City of Guelph

Stormwater Management Master Plan

Appendix I.1 – New End-of-Pipe Stormwater Management Facility Opportunities Part 1

January 2023

Prepared for:
The City of Guelph

Stormwater Management Master Plan

Appendix I: New End-of-Pipe Stormwater Management Facility Opportunities

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Table of Contents

List of Figures

List of Tables

Appendices

1 Introduction

A significant portion of the City of Guelph was developed prior to the development of current stormwater management (SWM) criteria. As such, there are areas within the city where uncontrolled and untreated stormwater runoff is directly discharged to the receiving streams and wetlands. General industry experience shows that these uncontrolled discharges are responsible for a significant portion of the contaminant loadings to receiving streams and wetlands as well as increasing the potential for downstream erosion and flooding.

The following end-of-pipe (EOP) facility opportunities study was initiated to outline a component of the overall framework for a long-term strategy to implement stormwater quality and quantity control within the existing urbanized areas of the City of Guelph as part of the Stormwater Management Mater Plan (SWM-MP). The establishment of new end-of-pipe (EOP) facilities, may be complemented by other approaches to be established as part of the SWM-MP, which may include but are not limited to: source and conveyance control retrofits as well as the retrofit, enhancement and/or expansion of existing stormwater management facilities (SWMF). These approaches are presented in the following reports:

- Stormwater Management Facility Maintenance Inspection Summary (October 2021)
- SWM Facilities, OGS and Catchments Report (October 2021)
- Municipal ROW Retrofit Opportunities Assessment (forthcoming; to address low impact development and OGS opportunities)

1.1 Study Purpose

To most effectively identify and construct new stormwater management facilities within an existing urban area, it is necessary to achieve multiple objectives beyond stormwater management including community enhancement, transit planning and active transportation (trails and cycling infrastructure), urban forestry and most relevant to this element of the SWM-MP is the potential synergy with parks rehabilitation and enhancements within under-serviced areas or within parks scheduled for improvements. It has been shown through previous Master Plans for other Ontario municipalities that 'broader community benefits' are required when implementing new SWM facilities in established neighbourhoods in order to gain community support and ensure the project success.

Terraview Park New SWMF, Toronto by Aquafor Beech

This report explores and assesses the feasibility of constructing new stormwater management facilities within urban areas and are intended to be completed as part of:

- Park creation and rehabilitations
- Natural heritage/ area and urban forestry enhancements
- Trails and active use enhancements

1.2 Background and Needs Establishment

According to the City's GIS database, a total of 121 active municipally-owned SWM facilities and 195 Oil and Grit Separator units (OGS) exist within the City of Guelph. Of the 195 OGS units, 150 are owned by the City, and 45 are privately owned OGS units. Additional privately-owned SWM facilities exist within the City, but were not included in the assessment. Three additional SWM facilities were identified through this SWM-MP, for a total of 124 active municipally-owned SWM facilities.

In total, 2,899ha (46.6 percent) out of the 6,217ha of built urban area in the City of Guelph has SWM control:

- 1,746 ha (28.1 percent) is controlled for water quality by surface SWM facilities (ponds, wetlands, and infiltration facilities);
- 2,335 ha (37.6 percent) is controlled for water quantity by surface SWM facilities (ponds, wetlands, and infiltration facilities);
- 148 ha (2.4 percent) may provide quantity control, but the extent of which is unknown; and
- The 195 OGS units provide additional water quality control for areas both outside and within the respective drainage areas for the active SWM facilities. Municipal OGS units provide an additional 325ha (5.2 percent) of water quality control, and private OGS units providing an additional 30ha (0.48 percent) of water quality control.

Accordingly, there are approximately 3,318ha (53.4 percent of urban area) that do not have either water quality or quantity control. **Figure 1.1** summaries the percentage of existing urban area with SWM control in the City of Guelph. **Figure 1.2** shows the location of the existing stormwater management facilities and their respective drainage areas within the City of Guelph.

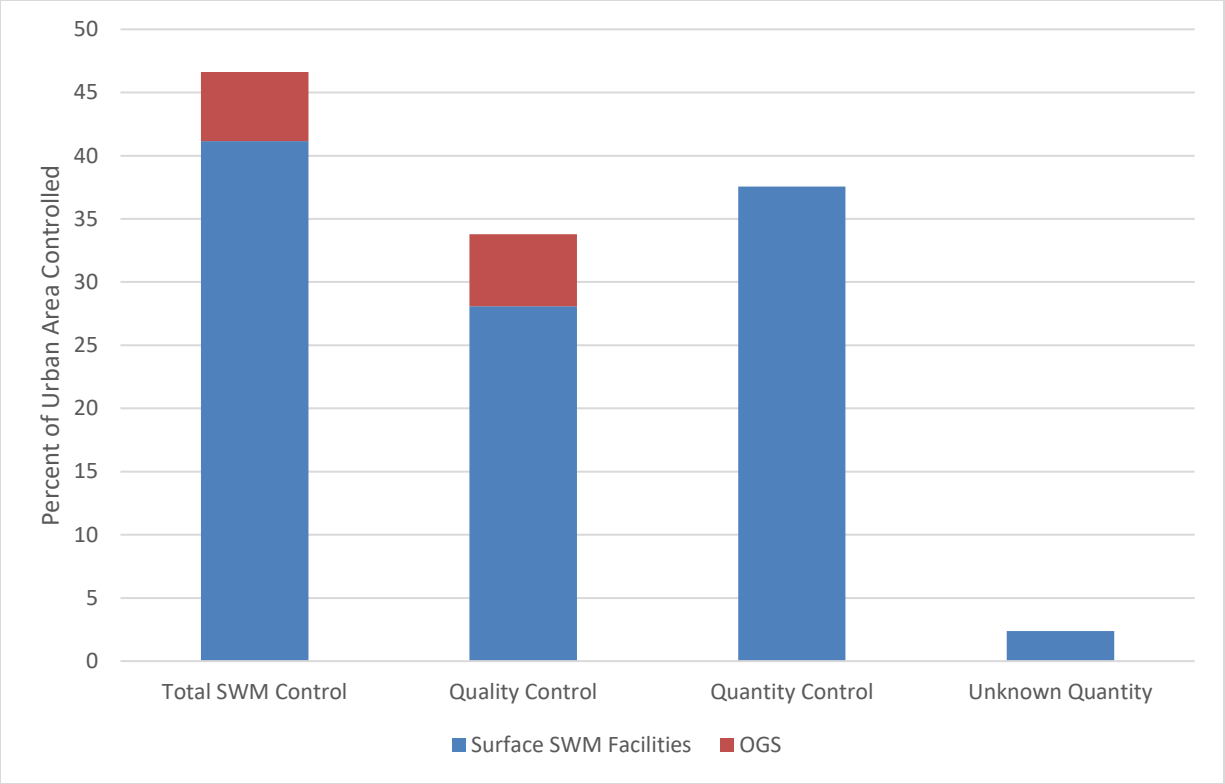

Figure 1.1: Percentage of City Controlled by SWM Assets

TOWNSHIP OF GUELPH/ERAMOSA

TOWNSHIP OF PUSLINCH

TOWN OF MILTON

Woodlawn Road West
Woodlawn Road East
Speedvale Avenue West
Speedvale Avenue East
Willow Road
Wellington Street West
York Road
Stone Road West
Stone Road East
Hanlon Expressway
Victoria Road North
Victoria Road South
Edinburgh Road South
Gordon Street
Metcalfe Street
Stevenson Street North
Southgate Drive

Legend

- Municipal Boundary
- Stormwater Management Facility
- Rivers
- Watercourse
- Road Centreline

Quantity / Quality Control

- Quality
- Quantity (100-year)
- Quantity (5-year)
- Quantity (10-year)
- Quality and Quantity (100-year)
- Quality and Quantity (5-year)
- Quality and Quantity (unknown)

LOCATOR MAP

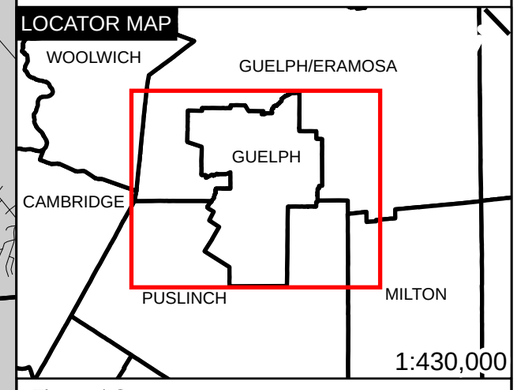

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Figure 1.2

Stormwater Facility and OGS Drainage Area

Date: 2021-10-13
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

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Aquafor Beech Limited

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1.2.1 Previous Studies

Previous studies, including the 2012 Stormwater Management Master Plan (AMEC) and the 2007 Ward One Stormwater Management Study Class EA (EarthTech) identified potential SWM facility locations within the City. The locations (**Figure 1.3** and **Figure 1.4)** represent drainage areas where new centralized facilities may be desirable for areas with high SWM needs.

In total, ten (10) locations were identified as part of previous studies where new SWM facilities were feasible (**Table 1.1**) and which have not yet been constructed. Three (3) facilities were quality control ponds, six (6) facilities were quantity control facilities, and one was a quality and quantity control facility. One of these locations (L-2) was deemed to no longer be feasible due to construction activities since 2012, while the Silvercreek Facility has since been constructed, but the remaining locations were carried forward for consideration.

Table 1.1: Previously Planned New Stormwater Management Facilities

Site	Location	Type	Current Status	Carried Forward
L-1	Silvercreek Park, south of Speed River.	Quality (Enhanced)	No substantial change since 2012.	Yes
L-2	Adjacent to WWTP.	Quality (Enhanced)	New construction has occurred in proposed pond location, including hydro tower and new snow storage facility. No other lands outside the floodplain are available. While a SWM facility was constructed at this location, it only receives drainage from the snow storage facility.	No
L-4 / L-5	Either in Royal City Park or east of Marianne's Park.	Quality (Basic)	No substantial change since 2012.	Yes
L-12	Green Meadows Park	Quantity	A superpipe was installed on Stevenson Street North in lieu of this facility.	Yes
L-13	Windsor Park	Quantity	Playground moved away from proposed pond location. Land now vacant.	Yes
-	Franchetto Park	Quantity	2012 MP indicated facility was only feasible if relief sewer constructed on Victoria Road. Relief sewer has not yet been constructed.	Yes
-	Oak Street Park	Quantity	No substantial change since 2012.	Yes
-	SE Corner of Hanlon and Stone Road	Quantity	No substantial change since 2012.	Yes

Site	Location	Type	Current Status	Carried Forward
-	Silvercreek Facility – CNR/Lafarge Lands	Quantity	SWMF 117 has been constructed at this location.	No
-	Guelph Junction Railway at Stevenson Street	Quality (Below Basic) & Quantity	Vacant land owned by City.	Yes
-	End of Industrial Street*	Quality	Land being acquired by the City. Currently vacant land with two existing ponds.	Yes

* In summer 2022, the City confirmed they will be acquiring lands south of York Road and east of the Guelph Junction Railway for the purposes of realigning Clythe Creek. This opened up the opportunity for a new EOP facility along the old alignment of the creek, as was proposed in the Environmental Impact Study for the York Road Environmental Design (Amec Foster Wheeler, 2017). Although the evaluation of new EOPs was generally completed in November 2021, the New EOP Opportunities Report was revised in August 2022 to include this new facility.

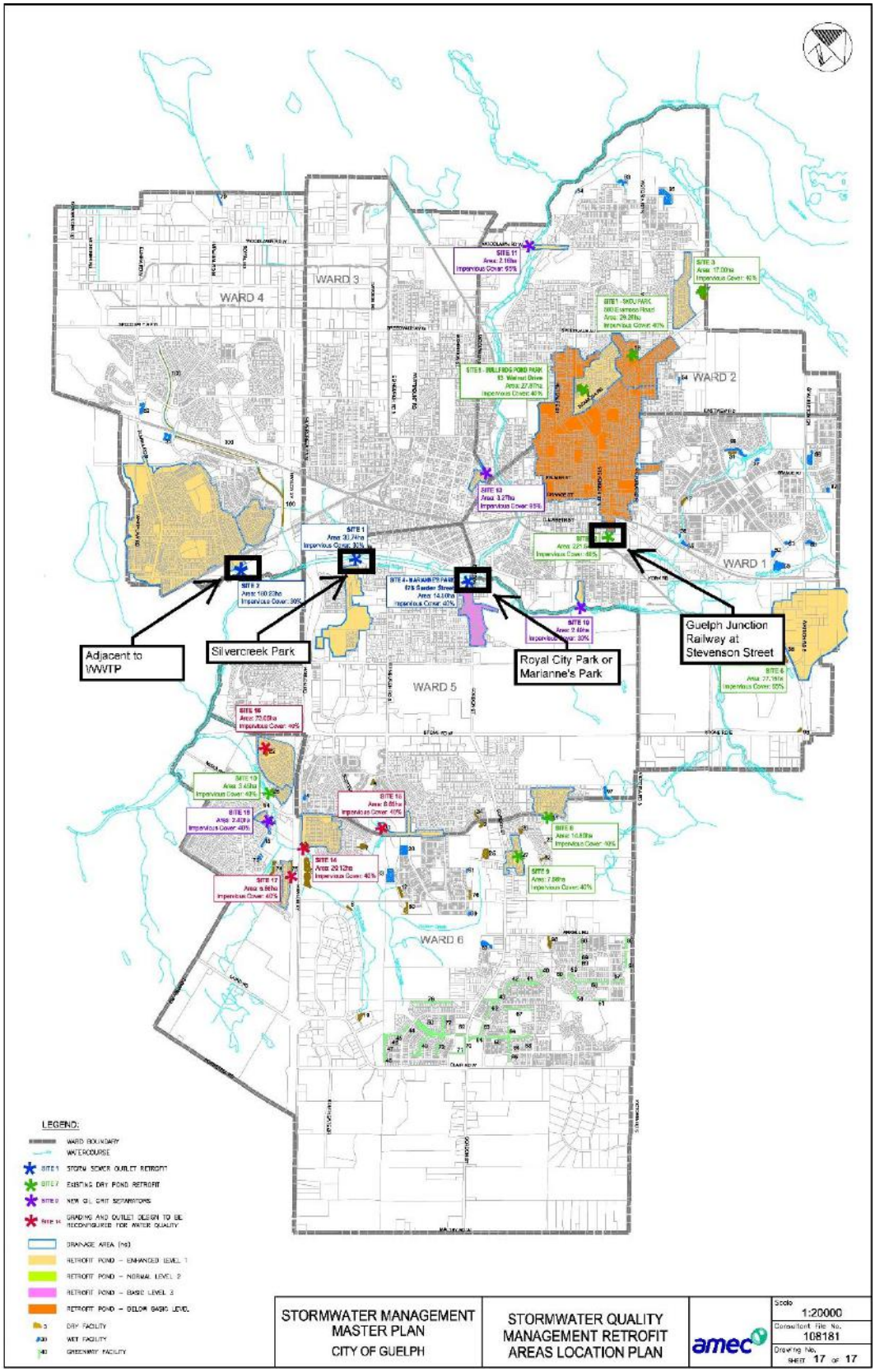


Figure 1.3: New Quality Control Facilities Proposed by AMEC (2012)

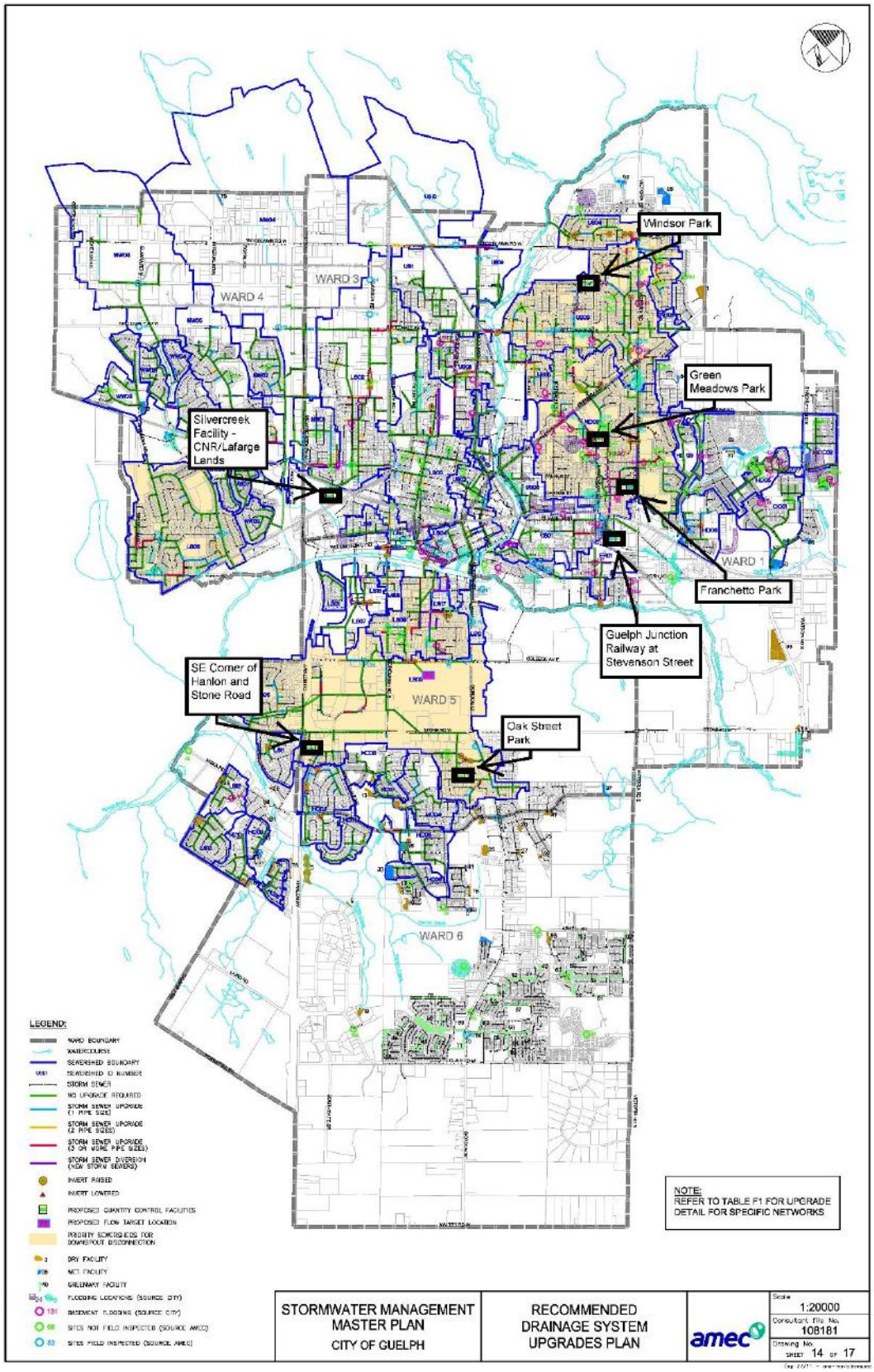


Figure 1.4: Proposed Quantity Control Facilities Proposed by AMEC (2012)

1.3 Report Objective

The principal objective of this report is to identify locations where new end-of-pipe stormwater management facilities could be implemented within existing urban areas of the City without stormwater control to increase the proportion of SWM controlled drainage areas in the City to improve:

- Water quality control
- Water quantity control
- Erosion control

As such, a list of potential sites which represent opportunities for new end-of-pipe stormwater management (SWM) facilities has been developed as a component of the City of Guelph's SWM-MP. Sites were identified and assessed using a four (4) step process as input into the Municipal Class Environmental Assessment Master Planning process. The information included in this report will be used to identify the preferred alternative for each site.

The following objectives were addressed as part of this report:

1. Identification of locations within the City of Guelph which represent potential opportunities for the construction of new surface or subsurface SWM facilities.
2. Review existing information and conduct field investigations and impact assessments at each identified location based on technical, environmental and social considerations.
3. Create graphical summaries of all feasible SWM facility opportunities outlining:
    a. Contributing drainage area, TIMP (percent) and existing sewer inverts
    b. Land ownership and existing easements
    c. Current use
    d. Available area including known constraints (vegetation, wetlands and regulatory floodplain constraints).
    e. Identified utilities and conflicts (sanitary sewers and watermain; hydro, gas and communications, where available)
    f. Site Photos of key elements
    g. Observations from site investigations
4. Consultation with City Staff: Undertake a performance assessment to identify conceptual SWM facility alternatives for each of the feasible or possible SWM facility opportunities based on the aforementioned considerations. The performance assessment included the potential water quality benefits as well the development of cost estimates for implementing each potential new SWM opportunity.

1.4 Coordination with Other Plans and Policies

The following report is not intended to be read or applied in isolation; in fact, the following report should be considered in the context of the SWM-MP within which it is being developed and also have regard for other City Strategic Plans, Master Plans, Secondary Plans and Policies. More specifically, many of the proposed SWM opportunities represent potential synergies with other studies and plans and should be considered as such. Implementation of the preferred approaches for each SWM opportunity location should have regard for the following:

- **Parks and Recreation Master Plan (Update expected Spring 2021)** which will direct the City's development of recreational services and infrastructure, including in parks and open spaces.

- **Cycling Master Plan (February 2012)** – was created to help guide the development of the City's cycling network. As a sustainable, affordable and reasonable transportation option for everyone the cycling network creates connection between intensification areas, neighborhoods and transit stations. The Cycling Master Plan provides a framework to ensure cycling networks are integrated into transportation planning. The objective is to triple the amount of daily cycling trips in the next 10 years through enhancing road safety, increasing cycling awareness and education, as well as including dedicated bike lane space for cyclists on major street networks where feasible.

- **Guelph Trail Master Plan (Proposed Draft May 2021)** – This Master Plan is also in the process of being updated. It is a strategic document that guides how to design, build and maintain Guelph's trail network. As the City of Guelph recognizes the importance of trails for recreation, health and mobility and is working to develop a connected, sustainable trail network that provides diverse experiences, advertises Guelph's natural and cultural assets as well as fosters an active and healthy lifestyle among residents. The updated master plan specifically focuses on trails that are outside road rights-of-way and connecting existing cycling and sidewalk networks.

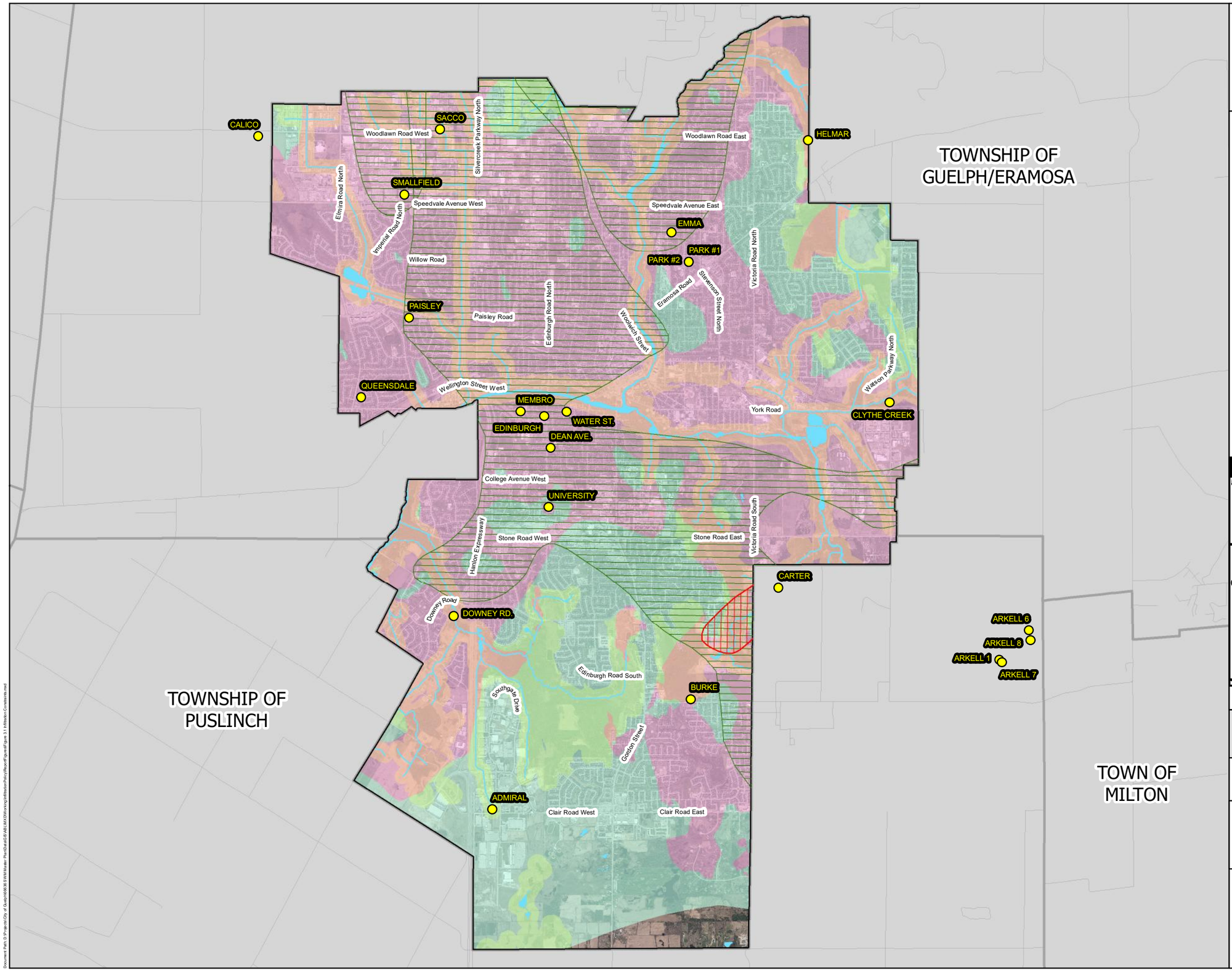
- **Natural Heritage Action Plan (September 2018)** – is designed to prioritize the maintenance, enhancement and restoration of woodlands, wetlands, watercourses, valley lands and meadows, surface water and groundwater features in Guelph. This framework is designed to support natural heritage system and watershed planning through community partnerships and stewardship networks. It focuses on managing natural heritage systems while supporting compatible urban growth to help build a healthy community that is resilient to climate change.

- **Urban Forest Management Plan (September 2012)** – focuses on providing environmental, social cultural and economic benefits through sustainable urban forest areas as the community continues to grow. As a healthy mix of trees and shrubs can provide many benefits to the city such as help filter pollutants, improve flood control, reduce energy usage, and improve human health. Thus, this management plan was developed to improve urban forest management by increasing operational efficiency, effectiveness and improving tree health.

1.4.1 Source Protection Plans (SPP) and Regional Policy

The SPP for the Grand River Source Protection Area was approved by the MECP on November 26, 2015 and became effective on July 1, 2016, with amendments approved on August 16, 2019. The SPP describes watershed characteristics, identifies the vulnerable areas related to drinking water sources, identifies the types and number of significant threats to water quality and quantity and outlines the policies and programs to manage or remove significant threats, and to prevent new significant threats from developing. Volume II of the Grand River Source Protection Plan covers the City of Guelph. Specific policies relating to Stormwater Management within Wellhead Protection Areas (WHPA) and Issue Contributing Areas (ICA) can be found in policy CG-MC-15 (**Figure 1.5**).

CG-MC-15: For the existing or future discharge from a stormwater management facility within vulnerable areas where this activity is or would be a significant drinking water threat, the Ministry of the Environment, Conservation and Parks shall ensure that the Environmental Compliance Approval that governs the stormwater management facility includes appropriate terms and conditions to ensure that the activity ceases to be and/or never becomes a significant drinking water threat.



Legend

- Well Production Sites
- Rivers
- Municipal Boundary
- Intake Protection Zone (3)

Issue Contributing Area:

- Nitrate as Nitrogen
- Trichloroethylene

Wellhead Protection Areas (Vulnerability Score):

- 2 - 6
- 8; 10

LOCATOR MAP

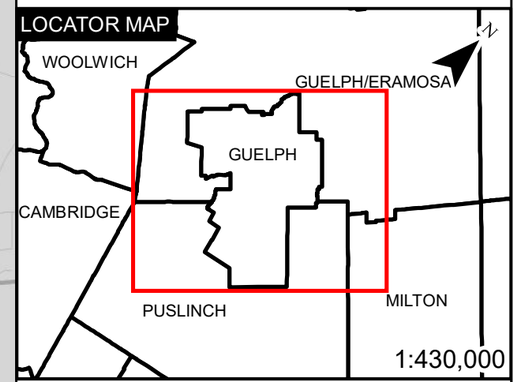


Figure 1.5

Wellhead Protection Areas and Issue Contributing Areas

Date: 2021-03-17
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA, Natural Resource Solutions
Created by: J.R.

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Aquafor Beech Limited

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2 Evaluation Process

The project team identified all potential SWM facility opportunity locations within the table lands and valley lands of the City of Guelph. A coarse screening assessment of the study area identified 29 potential sites, with an additional four site locations requested by the City in 2021, and one final location added in 2022 for a total of 34 sites. In order to manage the complexity and constraints inherent within the study area for stormwater management (SWM), each of the 34 sites were evaluated using a four (4) phase approach; each phase subject to a unique set of evaluation criteria and considerations. The following four (4) evaluation phases establish the framework of the evaluation process:

1) Phase 1 – Geographic Information Systems (GIS)/Land Assessment
2) Phase 2 – Field Reconnaissance and Impact Assessment
3) Phase 3 – Performance Assessment
4) Phase 4 – Consultation with City Staff (Workshop completed July 14, 2021 for sites 1-33; consultation for site 34 was via email)

The methodology used to assess potential site locations is outlined in **Figure 2.1**. The following sections describe the process outlined in **Figure 2.1** and the methods by which the various criteria for evaluating potential facility locations were obtained.

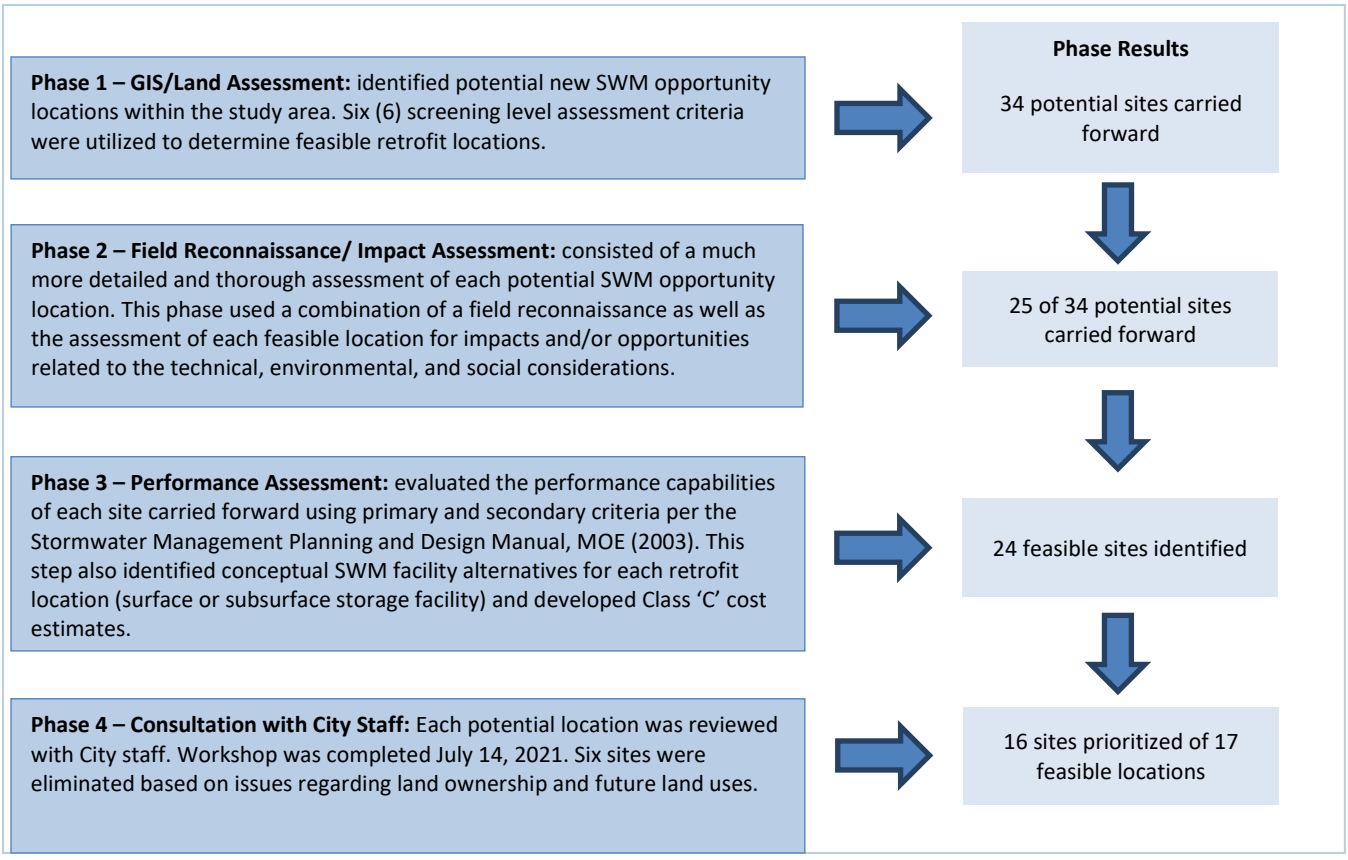


Figure 2.1: Evaluation Process Summary

2.1 Phase 1 Assessment – GIS/Land Assessment

The Phase 1 assessment involved analyzing available GIS databases to locate potential table and valley land SWM opportunities. This screening level assessment identified an initial 23 potential locations based on a geomatics assessment of all available land throughout the City of Guelph, plus an additional six locations previously identified, and five sites requested by the City (**Section 1.2.1**). One location at Green Meadows Park was identified in the 2012 SWM-MP and was also identified in the present Phase 1 GIS screening. **Appendices A** and **B** show each of the 34 locations. The initial 23 potential SWM opportunity sites were identified through GIS screening based on the criteria listed below. Note that criteria #1 and #3 were not applied for sites requested by the City for inclusion in the assessment (eg. sites 28-31, and 34).

1. Available area (area must be >1ha);
2. Land Ownership: Municipal, Conservation Area, Provincial including transportation corridors, Hydro Corridor, Unknown land ownership, Vacant lands, and existing site use;
3. Stormwater Infrastructure
    - Pipe Size: >450mm within 200m of the identified parcel boundary.

Once the additional locations were included in the analysis, the 33 locations were subsequently evaluated using the following technical evaluation criteria:

4. Stormwater Infrastructure
    - Pipe Depth;
    - Drainage area (sewershed);
    - Total Impervious Area Percentage (TIMP);
5. Topographic Constraints;
6. Significant Vegetation & Wetlands;
7. Preliminary Water Quality Performance Assessment

Available Area estimates were conducted for all potential SWM opportunity locations. Available area estimates considered topography, built-out environment (structures, buildings, roads etc.), and the natural environment (forested areas, etc). Sites with less than 1 ha of available area were eliminated. It was determined that any identified sites with less than 1 ha of available area would provide minimal stormwater benefits and may be economically restrictive.

Land ownership and Site Usage of the proposed SWM opportunity locations was an important consideration for feasibility. All land parcels designated as conservation, municipal, provincial, hydro corridor, unknown, and vacant were identified and flagged. Publicly owned lands were considered to be most feasible from a land ownership perspective. Available areas identified on privately owned lands were eliminated from the evaluation, as it was anticipated that such sites would have significant social and economic impacts. Vacant lands adjacent to or in close proximity to identified sites were further considered based on field reconnaissance activities.

Stormwater Infrastructure within the vicinity of the site area is critical for the conveyance of stormwater to potential SWM opportunity location. A desktop analysis of the available storm sewer infrastructure determined if storm sewers (greater than 450mm) passed through or in close proximity to the sites. Accessible storm sewer infrastructure was a minimum requirement for feasibility consideration. Infrastructure screening, also considered:

- Pipe size

- Pipe depth
- Drainage area (sewershed)
- Total basin imperviousness (TIMP)

Topographic Constraints which typically included significant grade changes or hummocky topography which would limit the ability to access and connect to the existing storm sewer were eliminated from further consideration or carried forward to Phase 2 for further evaluation.

Significant Vegetation & Wetlands within available areas was identified during the desktop analysis. Sites with significant vegetation (wooded areas and identified wetlands per the City's Natural Heritage System in the Official Plan) were noted. In several cases, the desktop analysis could not conclusively assess the vegetation conditions at various locations. Where the desktop analysis was not effective, the locations were carried forward. Site feasibility contingent on significant vegetation influences were confirmed following the Phase 2 assessment where necessary.

Preliminary Water Quality Performance Assessment for available areas greater than 1 ha was completed using **Table 3.2** of the 2003 MOE Stormwater Management Planning and Design Manual (see **Appendix C**). Performance targets for stormwater management practices (SWMP) have specific water quality sizing criteria based on the total imperviousness of the site and the level of protection required (Enhanced- Level 1). A preliminary water quality assessment was undertaken which utilized only volumetric water quality requirements based on drainage area (ha), impervious level (percent) and the enhanced storage requirements for each SWM opportunity location, assuming a wet pond which is 1.5m in depth. Shallow wet ponds were assumed to ensure a conservative approach. Locations which did not achieve Enhanced water quality protection were carried forward to determine if they could achieve Level 2 or 3. Those carried forward were re-evaluated for performance during Phase 2, where physical design standards (e.g. side slopes, pond depth, freeboard etc.) were considered. During this second phase evaluation, actual storage potential was based on individual site characteristics.

Each potential SWM opportunity site was determined as feasible, possible or not feasible based on the land assessment outlined below in **Table 2.1**.

Table 2.1: Geographic Information Systems (GIS)/Land Assessment

Feasible	Possible	Not Feasible
• Available area greater than 1 ha • Conservation, Municipal, Provincial, Hydro Corridor, Unknown and Vacant land ownership • No topographic constraints • No planned use/ active park elements present • No vegetation constraints or wetlands • No infrastructure required • Sufficient Enhanced water quality provided	• Available area limited • Unknown land ownership • Planned use/ active park elements present • Additional infrastructure required • Moderate vegetation constraints and or partial wetlands present • Some water quality provided	• Available area limited • Topographic limitations • Pipe size <450mm • High vegetation constraints and or significant portion of the area is dominated by wetlands • No water quality provided

Feasible	Possible	Not Feasible
Note: Consideration was made for proposed facilities within park areas where existing uses could be identified (i.e. active park elements) such as sports fields, play structures etc. but where the proposed facilities could co-exist with existing uses.		

Concluding the Phase 1 assessment, 25 of the 34 initially identified sites were classified as feasible or possible and were carried forward to the Phase 2 assessment. The results of the Phase 1 assessment are presented in **Table 2.2. Appendices A** and **B** include the preliminary mapping for the 34 sites.

Table 2.2: Phase 1 Assessment Results

Site ID	Location Name	Pipe Size	Ownership	Current Site Use	Significant Vegetation	DA (ha)	TIMP (%)	Available Area (ha)	Sufficient Area for Enhanced Water Quality†	Notes	Result of Phase 1
1	Golfview Park	1650mm & 1200mm	City	Park, trail, ice rink	Scattered trees	46.8	42	1.4	Yes	Investigate current park use.	Possible
2	Waverley Park	750mm & 900mm	City	Park, trail, sports field, ice rink	No	7.3	41	2.3	Yes	Investigate current park use. May require easement from Upper Grand District School Board for outlet pipe. Capacity in receiving storm sewer will need confirmation.	Possible
3	Victoria Road Recreation Centre	600mm	City	Recreation centre	No	17.6	44	0.89	Yes	Consider subsurface facility beneath parking lot.	Feasible
4	Green Meadows Park	975mm	City	Park, trail, sports field	Scattered trees	81.5	47	2.09	Yes	Stevenson Street North currently under construction, so GIS may not include most recent storm sewer inverts/diameters.	Feasible
5	Bailey Park	1650mm & 750mm	City	Park, trail, sports field	Yes	23.8	43	4.8	Yes	NA	Feasible
6	The Elliott Community	525mm	City	Long-Term Care and Retirement Home	Yes	-	-	-	-	Too many building constraints on the property.	Not Feasible
7	Silvercreek / Woodlawn	2000mm	Unknown	Vacant	No	59.7	63	0.9	Yes	New Highway 7 connection may reduce available area.	Possible
8	Exhibition Park	1050mm	City	Park, arena, sports field, trail	Yes	39.6	44	0.86	Yes	Consider subsurface facility beneath parking lot. Potential sanitary conflict.	Possible
9	Royal / Woodlawn	525mm	Unknown	Vacant	No	4.1	-	-	Yes	Drainage area too small for pond. Consider OGS.	Not Feasible
10	Speedvale / Hanlon	750mm	Unknown	Vacant	Yes	8.9	69	1.0	Yes	NA	Feasible
11	Victoria / Owens	600mm & 450mm	Unknown	Municipal well, vacant	Yes	-	-	-	-	Too many natural heritage constraints, including wetlands and woodlands.	Not Feasible
12	Speedvale / Elmira	3000mm	Unknown	Agriculture	No	95.2	55	2.98	Yes	Potential sanitary conflict.	Possible
13	Castlebury Park	675mm	City	Park, trail, sports field	No	3.7	-	-	Yes	Drainage area too small for pond. Consider OGS.	Not Feasible
14	Dunhill Place Park	675mm	City	Park, trail	Yes	9.9	47	0.7	Yes	Potential sanitary conflict.	Possible
15	Woodlawn / Governors	450mm	Unknown	Agriculture	Yes	2.6	67	7.4	Yes	Drainage area too small for pond. Consider OGS.	Not Feasible
16	Margaret Greene Park	1800mm	City	Park, trail, sports field	Yes	85.8	45	11.1	Yes	Potential sanitary conflict.	Possible
17	Deerpath Park	1200mm	City	Park, sports field, trail, municipal well	No	9.4	52	0.33	Yes	Part of park within WHPA-A.	Possible

Site ID	Location Name	Pipe Size	Ownership	Current Site Use	Significant Vegetation	DA (ha)	TIMP (%)	Available Area (ha)	Sufficient Area for Enhanced Water Quality†	Notes	Result of Phase 1
18	Centennial Park	900mm	City	Park, sports field, trail, tobogganing hill	Yes	15.7	44	2.7	Yes	Potential sanitary and water main conflict.	Possible
19	Springdale Park	2x 300mm & 375mm	City	Park, sports field	Yes	-	-	-	-	Drainage area too small even with three inlets.	Not Feasible
20	W.E. Hamilton Park	3450mm	City	Park, trail, sports field	Scattered Trees	241.9	48	1.9	No	Consider Maximum Extent Possible, as storm sewer passes beneath private properties without an easement downstream.	Possible
21	Stone / Hanlon	900mm	Unknown	Vacant	No	28.5	74	1.2	Yes	Investigate topography.	Possible
22	Hanlon Road Cul-de-Sac (SE Corner of Hanlon and Stone Road in the 2012 SWM-MP)	900mm	Unknown	Vacant	Yes	12.9	53	0.8	Yes	Potential sanitary conflict. Next to Union Gas station, but per Drawing G-68, the gas line is beneath Hanlon Road and will not conflict with proposed facility.	Possible
23	Dovercliffe Park	525mm	City	Park, sports field	Scattered Trees	3.1	-	-	Yes	Drainage area too small for pond. Consider OGS.	Not Feasible
24	Silvercreek Park, south of Speed River (L-1 from 2012 SWM-MP)	1050mm	Unknown	Vacant	Significant Woodlands	-	-	-	-	SWM facilities only permitted in Natural Heritage System buffer.	Not Feasible
25	Either in Royal City Park (L-4) or east of Marianne's Park (L-5 from 2012 SWM-MP)	900mm	L-4: City L-5: Unknown	L-4: Park, trail L-5: Unknown	L-4: Natural Heritage Restoration Area L-5: Significant Woodland	-	-	-	-	SWM facilities only permitted in Natural Heritage System buffer.	Not Feasible
26	Windsor Park (L-13 from 2012 SWM-MP)	1500mm	City	Park	Scattered Trees	105.9	39	0.48	No	Proposed as dry pond facility in 2012. Playground has been relocated. 2012 SWM-MP identified drainage area as 111.5ha with TIMP of 40 percent.	Possible
27	Guelph Junction Railway at Stevenson St (from 2007 Ward One EA)	Unknown	City	Vacant	Scattered Trees	177.9	42	1.27	No	Proposed as water quality facility in 2007 with drainage area of 220ha and unknown TIMP.	Possible
28	End of Dawn Avenue	Surface flow	GRCA	Vacant	Significant Wetland and Significant Woodland Buffers	8.63	31	0.3	Yes	Approximately 1.7ha of the 8.63ha catchment will receive water quality treatment, and 1.17ha will receive quantity control treatment from the Hearthstone development on Lowes Road West. SWM facilities are permitted in Natural Heritage System buffer.	Possible
29	Lewis Road Allowance	2000mm	City	Vacant	Scattered Trees	59.73	63	0.87	Yes	Investigate grade change from inlet to outlet, as the outlet would discharge to the surface.	Possible
30	606 Massey Road	Ditch	City	Vacant	None	5.1	72	0.53	Yes	No existing outlet. New outlet beneath Massey Road would be required.	Possible

Site ID	Location Name	Pipe Size	Ownership	Current Site Use	Significant Vegetation	DA (ha)	TIMP (%)	Available Area (ha)	Sufficient Area for Enhanced Water Quality†	Notes	Result of Phase 1
31	Springdale Park	1350mm	City	Park	Scattered Trees	31.74	41	2.16	Yes	Springdale Park revisited per City's request during Phase 4 to investigate the possibility of a different inlet. Extended inlet pipe with easement would be required beneath school property from Gateway Drive.	Possible
32	Oak Street Park	1200mm	City	Park	Scattered Trees	29.63	39	0.70	Yes	Proposed as dry pond facility in 2012, but no designs created.	Feasible
33	Franchetto Park	1350mm	City	Park	Scattered Trees	44.42	43	3.14	Yes	Limited inlet access from Victoria Road. Both the 2012 MP and the 2007 EarthTech report identified this as a possible location, but only if a relief sewer was installed on Victoria Road. Neither report elaborated on why this relief sewer would be required.	Possible
34	End of Industrial Street	1650mm & proposed twin 1800mm x 900mm	City	Clythe Creek	Significant Natural Area and Locally Significant Wetland	229.16	44	3.46	Yes	Proposed in 2017 York Road EIS with approximate drainage area of 50ha and unknown TIMP. Contingent on the re-routing of Clythe Creek. Available area is dependent on final Clythe Creek floodplain extents, GRCA wetland delineation, and extents of 100-year floodplain of the Eramosa River.	Possible

† Preliminary Water Quality Performance Assessment – assumes a wet pond (highest volume requirement per Table 3.2 of the 2003 MOE SWMPD) and a nominal depth of 1.5m (50 percent of typical maximum depth).

2.2 Phase 2 – Field Reconnaissance/Impact Assessment

On April 26, 2021 and September 24, 2021, members of Aquafor Beech Limited conducted a field reconnaissance of the possible and feasible SWM opportunity locations carried forward from Phase 1. Reconnaissance of site 34 was completed on August 8, 2022. The field assessment involved identifying site specific constraints and opportunities and potential impacts related to any future SWM opportunities proposed for each site location. The field assessment evaluated each location for impacts and/or opportunities related to the technical, environmental, and social considerations. The field assessments were also used to verify site conditions and identify site features at greater detail. Results of the Field Reconnaissance/Impact Assessment for each of the locations are detailed below and are illustrated in the summary figures presented in **Appendix A**.

2.2.1 General Site Characteristics

The field reconnaissance was used to confirm and or identify site characteristics which were not evident within the GIS mapping and aerial photography examined during the Phase 1 – GIS/Land Assessment. General site characteristics which were noted and or delineated in the field included:

- General site characteristics
- Topography
- Existing stormwater infrastructure and drainage issues
- Confirmation and/or observation of utilities
- Confirmation of current use, programming and condition
- Delineation of vegetation boundaries
- Confirmation of wetland areas
- Watercourse and outfall water quality conditions
- Confirmation of vacant lands (surface cover and evidence of activity)
- Related infrastructure issues
- Surrounding land-uses and encroachments onto non-private property

2.2.2 Technical Considerations

The following technical considerations were noted as part of field reconnaissance activities:

- **Topography** – Unfavorable topography which prevented the establishment of a suitable inlet or outlet to the proposed SWM opportunity site resulted in the elimination of the site from future consideration. Topography which would result in a significant increase in excavation to permit facility construction were determined to increase the difficulty of SWM opportunity installations and associated costs and consequently, such facilities were not carried forward.
- **Utilities** – mapped utilities were confirmed. Unmarked utilities were also noted.
- **Related infrastructure issues** – where existing stormwater infrastructure were present and could be accessed; a visual inspection was performed to note any deficiencies and/or issues. These were noted and used as a modifier to the prioritization in later phases. (i.e. repairs to infrastructure, unrelated to the SWM opportunity, may be more cost effective if undertaken as part of the construction of the new SWM opportunity).
- **Confirmation of vacant lands** – locations with bordering vacant land was investigated to confirm surface cover and evidence of development activity.

2.2.3 Environmental Considerations

The field reconnaissance was also used to confirm the presence and/or potential impact to existing vegetation. Identification of the quantity, grouping, sizes of trees, and other significant vegetation as noted during investigations. Surrounding vegetation type (e.g. meadow, forest, manicured, etc.) was also recorded with typical photos (**Appendix A)**.

2.2.4 Social Considerations

Potential social impacts were also identified as part of the field evaluations. As part of the evaluation process, the project team aimed to incorporate social considerations by identifying potential existing site uses and features which included but is not limited to:

- General site uses and aesthetics;
- Community gardens;
- Existing uses – Sports fields (soccer, baseball, ice-rinks, tennis courts, cricket pitch, etc.) and play structures. Evidence of recent use and/or status was also noted as relevant;
- Passive uses – Pedestrian walkways and trails (official and un-official trails); and/or
- Surrounding land-uses and encroachments onto City property.

Site reconnaissance was undertaken with the understanding that the potential SWM opportunity may present potential drawbacks or impacts, including but not limited to:

- Loss of existing park areas and sports fields;
- Loss or disruption of trails;
- Requirement to relocate park features;
- Temporary loss of park use during construction activities; and/or
- Impacts to neighboring properties (residential, commercial and industrial).

Table 2.3 summarizes the current site conditions and uses and potential social impacts for each of the 25 sites carried forward from Phase 1.

Following the completion of Phase 2, all 25 sites were carried forward to Phase 3.

Table 2.3: Summary of Current Site Conditions and Potential Social Impacts for Potential SWM Opportunity Sites

Site ID	Location Name	Surrounding Land-use	Current Site Use			Notes
			Pathway/Trails	Sports Fields	Playground	
1	Golfview Park	Residential	Yes	Ice rink in winter, basketball hoop	Yes	-
2	Waverley Park	Residential / Institutional	Yes	Soccer (x2)	Yes	Also a splash pad. Park is next to Waverley Drive Public School.
3	Victoria Road Recreation Centre	Residential	No	No	No	Recreation centre and parking lot.
4	Green Meadows Park	Residential / Institutional	Yes	Soccer, baseball	Yes	Park is next to John F. Ross Collegiate track and sports field.
5	Bailey Park	Residential / Industrial / Cemetery	Yes	Soccer, baseball	No	Vacant land east of park belonging to Gay Lea Foods may have potential park use, as may vacant lot at 25-43 Speedvale Avenue West.
7	Silvercreek / Woodlawn	Commercial / Industrial	-	-	-	Site area may be reduced due to Highway 7 expansion. Monitoring well recently installed at south end of site.
8	Exhibition Park	Residential	Yes	Baseball (x3), tennis, football	Yes	Arena and parking lot also present.
10	Speedvale / Hanlon	Residential / Commercial	-	-	-	Parking lot from plaza at 350 Speedvale Avenue West may be encroaching into the vacant lot.
12	Speedvale / Elmira	Residential / Industrial / Commercial	-	-	-	Existing sedimentation basin on site to control agricultural runoff.
14	Dunhill Place Park	Residential	Yes	-	Yes	Play structure appears new, and new trees have been planted.
16	Margaret Greene Park	Residential / Train track	Yes	Soccer (x3), tennis, baseball (x3), cricket	Yes	Tennis courts recently upgraded.
17	Deerpath Park	Residential	Yes	Soccer	Yes	Municipal well in centre of park. Soccer field at east side could be relocated to west side of park to make space for surface pond.
18	Centennial Park	Residential / Major Utility	Yes	Soccer (x7), baseball (x3), tennis (indoor)	Yes	Tobogganing hill present.
20	W.E. Hamilton Park	Residential / Commercial	Yes	Baseball, volleyball	Yes	Hydro corridor above adjacent residential parking lots.
21	Stone / Hanlon	Commercial	-	-	-	Hill and overhead hydro present.
22	Hanlon Road Cul-de-Sac	Residential	Yes (informal)	-	-	Site appears to have frequent informal use. Potential encroachments from Stone Road properties. Monitoring well on site.
26	L-13 Windsor Park	Residential / Golf Course	-	-	-	Playground relocated to be on Waverley Drive. Two monitoring wells present on site.
27	Stevenson / Guelph Junction Railway	Industrial / Residential	Yes (informal)	-	-	Site appears to have frequent informal use. Monitoring wells appear recently installed across site. Evidence of past industrial use.

Site ID	Location Name	Surrounding Land-use	Current Site Use			Notes
			Pathway/Trails	Sports Fields	Playground	
28	End of Dawn Avenue	Residential / Natural Heritage	Yes	-	-	Monitoring wells appear recently installed across site. Trail is well used. Significant sediment accumulation along Dawn Avenue due to poor erosion and sediment control practices at construction site on Lowes Road West.
29	Lewis Road Allowance	Service Commercial	-	-	-	Site appears to have frequent informal use.
30	606 Massey Road	Industrial	-	-	-	Cell phone tower on northeast corner of site. No visible outlet from site.
31	Springdale Park	Residential	Yes	Yes	Yes	Significant grade loss between school property and park. Potential opportunity for fill to be placed on park.
32	Oak Street Park	Residential	Yes	-	Yes	Hydro line crosses park. Ice rink in the winter.
33	Franchetto Park	Residential	Yes	Yes	Yes	No evidence of 300mm storm sewer outlet from Grange Street. Per City drawing K-513, this storm sewer outlet to a ditch in 1972. No ditch currently evident.
34	End of Industrial Street	Industrial / Natural Heritage	Yes (informal)	-	-	The proposed site is adjacent to a Provincially Significant Cultural Heritage Landscape and proposed Heritage Conservation District Boundary. Existing features at the site include a weir and bridge/outlet structure, and rock formations around the edges of the existing ponds. The site is entirely vegetated, with wetland potentially across the site.

2.3 Phase 3 – Performance Assessment

The performance assessment is intended to develop conceptual SWM facility alternatives for each of the feasible or possible SWM opportunity locations carried forward from Phases 1 and 2 using a set of primary and secondary evaluation criteria. The conceptual alternatives identify details such as SWM facility type, size, configuration and function for each potential location.

The following sections describe the primary and secondary assessment criteria and outline their significance to the performance assessment and the development of the conceptual alternatives.

2.3.1 Performance Criteria

The following primary and secondary evaluation criteria were used to develop the conceptual alternatives for each potential SWM facility and determine the feasibility of each SWM facility:

Primary Criteria

The primary criteria used in the evaluation are as follows:

1) Available areas with SWM pipe depths <5m were evaluated as surface facilities (wet pond, wetland and hybrid facilities) with the following exemptions:
    - Where surface constraints exist, due to impacts to active and passive use of parks and park features, sport fields and trails, subsurface storage facilities may be considered regardless of pipe depth criteria.
    - In addition, for site within the regulatory floodplain, subsurface storage facilities may also be considered regardless of pipe depth criteria.
2) Available areas with SWM pipe depths >5m were evaluated as subsurface storage facilities (due to excess excavation requirements for surface facilities).
3) Per the 2003 Stormwater Management Planning and Design Manual:
    - Provide at least 50 percent of Enhanced water quality control without exceeding available areas
        - The exception to this was Site 26, originally proposed as a quantity control facility only in the 2012 SWM-MP as Pond L-12.
    - Conceptual alternatives possess the ability to adhere to design guidelines to ensure proper function and safety requirements.

Secondary Criteria

The secondary criteria used in the evaluation include:

4) Ability to Provide Erosion Control (25mm Storm Event) – According to the 2003 Stormwater Management Planning and Design Manual, the larger of the erosion control active storage and the water quality active storage should be provided. For simplicity, the active storage volume criteria ($40m^3/ha$) was utilized.
5) Ability to Provide Quantity Control – In addition to quality and erosion control, any remaining storage available for quantity control was identified as an overall net benefit and ensured increased consideration of the applicable SWM opportunity. Additional flood control was not allocated to subsurface storage facilities as this would increase facility size and costs, although additional flood storage maybe accommodated based on available area and allocated budgets.

2.3.2 Performance Evaluation

End-of-pipe (EOP) stormwater management facilities receive stormwater from a conveyance system, upstream facilities or surface water tributaries, and discharge the treated water to receiving waters. In essence, there are four (4) traditional types of end-of-pipe SWM facilities:

1. Wet ponds;
2. Wetlands;
3. Hybrid - wet pond/ wetland; and
4. Subsurface stormwater facilities.

Dry ponds were not considered as they do not provide quality control. Greenways were not considered due to the infiltration constraints presented in **Figure 1.5**.

2.3.2.1 Facility Type Assessment

For the purpose of the Phase 3 assessment, from the list above, the types of end-of-pipe controls have been grouped into:

- Surface Facilities (wet pond, wetland and hybrid facilities)
- Subsurface Storage Facilities

The use of surface facilities such as wet pond, wetland and hybrid facilities becomes impractical, from an economic and social perspective, as installation depths increase. Therefore, the use of subsurface storage facilities was introduced as an alternative for servicing storm sewers at depths greater than 5m. As a preliminary cut-off, a depth of 5m was used to select surface facilities versus subsurface storage facilities. **Table 2.4** demonstrates the criteria for each EOP control.

Table 2.4: Facility Type Criteria

EOP Type	Criteria
Surface Facility	1. Pipe depth <5m
Subsurface Storage Facility	1. Pipe depth >5m, 2. Site has a surface constraints which cannot be mitigated, or 3. Site is within the Regulatory Floodplain

Following the above criteria, **Table 2.5** lists the sites identified as potential SWM facility opportunities:

1) Fifteen (15) sites were identified as where a **Surface Facilities** was the primary alternative;
2) Nine (9) sites were identified where a **Subsurface Storage Facilities** was the primary alternative; and
3) One (1) site was removed from feasibility (Site #29).

Table 2.5: Wet Pond versus Subsurface Storage SWM Opportunities

Site ID	Location Name	Pipe Depth Below Ground Surface (BGS) (m)	Surface Constraints which cannot be mitigated	Within Regulatory Floodplain	Recommended Facility Type (1- Primary alternative; 2- Secondary alternative)
1	Golfview Park	4.1 and 4.6	Maybe	No	1) Subsurface storage† 2) Surface facility (combined with 1)
2	Waverley Park	2.8 and 1.4	No	No	1) Subsurface storage† 2) Surface facility
3	Victoria Road Recreation Centre	1.6	Yes	No	Subsurface storage†
4	Green Meadows Park	3.6	No	No	1) Surface facility 2) Subsurface storage†
5	Bailey Park	1) 4.5 2) 5.8	Maybe	No	1) Surface facility 2) Subsurface storage†
7	Silvercreek / Woodlawn	2.2	No	No	Surface facility
8	Exhibition Park	1.0	Yes	No	Subsurface storage†
10	Speedvale / Hanlon	3.2	No	No	Surface facility
12	Speedvale / Elmira	8.6	No	No	Subsurface storage
14	Dunhill Place Park	4.3	No	No	1) Subsurface storage† 2) Surface facility
16	Margaret Greene Park	4.8	Maybe	No	1) Surface facility 2) Subsurface storage†
17	Deerpath Park	2.8	No	No	Surface facility
18	Centennial Park	3.0	Yes	No	1) Subsurface storage† 2) Surface (combined with 1)
20	W.E. Hamilton Park	9.9	Yes	No	Subsurface storage

Site ID	Location Name	Pipe Depth Below Ground Surface (BGS) (m)	Surface Constraints which cannot be mitigated	Within Regulatory Floodplain	Recommended Facility Type (1- Primary alternative; 2- Secondary alternative)
21	Stone / Hanlon	4.0	No	No	Surface facility
22	Hanlon Road Cul-de-Sac	3.0	No	No	Surface facility
26	L-13 Windsor Park	3.2	No	No	1) Subsurface storage† 2) Surface facility
27	Stevenson / Guelph Junction Railway	1.1*	No	Partially	Surface facility◊
28	End of Dawn Avenue	NA	No	No	1) Low impact development‡ 2) Surface facility
29	Lewis Road Allowance	2.2	No	No	Not feasible, as inlet pipe below outlet elevation
30	606 Massey Road	NA	No	No	Surface facility
31	Springdale Park	4.8	Yes	No	Subsurface storage†
32	Oak Street Park	3.87	Yes	No	Subsurface storage†
33	Franchetto Park	3.37	Yes	No	Subsurface storage†
34	End of Industrial Street			Yes	Surface facility

† Pipe depth criteria modified by Surface Constraints which cannot be mitigated

* pipe depth assumed based on City drawing S-038, as GIS showed pipe invert 1.0m above ground level

◊ Note that Sites 27 and 34 were previously recommended as surface facilities by EarthTech (2007) and Amec Foster Wheeler (2017), respectively, and were therefore maintained as surface facility recommendations despite being in the Regulatory Floodplain

‡ A low impact development solution was considered for Site #28, as the predominant issues within the neighbourhood are with the minor system, not the major system. Dawn Avenue already has good grading, curb cuts, and boulevards that are well-situated for bioretention systems. As Dawn Avenue is in a WHPA Vulnerability Zone 8-10, this would be a good pilot project for the City's Infiltration Policy exception clause. Low impact development opportunities will be discussed in the forthcoming Municipal ROW Retrofit Opportunities Assessment.

2.3.2.2 Enhanced Water Quality Control

Surface and Subsurface Storage Facilities are recommended to follow the 2003 MOE Stormwater Management Planning and Design Manual (SWMPD) in regards to design and sizing criteria in order to provide adequate water quality, erosion, and quantity control. These guidelines are also used to accurately design and dimension facilities to ensure proper facility function, safety and performance is achieved.

For Surface and Subsurface Storage Facilities, the SWMPD manual was followed to determine the general facility size, capacity, configuration, and dimensions. The SWMPD design guidelines and generic design specifications for subsurface plastic arch stormwater subsurface storage facilities **Table 2.6** lists the design guidelines and assumptions for both surface and subsurface storage SWM opportunity.

Table 2.6: General Design Standards/Specification - Surface & Subsurface Storage Facilities

Surface Facility	Subsurface Storage Facility
○ Assumed freeboard is pipe depth from ground surface ○ Average 4:1 side slopes ○ Assumed facility buffer of 2m from top of bank ○ Available permanent pool storage: • Base volume estimate (assumes 2.0m mean permanent pool depth) • Adjusted volume estimate (applies a 30 percent increase in required permanent pool volume base estimates to account for loss of storage due to submerged berms etc. • Permanent pool storage active below the storm sewer invert	○ Volume control per unit area = ranged from 1.0m^3/m^2 to 2.5m^3/m^2 (average 1.5m^3/m^2) ○ Storage volume is active below the storm sewer invert

Initially conducted during the Phase 1 assessment, the Phase 3 assessment re-evaluated each potential SWM opportunity for performance using specific water quality sizing criteria outlined in Table 3.2 of the 2003 MOE SWMPD and corresponding design standards. The goal when evaluating each potential SWM opportunity was to obtain a minimum of 50 percent of the Enhanced (80 percent long-term total suspended solid removal) water quality storage requirements for each facility. However, actual storage potential was determined by adhering to physical design standards (e.g. side slopes, pond depth, freeboard, etc) and individual site characteristics. Water quality targets were maximized as permissible by design standards and available area. For subsurface storage facilities, water quality targets were limited to the maximum number of subsurface units which could be accommodated. **Table 4.1** summarizes the performance criteria used to determine each of the site's feasibility and determine if adequate area exists to permit the construction of the new SWM opportunity, after accounting for the City's preferences for surface or subsurface facilities, and removing facilities deemed non-feasible by City staff (see **Section 2.4**).

2.4 Phase 4 – Consultation with City Staff

The consultation with City staff was intended to identify constraints, opportunities and synergies with other City of Guelph projects and or plans in regards to the identified SWM Pond Opportunities carried forward from Phase 1, 2 and 3.

On July 14, 2021 and through subsequent emails, SWM opportunity locations carried forward from Phases 1, 2 and 3 were presented to City staff from various departments to obtain feedback and provide an opportunity for City staff to review and discuss each location in detail.

Table 2.7 highlights relevant discussion points in regards to each of the 24 SWM opportunity locations.

Table 2.7: Summary of Discussion Points with City Staff

Site ID	Location Name	Notes
1	Golfview Park	• Subsurface facility preferred. • Liner would be required for source water protection.
2	Waverley Park	• Subsurface facility preferred, as surface facility limits recreational amenities. • The splash pad at this location currently recirculates water. If a SWM facility was installed, there may be opportunities for the splash pad to discharge to the SWM facility.
3	Victoria Road Recreation Centre	• Drainage-related issues have been noted at the courtyard. A rain garden has previously been proposed, to include educational signage, providing a good opportunity for additional SWM infrastructure on site. However, the status of this rain garden is in flux and may not go ahead. • Since the parking lot was recently redone, City staff prefer for this facility to be scheduled later in the capital plan to avoid disruptions close to the previous construction.
4	Green Meadows Park	• This area was studied with Stevenson Street in an EA in 2013 and a surface facility was rejected. Instead, oversized pipes (1800mm) were installed on Stevenson from Eramosa to Cassino to mitigate quantity issues. It does not appear that any sort of control structure was installed. • Potential for a sub-surface quality facility could remain in the SWM-MP. • Services noted potential groundwater quality concerns in this area for further investigation.
5	Bailey Park	• Subsurface facility preferred to surface facility to avoid relocating surface park amenities. • Potential future trail connection to TransCanada Trail along railway.
7	Silvercreek / Woodlawn	• There is a future trail and Active Transportation Route planned along Woodlawn Road as per the Guelph Trail Master Plan and the Active Transportation Network Study. This location could be a synergy to implement a trail at the same time.

Site ID	Location Name	Notes
		• Land parallel to Woodlawn Road is owned by the City of Guelph. Land parallel to the Hanlon Expressway is owned by the Hydro-Electric Power Commission of Ontario. • Land area owned by the City is too small to be feasible.
8	Exhibition Park	• Parks and Recreation have been examining the future of this site, with recommendations likely from the forthcoming Parks and Recreation Master Plan when complete. • The arena building on-site is in need of retrofit, providing a potential synergy. • Subsurface storage beneath the parking lot is an acceptable option. • Superpipe storage may also be considered beneath the adjacent trail, as quantity control is needed within this area. • Sewer capacity issues were previously identified in the area as part of 2012 MP.
10	Speedvale / Hanlon	• Land is owned by the Ministry of Transportation. This site is therefore no longer feasible.
12	Speedvale / Elmira	• Land is owned by the Arnel Corporation. This site is therefore no longer feasible.
14	Dunhill Place Park	• Subsurface facility preferred. • This site is a difficult location, making it a lower priority. However, there could be coordination with future naturalization of the Northwest Channel.
16	Margaret Greene Park	• A splash pad to be constructed in 2023 on the SW side of the playground. • Surface facility could add value to underutilized east side of park. • Due to the presence of two sanitary sewers in park, the pond location would need to be optimized to avoid conflict. • Opportunity for neighbourhood amenity with recreational and natural heritage value. There are quite a few mature trees in proposed locations, so planting plans would ideally recommend replacement plantings to maintain urban forest canopy.
17	Deerpath Park	• Concern for structural integrity of water reservoirs in the area and high bedrock. The water reservoir is located beneath the basketball courts, and requires upgrades due to structural requirements. The reservoir cap is to be replaced between 2022-2024. • Due to recent and projected construction activities, there will likely be low public tolerance to additional construction in the park. • This site is therefore no longer feasible.
18	Centennial Park	• Subsurface storage beneath a parking lot is preferred.

Site ID	Location Name	Notes

		• The gravel parking lot on Municipal Street has large sediment runoff. The Saultos parking lot also has drainage issues. Either parking lot would therefore be a good candidate for a subsurface facility.
		• Potential synergies include:
		  ○ The Wellington Feedermain is proposed along the west side of the park.
		  ○ The City is investigating the future of the existing dome.
		• There is a good opportunity for a master plan to be completed to assess the entire Centennial Park to capture all future works.

20	W.E. Hamilton Park	• There is an Active Transportation route through park. • Playground and trail relocation will be happening in 2021. • Due to the large pipe diameter of the adjacent storm sewer, a SWM facility in this park is not a typical project (high cost, but potential high benefit).
21	Stone / Hanlon	• Land is owned by the City of Guelph. However, the MTO's 2009 TESR notes full property acquisition of these lands for future Stone Road interchange. • This site is therefore no longer feasible.
22	Hanlon Road Cul-de-Sac	• Land is owned by the City of Guelph. However, the MTO's 2009 TESR notes full property acquisition of these lands for future Stone Road interchange. • This site is therefore no longer feasible.
26	L-13 Windsor Park	• Flood issues have been identified in this area in the past, so there is good synergy to address these flood issues. • Parks supports this location as a subsurface facility. • Alternatives for this location could include an oversized pipe in the ROW, increasing the capacity of the existing channel, YMCA lands on the south side of Waverly, or a combination of those. • Mature trees are present on and adjacent to property, so consideration should be given to protecting tree root zones in the SWM facility design.

27	Stevenson / Guelph Junction Railway	• This location was proposed during the 2007 Ward One EA and carried forward in the 2012 SWM-MP. City-owned parcel does not provide sufficient land for full treatment. City may wish to consider acquiring adjacent land (eg. 110 Stevenson Street South, which is privately owned) unless upstream quality treatment is installed to required reduce permanent pool size.
		• The site is within GRCA's regulation limit, mapped as part of Two-Zone Floodplain (Flood Fringe).
		• Further investigations may be necessary:
		  ○ High potential for contaminated soil and need for soil remediation.
		  ○ The site also has shallow groundwater and shallow bedrock.
		• This location is being studied for designation as NHS, which could result in designation as cultural or significant woodland. If it is designated, a facility at this location will no longer be possible, although amendments to the

Site ID	Location Name	Notes
		existing channel to facilitate some enhanced treatment/storage may be feasible. • While this is a great opportunity for improvement, it is likely one of the most complicated of all proposed locations.
28	End of Dawn Avenue	• Regular flooding issues along Dawn Avenue occur. • New development along Lowes Road will continue to release some discharge to Dawn Avenue. A 30-40cm deep depressional area will be installed at the end of Dawn Avenue. • Further infill development within the catchment is anticipated.
30	606 Massey Road	• This property is a stranded asset, so would be a good opportunity to use it for stormwater management.
31	Springdale Park	• Since there is no longer an opportunity for SWM controls at the WWTP, the City is interested in other opportunities nearby. • Springdale Park could allow for a subsurface facility, although the inlet pipe would have to be routed through the school property.
32	Oak Street Park	• A subsurface facility was previously proposed at this location, and is still the preferred alternative.
33	Franchetto Park	• The 2012 SWM-MP noted this this location was contingent on the construction of a twin relief sewer on Victoria Road. This relief sewer has not yet been constructed. There are additional inlet constraints; due to limited access to Victoria Road, the inlet would have to pass through an easement beneath private property, or a storm sewer would have to be routed along Delmar Boulevard from Victoria Road to the park to create an inlet, if grades permit. The need for this facility will therefore be evaluated during the EA assessment.
34	End of Industrial Street	• The City is acquiring lands to support the widening of York Road from two to four lanes as per the 2013 EA and 2017 EIS. This, along with the creek realignment restoration works, has opened the opportunity to acquire lands to support a SWM facility at this location.

2.5 Concept Designs

Eight (8) sites were deemed to be not feasible based on Phases 1-4, and were therefore eliminated from further consideration. These sites included:

- Site #7 – Silvercreek / Woodlawn
- Site #10 – Speedvale / Hanlon
- Site #12 – Speedvale / Elmira
- Site #17 – Deerpath Park
- Site #20 – W.E. Hamilton park
- Site #21 – Stone / Hanlon

- Site #22 – Hanlon Road Cul-de-Sac
- Site #33 – Franchetto Park

Concept designs were developed for all feasible sites, which are presented in **Appendix E**. However, during the process of developing the conceptual designs, two sites were eliminated as not feasible due to construction constraints. These included:

- Site #20 – due to the depth of the storm sewer and area constraints, excavating below the storm sewer depth is not feasible.
- Site #33 – grading constraints did not allow for sufficient differential in elevation between the inlet and outlet of the proposed facility.

Following the review, sixteen (16) SWM opportunities were confirmed as feasible. They include:

- Site #1 – Golfview Park
- Site #2 – Waverley Park
- Site #3 – Victoria Road Recreation Centre
- Site #4 – Green Meadows Park
- Site #5 – Bailey Park
- Site #8 – Exhibition Park
- Site #14 – Dunhill Place Park
- Site #16 – Margaret Greene Park
- Site #18 – Centennial Park
- Site #26 – L-13 Windsor Park
- Site #27 – Stevenson / Guelph Junction Railway
- Site #28 – Dawn Avenue
- Site #30 – 606 Massey Road
- Site #31 – Springdale Park
- Site #32 – Oak Street Park
- Site #34 – End of Industrial Street

2.5.1 Overlapping Catchments

The catchments of several proposed facilities overlap the catchments of existing or other proposed facilities, and will need to be considered holistically. Considerations for each overlapping site are discussed below.

Site #3
Site #3 is within the catchment of existing SWMF 36 and 127. SWMF 36 currently provides less than Basic water quality control, insufficient extended detention, and no water quantity control. SWMF 127 only provides water quantity control up to the 5-year event. While providing water quality treatment to Site #3 would reduce the permanent pool and extended detention requirements at SWMF 36, it would still not enable SWMF 36 to achieve Basic water quality treatment. In addition, Site #3 has not been proposed to provide water quantity control, although this could be recommended.

Sites #2 and #26
Site #26 is too small to provide 100 percent of the water quality benefits. However, Site #2 is located within its catchment. If the facility at Site #2 is implemented, then the facility at Site #26 would be able to provide 25 percent of the Enhanced water quality target.

Sites #4, #27, and #34

Site #4 is located within the catchment of Site #27, which itself is within the catchment of Site #34. If each facility is considered individually (i.e., without considering any upstream facilities), Sites #4 and #34 could provide 100 percent of the Enhanced water quality target, and Site #27 could provide 69 percent. Different combinations of these facilities could therefore be implemented while achieving Enhanced water quality controls:

- Site #34 only – As discussed in **Section 3** below, there are a number of constraints associated with this site. If all constraints can be mitigated, there is sufficient space for the permanent pool to provide Enhanced water quality control to the entire catchment, rendering Sites #4 and #27 redundant. Some amount of quantity control would be provided.
- Sites #27 and #34 - As discussed in **Section 3** below, there are a number of constraints associated with both of these sites. If the constraints at Site #34 reduce the available area for constructing the facility, then both Sites #27 and #34 could be constructed. This would provide 100 percent of the permanent pool volume to provide Enhanced water quality control to the entire catchment, and provides quantity controls at two locations. However, quantity control beyond the extended detention volume at Site #27 would be limited.
- Sites #4 and #34 – If constraints prevent the use of Site #27 and restrict the available area at Site #34, then both Sites #4 and #34 could be constructed. This would provide 100 percent of the permanent pool volume to provide Enhanced water quality control to the entire catchment, but only provides quantity control at Site #34.
- Sites #4, #27, and #34 – If constraints at Sites #27 and #34 are extensive, then constructing smaller facilities at each site, in combination with the facility at Site #4 could provide Enhanced water quality control to the entire catchment, and limited quantity control at Sites #27 and #34.

3 Sites with Significant Constraints

Sites #27 and #34 were included as feasible alternatives, but have more significant constraints that will need to be addressed during the detailed design phase.

Site #27 - Stevenson / Guelph Junction Railway constraints:

- Site #27 is located within the regulatory floodplain. Consultation with the GRCA will be required, as will modeling to confirm it is located outside of the 100-year floodplain.
- Shallow bedrock has been recorded approximately 1.8m below ground surface, which will increase excavation costs.
- Historical contamination is known to be present on site. This will increase excavation costs and may require lining the pond to ensure the facility does not leach contaminants into the permanent pool or mobilize contaminants off-site.
- This location is being studied for designation as NHS, which could result in designation as cultural or significant woodland. If it is designated, a facility at this location will no longer be possible, although amendments to the existing channel to facilitate some enhanced treatment/storage may be feasible.

Site #34 - End of Industrial Street constraints:

- Site #34 is located within the regulatory floodplain. Consultation with the GRCA will be required, as will modeling to confirm it is located outside of the 100-year floodplain.

- The site is entirely vegetated and would require clearing. In 2017, Dougan and Associates identified the site's vegetation communities as Cultural Meadow, Cultural Thicket, and Deciduous Forest, in addition to Open Aquatic where the two existing ponds are located. While the vegetation south of the existing ponds was identified as buckthorn cultural thicket in 2017, the report noted that wetlands could not be confirmed because the landowner had requested they not do soil samples. However, background mapping does indicate some wetland in that area, which was confirmed through a site visit by Aquafor staff on September 6, 2022. Consultation with the GRCA will be required to determine whether the pond footprint can extend into the wetland. In October 2022, the GRCA indicated that the wetland extents may be broader than what is shown in the GRCA mapping in the figure for Site 34 in **Appendix A**. Follow-up studies, including completion of a Scoped EIS (Terms of Reference to be developed in consultation with GRCA) are therefore required to confirm and map out the boundaries of any wetland areas.
- The Ward One EA (EarthTech, 2007) identified shallow bedrock at the south end of the site, at the Victoria Street Outfall, although two nearby monitoring wells (7314936 and 731495) were advanced to 15ft below ground surface without encountering bedrock. However, shallow bedrock outcrops may be encountered, which would increase excavation costs.
- The northern part of the site is largely buckthorn thicket, which would require an Invasive Species Removal and Management Plan to ensure that the native species planted during pond construction are able to survive.
- Design of the facility should be done in collaboration with the channel design of Clythe Creek to ensure stable channel cross-sections and separations between the SWMF and the channel can be maintained.

4 Summary of Opportunities

Table 4.1 summarizes the control provided by each facility. **Appendix A** presents figures for each of the 16 opportunities.

Table 4.1: Summary of Available Area to Provide Enhanced Water Quality Control

Site ID	Location Name	Pipe Depth Below Ground (m)	Facility Type	DA (ha)	TIMP (%)	Required Permanent Pool Volume (m^3)	Required Extended Detention Volume (m^3)	Required Facility Area (ha)†	Available Area (ha)	Percentage of Required Facility Area	Flood Storage Estimate (m^3)
1	Golfview Park	4.1 and 4.6	Subsurface storage	46.8	42	5,494	1,872	0.64	1.37	100%	NA◊
2	Waverley Park	2.8 and 1.4	Subsurface storage	7.3	41	844	292	0.10	2.3	100%	NA◊
3	Victoria Road Recreation Centre	1.6	Subsurface storage	17.6	44	2,163	704	0.25	0.89	100%	NA◊
4	Green Meadows Park	3.6	Subsurface storage	81.5	47	10,559	3,260	1.20	2.09	100%	NA◊
5	Bailey Park	5.9	Subsurface storage	23.8	43	2,872	952	0.33	4.8	100%	NA◊
8	Exhibition Park	1.0	Subsurface storage	39.6	44	4,866	1,584	0.56	0.86	100%	NA◊
14	Dunhill Place Park	4.3	Subsurface storage	9.9	47	1,283	396	0.15	0.7	100%	NA◊
16	Margaret Greene Park	4.8	Surface facility	85.8	45	10,735	3,432	1.39	11.1	100%	12,945
18	Centennial Park	3.0	Subsurface storage	15.7	44	1,929	628	0.22	2.7	100%	NA◊
26	L-13 Windsor Park	3.2	Subsurface storage	105.9	39	11,836	4,236	1.39	0.48	34%	NA◊
27	Stevenson / Guelph Junction Railway	1.1	Surface facility◊	177.9	42	21,071	7,116	1.83	1.27	69%	5,043
28	Dawn Avenue	NA	1) Low Impact Development 2) Surface facility	8.63	31	1) NA 2) 651*	1) NA 2) 277*	1) NA 2) 0.11*	1) NA 2) 0.3	1) NA 2) 100%	1) NA 2) 0
30	606 Massey Road	NA	Surface Facility	5.1	72	944	204	0.15	0.53	100%	0
31	Springdale Park	4.8	Subsurface storage	33.62	41	3,907	1,345	0.43	2.16	100%	NA◊
32	Oak Street Park	3.87	Subsurface storage	29.65	39	3,314	1,186	0.39	0.7	100%	NA◊
34	End of Industrial Street	2 (assumed)	Surface facility	229.16	44	28,192	9,166	2.56	3.46	100%	29,428

† Required facility area assumes the facility treats 100% of its catchment area
* designed for catchment area of 6.93ha to account for treatment of 1.7ha by Hearthstone development
◊ subsurface facilities may also be designed to provide quantity control, as deemed necessary through modelling

5 Cost Estimates

The construction cost estimates for the surface and subsurface storage facilities were based on the following:

Surface Facilities

1. Previous studies in the GTHA have utilized a rate of $120/m^3 for excavation required to excavate down to the proposed facility inlet (i.e. pipe depth) and a rate of $275.00/m^3 of permanent pool volume created thereafter.
2. Shallow bedrock has been recorded at Site #27 (approximately 1.8m below ground surface per MECP Well Record A055787). As such, excavation below bedrock has been estimated at $500/m^3, and bedrock was conservatively estimated at 1.5m below ground surface for costing purposes.
3. Site #27 is known to have some historical contamination on site. To accounted for the added costs of managing contaminated materials, the excavation costs above bedrock have been increased to $300/m^3.
4. A minimum construction cost of $350,000 per facility was also used for smaller facilities to account for costs associated with mobilization, demobilization, bonding, erosion and sediment control and dewatering etc.

Sub-Surface Facilities

1. Costing for each subsurface storage unit has been based on unit costs of previously constructed facilities in the GTHA, through discussions with several municipalities and product distributors. The unit costs for subsurface facilities ranged from $450/m^3 to $650/m^3 per unit of water quality storage volume provided.
2. A minimum construction cost of $350,000 per facility was also used for smaller facilities to account for costs associated with mobilization, demobilization, bonding, erosion and sediment control and dewatering etc.

Storm Sewer Costs

1. Since most SWM facilities are proposed near to the inlet and outlet storm sewers, piping costs have been lumped with the overall excavation costs. However, for sites where more extensive storm sewer extensions are necessary, the following cost estimates were used:
    a. Site #2: $2,000/m for 180m of 750mm storm sewer at 2.8m depth
    b. Site #16: $4,580/m for 240m of 1800mm storm sewer at 4.8m depth
    c. Site #31: $3,750/m for 270m of 1350mm storm sewer at 4.8m depth

Parks Rehabilitation

In addition to the above, the cost to establish and /or rehabilitate the respective park and or park features should be included. Three (3) levels of park rehabilitation have been assigned:

1. Low Park Rehabilitation ($50,000 to $100,000) – represent minor repairs, relocation of existing park features, tree planting and minor improvements to trails.
2. Moderate Park Rehabilitation ($250,000 to $500,000) - represent moderate repairs, relocation of existing park features, tree planting and moderate improvements to trails and general construction of new park features.

3. High Park Rehabilitation ($500,000 to $1,000,000) - represent reconstruction of high value park features and general construction of new park features (sports fields, etc.).

Implementation costs for each feasible SWM facility opportunity are summarized in **Table 5.1** below.

For any new facility proposed in a park or recreational facility property, Parks and Recreation must be consulted during preliminary design to ensure the details of the SWMF location aligns with the current and future uses of the park.

Table 5.1: Estimated Cost ($) of the Feasible SWM Facility Opportunities

Site ID	Location Name	Recommended Facility Type	Drainage Area (ha)	Estimated Construction Cost ($) (millions)†	Estimated Park Rehabilitation Requirement ($) (millions)†
1	Golfview Park	Subsurface Storage Facility	46.8	$4.31–$6.22	$0.25–$1.0 (moderate to high)
2	Waverley Park	Subsurface Storage Facility	7.3	$1.02–$1.32	$0.5–$1.0 (high)
3	Victoria Road Recreation Centre	Subsurface Storage Facility	17.6	$1.68–$2.42	$0.25–$0.5 (moderate)
4	Green Meadows Park	Subsurface Storage Facility	81.5	$8.08–$11.68	$0.5–$1.0 (high)
5	Bailey Park	Subsurface Storage Facility	23.8	$2.24–$3.23	$0.25–$0.5 (moderate)
8	Exhibition Park	Subsurface Storage Facility	39.6	$3.77–$5.45	$0.25–$0.5 (moderate)
14	Dunhill Place Park	Subsurface Storage Facility	9.9	$0.98–$1.42	$0.25–$0.5 (moderate)
16	Margaret Greene Park	Surface Facility	85.8	$11.78*	$0.05–$0.1 (low)
18	Centennial Park	Subsurface Storage Facility	15.7	$1.50–$2.16	$0.25–$0.5 (moderate)
26	L-13 Windsor Park	Subsurface Storage Facility	105.9	$3.24–$4.68	0 (N/A)
27	Stevenson / Guelph Junction Railway	Surface Facility	177.9	$6.98	0 (N/A)
28	Dawn Avenue	1) Low Impact Development 2) Surface facility	8.63	1) $0.2[α] 2) $0.35	$0.05–$0.1 (low)
30	606 Massey Road	Surface Facility	5.1	$0.41	0 (N/A)
31	Springdale Park	Subsurface Storage Facility	31.74	$3.93–$5.23	$0.5–$1.0 (high)
32	Oak Street Park	Subsurface Storage Facility	29.65	$2.63–$3.80	$0.25–$0.5 (moderate)
34	End of Industrial Street	Surface Facility	229.16	$5.95–$15.46[§]	0 (N/A)
		Totals	631.78[‡]	$58.71–$82.59	$3.35–$7.20

† Class ‘C’ cost estimate in 2021 CDN dollars

Site ID	Location Name	Recommended Facility Type	Drainage Area (ha)	Estimated Construction Cost ($) (millions)†	Estimated Park Rehabilitation Requirement ($) (millions)†
[α] Assumes a linear cost of $350/m of road length where bioswales are installed. Assumes bioswales are installed at same time as road reconstruction. [§] Lower cost assumes installation of Site #27; higher cost assumes neither Site #4 or #27 installed. * Following public consultation in November 2022, the location for Site #16 was shifted and the costs increased accordingly. ‡ Total area is less than the sum of each catchment, due to overlapping catchments (**Section 2.5.1**)					

6 Impact of Proposed Facilities

A four (4) phase feasibility assessment was conducted to identify available areas throughout the City of Guelph which have the potential to accommodate new stormwater management facilities. A total of 33 potential sites were screened, of which 16 were ultimately deemed feasible. In total, four (4) sites were identified where a surface facility was the primary alternative, eleven (11) sites were identified where a subsurface storage facility was the primary alternative, and one (1) site where the primary alternative was the implementation of low impact development through the catchment (this site will be further assessed during a future stage of the SWM-MP). **Figure 6.1** demonstrates the locations of the feasible SWM opportunity locations in addition to the City's existing SWM facilities.

The implementation of the proposed SWM facility opportunities would increase the City's SWM Assets by up to 16 facilities. This would cost $58.71 – $82.59 million with an additional $3.35 – 7.20 million required for park rehabilitation. The implementation of each opportunity would increase the SWM control in the urban area in the City of Guelph by an additional 632 ha (10 percent of the urban area), and improve the SWM control in the catchment of existing SWMF 36 and 237. This would result in a total controlled area of 3,531 ha (56.8 percent of the urban area). **Figure 6.2** summarizes the percentage of the existing urban area that would be controlled by SWM facilities at full implementation of the additional facilities. A breakdown is as follows:

- 2,378 ha (38.3 percent) would be controlled for water quality control by SWM facilities (ponds, wetlands, hybrid facilities and sub-surface storage facilities)
- 2,656 ha (42.7 percent) would be controlled for water quantity by SWM facilities (ponds, wetlands, hybrid facilities and dry ponds). However additional flood storage may be incorporated into the SWM opportunity sites where additional land is available.
- 148 ha (2.4 percent) may provide quantity control, but the extent of which is unknown; and
- The 195 OGS units would continue to provide additional water quality control for areas both outside and within the respective drainage areas for the active SWM facilities. Municipal OGS units provide an additional 325ha (5.2 percent) of water quality control, and private OGS units providing an additional 30ha (0.48 percent) of water quality control.

Accordingly, at full implementation, approximately 2,687 ha (43.2 percent of urban area) would remain uncontrolled. It is therefore recommended that the proposed SWM facilities opportunities be combined with other urban retrofit initiatives such as source and conveyance controls within road rights-of-way, private properties, and other municipal properties to more fully control the City's existing urban areas.

TOWNSHIP OF GUELPH/ERAMOSA

TOWNSHIP OF PUSLINCH

TOWN OF MILTON

Woodlawn Road East
Speedvale Avenue East
Imperial Road North
Willow Road
Paisley Road
Silvercreek Parkway North
Woolwich Street
Metcalfe Street
Eramosa Road
York Road
Hanlon Expressway
Edinburgh Road South
Victoria Road South
Gordon Street
Stone Road West
Stone Road East
Southgate Drive

Legend

- Municipal Boundary
- Stormwater Management Facility
- Rivers
- Watercourse
- Proposed SWM Facility Location
- Proposed SWM Facility Catchment
- Existing SWM Facility Catchment

LOCATOR MAP

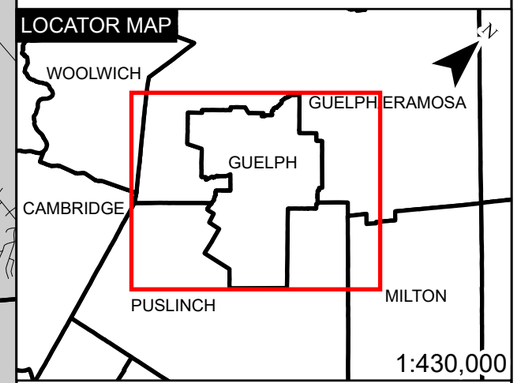


Figure 6.1

Existing and Proposed SWMF Drainage Areas at Full Implementation

Date: 2022-09-09
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

0 0.5 1 2
Kilometres

Aquafor Beech Limited

Document Path: C:\Users\AVo_d\Desk_2\00\Documents\Aquafor Beech\City of Guelph\60609 - SWM Master Plan\Projects\Figures\SWMFLocationsFigures\SWMFLocations.aprx

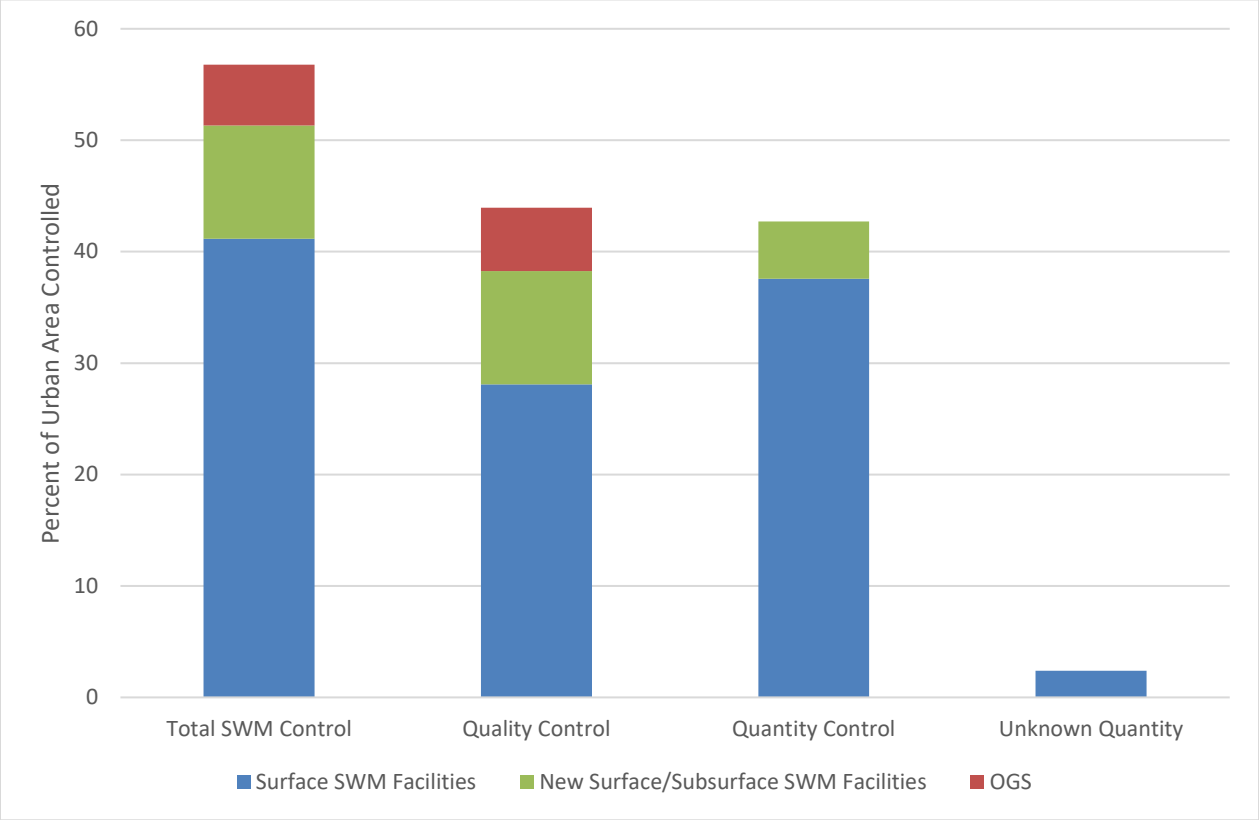


Figure 6.2: Percentage of City Controlled by SWM Assets at Full Implementation

7 Next Steps

As a component of the City of Guelph's SWM-MP, the following next steps have been identified:

1. Evaluation and selection of a preferred alternative based on an evaluation of the technical, environmental, social and financial merits using approved selection criteria and ranking methodologies.
2. Prioritization of the individual sites based on the outcomes from steps 1 above.

Appendix A: Preliminary Mapping – Feasible Sites (16 Sites)

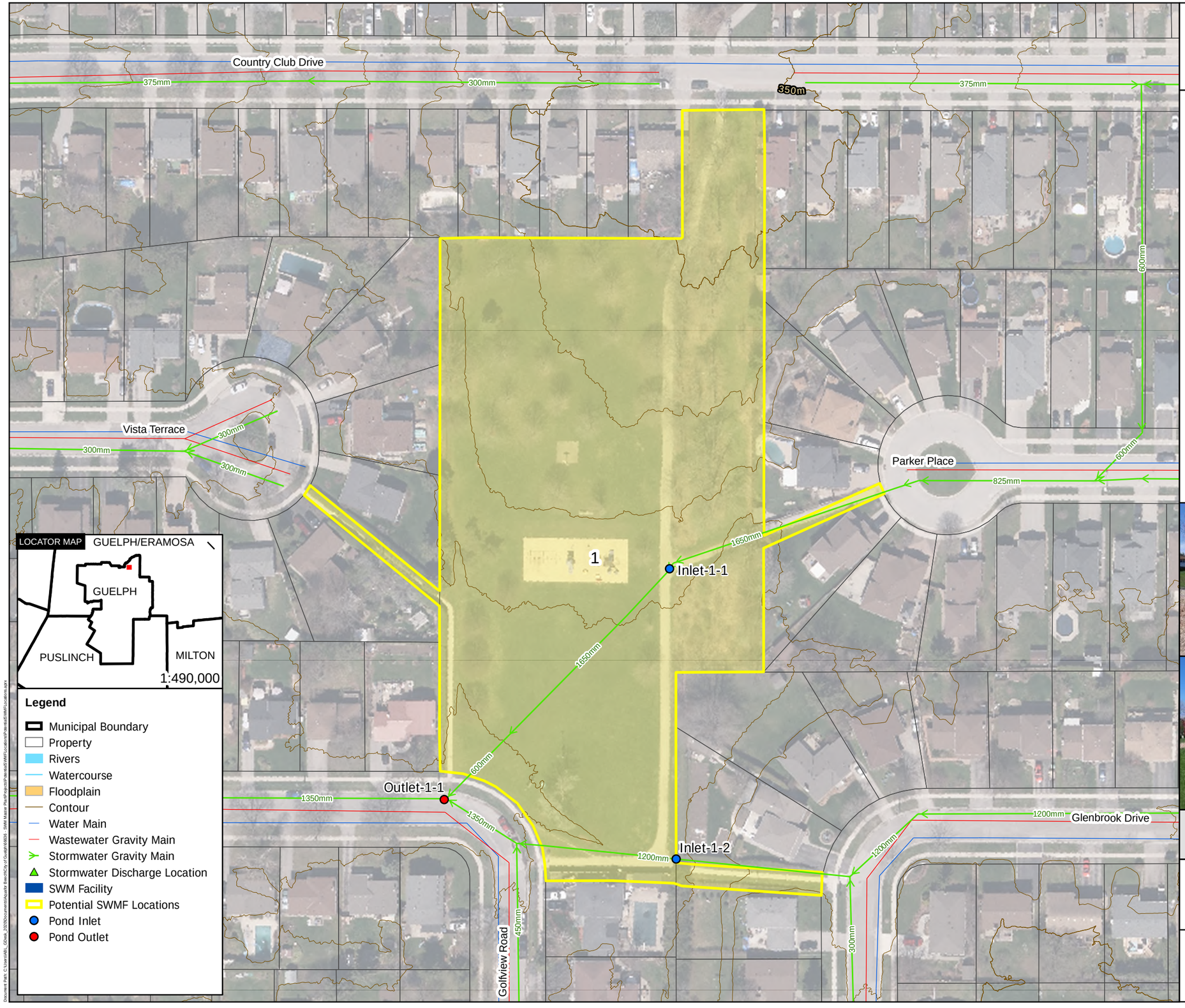
Possible SWM Facility Location 1: Golfview Park
Ownership: City of Guelph
Current Use: Park
Total Area: 1.37ha
Available Area: 1.4ha
Drainage Area: 1) 5.25ha; 2) 41.51ha
TIMP: 1) 46%; 2) 41%
Inlets At: 1) 1650mm Ø storm sewer; 2) 1200mm Ø storm sewer
Depth to Pipe Invert at Inlet: 1) 4.6m; 2) 4.1m
Outlets To: 1350mm Ø storm sewer
Depth to Pipe Invert at Outlet: 3.4m
Floodplain Present: No
Mature Trees: Yes
Identified Conflicts: Hydro pole at ice rink
Notes:
• Playground and basketball hoop present on site with a community ice rink installed in winter.
• Scattered mature trees in northern half of park.
• Site has good access and potential for a surface pond.
• Existing pathway system present.

End-of-Pipe Opportunities - Drainage Areas (1)

Date: 2021-10-14
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

0 5 10 20
Meters

Aquafor Beech Limited



Possible SWM Facility Location 2: Waverley Park
Ownership: City of Guelph
Current Use: Park
Total Area: 2.59ha
Available Area: 2.3ha
Drainage Area: 1) 5.48ha; 2) 1.81ha
TIMP: 1) 42%; 2) 37%
Inlets At: 1) 750mm Ø storm sewer; 2) 900mm Ø storm sewer
Depth to Pipe Invert at Inlet: 1) 2.8m; 2) 1.4m
Outlets To: 1350mm Ø storm sewer
Depth to Pipe Invert at Outlet: 2.3m
Floodplain Present: No
Mature Trees: Yes
Identified Conflicts: Hydro
Notes:
• Splash pad, playground and ice rink at southern end of park. Soccer fields at northern end.
• Trails connect Balmoral Drive and Waverley Drive to Waverley Drive Public School.
• Easement would be required for outlet from park to Waverley Drive.
• Larger catchment is from Inlet #1, but would require long distance of piping to reach outlet.

End-of-Pipe Opportunities - Drainage Areas (2)

Date: 2021-10-14
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

0 12.5 25 50
Meters

Aquafor Beech Limited

Inlet-2-1
Outlet-2-1
Inlet-2-2
2
345m
350m
Waverley Drive
Balmoral Drive
Delta Street
Victoria Road North
300mm
450mm
675mm
750mm
375mm
900mm
1350mm
1200mm
600mm

LOCATOR MAP GUELPH/ERAMOSA
GUELPH
PUSLINCH
MILTON
1:490,000

Legend
- Municipal Boundary
- Property
- Rivers
- Watercourse
- Floodplain
- Contour
- Water Main
- Wastewater Gravity Main
- Stormwater Gravity Main
- Stormwater Discharge Location
- SWM Facility
- Potential SWMF Locations
- Pond Inlet
- Pond Outlet

Possible SWM Facility Location 3: Victoria Road Recreation Centre
Ownership: City of Guelph
Current Use: Community Centre, Arena and Pool
Total Area: 2.33ha
Available Area: 0.9ha
Drainage Area: 17.59ha
TIMP: 44%
Inlets At: 600mm Ø storm sewer
Depth to Pipe Invert at Inlet: 1.6m
Outlets To: 900mm Ø storm sewer
Depth to Pipe Invert at Outlet: 1.6m
Floodplain Present: No
Mature Trees: Yes
Identified Conflicts: None
Notes:
• Opportunity for subsurface facility beneath the parking lot. Parking lot appears to have been recently repaved, so recommend installing facility at time of parking lot renewal.

End-of-Pipe Opportunities - Drainage Areas (3)

Date: 2021-10-14
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

0 12.5 25 50
Meters

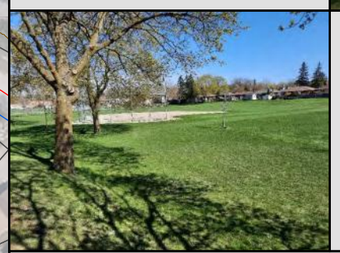
LOCATOR MAP GUELPH/ERAMOSA
GUELPH
PUSLINCH
MILTON
1:490,000

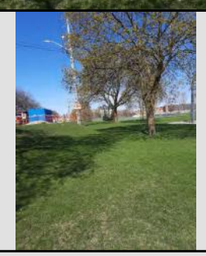
Legend
- Municipal Boundary
- Property
- Rivers
- Watercourse
- Floodplain
- Contour
- Water Main
- Wastewater Gravity Main
- Stormwater Gravity Main
- Stormwater Discharge Location
- SWM Facility
- Potential SWMF Locations
- Pond Inlet
- Pond Outlet

Inlet-3-1
Outlet-3-1
3
Victoria Road North
Eliot Place
McIlwraith Crescent
Hadati Road
runswick Avenue

Possible SWM Facility Location 4: Green Meadows Park
Ownership: City of Guelph
Current Use: Park
Total Area: 2.1ha
Available Area: 2.09ha
Drainage Area: 81.53ha
TIMP: 47%
Inlets At: 975mm Ø storm sewer
Depth to Pipe Invert at Inlet: 3.6m
Outlets To: 1800mm Ø storm sewer
Depth to Pipe Invert at Outlet: 2.5m
Floodplain Present: No
Mature Trees: Yes
Identified Conflicts: None
Notes:

- Mature trees along Stevenson Street North with parallel row of newly planted trees.
- Playground, baseball diamond and soccer field on site, with trail connecting Stevenson Street and William Street.
- Playground can be moved to create space for a surface pond.
- Stevenson Street North currently under construction.
- Park surface elevation is lower than road surface elevation.





End-of-Pipe Opportunities - Drainage Areas (4)

Date: 2021-10-14
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

0 12.5 25 50
Meters

LOCATOR MAP
GUELPH/ERAMOSA
GUELPH
PUSLINCH
MILTON
1:490,000

Legend

- Municipal Boundary
- Property
- Rivers
- Watercourse
- Floodplain
- Contour
- Water Main
- Wastewater Gravity Main
- Stormwater Gravity Main
- Stormwater Discharge Location
- SWM Facility
- Potential SWMF Locations
- Pond Inlet
- Pond Outlet

Meyer Drive
Ottawa Crescent
William Street
Calgary Avenue
Bennett Avenue
Stevenson Street North
Edmonton Drive
Vancouver Drive
Ryan Avenue
Inlet-4-1
Outlet-4-1
4
330m
325m
975mm
375mm
300mm
525mm
1800mm
600mm
750mm

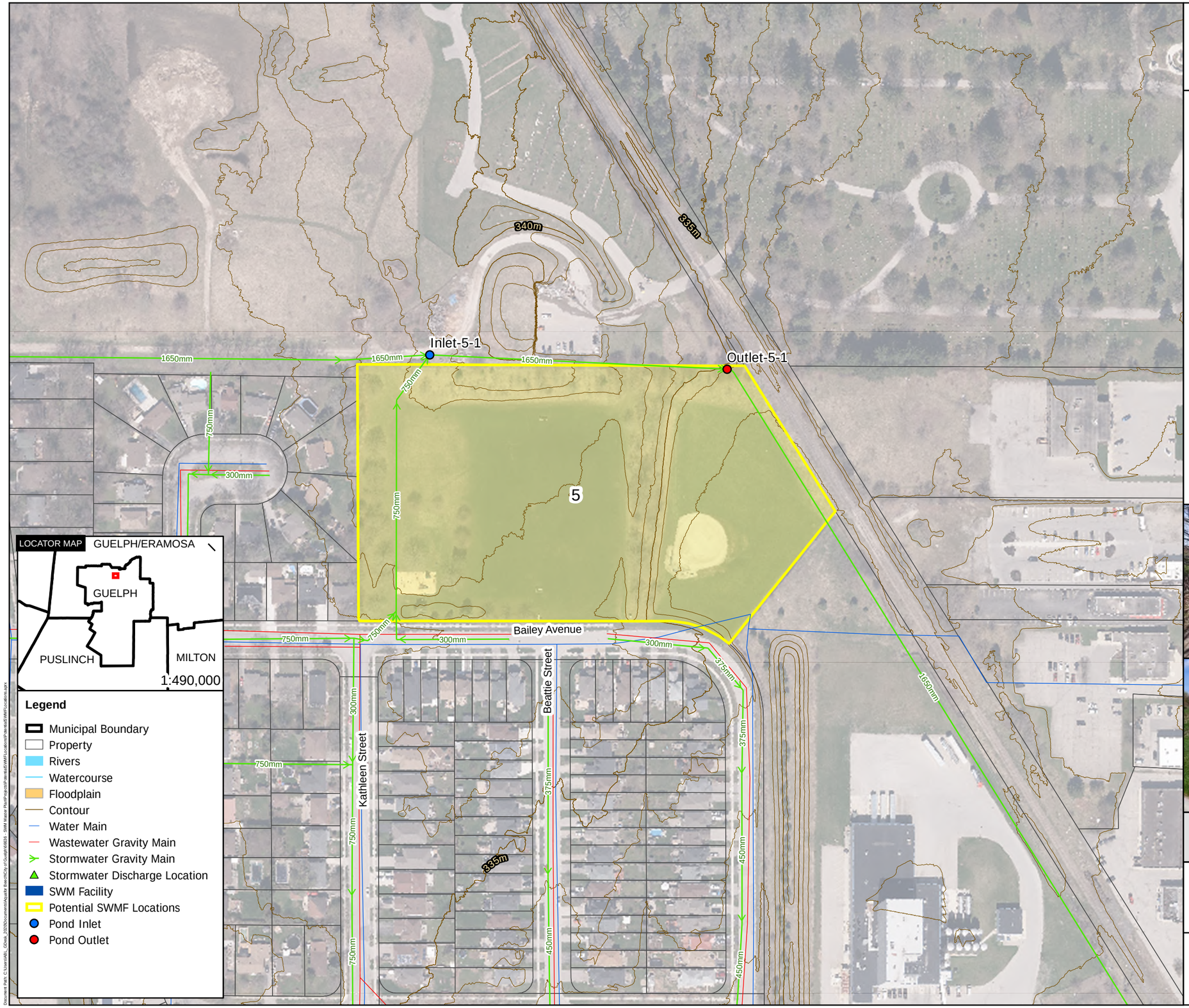
Possible SWM Facility Location 5: Bailey Park
Ownership: City of Guelph
Current Use: Park
Total Area: 3.05ha
Available Area: 3.05ha
Drainage Area: 23.81ha
TIMP: 43%
Inlets At: 1650mm Ø storm sewer
Depth to Pipe Invert at Inlet: 6.5m
Outlets To: 1650mm Ø storm sewer
Depth to Pipe Invert at Outlet: 1.1m
Floodplain Present: No
Mature Trees: Yes
Identified Conflicts: None
Notes:
• Western park includes playground and soccer field. Eastern park is at lower elevation and is a baseball diamond.
• Informal trail along north side of park. Opportunity to tie into cemetery trails.
• Error within GIS identifies 300mm storm sewer along northern side of park. Drawing I-346 confirms this storm sewer is 1650mm.

End-of-Pipe Opportunities - Drainage Areas (5)

Date: 2021-10-14
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

0 15 30 60
Meters

Aquafor Beech Limited



Possible SWM Facility Location 8: Exhibition Park
Ownership: City of Guelph
Current Use: Park and Arena
Total Area: 13.55ha
Available Area: 0.86ha
Drainage Area: 39.57ha
TIMP: 44%
Inlets At: 1050mm Ø storm sewer
Depth to Pipe Invert at Inlet: 1.0m
Outlets To: 1050mm Ø storm sewer
Depth to Pipe Invert at Outlet: 1.1m
Floodplain Present: No
Mature Trees: Yes
Identified Conflicts: Sanitary Sewer
Notes:
• Known flooding issues in this area.
• Subsurface storage feasible beneath north parking lot.
• Limited available area in proximity to storm sewer. Storm sewer continues downstream along the CNR Spurline Trail, where superpipe storage may be an opportunity.

End-of-Pipe Opportunities - Drainage Areas (8)

Date: 2021-10-14
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

0 30 60 120
Meters

LOCATOR MAP GUELPH/ERAMOSA
GUELPH
PUSLINCH
MILTON
1:490,000

Legend
- Municipal Boundary
- Property
- Rivers
- Watercourse
- Floodplain
- Contour
- Water Main
- Wastewater Gravity Main
- Stormwater Gravity Main
- Stormwater Discharge Location
- SWM Facility
- Potential SWMF Locations
- Pond Inlet
- Pond Outlet

Outlet-8-2
Inlet-8-2
8
Division Street
Kathleen Street
Edgehill Drive
Summit Crescent
Westmount Road
Torrance Crescent
Clarke Street West
Dufferin Street
Powell Street West
Central Street
Woolwich Street
Tiffany Street West
Mont Street
Mctague Street
Exhibition Street
Dublin Street North
London Road West
Edwin Street
Lyon Avenue
340m
335m
330m
325m
350m

Possible SWM Facility Location 14: Dunhill Place Park
Ownership: City of Guelph
Current Use: Park
Total Area: 1.51ha
Available Area: 0.7ha
Drainage Area: 9.85ha
TIMP: 47%
Inlets At: 675mm Ø storm sewer
Depth to Pipe Invert at Inlet: 4.3m
Outlets To: 675mm Ø storm sewer
Depth to Pipe Invert at Outlet: 3.8m
Floodplain Present: No
Mature Trees: Yes
Identified Conflicts: Sanitary sewer parallel to storm sewer
Notes:
• Playground located next to storm sewer and raised maintenance hole. Storm sewer discharges into adjacent watercourse.
• Trail located along top bank of watercourse.
• Play structure appears new, with young trees planted between playground and Kipling Avenue.
• Ditch inlet catch basin accepts runoff from the park and discharges it directly to watercourse.

End-of-Pipe Opportunities - Drainage Areas (14)

Date: 2021-10-14
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

0 15 30 60
Meters

Aquafor Beech Limited

LOCATOR MAP GUELPH/ERAMOSA
GUELPH
PUSLINCH
MILTON
1:490,000

Legend
- Municipal Boundary
- Property
- Rivers
- Watercourse
- Floodplain
- Significant Woodlands
- Contour
- Water Main
- Wastewater Gravity Main
- Stormwater Gravity Main
- Stormwater Discharge Location
- SWM Facility
- Potential SWMF Locations
- Pond Inlet
- Pond Outlet

Inlet-14-1
Outlet-14-1
14
Peachtree Crescent
Burton Road
Kipling Avenue
Flaherty Drive
Dunhill Crescent
Wimbledon Road
Bonar Place
Imperial Road North
Willow Road
330m
335m
340m
325m

Possible SWM Facility Location 16: Margaret Greene Park
Ownership: City of Guelph
Current Use: Park
Total Area: 18.18ha
Available Area: 11.1ha
Drainage Area: 85.78ha
TIMP: 45%
Inlets At: 1800mm Ø storm sewer
Depth to Pipe Invert at Inlet: 4.8m
Outlets To: 2100mm Ø storm sewer
Depth to Pipe Invert at Outlet: 4.3m
Floodplain Present: No
Mature Trees: Yes
Identified Conflicts: Two sanitary sewers meet near proposed outlet. Hydro connected to tennis courts.
Notes:

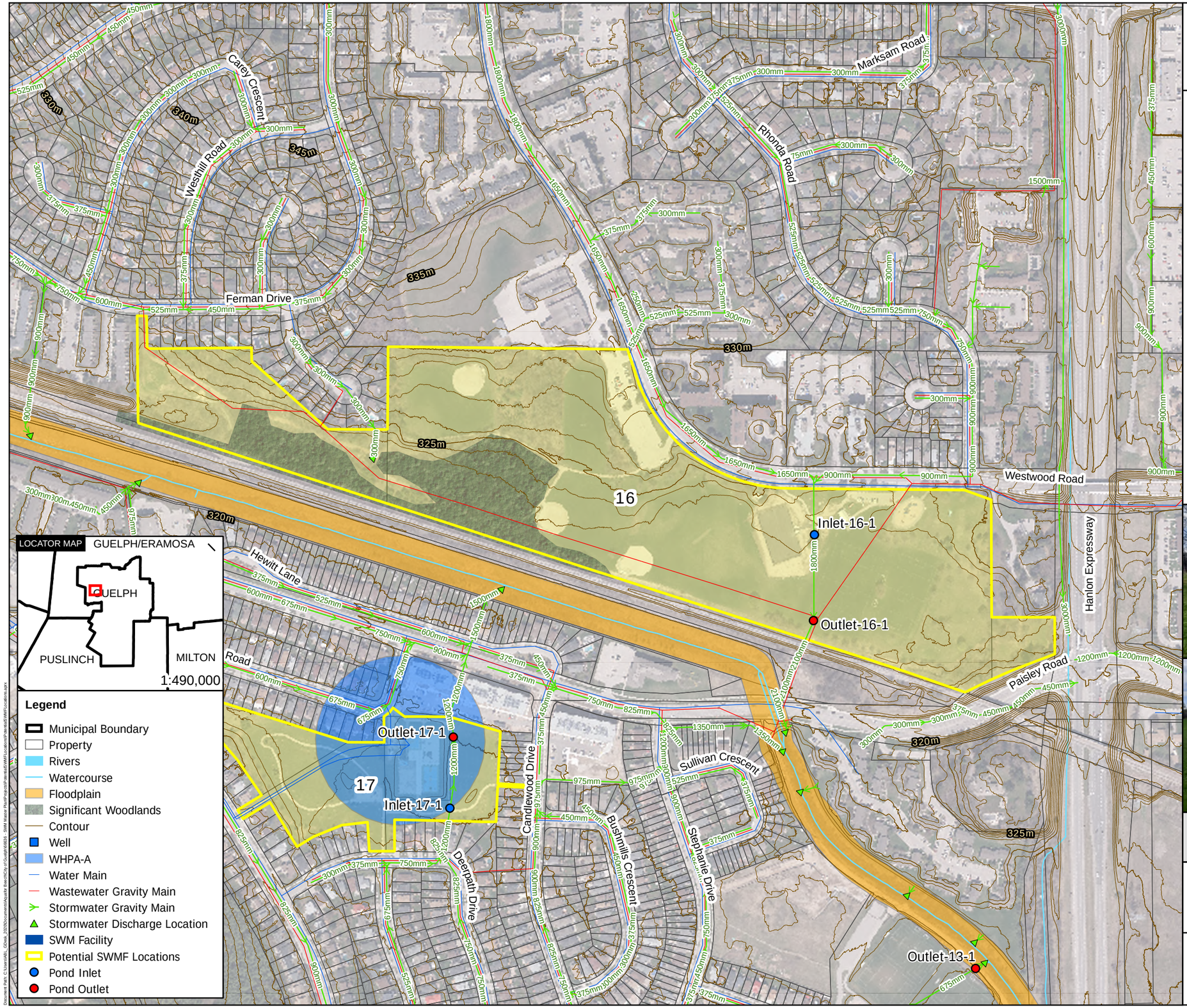
- Park includes soccer fields, baseball diamonds, playground, washrooms, tennis courts, and parking. Tennis courts recently re-installed; aerial photo does not have new image.
- Rail line and watercourse parallel southern park boundary. Outlet will be beneath train track.
- Very active local community recently prevented Metrolinx from constructing traction power substation in the park.

End-of-Pipe Opportunities - Drainage Areas (16)

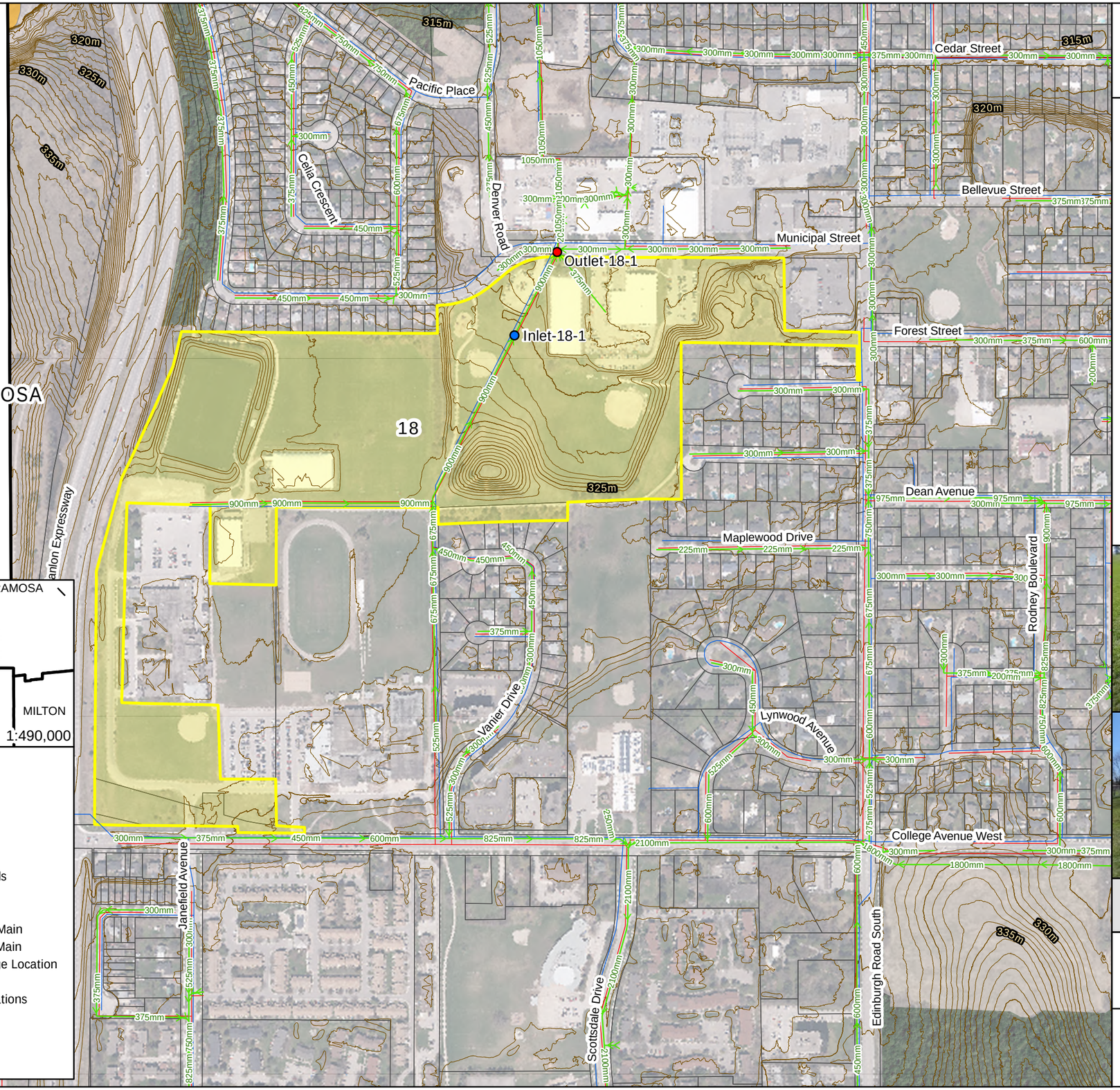
Date: 2021-10-14
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

0 40 80 160
Meters

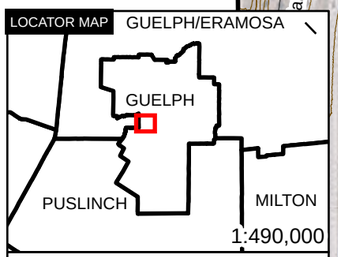
Aquafor Beech Limited



TOWNSHIP OF
GUELPH/ERAMOSA



LOCATOR MAP



Legend

- Municipal Boundary
- Property
- Rivers
- Watercourse
- Floodplain
- Significant Woodlands
- Contour
- Water Main
- Wastewater Gravity Main
- Stormwater Gravity Main
- Stormwater Discharge Location
- SWM Facility
- Potential SWMF Locations
- Pond Inlet
- Pond Outlet

Possible SWM Facility Location 18: Centennial Park
Ownership: City of Guelph
Current Use: Park
Total Area: 21.67ha
Available Area: 2.7ha
Drainage Area: 15.73ha
TIMP: 44%
Inlets At: 900mm Ø storm sewer
Depth to Pipe Invert at Inlet: 3.0m
Outlets To: 1050mm Ø storm sewer
Depth to Pipe Invert at Outlet: 2.0m
Floodplain Present: No
Mature Trees: Yes
Identified Conflicts: Water and sanitary lines parallel to storm sewer
Notes:
• Extremely well-used tobogganing hill located adjacent to storm sewer. Ball diamonds, soccer fields, and playground also on site.
• Gravel parking lot is a current source of sediment in runoff to Municipal Street. Opportunity to install subsurface storage beneath newly reconstructed parking lot.

End-of-Pipe Opportunities - Drainage Areas (18)

Date: 2021-10-14
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

0 45 90 180
Meters

Document Path: C:\Users\AVL_Office_2\Documents\Aquafor Beech\City of Guelph\169 - SWM Master Plan\Projects\Barrie\GIS\MXD\Locations\PotentialSWMFLocations.aprx

Possible SWM Facility Location 26: L-13 Windsor Park
Ownership: City of Guelph
Current Use: Park
Total Area: 0.48ha
Available Area: 0.48ha
Drainage Area: 105.92ha
TIMP: 39%
Inlets At: 1500mm Ø storm sewer
Depth to Pipe Invert at Inlet: 3.2m
Outlets To: 1500mm Ø storm sewer
Depth to Pipe Invert at Outlet: 1.5m
Floodplain Present: No
Mature Trees: Yes
Identified Conflicts: None
Notes:
• Two monitoring wells located at eastern end of parcel.
• Recommended retrofit in 2012 SWM-MP as site L-13. Playground relocated since 2012 and is no longer in proposed pond location.
• Some dumping occurring in treed area at western end of parcel.

End-of-Pipe Opportunities - Drainage Areas (26)

Date: 2021-10-14
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

0 10 20 40
Meters

LOCATOR MAP GUELPH/ERAMOSA
GUELPH
PUSLINCH
MILTON
1:490,000

Legend
- Municipal Boundary
- Property
- Rivers
- Watercourse
- Floodplain
- Contour
- Water Main
- Wastewater Gravity Main
- Stormwater Gravity Main
- Stormwater Discharge Location
- SWM Facility
- Potential SWMF Locations
- Pond Inlet
- Pond Outlet

Kingsley Court
Berkley Place
Windsor Street
Waverley Drive
Knightswood Boulevard
Dumbarton Street
345m
26
Outlet-26-1
Inlet-26-1
300mm
900mm
1500mm
1350mm

Empire Street

300mm

300mm

525mm

525mm

450mm

Inlet-27-1

315m

27

LOCATOR MAP

GUELPH/ERAMOSA

GUELPH

PUSLINCH

MILTON

1:490,000

Legend

- Municipal Boundary
- Property
- Rivers
- Watercourse
- Floodplain
- Contour
- Water Main
- Wastewater Gravity Main
- Stormwater Gravity Main
- Stormwater Discharge Location
- SWM Facility
- Potential SWMF Locations
- Pond Inlet
- Pond Outlet

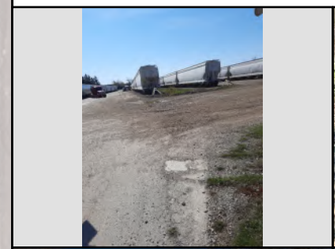
Document Path: C:\Users\AVL_Office_2020\Documents\Aquafor Beech\City of Guelph\19003 - SWM Master Plan\Projects\Planning\SWMFLocations\SWMFLocations.aprx

CITY OF Guelph

Making a Difference

Possible SWM Facility Location 27: Stevenson / Guelph Junction Railway
Ownership: City of Guelph
Current Use: Vacant
Total Area: 1.27ha
Available Area: 1.27ha
Drainage Area: 177.90ha
TIMP: 42%
Inlets At: 300mm Ø storm sewer
Depth to Pipe Invert at Inlet: 0.0m
Outlets To: 1500mm Ø storm sewer
Depth to Pipe Invert at Outlet: 1.0m
Floodplain Present: Yes
Mature Trees: Yes
Identified Conflicts: Sanitary sewer along southern
Notes:

- Land previously used for unknown industrial purposes, with some debris remaining on site. Multiple monitoring wells recently installed across vacant parcels.
- Existing surface channel connects proposed pond inlet and outlet.
- Weigh station located in location of proposed channel relocation identified in 2007 design drawings.
- 2007 drawing indicates existing 600mm HDP outlet, but site visit indicated CSP pipe of unknown diameter.



End-of-Pipe Opportunities - Drainage Areas (27)

Date: 2021-10-14
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

0 5 10 20
Meters

Aquafor Beech Limited

Possible SWM Facility Location 28: End of Dawn Avenue
Ownership: Grand River Conservation Authority
Current Use: Vacant
Total Area: 1.06ha
Available Area: 0.064ha
Drainage Area: 8.63ha
TIMP: 31%
Inlets At: Surface Channel
Ground Elevation at Inlet: 329.92m
Outlets To: Surface Channel
Ground Elevation at Outlet: 329.67m
Floodplain Present: No
Mature Trees: Yes
Identified Conflicts: None
Notes:

- Significant sediment accumulation along Dawn Avenue due to poor erosion and sediment control practices at construction site on Lowes Road West.
- Two monitoring wells located at proposed location.
- Trail and interpretive sign present.
- Cul-de-sac at lower elevation than proposed location.
- Drainage pipe inlet present at end of cul-de-sac, but o outlet location unknown.

End-of-Pipe Opportunities - Drainage Areas (28)

Outlet-28-1
28
Inlet-28-1
330m
Dawn Avenue
Vaughan Street
450mm
375mm
300mm
375mm
375mm

LOCATOR MAP
GUELPH/ERAMOSA
GUELPH
PUSLINCH
MILTON
1:490,000

Legend

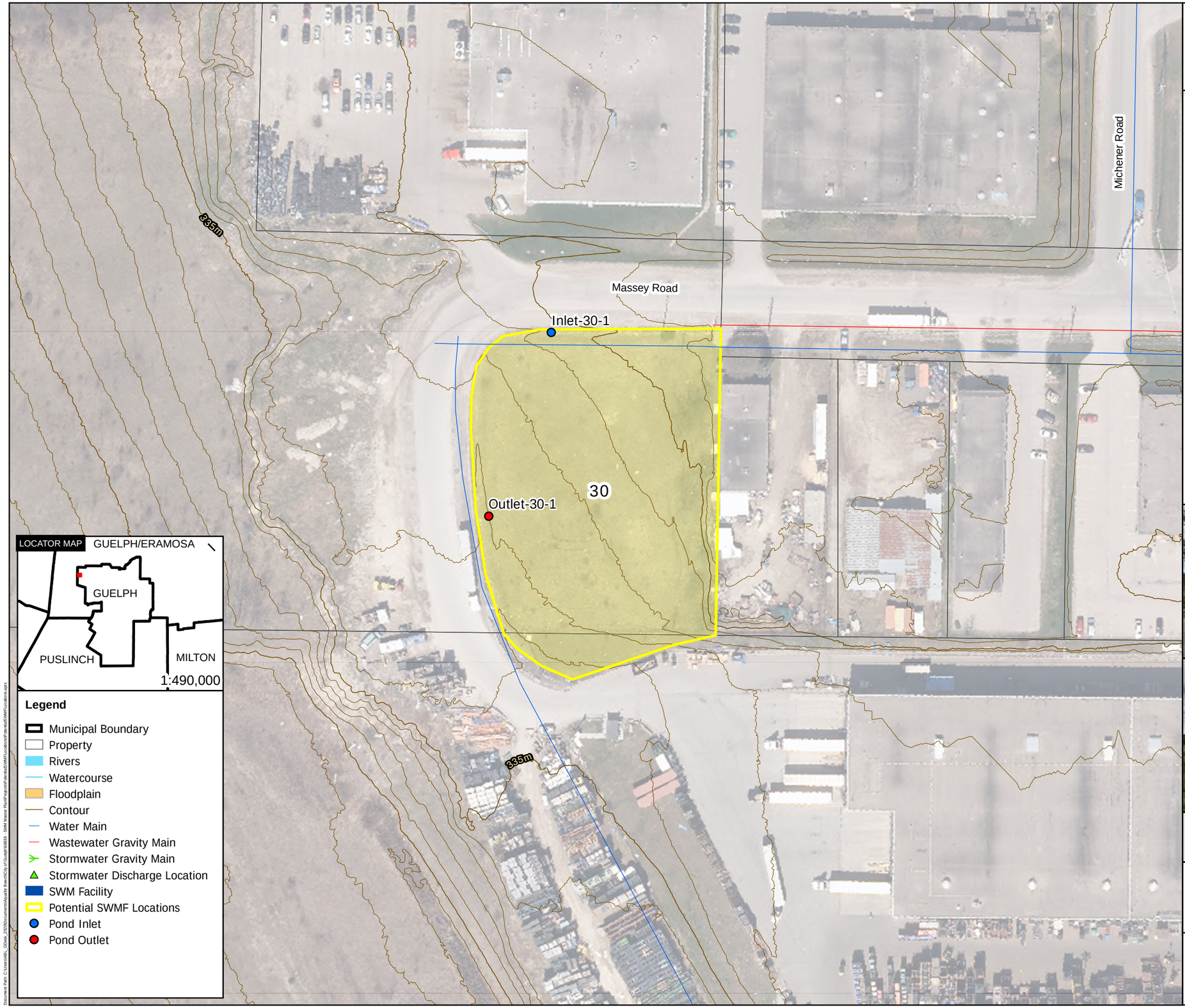
- Municipal Boundary
- Property
- Rivers
- Watercourse
- Floodplain
- Significant Woodlands
- Significant Woodlands Buffer
- Significant Wetlands
- Contour
- Water Main
- Wastewater Gravity Main
- Stormwater Gravity Main
- Stormwater Discharge Location
- SWM Facility
- Potential SWMF Locations
- Pond Inlet
- Pond Outlet

Date: 2021-10-14
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

0 12.5 25 50
Meters

Document Path: C:\Users\AVL_GDesk_2020\Documents\Aquafor Beech\City of Guelph\R003 - SWM Master Plan\Project\Planning\ArcMAP\Locations\Potential\SWMFLocations.mxd

Possible SWM Facility Location 30: 606 Massey Road
Ownership: City of Guelph
Current Use: Vacant
Total Area: 0.53ha
Available Area: 0.53ha
Drainage Area: 5.1ha
TIMP: 72%
Inlets At: Surface Channel
Ground Elevation at Inlet: 339.19m
Outlets To: No Outlet
Ground Elevation at Outlet: 337m
Floodplain Present: No
Mature Trees: No
Identified Conflicts: None
Notes:
• Cell tower located at northeast corner of site.
• No visible outlet from site.
• Ditch on north side of Massey Road discharges uncontrolled to vacant land to the west. No evidence of channelization visible.
• West side of Massey Road used for storage.



End-of-Pipe Opportunities - Drainage Areas (30)

Date: 2021-10-14
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

0 5 10 20
Meters

Possible SWM Facility Location 31: Springdale Park
Ownership: City of Guelph
Current Use: Park
Total Area: 2.67ha
Available Area: 2.16ha
Drainage Area: 1) 29.82ha; 2) 0.87ha; 3) 1.05ha
TIMP: 1) 41%; 2) 50%; 3) 48%
Inlets At: 1) 1350mm Ø storm sewer; 2) 375 Ø storm sewer; 3) 300 Ø storm sewer
Depth to Pipe Invert at Inlet: 1) 4.80m; 2) 1.71m; 3) 2.03m
Outlets To: 1500mm Ø storm sewer
Depth to Pipe Invert at Outlet: 5.98m
Floodplain Present: No
Mature Trees: Yes
Identified Conflicts: None
Notes:
- Playground and soccer field on site.
- Significant grade loss between school property and park.
- Inlet pipe will be required to pass beneath school property.

End-of-Pipe Opportunities - Drainage Areas (31)

Date: 2021-10-14
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

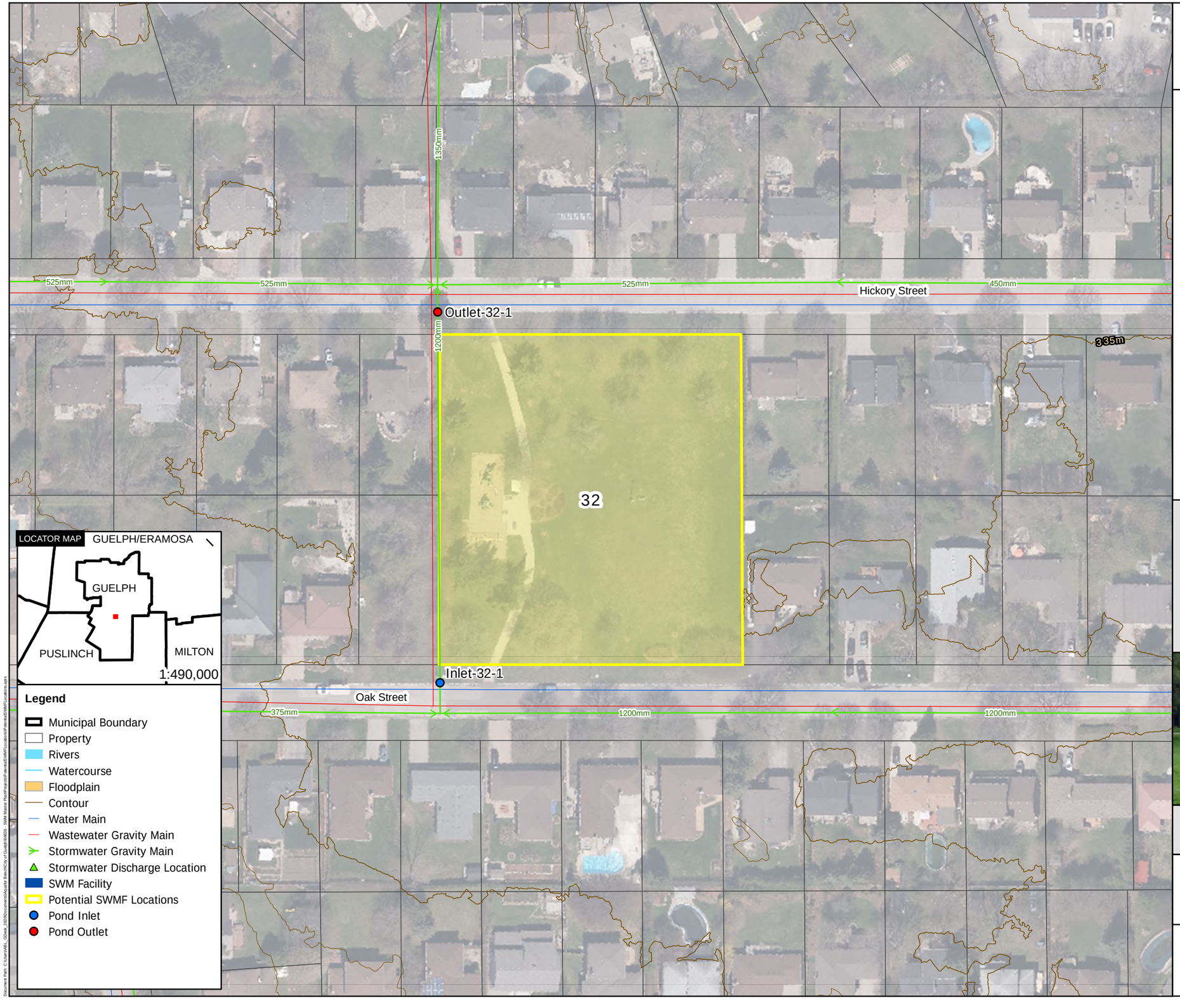
0 30 60 120
Meters

LOCATOR MAP
GUELPH/ERAMOSA
GUELPH
PUSLINCH
MILTON
1:490,000

Legend
- Municipal Boundary
- Property
- Rivers
- Watercourse
- Floodplain
- Significant Woodlands
- Contour
- Water Main
- Wastewater Gravity Main
- Stormwater Gravity Main
- Stormwater Discharge Location
- SWM Facility
- Potential SWMF Locations
- Pond Inlet
- Pond Outlet

Aquafor Beech Limited

Possible SWM Facility Location 32: Oak Street Park
Ownership: City of Guelph
Current Use: Park
Total Area: 0.70ha
Available Area: 0.70ha
Drainage Area: 29.65ha
TIMP: 39%
Inlets At: 1200mm Ø storm sewer
Depth to Pipe Invert at Inlet: 3.87m
Outlets To: 1200mm Ø storm sewer
Depth to Pipe Invert at Outlet: 4.20m
Floodplain Present: No
Mature Trees: No
Identified Conflicts: Hydro Line
Notes:
- Hydro line crosses park from east to west.
- Ice rink in park during winter.
- Playground and trail present.



End-of-Pipe Opportunities - Drainage Areas (32)

Date: 2021-10-14
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

0 5 10 20
Meters

Possible SWM Facility Location 34: End of Industrial Street
Ownership: City of Guelph (pending)
Current Use: Natural Heritage
Total Area: 3.46ha
Available Area: 3.46ha
Drainage Area: 229.16ha
TIMP: 44.06%
Inlets At: 1) Existing 1650mm Ø storm sewer; 2) Proposed twin 1800mm x 900mm storm sewer
Depth to Pipe Invert at Inlet: 2m (assumed)
Outlets To: Proposed channel
Depth to Pipe Invert at Outlet: N/A
Floodplain Present: Yes
Mature Trees: Yes
Identified Conflicts: Sanitary main
Notes:
- Informal trails present, with associated dumping
- Evidence of recent beaver activity
- Two outfalls currently discharge into existing ponds. Evidence of historical control structures on watercourse between the two ponds.
- Significant erosion noted associated with the Victoria Street Outfall along the Guelph Junction Railway.
- Potential wetlands at south end of parcel. If wetland presence confirmed, available area may be decreased pending GRCA direction.

End-of-Pipe Opportunities - Drainage Areas (34)

Date: 2022-09-02
Projection: NAD83_UTM_Zone_17N
Data Source: City of Guelph, GRCA
Created by: A.V.

0 15 30 60
Meters

Aquafor Beech Limited

Beaumont Crescent
Elizabeth Street
York Road
450mm
250mm
525mm
600mm
450mm
1650mm
1650mm
Inlet-34-2
Inlet-34-1
Outlet-34-1
34
Eramosa River

LOCATOR MAP GUELPH/ERAMOSA
GUELPH
PUSLINCH
MILTON
1:490,000

Legend
- Municipal Boundary
- Property
- Watercourse
- Natural Heritage System
- Floodplain
- Significant Woodlands
- Wetland
- Water Main
- Wastewater Gravity Main
- Stormwater Gravity Main
- Stormwater Discharge Location
- SWM Facility
- Potential SWMF Locations
- Pond Inlet
- Pond Outlet

Document Path: C:\Users\AV_GDesk_2020\Documents\Aquafor Beech\City of Guelph\168\8 - SWM Master Plan\Projects\Potential SWMFs\Location\Potential SWMFs Locations.aprx