

Toronto Green Standard

Making a Sustainable City Happen



For

New Mid to High-Rise Residential and All Non-Residential Development

(Residential apartment buildings 4 storeys and higher and
all industrial, commercial and institutional (ICI) buildings)

Version 2.0



TORONTO GREEN STANDARD VERSION 2.0



The Toronto Green Standard (**TGS**) is a two-tier set of performance measures, with supporting guidelines for new development. Its purpose is to promote sustainable site and building designs that address Toronto's urban environmental pressures: air quality, climate change and energy efficiency, water quality and efficiency, ecology and solid waste.

The Toronto Green Standard sets the Official Plan's vision of sustainability into action, and is a key strategy to achieve the City's Climate Change Action Plan, an aggressive environmental framework aimed at reducing Toronto's greenhouse gas emissions by 80 per cent by 2050. Achieving the TGS performance measures will help meet this goal, while building a greener, sustainable City.

There are two versions of the Toronto Green Standard, each relating to different development types:

- "Low-Rise Residential" applies to row and townhouses, up to 4 storeys (under Part 9 of the Ontario Building Code) with a minimum of 5 dwelling units.
- "Mid to High-Rise Residential and Non-Residential" applies to residential apartment buildings 4 storeys and higher and all Industrial, Commercial and Institutional (ICI) development.

Each version contains the Tier 1 (**mandatory**) and Tier 2 (**voluntary**) performance measures; detailed Specifications, Definitions, and Resources links; and examples of Strategies to implement the proposed Standard. The performance metrics and supporting specifications column should be read together. Tier 1 is required through development approvals implemented by City Planning and Tier 2 is the higher, voluntary standard implemented through a third party review.

Verified Tier 2 projects may be eligible for a refund of development charges equivalent to 20% of the 2014 rate. See: toronto.ca/greendevlopment

Applying the Toronto Green Standard

New planning applications, including Zoning Bylaw amendment, Site Plan Control and Plan of Subdivision approval, are required to meet Tier 1 of the environmental performance measures. Developers may also choose to meet Tier 2, the voluntary, higher level of environmental performance. Achieving the requirements of the TGS contributes towards LEED certification. See toronto.ca/greendevlopment for more information.

Planning submissions must include:

1. **TGS Checklist:** The Checklist is required as part of a complete planning application and is submitted with each planning submission. The Checklist must contain information provided by the applicant indicating how the design meets the Toronto Green Standard and where sufficient verification details are demonstrated on plans, drawings and in reports. The Checklist is a form provided to the City of Toronto and must be read and completed in conjunction with the full Toronto Green Standard. See: toronto.ca/greendevlopment
2. **TGS Statistics Template:** For Site Plan Control applications, complete the full Statistics Template and copy it directly onto the Site Plan or Statistics Plan submitted with the development application. For Zoning Bylaw Amendments or Plan of Subdivision applications, only the sections marked by an * are completed. The TGS Statistics Template can be found at: toronto.ca/greendevlopment
3. **Energy Report:** The TGS includes energy performance measures for new development that are higher than the Ontario Building Code. In order to meet these targets, a Design Development Stage Energy Report is required to be submitted prior to Site Plan Approval. Follow the City's [Terms of Reference](#) available from [Building Toronto Together: A Development Guide](#).
4. **TGS Documentation:** Include clear notations, illustrations and legends on relevant plans and drawings and in reports submitted to City Planning indicating compliance with Tier 1, TGS performance measures. All documentation should be identified in the TGS Checklist. Refer to [Building Toronto Together: A Development Guide](#) for planning submission instructions by application type.
5. **Tier 2, Development Charge Refund:** Applicants interested in enrolling in the program should view the TGS website toronto.ca/greendevlopment. **Tier 2 performance levels should be targeted early in the design process.** Contact the Environmental Planning office at 416-392-8343 for more information.



For New Mid to High-Rise Residential and All Industrial, Commercial and Institutional (ICI) Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources and Documentation	Potential Strategies
Low-Emitting and Fuel-Efficient Vehicle Infrastructure Encourage the use of low-emitting, fuel efficient vehicles, car pooling and car-sharing	AQ 1.1 LEV spaces <u>Residential:</u> If providing more than the minimum parking required under the Zoning Bylaw, include: Physical provision for future electric vehicle charging for the excess number of parking spaces provided above the minimum Zoning Bylaw required parking spaces and distributed to each parking level. ^{1,2,3} <u>Institutional/Commercial:</u> If providing more than the minimum parking required under the Zoning Bylaw, the excess spaces must be provided only for dedicated priority parking spaces for low-emitting vehicles (LEV), carpooling or for publicly accessible spaces dedicated to car-sharing. ^{1,2,5}	AQ 1.2 (Optional) Enhanced LEV spaces Electrical provision for at least 2% of residential parking spaces for future electric vehicle charging in accordance with the Ontario Electrical Safety Code. ⁴	<ol style="list-style-type: none"> AQ1.1 only applies where there is a minimum Zoning Bylaw car parking requirement. The effective Zoning Bylaw is the applicable bylaw in effect for the subject property on the date of the application. The physical provision of future electric vehicle charging consists of empty raceways or conduits starting in a junction box in the electrical room and terminating in a junction box central to each parking garage floor. This conduit will be empty to accommodate future wiring. Electrical provision means Level 2 Electric Vehicle Supply Equipment (208/ 240 VAC) installed in compliance with Section 86 of the Ontario Electrical Safety Code. Provide to each designated parking space. Low-emitting vehicles (LEV) are defined as vehicles having a Combined Fuel Consumption Rating (CFCR) of 6.5L/100km or less, as defined by Natural Resources Canada's Office of Energy Efficiency. Car pooling is when 2 or more workers share a car ride to work locations. Car-sharing refers to fee-based, shared automobile use that is intended to substitute for private vehicle ownership. It makes occasional use of a vehicle affordable, while providing an incentive to minimize driving and rely on alternative travel options as much as possible. 	Designated and marked parking spaces for LEV, carpool or car-sharing Shared parking Conduits, raceways, charging stations for electric plug-in vehicles



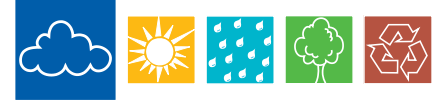
For New Mid to High-Rise Residential and All Industrial, Commercial and Institutional (ICI) Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources and Documentation	Potential Strategies
Cycling Infrastructure Encourage cycling as a clean air alternative	<p>AQ 2.1- Bicycle parking rates^{1,2,3,4}</p> <p><u>Residential:</u> Bicycle <u>Zone 1</u>: (1 per unit) Provide a minimum of 0.9 long-term bicycle parking spaces and 0.1 short-term bicycle parking spaces per dwelling unit.</p> <p>Bicycle <u>Zone 2</u>: (0.75 per unit) Provide a minimum of 0.68 long-term bicycle parking spaces and 0.07 short-term bicycle parking spaces per dwelling unit.</p> <p><u>All other uses:</u> Bicycle Zone 1 and Bicycle Zone 2: Provide long-term and short-term bicycle parking spaces consistent with the non-residential bicycle parking rates identified in Chapter 230 of the City-wide Zoning Bylaw.</p> <p>AQ 2.2 Long-term bicycle parking location Long-term bicycle parking must be provided in a secure controlled-access bicycle parking facility or purpose-built bicycle locker in the following locations:</p> <p>(i) on the first storey of the building; (ii) on the second storey of the building; (iii) on levels of the building below-ground commencing with the first level below ground and moving down, in one level increments when at least 50% of the area of that level is occupied by bicycle parking spaces, until all required bicycle parking spaces have been provided.^{5,6}</p> <p>AQ 2.3 Short-term bicycle parking location Locate short-term bicycle parking in a highly visible and publicly accessible location at-grade or on the first parking level of the building below grade.⁷</p> <p>AQ 2.4 Shower & change facilities Non-residential uses: Provide shower and change facilities for each gender consistent with the rate identified in Chapter 230 of the City-wide Zoning Bylaw.¹</p>	<p>AQ 2.5 (Optional) Enhanced Bicycle parking rates^{2,3,4,6,7}</p> <p><u>Residential:</u> Bicycle <u>Zone 1</u>: (1.2 per unit) Provide a minimum of 1.08 long-term and 0.12 short-term bicycle parking spaces per dwelling unit.</p> <p>Bicycle <u>Zone 2</u>: (1.0 per unit) Provide a minimum of 0.9 long-term and 0.1 short-term bicycle parking spaces per dwelling unit.</p> <p>AQ 2.6 (Optional) Bike share Provide a public bike share location at-grade and program for visitors on the site.⁸</p>	<ol style="list-style-type: none"> 1. Bicycle parking rates, shower and change facilities in the TGS are consistent with the Bicycle Parking Space Regulations, Chapter 230 of the City-wide Zoning Bylaw: toronto.ca/zoning 2. All bicycle parking spaces must be designed in accordance with the Bicycle Parking Space Regulations, Chapter 230 of the City-wide Zoning Bylaw and for other aspects of bicycle parking spaces, refer to the City of Toronto's Guidelines for the Design and Management of Bicycle Parking Facilities. 3. Long-term (occupant) bicycle parking spaces are bicycle parking spaces for use by the occupants or tenants of a building. Short-term (visitor) bicycle parking spaces are bicycle parking spaces for use by visitors to a building. 4. Bicycle Zone 1 is defined as the area of the City bounded by the Humber River on the west, Lawrence Avenue on the north, Victoria Park Avenue on the east and Lake Ontario on the south. Bicycle Zone 2 includes all areas of the City not included in Bicycle Zone 1. 5. When providing long-term bicycle parking on levels below-ground, calculate 50% of the net area of the parking level (deduct required areas such as elevator shafts, drive aisles and mechanical rooms). 6. Where bicycle parking is located on or below the second parking level of the building below-ground provide at least one elevator accessible to bicycles with direct access to each level where bicycle parking is located. The location and dimensions of the elevator must facilitate easy access for bicycles. 7. A short-term bicycle parking space must be no more than 30 metres from a pedestrian entrance to the principal building on the lot. 8. Bike share stations must include a minimum of 11 docking points. Bike share stations may be provided on private property or within the public boulevard. Location and size criteria must be approved by Transportation Services, Cycling Infrastructure and Programs. For more information see: toronto.ca/cycling. 	<p>Dedicated bicycle storage racks, bicycle lockers or cages</p> <p>Bike stackers</p> <p>Bicycle ramps on staircases</p> <p>Signage to local bicycle paths</p> <p>Dedicated entrances to indoor bicycle parking facilities</p> <p>Parking garages designed to minimize conflicts between bicycles and cars</p> <p>Dedicated bicycle elevator</p>



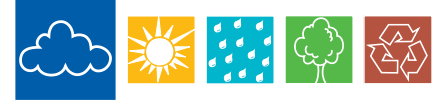
For New Mid to High-Rise Residential and All Industrial, Commercial and Institutional (ICI) Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources and Documentation	Potential Strategies
Pedestrian Infrastructure Encourage walking as a clean air alternative for all ages and abilities	<p>AQ 3.1 Connectivity Provide safe, direct, universally accessible pedestrian routes, including crosswalks and midblock crossings, that connect the buildings on-site to the off-site pedestrian network and priority destinations.¹</p> <p>AQ 3.2 Sidewalk space Provide a pedestrian clearway at least 2.1 m wide,* to safely and comfortably accommodate pedestrian flow.^{2,3}</p> <p>AQ 3.3 Weather protection Provide covered outdoor waiting areas for pedestrian comfort and protection from inclement weather.⁴</p> <p>AQ 3.4 Pedestrian specific lighting Provide pedestrian-scale lighting that is evenly-spaced, continuous and directed onto sidewalks, pathways, entrances, outdoor waiting areas and public spaces.⁵</p>		<ol style="list-style-type: none"> Off-site pedestrian networks and priority destinations include: sidewalks, transit stops/stations, parking areas (bikes and cars), surrounding parks and open space, mid-block walkways, underground concourses, primary building entrances or other key pedestrian access points and routes. The pedestrian clearway is the universally accessible, unobstructed, direct and continuous path of travel within the sidewalk zone. *A clearway greater than 2.1 m wide may be required at corners, transit nodes or other locations with high pedestrian volumes or pedestrian activity (e.g., at grade patios and retail uses). City of Toronto Accessibility Design Guidelines. A sidewalk zone at least 6.0 m wide, measured from curb to buildings face, is recommended to support a variety of streetscape elements including the pedestrian clearway, trees, furniture, lighting, utilities, cafés, etc. that contribute to a vibrant and complete street: Vibrant Streets Toronto Urban Design Streetscape Manual Avenues & Mid-Rise Buildings Study (Performance Standard #7A: Minimum Sidewalk Zones) Tall Building Design Guidelines (Section 4.2 Sidewalk Zone). Outdoor waiting areas must include the primary entrance to the building or any entrance adjacent to a lobby. Coverings such as canopies and awnings should be opaque for shade and weather protection and to mitigate bird collisions. Pedestrian scale lighting must be full cutoff in accordance with EC 5.1, directed downward and includes fixtures such as bollards or lower-scale pole fixtures along pedestrian routes. For details on pedestrian scale exterior lighting design strategies that minimize light pollution refer to the Best Practices for Effective Lighting. 	<p>Pedestrian scale building design</p> <p>Pedestrian oriented landscaping, lighting and signage</p> <p>Building setbacks to accommodate sidewalk space and trees</p> <p>Weather protection such as attached canopies, and awnings</p> <p>Building orientation to facilitate transit access</p> <p>Recessing the first floor of buildings to create more space for pedestrian movement and amenity at-grade</p>



For New Mid to High-Rise Residential and All Industrial, Commercial and Institutional (ICI) Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources and Documentation	Potential Strategies
Urban Heat Island Reduction: At Grade Reduce ambient surface temperatures, and provide shade for human health and comfort	<p>AQ 4.1 UHI, Non-roof hardscape</p> <p><u>All uses:</u></p> <p>Use a combination of the following strategies to treat at least 50% of the site's non-roof hardscape (including driveways, walkways, courtyards, surface parking areas, artificial turf and other on-site hard surfaces):</p> <ul style="list-style-type: none"> High-albedo surface materials with an initial reflectance of at least 0.3 or SRI of 29¹ Open grid pavement with at least 50% perviousness² Shade from existing tree canopy or within 5 years of landscape installation^{3,4} Shade from structures covered by solar panels.⁵ <p><u>Non-residential uses option:</u></p> <p>Select one or a combination of the above strategies</p> <p style="text-align: center;">OR</p> <p>Place a minimum of 50% of required parking spaces under cover. Any roof used to shade or cover parking must have an SRI of at least 29, be green roof or be covered by solar panels that produce energy to offset some non-renewable resource use.^{5,6}</p>	<p>AQ 4.2 (Core)</p> <p>Enhanced UHI, Non-roof hardscape</p> <p>Use any combination of the following strategies to treat at least 75% of the site's non-roof hardscape (including driveways, walkways, courtyards, parking areas, artificial turf and other on-site hard surfaces):</p> <ul style="list-style-type: none"> High-albedo surface materials with an initial reflectance of at least 0.3 or SRI of 29¹ Open grid pavement with at least 50% perviousness² Shade from existing tree canopy or within 5 years of landscape installation^{3,4} Shade from structures covered by solar panels.⁵ 	<ol style="list-style-type: none"> Solar Reflectance Index (SRI) is a measure of a surface's ability to reflect solar heat. The SRI for a given material is calculated using both the reflectance value and emittance value of the material. Black asphalt has an SRI of 0, while new white Portland cement concrete has an SRI of 86. Other pavement types range between these values, with a SRI of 35 for gray concrete. Open grid pavement consists of concrete or hard plastic grid systems with large pore spaces filled with a planted growing medium or light coloured aggregate. Shade is measured at solar noon at the summer solstice (approximately June 21) and may be provided by existing tree canopy, new shade trees or shade structures. For examples of native shade trees, refer to Forestry Facts & Native Plant Lists. Refer to EC2.1 - 2.5 for the applicable tree planting standards. Refer to LEED® Canada NC 2009 Rating System, Credit SS 7.1 Case 1. Shade cast by buildings is not an eligible strategy. Parking spaces do not include drop off and loading areas. Acceptable cover includes: underground, under deck, under roof, under building. 	<p>High-albedo materials include: grey or white concrete, light-coloured asphalt, selected interlocking concrete pavers and other light coloured pavers</p> <p>Soft landscaping</p> <p>High-branching deciduous shade trees</p> <p>Design site to reduce the size of hardscaped areas (i.e. smaller parking lots, shorter driveways and below-grade parking)</p> <p>Position photovoltaic cells to shade the hardscape</p>



For New Mid to High-Rise Residential and All Industrial, Commercial and Institutional (ICI) Development

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Urban Heat Island Reduction: Roof Reduce ambient surface temperatures on or from rooftops	<p>AQ 5.1 Green & cool roofs</p> <p><u>Buildings where the Green Roof Bylaw is applied:</u> Install a green roof to meet the requirements of the Bylaw.^{1,2,3,6}</p> <p><u>Buildings where the Green Roof Bylaw does not apply</u> use one of the following strategies:</p> <ul style="list-style-type: none"> Green roof installed for at least 50% of Available Roof Space^{2,3,6} <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> Cool roof installed for 100% of Available Roof Space^{3,4} <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> Use a combination of a green and cool roof for at least 75% of Available Roof Space^{3,4,5,6} <p><u>City-owned buildings and all Agencies, Boards, Commissions and Corporations:</u></p> <p>For new buildings or building additions with a GFA greater than 600 m² install a green roof for at least 50% of the Available Roof Space or meet the requirements of the Green Roof Bylaw, whichever is greater. Cover the remaining Available Roof Space with cool roofing materials.^{2,3,5,6}</p>		<ol style="list-style-type: none"> Refer to the Green Roof Bylaw for details on calculating the green roof area required and the Toronto Green Roof Construction Standard. A green roof is an extension of an above grade roof, built on top of a human-made structure, that allows vegetation to grow in a growing medium and which is designed, constructed and maintained in accordance with the Toronto Green Roof Construction Standard. A green roof system typically includes: vegetation, growing medium, filter layer, drainage layer, root resistance layer and waterproof membrane. Available Roof Space is defined as the total roof area of the building excluding areas designated for renewable energy devices, residential private terraces and required residential outdoor amenity space to a maximum of 2 m² per residential unit. Cool roofing materials must have a minimum initial reflectance of 0.65 and minimum emittance of 0.90 or an SRI value of 78 for a low-sloped roof and 29 for a steep-sloped roof. <p>Low sloped roofs have a surface slope of less than 2:12 (9.5 degrees) and steep sloped roofs have a surface slope greater than 2:12 (9.5 degrees). Ballasted roofs with a minimum stone ballast of 83 kg/m² (17 lb/ft²) or pavers of 17 kg/m² (23 lb/ft²) will also be accepted.</p> <ol style="list-style-type: none"> Weighted average of SRI values will be accepted if the effective SRI compliant roof area is equal to or greater than 100% as defined in LEED® Canada NC 2009 Rating System, Credit SS 7.2 Option 1 calculation. Where a green roof is to be constructed in or abutting the Natural Heritage System (Map 9, Official Plan), consider designing the green roof to promote biodiversity. Refer to the City of Toronto Guidelines for Designing for Biodiversity on Green Roofs. 	<p>Cool Roof Rating Council (CRRC) rated cool roof coatings and single ply membranes for low-sloped applications</p> <p>Green roof types include: complete and modular systems and pre-cultivated vegetation blankets</p>

GREENHOUSE GAS EMISSIONS/ENERGY EFFICIENCY



For New Mid to High-Rise Residential and All Industrial, Commercial and Institutional (ICI) Development

<p>Minimum Energy Performance</p> <p>Minimize energy demand through efficient building design and encourage renewable energy supply</p>	<p>GHG 1.1 Energy efficiency</p> <p>Design the building(s) to achieve at least 15% energy efficiency improvement over the current Ontario Building Code.^{1,2,3,4}</p> <p>GHG 1.2 On-site renewable energy</p> <p><u>City-owned buildings and all Agencies, Boards, Commissions and Corporations:</u></p> <p>For new buildings with a GFA greater than 600 m² install renewable energy devices to supply at least 5% of the building's total energy load from one or a combination of energy sources.^{5,6}</p>	<p>GHG 1.3 (Core) Enhanced energy efficiency</p> <p>Design and construct the building(s) to achieve at least 25% energy efficiency improvement over the current Ontario Building Code.^{1,3,4}</p> <p>GHG 1.4 (Optional) On-site renewable energy</p> <p>Design and install on-site renewable energy systems to supply at least 1% of the building's total energy load from one or a combination of solar photovoltaic (PV), solar thermal or wind energy sources</p> <p style="text-align: center;">OR</p> <p>Design and install on-site renewable energy systems to supply at least 20% of the building's total energy load from geo-exchange (geothermal or ground source heat pumps).^{5,6}</p>	<ol style="list-style-type: none"> For buildings greater than 2000 m² GFA, Tier 1 requires the submission of a "Design Development Stage Energy Report" prior to Site Plan Approval. Tier 2 requires the submission of an "As-Constructed Energy Report" based on construction drawings. <p>Energy Modeling is performed with EE4, DOE2 or EQuest or other software approved by the City of Toronto Energy Efficiency Office (EEO).</p> <p>For more information see the Energy Report Terms of Reference. The Better Buildings Partnership New Construction Program (BBP-NC) offers financial incentives for energy savings. For details on financial incentives available: bbptoronto.ca.</p> <ol style="list-style-type: none"> Buildings with a total Gross Floor Area less than 2000 m² demonstrate compliance using the City of Toronto Small Buildings Checklist (Appendix E). <p>The Small Buildings Checklist must be completed along with Natural Resources Canada's Screening Tool for New Building Design.</p> <ol style="list-style-type: none"> Energy modeling reports for Tier 1 and Tier 2 should demonstrate that the simulated peak demand is no greater than the simulated peak demand of a building designed to meet the Ontario Building Code. Ontario Building Code. Renewable energy includes energy generated by: solar photovoltaic, solar thermal, wind or geothermal (heating and cooling): <ul style="list-style-type: none"> • Solar photovoltaics – use of composite panels to convert solar energy into electricity, to be used within in the building or exported to the grid. • Solar thermal – use of solar thermal collectors to directly convert solar energy into heating air or water for use in the building. • Geoexchange – Use of electric heat pumps coupled with horizontal or vertical ground loop piping systems to provide heating and cooling energy; or use or direct ground contact systems. Savings must be demonstrated by third-party non-commercial energy modeling tools such as RETScreen and whole-building modeling software utilized for GHG1.1. 	<p>Passive solar day -lighting and orientation</p> <p>Less than 50% glazing of the exterior wall area</p> <p>High performance glazing assemblies</p> <p>Solar shading on south and west-facing windows with awnings or shade trees</p> <p>Energy Recovery Ventilation Systems</p> <p>High efficiency appliances and pumps</p> <p>Variable speed drives on fans and pumps</p> <p>Low-flow water fixtures</p> <p>Drain water heat recovery</p> <p>Connect to a District Energy System</p> <p>BIPV (Building-Integrated Photovoltaics) art</p>
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GREENHOUSE GAS EMISSIONS/ENERGY EFFICIENCY



For New Mid to High-Rise Residential and All Industrial, Commercial and Institutional (ICI) Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
Operational Systems Ensure building systems function efficiently and as designed		<p>GHG 2.1 (Core) Building Commissioning Commission the project using best practice commissioning.^{1,2}</p> <p>GHG 2.2 (Optional) Meters Install in-suite thermal energy meters on all heating and cooling appliances in all residential units.³</p> <p>OR</p> <p>For multi-tenant commercial/retail buildings, install thermal energy meters for each individual commercial/retail tenant.³</p>	<ol style="list-style-type: none"> 1. Refer to LEED® Canada NC 2009 Rating System EA Prerequisite 1, Fundamental Commissioning of Building Energy Systems or LEED EA credit 3 Enhanced Commissioning, for building commissioning standards. 2. Commissioning of a building is a systematic process that documents and verifies that all the facility's energy related systems perform interactively in accordance with the design documentation and intent, and according to the owner's operational requirements from the design phase through to at least one-year post construction. For more information on commissioning, see The Building Commissioning Guide. 3. All thermal energy meters must be "true" energy meters capable of measuring flow rates as well as supply and return temperatures and computing energy consumption. Meters shall conform to CSA (Canadian Standards Association) Standard C 900 Heat Meter Standard or to CEN (European Committee for Standardization) Standard EN 1434. <ul style="list-style-type: none"> • IPMVP (International Performance Measurement and Verification Protocol) provides a framework to determine energy and water savings resulting from the implementation of an energy efficiency program and the standards for creating a Measurement & Verification Plan, including requirements for designing a sub-metering system. For strategies to implement, see the International Performance Measurement and Verification Protocol Volume I. 	Engage a Commissioning Authority

WATER QUALITY, QUANTITY AND EFFICIENCY



For New Mid to High-Rise Residential and All Industrial, Commercial and Institutional (ICI) Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
Construction Activity Ensure protection of water quality during construction and demolition	WQ 1.1 Erosion & sediment control Follow the Erosion and Sediment Control Guideline for Urban Construction (Greater Golden Horseshoe Conservation Authorities, December 2006) during construction and demolition activities. ¹		1. Refer to the Greater Golden Horseshoe Area Conservation Authorities Erosion and Sediment Control Guideline for Urban Construction .	Erosion and sediment control plan Silt fencing, sediment traps, sediment basins
Stormwater Retention (Water Balance) Minimize stormwater that leaves the site	WQ 2.1 Stormwater balance Retain stormwater on-site to the same level of annual volume of overland runoff allowable under pre-development conditions. ¹ WQ 2.2 Stormwater retention & reuse Retain at least the first 5 mm from each rainfall through rainwater reuse, on-site infiltration and evapotranspiration ^{1,2} OR Ensure that the maximum allowable annual runoff volume from the development site is no more than 50% of the total average annual rainfall depth.	WQ 2.3 (Optional) Enhanced stormwater retention & reuse Retain 10 mm of each 24 hour rainfall event, or 70% of total average annual rainfall depth, for rainwater reuse, on-site infiltration and/or evapotranspiration. ³	1. These measures come from the Wet Weather Flow Management Guidelines . The guidelines provide stormwater practices so that source control is undertaken as a priority to the extent physical factors allow. When source control practices are exhausted, the WWFM Guidelines provide conveyance and end of pipe practices. Strategies for TSS removal include green streets, stormwater ponds, oil-grit separators, bioswales, filters and others. See the Wet Weather Flow Management Guidelines Table 7 for summary of required stormwater management targets. 2. Use tree and shrub planting, green roofs and other landscaping to increase evapotranspiration from the site, and to increase the amount of permeable surfacing on site. 3. Any storage system must be capable of storing the water collected for later use with over-flows that only release water over and above the 10 mm of rainfall.	Green roofs Rain water harvesting Permeable pavers, permeable asphalt, permeable concrete for hard surfaces Stormwater Management ponds Bioswales Downspout disconnection Infiltration trenches Rain gardens/ absorbent landscaping

WATER QUALITY, QUANTITY AND EFFICIENCY



For New Mid to High-Rise Residential and All Industrial, Commercial and Institutional (ICI) Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
Water Quality-Stormwater Run-Off Manage and clean stormwater that leaves the site	WQ 3.1 Total suspended solids (TSS) Remove 80% of total suspended solids (TSS) on an annual loading basis from all runoff leaving the site based on the post-development level of imperviousness. ¹ WQ 3.2 E. Coli reduction Control the amount of E. Coli directly entering Lake Ontario and waterfront areas as identified in the Wet Weather Flow Management Guidelines. ²		<ol style="list-style-type: none"> 1. These measures come from the Wet Weather Flow Management Guidelines. The Guidelines provide stormwater practices so that source control is undertaken as a priority to the extent physical factors allow. When source control practices are exhausted, the WWFM Guidelines provide conveyance and end of pipe practices. Strategies for TSS removal include green streets, stormwater ponds, oil-grit separators, bioswales, filters and others. 2. Refer to the Water Quality Targets for E.Coli in the Wet Weather Flow Management Guidelines. 	Mechanical or natural treatment systems such as: vegetated filter strips bio-swales sediment traps oil/grit separators

WATER QUALITY, QUANTITY AND EFFICIENCY



For New Mid to High-Rise Residential and All Industrial, Commercial and Institutional (ICI) Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
Water Efficiency Reduce demand for potable water	WQ 4.1 Drought-tolerant landscapes Provide drought-tolerant plants for at least 50% of the landscaped site area (including at-grade landscapes, vegetated roofs and walls). ^{1, 2}	WQ 4.2 (Core) Water efficient fixtures Install water fixtures and appliances that achieve at least a 30% reduction in potable water consumption for the building (not including irrigation) over the baseline water fixtures and appliances. ^{3, 4} WQ 4.3 (Core) Irrigation Where soft landscaping exists on the site, reduce potable water use for irrigation by 50%. ⁵	<ol style="list-style-type: none"> 1. Drought-tolerant landscapes and species are provided in accordance with the following City of Toronto guideline document, Drought Tolerant Landscaping: A Resource for Development. 2. In choosing tree species, preference should always be given to those native to the area. Where it can be clearly demonstrated that the planting of native tree species would not be appropriate due to site constraints often encountered in urban settings, Urban Forestry may accept non-native, non-invasive species better suited to the particular site. 3. Refer to LEED® Canada for New Construction and Major Renovations 2009: WE Credit 3, Water Use Reduction, for further details on how to achieve this requirement. Calculations will be based on estimated occupant usage and baseline fixtures including: toilets, urinals, faucets, shower heads. Baseline fixtures include the following: toilets (6.0L), urinals (3.8L) residential faucets (8.3 LPM at 414 kPa), commercial lavatory (rest room) faucets (1.9 LPM at 414 kPa), shower heads (9.5LPM at 552 kPa). 4. Appliances exclude: dishwashers, clothes washers, commercial icemakers and steam cookers. 5. Refer to LEED® Canada for New Construction and Major Renovations 2009: WE Credit 1, Water Efficient Landscaping, Option 1 for further details on how to achieve this requirement. Reductions in potable water must be calculated from a midsummer baseline case. Landscape area must constitute 5% of the project site area. Methods to reduce potable water use for irrigation include: selection of plant species appropriate to local conditions, high efficiency irrigation and use of captured rainwater and use of greywater.* <p>* Greywater may be used for subsurface irrigation if treated as per the requirements of the Ontario Building Code and CAN/CSA-B128.</p>	Dual flush toilets Waterless urinals Drought-tolerant native species Water-efficient plants/ landscaping Rain sensors for irrigation systems Rainwater irrigation system Grey water irrigation* Drip irrigation



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Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
Urban Forest: Tree Protection Preserve the existing urban forest	<p>EC 1.1 Tree protection Adhere to the Tree Protection Policy and Specifications for Construction Near Trees for tree protection and barriers during construction.¹</p> <p>EC 1.2 Preservation of mature trees Protect and retain all trees that are 30 cm or more DBH (diameter at breast height) from injury or removal.²</p> <p>EC 1.3 Ravine protection Within the Ravine Protected Area, protect and retain trees of all diameters from injury or removal.³</p> <p>EC 1.4 Street tree retention Protect and retain trees of all diameters adjacent to City of Toronto streets and roadways and City-owned Parkland.^{4, 5}</p>		<ol style="list-style-type: none"> 1. Refer to the City of Toronto Tree Protection Policy and Specifications for Construction Near Trees. 2. Tree injury or removal of trees measuring 30cm in diameter or larger, is prohibited on private property, except where a permit is issued, in accordance with the City of Toronto Municipal Code Chapter 813, Private Tree Protection. 3. Tree injury or removal of trees of all diameters within a Ravine Protection Bylaw Area property is prohibited, except where a permit is issued, in accordance with the City of Toronto Municipal Code Chapter 658, Ravine and Natural Feature Protection. 4. Trees of all diameters on City property adjacent to City of Toronto streets and roadways are protected under the City of Toronto Municipal Code Chapter 813, Trees on City Streets. 5. Trees of all diameters on City-owned Parkland are protected under the City of Toronto Municipal Code Chapter 608, Parks. <ul style="list-style-type: none"> • Privately-owned trees that were planted as a condition of site plan approval and incorporated into a site plan agreement registered on title, that do not qualify for protection under the private tree or the Ravine and Natural Feature Protection Bylaw are required to be maintained substantially in conformity with the approved drawings. 	<p>Construction management plan to avoid site disturbance</p> <p>Relocate trees on-site</p> <p>Establish tree protection zones during construction</p>



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Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
Urban Forest: Increase Tree Canopy Make space for trees, enhance the urban forest	<p>EC 2.1 Tree Planting Provide tree canopy cover distributed across the site area and the public boulevard at a minimum rate of : 1 tree for every 66 m² of 40% of the site area.^{1,2}</p> <p>EC 2.2 Soil volumes Provide all trees planted with a minimum volume of 30 m³ of high quality soil per tree. The minimum soil volume can be 20 m³ per tree where the soil volume is shared.³</p> <p>EC 2.3 Trees along street frontages Plant large growing shade trees at the equivalent of 8 to 10 m intervals along all street frontages, including along private streets and in the public boulevard.⁴</p> <p>EC 2.4 Trees in parking lots If surface parking is permitted and provided, plant shade trees throughout the parking lot interior at a minimum ratio of one tree planted for every five parking spaces supplied.⁵</p> <p>EC 2.5 Watering program Provide a watering program for trees for at least the first 2 years after planting.</p>	<p>EC 2.6 (Optional) Enhanced trees in parking lots If surface parking is provided, plant internal shade trees at a minimum ratio of one tree planted for every three parking spaces supplied.⁵</p> <p>EC 2.7 (Optional) Enhanced tree planting Provide additional tree planting beyond the development site and the associated public boulevard at a minimum rate of: 1 tree for every 200 m² of 40% of the total site area.⁶</p>	<ol style="list-style-type: none"> 1. The “site area” is the privately-owned portion of the property affected by the development. The “public boulevard” is the City-owned portion. Calculate 40% of the site area and provide 1 tree for every 66 m². For these purposes, the site area may exclude areas dedicated for active recreation or local food production and utility corridors or easements. The required number of trees may be distributed across both the site area and the public boulevard. 2. Species selection, size and distribution will vary by project. Large growing trees are preferred, however small or medium growing trees may be accepted in restrained site conditions. For suggestions on species selection, refer to Forestry Facts & Native Plant Lists. 3. The soil volume of 30 m³ is based on a minimum soil depth of 0.8 m and a maximum of 1.2 m of high quality soil above a well drained sub-soil or drainage layer. Groups of trees should be planted so that they can share soil volume. Soil volumes for groups of trees may overlap by as much as 33%. Where trees are planted under hardscape, a continuous soil trench provides structural support for the hardscape while also ensuring adequate soil volumes and protecting roots from compaction. Soil cells, which are subsurface modular structures designed specifically for tree trenches, are recommended. Other approaches must be approved by City of Toronto Urban Forestry Department. For further information refer to: Toronto Urban Design Streetscape Manual. 4. Trees planted along street frontages in the public boulevard are included in the number of trees required under EC 2.1. Tree spacing will vary depending on the species selected. See: Toronto Street Trees: A Guide to Standard Planting Options and links to City of Toronto Urban Forestry website for tree planting details. 5. Distribute internal shade tree planting such that no parking space is more than 30 m from a tree. On small or narrow sites, shade trees provided in non-street facing perimeter planting areas can be counted towards the internal tree requirement, provided that the maximum distance from a parking space (30 m) is met. Refer to the Design Guidelines for ‘Greening’ Surface Parking Lots. 6. Locations must be identified and approved by the City of Toronto Urban Forestry Department. 	Soil cells Continuous soil trench Silva Cells Raised beds Open planters Rainwater harvesting irrigation system



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Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
Natural Heritage Protect, restore and enhance the natural environment and increase biodiversity	<p>EC 3.1 Biodiversity in landscapes Plant the landscaped site area using a minimum of 50% native species (including trees, shrubs and herbaceous plants).¹</p> <p>EC 3.2 Ravines and natural areas buffers Where a setback from top-of-bank is required, plant the landscaped area of the setback with native species.^{1,2,3,4,6}</p> <p>EC 3.3 Invasive species Do not plant any invasive species on properties along streets abutting ravines and natural areas.^{5,6}</p>	<p>EC 3.4 (Optional) Enhanced landscaping Restore or protect a minimum 50% of the site area (excluding the building footprint) or 20% of the total site area (including building footprint), whichever is greater, with native or drought-tolerant vegetation.^{1,7}</p>	<ol style="list-style-type: none"> Native plant species are defined as plants that live or grow naturally in a region without direct or indirect human intervention. For examples of species native to the Toronto area refer to: Native Plants for Naturalization. Drought Tolerant Landscaping: A Resource for Development. A development setback is defined in Section 3.4.8a) of the City of Toronto's Official Plan as 10 m from the top-of-bank of a valley, ravine or bluff. Buffer areas are addressed under Section 3.4.12d). Where the top-of-bank is unstable, minimum setbacks may be greater than 10 m. Minimum buffer widths may be greater than 10 m for significant features such as Provincially Significant Wetlands, Life Science Areas of Natural and Scientific Interest (ANSI) and Environmentally Sensitive Areas (ESA). Naturalized setbacks and buffers should provide species and structural diversity with native trees (both small and large growing trees), shrubs and herbaceous ground layer species. Non planted surfaces such as walkways must be permeable. Topsoil for landscape planting shall be uncontaminated, fertile, friable natural loam having an acidity range and organic matter capable of sustaining vigorous plant growth, and be free of construction debris or any admixture of subsoil, lumps, stones and roots over 25 mm in diameter and other extraneous matter. Invasive species are species that reproduce aggressively and become established in a natural area by displacing native species. For examples of invasive species in Southern Ontario see the Ontario Society for Ecological Restoration. Ravine and natural areas are defined in accordance with the City of Toronto Ravine and Natural Feature Protection Bylaw. <p>Refer to LEED® Canada for New Construction and Major Renovations 2009: Credit SS5.1 Protect and Restore Habitat Case 2, for further details on how to achieve this requirement.</p> <p>Green Roof Area may be included if the green roof is designed to promote biodiversity and habitat and plants are native or drought tolerant. Refer to the City of Toronto Guidelines for Designing for Biodiversity on Green Roofs.</p> <p>Exterior, vertical living/green walls planted with native or drought tolerant plants may be included in the calculation. A living wall should incorporate growing media and be constructed to be low maintenance and chemical free.</p>	<p>Enhance the City's natural heritage system</p> <p>Identify habitats that could be sustained and enhanced on-site</p> <p>Plant a diversity of species and habitats</p> <p>Contiguous vegetated features to minimize habitat fragmentation</p>



For New Mid to High-Rise Residential and All Industrial, Commercial and Institutional (ICI) Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
Bird Collision Deterrence Design buildings to reduce bird collisions and mortality	<p>EC 4.1 Bird friendly glazing</p> <p>Use a combination of the following strategies to treat a minimum of 85% of all exterior glazing within the first 12 m of the building above grade (including balcony railings, clear glass corners, parallel glass and glazing surrounding interior courtyards and other glass surfaces):^{1,2}</p> <ul style="list-style-type: none"> Low reflectance, opaque materials³ Visual markers applied to glass with a maximum spacing of 100 mm x 100 mm⁴ Building-integrated structures to mute reflections on glass surfaces.⁵ <p><u>Balcony railings:</u> Treat all glass balcony railings within the first 12 m of the building above grade with visual markers provided with a spacing of no greater than 100 mm x 100 mm.^{4,6}</p> <p><u>Fly-through conditions:</u> Glass corners: Within the first 12m of the building, treat all glazing located at building corners with visual markers at a spacing of no greater than 100 mm x 100 mm.⁷</p> <p><u>Parallel glass:</u> Treat parallel glass at all heights with visual markers at a spacing of no greater than 100 mm x 100 mm.⁷</p> <p><u>City-owned buildings and all Agencies, Boards, Commissions and Corporations:</u> For new buildings or major renovations, treat all exterior glazing within the first 16 m of the building above grade as per the requirements of EC 4.1 above; visual markers applied to glass must have a maximum spacing of 50 mm x 50 mm⁸.</p>	<p>EC 4.4 (Optional) Enhanced bird friendly glazing</p> <p>Use a combination of the following strategies to treat a minimum of 95% of all exterior glazing within the first 12 m of the building above grade (including all balcony railings, clear glass corners, parallel glass and glazing surrounding interior courtyards and other glass surfaces):^{1,2}</p> <ul style="list-style-type: none"> Low reflectance, opaque materials³ Visual markers applied to glass with a maximum spacing of 100 mm x 100 mm⁴ Building-integrated structures to mute reflections on glass surfaces.⁵ <p>EC 4.5 (Optional) Opaque building materials</p> <p>Provide at least 50% of the exterior surface of the building as non-reflective opaque materials to significantly reduce bird collisions with buildings.</p>	<ol style="list-style-type: none"> Bird friendly design aims to reduce bird collisions and mortalities caused by reflective glazing by: making glazed areas visually distinct to birds and by reducing images of trees or sky reflected in glass through shading/muting reflections. The most critical zone for bird collisions is 12 m minimum above grade (mature tree height). If the site is adjacent to a natural area feature, glass must be treated to the first 12 m of the building or to the height of the top of the surrounding tree canopy at maturity, whichever is greater. Low reflectance, opaque materials may include spandrel glass with one of the following: (i) Solid back-painted frit or silicone backing opaque coatings OR; (ii) Reflective or low-e coatings that have an outside reflectance of 15% or less. Spandrel glass with reflective or low-e coatings that have an outside reflectance of greater than 15% should be used in combination with other strategies. Visual markers consist of opaque contrasting points or patterns etched into or applied onto the exterior or interior surfaces of glass and must have a minimum diameter of 5 mm and a maximum spacing of 100 mm x 100 mm. Patterns applied closer to the first (exterior) surface, in combination with low reflectance glass, are most visible and effective. Building integrated structures include: opaque awnings, sunshades, exterior screens, shutters, grilles and overhangs or balconies that provide shading below a projection (assume 1:1 ratio of treatment below a projection) to mute reflections. Shade cast by the building or adjacent buildings cannot be included as a bird collision deterrence strategy. Glass behind treated balcony railings is considered to be treated. Fly-through conditions are created when clear glass corners meet or provide any clear line of sight to birds. Glass corners must be treated for 2.5 m extending on each side away from the corner. Parallel glass is glass installed at any height that is parallel at a distance of 5 m or less such as a clear glass corridor or bridge. This requirement applies to City-owned non residential facilities. 	<p>Visual markers:</p> <p>Etched glass Fritted glass Films Decals Mullions</p> <p>Exterior screens, shutters, grilles and louvers to shield glass surfaces</p> <p>Shadows from opaque overhangs, awnings, exterior sunshades</p>



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Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
	<p>EC 4.2 Rooftop vegetation Treat the first 4 m of glazing above the feature and a buffer width of at least 2.5 m on either side of the feature using strategies from EC 4.1.⁹</p> <p>EC 4.3 Grate porosity Ensure ground level ventilation grates have a porosity of less than 20 mm X 20 mm (or 40 mm x 10 mm).</p>		<p>9. Rooftop vegetation includes any rooftop vegetative landscaping or green roof adjacent to or abutting glass.</p> <p>For more information refer to the City of Toronto Bird-Friendly Development Guidelines.</p>	
<p>Light Pollution</p> <p>Reduce nighttime glare and light trespass</p>	<p>EC 5.1 Exterior lighting Shield all exterior light fixtures to meet the IESNA Full Cutoff Classification or an Uplight rating of 0, to prevent glare and/or light trespass onto any neighbouring properties.^{1,2,3,4,5}</p>	<p>EC 5.2 (Core) Enhanced lighting Any rooftop architectural illumination must be directed downward and turned off between the hours of 11 p.m. and 6 a.m.⁶</p> <p>EC 5.3 (Core) Lighting controls <u>Institutional /Commercial:</u> Install an automatic device that reduces the outward spillage of internal light by: Reducing the input power to lighting fixtures by at least 50% between the hours of 11 p.m. and 6 a.m. year-round.⁷</p> <p>OR</p> <p>Shielding all openings in the envelope with a direct line of sight to any non-emergency light fixtures between the hours of 11 p.m. and 6 a.m. year-round.⁸</p>	<ol style="list-style-type: none"> 1. Refer to the Illuminating Engineering Society of North America (IESNA) Recommended Practice Manual: Lighting for Exterior Environments for requirements for the Full Cutoff IESNA Classification: iesna.org or the BUG (Backlight, Uplight and Glare) rating system. 2. All exterior light fixtures should be efficient while providing minimum illumination levels sufficient for personal safety and security. Efficient exterior lighting is defined as 60 lumens/watt minimum system efficiency. Safety and security lighting should minimize glare and/or light trespass. 3. Architectural illumination including uplighting may be permitted through a heritage designation provided lighting is turned off year-round between 11:00 p.m. and 6:00 a.m. by an automatic device. Excessive lighting that contributes to light pollution including flood lighting, search lights or sky canons, is not permitted. 4. Glare is the physical sensation caused by artificial light that is brighter than one's adapted surroundings. Glare is produced by a bare light shining directly into the eyes of the observer. 5. Light trespass is unwanted stray light shining across property boundaries. Any light fixture installed on a property must direct and shield light coming from the fixture so that the light source is not directly visible from any adjacent property. Lighting must focus downward, eliminating direct upward light and reducing spill light. 6. Rooftop architectural illumination must be turned off during migratory bird seasons: April and May; August to October. 7. After-hours override may be provided by a manual or occupant sensing device provided that the override lasts no more than 30 minutes. 8. Openings in the building envelope, transparent or translucent, include all fenestration (windows, doors, skylights, curtain walls). Provide shielding with less than 10% transmittance overnight. 	<p>Fixtures that effectively project light downwards</p> <p>Occupancy sensors in parking structures</p> <p>Building automation systems</p> <p>Motion sensor lighting</p>

SOLID WASTE



For New Mid to High-Rise Residential and All Industrial, Commercial and Institutional (ICI) Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
Storage and Collection of Recycling and Organic Waste Facilitate waste sorting and reduction	SW 1.1 Waste collection & sorting <u>Residential:</u> Provide a waste sorting system using a single chute with a tri-sorter or two chutes, one with a bi-sorter. ^{1,2,3} SW 1.2 Waste storage space <u>Residential:</u> Provide an easily accessible waste storage room with a minimum floor space of 25 m ² for the first 50 units plus an additional 13 m ² for each additional 50 units. ^{1,2} SW 1.3 Bulky waste <u>Residential:</u> Provide a minimum of 10 m ² for bulky items and additional diversion programs. ⁴	SW 1.4 (Optional) Enhanced waste collection & sorting <u>Residential:</u> Provide three separate chutes for collection of each of the three waste streams on all floors. ^{1,2,3} SW 1.5 (Optional) Enhanced waste storage space <u>Residential:</u> Provide separated cabinet space in all kitchen suites for segregated collection of: <ul style="list-style-type: none"> • Recyclables • Organics • Garbage.¹ <p style="text-align: center;">OR</p> Provide a dedicated area or areas within the building for the collection and storage of recycling and organics. SW 1.6 (Optional) Household hazardous waste Provide a dedicated collection area or room for the collection of household hazardous waste and/or electronic waste. ⁵	<ol style="list-style-type: none"> 1. Apply these standards to residential apartment developments with 31 units or more where front-end collection is required. 2. Refer to the City of Toronto Requirements for Garbage, Recycling and Organics Collection Services for New Developments and Redevelopments and Chapter 844 of the Toronto Municipal Code, Waste Collection for Residential Properties. 3. Waste is defined as garbage, recyclable materials, organic materials, yard waste and prohibited waste. The three waste streams refers to garbage, organics and recycling. 4. Bulky items are defined as household items that are greater than 1.2 m in any one dimension or weigh in excess of 20kg including furniture. 5. Household Hazardous Waste (HHW) includes: paints, solvents, cleaners, detergents, oils, batteries and compact fluorescent light bulbs. HHW does not include propane or other explosives: <p>City of Toronto Household Hazardous Waste program</p> <p>City of Toronto Electronic program information</p>	Bi-sorter Tri-sorter Three chute system Dedicated collection areas and signage

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Building Reuse Maintain existing walls, floors and roof		SW2.1 (Optional) Building reuse Maintain at least 55% of the existing building structure (including structural floors and roof decking) and envelope. ^{1,2,3}	<ol style="list-style-type: none"> 1. Refer to LEED® Canada for New Construction and Major Renovations 2009: MR Credit 1.1 Building Reuse: Maintain Existing Walls Floors and Roof, for further details on how to achieve this requirement. 2. Envelope components include: exterior skin and framing, and exclude window assemblies and non-structural roofing material. 3. Hazardous materials are excluded. 	Adaptive reuse of existing building structure, envelope and elements
Construction Waste Management Recycle and/or salvage non-hazardous construction and demolition debris		SW 3.1 (Optional) Construction waste Recycle at least 75% of non-hazardous construction and demolition debris. ^{1,2,3,4}	<ol style="list-style-type: none"> 1. Refer to LEED® Canada for New Construction and Major Renovations 2009: MR Credit 2 Construction Waste Management, for further details on how to achieve this requirement. 2. Adopt a construction waste management plan to achieve these goals. Consider recycling cardboard, metal, brick, mineral fibre panel, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation. 3. Construction debris processed into a recycled content commodity which has an open market value (e.g. wood derived fuel [WDF], compost or mulch, etc.) may be applied to the construction waste calculation. 4. Calculations can be done by weight or volume, but must be consistent throughout. 	Develop a construction waste management plan and tracking method Designated area on-site for recyclable materials Recycle trees removed from the site through tree salvage companies
Recycled Content Reduce demand for new materials and increase market for recycled materials		SW 4.1(Optional) Recycled content Ensure that at least 20% of a project's construction materials (based on value) comprise recycled content. ^{1,2,3}	<ol style="list-style-type: none"> 1. Refer to LEED® Canada for New Construction and Major Renovations 2009: MR Credit 4 Recycled Content, for further details on how to achieve this requirement. 2. Use materials with recycled content such that the sum of post-consumer recycled content plus ½ of the pre-consumer content constitutes at least 20%, based on cost, of the total value of the materials in the project. 3. Recycled content is defined in accordance with the International Organization of Standards document, ISO 14021—Environmental Labels and Declarations - Self-declared Environmental Claims (Type II environmental labelling). 	Specify recycled content for building products for building envelope and interior finishing materials such as concrete, masonry, metals, gypsum wallboard, acoustic tile, lumber, ceramic tiles Identify recycled materials suppliers

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Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
Regional Materials Increase demand for building materials and products extracted, processed and manufactured in the region		SW 5.1 (Optional) Regional materials Ensure that at least 20% of a project's building materials or products have been extracted, harvested, recovered or processed within 800 km (2400 km if moved by rail or water) of the final project site. ^{1,2}	<ol style="list-style-type: none"> 1. Refer to LEED® Canada for New Construction and Major Renovations 2009: MR Credit 5 Regional Materials, for further details on how to achieve this requirement. 2. Demonstrate that the final manufacturing site is within 800 km (500 miles) (2,400 km if shipped by rail or water) of the project site for these products. If only a fraction of a product or material is extracted, harvested, recovered, processed and manufactured locally, then only that percentage (by weight) must contribute to the regional value. 	Specify materials, material suppliers and manufacturers that meet the regional criteria