Site Plan Engineering Guidelines

Engineering Division

Development Services Department

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A - REPORT FORMATS, SUBMISSION REQUIREMENTS AND PROCESSES

A.1 - Purpose

The following information is intended to support Engineering Consultants design of Grading Plans, Servicing Plans, Erosion & Sediment Control Plans, Stormwater Management and any additional designs or studies that may be required by the City of Kitchener's Engineering Division (DSD) for approval or clearance of conditions for Site Plan Approval, Committee of Adjustment, Site Alteration or Off-Site Works. Development review is an essential component to the approval process. As such, it is intended to:

- Complement the objectives of the Official Plan
- Conform to the requirements of the Zoning By-Law and other appropriate by-laws/regulations
- To ensure sufficient municipal services and on-site facilities
- Eliminate or reduce negative impacts on adjacent land uses; and
- Provide clear guidelines to help streamline and speed up the approval process

It should be noted that while the standards/criteria are designed to address most situations, they cannot cover every situation that may be encountered. Direct consultation should be made with the appropriate service area when the applicant feels that deviations from these standards are warranted. It is the responsibility of the applicant to ensure that the site plans depict appropriate and workable designs, services and facilities.

A.2 - Design Guidelines and Specifications

The following sections outline various engineering standards, administrative requirements, and information on engineering design for site development. This manual is not intended to be a complete reference for detailed design. Professional design staff must be familiar with applicable standards, specifications, guidelines, legislation, best practices and municipal policies relating to the proposed works. The Engineer providing design services for the site servicing works is responsible for understanding and incorporating all relevant requirements based on current legislation and guidelines as applicable to the planning, design, and construction of all services in Ontario.

The following list references key documents that pertain to engineering and landscape design for site development:

- MOE Design Guidelines for Drinking Water Systems
- MOE Design Guidelines for Sewage Works
- MOE Stormwater Management Planning and Design Manual
- Ontario Provincial Standard Specifications (OPSD)
- Region of Waterloo Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS)
- Ontario Building Code (OBC)
- Region of Waterloo By-laws
- City of Kitchener By-laws
- City of Kitchener Policies
- Urban Design Manual
- City of Kitchener Development Manual

Designs that are not consistent with the above requirements may not be accepted by the

City at the discretion of the Director of Engineering.

A.3 - Engineer's Qualifications

A registered Professional Engineer, specializing in Civil Engineering must endorse all design drawings and reports for Grading, Erosion and Sediment Control, Site Servicing, Details and Notes and Stormwater Management. A registered Professional Engineer, specializing in hydrogeological studies must endorse any geotechnical analysis. All engineers must be operating under a Certificate of Authorization issued by the Professional Engineers of Ontario. The firm should also be a member in good standing of the Consulting Engineers of Ontario. The Engineer must be qualified and competent to design the proposed works and must also be acceptable to the Director of Engineering.

All drawings and reports prepared by the professional engineer are to be sealed, signed & dated.

As the grading and stormwater management designs are inter-related it is required that the engineer and/or engineering firm that designed the site grading also develop the stormwater management scheme.

A.4 - Coordination of Drawings

It is imperative that the engineer responsible for stormwater management coordinate all related drawings, details and specifications through the prime consultant to ensure they are compatible with the approved site plan, architectural plans, and landscaping plans, etc. Drawings that are not compatible with the other disciplines may result in undue delays in clearing the conditions of the Development Agreement.

Please note that the Grading Control Plan, the Erosion and Sedimentation Control Plan and possibly the Details and Notes Plan for Site Plan developments require coordination between the engineering consultant and the landscaping consultant. Accordingly, prior to acceptance of the Grading Control Plan and the Erosion, Sedimentation Control Plan and possibly the Details and Notes Plan please ensure that each of the respective design professionals have duly signed these plans.

A.5 - Submission Requirements

For the Development Engineering Division to commence the review of a development proposal the following number of reports and drawings may be required. Digital submissions (PDF) are recommended for each submission. Hard copies will be accepted. If submitting hard copies only one set of drawings/reports are required and drawings should be folded and submitted on size 24"x36" paper:

- SWM Report and Plans (see note 1 & 2)
- Existing Conditions Plans (see note 3)
- Grading and Erosion & Sediment Control Plans (see note 2)
- Site Servicing Plans (see note 2)
- Geotechnical Investigation Report (see note 1 & 4)
- Sanitary and Storm Sewer Design Sheets (for new municipally owned sewers and services, if applicable)
- Phase 1 and if required a Phase 2 Environmental Site Assessments (see note 1 - if applicable)
- Development Asset Drawing (.dwg format – if applicable)
- Letter of Permission (if applicable)

- MECP, Environmental Compliance Approval or acceptable alternative (see note 1 - if applicable)
- Pollution Prevention Plan (see note 1 - if applicable)

NOTES:

1. *If submitting hard copies all reports are to be bound.*
2. *May be incorporated into one legible plan. The City reserves the rights to return all reports and plans that are deemed incomplete or onerous to review.*
3. *The existing conditions plan must be separate drawing but may include removals.*
4. *Geotechnical Report must be supplied by a geotechnical firm operating under appropriate authorizations (professional engineer). The report should include infiltration rates of on-site soils and ground water elevations.*

A.6 - Environmental Site Assessment (ESA)

An Environmental Site Assessment (ESA) shall be undertaken for the Site when a portion of the site is to be dedicated to the City free of encumbrances. When lands that are to be dedicated to the City of Kitchener, a Phase I ESA, and if deemed required as a conclusion of the Phase I, a Phase II ESA must be completed in accordance with either CSA Standard Z768 01 or Schedule D of Ontario Regulation 153/04. The Building Division may also require a Record of Site Condition (RSC) when a property is changing the land use through a Site Plan application or, Building Permit. Under Ontario Regulation 153/04, an RSC will be required if the proposed development will change the site to a more sensitive land use.

A.7 - On-Site Letter of Credit and Site Certification

Prior to Site Plan Approval the Developer must submit and receive acceptance of a cost estimate for the on-site works from City Engineering and Planning staff. Planning staff must receive a Letter of Credit (LC) and review fee in the amounts determined through the completion of the cost estimate. More information for the on-site LC process can be found on the City's website.

Upon completion of the project a letter of certification and Site Works Notification Form (found on the City's website) is required from the Professional Engineer who completed the grading, servicing and stormwater management design for the site prior to release of the LC. Once these are submitted to the Development Engineering Division, a site inspection will be completed to confirm the site was built as per the design. If City staff find deficiencies in the construction, they will prepare the standardized Site Deficiency Form along with redlined drawings noting where deficiencies are located. Consultants will be responsible for correcting the noted deficiencies prior to release of the LC. A fee, as defined by the City's approved fee schedule will be charged to the Developer for the third (3rd) and any subsequent inspections as required.

A.8 - Off-Site Works Process

Review of the Site Servicing Plan will indicate the need for the removal of redundant service connections or the installation of new ones within the municipal right-of-way. Refer to Appendix D in the City of Kitchener's Development Manual for the "Procedure for Off-Site Works Permit by Private Contractors" for the step-by-step process and required documents. This process needs to be completed prior to Site Plan Approval or Application for Consent (severances).

A.9 - Applications for Sewer and Watermains Extensions and Stormwater Management

Municipal authorization and alteration of the Environmental Compliance Approval (ECA) issued to the City of Kitchener from the MECP will be required for any alterations to the City of Kitchener Municipal Sewage Collection and/or Stormwater Management system (including addition, modification, replacement, or extension). The engineer shall submit an application for sanitary sewer and/or storm sewer extensions within the right-of-way and pay all fees associated with the extension prior to Site Plan approval or other development applications. For watermain extensions within the right-of-way and new water services 100mm and larger a Form 1 must be submitted to the Kitchener Utilities. The application can be found on The City of Kitchener's web site. The extension of sanitary/storm sewer or a watermain is 100% developer cost.

Please note that if the site is located in the City's Central Neighbourhood Boundary and a sewer or watermain extension or capacity upgrade is required the works may be eligible for funding by the City in accordance with Central Neighbourhoods Intensification Funding Guidelines. For further information please visit the City's website or contact the Project Manager in the Development Engineering Division assigned to the file.

To expedite Site Plan approval, Commercial, Industrial and some large Residential projects that involve stormwater management facilities and/or oil-grit separator units may require an MECP application to be submitted directly to the MECP for approval. The application forms shall be submitted to the City of Kitchener for signature prior to submission to the MECP. The developer shall be responsible for any fees payable to the MECP for this review. Proof that an application has been submitted to the MECP for approval along with a 100% guarantee based on the related cost of the SWM pond and/or oil-grit separator units is required prior to engineering sign-off for Site Plan approval and calculated in the On-Site Letter of Credit Cost Estimate. Prior to release of the guarantee a copy of the Environmental Compliance Approval is required, installation and engineering certification has occurred in accordance with approved plans and successful inspection has taken place. The requirement for an Environmental Compliance Approval will be at the discretion of the Director of Engineering.

A.10 - Development Asset Drawing

As per the Public Sector Accounting Board (PSAB) S. 3150 a Development Asset Drawing (AutoCAD) is required to be submitted with the corresponding correct layer names and NAD83 coordinate system to the satisfaction of the Development Engineering Division prior to Site Plan Approval. For a complete list of layer names refer to "CAD Standards for Engineering" in section A.9.4 of City of Kitchener Design Manual which refers to the CAD Standards Manual and Constructed Asset Data Submission Manual under the Development Manual Webpage.

PSAB is an independent body with the authority to set accounting standards for the public sector. The mission of the Public Sector Accounting Board (PSAB) is to serve the public interest by setting standards and providing guidance for financial and other performance information reported by the public sector. PSAB shall do this by establishing independent, conceptually-based standards and other guidance through consultation and communication and contributing to the development of internationally accepted standards.

Development Asset Drawing requirements apply to:

- New service connections or sewer and/or watermain extensions on City or

Regionally owned lands
- New sidewalk in the City or Regional right-of-way
- New fire hydrants, MH, CBMH, CB in the City or Regional right-of-way

Private stormwater management ponds, OGS units, infiltration galleries or other miscellaneous SWM infrastructure are no longer required to be included. Please reference the City of Kitchener Development Manual web page for submission manual and template file.

A.11 – O.Reg. 406/19

All private sites importing or exporting soils are required to be in compliance with O.Reg. 406/19 – On-Site and Excess Soil Management. Full details of the regulations and requirements are available on the MECP's website. Owners and their contractors are responsible to comply with the regulations when completing works on private property or as part of any Off-Site Works related to private development.

Compliance may include requiring a Qualified Professional completing studies comprising of an Assessment of Past Uses, a Sampling and Analysis Plan, a Soil Characterization Report and a Destination Report. Contractors may be responsible for Public Registry and Electronic Tracking.

B - GRADING AND EROSION & SEDIMENT CONTROL

This section deals with the grading and erosion control requirements of the proposed development. The following drawings are to be submitted to Development Engineering:

B.1 - Existing Conditions Plan

This plan will be used as a benchmark for all future development on the site and is required so the City may familiarize themselves with the present site conditions. In addition, this plan will be used to validate the pre-development parameters to be used in the pre-development stormwater management modeling. The professional responsible for the preparation of this plan must seal the plan with their professional seal (ie. Professional Engineer, OLS, CET). The requirement for this plan may not be substituted by information illustrated jointly or wholly on other required plans.

The following information is required to be shown on this plan:

1) Drawing to be completed in Metric (SI Units) to a measurable scale
2) Geodetic Benchmark
3) Legend
4) North Arrow
5) Municipal Address
6) Professional seal (signed & dated)
7) Key Plan
8) Legal Property Description
9) Property lines and all applicable bearings and distances of each property line
10) Street Names (City and Regional)
11) Contours to be drawn to 0.5m intervals minimum. Flat areas may require contours to be drawn at closer intervals in order to define drainage patterns. Contours to extend beyond the property line to a point which confirms the drainage on the neighbouring property will not be impeded by the proposed development.
12) Spot elevations are required at all lot corners and should be used to delineate depressions and ridges within the site.
13) Show all existing site surface features such as:
    buildings, sheds, walkways, driveways, trees, fences, major drainage channels, surface texture (i.e. concrete, gravel, asphalt)
14) All existing above ground and underground services, within the road allowance, fronting the site:
    - location of sidewalks/hydrants/trees/utility poles/signs/storm & sanitary sewers/infiltration galleries/water & gas mains/manholes/catchbasins/curbs & gutters
    - diameter/length/slope/inverts of all storm and sanitary sewers
    - location of all telephone and hydro ducts
    - elevations along centreline, top/bottom of curbs, and property line
15) Drainage patterns on neighbouring properties
16) Full width of fronting or flanking streets

Please note that this plan will not be required if the proposed development is located within a registered plan of subdivision with an approved lot grading control plan. If this plan is prepared by someone other than the Engineer responsible for the SWM design it is the Engineer's responsibility to ensure the accuracy of the Existing Conditions Plan for which the SWM design is based upon.

Each Existing Conditions Plan shall bear a note making reference to all other plans. Reference should also be made to the SWM Report and the Landscaping Plan (e.g. *This plan to be read in conjunction with the Grading and Erosion Control Plan, Site Servicing Plan, Landscaping Plan, and the Stormwater Management Report)*

All proposed removals including items in the municipal right-of-way may be placed on the Existing Conditions Plan. The drawing may then be named the Existing Conditions and Removals Plan.

B.2 - Grading and Erosion & Sediment Control Plan

The Grading and Erosion & Sediment Control Plan must illustrate how the site will be graded to provide erosion protection during the construction phase, how the final grading will ensure positive drainage away from all buildings, how the rainfall runoff will be directed to an approved outlet and that the site grading is compatible with the neighbouring properties. Downspouts should be directed to a landscaped area and are required to be equipped with splash pads to minimize the effect of erosion from rain water unless they are connected to infiltration gallery, holding tank or other stormwater management infrastructure.

The site grading is to be designed in a way to allow SWM to be implemented using both the minor and major drainage systems.

All grading of SWM facilities to be completed in accordance with the Integrated Stormwater Management – Master Plan (available under separate cover from Infrastructure Services Department – Sanitary and Stormwater Utility).

The following information is required to be shown on this plan:

1) Drawing to be completed in Metric (SI Units) to a measurable scale
2) Geodetic Benchmark
3) Legend
4) North Arrow
5) Municipal Address
6) Professional Engineer's seal (signed & dated)
7) Key Plan
8) Drawing Revisions Table
9) Legal Property Description
10) Property lines and all applicable bearings and distances of each property line
11) Street Names (City and Regional)
12) Proposed grades
13) Top of foundation and/or finished floor elevation and basement elevations (if applicable)
14) Location of all proposed manholes and catch basins
15) Clear indication of where existing grades are to be matched
16) Direction of flow with corresponding gradient
17) Swales with corresponding gradient (see typical swale detail)
18) Top and bottom elevations of all curbing, retaining walls and embankments
19) Embankments 6: 1 or steeper to be shown using a series of alternating long and short lines with corresponding slope ratio. Maximum embankment is 3:1 or 2:1 with a note indicating that low maintenance ground cover is required.
20) Easements both aerial and land: Storm, sanitary, water, gas, hydro, Bell, cable, environmentally significant areas, access, etc.

21) Drainage patterns on neighbouring properties +/- 10m outside the subject property line. Existing drainage patterns must be considered and respected in the design of infill development.
22) Trees to be retained/protected, or removed and location of any proposed LID's
23) Location of all proposed stockpiles
24) Silt Fencing
25) Sedimentation ponds with cross sections. Fences are required around water bodies with 91cm or more of standing water within a 24 hours period.
26) Check dams
27) Diversion swales
28) Erosion protection for catch basins and manholes
29) All permanent structures (i.e. decorative features, light standards, deep well units, sheds)
30) Construction details for swales, silt fencing, sedimentation ponds, check dams, diversion swales, erosion protection for catchbasins and manholes, mud mats, etc.
31) Landscape architect sign-off
32) Snow storage locations or snow removal procedures
33) Design of the barrier free spaces on the property shall be in accordance with the Urban Design Manual and the Zoning By-Law.
34) Appropriate widths and materials used on all sidewalks and walkways internal to the site per the Urban Design Manual. Sidewalk widths should be measured from the back of curb (if applicable).
35) Internal walkways crossing parking areas or drive aisles are to be noted as being concrete or alternate material to painted asphalt.
36) Driveway entrances to sites within the City right-of-way are to be built in conformance with OPSD 350.010. Driveways within the Region of Waterloo right-of-way are to be built in conformance with the Regional Standard. All driveway entrances that abut a sidewalk must be constructed in concrete. All driveway entrances within the City or Regional ROW must be constructed in a hard surface. Curb returns, if specified, must taper for the sidewalk. Sidewalks for commercial, industrial and large residential properties must be 200mm thick within the driveway entrance. If the site has street fronting townhomes the standard drop curb and driveway ramp detail from the Development Manual may be used. Driveway entrances abutting a Multi-Use Trail (MUT) shall be concrete.
37) Retaining wall permitting and design should be in accordance with the OBC Division A, Part 1 and Division B, Part 4. Furthermore, any retaining walls adjacent to public property will be built for a 75 year design life, built entirely on private property (including tie-backs and footings) and be approved by the Chief Building Official.
38) Show delineation between light duty and heavy duty asphalt on grading plan as per geotechnical report and fire route requirements.
39) All deep well units and garbage locations must be on a hard surface (concrete pad recommended).
40) All bike racks must be on a hard surface (concrete pad recommended).
41) A step joint for where proposed asphalt matches existing asphalt within private property and also within the right-of-way as per the Development Manuals Asphalt Joint Restoration Detail.
42) For sewer and culvert outlets, rip rap placement should be in accordance with OPSD 810.010 (Type B).
43) The Owner is responsible to obtain applicable permits/clearances from other governing bodies.

B.3 - Erosion & Sediment Control Notes

The GRCA is slowly shifting away from the 2006 Greater Golden Horseshoe document for erosion control plans, designing and practices. They have been noting the Erosion and Sediment Control Guide for Urban Construction (TRCA, 2019) as the document for consultants to reference. Sites may require diversion swales and a temporary sedimentation basin unless it is shown that the erosion index factor is low enough that such a facility is not warranted. The following standard notes are to be placed on the Grading and Erosion & Sediment Control Plan along with the erosion control details:

1) All silt fencing to be installed prior to commencement of any area grading or excavating works.
2) Erosion control fencing to be placed around the base of all stockpiles. All stockpiles must be kept a minimum distance of 2.5m from all property lines and 15m away from all water courses.
3) Erosion protection to be provided around all storm and sanitary manholes and/or catchbasins as per the attached details.
4) Additional erosion control measures may be required as site development progresses. Contractor to provide all additional erosion control structures.
5) Erosion control structures to be monitored regularly by (Owners Representatives Name) and any damage repaired immediately. Sediments to be removed when accumulations reach a maximum of one third (1/3) the height of the silt fence.
6) All erosion control structures to remain in place until all disturbed ground surfaces have been re-stabilized either by paving or restoration of vegetative ground cover.
7) No alternate methods of erosion control protection shall be permitted unless approved by (Owners Representatives Name) and the City of Kitchener's Engineering Division.
8) The Contractor is responsible for removing sediments from the municipal roadway and sidewalks at the end of each work day.
9) Mud mats to be provided on site at all locations where construction vehicles exit the site. Mud mats shall be a minimum of 3.0m wide, 15.0m long (length may vary depending on site layout) and 0.3m deep and shall consist of 200mm stone material or approved equivalent. Contractor to ensure all vehicles leave the site via the mud mat and that the mat is maintained in a manner to maximize its effectiveness at all times.
10) (Owners Representatives Name) to monitor the site development to ensure all erosion controls are installed and maintained to City requirements. Contractor to comply with the Engineer's instructions to install, modify, or maintain erosion control works.
11) Any runoff from the developing property affecting a neighbouring property in any way must have heavy duty silt fence installed to limit future issues.
12) The contractor is required to apply reasonable preventative measures to limit the generation of dust which may result from construction activities. Under the Environmental Protection Act, it is the duty of the owner or controller of a spilled pollutant to clean up a spill. They must do everything practicable to prevent and eliminate the negative effects from a spill, including restore the natural environment to its original state.

Please note that the Grading and Erosion & Sediment Control designs may be split onto two separate drawings, one being the Grading Plan and the other being the Erosion & Sediment Control Plan.

The following additional notes are to be placed on all Grading and Erosion & Sediment

Control Plans:

1) The property owner is responsible for restoration of all damaged and/or disturbed property within the municipal right-of-way to City of Kitchener standards.
2) If, for unforeseen reasons, the Owner and/or his/her representative must encroach onto private lands to undertake any works, he/she must obtain written permission from the adjacent property owners prior to entering upon the private property to perform any works. Copies of these letters of consent must be submitted to the Engineering Division, prior to any work being performed. Failure to comply with the above is at the property owners own risk.
3) Each Grading and Erosion & Sediment Control Plan shall bear a note making reference to all other plans included with the SWM Report. Reference should also be made to the Landscaping Plan (e.g. This plan to be read in conjunction with the Existing Conditions Plan, Site Servicing Plan, the Stormwater Management Report and Landscaping Plan)
4) The final grading of the property shall not adversely affect the drainage of adjacent properties or the overall grading control plan (subdivision).

B.4 - Letters of Permission

Encroachment on to neighbouring properties is prohibited. If it is shown on the plans that site servicing, grading or erosion and sediment control works will have to encroach onto neighbouring lands, the City of Kitchener will require letters of permission from each property owner affected by the proposed works. These letters must be received by the Development Engineering Division prior to receiving approval of the Grading and Erosion & Sediment Control Plan, Site Servicing Plan and Stormwater Management Report.

B.5 - Grading Standards

The following table is to be used as a guide in establishing the internal grading for the site:

Driveways	Optimum slope	4.0%
	Maximum slope	8.0%
	Minimum cross slope where centerline slope is less than 2%	2.0%
	Maximum cross slope	5.0%
Emergency Access	Maximum slope	6.0%
	Minimum cross slope where centerline slope is less than 2%	2.0%
	Maximum cross slope	6.0%
Paved Areas – including parking stalls & associated aisles	Minimum slope	0.5%
	Optimum slope	1.0%
	Maximum slope	5.0%
Sidewalks – no complex slopes permitted	Minimum slope	0.5%
	Optimum slope	2.0%
	Maximum slope (private)	4.9%
	Maximum slope (public)	4.0%
	Minimum ramp slope	5.0%
	Maximum cross-fall	4.0%
Landscaped Areas	Minimum slope	2.0%
	Optimum slope	4.0%
Rear Yard Access Routes	Maximum slope	10.0%

B.6 - Pre-Grading

Pre-grading must be requested by the Engineering Consultant. Once the Erosion and Sediment Control Plan is accepted by the City's Engineering Division, the Consultant will receive consent to begin installing the erosion and sediment control measures on site as per the accepted plan. Once erosion and sediment controls are in place and inspected by the Consultant Engineer, a certification letter (stamped, signed and dated by a professional civil engineer) must be submitted to Engineering. Engineering Staff will complete an inspection to confirm E&SC measures have been installed per the accepted plans.

Additionally, pre-grading authorization must be coordinated with the City's Urban Designer from the Planning Division. The Urban Designer requires confirmation from the Professional who completed the Vegetation Management Plan that tree protection measures have been installed in accordance with the approved plans. Confirmation can be provided by either letter or email. The Urban Designer will also need to complete a site inspection to confirm tree protection measures have been installed per the accepted plans.

Upon successful inspection by City Engineering and Planning staff, Engineering will grant pre-grading approval on the site. This will allow area/rough grading activities to proceed prior to satisfying all required engineering conditions. This does not grant permission to install any services, build any retaining walls or pour any building foundations.

C – SITE SERVICING

This section deals with the site servicing requirements of the proposed development. The section is broken out into Engineering Division and Building Division review scope.

C.1 - SITE SERVICING – ENGINEERING DIVISION

A Site Servicing Plan is to be completed which illustrates the location of all existing and proposed sanitary, storm and water services from the street sewer or main to the property line and from the property line into the site. For new sanitary or storm service connections or main lines sewers in the municipal right-of-way the Site Servicing Plan must be accompanied by the sanitary and/or storm sewer design sheets for Engineering review and approval. Minimum sanitary velocity is 0.8m/s and max sanitary velocity is 3.0m/s, whereas storm minimum and maximum velocities are 0.8m/s and 6.0m/s respectively. Removal of existing service connections and/or installation of new service connections will be completed, at the owner's expense, through the current Off-Site Works Process.

An application for the removal and/or installation of services and/or inspection fees is to be made to Development Engineering Division. Upon receipt of all funds for the service connections, inspection fees and completion of the Off-Site Works process, an Off-Site Works Permit will be generated authorizing the work to proceed.

For any site developments that will have street fronting townhomes but are part of the site property, these units need to be serviced from inside the site. Separate individual service connections to the municipal right-of-way will not be permitted.

For approved sanitary and storm sewer pipe materials used in the City or Regional right-of-ways refer to the most current edition of the Region of Waterloo and Area Municipalities Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS). Please note that the Region of Waterloo and the City of Kitchener will not accept plastic pipe over 600mm diameter and The City of Kitchener does not accept Profile PVC pipe (CSA 182.4).

For developments occurring through the Committee of Adjustment process where there is no existing municipal storm sewer infrastructure and it is not feasible to extend a municipal storm sewer, sump pump discharge may be directed to a privately owned infiltration gallery. The infiltration gallery may be designed and sized by the Consulting Engineer with applicable details included in the Site Serving Plan.

For developments where there is limited downstream sanitary capacity, private sewage holding tanks for off peak hour pumping will not be permitted. Downstream sanitary sewers that require upsizing for the proposed development will paid for by the developer.

C.1.1 - Site Servicing Plan

A Site Servicing Plan showing all private site services for sanitary, storm and water is required for approval by engineering prior to final Site Plan approval. The Site Servicing Plan must also show the location of all municipally owned infrastructure located in the public right-of-way. The City must be satisfied that proper engineering practices have been applied to the design of all proposed services within the site and within the right-of-way.

It is the Engineer's responsibility to ensure the accuracy of the existing plan shown on the drawings submitted to the City for review. The City does not guarantee the accuracy of the information presented on any drawings that are obtained from the City for design purposes.

All sanitary manholes located within a stormwater management ponding area is to be fitted with water tight covers, as per OPSD 401.050.

The following information is required to be shown on the Site Servicing Plan as they relate to the design. Additional information is for reference:

1) Drawing to be completed in Metric (SI Units) to a measurable scale
2) Geodetic Benchmark
3) Legend
4) North Arrow
5) Municipal Address
6) Professional Engineer's seal (signed & dated)
7) Key plan
8) Street Names (City and Regional)
9) All existing underground services to the site such as:
   - storm/sanitary laterals
   - water/gas services
10) Notation of all existing services to be removed or disconnected
11) Full width of fronting or flanking streets
12) Proposed services from the street to the building including the following:
   - size, length and slope of all sewers and laterals, top of grate elevations and sewer inverts of all manholes and catch basins
13) Pipes located within frost zones to be insulated. Detail to be provided on plan.
14) Location and size of all LID's
15) Details for all appurtenances related to servicing to include the following:
   - all specialized engineered structures, pipe bedding, insulation, flow control device, weirs, rip rap
16) Specifications for all on-site sanitary and storm sewers and water services to the property line (i.e. pipes, grades, manholes, catchbasins, seepage collars, etc.)
17) Location and size of all easements (existing and proposed). Easements widths must be twice the depth of the service or 5m (whichever is larger) and centered over the services. No structures (as defined in the Building Code) are permitted within an easement.
18) Clear identification of works to be completed, within the municipal right-of-way, by the Developers Contractor (i.e. servicing, closing of redundant driveway entrances, curb & gutter replacement, curb cuts, sidewalks, boulevard restoration, etc.)
19) Clearly identify downspout locations and ensure downspouts are directed to landscaped areas, splash pads or infiltration galleries.
20) Show all fire hydrant locations. Fire hydrant separation between permanent structures must be 3.0m min. As per Region of Waterloo DGSSMS a minimum clearance of 0.6m behind, 2.0m to side with port and 1.0m to side without port.
21) All privately owned structures must be completely on private property.
22) Infiltration galleries with two observation wells must be shown on the plan. The plan should identify the size of the gallery and include storm connections to and from the gallery. Infiltration galleries must be 5m away from a structure (structure defined under the Building Code).
23) All MH's and CBMH's in the City or Regional right-of-way require benching as per OPSD 701.021.

24) The maximum MH and CB adjustment unit height is 300mm. Per the Region of Waterloo DGSSMS MH adjustment units are to be as per OPSS 407 and OPSD 704.010. Additionally, ladder rings to conform to the aforementioned OPSD 704.010.
25) Safety grates are required in structures 5.0m deep or greater.
26) As per The Region of Waterloo DGSSMS drop structures shall be provided in accordance with MECP design guidelines. MECP guidelines require an external drop structure where difference in inverts is 0.61m or greater.
27) As per The Region of Waterloo DGSSMS 300mm or larger open inlet/outlet requires rodent grate. Refer to OPSD 800.010. Other details/designs may be acceptable upon City of Kitchener review. Additionally, per The Region of Waterloo DGSSMS headwalls with 450mm and smaller outlet require headwall as per OPSD 804.030 and with 525 and larger outlet requires a headwall as per OPSD 804.040. The grating for a headwall is as per OPSD 804.050.
28) All unused water services must be capped at the main and curb stops removed at property line unless approval is granted by Kitchener Utilities in writing to cap at the property line. All unused sanitary and storm services must be capped at the property line. The Region of Waterloo should be consulted for all unused services located in their right-of-ways.
29) Minimum separation between the proposed orifice and oil-grit separator is 5.0m.
30) Foundation drainage must be directed to sump pumps and discharged to a storm lateral where municipal infrastructure (storm sewers) exists in the right-of-way. This includes all new developments and most infill developments. Instances where municipal infrastructure does not exist sump pump discharge can be per OBC. Foundation drains using sump pumps shall use a 'gooseneck' connection and shall be pumped over the foundation wall and connected to the storm sewer connection where available. Sump pumps may discharge to grade with permission from the Engineering Division.
31) New services are required to be connected to the property if the existing services are undersized, older than 50 years or of a material that is no longer acceptable within The City of Kitchener (ex. clay). The existing services then must be capped.
32) Each property may have a maximum of one water service and one sanitary service. An additional sanitary service may be acceptable but will be reviewed on case by case basis. An additional water service may also be required if the building height exceeds 84m and in accordance with the OBC 3.2.9.7.(4).
33) Cleanouts are required in accordance with OBC 7.4.7.1 & 7.4.7.2
34) All new sanitary and storm sewer service connections into the municipal right-of-way are to be in accordance with the latest version of the DGSSMS.
35) If Off-Site Works servicing is required in the City's right-of-way the asphalt restoration shall be in accordance with City of Kitchener Standard Specification for Hot Mix Asphalt (CKSS 310.02). Binder asphalt may include up to 30% recycled asphalt pavement (RAP) and surface asphalt may include up to 15% RAP.
36) For on-site (private) sanitary or storm blind connections 150mm and smaller into a sanitary or storm mainline, 'Y' connections are required per OBC.
37) The Owner is responsible to obtain applicable permits/clearances from other governing bodies.

C.1.2 - Standard Notes

The following notes are to be placed on all Site Servicing Plans:

1) The property owner is responsible for restoration of all damaged and/or disturbed property within the City or Regional right-of-way to City of Kitchener or Regional

standards.

2) If, for unforeseen reasons, the Owner and/or his/her representative must encroach onto private lands to undertake any works, he/she must obtain written permission from the adjacent property owners prior to entering upon the private property to perform any works. Copies of these letters of consent must be submitted to Development Engineering Division, prior to any work being performed. Failure to comply with the above is at the property owners own risk.

3) Each Site Servicing Plan shall bear a note making reference to all other plans including with the SWM Report. Reference should also be made to the Landscaping Plan (e.g. This plan to be read in conjunction with the Existing Conditions Plan, Site Grading and Erosion & Sediment Control Plan, the Stormwater Management Report and Landscaping Plan,)

4) All work within the City or Regional right-of-way must go through the City of Kitchener's Off-Site Works Process and must be completed by a developer selected contractor solely at the developer's expense.

C.1.3 - Water Servicing

General – refer to the Region of Waterloo and Area Municipalities Design Guidelines and Supplemental Specifications for Municipal Servicing (DGSSMS) for:

- Sizing
- Location
- Number of Services Per Property
- Restraints
- Bends
- Valving – The City of Kitchener requires 2 valves for service 100mm and larger. For services under 100mm a curb stop is required at property line.
- Metering - Refer to Kitchener Utilities Policy for Properties Requiring Multiple Meters under Kitchener Utilities Forms.
- Meter Pits – Kitchener Utilities does not permit the installation of water meters in chambers (pits). Refer to Kitchener Utilities Policy for Meter Pits under Kitchener Utilities Forms
- Allowable materials (e.g. curb stops, services) - On site water service 50mm and less should be of the type Can/CSA 131.1 Polytubes 200 or copper type K or Municipex

Watermain Looping – The maximum water service length is 150m. The water service must be looped if 150m is exceeded.

Service Diameter – Services greater than or equal to 100mm shall be sampled to ensure these services pass the chlorine residual and bacteriological requirements for new mains. A Watermain Commissioning Plan shall be provided to the Building Department. Testing shall be completed by licensed personnel as defined in Ont. Reg. 248/03 prior to being put into commissioning. The Building Department reviews and provides sign-off regarding private tests.

Service Length – When the water service is greater than 250m in length, regardless of diameter, chlorine residual shall be completed. A Watermain Commissioning Plan does not need to be submitted; however, sampling is required at the end of each branch/stub (not small services) and at a maximum of 350m between samples.

Watermain Commissioning Plan – Refer to DGSSMS for procedure and template. Water

commissioning plans must be submitted to the Building Department when the service diameter is greater than or equal to 100mm. To arrange for water shut downs call Kitchener Utilities 519-741-2529.

Kitchener Utilities prefers that private fire hydrants be painted entirely red. Private hydrants shall not be painted City of Kitchener colours as outlined in the DGSSMS.

Water services may be reused if the service is less than 50 years old or the service will be used within the next two years.

If Engineering requests a Water Distribution Analysis be completed as part of a Zoning Bylaw Amendment application please contact the Engineering Division or Kitchener Utilities for the latest Fire Flow Requirement document.

When completing new water services connections 100mm and larger to an existing municipal watermain a tapping valve should be specified on the Servicing Plan.

C.1.4 – Pre-Servicing

The City's Building Division has revised its process for Pre-Servicing. A Building Permit (Plumbing Permit) cannot be issued without site plan approval which includes site servicing. The only exemption to this is a conditional permit that must be approved by the Chief Building Official. If the CBO deems the application acceptable for a conditional permit after checking with City Planning and Engineering staff, a conditional permit can be applied for. A conditional permit includes a legal agreement between the client and the City and a letter of credit. Off-Site Works may proceed to bring services to the P/L once an Off-Site works permit is issued.

C.1.5 – Servicing of Stacked Townhouses

Stacked townhouses in private site plan developments will need to be serviced entirely from within the site with private services (sanitary, storm, water). Each building shall receive a least one storm sewer connection for foundation weepers. Each unit shall receive one water service complete with a curb stop. Each unit stack shall receive one sanitary service. A unit is considered as a dwelling within the building. A unit stack is considered 2 to 4 units set vertically on top of each other. Servicing through units on back-to-back stacked buildings is not permitted.

C.1.6 – Sanitary Flow Calculations (ZBA)

All sanitary flows should be developed based on the sites zoning and per the City of Kitchener Development Manual and the Region's DGSSMS. In certain instances where a Zoning Bylaw Amendment application is made to provide a property with a special regulation that would permit the buildings Floor Space Ratio (FSR) to be increased beyond what is permitted per the sites zoning, in other words to increase the properties population, the population in the sanitary flow design sheet should be based off the Regions 2020 Water and Wastewater Monitoring Report. Section 2.4 – Development Data establishes a People Per Unit (PPU) based on Structure Type and assigns Apartments as having a PPU of 1.77. Please multiply 1.77 by the number of units in the building. Furthermore, the City's Average Daily Residential Sanitary Flow rate is 305L/day/cap and the City's Average per second Residential Sanitary Flow rate is 0.0035L/sec/cap.

C.1.7 – Zoning Bylaw 2019-051 Conversion

The City of Kitchener's Comprehensive Review of Zoning Bylaw (2019-051) has now been implemented across the City on approximately 80% of Residential, Commercial, Employment,

Institutional, and Mixed Use properties. As of January 2023, key lands that remain within old zoning 85-1 are: central neighbourhoods, lands around LRT stations, Lower Doon, Bridgeport East, North Ward, Hidden Valley, and Rosenberg. These lands will be phased into the new zoning 2019-051 over the next 1-5 years. The following chart is a conversion chart that compares the old zoning (85-1) to new zoning. It also includes relevant sanitary flow rates, people per hectare and floor space ratios:

Zoning per 85-1	Zoning per 2019-051	Sanitary Flow	Peo/ha	Floor Space Ratio
Industiral	EMP 1-5	per DGSSMS		
Institutial	INS 1-2	per DGSSMS		
Commercial	COM 1-4	per DGSSMS		
MU-1	MIX 1	305L/day/cap	312	1
MU-2	MIX 2	305L/day/cap	387	2
MU-3	MIX 3	305L/day/cap	775	2
R1	RES-1	305L/day/cap	36	Max 3 units
R2	RES-1	305L/day/cap	36	Max 3 units
R3	RES-2	305L/day/cap	72	Max 3 units
R4	RES-3 frontage btwn 10.5m to 14.99m	305L/day/cap	143	Max 3 units
R4	RES-4 frontage less than 10.5m or greater than 14.99m	305L/day/cap	143	0.6
R5	RES-4	305L/day/cap	143	0.6
R6	RES-5	305L/day/cap	196	0.6
R7	RES-6	305L/day/cap	387	2
R8	RES-6	305L/day/cap	387	2
R9	RES-7	305L/day/cap	775	4

C.1.8 – Permanent Pumping of Foundation Drains

Permanent pumping of foundations situated in a water table is permitted in the City of Kitchener. The proposed outlet should be a piped outlet and connected to the municipal storm sewers in the right-of-way. A proposed storm sewer outlet location should be shown on the Site Servicing Plan. Since municipal storm sewers are typically designed to convey a 5-year storm and will be at capacity during a 5-year storm event an alternate discharge location for the pumping system should be shown on the Site Servicing Plan. If the alternate discharge location includes the surface of the development outside of the building, drainage of this water will need to be carefully considered.

The Engineering Division will comment on the capacity of the receiving municipal storm sewer system to which the building pumping system is proposed to discharge to. Engineering will also review general site drainage and specifically drainage of any pumped groundwater if it is discharged to the surface. The Building Division will comment on all other aspects of the groundwater control system and building design.

C.2 - SITE SERVICING – BUILDING DIVISION

An accepted Site Servicing Plan, bearing stamp and signature from Development Engineering,

shall be submitted to Building Division. The applicant must ensure the latest (most recent) accepted plans are submitted, to avoid delays in the review and approval process.

A building permit application for the installation of services shall accompany the accepted Engineering plans. A separate application (in addition to Engineering accepted) shall be made to Building Division. Applicable permit fees owing are due at time of building permit application. Once review and approval of the permit plans are completed, the permit will be issued, authorizing the work to proceed.

For approved sanitary and storm sewer pipe materials used within the private property refer to **7.2 - Materials and Equipment**, under the current Ontario Building Code (OBC).

Servicing plans that include an infiltration gallery shall be designed and sized by the Consulting Engineer with applicable details included in the Site Serving Plan.

C.2.1 - Site Servicing Plan

A Site Servicing Plan showing all private site services for sanitary, storm and water is required for approval by the Building Division prior to permit issuance. The City must be satisfied that proper engineering practices have been applied to the design of all proposed services within the site, taking into account all applicable Codes and Guidelines.

It is the Engineer's responsibility to ensure the accuracy of the placement of all services on the drawings submitted to the City for review. Site Services Engineer shall ensure servicing plans are coordinated with the plumbing plans when a separate building permit for a new building is involved. Size and location of services from proposed building shall match site servicing plans.

In addition to the list of items specified by Engineering, the following information is required to be addressed on the Site Servicing Plan related to sanitary and storm sewers. Refer to C.2.2 for requirements of water service piping.

1) Every sanitary drainage system shall be connected to a public sanitary sewer, or if accepted by the Region, a private sewage disposal system (when a public sanitary sewer is not available) – OBC 7.1.5.1. Note systems larger than 10,000 litres/day are regulated under the Ontario Water Resources Act, with approvals issued by the Ministry of Environment.
2) Every storm drainage system shall be connected to a public storm sewage works, or a designated storm water disposal location but **shall not** be connected to a sanitary sewage works – OBC 7.1.5.2.
3) With some exceptions, piping in any building shall be connected to the public service separately from piping of any other building – OBC 7.1.5.4.
4) Every interceptor, cleanout, valve, device or piece of equipment shall be so located that it is readily accessible for use, cleaning and maintenance.
5) Materials and equipment shall be in accordance with OBC 7.2.
    a. Materials and equipment used in a drainage system where excessively corrosive wastes are present shall be suitable for the purpose
    b. Every length of pipe shall have cast, stamped or indelibly marked on it with the relevant standard
    c. A "T" fitting shall not be used in a drainage system except to connect a vent pipe
    d. No double Y, double TY, double T or double waste fitting shall be installed in a nominally horizontal soil or waste pipe

6) Nominally horizontal piping that is underground shall be supported on a base that is firm and continuous under the whole of the pipe
7) Protection of piping, including protection from frost, shall be in conformance with OBC 7.3.5.
8) Testing of drainage pipes and potable water systems shall be in conformance with OBC 7.3.6. and 7.3.7.
9) With some exceptions, no foundation drain, or subsoil drainage pipe shall connect to a sanitary drainage system – OBC 7.4.5.3.
10) Every sanitary drainage system and storm drainage system shall be provided with cleanouts that will permit cleaning of the entire system – OBC 7.4.7.
    a. Cleanouts on a building sewer 8 in. or larger in size shall be a manhole
    b. Manholes shall be located at all junctions and all changes in grade, size or alignment on a sanitary building sewer that is 8 in. or larger in size
    c. Manholes shall be located at changes in grade, size or alignment on a storm building sewer or exterior storm drainage pipe that is 8 in. or larger in size.
    d. Where there is a change in direction greater than 45 degrees in a sanitary building sewer, a cleanout shall be installed at each change in direction.
11) Every drainage pipe that has a size of 3 in. or less shall have a downward slope in the direction of flow of at least 1 in 50. Where compliance is not possible, a lesser slope may be used if it will produce a gravity flow of not less than 0.6m per second – OBC 7.4.8.1.
12) No drainage pipe shall be connected as to drain to other drainage pipe of a lesser size – OBC 7.4.9.1.
13) The hydraulic load that is drained to a horizontal sanitary drainage pipe shall be in conformance with OBC Table 7.4.10.8. – based on pipe diameter/size and slope
14) Horizontal sanitary drainage pipe shall be designed to carry no more than 65% of its full capacity
15) The hydraulic load that is drained to a horizontal storm drainage pipe shall be in conformance with OBC Table 7.4.10.9. – based on diameter/size and slope.

C.2.2 - Water Servicing

In addition to the list of items specified by Engineering, the following information is required to be addressed on the Site Servicing Plan related to water service piping:

1) Water service pipes and fire service mains shall be certified or confirm to the standards for materials listed in OBC Table 7.2.11.1.
2) A 14-gauge TW solid copper light-colored plastic-coated tracer wire shall be attached to every non-metallic water service pipe or fire service main – OBC 7.2.11.3.
3) Pipe clamps and tie-rods, thrust blocks, locked mechanical or pushed-on joints, mechanical joints utilizing set screw retainer glands, or other suitable means of thrust restraint shall be provided at each change of direction of a water service pipe 4 in. or more in size and at all tees plugs, caps and bends – OBC 7.3.4.9.
    - Concrete thrust blocks shall have a compressive strength of not less than 10 MPa after 28 days
    - Thrust blocks shall not be used to restrain vertical pipe
4) With some exceptions, a buried water service pipe shall be separated from the building drain, building sewer and a private sewage disposal system, by not less than 2440 mm measured horizontally, of undisturbed or compacted earth – OBC 7.3.5.7.
    - Water service pipe may be closer than 2440 mm if the bottom of the water service pipe at all points is at least 500 mm above the top of the building drain or building

sewer

5) Testing of potable water systems shall be in conformance with OBC 7.3.7.
6) Where the water supply is metered, the installation shall be according to the City of Kitchener Utilities Division – OBC 7.6.1.3.
7) Thrust restraint of water service pipes shall be in conformance with OBC 7.3.4.9.
8) Connections to potable water systems shall be designed and installed so that non-potable water or substances that may render the water non-potable cannot enter the system. Backflow protection shall be in conformance with OBC 7.6.2.
9) A newly installed part of a potable water system shall be cleaned and then flushed with potable water before the system is put into operation – OBC 7.6.2.8.
10) See the water quality testing details below as part of the Building Permit for requirements on new 100mm and larger water services.

WATER QUALITY TESTING REQUIREMENTS FOR NEW 100mm AND LARGER WATER SERVICES

This standard practice has been revised as April 2018 and applies to all new and/or replacement water systems, 100mm and larger in size, on private property.

General

In order to ensure that the municipal water system is not contaminated due to a backflow event, the City is taking pro-active steps to maintain a safe and reliable water supply for consumers. In order to achieve this goal, the new private water system shall be kept isolated from the existing municipal water service using a physical separation or acceptable backflow preventer until satisfactory bacteriological testing has been completed and accepted by the municipal building department.

A watermain commissioning plan should be submitted prior to watermain installation so that source requirements and sampling points are known which may avoid the need to change construction plans or re-excavate a main to install an intermediate sampling point. City of Kitchener Public Utilities Engineer, to be copied for comments (519-741-2600 x4408)

Site servicing contractor must be licensed within City of Kitchener as a drainlayer or plumber. Contact 519-741-2275 for any licensing inquires.

Procedure

1) Water required to fill the new water service for hydrostatic pressure testing, disinfection, and flushing shall be supplied through a temporary connection between the municipal service and the new private water system. The temporary connection shall include an appropriate cross-connection control device consistent with the degree of hazard (a double check valve assembly (used above ground level **ONLY**)). Contractor must provide proof of being a certified installer of backflow preventers as well as a recent written certification for the backflow prevention device being used (to ensure operation in accordance with CAN/Canadian Standards Association-B64 Series Manual).
2) During the hydrostatic pressure test, the backflow preventer must be physically disconnected to positively ensure that there is no cross-contamination. Provide copy of test results to Plumbing Inspector. Plumbing Inspector to verify test (as per 7.3.7.5.).
3) The private water system must be disinfected in accordance with: Water Main Disinfection Procedure M.O.E.C.C (2016). As of May 1, 2016, the new watermain Disinfection Procedure comes into effect in Ontario. The new Procedure is being

released by the Ministry of the Environment and Climate Change. It outlines a number of changes to the disinfection requirements for new watermains and also when dealing with routine water system maintenance and watermain breaks. The requirement for disinfecting new watermains has changed slightly. The new requirement is that during the super chlorination phase of the new main commissioning, the maximum allowable decrease in chlorine residual is 40% (to a maximum of 50mg/L). For example: When using the continuous feed method of chlorination with and initial chlorine concentration of 50mg/L, the maximum allowable decrease in chlorine concentration is 40% of 50 mg/L, or 20 mg/L. Therefore, at least 30mg/L of chlorine must be present after 24 hours. This information must be submitted and approved before final connection will be permitted (for both temp watermains and new watermains). The Contractor shall provide acceptable equipment and chemical additives to de-chlorinate any water that must be wasted. Total residual chlorine in waste water discharged into storm sewers, drainage ditches or watercourses shall not exceed 0.2 mg/L. If alternate options are not available, the discharge of super-chlorinated water may be permitted to the sanitary collection system with the written authority of the city of Kitchener Public Works Department.

4) Before the water service can be approved for final connection to the municipal service, two consecutive rounds of water samples, taken at least 24 hours apart, must pass bacteriological requirements before the system will be considered potable.
5) The Site Engineer and Plumbing Inspector shall determine the sampling locations
6) Do not flush or allow water to be taken or otherwise disturb the water in the private water system during the 24 hour time period between the first and second sampling rounds.
7) Only licensed testing personnel shall collect water samples and only an accredited lab shall be used to perform the bacteriological testing. Associated costs for testing shall be the responsibility of the project owner. The sampler must be licensed in accordance with OWRA Reg. 459. Information on licensing can be found at the Ontario Environmental Training Consortium website, www.oetc.on.ca
8) The minimum requirements for acceptability of bacteriological tests are: (as per city of Kitchener minimum municipal requirements)

E.coli	A (Presence / Absence Test)
Total Coliform	A (Presence / Absence Test)
Background	<25 count (membrane filtration)

Note: If any of the samples taken do no show acceptable bacteriological quality in either of the sampling rounds, steps must be taken by the Owner to rectify the problem. This action may include re-chlorination and additional samples taken until acceptable results are obtained. Municipal water sampling is encouraged to satisfy any questions about the quality of the source water. If problems are discovered with the municipal system, the sampler or Engineer must notify Kitchener Utilities Dispatch (741-2529) immediately. **All** original sampling locations must be re-sampled even if the sampling point had passing results previously. The possibility exists that water can migrate and the contamination can spread. The Plumbing Inspector may require additional sampling locations.

9) A Professional Engineer must interpret the water quality results to assess if the bacteriological requirements have been satisfied.
10) The private water service can be connected to the municipal water service only after the Professional Engineer has provided a final certification letter report and the Plumbing Inspector has acknowledged receipt of the same. The certification letter report must, at a minimum, include the sampler's license number, time and date tests, lab bacteriological results and the sample location drawing detailing where the samples

were collected.

11) The final connection must be made in a manner to satisfy the following:
    - The water service must be dewatered in a manner to ensure the water level in the trench is always below the invert of the exposed water pipe. If the Site Engineer or Plumbing Inspector suspects that backflow, and thereby contamination, has occurred, additional bacteriological samples may be ordered prior to the water service being activated.
    - The interior of all new pipe, couplings and sleeves being installed must be swabbed and sprayed with a 1% hypochlorite solution. A 1% hypochlorite solution is obtained by either using Household Bleach (4 Parts Water + 1 Part Bleach) or Waterworks Chlorine (9 Parts Water + 1 Part Bleach).
    - After the municipal water service is turned back on, flush the affected area using existing valves and hydrants to eliminate any contamination and air that may have been introduced during repairs. Flushing shall be started as soon as the repairs are completed and shall be continued until discolored water is eliminated.
12) **The plumbing inspector must inspect the final connection** and he/she will notify Utilities Engineer in INS-Utilities/Eng., who in turn will dispatch staff to open the water service valve at the property line. (Email: turn on Water Group)
    - Only utilities shall operate the main service valve.
    - Recharge the system with city water and flush with a maximum ¾" line for 24 hours.
    - This document is for guidance only. Refer to O.B.C. for further requirements.
    - Refer also to a temporary connection drawing.

C.2.3 - Standard Notes

The following notes are to be placed on all Site Servicing Plans:

1) Cleanouts in vehicular areas must have concrete collars to withstand the vehicular loading.
2) Anode protection required as per DGSSMS D.2.5.6. and shall be installed on all ferrous metal fittings. Tracer wire shall not be connected to the anodes.
3) Pipe connection wrapping to be done in accordance with DGSSMS D.2.5.10.
4) Watermain commission plan to be submitted to inspector and Kitchener Utilities for comment prior to construction
5) Verify all fittings and materials not specified in permit documents with inspector prior to installation
6) It is the Contractor's responsibility to ensure that all construction conforms to the requirements of the Ontario Building Code. Notations made on these drawings are for your information and assistance only and do not necessarily comment on all areas of construction.

D - SITE STORMWATER MANAGEMENT (SWM)

This section of the guidelines deals with the SWM requirements to be implemented into the engineering design for each property. In order to satisfy Site Plan conditions, a detailed SWM Report complete with all aforementioned drawings, pre and post development catchment maps and a SWM Plan will be required. Listed below are the applicable studies and policies which dictate the SWM criteria for each development area. The Project Manager assigned to your file will establish the criteria on a site specific basis. General information that is to be contained within the SWM brief is also provided for your reference.

All developments with a lot area of 0.1 hectares or greater in size are required to incorporate stormwater management measures into the site engineering design. If the part of the site that is impacted for development is less than or equal to 0.1ha then the entire site is exempt from the SWM Policy. If the part of the site that is impacted for development is greater than 0.1ha and less than or equal to 20% of the total site area, then only the impacted area will need to meet the current SWM criteria as defined by the SWM policy. If the part of the site that is impacted for development is greater than 0.1ha and 20% of the total site area, then the whole site needs to be brought into compliance with the current SWM policy.

Impacted area is defined as any part of the site subject to construction activity and/or changed from its original condition prior to development activities. The repair and or replacement of an existing impervious area (concrete, asphalt, compacted gravel) is not part of the impacted area unless it is subject to other site related construction activities. For example, if a building addition is proposed on an existing impervious surface, the building addition would be considered impacted area.

D.1 - Studies

There are several watershed studies/SWM Reports available for reference purposes. Certain new development areas may have been included within a registered plan of subdivision. The project manager assigned your file can arrange for review of any relevant design information.

The following documents are available for review, in conjunction with any SWM Reports completed as part of a plan of subdivision, to establish the specific details relating to your development site:

- Alder Creek Watershed & Upper Strasburg Sub-Watershed Plan Update
- Blair, Bechtel & Bauman Creeks Sub-Watershed Plan
- Upper Blair Creek Function Drainage Study
- Cedar Creek Subwatershed Study
- Detweiler Drainage Study
- Doon South Creek Sub-Watershed Management Plan
- Hidden Valley Creek Hydrologic & Hydraulic Study
- Idlewood Creek Master Drainage Plan
- Kolb Creek Drainage Study
- Laurel Creek Watershed Study
- Laurentian West Master Drainage Plan
- Melitzer Creek Master Drainage Plan
- Strasburg Creek Master Watershed Plan
- Upper Shoemaker Creek Watershed Study

Reference should be made to the "SCHNEIDER CREEK FLOODLINE MAPPING STUDY", completed on behalf of the Grand River Conservation Authority (GRCA), in conjunction with the fourteen aforementioned studies, for supplementary details regarding SWM criteria for those watersheds which are tributaries of the Schneider Creek.

D.2 - Design Parameters for Stormwater Management Facilities

The City has developed a policy detailing the parameters that are to be incorporated into the engineering designs for all SWM facilities. Reference should be made to Section 14 of the City's Urban Design Manual - DESIGN PRINCIPLES FOR STORMWATER MANAGEMENT FACILITIES for details. In the absence of sub-watershed planning, and for additional design details regarding SWM practices, the MOE STORMWATER MANAGEMENT PLANNING AND DESIGN MANUAL – March 2003" is to be read in conjunction with the aforementioned policy.

D.3 - Stormwater Management Brief

Prior to Development Engineering providing clearance to the Planning Division for Approval in Principle during the City of Kitchener's Site Plan process, Development Engineering may require a SWM Brief to document how retention targets will be achieved along with the Geotechnical Report. Furthermore, an impacted area drawing should be provided if SWM is not required for the entire site. For further information on retention please refer to the Low Impact Development section of these guidelines or contact the assigned Project Manager. Please note that detailed design and modeling is not required in the Stormwater Management Brief.

D.4 - Stormwater Management Report

Most developments will require a SWM report or design brief to be read in conjunction with the design drawings. The following information is required to be incorporated into all stormwater management reports:

1) Name of the project, the municipal address, and date of the report to be shown on the front cover.
2) A summation of the selected criteria along with references to governing documents and background reports researched. The City of Kitchener does not allow sites to discharge to full storm capacity based on the municipal design sheets. The entire area of flows coming into that storm pipe is unknown and there is no real-time storm flow data available to confirm existing capacities. Individual sites must adhere to the sub watershed requirements in the specific area.
3) The Geotechnical report should contain the following information; borehole/test pit logs (minimum of three boreholes or test pits, minimum depth 5.0m); water table elevation, soil types, hydrologic soil group along with percolation rate of predominant soil type *(mm/hr)* and how the curve number (CN) was determined (surface characteristics).
4) Manning's '*n*' for impervious areas should be in the range of 0.013 -0.015. Gravel and crushed asphalt to be considered as pavement for post-development modeling purposes.
5) An Impacted Area Drawing (if applicable)
6) Pond stage-storage-discharge table.
7) Table of "Pre" and "Post" development catchment parameters with corresponding flows.
8) Printouts of all modeling for quality and quantity control (pre and post construction). All calculations to be completed in Metric (SI Units).

9) Orifice and weir formula/calculations.
10) Draw down time/calculations.
11) Additional dead storage to be provided within water quality ponds. Calculations for sediment loading and life expectancy of dead storage area prior to sediments requiring removal.
12) Report to be signed and stamped with a Professional Engineer's seal.
13) Pre and Post catchment delineation maps with catchment areas (in hectares) and impervious percentages. These values should directly correspond to modeling results.
14) Oil-Grit Separator and Infiltration Gallery sizing.
15) Calculations for required retention volume and retention volume achieved.

D.5 - Software

The following software may be used for hydrologic modeling: MIDUSS, SWMHYMO/OTTHYMO, VISUAL OTTHYMO, SWMM, XP-SWMM, MIKE SWMM, MOUSE (DHI), HSPF/WINHSPF, GAWSER.

Models used for the site analysis are to coincide with the models used in the Watershed Study. Reports using other models or methods of calculation, not approved by the City of Kitchener, will be returned. The City of Kitchener will not accept the Rational Method. The Rational Method is a basic calculation with many assumptions built in. The Rational Method provides the designer with a peak discharge value but does not provide a time series of flow or flow volume. The City of Kitchener must ensure the specific flow restrictions proposed on the site work with the entire modeling system.

D.6 - IDF Curves

RETURN PERIOD (Years)	PARAMETERS			DURATION (Hours)	Depth (mm)
	a	b	C		
12.5mm	254.1	6	0.7989	4	12.5
25mm	509	6	0.7989	4	25.0
2	743	6	0.7989	3	34.3
5	1593	11	0.8789	3	47.3
10	2221	12	0.9080	3	56.3
25	3158	15	0.9355	3	68.3
50	3886	16	0.9495	3	77.2
100	4688	17	0.9624	3	87.1

D.7 - Maintenance Recommendations

The Section 41 Development Agreement requires that maintenance be provided (registered on title) for the life of the development. The Owner is responsible to ensure all stormwater management infrastructure is functioning as designed. To aid property owners in complying with the development agreement a detailed maintenance recommendation should be included in the Stormwater Management Report. The recommendation should include the following:

1) Inspection of all structures and how often (minimum of once annually).
2) Immediate repair or replacement of all worn, missing, and damaged structures.
3) Removal of sediments and how often.
4) Method of restabilization of all disturbed areas.
5) Sediment disposal to be in accordance with MECP standards.

D.8 – Oil-Grit Separators

Oil-grit separators are most appropriate for commercial/industrial land use and should not be used as a standalone method, but rather part of a "treatment train" approach to achieve the required water quality treatment. Oil-grit separators typically serve drainage areas under 2ha and are predominantly encouraged by the City to be used for spill control. In situations that involve spill management controls, effluent from oil-grit separators is governed by the Sewer Use By-Law. Oil-grit separators are also appropriate for providing water quality control for redevelopment or infill areas which typically have space limitations. Oil-grit separator manufacturer's technical guidelines shall be consulted in the sizing of a unit and output data should be provided in the SWM Report for the selected unit.

The type of Oil-Grit Separator units that are accepted by the City of Kitchener are Environmental Technology Verification (ETV) certified units unless approved otherwise by the Director of Engineering.

D.9 - Maintenance Access

Maintenance accesses are required to any onsite SWM facilities. A minimum 4.0 metre wide hard surface (turfstone/asphalt) access not exceeding 10% grade is required to allow for maintenance activities. Accesses should be designed to support heavy maintenance vehicles, with suitable turning radii for construction equipment (suggested 10.0 metre minimum centerline radius).

D.10 - Orifice Controls

A typical approach to achieve quantity control is to install an orifice on the storm outlet and induce pipe surcharging and surface ponding during heavier rain events. Types of orifices include orifice pipes, on-line orifice plates installed inside a manhole or a cast in place orifice plate installed under catchbasin grates.

The minimum size of orifice to be used as an outlet control, without a trash rack, is 75mm for on- line orifices and 90mm for cast in place orifices. Orifices less than 75mm must be located within a perforated riser or trash rack that has smaller openings than the required orifice diameter.

Note that when using orifices to provide quantity control the maximum surface ponding depth is 30cm. Furthermore, if an OGS unit is located upstream of the ponding the unit will need to be submersible.

D.11 - Soak-Away Pits / Infiltration Galleries

Soak-away pits / infiltration galleries are encouraged to be incorporated into the stormwater management design regardless of percolation rates as way to meet retention targets. Design volumes to be infiltrated are derived from the area watershed study, the ISWM-MP or the approved stormwater management report completed as part of the subdivision and/or the

most recent guideline from the MECP regarding stormwater management. Please refer to the Project Manager assigned to your file for further information.

In Committee of Adjustment applications, it is a standard comment for Engineering to request that separate service connections (sanitary, storm, water) be provided or maintained for both the retained and severed properties. Storm services should only be connected to the building's sump pump. Should an instance occur where there is no existing municipal storm sewer along the property frontage the owner has the option to install a soak-away pit / infiltration gallery in lieu of extending a municipal storm sewer and providing a storm service connection. This sump pump soak-away pit / infiltration gallery should be sized by the design engineer and should be provided with an overflow to grade at the building foundation wall.

An infiltration cross section detail is required. All soak-away pits / infiltration galleries generally should have a minimum of two observation wells for inspection and maintenance purposes. If the site design requires the observation wells to be in a driveway or parking lot, the cap structures must be designed so that they can handle vehicular loading. It is preferred that a minimum cover of 1.2m is required for all infiltration facilities to protect against frost penetration. A minimum of 1.0m is required for separation from the bottom of the infiltration facility to the high ground water level. The high ground water level must be identified on the detail. All soak-away pits / infiltration galleries must have an overflow system. Sizing details should also be provided in order to confirm that design volumes are captured.

D.12 – Guidelines for Quality Control and Retention

Since the introduction of the ISWM-MP certain Site Plan SWM design and implementation practices have been found to be confusing or misleading. The following is an attempt to clarify some of the practices for implementing Quality Control and Retention:

Quality Control:

1) All quality controls are to be designed in accordance with current MECP guidelines to Enhanced-Level 1 protection
2) Enhanced quality control treatment is required on-site to the maximum extent possible regardless of the distance to the downstream outlet.
3) Stormwater generated from the roof and landscape areas which has not come into contact with paved surfaces or mixed with stormwater that has, does not require quality treatment or cash-in-lieu payments.
4) Sites paying cash-in-lieu for quality will only pay for impervious areas.
5) Sites over 2.0ha paying cash-in-lieu for quality will be required to contribute to a fee maximum of 2.0ha for impervious area.
6) Retention of 27mm of rainfall depth over the entire site does not mean that quality control has been met for the site.
7) If 27mm of rainfall depth over an impervious (paved) area is retained, quality control for that area has been achieved.
8) All sites must enroll in the City of Kitchener's Stormwater Management Credit Program prior to site certification.
9) Site OGS units are to be designed using the current City of Kitchener Particle Size Distribution curve and treat 90% of the site runoff volume (annual).

Retention:

1) Up to 30mm of rainfall depth (multiplied by the contributing area) for sizing LID's can be used regardless of surface types; Pervious (landscaped) Impervious (paved) and

Roofs.

2) Initial Abstraction does not form part of the 12.5mm site retention target.
3) Above or below ground LID’s may use high infiltrating or amended soils for year-round designs. Specifications soil makeup should be provided during detailed design.
4) The City does not have minimum allowable percolation rates for soils under infiltration galleries. Ministry guidelines should be followed for infiltration rates.

E - LOW IMPACT DEVELOPMENT (LID) FOR STORMWATER MANAGEMENT

The City approved the Integrated Stormwater Master Plan (ISWM-MP) in May 2016. As part of the ISWM-MP, the Stormwater Infiltration Policy was developed and approved by Council in November 2016. Included in the ISWM-MP the City established minimum stormwater volume retention criteria and targets for new development, redevelopment, reurbanization and residential intensification as well as linear projects. The specified minimum volume targets relate specifically to the control of runoff volume to achieve water quality improvements. They do not preclude the proponent from conforming to the requirements for stormwater quantity or quality control as required by The City of Kitchener in accordance with the sub-watershed studies.

The stormwater volume criteria is defined as numerical targets or management principles given to developers for stormwater control to be defined and outlined in local by-laws set by the City of Kitchener. The volume retention criteria has been described by others as "volume reduction", "permanent interception", "zero discharge" and/or an "infiltration target". For the purpose of the City of Kitchener, the Stormwater Volume Criteria and Target shall be described as a Volume Retention. The retained volume shall be ultimately infiltrated, directed to landscape areas for evapotranspiration or re-used. As such the specified volume shall not later be discharged to the municipal storm sewer networks or surface waters and does not therefore become runoff.

E.1 - Stormwater Volume Retention Targets

The City of Kitchener Integrated SWM Master Plan has set an interim minimum Volume Retention Target of 12.5mm. This interim target will ensure that the implementation mechanisms and policies within the ISWM-MP are in place while not pre-supposing the pending targets from the MECP. This approach is considered a moderate approach with consideration for the municipal interests as well as the interests of the broader development community. Exception to the interim targets will be considered on lands where volume targets are specifically specified in the areas sub-watershed study

The volume retention target is to be applied as a minimum target. This minimum target shall be superseded by more stringent volume targets as developed by the MECP or through future watershed studies, sub-watershed studies, Master Drainage Plans, Environmental Impact Statement (EIS) and/or other area specific studies such as GRCA Wetland Policy.

The Volume Retention Targets will be applied to any form of development (new development, redevelopment, reurbanization, and intensification) where the site area is 0.1ha or greater in size or where the impacted area is 0.1ha or greater. Post development stormwater runoff volumes will be controlled and the SWM design should provide retention of the first 12.5mm of surface runoff from the entire site area or impacted area. Initial Abstraction shall not be used as a form of retention.

The subject site shall be required to enroll in the City of Kitchener Stormwater Utility Credit Program. For additional information regarding this process please visit the City's website.

E.2 - Low Impact Development (LID) Measures

The ultimate goal of LID is to maintain natural or predevelopment hydrologic conditions, including minimizing the volume of runoff produced at the site (i.e., neighbourhood, subdivision or individual lot). Runoff reduction is defined as the total runoff volume reduced

through urban tree canopy interception, evaporation, rainwater harvesting, engineered infiltration and evapotranspiration.

As per the City's ISWM-MP for all sites and subdivisions regardless of perceived constraints; the proponent shall fully attempt to comply with the volume control targets to the maximum extent possible.

Prior to assessing the Stormwater Management Fee for the development application, all LID practices should be reviewed, and justification given (which would include a Geotechnical Report) where certain practices could not be applied (ie. Contamination, high ground water, bedrock). Cost of these practices is not an acceptable justification for not using them. The following is a list of LID measures that could be implemented on site:

- Rainwater harvesting
- Green roofs
- Soakaways, infiltration trenches and chambers
- Bioretention
- Permeable Pavement
- Perforated pipe system

Details of the above noted LID practices can be found in Section 4.0 of the Credit Valley Conservation Authority's web site in their '*Low Impact Development Stormwater Management Planning and Design Guide".*

E.3 - Issue Contributing Areas and Wellhead Protection Areas

When a substance is present in a well at a concentration that could lead to the deterioration of the water quality, an Issue Contributing Area (ICA) is delineated identifying the area where activities and conditions as a result of past activities have or are likely to contribute to the elevated concentration of the substance in the well. A Wellhead Protection Area (WHPA) is a surface and subsurface land area regulated to prevent contamination of a well or well-field supplying a public water system.

Since the City of Kitchener is reliant on groundwater for our public water supply and municipal wells are located throughout the Region, there are both ICA's and WHPA's throughout the City. Figure 3.1, Issue Contributing Area & Wellhead Protection Area, in the City's Stormwater Infiltration Policy (Source Water Protection) Update (December 2023) provides a map showing both ICA's and WHPA's. Furthermore, recent analysis has been completed to determine the ultimate receiver of water that infiltrates throughout the City and identifies if the receiver of infiltrated water is surface water courses. Based on the delineation of ICA's, WHPA's and surface water receivers, four levels of infiltration zones have been identified, plus one Special Policy Area as shown in Figure 4.1, Infiltration Opportunities and Constraints by Zone. For further information please reference City's Stormwater Infiltration Policy (Source Water Protection) Update (December 2023).

Table 6.1, Land Use Infiltration Opportunities and Constraints from the City's Stormwater Infiltration Policy (Source Water Protection) Update (December 2023) will provide the designer with guidance on accepted infiltration practices based on the proposed or existing site zoning and the Zone identified in Figure 4.1.

Figure 3.1, Figure 4.1 and Table 6.1 noted above are attached for reference.

Figure 3.1 – Issue Contributing Areas & Wellhead Protection Area

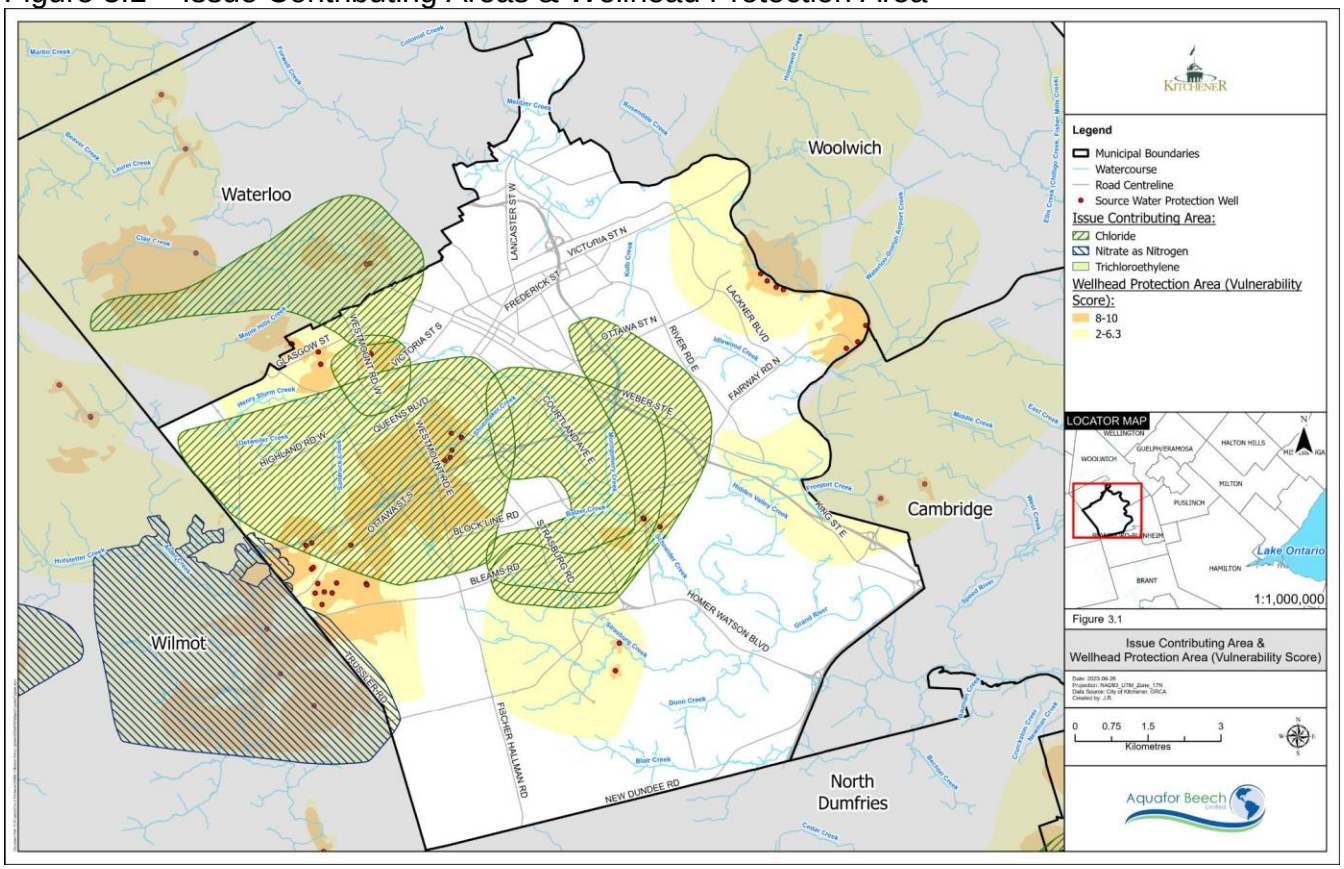

Figure 4.1 – Infiltration Opportunities and Constraints by Zone

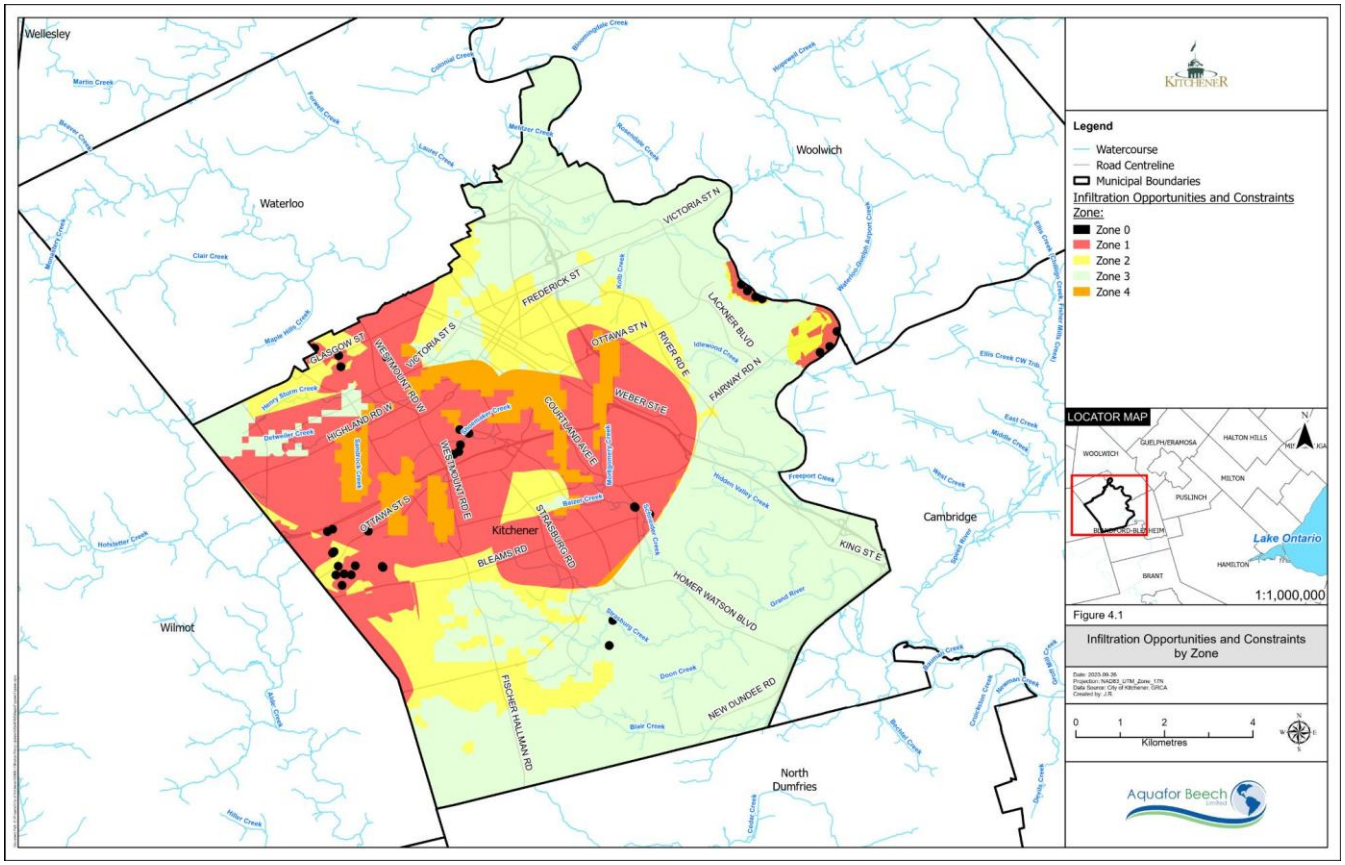
Wellesley
Waterloo
Woolwich
Wilmot
Kitchener
Cambridge
North Dumfries
VICTORIA ST N
FREDERICK ST
OTTAWA ST N
RIVER RD E
LACKNER BLVD
FAIRWAY RD N
GLASGOW ST
VICTORIA ST S
WESTMOUNT RD W
HIGHLAND RD W
WEBER ST E
COURTLAND AVE E
WESTMOUNT RD E
OTTAWA ST S
BLEAMS RD
STRASBURG RD
KING ST E
HOMER WATSON BLVD
FISCHER HALLMAN RD
NEW DUNDEE RD
Legend
Watercourse
Road Centreline
Municipal Boundaries
Infiltration Opportunities and Constraints Zone:
Zone 0
Zone 1
Zone 2
Zone 3
Zone 4
LOCATOR MAP
WOOLWICH
GUELPH/ERAMOSA
HALTON HILLS
MILTON
PUSLINCH
BRANT
HAMILTON
Lake Ontario
1:1,000,000
Figure 4.1
Infiltration Opportunities and Constraints by Zone
0 1 2 4
Kilometres
Aquafor Beech

Table 6.1 – Land Use Infiltration Opportunities and Constraints.

Reference: 66868
December 2023

Table 6.1: Land Use- Infiltration Opportunities and Constraints

Land Use	Zone 0			Zone 1			Zone 2			Zone 3			Zone 4 (Special Policy Area)		
	Opportunities	Constraints	Acceptable Practices	Opportunities	Constraints	Acceptable Practices	Opportunities	Constraints	Acceptable Practices	Opportunities	Constraints	Acceptable Practices	Opportunities	Constraints	Acceptable Practices
Single Family Residential	Landscaped Areas and Rooftops	Paved Surfaces and High-Risk Site Activities (Table 5.1)	Downspout Disconnection & Bioretention (Rain Gardens), Soil Amendments	Landscaped Areas and Rooftops	Paved Surfaces and High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention (Rain Gardens), Soil Amendments	Landscaped Areas, Driveways and Rooftops	High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention (Rain Gardens), Soil Amendments	Landscaped Areas, Driveways and Rooftops	High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention (Rain Gardens), Soil Amendments	Landscaped Areas, Driveways and Rooftops	High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention (Rain Gardens), Soil Amendments
Low, Medium Rise & High Rise Residential	Landscaped Areas and Rooftops	Paved Surfaces and High-Risk Site Activities (Table 5.1)	Downspout Disconnection & Bioretention (Rain Gardens), Soil Amendments	Landscaped Areas and Rooftops	Paved Surfaces and High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention (Rain Gardens), Soil Amendments	Landscaped Areas, Paved Surfaces (less than 2000m²) and Rooftops	Paved Surfaces (larger than 2000m²) and High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention (Rain Gardens), Soil Amendments	Landscaped Areas, Paved Surfaces* and Rooftops *>2000m² allowed with a salt management plan	High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention (Rain Gardens), Soil Amendments	Landscaped Areas, Paved Surfaces* and Rooftops *>2000m² allowed with a salt management plan	High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention (Rain Gardens), Soil Amendments
Mixed Use	Landscaped Areas and Rooftops	Paved Surfaces and High-Risk Site Activities (Table 5.1)	Downspout Disconnection & Bioretention, Soil Amendments	Landscaped Areas and Rooftops	Paved Surfaces and High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention, Soil Amendments	Landscaped Areas, Paved Surfaces (less than 2000m²) and Rooftops	Paved Surfaces (larger than 2000m²) and High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention, Soil Amendments	Landscaped Areas, Paved Surfaces* and Rooftops *>2000m² allowed with a salt management plan	High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection; Bioretention & Permeable Pavements, Soil Amendments	Landscaped Areas, Paved Surfaces* and Rooftops *>2000m² allowed with a salt management plan	High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection; Bioretention & Permeable Pavements, Soil Amendments
Commercial	Landscaped Areas and Rooftops	Paved Surfaces and High-Risk Site Activities (Table 5.1)	Downspout Disconnection & Bioretention, Soil Amendments	Landscaped Areas and Rooftops	Paved Surfaces and High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention, Soil Amendments	Landscaped Areas, Paved Surfaces (less than 2000m²) and Rooftops	Paved Surfaces (larger than 2000m²) and High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention, Soil Amendments	Landscaped Areas, Paved Surfaces* and Rooftops *>2000m² allowed with a salt management plan	High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection; Bioretention & Permeable Pavements, Soil Amendments	Landscaped Areas, Paved Surfaces* and Rooftops *>2000m² allowed with a salt management plan	High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection; Bioretention & Permeable Pavements, Soil Amendments
Industrial Employment	Landscaped Areas and Rooftops	Paved Surfaces and High-Risk Site Activities (Table 5.1)	Downspout Disconnection & Bioretention, Soil Amendments	Landscaped Areas and Rooftops	Paved Surfaces and High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention, Soil Amendments	Landscaped Areas and Rooftops	Paved Surfaces and High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention, Soil Amendments	Landscaped Areas, Paved Surfaces* and Rooftops *>2000m² allowed with a salt management plan	High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention, Soil Amendments	Landscaped Areas, Paved Surfaces* and Rooftops *>2000m² allowed with a salt management plan	High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention, Soil Amendments
Institutional	Landscaped Areas and Rooftops	Paved Surfaces and High-Risk Site Activities (Table 5.1)	Downspout Disconnection & Bioretention, Soil Amendments	Landscaped Areas and Rooftops	Paved Surfaces and High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention, Soil Amendments	Landscaped Areas, Paved Surfaces (less than 2000m²) and Rooftops	Paved Surfaces (larger than 2000m²) and High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection; Bioretention & Permeable Pavements, Soil Amendments	Landscaped Areas, Paved Surfaces* and Rooftops *>2000m² allowed with a salt management plan	High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection; Bioretention & Permeable Pavements, Soil Amendments	Landscaped Areas, Paved Surfaces* and Rooftops *>2000m² allowed with a salt management plan	High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection; Bioretention & Permeable Pavements, Soil Amendments
Open Space & Natural Heritage Conservation	Landscaped Areas and Rooftops	Paved Surfaces and High-Risk Site Activities (Table 5.1)	Downspout Disconnection & Bioretention, Soil Amendments	Landscaped Areas and Rooftops	Paved Surfaces and High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection & Bioretention, Soil Amendments	Landscaped Areas, Paved Surfaces (less than 2000m²) and Rooftops	Paved Surfaces (larger than 2000m2) unless the paved surface receives no salt applications or is closed/ not maintained during winter months and High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection; Bioretention & Permeable Pavements, Soil Amendments	Landscaped Areas, Paved Surfaces and Rooftops	High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection; Bioretention & Permeable Pavements, Soil Amendments	Landscaped Areas, Paved Surfaces* and Rooftops *>2000m² allowed with a salt management plan	High-Risk Site Activities (Table 5.1)	Soakaways, Infiltration Trenches and Chambers; Downspout Disconnection; Bioretention & Permeable Pavements, Soil Amendments

F - POLLUTION PREVENTION PLAN

As identified in Table 5.1 of the City's Stormwater Infiltration Policy (Source Water Protection) Update (December 2023) there are a number of site uses that are considered high risk site activities. For the sites identified as high risk activities a Pollution Prevention Plan (PPP) is required as part of development approvals. The purpose of an effective PPP is to:

- Identify the risks of site activities and prepare a plan to mitigate the risks
- Prevent or reduce the pollutant loading on stormwater, including pre-treatment measures
- Include spills action plan

Where a site will be subject to development or re-development, there is an opportunity to improve the long-term management of stormwater pollution risks. Incorporating stormwater management considerations into site planning and design from the outset will reduce sources of stormwater pollution risk or allow for more effective mitigation of these risks. Accordingly, pollution prevention should not be an add-on after the site design is finalized.

Stormwater Pollution Prevention Plans should be based on site specific information and should be customized to address the risk of stormwater pollution on a site. This document should be included in the SWM Report.

The PPP should include the following items and are detailed below:

- Site inventory
- Issue identification and risk analysis
- Pollution Prevention Planning
- Implementation and Monitoring
- Adaptive management measures

F.1 - Site Inventory

Applicants should describe the site including:

- Physical properties
- Stormwater infrastructure
- Specific processes that occur and/or are going to occur on the site, how often each of these activities will occur, and the materials involved in each of these processes
- Location of all activities and materials
- Storage location of materials including outside storage, stormwater discharge points and the hydrologic parameters. Applicants should also include a layout plan of the site and proposed plan and profile

The PPP should also assess impacts and appropriate measures during construction as stormwater runoff from construction sites can cause adverse impacts to the aquatic environment. Therefore, during construction, temporary drainage systems including their catchments and discharge points must be planned and have appropriate measures. The PPP will need to accommodate and address changes in drainage system function as construction progresses. The plan must consider the dynamic environment of a construction site, such as changes in the workforce and phased construction activities, which lead to risks that may be present during the routine operations.

The developer should identify all materials or substances that will be used in each activity. There could be substances used on site which may be pollutants, such as nutrients, sediments, pathogens and toxins. These substances may appear insignificant at their source but could be detrimental when they enter the watershed. Industrial and commercial businesses can contribute to stormwater pollution runoff by accidental spills, leaks, and through use and discharge of potentially toxic substances. Substances may potentially be introduced to the site as a result of infrequent events such as fires or spills.

The resulting responses should also be identified. In addition to identifying which materials may be present on site, appropriate quantities of each material should be estimated, and where appropriate, indicate which months the material is typically consumed. If materials are stored on site, storage procedures should be documented. Any hazardous materials that may be present on site should be identified and documented, with specific substance-related regulations outlined.

The developer should consider all activities that could occur on site. These activities will vary over the lifecycle of a site, as a development progresses through construction, operation and decommissioning. The following lists are examples of activities to consider during the different phases that should be accounted for in the PPP:

Examples of Construction or Demolition/Decommissioning Phase Activities:

- Excavation, filling and regrading
- Demolition of existing buildings
- Fueling and servicing of construction equipment on site
- Concrete forming, pouring and curbing
- On-site material preparation, including cutting, cleaning, and painting
- Material and waste storage
- Testing for contaminants (soil and water)
- Disposal of material

Examples of Operational Phase Primary Activities:

- Material handling
- Trans-shipment and storage
- Manufacturing processes
- Servicing activities

Examples of Operational Phase Secondary Activities:

- Fueling of equipment and vehicles
- Routine servicing of equipment
- Occasional repair and maintenance activities including cleaning, painting, renewal or replacement of fixed plant

F.2 - Issues Identification and Risk Analysis

This step involves identifying any stormwater pollution risks and defining their priority level. This should include:

- Applicable standards
- Acts and regulations
- Potential pollutant sources
- Potential sensitive receptors for the environment (terrestrial, aquatic)
- The public (municipal, community, stakeholders, first nations and metis)
- Identifying issues and pollutant pathways

Based on the materials and activities that are anticipated within the site, the developer should identify the stormwater pollution risks for each sub-catchment. The developer should identify which pollutants are anticipated and how frequently these pollutants will be released into the site.

The risk analysis should take into consideration the results of the hydrologic assessment to identify the conditions under which the pollutants would be mobilized (ie. during frequent rainfall events, during major events, during spills regardless of rainfall, etc.). This analysis should also consider special features within the site such as containment berms, wash pads, fueling stations, etc.

The risk analysis should consider the probability of each type of pollutant being released, the consequences of the pollutant being released and assess how significant the impact would be on the surrounding environment. A ranking matrix must be developed for each major pollutant concern which assesses the relative probability of a pollutant entering runoff and the consequence if this occurs. An example matrix is shown below:

		Pollution Consequences		
		Low (1)	Medium (3)	High (5)
Pollution Probability	Low (1)	1	3	5
	Medium (3)	3	9	15
	High (5)	5	15	25

Based on any specific regulations or special risks, the developer should determine the requirements for mitigating these, and ensure conformance with applicable regulations. The emergency response plan should be considered in this risk analysis.

The developer should identify the pollutant pathways showing the source of the polluting material and activity which interacts with stormwater and the subsequent downstream path. If stormwater pollution prevention measures are in place or proposed, they need to be shown on the plan.

F.3 - Pollution Prevention Planning

Once the stormwater pollution risks have been identified, the third step is to develop an appropriate plan to mitigate these risks. Mitigation measures can include prevention and pre-

treatment, containment/reduction, and treatment.

Prevention/Pre-Treatment: As a primary goal, a management strategy should aim to prevent the release of polluting materials within the site. Prevention begins at project design and can also be used during construction, operation and decommissioning. During design, exposure of materials to stormwater may be prevented by complete coverage of processes or storage. During construction, minimizing exposed soils, providing surface stabilization and pre-treatment measure in catchbasins on site will prevent mobilization of sediment into the storm system. During operation, selection of alternate materials or processes will prevent some pollution risks. Site management activities, such as sweeping or cleaning will also prevent or minimize pollutants runoff in rainfall events.

Containment/Reduction: Minimizing the area where potentially polluting activities take place and thereby limiting the quantity of polluted stormwater produced will reduce the subsequent treatment effort that will be required. Containment and reduction practices can occur during project design, construction, operations and decommissioning. A common example is equipment fueling that may take place anywhere.

Treatment: Where measures to prevent contact between pollutants and rainwater runoff are not feasible or do not provide complete protection, the final stage in mitigating stormwater pollution is to provide treatment of polluted stormwater. See High Risk Tables below that illustrates the measures that should be used depending on what the spill risk is. Where landscaping features are feasible, rain gardens or bioswales are able to treat common pollutants such as total suspended solids and hydrocarbons. However, groundwater interaction and ultimate release points should be considered in their design. Where landscaping features are not feasible or are inadequate to handle the pollutant loads, a more robust structural best management practice such as sediment basins will be needed.

Where oil, gasoline, light petroleum compounds and grease can potentially enter the stormwater system, an oil grit separator will be required.

F.4 - Implementation and Monitoring

The fourth step is to implement the pollution prevention plan and monitor the quality of stormwater to track effectiveness of mitigation measures. The implementation and monitoring component should address the following items:

- Define when stormwater pollution prevention actions or measures are required (including timing, triggers and responses)
- Designate a response person to act and carry out the implementation of the PPP and ensure compliance with its requirements
- Identify training requirements for personnel; who should be trained, when training should occur, their level of responsibility, and their roles in stormwater pollution prevention
- Define required maintenance activities, frequency and documentation
- Define a monitoring or oversight process to track the PPP effectiveness
- Define response and adaptive actions in the event of a failure in the implementation of mitigation measures
- Define a spills response plan
- Define triggers for adaption or modification of the PPP in light of changing conditions,

activities or pollution risks to stormwater

F.5 - Adaptive Management Measures

Once the pollution prevention plan has been established, the last step is to adaptively manage the site which enables continuous improvement. Adaptive management provides flexibility to identify and implement new mitigation measures or to modify existing ones during the life of a project. There may be unanticipated changes in environmental conditions, changes in material use, activities on site, or subsequent information that might affect the goal of stormwater pollution prevention. If follow up monitoring identifies potential weaknesses of the PPP, adapting to address these weaknesses may be necessary. Adaptive management can help determine whether mitigation measures are cost effective and if the predicted effects occurred. If the actual effects are not what were predicted, adaptive management can help determine actions to avoid stormwater pollution.

Adaptive management ensures the pollution prevention plan is working effectively. There may be opportunities for continuous improvement for management practices that may impact stormwater quality.

Table 5.1: High Risk Site Activities

Potentially Contaminating Activities (O.Reg. 153/04 Table 2)		
• Acid and Alkali Manufacturing, Processing and Bulk Storage • Adhesives and Resins Manufacturing, Processing and Bulk Storage • Airstrips and Hangars Operation • Antifreeze and De-icing Manufacturing and Bulk Storage • Asphalt and Bitumen Manufacturing • Battery Manufacturing, Recycling and Bulk Storage • Boat Manufacturing • Chemical Manufacturing, Processing and Bulk Storage • Coal Gasification • Commercial Autobody Shops • Commercial Trucking and Container Terminals • Concrete, Cement and Lime Manufacturing • Cosmetics Manufacturing, Processing and Bulk Storage • Crude Oil Refining, Processing and Bulk Storage • Discharge of Brine related to oil and gas production • Drum and Barrel and Tank Reconditioning and Recycling • Dye Manufacturing, Processing and Bulk Storage • Electricity Generation, Transformation and Power Stations • Electronic and Computer Equipment Manufacturing • Explosives and Ammunition Manufacturing, Production and Bulk Storage • Explosives and Firing Range • Fertilizer Manufacturing, Processing and Bulk Storage	• Fire Retardant Manufacturing, Processing and Bulk Storage • Fire Training • Flocculants Manufacturing, Processing and Bulk Storage • Foam and Expanded Foam Manufacturing and Processing • Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles • Gasoline and Associated Products Storage in Fixed Tanks • Glass Manufacturing • Importation of Fill Material of Unknown Quality • Ink Manufacturing, Processing and Bulk Storage • Iron and Steel Manufacturing and Processing • Metal Treatment, Coating, Plating and Finishing • Metal Fabrication • Mining, Smelting and Refining; Ore Processing; Tailings Storage • Oil Production • Operation of Dry-Cleaning Equipment (where chemicals are used) • Ordnance Use • Paints Manufacturing, Processing and Bulk Storage • Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications • Petroleum-derived Gas Refining, Manufacturing, Processing and Bulk Storage • Pharmaceutical Manufacturing and Processing	• Plastics (including Fibreglass) Manufacturing and Processing • Port Activities, including Operation and Maintenance of Wharves and Docks • Pulp, Paper and Paperboard Manufacturing and Processing • Rail Yards, Tracks and Spurs • Rubber Manufacturing and Processing • Salt Manufacturing, Processing and Bulk Storage • Salvage Yard, including automobile wrecking • Soap and Detergent Manufacturing, Processing and Bulk Storage • Solvent Manufacturing, Processing and Bulk Storage • Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems • Tannery • Textile Manufacturing and Processing • Transformer Manufacturing, Processing and Use • Sewage Treatment and Sewage Holding Facilities • Vehicles and Associated Parts Manufacturing • Waste Disposal and Waste Management, including thermal treatment, landfilling and transfer of waste, other than use of biosoils as soil conditioners • Wood Treating and Preservative Facility and Bulk Storage of Treated and Preserved Wood Products
Prescribed Drinking Water Threats (O.Reg. 287/07)		
• The establishment, operation or maintenance of a waste disposal site within the meaning of Part V of the Environmental Protection Act. • The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage. • The application of agricultural source material to land. • The storage of agricultural source material. • The management of agricultural source material. • The application of non-agricultural source material to land. • The handling and storage of non-agricultural source material.	• The application of commercial fertilizer to land. • The handling and storage of commercial fertilizer. • The application of pesticide to land. • The handling and storage of pesticide. • The application of road salt.[1] • The handling and storage of road salt. • The storage of snow. • The handling and storage of fuel. • The handling and storage of a dense non-aqueous phase liquid. • The handling and storage of an organic solvent.	• The management of runoff that contains chemicals used in the de-icing of aircraft. • An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body. • An activity that reduces the recharge of an aquifer. • The use of land as livestock grazing or pasturing land, an outdoor confinement area or a farm-animal yard. • The establishment and operation of a liquid hydrocarbon pipeline. O. Reg. 385/08, s. 3; O. Reg. 206/18, s. 1.
Other Threats		
• Anthropogenically contaminated soils that have not been fully remediated • Airports[2]	• Manufacturing of: Small electrical appliances, Major electric appliances, Leather products, Mobile homes, Electric lamps, Lighting fixtures, Cable & wire, Dry electrical industrial equipment, Wet electrical equipment, Jewelry & precious metals[2]	

[1] Although salt is included as a Prescribed Drinking Water Threat, it is being managed through restrictions to infiltration in high-risk areas and through City and Private Salt Management Plans, and therefore does not automatically prohibit infiltration.
[2] Source: Amended from LID Stormwater Management Manual (TRCA & CVC, 2010) and East Side Lands Master Drainage Plan (Nov 2013)

G - SITE ALTERATION BYLAW

The City of Kitchener Site Alteration By-law was approved in order to control site alteration activities within the City such as the placing or dumping of fill, the removal of topsoil, and the alteration of the grade of land. Please note that in accordance with Section 633.5.2 of the Site Alteration Bylaw, a Site Alteration Application may be made concurrently with a Planning Act Application.

A permit process has been set in place to balance environmental and administrative considerations for site alterations. The requirement of a permit will grant the City the ability to ensure that:

- Unanticipated drainage and site alteration is prevented;
- Appropriate drainage patterns are maintained;
- Interference and damage to watercourses or water bodies is limited;
- Water quality is maintained;
- The use of hazardous and/or improper fill is prevented;
- Erosion and sedimentation is prevented;
- Natural heritage features such as wetlands, valley lands, and woodlands and areas of archaeological resources are protected; and
- The City‘s natural topography, soils, and vegetative features are considered.

G.1 - Site Alteration Permit

Unless exempt from the provisions of the by-law, site alteration activities within the City will be regulated and a permit from the City will be required. A Site Alteration Permit will be required for all properties in accordance with the Site Alteration Bylaw and for all properties not involved in a development process. A Site Alteration Permit is not required for:

- The installation of a swimming pool, provided a pool permit is obtained
- Minor gardening or landscaping projects
- Normal farm practices
- Development that is undertaken with the appropriate Planning Approvals and Building Permits

Once issued, the permit will remain in effect for a period of 90 calendar days from the date of issuance. A permit may be extended where an application to renew is filed at least 30 calendar days before the date of expiry upon making a written request to the City’s Director of Engineering, provided the proposed work, which was the subject of the permit, has not been revised.

For further information regarding Site Alteration Permits please visit the City of Kitchener’s website.