North Maple Regional Park Master Plan

Volume 3: Civil Engineering

2026

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1 Introduction

This technical volume is part of the comprehensive planning documentation developed for the North Maple Regional Park (NMRP) Master Plan, an initiative undertaken by the City of Vaughan to transform 364 hectares (900 acres) of former landfills and open space into a nationally significant signature park and legacy project for future generations. The Master Plan establishes a framework for the park's ongoing and long-term development, programming, and management under three guiding principles: Restore, Engage, and Play.

The Master Plan suite consists of one public-facing master plan document and seven supporting technical volumes that provide detailed engineering, environmental, cultural, and operational guidance. This technical volume is one of eight discipline-specific documents that provide the technical foundation and implementation details necessary to realize the master plan vision.

The civil servicing framework for the park has been developed to provide a high-level, flexible, and technically sound foundation that will guide future detailed design as the park continues to evolve. This section outlines the existing infrastructure context, describes key design strategies, and highlights anticipated constraints and requirements for future phases.
The servicing approach is informed by a review of existing municipal infrastructure, City-provided as-builts, and previously completed background reports.

2 Water Supply Servicing

The Master Plan presents a conceptual water distribution strategy to ensure that future park programming—ranging from active recreation facilities to eco-park components—can be reliably serviced.

2.1 Key Strategies

The key goal is to have all strategies cohesively together to work in unison to manage water on-site. Connect to cities capital works:

- Identify existing water servicing infrastructure for the masterplan based on the available reports and background information obtained from the City of Vaughan.
- Explore feasible options and strategies to achieve water use efficiency and reduce potable water consumption for irrigation where possible and avoid causing adverse impacts on the surrounding areas and existing municipal systems.
- Provide a robust water supply system which is aligned with the existing and planned City water supply systems to ensure reliable water supply within the Master Plan area.
- Design proposed water supply servicing infrastructure per design criteria as ascertained by the Municipal, Provincial and Federal Guidelines as applicable.
- Ensure proper looped water network is designed to reduce stagnation, dead ends and pressure drops to improve flexibility in the network and build resiliency.
- Implement water demand reduction measures through water use efficiency measures such as stormwater re-use for landscape irrigation purposes and water efficient fixtures in the buildings.
- Recommend field investigation studies required to inform the detailed design phase of the project.

2.2 Design Guidelines

The following design criteria must be achieved in accordance with the City of Vaughan's engineering design criteria & standard drawings (2020) as well as the Official Plan and the City-Wide Water & Wastewater Master Plan:

- Supply greater of Maximum Day Demand (MDD) + Fire Flow Demand (FF) or the Peak Hour Demand (PHD), whichever is greater. The park site straddles between three pressure districts, PD6, PD7 and PD8. PD 7 is a very stable system; however, PD 8 system is divided into PD east and west. PD west services the park site along its east and south-east boundary. A Schedule A+ EA had been completed to decommission this facility and replace this supply source with a connection to the large diameter PD8 feeder main pressurized by Maple PD8 pumping station. PD 9 operated by booster pumping station which draws water from the York Region's North Maple Reservoir.
- The unit demand rates for development blocks within the Site shall be discussed and agreed with the City of Vaughan to estimate the proposed water servicing demands.
- Fire flow demand shall be calculated according to the latest published requirements of the Water Supply for the Public Fire Protection, Fire Underwriters Survey for each zone. The required fire flow demand based on land use shall be discussed with the City.
- A combination of fire and domestic water services shall be proposed for building service connections. Both proposed connections to the park shall consist of a minimum 200mm fire service connection and a 150mm domestic service connection. The proposed fire service connections shall be constructed with a valve and chamber while the proposed domestic connections shall be constructed with a valve and box as per City of Vaughan standard C-103.
- Domestic water demand, and fire flow calculations shall be prepared based on City of Vaughan standards as well as based on the recommendations of the Water Supply for Public Fire Protection, 2020– Fire Underwriters Survey (FUS). Hydrant flow tests will be performed to ensure adequate water supply and pressure.
- Building code requirements stipulate that each building is to be serviced by a fire hydrant which is located no more than 45m away from the building's Siamese connection. Additional hydrants shall be proposed to ensure one is located within 45 m of any proposed buildings Siamese connections.
- Water meters shall be provided for measuring water demand usage as per City of Vaughan's guidelines. Water metering of the buildings, as required, shall be proposed within the building's mechanical room based on the location of the building from the municipal street. Backflow preventers and double check valve assemblies will be provided within the mechanical rooms domestic water services, in accordance with City standards. The mechanical room within the buildings will need to be accessible by City staff and provide remote read-out locations for the City's use in reading the meters. The details of the mechanical room layout will be provided by the mechanical engineer in later design development.
- To ensure reliable pressure to service the park site, appropriate pressure testing shall be completed at key City connections. Additionally, consult with the City of Vaughan to ensure alignment of the proposed water servicing infrastructure with the City planned capital works projects.

2.3 Water Supply Servicing – Proposed Demands

Preliminary proposed water demands have been incorporated based on preliminary architectural gross floor area (GFA) attributes, with final calculations to follow as these attributes are refined. The servicing network will build upon the existing municipal grid surrounding the site, with opportunities to loop systems where possible to enhance redundancy, operational flexibility, and fire protection coverage. The built form attributes are presented in **Appendix 2**.

The following Table 1 shows the water demand calculations prepared for the proposed development using the City of Vaughan Engineering Design Criteria and Standard Drawings dated December 2020:

Table 1: Summary of Proposed Water Demand

Development	
Water Demand Rate	190 L/Person/Day
Population Density	Commercial: 70persons/ha Institutional: 50persons/ha Parks & Recreational: 50persons/ha
Equivalent Population	96
Average Water Demand	0.211 L/s
Total Average Water Demand from Site	0.211 L/s
Peaking Factor	Peak Hour: 3.00 and Maximum Day: 1.80
Peak Water Demand	0.633 L/s
Total Peak Water Demand from Site	Peak Hour: 0.633 L/s Max. Day: 0.380 L/s

The estimated average day domestic demand for the proposed development is 0.211 L/s and the peak hour demand is 0.633 L/s. Detailed calculations are included in **Appendix 2**. It is to be noted that these are preliminary demand estimates and will be refined further as the design progresses.

Estimated fire flows for the proposed development have been prepared using the recommendations of the Water Supply for Public Fire Protection, 2020 – Fire Underwriters Survey (FUS). The highest fire flow demand was calculated to be 8000 L/min (equal to 133 L/s) for Building 5 in Zone 2 which has the largest floor area of 5736m^2.

The fire flow demand was based on the largest floor (Main Floor) and the floor above. The fire flow calculations have been prepared with the assumption that the designed building will be fire resistive, fully monitored automatic sprinkler system. For detailed calculations and the confirmation letter from the architect regarding the building design, please refer to **Appendix 2**. It is to be noted that the building programs are illustrative and demands shall be updated during future design.

2.4 Proposed Water Supply Servicing

The proposed development is divided into four zones as shown in Figure 1 below. As noted earlier, the park lands are serviced by between pressure district (PD) 8 and PD9, where there is an existing connection from Maple Forest Drive to the City's 300mm diameter PD9 watermain and a proposed connection to the existing 400mm watermain (PD8) along Keele Street from Vaughan Cares Way.

Water Servicing Strategy report from Hydratek for the park (dated April 2025) indicate that the PD8 watermain is serviced by Maplewood Booster Pumping Station (BPS) and the watermain along Keele Street is serviced by Vaughan Pumping Station (PS) Jane Street Facility. This report recommends field testing of various facilities at the park to observe the performance of Maplewood BPS and PD9 distribution system. This report evaluated existing, near term and future demands from the park and its impact on the surrounding water supply systems. Conservative water demands have been considered for this analysis, and the results indicate sufficient system capacity to provide for these demands. A pressure sustaining valve is proposed to sustain pressure at the park during snow tubing operation which is considered to have high water demand.

The above noted preliminary water demands are based on the architectural land use attributes. A further detailed study shall be completed for future development as design progresses further.

Field investigation shall be performed to confirm adequate flow and pressure in the system for the proposed development before commencement of detailed design stage.



Figure 1: NMRP Phases (source: O2 Design)

Out of four zones, Zone 1 and Zone 2 are planned to have various programming spaces such as picnic fields, sports fields, heritage buildings, wellness village etc. Zone 1 fronts Keele Street and shall be serviced by the existing 400mm diameter watermain through the stub up connections made available from the watermain along Vaughan Cares Way as well as a direct connection to the future 400mm WM on Keele Street.

Zone 2 can be serviced through the existing 300mm watermain (PD8) on Maple Forest Drive.

Figure 2 below illustrates the proposed servicing strategy for Zone 1 and Zone 2.

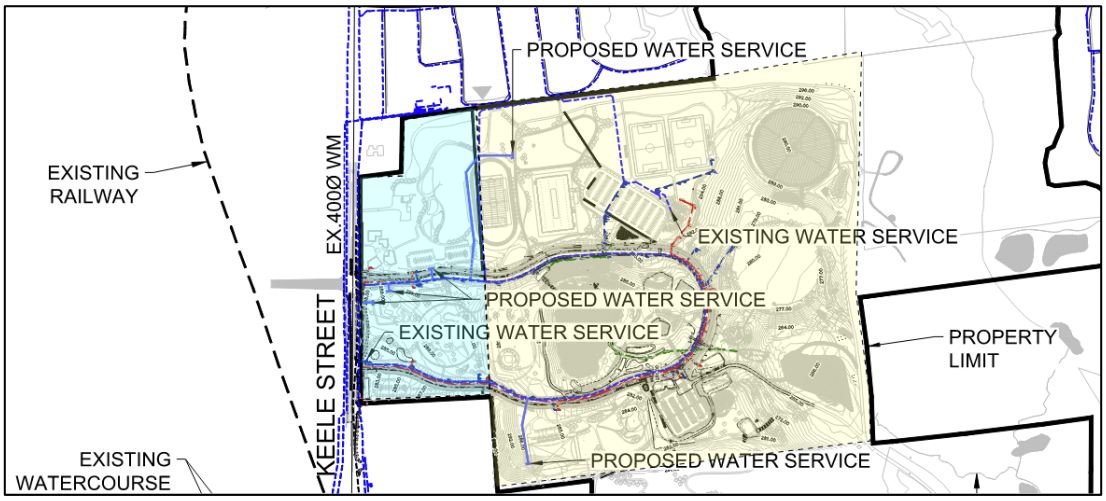


Figure 2: Proposed Water Supply Servicing for Zone 1 and Zone 2

Zone 3 consists of Don River headwaters and hence shall be maintained as a natural area with trails for hiking and biking and hence would likely not need water servicing. Zone 4 comprises of remediated landfill sites and shall host year-round activities such as winter trails, picnic spaces with minimal development and so. Given nature focused planning for the water supply servicing could be provided by extending connections from Zone 2 as well as connecting to existing watermain along Teston Road as needed. The south side of Zone 4 could be serviced by the existing 200mm diameter watermain along McNaughton Road East through Eagle Court.

Refer to **Appendix 1** for water servicing figures and **Appendix 2** for water demand calculations.

2.4.1 Recommendations for the Water Conservation and Potable Water Demand Reduction Strategies

Drawing from the North Maple Regional Park Master Plan's vision to create a nationally significant, ecologically restored, and community-defining landscape, the water conservation and water demand reduction strategies are conceived as essential components of the park's long-term sustainability framework. Installation of low-flow water efficient fixtures in the buildings help reduce potable water demands as well as sanitary flow generation.

Rooted in the guiding principles of Restore, Engage, and Play, promoting use of native plants and vegetation as well as reusing stormwater runoff for landscape irrigation encourages groundwater recharge and supports biodiversity—while supporting an active, inclusive, and resilient park environment. By aligning water use practices with the Master Plan's ecological restoration goals and its commitment to climate resilience, biodiversity, and responsible stewardship, the water conservation approach reinforces the park's transformation into a natural oasis and enduring legacy for current and future generations.

3 Sanitary Sewage System

Sanitary flows shall be conveyed to existing municipal infrastructure based on the site's grading, future building locations, and servicing capacity constraints. The key servicing strategies and design guidelines are noted below:

3.1 Key Strategies

- Provide adequate servicing for the master plan area and mitigate adverse impacts on the municipal infrastructure.
- Emphasize on inflow and infiltration (I&I) reduction to reduce Wet Weather impacts to the downstream systems.
- Prioritize gravity infrastructure and avoid permanent high energy and maintenance infrastructure (i.e. siphons, pumping stations).
- Plan for incremental growth to ensure optimal life of sanitary assets.
- Decrease sanitary discharge from design levels through the inclusion of water efficiency measures following the reduced water consumption approach.

3.2 Design Guidelines

The sanitary sewer design shall comply with the City of Vaughan's design criteria. The sanitary demands for the proposed site shall be evaluated based on the following municipal design criteria:

- 160 L/cap/day for commercial (Region of York)
- 370 L/cap/day for residential (City of Vaughan)
- Peaking Factor = Harmon Peaking Factor for Residential and Commercial
- 2.5 Persons/unit for 1,2 and 3 bedrooms (City of Vaughan)
- 115 Persons/ha for office commercial (City of Vaughan)
- 115 Persons/ha for retail (City of Vaughan)
- 0.26 L/s/ha for Infiltration (City of Vaughan)

3.3 Proposed Sanitary Flow Estimation

Preliminary estimates of sanitary loading are being developed in alignment with architectural program updates and shall be refined as the design progresses. Table 2 provides a summary of the proposed sanitary flow estimates.
To calculate the peak sanitary flows to the sanitary sewer system, the following design criteria have been utilized, as advised by the City of Vaughan Engineering Design Criteria and Standard Drawings dated December 2020.

Table 2: Summary of Proposed Sanitary Flow Estimation

Development	
Area	21.90 ha
Average Commercial-Institutional Sewage Flow	475 L/cap/day
Total Commercial-Institutional Population	96
Average Commercial-Institutional Flow	0.53 L/s
Harmon Peaking Factor M = 1+14/(4+$p^{0.5}$) where p = population in thousands	4.25
Infiltration	5.69 L/s
Peak Sanitary Flow	2.23 L/s
Total Sanitary Flow from Site	7.92 L/s

An estimate of the proposed sanitary sewage flows has been calculated and is included in **Appendix 2**. It is to be noted that the building programs are illustrative and demands will be updated during future design.

3.4 Proposed Sanitary Servicing

The majority of the park site is located within the Maple collector sewer shed except for a portion of Zone 3 on the north-east side which drains the Bathurst collector sewer shed. Zone 1, which fronts Keele Street, would drain into the existing 375mm diameter sanitary sewer along Keele Street as illustrated in Figure 3 below.

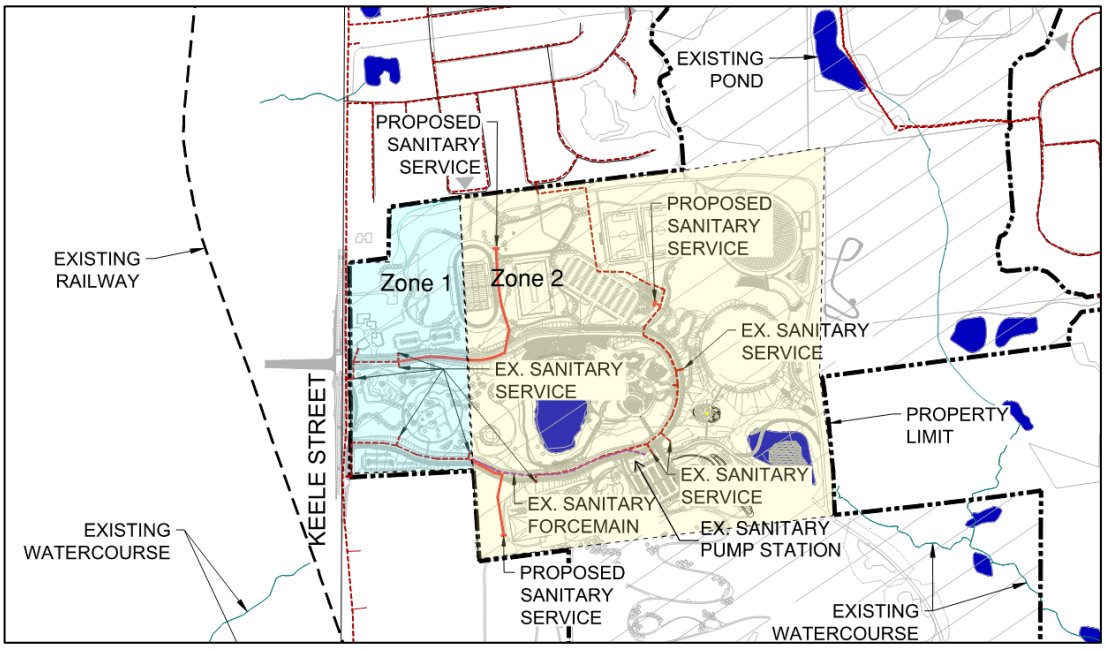


Figure 3: Proposed Sanitary Servicing for Zone 1 and Zone 2

Since the surface slopes down from northeast to southwest, the sanitary sewers shall be designed as gravity-based systems to avoid any pumping requirements. Additionally, the downstream capacity assessment of the existing sanitary system is required to be performed to ensure the flows from the proposed development can be accommodated without upgrades to the municipal infrastructure.

There is also an existing 200mm sanitary sewer on Maple Forest Drive, just north of the site. There is an existing 150mm sanitary connection and 1200mm control manhole from the Maple Forest Drive sanitary sewer that services the north end of the site. This sewer connects to the existing sanitary pumping station, just north-east of the existing parking lot area.

The existing sewer locations are from Conceptual Grading Plan C-111 by Stantec dated July 13th, 2021. North Maple Regional Park Servicing figure from City of Vaughan, dated January 24th, 2011. Refer to **Appendix 1** for sanitary servicing figures.

3.4.1 Recommendations for Reduction in Infiltration and Inflow into Sanitary Sewer System

Infiltration and inflows (I&I) to the sanitary systems overloads the downstream municipal infrastructure and reduces life and performance of sanitary assets. The following recommendations are made to reduce the I&I flows to the sanitary systems:

- Regular flow monitoring and I&I analysis to identify any high impact areas. Install flow meters to compare dry-weather and wet weather flows.
- Ensure proper construction standards to avoid inflows due to faulty construction.
- Where utilities are in proximity to groundwater, include clay seals and other sealing methods to prevent groundwater from entering the pipes.

3.4.2 Field Investigation for Sanitary Servicing Design

Field investigation shall be undertaken to confirm existing sanitary sewer infrastructure and subsurface conditions to support the detailed design and reduce construction risk for the North Maple Regional Park. Field investigation such as but not limited to the following shall be considered:

- Geotechnical and Hydrogeological investigations shall be conducted along the alignment of sanitary sewer alignment to characterize subsurface conditions.
- Verify existing sanitary sewer information through a combination of record drawings, field observations, and available subsurface utility engineering (SUE) where applicable to inform the Downstream sanitary capacity assessment and detailed design.

4 Stormwater Management

4.1 Key Strategies

- Promote use of green infrastructure where feasible to meet the overall stormwater management design requirements as well as replenish groundwater levels and support local biodiversity, and ecology.
- Collaborate with landscape planners to design green infrastructures that provides education opportunity for the community and habitat for the local animals and insects
- Emphasize the implementation of controls at source and conveyance levels to reduce dependency on end-of-pipe control requirements.
- Explore feasibility for decentralizing stormwater management systems to reduce dependence on large detention facilities.
- Maintain existing overland flow paths and avoid creation of additional outfalls where possible and ensure safe conveyance of overland flows to the downstream systems.
- Account for climate change and resilience in the design to safely manage and convey flows to the downstream system.
- Balance retention and hydrological targets with the potential limitations of on-site environmental constraints being careful to not introduce further risk from landfill sites to surface water and ground water recharge and discharge.
- Control water quality as defined in the SWM Planning and Design Manual (2003) for either short-term or long-term removal of TSS.

4.2 Design Guidelines

The following guidelines and resources were reviewed in addition to the City of Vaughan – Engineering Design Criteria and Standard Drawings (EDCSD) (2020) and referenced to comply with regulations within the development area.

- Stormwater Management Criteria and Guidelines:
    - Sustainable Technologies Evaluation Program (STEP) – Erosion and Sediment Control Guide for Urban Construction (2019)
    - Toronto and Region Conservation Authority (TRCA) – Stormwater Management Criteria (August 2012)
    - Toronto and Region Conservation Authority (TRCA) – Low Impact Development Stormwater Management Planning and Design Guide (2012)
    - Ministry of Environment, Conservation and Parks (MECP) – Stormwater Management Planning and Design Manual (2003)
- Other Resources:
    - Government of Ontario Ministry of the Environment, Conservation and Parks (MECP) – Source Protection Information Atlas (Online Map)
    - Toronto and Region Conservation Authority – TRCA Regulation Mapping (Online Map)
    - Sustainable Technologies Evaluation Program (STEP) – Low Impact Development Stormwater Management Planning and Design Guide (2010)
- Background Documents:
    - Vaughan Integrated Urban Water Plan (April 2024)
    - Conceptual Grading Plan – North Maple Regional Park – Prepared by Stantec Consulting Ltd., (August 2021)
    - Figure 2 - Topography and Drainage – Phase 2B North Maple Regional Park (NMRP) – Prepared by Stantec Consulting Ltd., (August 2021)
    - Stormwater Management Report – Stormwater Basis of Design – Phase 2B – North Maple Region Park – Prepared by Stantec Consulting Ltd., (August 2021)
    - City of Vaughan, City-wide Storm Drainage/ Stormwater Management Plan, prepared by Cole Engineering (June 2014).
    - City of Vaughan, City-wide Water & Wastewater Master Plan Class EA Final Report, prepared by the Municipal Infrastructure Group Ltd. in association with Fabian Papa & Partners Inc. (June 2014)
    - Clean Water Act (2006)
    - Phase 2B North Maple Regional Park (NMRP) Stormwater Management Report – 7th Submission – Prepared by Resilient Consulting Corporation, (February 2024)
    - Functional Servicing & Stormwater Management Report for the Proposed Development of the Family Recreation Area – Prepared by ARUP Canada Inc., (May 2025)

4.3 Stormwater Management Design Criteria

This section addresses stormwater; retention, water balance, quantity and criteria needed to manage runoff and maintain the site's natural hydrological cycle. The existing conditions of the site consist of an existing stormwater management pond.

4.3.1 Water Balance

- Maintain the existing water balance or retention of minimum 5 mm of rainfall depth on site based on TRCA Stormwater Management Criteria, constraints, soil conditions permitting. If this is not feasible this will be addressed as "Best Efforts" to capture an alternative depth of rainfall.
- Additionally, the post-development water balance should be compared to the pre-development water balance to ensure that the conditions are equal or close as possible. The TRCA has a Water Balance Tool that can be used to estimate the pre-development and post-development water balance for a given site within their jurisdiction. The tool can be used for a preliminary analysis. The expertise of a hydrogeological consultant is recommended to aid in ensuring the requirements are met.
- Modeling of the water balance shall follow the MECP Stormwater Management Planning and Design Manual (2003) and CTC Source Protection Guidance, using the Thornthwaite Mather method to model the pre and post development conditions.
- Infiltration based Low impact development (LID) solutions may be inhibited for portion of the site which is located within 250 m of a landfill site and near wetlands as per Vaughan Integrated Urban Water Plan (April 2024).
- Precautions are to be taken with respect to infiltration in areas where there is increased risk or concern with contamination. Limitations may arise with deep recharge, and shallower retention designs may be warranted.
- High groundwater levels and soil conditions dictate the capacity of a site to infiltrate runoff. Hence, soil investigation, long-term groundwater monitoring results and in-situ infiltration tests shall be conducted and referred to in the design of water balance strategy for the site.

4.3.2 Quantity Control

- As the subject site is located within the Don River watershed, post-development peak flows are to be controlled to pre-development levels for all storm events up to and including the 100-year storm, in accordance with the Unit Flow Equations prescribed for the Don River Watershed (Table 3-1, Appendix A) of the TRCA Stormwater Management Criteria. The Don River unit flow rates should only be used for sites greater than 5 ha in size.
- In accordance with the City of Vaughan's Engineering Design Criteria and Standard Drawings, storm sewers are to be designed to convey the 5-year return frequency storm from the road allowance and 180 L/s/ha from lots/blocks, or as otherwise specified in the relevant Master Drainage Plan or equivalent document.
- Green infrastructure facilities are recommended to managing runoff on site and these are further described in detail in the stormwater servicing section. However, a maintenance manual is to accompany any proposed green infrastructure as to demonstrate the required effort from the City of Vaughan for upkeep and maintenance.
- The area of the site which discharges to municipal storm system, the allowable peak flows shall be limited to the minimum of the downstream storm sewer capacity and the flow rates evaluated per the unit flow equation for Don River Watershed.
- Additional awareness of the City of Vaughan's Non-Conventional Stormwater Management Facilities Design Criteria dated March 2025, should be taken into

consideration if any underground storage tanks or super pipes are proposed. The maintenance manual is to accompany any proposed non-conventional stormwater management facilities.

4.3.3 Quality Control

- The site is required to provide a long-term removal of 80% of total suspended solids (TSS) on an average annual basis as defined in the MECP SWM Planning and Design Manual (2003). Should a stormwater management wet pond be proposed as a control option, it should be designed to provide a long-term removal of 80% of total suspended solids (TSS) from the impervious areas that generate pollutants such as the municipal rights-of-way and parking lots tributary to the pond's drainage area.

- The site is located in Don River Watershed and will need to provide the required quality treatment per the MECP and City of Vaughan requirements to provide Enhanced Level of Protection (80% TSS Removal).

4.3.4 Erosion Control

- The City of Vaughan requires erosion and sediment control of the water quality event. Should stormwater management wet or dry ponds be proposed to provide quantity control, erosion control should be considered through the provision of runoff detention of the 25mm storm over a 48-hour period.

- Temporary erosion and sediment controls are required for the construction phase. Please refer to Section 4.4.4 for more information.

4.4 Stormwater Management Strategy

To address the stormwater management design criteria above, many design options can be considered. They can be separated into three categories, Source Controls, Conveyance Controls and End-of-Pipe Controls, which is further explained in the following section.

The runoff from building roofs shall be discharged to the ground surface and through surface grading shall be conveyed to a nearby landscaped area. If the roof runoff is planned to be infiltrated into the surface, the infiltration facility shall be located at least four meters away from the building foundation or as per the geotechnical consultant's recommendation.

Green infrastructure or low impact development (LID) facilities are designed to manage urban drainage to prevent flooding, erosion and sedimentation of downstream stormwater receiving systems while minimizing reliance on the conventional stormwater management systems such as centralized stormwater detention tanks and ponds, also known as end-of pipe treatment. It is recommended to use LID facilities where it is feasible to manage and treat runoff from the park site. At detailed design stage the landfill, groundwater environmental constraints and infiltrations rates will be confirmed which will effect the feasibility of proposed LID measures.

At the detailed design stage, once the site plan, grading and servicing is finalized for each catchment the specific stormwater management measures will be determined, including supporting calculations.

1. Source Controls:

   Source controls are measures that are designed to simulate natural hydrological conditions at the lot or property level. These physical strategies aim to retain runoff, promote infiltration into the ground and manage water at or near its source, thereby reducing flow volumes before entering subsurface or surface drainage systems.

   Examples of Source Controls include:

   - Bioretention and biofiltration to promote infiltration, evapotranspiration, and/or filtration. Methods include Rain gardens or engineered layered surface to allow runoff to be treated through percolation before being recharged evaporated or transpired.
   - As part of the enabling work (EW), eleven (11) bioretention facilities (BRF) have been proposed within Zone 1 and Zone 2 of the Master Plan. A summary of details of these facilities is provided below in

- Table 3.

Table 3: SWM Summary for EW Bioretention Facilities (BRF)

BRF ID	Contributing Impervious Area	Required Water Quantity Control Volume	Required Water Quality Control Volume	Required Water Balance Volume	Provided Storage Volume
	(ha)	(m^3)	(m^3)	(m^3)	(m^3)
BRF 1/101-1a	0.58	2049.1	32.1	29.0	2096.8
BRF 2/101-2a	1.07	765.1	51.4	85.9	831.3
BRF 1b/101-1 + 2	n/a	317.6	n/a	n/a	317.7
BRF 3/101-8	0.52	235.9	29.8	26.0	250.9
BRF 4/101-5a	0.12	503.5	56.1	6.0	517.5
BRF 5/101-6a	0.13	338.0	34.3	6.5	367.0
BRF 6/111a	0.94	167.4	167.4	47.0	172.8
BRF 7/111b	0.71	142.3	142.3	35.4	157.0
BRF 8/111c	0.57	1039.7	35.4	28.5	1068.2
BRF 9/101-3	0.52	1750.7	85.6	26.0	1827.0
BRF 10/111e	0.30	379.9	24.3	15.0	465.7
BRF 11/201-1a	0.31	262.5	12.0	15.7	285.0

- Stormwater Tree Trench to promote infiltration, evapotranspiration, and/or filtration. Trench lines are designed with bioretention media and runoff is directed towards the trench, filtered, and used by the tree.
- Infiltration Trenches promote infiltration and retention. These trenches are either rectangular or circular and filled with clean gravel or stone. This technology can also be considered as a conveyance measure.
- Infiltration Basins promote infiltration evapotranspiration, filtration and retention. They are open impoundments (greater than 5 m at minimum dimension) with a flat densely vegetated floor designed for infiltration.
- Pervious Pavements promote infiltration, evapotranspiration, and retention. They encourage infiltration to the ground below by allowing the runoff to infiltrate.
- Stormwater harvesting promotes reuse. Runoff is collected from impervious surfaces or pervious landscapes with appropriate conveyance and is stored for grey water uses, such as irrigation and mechanical uses.
- Green Roofs promote evapotranspiration, filtration, and retention. A Green Roof is a roof with a series of engineered layers that create an environment suitable for plant growth, thereby reducing runoff.
- Blue Roofs promote evapotranspiration and retention. Rainwater is temporarily stored on the rooftop where control devices can be implemented for releasing runoff.

2. Conveyance Controls:

   Conveyance Controls are designed to intercept and transport runoff in a controlled manner, while promoting infiltration, filtration, or evapotranspiration before entering the municipal drainage system or local water body. Conveyance Controls are often used to improve water quality and reduce peak flows by slowing runoff and simultaneously allowing sediment to settle out.

   Examples Conveyance Controls include:

   - Dry Swales or Enhanced Swales promote infiltration, evapotranspiration, and filtration. These swales are structural channels that can be designed to capture, temporarily store and can route runoff through an engineered filter bed. Vegetated swales use vegetation such as grass to filter pollutants and sediment while directing flow and aiding in infiltration.
   - Exfiltration trenches promote infiltration and retention. These can be integrated with traditional stormwater conveyance systems and temporarily store and infiltrate runoff into the surrounding soil. It consists of a trench filled with crushed gravel and generally includes a perforated pipe to promote exfiltration to the surrounding areas while conveying most of the flow. The City of Vaughan has clean water collector (CWC), consisting of perforated pipe/storm sewers that collects and infiltrates roof runoff, typically within a residential subdivision.

3. End of Pipe Controls:

   End of Pipe Controls are stormwater management measures located at the outlet or discharge point of a stormwater collection system. They are designed to manage runoff, reduce flow volumes, and mitigate downstream impacts after it leaves properties or developments at a final discharge point, typically before it can enter a natural water body.

   Examples of End of Pipe Controls include:

   - Dry Ponds, also known as detention basins, temporarily store runoff during and after a rainfall event. They are designed to empty completely between events and remain dry most of the time.
   - Wet ponds, also known as retention basins, or stormwater management ponds, permanently hold a pool of water provided by rainfall events and facilitate both quantity and quality control by slowing peak flow volumes while allowing for sediment to settle out. They are designed to retain rainwater even during dry periods.
   - Subsurface storage facilities, including concrete tanks, large storm sewers or plastic chambers, will temporarily store runoff during and after a rainfall event. Additional awareness of the City of Vaughan's Non-Conventional Stormwater Management Facilities Design Criteria, dated March 2025, will need to be taken into consideration if any underground storage tanks are proposed. Specifically refer to the List of Acceptable Technologies as per Section 1.10 of the City of Vaughan Engineering Design Criteria & Standard Drawings.

The selection of the appropriate stormwater management controls for the site will depend on the following factors:

- Site grading and servicing design
- Available footprint and cover
- Proximity to existing/proposed buildings and utilities
- Subsurface conditions, specifically, underlying soil, groundwater levels and infiltration rates
- Building roof design

The selected stormwater management controls will need to be coordinated with many other consultants which may include, but are not limited to:

- Architect
- Landscape Architect
- Irrigation Consultant
- Geotechnical and Hydrogeological Consultants
- Geomorphologist
- Civil Engineer
- Mechanical Engineer
- Structural Engineer
- Transportation and Roadway Engineer

4.4.1 Water Balance

As part of the proposed development, it is expected that there will be an increase in impervious surfaces. Pending detailed site and landscape plans for the site, there is expected to be:

- ~23,500 m^2 of roof area
- ~36,000 m^2 of vehicular parking areas
- ~20,250 m^2 stormwater management pond
- ~4,500 m^2 track facility
- A 1,700 m ring road with an asphalt width of 6.6m and two (2) multi-use path with a width of 3.0m. Resulting in an impervious area of ~21,500 m^2
- Upon completion of the park, there will be 9km of trails in the park. Assuming a 3.0m wide trail, this would result in an impervious area of ~27,000 m^2

Based on the numbers above, there is estimated to be a total of 132,750 m^2 of impervious surfaces on site.

Assuming a 5mm initial abstraction for the landscape areas, the estimated corresponding 5mm water balance volume over the impervious surfaces is 664 m^3. This volume will have to be infiltration, reused or evapotranspired to meet the water balance criteria.

This water balance volume may be higher or lower depending on the finding from the hydrogeological assessment from a post-to-predevelopment water balance analysis. The impervious areas and the required water balance volume will need to be confirmed once detailed site and landscape plans, and a hydrogeological report are available.

4.4.2 Quantity Control and Stormwater Servicing

The stormwater service infrastructure shall be designed in accordance with the City's Engineering Design Criteria and Standard Drawings, the TRCA's Stormwater Management Criteria and the MECP's Stormwater Management Planning and Design manual. The servicing infrastructure, sewers, swales and culverts--, shall be designed to safely capture, store and convey the runoff from the design storm events. Storm sewers shall be designed to convey the minimum 5-year return frequency storm without surcharge. The 5-year storm event is considered as a minor storm event and the infrastructure designed to manage it is generally known as the minor system.

The runoff flows generated from storm events greater than the 5-year return frequency, up to 100-year return storm, also known as major storms, shall be conveyed through surface features such as overland flows to a safe outlet. The systems designed to convey major storms are known as major systems and they may include features such as streets, gullies, and open channels. The approach of collecting urban storm runoff through such two separate systems, i.e., minor and major systems is known as dual drainage systems.

The existing drainage patterns include the site draining to Keele Street, the existing Stormwater Management Pond designed by Stantec, or the adjacent wetlands. These drainage patterns are to be maintained where possible. If it is not possible to maintain the existing drainage catchments, the proposed design must control the flows to pre-development flow rates. The existing catchments are as follows:

- Catchment 201: 14.63-hectare drainage area towards Keele Street with existing 1.3% imperviousness.
- Catchment 202: 40.37-hectare drainage area towards the existing Wet Pond and ultimately the wetland with existing 9.5% imperviousness.
- Catchment 203: 35.64-hectare drainage area towards the wetlands with existing 2.9% imperviousness.

According to current topography, Catchment 101 drains to Keele Street in existing condition and Catchments 102 and 103 drains to the wetland. In proposed conditions no increase in imperviousness is expected for these, thus these areas do not require any water quantity control. However, an increase in imperviousness will occur in Catchment 201, 202 and 203. Once detailed design has begun, the post-development catchment areas will be defined and must be released at the allowable release rate established by the existing conditions.

The allowable release rates for each storm event are outlined in the table below and have been calculated based on the existing topography and time of concentration calculations.

Table 4: Allowable Release Rates from Existing Conditions

Storm Event	2-year (m^3/s)	5-year (m^3/s)	10-year (m^3/s)	25-year (m^3/s)	50-year (m^3/s)	100-year (m^3/s)
Don River Unit Flow Rate ($m^3/s/ha$)	0.0033	0.0053	0.0069	0.0080	0.0116	0.0143
Catchment 201 - To Keele Street (m^3/s)	0.048	0.078	0.101	0.117	0.170	0.209
Catchment 202 - To Existing Pond (m^3/s)	0.133	0.214	0.279	0.323	0.468	0.577
Catchment 203 - To Wetland (m^3/s)	0.118	0.189	0.246	0.285	0.413	0.510

Please refer to the drainage figures in **Appendix 1.2** and the stormwater management calculations in **Appendix 2.3** for more information.

4.4.3 Quality Control

In order to treat the runoff to 80% TSS Removal prior to discharge off site, several options can be considered:

- Treatment units such as Oil-Grit Separators (OGS) can provide up to 60% TSS removal. While filter units can provide up to 80% TSS removal.
- Stormwater Management Wet Ponds can provide up to 80% TSS Removal.
- Low-Impact Development including infiltration and filtration function in isolation or part of treatment rain can provide 80% TSS removal. Proper maintenance is required to ensure the LID measure(s) continue to function as per design.

4.4.4 Erosion Control

As noted in Section 4.3.4, erosion control requirements are required as part of City and TRCA approvals. If a stormwater management pond is proposed on site, they should be designed for the runoff detention of the 25mm storm over a 48-hour period.

Temporary erosion and sedimentation controls shall be installed, inspected and maintained during constructions to minimize the construction impacts to the surrounding areas. Please refer to the Urban ESC Design Guide, prepared in 2019 by TRCA to provide guidance on ensuring the ESC requirements are met for the development.

5 Grading

The grading design for the site shall follow the existing site topography which slopes from north to south and from east to west towards the Don River headwaters. Zone 1 has a mild downward slope from north towards south-west along Keele Street. The site grading shall comply with this overall site slope. However, proposed grading shall be adjusted around building facilities to slope away from the building entrances and create spaces for low impact development facilities to promote infiltration and ground water recharge. The proposed streets and pathways within this zone should be designed per City of Vaughan guidelines and limit cross slopes and longitudinal slopes between 2-4% to promote drainage and meet accessibility design guidelines.

5.1 Key Strategies

- Maintain existing overland flow routes through the site;
- Match existing elevations at the property boundary and prevent overland flows to the adjacent property boundary.
- Optimize earthworks, i.e. minimize the quantity of surplus materials to be exported by working in collaboration with landscape architects.
- Promote positive drainage that supports a decentralized drainage approach through grading and overland flow routes to accommodate the overall stormwater management vision and objectives.
- Optimize grading to allow for design of low impact development facilities to convey runoff through surface features such as swales and ditches as well allow for opportunities for groundwater recharge through infiltration.

Appendix 1: Figures

KIRBY ROAD

DUFFERIN STREET

EXISTING POND

EXISTING STORM OUTLET

EXISTING RAILWAY

KEELE STREET

EXISTING STORM OUTLET

PROPERTY LIMIT

EXISTING WATERCOURSE

EXISTING WATERCOURSE

TESTON ROAD

EXISTING WATERCOURSE

TESTON ROAD

PROPERTY LIMIT

DUFFERIN STREET

MAJOR MACKENZIE DRIVE

LEGEND

LIMIT OF PROPERTY

EX. STORM SEWER

No.	REVISIONS TO DRAWING	BY	DATE	APPR.
1		SMD		

ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED

CLIENT

CITY OF VAUGHAN

MUNICIPALITY

CITY OF VAUGHAN
REGIONAL MUNICIPALITY OF YORK

PROJECT TITLE

NORTH MAPLE REGIONAL PARK

SHEET TITLE

STORM SERVICING PLAN

CONSULTANT

wsp

150 Commerce Valley Dr. West, Thornhill, ON Canada L3T 7Z3
t: 905.882.1100 f: 905.882.0055 www.wsp.com

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APPROVAL

DESIGNED	DRAWN	CHECKED
S.M.D.	01/26 CAD	P.H.

SCALE	DATE
1:7500	FEB. 2026

PROJECT NUMBER	DWG. NUMBER
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PLOTTED: Feb 26, 2026 - 8:49AM

KEELE STREET

EXISTING STORM OUTLET

PROPERTY LIMIT

PROPERTY LIMIT

LEGEND

LIMIT OF PROPERTY

EX. STORM SEWER

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REGIONAL MUNICIPALITY OF YORK

PROJECT TITLE

NORTH MAPLE REGIONAL PARK

SHEET TITLE

STORM SERVICING PLAN
ZONE 1 AND ZONE 2

CONSULTANT

wsp

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PLOTTED: Feb 4, 2026 - 3:09pm by mendoza

KIRBY ROAD

DUFFERIN STREET

EXISTING POND

PROPOSED SANITARY SERVICE

PROPOSED SANITARY SERVICE

EXISTING RAILWAY

Zone 1

Zone 2

EX. SANITARY SERVICE

EX. SANITARY SERVICE

KEELE STREET

PROPERTY LIMIT

EX. SANITARY SERVICE

EX. SANITARY FORCEMAIN

EX. SANITARY PUMP STATION

EXISTING WATERCOURSE

PROPOSED SANITARY SERVICE

EXISTING WATERCOURSE

TESTON ROAD

TESTON ROAD

EXISTING WATERCOURSE

PROPERTY LIMIT

DUFFERIN STREET

MAJOR MACKENZIE DRIVE

LEGEND

- LIMIT OF PROPERTY
- EX. SANITARY SEWER
- EX. SANITARY FORCEMAIN
- PROP. SANITARY SEWER

No.	REVISIONS TO DRAWING	BY	DATE	APPR.
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CITY OF VAUGHAN

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PROJECT TITLE
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SHEET TITLE
SANITARY SERVICING PLAN

CONSULTANT
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PROJECT NUMBER	DWG. NUMBER
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LAST SAVED: Jan 26, 2026 - 9:46am

PROPERTY LIMIT

PROPOSED SANITARY SERVICE

EX. SANITARY SERVICE

PROPOSED SANITARY SERVICE

EX. SANITARY SERVICE

EX. SANITARY SERVICE

EX. SANITARY SERVICE

EX. SANITARY FORCEMAIN

EX. SANITARY SERVICE

EX. SANITARY SERVICE

PROPOSED SANITARY SERVICE

KEELE STREET

PROPERTY LIMIT

LEGEND

- LIMIT OF PROPERTY
- EX. SANITARY SEWER
- EX. SANITARY FORCEMAIN
- PROP. SANITARY SEWER

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CLIENT
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CITY OF VAUGHAN
REGIONAL MUNICIPALITY OF YORK

PROJECT TITLE
NORTH MAPLE REGIONAL PARK

SHEET TITLE
SANITARY SERVICING PLAN
ZONE 1 AND ZONE 2

CONSULTANT
wsp
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CA0027129.6857

DWG. NUMBER
4

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KIRBY ROAD

DUFFERIN STREET

EXISTING POND

PROPOSED WATER SERVICE

EXISTING RAILWAY

EX.400Ø WM

KEELE STREET

EXISTING WATER SERVICE

PROPOSED WATER SERVICE

EXISTING WATER SERVICE

PROPERTY LIMIT

EXISTING WATERCOURSE

PROPOSED WATER SERVICE

EXISTING WATERCOURSE

TESTON ROAD

EXISTING WATERCOURSE

TESTON ROAD

PROPERTY LIMIT

DUFFERIN STREET

MAJOR MACKENZIE DRIVE

LEGEND

LIMIT OF PROPERTY

EX. WATERMAIN

PROP. WATERMAIN

No.	REVISIONS TO DRAWING	BY	DATE	APPR.
1		SMD		

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CLIENT

CITY OF VAUGHAN

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REGIONAL MUNICIPALITY OF YORK

PROJECT TITLE

NORTH MAPLE REGIONAL PARK

SHEET TITLE

EXISTING WATER SERVICES

CONSULTANT

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1:7500	MARCH 2025

PROJECT NUMBER	DWG. NUMBER
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EXISTING RAILWAY

EXISTING POND

PROPOSED WATER SERVICE

PROPOSED WATER SERVICE

EX. 400Ø WM

KEELE STREET

PROPOSED WATER SERVICE

EXISTING WATER SERVICE

PROPOSED WATER SERVICE

PROPERTY LIMIT

PROPERTY LIMIT

EXISTING WATERCOURSE

296.00 292.00 290.00 289.00 280.00 288.00 281.00 279.00 280.00 277.00 264.00 POTENTIAL TURTLE NESTING HABITAT 282.00 285.00 278.00 277.00 284.00 286.00 289.00 291.00

N

LEGEND

- LIMIT OF PROPERTY
- EX. WATERMAIN
- PROP. WATERMAIN

No.	REVISIONS TO DRAWING	BY	DATE	APPR.
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CITY OF VAUGHAN
REGIONAL MUNICIPALITY OF YORK

PROJECT TITLE
NORTH MAPLE REGIONAL PARK

SHEET TITLE
WATER SERVICING PLAN
ZONE 1 AND ZONE 2

CONSULTANT
wsp
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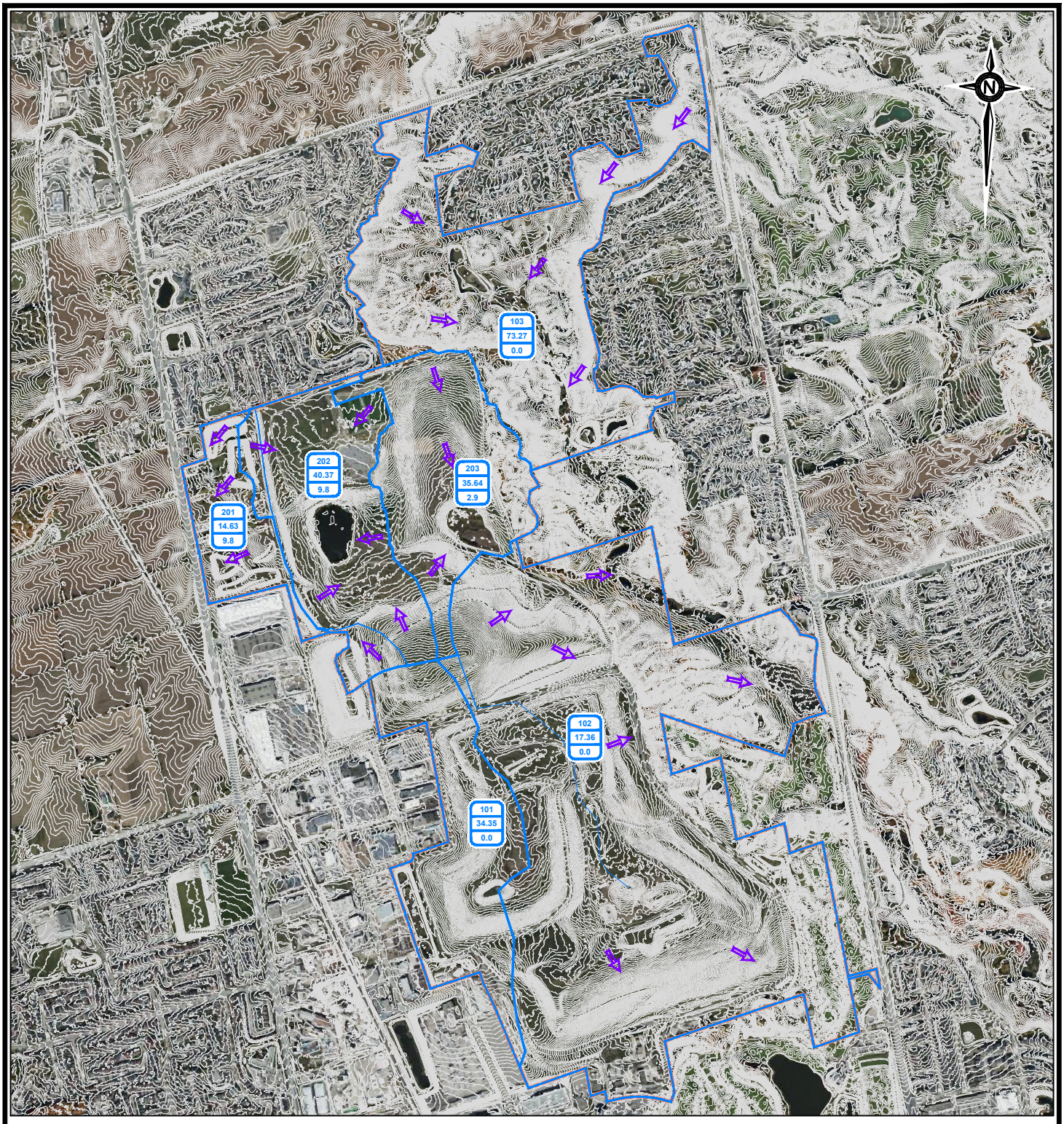
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DATE FEB. 2026

PROJECT NUMBER
CA0027129.6857

DWG. NUMBER
6

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PLOTTED BY Paul Hollingsworth on Thursday, January 29, 2026 - 10:56:40 AM



PROPERTY BOUNDARY

SUB-CATCHMENT BOUNDARY

DRAINAGE DIRECTION

101 — SUB-CATCHMENT ID.

34.36 — DRAINAGE AREA (ha)

0.0 — IMPERVIOUSNESS (%)

CLIENT

CITY OF VAUGHAN

TITLE

NORTH MAPLE REGIONAL PARK

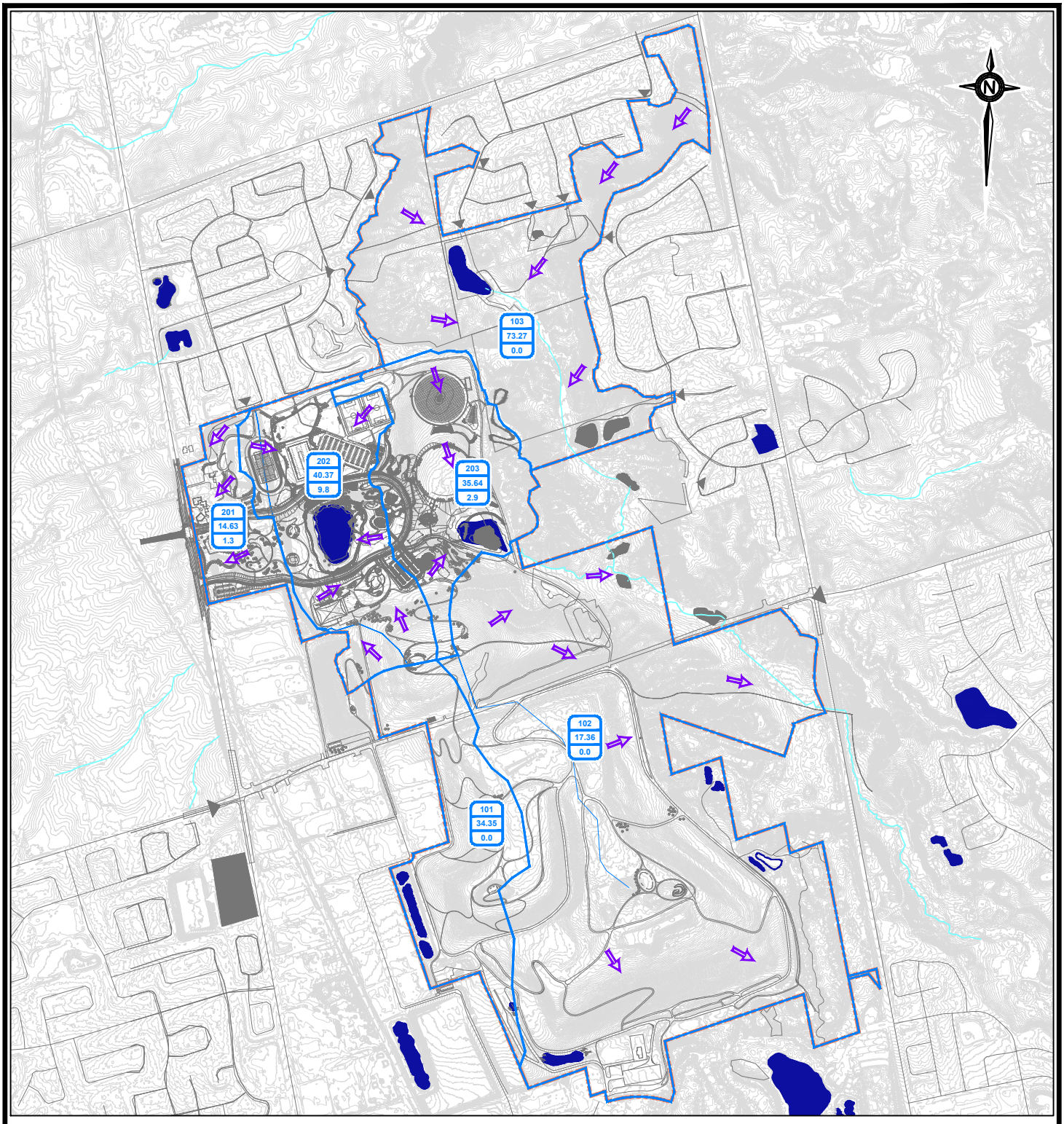
PRE-DEVELOPMENT CONDITIONS

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Checked G.W.	Drawn AutoCAD/S.K.	
Date FEBRUARY 2026	Proj. No. CA0027129.6857	
Scale N.T.S.	Figure No. 1	Gr.No. 00

FIGURE 1 NMRP Pre-Dev Conditions.dwg Fig 1 C:\Users\CASK008928\DC\ACCDocs\WSP Canada projects (AMER)\LDME ON 24\Files\CA0027129.6857 North Maple Regional Park\SWM\ Feb 17, 2026 - 3:29pm



CLIENT

CITY OF VAUGHAN

TITLE

NORTH MAPLE REGIONAL PARK

ESTIMATED POST-DEVELOPMENT CONDITIONS

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Date FEBRUARY 2026	Proj. No. CA0027129.6857	
Scale N.T.S.	Figure No. 2	Gr.No. 00

FIGURE 2 NMRP Post-Dev Conditions.dwg Fig 2 C:\Users\CASK008928\DC\ACCDocs\WSP Canada projects (AMER)\LDME ON 24\Files\CA0027129.6857 North Maple Regional Park\SWM\ Feb 17, 2026 - 3:13pm

Appendix 2: Calculations

Built Form Attributes

North Maple Regional Park Master Plan

Building #	Description	Zone	Gross Floor Area (sq.ft.)	Main Floor Area (sq.m.)	Main Floor Area (sq.ft.)	Max number of Storeys	Avg Area per Upper Floor (sq.ft.)	Use	Assumed OBC Major Occupancy Classification (to be confirmed)	Construction type
Building 1	Nordic Spa (8 hot/cold pools, 3 saunas, 2 steam rooms etc.) within a mixed use commercial retail zone, as depicted in plan test fit. Consider both building cost and exterior nordic spa. 60% of buildings are two-storey. Rather than a single building, there would be 2 main buildings (entry/massage and resturant/offices/janitor) and 5 small buildings. 900 visitors per day (350 at one time).	Zone 1: P3 Lands - Not a capital project funded by public/City funds. To be categorized separately in the MP cost estimate and developed by private entity.	33,308.1	1,934.0	20,817.6	2	N/A	Commercial	Primary: Group A, Division 2 - Assembly occupancy for pools, saunas Secondary: Group F, Division 3 - Personal service (spa treatments if applicable)	Concrete
Building 2	Civic building or cultural centre with lecture/performance theatre, activity rooms, community amenitities, meeting rooms, etc. High sustainability design intent.	Zone 1	58,125.6	3,600.0	38,750.4	3	9,687.6	Institutional/Civic Community	Primary: Group A, Division 1 - Assembly for theatre (>300 occupants for performances) Alternative: Group A, Division 2 - If theatre <300 occupants Group A, Division 2 - Activity/meeting rooms, community halls	Potentially Wood (Mass Timber)
Building 3	Conservatory building (associated with outdoor botanical gardens), including restaurant/cafe and public washrooms. High sustainability design intent, including glass and steel structure, green roof and rooftop access for visitors. A comparable precedent building is the Leaf in Winnipeg--that is bigger than NMRP's conservatory but design quality is similar.	Zone 2	39,912.9	2,472.0	26,608.6	2	13,304.3	Mixed use: Institutional-Commercial	Primary: Group A, Division 2 - Assembly for botanical garden/exhibit areas Group D - Restaurant/food service	Steel/Concrete hybrid
Building 4	Sports Stadium with FIFA-grade artificial turf field, rubberized running track, including building with food and beverage concessions, athelete changerooms, offices, and public washrooms. Spectator seating for approx 2,260. This would be about half the size of the Downsview BMO Training Ground.	Zone 2	24,864.8	1,155.0	12,432.4	2	12,432.4	Major recreational facility	Primary: Group A, Division 3 - Arena-type assembly (bleachers/stands for viewing) Group D - Food and beverage concessions Group D - Offices	Concrete
Building 5	Sports enclosed structure (likely racquet sports), high design quality.This building can be combined with of Bldg 6	Zone 2	61,742.3	5,736.0	61,742.3	1	N/A	Community recreation facility	Group A, Division 4	Concrete
Building 6	Parks operations centre, including offices, kitchen/lunchroom, lockers, storage, washrooms. This building can be combined with the south side of Bldg 5	Zone 2	2,152.8	200.0	2,152.8	1	N/A	Civic Community	Primary: Group D Group F, Division 3	Concrete
				15,097.0	162,504.1		35,424.3			
					m2		3291.025			

Note:
Building programs are illustrative and demands will be updated during future design.

North Maple Regional Park Master Plan
Water Demand

Project: North Maple Regional Park Master Plan
Job No.: CA0027129.6857
Date: 2026-02-18

Site Area

Site Area = 21.90 ha

Post-Development Condition

Unit Type	Unit Count or GFA	Density (Pers/Unit) or (ppl/m2)	Equivalent Population
Zone 1			
Commercial	1934	0.0075	15
Commercial-Institutional	3600	0.0075	27
Zone 2			
Community-Recreational	7091	0.005	35
Commercial-Institutional	2472	0.0075	19
Total	15097	-	96

Population =	96	ppl
Avg. Demand =	0.211	L/s (assuming 190 L/cap/d)
Peak Factor =	3.00	(For Peak Hour Demand)
Peak Flow =	0.633	L/s
Max. Day Factor =	1.80	(For Max. Day Demand)
Max. Day Flow =	0.38	L/s

Total Avg. Water Demand = 0.211 L/s
Total Peak Water Demand = 0.633 L/s
Total Max. Day Water Demand = 0.380 L/s

Notes:

1. The recreational centre area was approximated to 932 m2 using google maps and a population density of 0.0258 persons/m2 was used to estimate the equivalent population of the Recreation Centre
2. Building programs are illustrative and demands will be updated during future design.

Project:	North Maple Regional Park Master Plan
Job No.:	CA0027129.6857
Date:	2026-02-17
Designed By	YN

Based on the Water Supply for Public Fire Protection Manual, 2020 by the Fire Underwriters Survey

Building 1

Based on Preliminary assumptions. To be updated as the design progresses.

Fire Flow Calculations

Construction Coefficient =	0.6	
Largest Floor Area =	1934	m2
Floor Above =	0	m2
Floor Below =	0	m2
Area =	1934	m2
Fire Flow (F) =	5805.0	L/min

F = required fire flow (L/min)
C = coefficient related to type of construction
0.6 for fire resistive (fully protected, 2 hr ratings)
0.8 for non-combustible (i.e. unprotected metal buildings)
1.0 for ordinary construction
1.5 for wood frame construction
A = total floor area excluding basements more than 50% below grade

** If vertical opentings are inadequatly protected, consider two largest adjoining floors plus 50% of each of any floors above up to eight floors.*
** If vertical openings are adequatly protected (one hour rating), consider largest floor area +25% of two immediately floor*

Adjusments for Building Occupancy (shall not be less than 2,000 L/s)

Occupancy Adjustment	-15%	Non Combust		-25%	Free Burning	15%
F1 = Fire Flow x Adjustment =	4934.2 L/min	Limited Combust		-15%	Rapid Burning	25%
		Combustable	No Change			

Fire Suppression System

Sprinkler Adjustment =	30%	Automatic Sprinkler (monitored)	-50%
F2 = F1 x Adjustment =	1480.3 L/min	Adequately Designed System	-30%

Proximity Factor

Proximity Adjustment =	20%	(max 75%)	Separation	Adjustment	Separation	Adjustment	
F3 = F1 x Factor =	986.8	L/min	0m to 3m	25%	20.1m to 30m		10%
			3.1m to 10m	20%	30.1 to 45m		0%
			10.1m to 20m	15%			

Adjusted Fire Flow (shall not be less than 2000 L/min or greater than 45,000L/min)

F1 =	4934.2	L/min
- F2 =	1480.3	L/min
+ F3 =	986.8	L/min
Fire Flow =	4000	L/min
Fire Flow =	66.7	L/s
Total Demand (Fire Flow + MDD) =	67.0	L/s

Fire Flow = F1 - F2 + F3

Project:	North Maple Regional Park Master Plan
Job No.:	CA0027129.6857
Date:	2026-02-17
Designed By	YN

Based on the Water Supply for Public Fire Protection Manual, 2020 by the Fire Underwriters Survey
Based on Preliminary assumptions. To be updated as the design progresses.

Building 2

Fire Flow Calculations

Construction Coefficient =	0.6	
Largest Floor Area =	3600	m2
Floor Above =	900	m2
Floor Below =	0	m2
Area =	3825	m2
Fire Flow (F) =	8163.7	L/min

F = required fire flow (L/min)
C = coefficient related to type of construction
0.6 for fire resistive (fully protected, 2 hr ratings)
0.8 for non-combustible (i.e. unprotected metal buildings)
1.0 for ordinary construction
1.5 for wood frame construction
A = total floor area excluding basements more than 50% below grade

** If vertical opentings are inadequatly protected, consider two largest adjoining floors plus 50% of each of any floors above up to eight floors.*
** If vertical openings are adequatly protected (one hour rating), consider largest floor area +25% of two immediately floor*

Adjusments for Building Occupancy (shall not be less than 2,000 L/s)

Occupancy Adjustment	-15%	Non Combust		-25%	Free Burning	15%
F1 = Fire Flow x Adjustment =	6939.2 L/min	Limited Combust		-15%	Rapid Burning	25%
		Combustable	No Change			

Fire Suppression System

Sprinkler Adjustment =	30%	Automatic Sprinkler (monitored)	-50%
F2 = F1 x Adjustment =	2081.8 L/min	Adequately Designed System	-30%

Proximity Factor

Proximity Adjustment =	20%	(max 75%)	Separation	Adjustment	Separation	Adjustment	
F3 = F1 x Factor =	1387.8	L/min	0m to 3m	25%	20.1m to 30m		10%
			3.1m to 10m	20%	30.1 to 45m		0%
			10.1m to 20m	15%			

Adjusted Fire Flow (shall not be less than 2000 L/min or greater than 45,000L/min)

F1 =	6939.2	L/min
- F2 =	2081.8	L/min
+ F3 =	1387.8	L/min
Fire Flow =	6000	L/min
Fire Flow =	100.0	L/s
Total Demand (Fire Flow + MDD) =	100.3	L/s

Fire Flow = F1 - F2 + F3

Project:	North Maple Regional Park Master Plan
Job No.:	CA0027129.6857
Date:	2026-02-17
Designed By	YN

Based on the Water Supply for Public Fire Protection Manual, 2020 by the Fire Underwriters Survey
Based on Preliminary assumptions. To be updated as the design progresses.

Building 3

Fire Flow Calculations

Construction Coefficient =	0.6	
Largest Floor Area =	2472	m2
Floor Above =	1236	m2
Floor Below =	0	m2
Area =	2781	m2
Fire Flow (F) =	6961.0	L/min

F = required fire flow (L/min)
C = coefficient related to type of construction
0.6 for fire resistive (fully protected, 2 hr ratings)
0.8 for non-combustible (i.e. unprotected metal buildings)
1.0 for ordinary construction
1.5 for wood frame construction
A = total floor area excluding basements more than 50% below grade

** If vertical opentings are inadequatly protected, consider two largest adjoining floors plus 50% of each of any floors above up to eight floors.*
** If vertical openings are adequatly protected (one hour rating), consider largest floor area +25% of two immediately floor*

Adjusments for Building Occupancy (shall not be less than 2,000 L/s)

Occupancy Adjustment	-15%	Non Combust		-25%	Free Burning	15%
F1 = Fire Flow x Adjustment =	5916.9 L/min	Limited Combust		-15%	Rapid Burning	25%
		Combustable	No Change			

Fire Suppression System

Sprinkler Adjustment =	30%	Automatic Sprinkler (monitored)	-50%
F2 = F1 x Adjustment =	1775.1 L/min	Adequately Designed System	-30%

Proximity Factor

Proximity Adjustment =	20% (max 75%)	Separation	Adjustment		Separation	Adjustment	
F3 = F1 x Factor =	1183.4 L/min	0m to 3m		25%	20.1m to 30m		10%
		3.1m to 10m		20%	30.1 to 45m		0%
		10.1m to 20m		15%			

Adjusted Fire Flow (shall not be less than 2000 L/min or greater than 45,000L/min)

F1 =	5916.9	L/min
- F2 =	1775.1	L/min
+ F3 =	1183.4	L/min
Fire Flow =	5000	L/min
Fire Flow =	83.3	L/s
Total Demand (Fire Flow + MDD) =	83.6	L/s

Fire Flow = F1 - F2 + F3

Project:	North Maple Regional Park Master Plan
Job No.:	CA0027129.6857
Date:	2026-02-17
Designed By	YN

Based on the Water Supply for Public Fire Protection Manual, 2020 by the Fire Underwriters Survey

Building 4

Based on Preliminary assumptions. To be updated as the design progresses.

Fire Flow Calculations

Construction Coefficient =	0.6	
Largest Floor Area =	1155	m2
Floor Above =	1155	m2
Floor Below =	0	m2
Area =	1443.75	m2
Fire Flow (F) =	5015.6	L/min

F = required fire flow (L/min)
C = coefficient related to type of construction
0.6 for fire resistive (fully protected, 2 hr ratings)
0.8 for non-combustible (i.e. unprotected metal buildings)
1.0 for ordinary construction
1.5 for wood frame construction
A = total floor area excluding basements more than 50% below grade

** If vertical opentings are inadequatly protected, consider two largest adjoining floors plus 50% of each of any floors above up to eight floors.*
** If vertical openings are adequatly protected (one hour rating), consider largest floor area +25% of two immediately floor*

Adjusments for Building Occupancy (shall not be less than 2,000 L/s)

Occupancy Adjustment	-15%	Non Combust		-25%	Free Burning	15%
F1 = Fire Flow x Adjustment =	4263.2 L/min	Limited Combust		-15%	Rapid Burning	25%
		Combustable	No Change			

Fire Suppression System

Sprinkler Adjustment =	30%	Automatic Sprinkler (monitored)	-50%
F2 = F1 x Adjustment =	1279.0 L/min	Adequately Designed System	-30%

Proximity Factor

Proximity Adjustment =	20% (max 75%)	Separation	Adjustment		Separation	Adjustment	
F3 = F1 x Factor =	852.6 L/min	0m to 3m		25%	20.1m to 30m		10%
		3.1m to 10m		20%	30.1 to 45m		0%
		10.1m to 20m		15%			

Adjusted Fire Flow (shall not be less than 2000 L/min or greater than 45,000L/min)

F1 =	4263.2	L/min
- F2 =	1279.0	L/min
+ F3 =	852.6	L/min
Fire Flow =	4000	L/min
Fire Flow =	66.7	L/s
Total Demand (Fire Flow + MDD) =	67.0	L/s

Fire Flow = F1 - F2 + F3

Project:	North Maple Regional Park Master Plan
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Date:	2026-02-17
Designed By	YN

Based on the Water Supply for Public Fire Protection Manual, 2020 by the Fire Underwriters Survey
Based on Preliminary assumptions. To be updated as the design progresses.

Building 5

Fire Flow Calculations

Construction Coefficient =	0.6	
Largest Floor Area =	5736	m2
Floor Above =	0	m2
Floor Below =	0	m2
Area =	5736	m2
Fire Flow (F) =	9997.2	L/min

F = required fire flow (L/min)
C = coefficient related to type of construction
0.6 for fire resistive (fully protected, 2 hr ratings)
0.8 for non-combustible (i.e. unprotected metal buildings)
1.0 for ordinary construction
1.5 for wood frame construction
A = total floor area excluding basements more than 50% below grade

** If vertical opentings are inadequatly protected, consider two largest adjoining floors plus 50% of each of any floors above up to eight floors.*
** If vertical openings are adequatly protected (one hour rating), consider largest floor area +25% of two immediately floor*

Adjusments for Building Occupancy (shall not be less than 2,000 L/s)

Occupancy Adjustment	-15%	Non Combust		-25%	Free Burning	15%
F1 = Fire Flow x Adjustment =	8497.6 L/min	Limited Combust		-15%	Rapid Burning	25%
		Combustable	No Change			

Fire Suppression System

Sprinkler Adjustment =	30%	Automatic Sprinkler (monitored)	-50%
F2 = F1 x Adjustment =	2549.3 L/min	Adequately Designed System	-30%

Proximity Factor

Proximity Adjustment =	20%	(max 75%)	Separation	Adjustment	Separation	Adjustment	
F3 = F1 x Factor =	1699.5	L/min	0m to 3m	25%	20.1m to 30m		10%
			3.1m to 10m	20%	30.1 to 45m		0%
			10.1m to 20m	15%			

Adjusted Fire Flow (shall not be less than 2000 L/min or greater than 45,000L/min)

F1 =	8497.6	L/min
- F2 =	2549.3	L/min
+ F3 =	1699.5	L/min
Fire Flow =	8000	L/min
Fire Flow =	133.3	L/s
Total Demand (Fire Flow + MDD) =	133.6	L/s

Fire Flow = F1 - F2 + F3

Project:	North Maple Regional Park Master Plan
Job No.:	CA0027129.6857
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Designed By	YN

Based on the Water Supply for Public Fire Protection Manual, 2020 by the Fire Underwriters Survey

Building 6

Based on Preliminary assumptions. To be updated as the design progresses.

Fire Flow Calculations

Construction Coefficient =	0.6		F = required fire flow (L/min)
Largest Floor Area =	200	m2	C = coefficient related to type of construction
Floor Above =	0	m2	0.6 for fire resistive (fully protected, 2 hr ratings)
Floor Below =	0	m2	0.8 for non-combustible (i.e. unprotected metal buildings)
Area =	200	m2	1.0 for ordinary construction
Fire Flow (F) =	1866.8	L/min	1.5 for wood frame construction
			A = total floor area excluding basements more than 50% below grade

** If vertical opentings are inadequatly protected, consider two largest adjoining floors plus 50% of each of any floors above up to eight floors.*
** If vertical openings are adequatly protected (one hour rating), consider largest floor area +25% of two immediately floor*

Adjusments for Building Occupancy (shall not be less than 2,000 L/s)

Occupancy Adjustment	-15%		Non Combust	-25%	Free Burning	15%
F1 = Fire Flow x Adjustment =	1586.74762	L/min	Limited Combust	-15%	Rapid Burning	25%
			Combustable	No Change		

Fire Suppression System

Sprinkler Adjustment =	30%		Automatic Sprinkler (monitored)	-50%
F2 = F1 x Adjustment =	476.0	L/min	Adequately Designed System	-30%

Proximity Factor

Proximity Adjustment =	20%	(max 75%)	Separation	Adjustment	Separation	Adjustment	
F3 = F1 x Factor =	317.3	L/min	0m to 3m	25%	20.1m to 30m		10%
			3.1m to 10m	20%	30.1 to 45m		0%
			10.1m to 20m	15%			

Adjusted Fire Flow (shall not be less than 2000 L/min or greater than 45,000L/min)

F1 =	1586.7	L/min	Fire Flow = F1 - F2 + F3
- F2 =	476.0	L/min	
+ F3 =	317.3	L/min	
Fire Flow =	1000	L/min	
Fire Flow =	16.7	L/s	
Total Demand (Fire Flow + MDD) =	17.0	L/s	

North Maple Regional Park Master Plan
Sanitary Flow Generation

Project: North Maple Regional Park Master Plan
Job No.: CA0027129.6857
Date: 2026-02-17

Post-Development Condition

Site Area 21.90 ha

Unit Type	Unit or GFA	Density (ppl/Unit) or (ppl/m2)	Equivalent Population	Per Capita Flow (L/cap/day)	Average daily Flow (L/s)	Peaking Factor	Peak Flow (L/s)
Zone 1							
Commercial	1934	0.0075	15	475	0.08	4.40	0.35
Commercial-Institutional	3600	0.0075	27	475	0.15	4.36	0.65
Zone 2							
Community- Recreational Centre	7091	0.005	35	475	0.19	4.34	0.85
Commercial-Institutional	2472	0.0075	19	475	0.10	4.38	0.45
Total	**-**	**-**	**96**		**0.53**	**4.25**	**2.23**
Groundwater Discharge	-	-	-	-	-	-	-
Infiltration	-	-	-	-	5.69	-	5.69
						Grand Total	**7.92**

Notes:

1. The recreational centre area was approximated to 932 m2 using google maps and a population density of 0.0258 persons/m2 was used to estimate the equivalent population of the Recreation Centre
2. Building programs are illustrative and demands will be updated during future design.

KEELE STREET

PROPERTY LIMIT

PROPOSED SANITARY SERVICE

PROPOSED SANITARY SERVICE

ZONE 1 SANITARY CATCHMENTS AREA

ZONE 2 SANITARY CATCHMENTS AREA

EX. SANITARY SERVICE

EX. SANITARY SERVICE

EX. SANITARY SERVICE

EX. SANITARY FORCEMAIN

ZONE 2 SANITARY CATCHMENTS AREA

PROPOSED SANITARY SERVICE

POTENTIAL TURTLE NESTING HABITAT

LEGEND

- LIMIT OF PROPERTY
- EX. SANITARY SEWER
- EX. SANITARY FORCEMAIN
- PROP. SANITARY SEWER
- PROP. SANI CATCHMENTS AREAS

No.	REVISIONS TO DRAWING	BY	DATE	APPR.
1		SMD		

ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED

CLIENT
CITY OF VAUGHAN

MUNICIPALITY
CITY OF VAUGHAN
REGIONAL MUNICIPALITY OF YORK

PROJECT TITLE
NORTH MAPLE REGIONAL PARK

SHEET TITLE
SANITARY CATCHMENTS AREAS

CONSULTANT
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STAMP

APPROVAL

DESIGNED	DRAWN	CHECKED
S.M.D.	01/26 CAD	P.H.

SCALE	DATE
1:2000	MARCH 2025

PROJECT NUMBER	DWG. NUMBER
CA0027129.6857	3

FILENAME C:\Users\ryan95845\DOCS\Docs\WSP Canada projects (AMER)\LDME ON 24\Files\CA0027129.6857 North Maple Regional Park\MAINFSR_Figure_Ac\3D.dwg
PLOTDATE Feb 11, 2026 - 10:56pm

	Stormwater Management Calculations	Project:	North Maple Regional Park	No.:	CA0027129.6857	
	Existing Area Takeoff	By:	SK	Date:	2026-03-31	Page: 1
		Checked:	GW			

Areas taken from the Existing Storm Drainage Plan in Stantec Report Appendix L, dated 2021

Existing Conditions to Keele St

Catchment	Area (ha)	Impervious
201-1	6.39	0.0%
201-2	0.83	0.0%
202	6.32	2.9%
203	1.09	0.0%
Existing Site Area (201)	**14.63**	**1.3%**

Existing Conditions to Existing SWM Pond

Catchment	Area (ha)	Impervious
101-1	11.07	3.9%
101-2	5.04	29.1%
101-3	7.53	1.9%
101-4	1.80	100.0%
101-5	4.13	3.0%
101-6	4.25	0.0%
102	6.55	0.0%
Existing Site Area (202)	**40.37**	**9.8%**

Existing Conditions to Wetland

Catchment	Area (ha)	Impervious
111	29.69	3.5%
112	4.48	0.0%
113	1.47	0.0%
Existing Site Area (203)	**35.64**	**2.9%**

	Stormwater Management Calculations	Project:	North Maple Regional Park	No.:	CA0027129.6857	
	Allowable Discharge Rate	By:	SK	Date:	2026-03-31	Page: 2
		Checked:	GW			

As per the TRCA requriements for the Unit Flow Rates North of Steeles:

To Keele St:	14.63	ha
To Existing Pond:	40.37	ha
To Wetland:	35.64	ha

Return Period (Years)	2	5	10	25	50	100
Unit Flow Rate (m^3/s/ha)	0.0033	0.0053	0.0069	0.0080	0.0116	0.0143
To Keele Street (m^3/s)	0.048	0.078	0.101	0.117	0.170	0.209
To Existing Pond (m^3/s)	0.133	0.214	0.279	0.323	0.468	0.577
To Wetland (m^3/s)	0.118	0.189	0.246	0.285	0.413	0.510

