

Toronto Green Standard

Making a Sustainable City Happen



For
New Low-Rise Non-Residential Development
(Buildings 3-storeys or less)

TORONTO GREEN STANDARD



For New Low-Rise Non-Residential Development

The Toronto Green Standard (TGS) is a two-tier set of performance measures, with supporting guidelines, for sustainable site and building design for new development. Its purpose is to promote site and building designs that address air quality, greenhouse gas emissions, energy efficiency, water quality and efficiency, solid waste and ecology.

The Toronto Green Standard is a key strategy of 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 improving air and water quality, and enhancing the natural environment.

There are three versions of the Toronto Green Standard, each relating to different building types:

- "Low-Rise Non-Residential" applies to non-residential buildings up to three storeys in height.
- "Low-Rise Residential" applies to detached, semi-detached and town homes, in projects containing a minimum of 5 dwellings or units, up to three storeys in height.
- "Mid to High-Rise" applies to all residential apartment buildings and non-residential buildings that are 4 storeys and higher.

Each version contains the Tier 1 (required) and Tier 2 (voluntary) TGS performance measures; detailed specifications and definitions that provide additional information on how to comply with the TGS; and examples of possible strategies to implement the proposed standard.

Applying the Toronto Green Standard

New planning applications, including zoning bylaw amendments, site plan approval and draft plan of subdivision, are required to meet Tier 1 of the environmental performance measures. Developers may also choose to meet Tier 2, a voluntary higher level of environmental performance. Site Plan applications that meet both Tier 1 and 2 of the TGS are eligible for a refund of 20% of the development charges paid to the City.

There are a number of materials that have been produced to support implementation of the TGS:

1. **TGS Checklist:** The Checklist should be submitted and completed in full with all development applications. The Checklist should provide adequate detail on how the design meets the Toronto Green Standard. The Checklist must also indicate the appropriate plans, drawings and reports that document the achievement of the TGS performance measures. In order to complete the TGS Checklist, review the appropriate standard that applies to the development type, including the Specifications, Definitions and Resources column that provide more information on how to comply with the standard.
2. **TGS Statistics Template:** For Site Plan Control applications, complete the full Statistics Template and copy it directly onto the site plan submitted with the development application.
3. **Energy Report:** The TGS includes energy performance measures for new development. In order to meet these targets, an Energy Report is required following the City's terms of reference available from the website www.toronto.ca/greendevlopment and in the *Building Toronto Together Development Guide* www.toronto.ca/developing-toronto/darp_guide.htm.



For New Low-Rise Non-Residential Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
<p>Automobile Infrastructure</p> <p>Discourage single-occupancy automobile use and encourage the use of low emission vehicles.</p>	<p>AQ 1.1 Institutional/Commercial: If providing more than the minimum parking required under the Zoning Bylaw, any additional spaces must be provided only for dedicated priority parking spaces for carpooling and for publicly accessible spaces dedicated to car-sharing.^{1,2,3}</p>		<ol style="list-style-type: none"> 1. This target can only apply where there is a minimum parking requirement. 2. All carpool or car-sharing spaces must be clearly identified with signage or symbol on the paved area. 3. The number of dedicated priority parking spaces (carpool and car-share) should be no less than 1 dedicated space for every 10 parking spaces provided above the minimum requirement of the City of Toronto Comprehensive Zoning Bylaw 1156-2010, as adopted by Council on August 7, 2010. <ul style="list-style-type: none"> • The number of accessible parking spaces for disabled persons should be no less than 1 designated space for every 25 parking spaces up to the first 100 spaces, plus 1 space per additional 50 spaces above 100. No less than 1 accessible parking space should be provided where the number of parking spaces provided is less than 25. For details on accessible parking spaces, refer to the <i>Toronto Accessibility Design Guidelines</i>: www.toronto.ca/diversity/pdf/accessibility_design_guidelines.pdf. • 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. • Car pooling is when 2 or more workers share a car ride to work locations. 	<p>Designated car-pool or car sharing parking spaces and signage</p> <p>Shared parking</p> <p>Rough-in conduits for electric plug-in infrastructure for cars, bicycles and scooters</p> <p>Establish transportation demand management associations</p>



For New Low-Rise Non-Residential Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
<p>Cycling Infrastructure</p> <p>Encourage cycling as a clean air alternative</p>	<p>AQ.2.1 Bicycle parking rates:^{1,2} <u>Commercial/Institutional</u>: Downtown, Central Waterfront and Centres, provide <u>0.2</u> occupant bicycle parking spaces per 100m² of GFA and the greater of <u>0.2</u> visitor bicycle parking spaces/100m² of GFA or 6 spaces; For the rest of the City provide <u>0.13</u> occupant bicycle parking spaces/100m² of GFA and provide the greater of <u>0.15</u> visitor bicycle parking spaces /100m² of GFA or 6 spaces. <u>Retail</u>: Downtown, Central Waterfront and Centres, provide <u>0.2</u> occupant bicycle parking spaces per 100m² of GFA and the greater of <u>0.3</u> spaces/100m² of GFA or 6 spaces; For the rest of the City provide <u>0.13</u> occupant bicycle parking spaces/100m² of GFA and the greater of <u>0.25</u> spaces/100m² of GFA or 6 spaces. <u>Industrial</u>: Provide occupant bicycle parking spaces equal to 5% of the number of required parking spaces.³</p> <p>AQ.2.2 Locate occupant bicycle parking in a weather protected, secure area with controlled access; or secure individual enclosures.⁴</p> <p>AQ.2.3 Provide visitor bicycle parking in a highly visible and easily accessible location at grade.</p> <p>AQ.2.4 In workplaces, provide 1 male and 1 female shower and change facility for every 30 bicycle parking spaces.⁵</p>		<ol style="list-style-type: none"> 1. City of Toronto Comprehensive Zoning Bylaw 1156-2010, was adopted by Council on August 27, 2010. All applications received on or after August 27, 2010 provide bicycle parking in accordance with the Bylaw. 2. All bicycle parking spaces should be designed in accordance with the City of Toronto Guidelines for the Design and Management of Bicycle Facilities www.toronto.ca/planning/bicycle_parking_guide.htm. 3. No less than 1 bicycle parking space should ever be provided. 4. All occupant bicycle parking must be provided either at-grade, on the ground floor of the building or on the first floor of the building below grade used for vehicular parking spaces. 5. If less then 30 occupant bicycle parking spaces are provided, no shower and change facilities are required. <ul style="list-style-type: none"> • Occupant bicycle parking is also known as long-term or Type 1 bicycle parking for residents or employees of a building. • Secure long-term bicycle parking is in a separately accessed controlled area, that is regularly monitored by security personnel or video surveillance. • Visitor bicycle parking is also known as short-term or Type 2 bicycle parking and includes bicycle racks in an easily accessible location, at grade, such as near major building entrances, and are available use by visitors to a building. 	<p>Bicycle storage racks, lockers or cages</p> <p>Bicycle ramps on staircases</p> <p>Signage to local bicycle paths</p> <p>Provide a dedicated entrance or separated entrance ramp for parking facilities in underground parking garages</p> <p>Dedicated entrances to indoor bicycle parking facilities</p>



For New Low-Rise Non-Residential Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
<p>Pedestrian Infrastructure</p> <p>Encourage walking as a clean air alternative for all ages and abilities</p>	<p>AQ 3.1 Connect buildings on the site to off-site pedestrian paths, surface transit stops and parking areas (car and bike).</p> <p>AQ 3.2 Design on-site sidewalks, crosswalks and walkways to be continuous, universally accessible, barrier free and clearly designated.</p> <p>AQ 3.3 Outdoor waiting areas located on the site must offer protection from the weather.¹</p> <p>AQ 3.4 Use only pedestrian-specific lighting directed onto sidewalks, pathways, entrances and outdoor waiting areas.²</p> <p>AQ 3.5 Where a transit stop is located within a walkable distance of the project site boundary, the building main entrance should have a direct pedestrian linkage to that transit stop.</p>		<ol style="list-style-type: none"> Outdoor waiting areas must include the primary entrance to the building or any entrance adjacent to a lobby. Pedestrian scaled lighting must be directed downward and includes fixtures such as bollards or lower-scale pole fixtures along pedestrian routes. For details on exterior lighting design strategies that minimize light pollution refer to the <i>Bird-Friendly Development Guidelines</i>: www.toronto.ca/lightsout/pdf/development_guidelines.pdf. <ul style="list-style-type: none"> For details on appropriate grading, walkway width, amenity strips and surface treatment, refer to the <i>Toronto Accessibility Design Guidelines</i> www.toronto.ca/diversity/pdf/accessibility_design_guidelines.pdf, the <i>Design Guidelines for 'Greening' Surface Parking Lots</i> www.toronto.ca/planning/urbdesign/greening_parking_lots.htm and the <i>Toronto Streetscape Manual</i> http://www.toronto.ca/planning/urbdesign/streetscape/index.htm. The <i>Canadian Institute for Transportation Engineers'</i> (CITE) document, <i>Promoting Sustainable Transportation Through Site Design</i>, provides some useful design guidelines for sustainable transportation options for non-residential developments. 	<p>Pedestrian scale building design</p> <p>Pedestrian oriented landscaping, lighting</p> <p>Free standing structures, attached canopies, awnings</p> <p>Building orientation to facilitate transit access</p>



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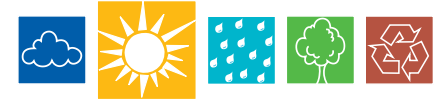
Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
<p>Urban Heat Island Reduction: At Grade</p> <p>Reduce ambient surface temperatures, and provide shade for human health and comfort</p>	<p>AQ 4.1 Use high-albedo surface materials for at least <u>50%</u> of the site's non-roof hardscape^{1,2}</p> <p style="text-align: center;">OR</p> <p>Use open grid pavement for at least <u>50%</u> of the site's non-roof hardscape²</p> <p style="text-align: center;">OR</p> <p>Shade within 5 years at least <u>50%</u> of the site's non-roof hardscape, including surface parking areas, walkways and other hard surfaces³</p> <p style="text-align: center;">OR</p> <p>Use a combination of high-albedo surface materials, open grid pavement and shade for at least <u>50%</u> of the site's non-roof hardscape.⁴</p> <p>AQ 4.2 Plant large growing shade trees at the equivalent of 6-8m intervals starting from the property line:</p> <ul style="list-style-type: none"> • along all street frontages, • along all open space frontages and • along all public walkways, excluding driveways and easements.^{5,6} <p>AQ 4.3 If surface parking is permitted and provided, plant shade trees at a minimum ratio of one tree planted for every <u>five</u> parking spaces supplied.^{6,7}</p>	<p>AQ 4.4 Use high-albedo surface materials for at least <u>75%</u> of the site's non-roof hardscape^{1,2}</p> <p style="text-align: center;">OR</p> <p>Use open grid pavement for at least <u>75%</u> of the site's non-roof hardscape²</p> <p style="text-align: center;">OR</p> <p>Shade at least <u>75%</u> of the site's non-roof hardscape, including surface parking areas, walkways and other hard surfaces³</p> <p style="text-align: center;">OR</p> <p>If surface parking is provided, plant internal shade trees at a minimum ratio of one tree planted for every <u>three</u> parking spaces supplied^{6,7}</p> <p style="text-align: center;">OR</p> <p>Install a green wall on an exterior surface that is either free-standing or part of a building to a minimum height of one-storey⁸</p> <p style="text-align: center;">OR</p> <p>Use a combination of high-albedo surface materials, open grid pavement and shade for at least <u>75%</u> of the site's non-roof hardscape.⁴</p>	<ol style="list-style-type: none"> 1. Non-roof hardscape (hard landscaping) includes: parking areas, walkways, plazas and other hard surfaces. 2. High-albedo surface materials must have an initial reflectance of at least 0.3 or SRI of 29. Solar Reflectance Index (SRI) combines the reflectivity and emittance values as a measure of a coating's overall ability to reject solar heat. 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 35 SRI for gray concrete. Open grid pavement consists of concrete or plastic grid systems with large pore spaces filled with a planted growing medium or light colour aggregate. 3. Shade must be measured at solar noon at the summer solstice (Approximately June 21) and may be provided by vegetation or shade structures. For examples of native, large growing shade trees see: www.toronto.ca/trees/pdfs/Tree_List.pdf. 4. If an elementary or secondary school site provides softscaping for a minimum of 30% of the non-roof site area (not including artificial turf areas) 50% of the site's non-roof, non-recreational hardscape (e.g. parking lots, drop-off locations, paths) must be treated for Urban Heat Island; and at least 25% of the site's non-roof recreational hardscape must be shaded within 5 years. 5. Open space frontages include public or privately owned, but publicly accessible open spaces, such as parks, squares, plazas, courtyards, etc. Easements include those for utilities (only if the utility type or location directly precludes tree planting), driveways, laneways, and other such access routes. 6. Provide trees with sufficient soil volume to support crown growth diameter equivalent to proposed tree spacing. Refer to the Ecology section for soil specifications. 7. Distribute internal shade tree planting such that no parking space is more than 30m from a tree. For details on parking lot materials, landscaping and layout including small sites refer to the <i>Design Guidelines for 'Greening' Surface Parking Lots</i>: www.toronto.ca/planning/urbdesign/greening_parking_lots.htm. 8. Green wall is defined as a wall, that is partially or completely covered with vegetation and, in some cases a growing medium. 	<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>Bioswales</p> <p>Design site to reduce the size of hardscaped area (i.e. smaller parking lots, shorter driveways and below grade parking)</p>



For New Low-Rise Non-Residential Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
<p>Urban Heat Island Reduction: Roof</p> <p>Reduce ambient surface temperatures on or from rooftops</p>	<p>AQ 5.1 <u>For buildings included in the City of Toronto Green Roof Bylaw</u> install a green roof to meet the requirements of the Bylaw.¹</p> <p><u>For buildings not covered by the Green Roof Bylaw</u> do one of the following for Available Roof Space:²</p> <p>Install a Green Roof with 50% minimum coverage³</p> <p style="text-align: center;">OR</p> <p>Use cool roofing materials for 100% of the roof⁴</p> <p style="text-align: center;">OR</p> <p>Use a combination of both for a minimum of 75% of the roof.</p> <p><u>For all City-owned buildings and all Agencies, Boards, Commissions, Corporations and Divisions</u>, new buildings will provide a Green Roof with total area coverage equal to at least 50% of the building footprint. Cover the remaining available roof space with cool roofing materials.</p>		<ol style="list-style-type: none"> Where a green roof is required under the City of Toronto Green Roof Bylaw, the Bylaw specifications apply. For more information see: http://www.toronto.ca/greenroofs/. Available Roof Space is defined as the total roof area of the building excluding areas designated for renewable energy devices, private terraces and residential outdoor amenity space to a maximum of 2m² per residential unit. A Green Roof is a roof surface that supports the growth of vegetation over a substantial portion of its area for the purpose of water conservation or energy conservation. A green roof system typically includes: vegetation, growing medium, filter layer, drainage layer, root resistance layer, and waterproof membrane. Cool roofing materials are defined as having high thermal emittance and high solar reflectance properties. Cool roof 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. Low sloped roofs have a surface slope less than 16.7% (9.5 degrees) and steep sloped roofs have a surface slope greater than 16.7% (9.5 degrees) and less than 41.7% (22.6 degrees). Ballasted roofs with a minimum stone ballast of 83 kg/m² (17 lb/ft² or 117 kg/m²) (23 lb/ft²) pavers will also be accepted. <ul style="list-style-type: none"> Where a green roof is to be constructed in or abutting the Natural Heritage System (Map 9, Official Plan), consider providing a minimum growing medium depth of 150mm (6 inches) to accommodate a greater variety of plant species, to promote biodiversity. Invasive species are discouraged on green roofs. For a list of local invasive species see the Ontario Society for Ecological Restoration: http://www.serontario.org/pdfs/exotics.pdf. Planting of native or adaptive species from the Southern Ontario area is encouraged. Refer to the Toronto and Region Conservation Authority list of native plants for a green roof environment in Toronto: http://www.toronto.ca/greenroofs/pdf/plant_suggestions2007.pdf. Where a green roof is constructed on a building that is adjacent to reflective glass; ensure that the glass is treated to a height of at least 12m above the level of the green roof to prevent potentially fatal bird collisions with windows. 	<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 systems, modular systems and pre-cultivated vegetation blankets</p>

GREENHOUSE GAS EMISSIONS/ENERGY EFFICIENCY



For New Low-Rise Non-Residential Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
<p>Minimum Energy Performance</p> <p>Minimize demand for energy through efficient building design and renewable energy</p>	<p>GHG 1.1 Design the building to achieve at least 25% efficiency improvement over the MNECB or 13% over the Ontario Building Code.^{1,2}</p>	<p>GHG 1.2 Design and construct the building(s) to achieve at least 35% efficiency improvement over the MNECB.^{1,2}</p>	<ol style="list-style-type: none"> Energy Modeling may be performed with EE4, DOE2 or EQuest or other models approved by the City of Toronto Energy Efficiency Office. See the Better Buildings Partnership New Construction Program (BBP-NC) for details on energy simulation and the Design Assistance Incentive: http://bbptoronto.ca/. Buildings with a total Gross Floor Area under 2000m² may meet this target by designing the building in accordance with the specifications contained in the City of Toronto Small Buildings Checklist at: http://www.toronto.ca/planning/environment/index.htm. <p>The Small Buildings Checklist must be completed along with Natural Resources Canada's Screening Tool for New Building Design found at http://screen.nrcan.gc.ca.</p> <ul style="list-style-type: none"> Model National Energy Code for Buildings: http://oee.nrcan.gc.ca/commercial/newbuildings/mnecb.cfm?attr=20. In 2012, the Ontario Building Code (2006) will require new buildings to meet standards 25 per cent higher than the Model National Energy Code for Buildings. Window and glazing thermal performance can be determined by measured ratings http://www.nfrc.org or using a verified rating tool, such as FRAMETMplus http://canmetenergy-canmetenergie.nrcan-nrcan.gc.ca/eng/software_tools/frameplus.html. Buildings are encouraged to connect to existing district energy systems where the capacity exists to supply the heating and cooling demands of the building. 	<p>BBP-NC Design Assistance Incentive</p> <p>Less than 50% glazing of the exterior wall area</p> <p>High efficiency fixtures, appliances and pumps</p> <p>Variable speed drives on fans and pumps</p> <p>Low-flow hot water fixtures and appliances</p> <p>Heat Recovery Ventilation</p> <p>Demand Control Ventilation</p> <p>Drain water heat recovery</p> <p>Passive solar day lighting</p> <p>Shade south- and west-facing windows with awnings or shade trees</p> <p>Connect to a District Energy System</p>

GREENHOUSE GAS EMISSIONS/ENERGY EFFICIENCY



For New Low-Rise Non-Residential Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
<p>Systems Commissioning Ensure building systems function properly</p>		<p>GHG 2.1 Commission the project using best practice commissioning.^{1,2}</p>	<ol style="list-style-type: none"> 1. Refer to LEED-NC Energy & Atmosphere Prerequisite1- Fundamental Building Commissioning for building commissioning standard: www.cagbc.org/leed/systems/new_construction/documents.php. 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. <ul style="list-style-type: none"> • For more information on commissioning, see <i>The Building Commissioning Guide</i>: http://www.wbdg.org/ccb/GSAMAN/buildingcommissioningguide.pdf. • For strategies to implement, see the <i>International Performance Measurement and Verification Protocol Volume I</i>: www.evo-world.org. 	<p>Engage a 3rd party commissioning authority</p>

WATER QUALITY, QUANTITY AND EFFICIENCY



For New Low-Rise Non-Residential Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
<p>Construction Activity</p> <p>Ensure protection of water quality during construction and demolition</p>	<p>WQ 1.1 Follow the <i>Erosion and Sediment Control Guidelines for Urban Construction</i> (Greater Golden Horseshoe Conservation Authorities, December 2006) during construction and demolition activities.¹</p>		<p>1. Refer to the Greater Golden Horseshoe Area Conservation Authorities <i>Erosion and Sediment Control Guidelines for Urban Construction</i>: http://www.sustainabletechnologies.ca/Portals/_Rainbow/Documents/ESC%20Guideline%20-%20December%202006.pdf.</p>	<p>Erosion and sediment control plan</p> <p>Silt fencing, sediment traps, sediment basins</p>
<p>Stormwater Retention (Water balance)</p> <p>Minimize stormwater that leaves the site</p>	<p>WQ 2.1 Retain stormwater on-site to the same level of annual volume of overland runoff allowable under pre-development conditions.¹</p> <p>WQ 2.2 Retain at least the first 5mm from each rainfall through rainwater reuse, on-site infiltration, and evapo-transpiration^{1,2}</p> <p>OR</p> <p>Ensure that the maximum allowable annual runoff volume from the development site is no more than 50% of the total average annual rainfall depth.</p>	<p>WQ 2.3 Retain 25mm from a 24 hour rainfall event for rainwater reuse, on-site infiltration and/or evapo-transpiration.³</p>	<p>1. See <i>Wet Weather Flow Management (WWFM) Guidelines</i> Table 7 for summary of required stormwater management targets: http://www.toronto.ca/water/protecting_quality/wwfmmp/pdf/wwfm_guidelines_2006-11.pdf.</p> <p>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.</p> <p>3. The facility must be capable of retaining subsequent rainfall events up to 5mm within 72 hours without overflow. The maximum resident time of the retained run-off must not exceed 28 days.</p> <ul style="list-style-type: none"> • These measures come from the WWFM Guidelines which 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. 	<p>Green roofs</p> <p>Rain water harvesting</p> <p>Permeable pavers, permeable asphalt, permeable concrete for hard surfaces</p> <p>Greening of impervious areas such as alleyways, fire lanes and parking lots using permeable paving materials, trees and vegetation</p> <p>Downspout disconnection</p> <p>Infiltration trenches</p> <p>Rain gardens/absorbent landscaping</p>

WATER QUALITY, QUANTITY AND EFFICIENCY



For New Low-Rise Non-Residential Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
<p>Water Quality - Stormwater Run-Off</p> <p>Manage and clean stormwater that leaves the site</p>	<p>WQ 3.1 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</p> <p>WQ 3.2 Control the amount of E. Coli directly entering Lake Ontario and waterfront areas as identified in the <i>Wet Weather Flow Management Guidelines</i>.²</p>		<ol style="list-style-type: none"> Strategies for TSS removal include green streets, stormwater ponds, oil-grit separators, bioswales, filters and others. See: http://www.toronto.ca/water/protecting_quality/wwfmmp/pdf/wwfm_guidelines_2006-11.pdf. Refer to the Water Quality Targets for E.Coli in the <i>Wet Weather Flow Management Guidelines</i>: http://www.toronto.ca/water/protecting_quality/wwfmmp/pdf/wwfm_guidelines_2006-11.pdf. <ul style="list-style-type: none"> These measures come from the WWFM. 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. 	<p>Mechanical or natural treatment systems such as: vegetated filter strips, bio-swales, sediment traps, oil/grit separators</p>

WATER QUALITY, QUANTITY AND EFFICIENCY



For New Low-Rise Non-Residential Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
<p>Water Efficiency</p> <p>Reduce demand for potable water through greater efficiencies and by the use of non-potable water</p>	<p>WQ 4.1 Use water efficient plant material for at least 50% of landscaped areas (including vegetated roofs and walls).^{1,2}</p>	<p>WQ 4.2 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}</p> <p>WQ 4.3 Where soft landscaping exists on site, reduce potable water use for irrigation by 50 percent.⁵</p>	<ol style="list-style-type: none"> 1. Refer to the City of Toronto preferred plant list: http://www.toronto.ca/planning/pdf/water_efficient_plant_list.pdf and the Native Tree list: www.toronto.ca/trees/pdfs/Tree_List.pdf. 2. If potable water is not used for soft landscape irrigation, this target is not applicable. 3. Excluding commercial dishwashers, clothes washers and icemakers. 4. Calculations will be based on occupant usage and baseline fixtures including: toilets, urinals, faucets, shower heads. Baseline fixtures include the following: toilets (6.0L), urinals (3.8L) faucets (8.3 LPM), shower heads (9.5LPM). 5. Methods to reduce potable water for irrigation include: plant selection, high efficiency irrigation, use of captured rainwater and use of recycled wastewater. <ul style="list-style-type: none"> • Toronto Water’s Water Saver program assists major ICI sector water users in reducing water use http://www.toronto.ca/watereff/ici_water_saver.htm. • High efficiency hot water fixtures and appliances reduce energy consumption for hot water heating. For more information on ENERGY STAR refer to: http://www.oeenrcan.gc.ca/energystar/index.html. 	<p>Dual flush toilets</p> <p>Waterless Urinals</p> <p>Drought tolerant native species</p> <p>Water efficient plants/ landscaping</p> <p>Rain sensors for irrigation systems</p> <p>Rainwater irrigation system</p> <p>Grey water irrigation</p> <p>Drip irrigation</p>



For New Low-Rise Non-Residential Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
<p>Urban Forest: Tree Protection Preserve the urban forest</p>	<p>EC 1.1 Adhere to the Tree Protection Policy and standards for tree protection barriers during construction according to Specifications for Construction Near Trees.¹</p> <p>EC 1.2 Retain all trees that are 30cm or more DBH (diameter at breast height) in accordance with the City of Toronto Private Tree Protection Bylaw.²</p> <p>EC 1.3 Where property is located within a Ravine Protected Area retain trees of all diameters.³</p> <p>EC 1.4 Where applicable, protect and retain trees of all diameters adjacent to City of Toronto streets and roadways and City-owned Parkland in accordance with the Trees on City Streets and Parkland Bylaws.^{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: http://www.toronto.ca/trees/pdfs/TreeProtSpecs.pdf. 2. Tree injury or removal of trees measuring 30 cm in diameter or larger, is prohibited on private property, except where a permit is issued, in accordance with Bylaw City of Toronto Municipal Code Chapter 813, Private Tree Protection: www.toronto.ca/legdocs/municode/1184_813.pdf. 3. Tree injury or removal of trees of all diameters within a Ravine Protection 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: www.toronto.ca/legdocs/municode/1184_658.pdf. 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: www.toronto.ca/legdocs/municode/1184_813.pdf. 5. Trees of all diameters on City-owned Parkland are protected under the City of Toronto Municipal Code Chapter 608, Parks: www.toronto.ca/legdocs/municode/1184_608.pdf. <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>Include details on tree protection on site and/or landscape plans</p>



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<p>Urban Forest: Encourage Tree Growth</p> <p>Enhance the urban forest</p>	<p>EC 2.1 Plant a minimum of one tree on-site for every 30m² of post development site area covered by soft landscaping.^{1,2}</p> <p>EC 2.2 Trees in hardscaping (hard landscaping): For 2 or more trees planted in primarily hardscaped areas, provide a minimum volume of 15m³ of high quality soil per tree. A single tree planted in hardscape requires a minimum volume of 30m³ of soil.³</p> <p>EC 2.3 Trees in softscaping (soft landscaping): Provide trees planted in softscaping with a minimum volume of 30m³ of high quality soil.⁴</p> <p>EC 2.4 Provide a watering program for trees for the first 2 years after planting.⁵</p>		<ol style="list-style-type: none"> Soft landscaping should contain well drained, uncompacted, permeable growing medium at-grade, with a minimum depth of 50cm, that can support plants and trees and that may be covered by planted ground cover. It may also be covered by decorative stones on an uncompacted sub surface. Soft landscaping does not include decorative stonework, retaining walls, walkways, or similar landscape architectural elements over a compacted surface. Included softscape area must be within the site boundary. Trees must be planted within the site boundary. Areas dedicated for playing fields and sustainable local food production are excluded from the calculation of softscape area. The soil volumes of 15m³ and 30m³ respectively, should be based on a minimum soil depth of 0.8m and a maximum of 1.2m of high quality soil above a well drained sub soil or drainage layer. Ensure that groups of trees planted in hardscape can share soil volume, for example, through the use of continuous soil planters. If trees can share soil, providing at least 15m³ per tree ensures that each tree actually has access to closer to 30m³. The use of soil cells is also encouraged. The soil volume of 30m³ should be based on a soil depth of a minimum of 0.8m and a maximum of 1.2m of high quality soil above a well drained sub soil or drainage layer. The objective for trees in softscaping is to achieve species maturity, a higher soil volume is specified. The lower volume for hardscaped areas recognizes species maturity may not be possible in confined conditions, but still allows reasonable growth. Non-potable water for the tree watering program is preferred. <ul style="list-style-type: none"> Large growing, native trees are preferred: www.toronto.ca/trees/pdfs/Tree_List.pdf. 	<p>Soil cells</p> <p>Continuous soil planters</p> <p>Rainwater harvesting irrigation system</p>



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Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
<p>Natural Heritage: Site</p> <p>Protect, restore and enhance the natural heritage system and increase biodiversity</p>	<p>EC 3.1 Ensure that at least 50% of vegetation species used in landscaping are native.^{1,2,3}</p> <p>EC 3.2 Do not plant any invasive species on properties along streets abutting ravines and natural areas.⁴</p> <p>EC 3.3 Where a development setback from the top-of-bank of a valley, ravine or bluff or a buffer area is required by the City, all plants must be native species.^{5,6}</p>	<p>EC 3.4 100% of tree species planted must be native species on properties or streets abutting ravines and natural areas.^{3,5}</p> <p>EC 3.5 Where a setback from top-of-bank is required, the setback must be planted and all plants must be native species.^{6,7}</p>	<ol style="list-style-type: none"> 1. Landscaping is defined as at-grade trees, plants, decorative stonework, retaining walls, walkways, or other landscape-architectural elements. 2. Native plant species are defined as plants that live or grow naturally in a region without direct or indirect human intervention. Refer to the City of Toronto Native Plant Lists and fact sheets for lists of plant species native to the Toronto Region: http://www.toronto.ca/trees/ravines.htm. 3. 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. 4. Invasive species are species that reproduce aggressively and become established in a natural area by displacing native species. Invasive species are predominantly non-native species that do not naturally occur in an area. They are introduced through a number of means, most often through intentional or accidental human activity. The proliferation of invasive species is often facilitated by site and environmental disturbances that disrupt natural forest systems, including compaction, trampling, drought, pollution, poor soils, heat, and disease. For examples of invasive species in Southern Ontario see the Ontario Society for Ecological Restoration: www.serontario.org/pdfs/exotics.pdf. 5. Ravine and natural areas are defined in accordance with the City of Toronto Ravine and Natural Feature Protection Bylaw: www.toronto.ca/legdocs/municode/1184_658.pdf. 6. A development setback is defined in section 3.4.8 a) of the City's Official Plan as 10 metres from the top-of-bank of a valley, ravine or bluff. Buffer areas are addressed under section 3.4.12 d). Where the top-of-bank is unstable, minimum setbacks may be greater than 10m. 7. Naturalized setbacks and buffers should provide species and structural diversity with native trees (both small and large growing trees), shrubs and ground layer species. <ul style="list-style-type: none"> • Refer to the Green Development Standard Water section for details on drought tolerant species. • Minimum buffer widths may be greater than 10 m for significant features such as Provincially Significant Wetlands, life science ANSIs and ESAs. 	<p>Identify habitats that could be sustained on-site</p> <p>Limit monocultures across large areas</p> <p>Plant a diversity of native species</p> <p>Locate constructed features to leave as much contiguous vegetated area as possible to minimize habitat fragmentation</p>



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Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
<p>Soil Quality and Planting Conditions</p> <p>Provide growing conditions to support long-term plant survival and growth</p>	<p>EC 4.1 Retain and reuse all uncontaminated on-site soil in areas not covered by the building and parking footprint or hard surfaces</p> <p style="text-align: center;">OR</p> <p>Adjust or replace with soil of equal or better quality.¹</p>		<ol style="list-style-type: none"> 1. Refer to soil specifications from Forestry. Specifications for planting should indicate soils that are fertile and friable, obtained from well-drained, arable land. They should be free of calcium carbonate, subsoil, refuse, heavy clay, noxious weed seeds, large debris, and other deleterious substances. <ul style="list-style-type: none"> • For planting details refer to: http://www.toronto.ca/trees/pdfs/DetailPD101bbinturf.pdf. • For information on soil compaction during construction refer to the tree protection policy and specifications for construction near trees: http://www.toronto.ca/trees/pdfs/TreeProtSpecs.pdf. • Continuous soil trenches are encouraged for shrub beds and trees planted within hard and softscaping. 	<p>Develop a soil protection plan and specifications</p> <p>Limit areas impacted by construction</p> <p>Use compost to increase soil organic matter, increase water retention</p> <p>Mulch tree or planting beds</p>
<p>Glass and Other Design Features for Migratory Birds</p> <p>Ensure that design features minimize the risk for migratory bird collisions</p>	<p>EC 5.1 Treat glass with a density pattern between 10-28cm apart for a minimum of the first 10-12m of a building above grade^{1,2,3}</p> <p style="text-align: center;">OR</p> <p>Mute reflections for a minimum of the first 10-12m of a building above grade.⁴</p> <p>EC 5.2 Where a green roof is constructed that is adjacent to glass surfaces; ensure that the glass is treated to a height of at least 12m above the level of the green roof to prevent potentially fatal collisions with windows.</p> <p>EC 5.3 Ensure ground level ventilation grates have a porosity of less than 2cm X 2cm.</p>	<p>EC 5.4 Apply glass treatment to supplementary building and glass features on-site.</p>	<ol style="list-style-type: none"> 1. Density patterns and multiple paned glass provides the best visual markers for birds to reduce collisions with windows. Visual markers must be applied to the exterior surface of the glass. The denser the pattern the more visible and the more effective. 2. If the site is adjacent to a natural area such as a ravine or woodlot or other natural feature, glass must be treated with a density pattern to the first 12m of the building or to the height of the top of the surrounding tree canopy at maturity. 3. Visual markers consist of points (or alternative pattern) etched into or applied onto the exterior surface of the glass and must have a minimum diameter of 5mm. 4. Strategies to mute reflections include angled glass panes at a minimum angle of 20 degrees, awnings and overhangs and external sunshades. Awnings should provide muted reflection to the base of the window. <ul style="list-style-type: none"> • For details on ways to make buildings better for birds including glass treatments, lighting, building operations and site management, refer to the <i>Bird-Friendly Development Guidelines</i>: http://www.toronto.ca/lightout/guidelines.htm. 	<p>Decals</p> <p>Window frames</p> <p>Grilles and Louvres</p> <p>Angled glass</p> <p>Awnings/Overhangs</p> <p>Sunshades</p> <p>Fritted glass</p> <p>Window films</p> <p>Fenestration patterns</p>



For New Low-Rise Non-Residential Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
<p>Light Pollution</p> <p>Reduce nighttime light trespass from the building and the site</p>	<p>EC 6.1 Install exterior light fixtures that are shielded to prevent glare and/or light trespass onto any neighbouring properties.^{1,2,3}</p> <p>EC 6.2 No up-lighting from exterior light fixtures unless otherwise permitted through a heritage designation.⁴</p>	<p>EC 6.3 Eliminate all spot-lighting and rooftop vanity lighting on the building.⁴</p> <p>EC 6.4 In Commercial/ Institutional buildings, 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 PM and 5 AM⁵</p> <p>OR Shielding all openings in the envelope with a direct line of sight to any non-emergency light fixture between the hours of 11 PM and 5 AM.⁶</p>	<ol style="list-style-type: none"> All exterior light fixtures should be efficient while providing minimum illumination levels sufficient for personal safety and security. Safety and security lighting should minimize glare and/or light trespass. Refer to the Illuminating Engineering Society of North America (IESNA) Recommended Practice Manual: Lighting for Exterior Environments for requirements to partially or fully shield exterior lighting www.iesna.org. 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. 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. Excessive rooftop lighting that contributes to light pollution is not permitted. Architectural illumination may be permitted in accordance with the following performance specifications: <ul style="list-style-type: none"> Shield exterior light fixtures to prevent light trespass Architectural illumination is turned off year round from 11pm - 5am using an automatic device. After hours override may be provided by a manual or occupant sensing device provided that the override lasts no more than 30 minutes. Openings in the building envelope, transparent or translucent, include all fenestration (windows, doors, skylights, curtain walls). Provide shielding with less than 10% transmittance overnight. <ul style="list-style-type: none"> For details on ways to make buildings better for birds including lighting, building operations and site management, refer to the <i>Bird-Friendly Development Guidelines</i>: http://www.toronto.ca/lightout/guidelines.htm. 	<p>No vanity lighting</p> <p>Fixtures that effectively project light downwards</p> <p>Building automation systems</p> <p>Use motion sensor lighting</p> <p>Task or workstation lighting</p>

SOLID WASTE



For New Low-Rise Non-Residential Development

Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
<p>Reuse of Building Materials</p> <p>Reduce demand for new materials and reduce waste going to landfill</p>		<p>SW 1.1 Ensure that at least 5% of a project's materials (based on value) comprise salvaged, refurbished or reused materials.</p>	<ul style="list-style-type: none"> Material costs exclude installation expenses (e.g. labour and equipment) and transportation costs. This target may be met through the reuse of various building components, including but not limited to, structural steel, timbers, a building façade and/or existing concrete structures. Materials must also satisfy the requirements of the Ontario Building Code, or any other Applicable Standard (such as CSA certification), as well as the requirements of TARION Home Warranty Program. 	<p>Integrate existing structures into design</p> <p>Salvaged beams, posts, flooring, doors, paneling, frames, cabinetry, bricks and detailing</p> <p>Reuse trees from the site for terracing and erosion control</p>
<p>Use of Recycled Materials</p> <p>Reduce demand for new materials and increase market for recycled materials</p>		<p>SW 2.1 Ensure that at least 15% of a project's construction materials (based on value) comprise recycled content.¹</p>	<ol style="list-style-type: none"> Recycled content is defined by CAN/CSA-ISO 14021-00 Environmental Labeling and Advertising Guidelines. Recycled materials include both post-industrial (pre-consumer) and post-consumer materials. However, post-industrial materials are assigned half the value of post-consumer materials in the calculation of the percentage of recycled construction materials. <ul style="list-style-type: none"> Material costs exclude installation expenses (e.g. labour and equipment) and transportation costs. Materials must also satisfy the requirements of the Ontario Building Code, or any other applicable standard (such as CSA certification), as well as the requirements of TARION Home Warranty Program. 	<p>Specify recycled content for outdoor structures and landscaping, building envelope and interior finishing materials</p> <p>Require manufacturer documentation</p>
<p>Construction and Demolition Waste Management</p> <p>Reduce waste going to landfill</p>		<p>SW 3.1 Recycle at least 75% of non-hazardous construction and demolition debris.¹</p>	<ol style="list-style-type: none"> Recycling involves breaking down and reprocessing materials. This is different from reuse, in which whole components are reused. For this target, materials salvaged for reuse can be included. 	<p>Develop a construction waste management plan</p> <p>Designated area on-site for recyclable materials</p> <p>Tree salvage</p>