the study site or even the watershed, specifically those related to Toronto Water infrastructure, provides invaluable guidance for the expectations of the City and the success(es) of rehabilitation projects where monitoring is available.

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

2.1.1 Information Available

- *Wet Weather Flow Management Master Plan, Overview and Implementation Plan (WWFMP; City of Toronto 2003)*
 - ✦ The City's 2003 WWFMP was developed to mitigate the adverse impacts of flooding on the built and natural environment and includes general and specific management recommendations on a watershed and reach basis.
 - ✦ German Mills Creek was not investigated in detail for the 2003 WWFMP, but the current study reach corresponds to Reach 17 of Area 4: Don River in the 2003 WWFMP.
 - ✦ The 2003 WWFMP defined a series of stream restoration projects to be implemented within the City. In the German Mills Creek watershed, recommended stream restoration activities include fish barrier removal and limited to moderate channel form naturalization.
 - ✦ The 2003 WWFMP also includes water quality and fish sampling data from the 1990s for German Mills Creek.
- *Schedule B Municipal Class Environmental Assessment - Project File, German Mills Settlers Park Sanitary Infrastructure Protection Project (German Mills Settlers Park EA; TRCA 2019).*

- ✦ The report includes:
 - characterization between John Street and Steeles Avenue (City of Markham, Regional Municipality of York), immediately upstream of the current study, including existing erosion sites and prioritization recommendations
 - generation and evaluation of alternative solutions
 - selection of preferred option and recommendations for mitigation, implementation, and post-construction monitoring
- *Taylor-Massey Creek Geomorphic Systems Master Plan, Municipal Class Environmental Assessment* (PARISH Aquatic Services 2015).
 - ✦ The report includes steps to characterize channel and existing functions at the reach scale and identify, evaluate, and present specific erosion issues at Toronto Water infrastructure sites, with details on the mode of adjustment and current state of intervention. The report is in a similar format to what is anticipated for the current study. Though it is understood that the risk assessment (Section 2.1.2) presents a more detailed methodology for evaluation and conceptual remediation.
- Duncan Creek design (2013) and monitoring (2018 - 2023):
 - ✦ Detailed designs from September 2013 have been made available and include detail of proposed cross-section/bank and profile modifications on German Mills Creek in the vicinity of the confluence with Duncan Creek. This work has since been constructed, and monitoring completed.
 - ✦ Aquafor Beech Limited detailed a monitoring plan for Duncan Creek Phase 4 (German Mills Creek) at the request of the City to observe subsequent deficiencies and erosion within the detailed design section, including a large riffle with four transverse anchor ribs. The details of the monitoring program have been made available.

2.2 Base Mapping and Aerial Imagery

After the project was initiated, data requests for current and historical aerial imagery as well as relevant base mapping data (e.g., property boundaries, roads, etc.) were submitted to the City, and available base and mapping data was subsequently provided.

2.2.1 Information Available

The base mapping layers, aerial imagery, and spatial datasets have been compiled and reviewed from the following sources:

- general base mapping layers, City of Toronto:
 - ✦ Toronto centerline (TCL; SHP), linear representations of streets, walkways, rivers, railways, highways, and administrative boundaries within Toronto

- ✦ parcel data (SHP), property boundaries
- ✦ property data maps (PDM; DWG), building envelopes, railway lines, major watercourses, curbs, catch basins, hydrants, streetlights/poles, municipal addresses, street names, property lines, street lines, and right-of-way boundaries
- ✦ edge of road (SHP), physical area of street systems
- topographic data, City of Toronto:
 - ✦ enterprise stereoscopic model (ESM; DWG), 2005
 - ✦ digital terrain model (DTM; DWG), 2005
- easements (digital TIFF files only), City of Toronto
- infrastructure and utilities, City of Toronto (also see Section 2.3):
 - ✦ Toronto Water asset geodatabase (TWAG; GDB and online access to DCAD), location and plan position of storm, sanitary, and watermains, stormwater outfalls, and maintenance holes
 - ✦ City utility mapping (CUMAP; DWG) underground and aboveground utility maps, including sewer and water infrastructure
 - ✦ engineering drawings for Toronto Water infrastructure (also see Section 2.3)
- watercourses, erosion, and ecological data, TRCA (also see Sections 2.4 and 2.5):
 - ✦ watercourses, TRCA open data portal, polylines to represent centre channel
 - ✦ ecological land classification mapping data, TRCA (2021)
 - ✦ floral and faunal observation mapping data, TRCA (2021)
- aerial imagery, City of Toronto:
 - ✦ orthoimagery (for years 2005, 2009, 2011, 2012, 2014, 2015, 2016, 2017, 2018)
 - ✦ historical aerial imagery (for years 1954, 1965, 1978)
- LiDAR digital elevation model, online open source:
 - ✦ 0.5 m resolution LiDAR data (Lidar DTM GTA 2015 Package D; MNRF 2021a)

As part of the base mapping data compilation tasks, additional work was required to standardize the mapping projection and coordinate system across all datasets in both AutoCAD® and GIS platforms. Much of City of Toronto’s geospatial data is stored in a modified transverse Mercator (MTM) coordinate

system, and specifically MTM Zone 10, North American Datum (NAD) 83 or NAD27. Some datasets from other sources use other projections (e.g., UTM Zone 17, World Geodetic System [WGS] 84). For consistency in the current GSMP study, all data was converted to MTM Zone 10, NAD27. In order to accomplish this conversion, some specialized transformations must be referenced as per the following reference for NTV2 Grid Shift Files for Ontario from ArcGIS.com (LIO 2020). The following transformation covers going from WGS84 to NAD27 in Toronto only:

- Transformation 1: WGS84 (EPSG Code 4326) to NAD83 Canadian Spatial Reference System (CSRS; EPSG Code 4617) using standard ArcGIS transformation tools.
- Transformation 2: NAD83 CSRS (EPSG Code 4617) to NAD27 (EPSG Code 4267) requires custom transformation as per NTV2 Grid Shift Files for Ontario from ArcGIS.com (LIO 2020).

Other conversions require different transformations and may also need to be referenced for future data. Data gaps with respect to base mapping and base plans were mainly addressed through field characterization and topographic surveys, while a 3D model/surface was compiled to better evaluate and confirm depth of cover over Toronto Water infrastructure (Section 2.3), as summarized in the Master Plan report, and detailed in Appendix C.

2.3 Infrastructure and Utilities

At the onset of the project, the design team initiated the data collection for utilities to form a composite utility plan to identify both Toronto Water infrastructure and that of third-party owners in the project vicinity. The project area and a brief description of the project requirements were circulated to all third-party utility owners to initiate the Toronto Public Utilities Coordinating Committee process and responses were compiled. A site walk was also conducted by the infrastructure design team to verify the available utility mapping information.

2.3.1 Information Available

The composite base plans to date have been compiled from information gathered from the following sources (in approximate order of reliability):

- engineering drawings; 11 as-built drawing records received from the City:
 - ✦ STS drawings 1268-C-301, 1268-D-6634, 1268-D-6656, 1268-D-6657, 1268-D-6658, 1268-D-6659, 1268-D-6660, 1268-D-6661, 1268-D-6662, 1268-D-6663, 1268-D-7315
- third-party utility drawings
- City of Toronto City Utility Mapping (CUMAP)
- City of Toronto TWAG Mapping/DCAD
- Engineering Drawings for: Pineway Pedestrian Bridge, Steeles Avenue Bridge, Leslie Street Bridge, Metrolinx/CN Railway crossing, East Don Parkland Trail.
- Leslie Street Bridge inspection forms and photographs (ID 332 OSIM 2019)
- CCTV footage – Toronto Water CCTV Cloud Repository

The above data was combined with detailed topographic surveys, maintenance hole invert and stormwater outfall surveys, and updated surveys of pedestrian crossings to develop a 3D model of Toronto Water assets within an updated ground surface, and complete a risk assessment. Appendix B-1 provides an overview of Toronto Water assets within the study area and detailed table summarizing asset type, elevation, and relative risk to erosion. Appendix C of the Master Plan Report provides an overview of the existing conditions.

2.4 Geomorphology and Erosion

Background reporting (Section 2.1) and digital mapping/photography (Section 2.2) provide essential information in developing a historical and contemporary geomorphic characterization of watercourses. For example, air photographs can provide detail on degree/timing of direct modification, rates of natural adjustment and land use change.

2.4.1 Information Available

The information regarding the geomorphology and erosion conditions on German Mills Creek was compiled and reviewed from the following sources:

- Duncan Creek (Phase 4) monitoring plan:
 - ✦ Details the extent and duration of monitoring, and specific data to be collected following construction.
- Duncan Creek Phases 3 and 4 design drawings:
 - ✦ Dimensions and material type/size available. Such information is useful when evaluating proposed stabilization at erosion sites, and the effectiveness of material to remain stable in the context of recent flood events.
- TRCA Riverine Erosion Monitoring Database (GIS):
 - ✦ Site locations, ID's, and years inspected provided. Includes brief interpretation of erosion and material type/grainsize.
 - ✦ GIS database provides ease when identifying characteristics at specific erosion sites.
- TRCA Toronto Water structure inspections:
 - ✦ Microsoft® Excel spreadsheet with details on site location (easting/northing), the type of infrastructure at risk (e.g., sanitary maintenance holes), indicators of instability of structure and/or channel (e.g., concrete spalling, bank scour), and summary comment observations organized per bank and the infrastructure itself.
 - ✦ Possible that sites relate to those in the riverine erosion monitoring database, but there does not appear to be an ID to link sites from the spreadsheet to those observed in the mapping.

- engineering drawings - STS (also see Sections 2.2 and 2.3):
 - ✦ Scanned construction drawings (TIFF) of the STS through the valley provides a baseline elevation at sewer crossings from which to evaluate rates of vertical scour.
- aerial imagery (georeferenced and orthorectified, also see Section 2.2):
 - ✦ Essential when characterizing channel dimensions, migration, historical modification (natural and intentional). Furthermore, historical review can be used to confirm or update field observations of failed treatments, for example, and timing of works (age of treatment). Migration analysis will also be completed using historical and contemporary imagery.

2.4.2 Data Gaps

The following data gaps and uncertainties have been identified in the review of geomorphology and erosion information:

- Vertical alignments of water infrastructure, which is the primary infrastructure at risk to channel erosion, is not available beyond construction drawings. Although not necessarily required for base mapping, an accurate depiction of the sewer obvert at crossings or proximal to zones of channel migration is invaluable when evaluating current and potential risk, prioritizing sites, and developing plans. Measure down surveys will be completed for the GSMP to mitigate missing information as needed. The accuracy of water main data and drawings should be reviewed and uncertainties be identified as detailed designs progress for each priority site.

2.4.3 Next Steps

Next steps for completion of the geomorphology and erosion data compilation and for the risk assessment will include:

- **Completion of Phase 1, Task 1 Data Requests:**
 - ✦ Request confirmation from TRCA as to whether there is a connection between the TRCA riverine erosion monitoring GIS database and the TRCA Toronto Water infrastructure inspections Microsoft® Excel data.
 - ✦ Request mapping and reporting from TRCA to accompany the GIS data provided in the TRCA riverine erosion monitoring GIS database.

Background data and reporting regarding geomorphology and erosion was incorporated into the overall inventory of channel structures, identification and quantification of channel modifications (direct and indirect), evaluation of Toronto Water asset risk with respect to time to exposure (e.g., migration rates), and understanding the evolution and trajectory of channel adjustment. Appendix C provides details on the existing conditions, including the desktop analysis, field assessments, and risk assessment.

2.5 Ecology

At the onset of the project, background information for terrestrial and aquatic ecology was collected from multiple open source databases and through agency requests. Additionally, Matrix conducted field assessments to corroborate ELC vegetation communities mapped by the TRCA and completed aquatic habitat mapping to confirm and/or update the existing background information to describe existing conditions.

2.5.1 Information Available

The available information was compiled to characterize the existing condition, and provide initial insight into ecological constraints prior to the Development of Alternative Solutions (ref. Appendix C). Any species at risk (SAR), including their habitat, are provided protection under both the provincial *Endangered Species Act* and the federal *Species at Risk Act*. The background data was compiled from the following sources:

- German Mills Settlers Park EA (TRCA 2019)
- terrestrial and aquatic SAR, wetlands, areas of natural and scientific interest, and environmentally significant area (ESA) - *Natural Heritage Information Centre Database* (MNRF 2021b)
- aquatic SAR records - Fisheries and Oceans Canada (DFO)
- bird species recordings (including SAR) - *Atlas of the Breeding Birds of Ontario, 2001-2005* (Cadman et al. 2007)
- insect species recordings (including SAR) - *Ontario Butterfly Atlas* (TEA 2020)
- reptile and amphibian recordings (including SAR) - *Ontario Reptile and Amphibian Atlas* (Ontario Nature 2019)
- fish community, mammal, and bird species with known habitat overlapping with study area, amphibian recordings, and flora recordings - TRCA Schedule B MCEA (TRCA 2019)
- ELC mapping data - TRCA (2021)
- floral and faunal observation mapping data - TRCA (2021)
- fish community data - TRCA open source (accessed 2021) and TRCA Schedule B MCEA (TRCA 2019)
- SAR information request- MECP (2021, Pers. Comm.)

Following the background review and to develop a baseline assessment for the ecological condition, fieldwork was completed to confirm vegetation communities, aquatic habitat and thermal regime, SAR potential and occurrence. Additionally, a three-year monitoring program was established that included aquatic habitat, benthic macroinvertebrate sampling, and water quality (ref Appendix C and Appendix E).

2.6 Hydrology and Hydraulics

At the onset of the project hydrologic and hydraulic modelling data were requested from TRCA.

2.6.1 Information Available

The following hydrologic and hydraulic information from TRCA was provided:

- The updated PCSWMM hydrological model for the Don River system and the associated report, completed by AECOM in 2018 (AECOM 2018). This 2018 model is the most up-to-date hydrology for the German Mills Creek subwatershed and will be used as design flow input for the hydraulic assessment.
- A one-dimensional (1D) steady-state HEC-RAS hydraulic model of the Don River system (Phase 1) and the associated report that was developed by KGS Group (2020) for the use of updating regulatory floodplain mapping. Model geometry extends from Pottery Road in the Lower Don Parklands, north to Steeles Avenue East, approximately 50 m upstream of the confluence of German Mills Creek and Duncan Creek. The 2020 HEC-RAS model report indicates that peak flows from the *Don River Hydrology Update* (AECOM 2018) have been included in the hydraulic model.
- A 1D steady-state HEC-RAS hydraulic model of the Don River and its tributaries north of Steeles Avenue (Phase 2) and the associated report developed by WSP in 2020 for the use of updating regulatory floodplain mapping. Model geometry extends from Steeles Avenue, north to Hearthsides Avenue and Bathurst Street in Richmond Hill.

Available modelling was updated to reflect the current channel geometry and the broader floodplain surface (surveyed), addition of structures, and an extension north of the study area as a part of the existing conditions update and development of alternatives (Appendix C).

2.7 Archaeological Assessment

The majority of the German Mills Creek GSMP study area is located within TRCA owned lands. As such, TRCA was engaged in June 2021 to complete a Stage 1 archaeological assessment. The request for this study was submitted by the Matrix-WSP team identifying the limits of the project study as part of the data compilation and base mapping activities.

The Stage 1 assessment was 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 (Ministry of Heritage, Sport, Tourism and Culture and Industries, 2011). The assessment evaluated in detail the property's archaeological potential, which supported recommendations for Stage 2 archaeological assessments where required. The following checklist provides a summary of the research and consultation required for the Stage 1 assessment that also supports the overall background review.

- Desktop review:
 - ✦ archaeological sites within 1 km
 - ✦ Indigenous knowledge or historically documented evidence of past Indigenous use on or within 300 m of the project area
- Consultation:
 - ✦ Ministry of Heritage, Sport, Tourism, and Culture Industries (MHSTCI) to be consulted regarding archaeological sites within and adjacent (1 km) to the study area, as well as any archaeological assessments within 50 m of the study area.
 - ✦ Municipal Heritage Services to be consulted regarding cultural heritage resources including built heritage and cultural heritage landscapes within and immediately adjacent to the study area.

Evaluation of archaeological potential is obtained through detailed research of land use history, built features (parks and trails), built heritage (bridges, designated houses), and known archaeological sites within and adjacent to the study area. The evaluation summarizes a map detailing areas cleared of archaeological concern and areas recommended for Stage 2 assessment, if required. Activities required to support the Stage 1 reporting process include archival research, consultation with municipal heritage registrars, consultation with the archaeological sites database administrator at the MHSTCI, consultation with the Ontario cemetery registrar, report drafting, graphics, development of archaeological recommendations, editing, report submission and revisions, if necessary.

The TRCA Stage 1 archaeological assessment report for the German Mills Creek GSMP study area was received August 20, 2021, and is included in Appendix C-1. Concurrently with Phase 2 of the GSMP study, the study team reviewed the TRCA report and consulted with the City regarding the communications plan, Indigenous community engagement, and the requirements for future studies.

3 CONFIRMATION OF GOALS AND OBJECTIVES

3.1 Goals and Objectives of Toronto 2003 Wet Weather Flow Master Plan

The 2003 WWFMP (City of Toronto 2003) defines the requirements for most water related projects in the City and should be considered when formulating the alternative solutions for the German Mills Creek GSMP. The primary goal and technical objectives of the 2003 WWFMP are as follows:

- **2003 WWFMP Goal Statement:** to reduce and ultimately eliminate the adverse impacts of wet weather flow on the built and natural environment in a timely and sustainable manner and to achieve a measurable improvement in the ecosystem health of the watersheds.
- **2003 WWFMP Technical Objectives:** as follows, 13 technical objectives were established to ensure that the 2003 WWFMP meets the principles and goal established:

✦ Water Quality:

1. Meet guidelines for water and sediment quality: contribute to achieving federal, provincial, and municipal water and sediment quality objectives and guidelines in area watercourses and along the waterfront.
2. Virtually eliminate toxics through pollution prevention: contribute to the virtual elimination of toxic contaminants in groundwater and surface water utilizing the principle of pollution prevention at source.
3. Improve water quality in rivers and the lake for body contact recreation: improve water quality for body contact recreation in rivers and recreational areas and reduce posting of beaches by the Medical Officer of Health.
4. Improve aesthetics: contribute to eliminating objectionable deposits, nuisance algae growth, unnatural colour, turbidity, and odour in order to improve the aesthetics of area surface waters.

✦ Water Quantity:

5. Preserve and re-establish a natural hydrologic cycle: contribute to the re-establishment of a more natural hydrologic process to protect and restore groundwater and surface water resources, based on maximizing permeability and minimizing runoff at source.
6. Reduce erosion impacts on habitats and property: manage wet weather flows to reduce erosion impacts on stream and riparian habitats on public and private properties and open spaces.
7. Eliminate or minimize threats to life and property from flooding: eliminate or minimize threat to life and property from flooding.

✦ Natural Areas and Wildlife:

8. Protect, enhance, and restore natural features (e.g., wetlands) and functions: contribute to the protection, enhancement, and restoration of natural features and functions such as wetlands and riparian and other ecological corridors.
9. Achieve healthy aquatic communities: contribute to achieving healthy aquatic communities, including warmwater or coldwater fisheries as appropriate.
10. Reduce fish contamination: contribute to reducing fish consumption advisories due to local wet weather sources.

✦ Sewer System:

11. Eliminate discharges of sanitary sewage: eliminate discharges of sanitary sewage including those associated with combined sewer overflows (CSOs), sanitary sewer overflows (SSOs), treatment plant bypasses, illegal cross-connections, and spills.
12. Reduce infiltration and inflow to sanitary sewers: reduce sanitary sewer infiltration and inflows to City design standards.
13. Reduce basement flooding: manage wet weather flow to reduce basement flooding.

The goals and objectives of the German Mills Creek GSMP generally align with the 2003 WWFMP study and are expected to contribute directly or indirectly to many of the technical objectives established above. The current study will specifically contribute toward technical objectives 1, 3, 4, 6, 8, 9, and 12 from the 2003 WWFMP. The City's GSMP studies fall under the watercourse management component of the WWFMP as documented in the most recent update (2017 WWFMP; City of Toronto 2017a).

The German Mills Creek GSMP also aligns with the Toronto Ravine Strategy (City of Toronto 2017b) contributing to implementation of its five guiding principles of protect, invest, connect, partner, and celebrate.

3.2 Confirmation of Goals and Objectives for German Mills Creek Geomorphic Systems Master Plan

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 City staff through meetings and a site walk, and early comments from TRCA. The primary and secondary goals of the study have been identified as follows:

- **Primary Goal 1:** To reduce the risks of erosion threatening Toronto Water infrastructure within the study area of German Mills Creek, an area impacted by past storm events that have caused substantial damage to the stream bed, banks, and existing erosion control works.
- **Secondary Goal 2:** To enhance local aquatic and riparian ecosystems using natural channel design principles.
- **Secondary Goal 3:** To ensure climate change resiliency in the erosion mitigation strategies used to protect infrastructure over an effective design life.

To achieve the above goals, the following three objectives have been considered and discussed with the City as part of the GSMP approach, while also fulfilling the MCEA requirements and AMSC principles.

- **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 Toronto Water infrastructure along German Mills 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 MCEA and Consultation Processes:** Select preferred solution(s) following an evaluation of environmental, social, and economic factors that will protect Toronto Water infrastructure.

3.2.1 Refined Project Objectives

Discussions with the City over a number of meetings between May and August 2021 have further confirmed and refined the above goals and objectives of the German Mills Creek GSMP study. The key discussion topics associated with confirming and refining the study objectives are summarized below.

- **Project Objective 1 - Existing Conditions and Risk Assessment:**
 - ✦ Discussions with the City during the project kickoff and monthly progress further highlighted the focus on Toronto Water infrastructure, as there are existing pipe exposures and near exposure. Similar to the recent approach to the Taylor-Massey Creek Risk Assessment (Aquafor Beech 2021), it was confirmed that all erosion risks would be assessed within the German Mills Creek study area, including trail infrastructure and private property, but that the prioritization of erosion mitigation projects would be for Toronto Water infrastructure. Should the proposed Toronto Water projects impact infrastructure or property owned by the TRCA or others, further consultation may be required to determine how the project will proceed.
- **Project Objective 2 - Evaluate Alternatives to Meet Project Goals:**
 - ✦ The climate change assessment (Appendix D) is to inform the development and evaluation of alternative solutions; however, the City confirmed that there is no preferred approach to constrain future rainfall scenarios or established methodology that the City requires.
 - The City noted that other recent GSMP projects included assessment of erosion indices (e.g., cumulative stream power and shear stress) with continuous hydrologic simulation approaches to evaluate total work on the stream as opposed to event-based comparisons (e.g., flow velocities) for future climate change conditions and effects. In consultation with the City, a “pseudo-approach” was developed to calculate approximate total work based on established erosion indices and was used in the evaluation of alternatives from a geomorphic perspective.
 - It was also discussed that the criteria used to short-list the most appropriate future climate change scenarios for design should also consider the range of potential design strategies (e.g., balance between “hard” stable and “soft” flexible elements) that are most applicable and feasible to mitigate erosion risks within the study area. The potential design strategies will help inform and guide the selection of future climate change condition to ultimately design to and the expected design life of the erosion protection measures built.

- **Project Objective 3 - Select Preferred Solutions through MCEA and Consultation Processes:**

- ✦ With the recent changes to provincial environmental assessment legislation and regulations for province, the City of Toronto is continuing to follow an old environmental assessment process, which makes it at or above new standards. At the City gains a better understanding of the new regulations, more information may be provided for the GSMP process, if necessary.
- ✦ Detailed designs for prioritized projects are to be augmented from Master Plan selected solutions, to be more than a simple sketch of vertical plan and profile, but with further details as a preliminary functional design with cross-sections, typical details, and feasibility for access and staging.
- ✦ Timing of the MCEA Notice of Commencement for stakeholder and public consultation was deferred until after the Stage 1 archaeological assessment has been completed, with Indigenous community engagement included under communications plan developed by the City.
- ✦ One Public Information Centre (PIC) was held in August 2023. Prior to public consultation, the local city councillor was engaged to help navigate and guide the public consultation needs.

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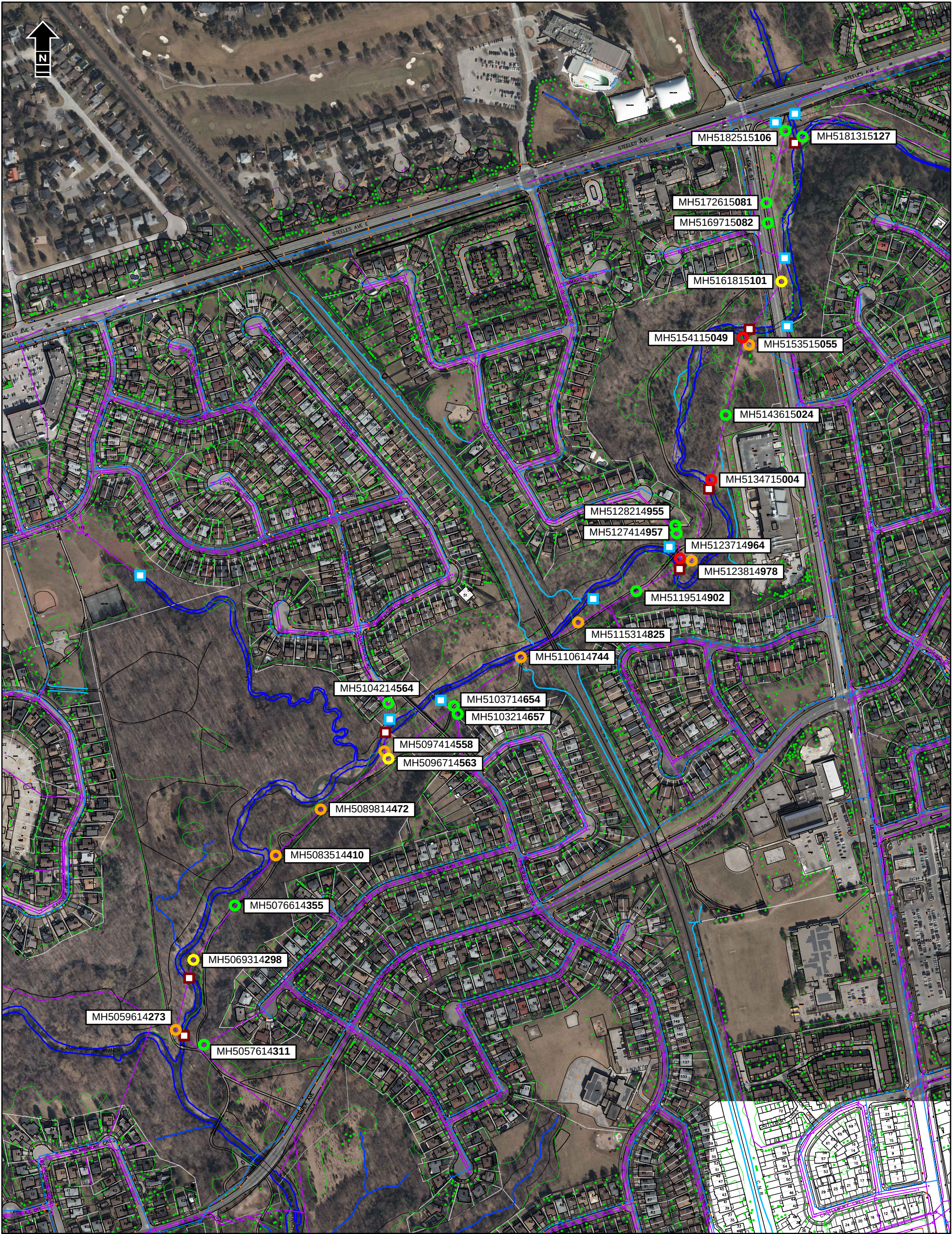
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APPENDIX B1
Site Plan and Maintenance Hole Table



REFERENCE:



Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

CITY OF TORONTO
GERMAN MILLS GSMP EA

SITE PLAN

Date:	JUNE 2021	Project:	32227-SP	Submitter:	N.CYPLES	Reviewer:	R.PHILLIPS
Disclaimer: The information contained herein may be compiled from numerous third party materials that are subject to periodic change without prior notification. While every effort has been made by Matrix Solutions Inc. to ensure the accuracy of the information presented at the time of publication, Matrix Solutions Inc. assumes no liability for any errors, omissions, or inaccuracies in the third party material.							

Figure 1

Manhole ID	Type of MH	DCAD Top Elevation (m)	Pipe Between Manholes Adjacent to Creek or Crossing Creek?	Locked (Y/N)	*MH Notes	Risk Level
MH5057614311	Sanitary Sewer Main (Lateral)	140.27	Adjacent	N		Very Low
MH5059614273	Sanitary Trunk Sewer	139.86	Adjacent	N		Moderate
MH5069314298	Sanitary Trunk Sewer	140.56	Adjacent	*	No found	Low
MH5076614355	Sanitary Trunk Sewer	140.71	Adjacent	Y*	Only 1 washer	Very Low
MH5083514410	Sanitary Trunk Sewer	143.09	Adjacent	Y*	Only 1 washer	Moderate
MH5089814472	Sanitary Trunk Sewer	141.52	Adjacent	Y*	Only 1 washer	Moderate
MH5096714563	Sanitary Trunk Sewer	141.97	Adjacent	Y*	Only 1 washer	Low
MH5097414558	Sanitary Sewer Main (Lateral)	141.9	Crossing	N		Moderate
MH5104214564	Sanitary Trunk Sewer	147.66	Crossing	*	Not found	Very Low
MH5103214657	Sanitary Sewer Main (Lateral)	144.84	Adjacent	N		Very Low
MH5103714654	Sanitary Trunk Sewer	143.41	Adjacent	N		Very Low
MH5110614744	Sanitary Trunk Sewer	142.26	Adjacent	Y*	2 washers	Moderate
MH5115314825	Sanitary Trunk Sewer	143.25	Adjacent	Y*	2 washers	Moderate
MH5119514902	Sanitary Trunk Sewer	145.36	Adjacent	N		Very Low
MH5123814978	Sanitary Trunk Sewer	143.93	Adjacent	Y		Moderate
MH5123714964	Sanitary Sewer Main (Lateral)	144.3	Crossing	N		High
MH5127414957	Sanitary Sewer Main (Lateral)	147.17	Adjacent	N*	Partially buried	Very Low
MH5128214955	Sanitary Sewer Main (Lateral)	148.93	Adjacent	Y*	Partially buried	Very Low
MH5143615024	Sanitary Trunk Sewer	145.81	Adjacent	*	Not checked	Very Low
MH5134715004	Sanitary Trunk Sewer	147.6	Adjacent	Y		High
MH5153515055	Sanitary Trunk Sewer	145.51	Adjacent	N		Moderate
MH5154115049	Sanitary Trunk Sewer	144.82	Adjacent	Y		High
MH5161815101	Sanitary Trunk Sewer	150.79	Adjacent	Y*	Only 1 washer	Low
MH5169715082	Sanitary Sewer Main (Lateral)	150.37	Adjacent	Y*	Not checked	Very Low
MH5172615081	Sanitary Trunk Sewer	151.49	Adjacent	N		Very Low
MH5181315127	Sanitary Trunk Sewer	148.75	Crossing	Y*	Not typical bolt, washer	Very Low
MH5182515106	Sanitary Trunk Sewer	152.72	Adjacent	N		Very Low