SCHEDULE 2 - GREEN DEVELOPMENT STANDARDS v3.docx

May 31, 2021

Contents

Introduction & Overview of Measures

The original version of the Green Development Standards (GDS) was introduced in 2010 and subsequently updated in 2014 to include industrial, commercial, institutional and multi-unit residential buildings. This most recent update to the Standards is version 3. GDS v3 will be applicable to all developments and major additions subject to an Official Plan and/or Zoning By-law Amendment, Draft Plan of Subdivision, or Site Plan Control approval as of June 15, 2021.

GDS v3 has been put in place to further elevate the sustainability performance of new developments in Halton Hills, and to ensure alignment with current best practices in sustainable building and development. The Town of Halton Hill's Climate Change Emergency Declaration issued in May 2019, which established community-wide net-zero carbon goals, is a key priority that has shaped GDS v3. Given this, while GDS v3 builds on the successful tenets of the previous versions, it puts increased weight on measures that reduce the greenhouse gas intensity of developments. This change will ensure that new developments are aligned with the Town's strategy for responding to climate change, which forms an integral component of the Town's overall strategy for striving towards net-zero energy.

The measures incorporated into GDS v3 were established through: a review of relevant industry standards and guidelines; a review of other municipal green development standards across Canada; and several rounds of consultation with various private and public sector stakeholders.

GDS v3 has also been developed to work with, and build upon, existing legislation and policy (e.g. Ontario Building Code, Provincial Policy Statement, The Planning Act, A Place to Grow: The Growth Plan for the Greater Golden Horseshoe, Made-in-Ontario Environment Plan) and existing municipal and provincial goals and priorities. Nevertheless, because every development site is different and legislation is always changing, conflicts between the GDS v3 requirements and those of other authorities having jurisdiction could arise. Should this occur, the developer should point the Town and the other authority having jurisdiction to the conflict. These parties will then identify the appropriate site-specific approach in collaboration with the development team, which in most cases would see the more stringent of the requirements prevailing.

GDS v3 consists of 12 measures, that are organized into 5 categories:

1. Energy & Water
2. Ecology
3. Resiliency
4. Transportation
5. Innovation

Each measure has points associated with it. To be compliant with GDS v3, all new developments and major additions that submit a rezoning, subdivision, or site plan control application must demonstrate achievement of at least 20 points.

The next page includes a checklist summarizing the submission requirements, performance thresholds, and points associated with each measure. The pages that follow this checklist summary list details on the requirements, submission documentation, rationale, and resources for each measure.

Town of Halton Hills Green Development Standards Summary Checklist

Project Address / Name: _____ App. #: _____

Contact Name & Email: _____ Date: _____

	Submission Requirements	Theshold & Potential Points			Targeted Points
Energy & Water					
1.1: Energy Use Reduction Demonstrate reduction in energy use over code minimum with an energy model reflecting the proposed design. Low-rise residential (i.e. OBC's Part 9) minimum is 10%. Minimum for everything else is 15%.	☐ Energy report ☐ Energy model file ☐ Envelope design brief ☐ Mech. & elec. design brief	Part 3	Part 9	Pts	
		15%	10%	5	
		25%	20%	8	
		40%		11	
		Net-Zero		14	
1.2: Low Carbon Energy Utilize low emission mechanical systems, and/or install onsite renewables, to achieve an incremental percent CO2e reduction beyond the percent energy use reduction demonstrated for measure 1.1.	☐ All above items ☐ Supporting CO2e calculations ☐ Renewable energy calculations (if applicable)	+ 5%		1	
		+ 10%		2	
		+ 15%		3	
		+ 20%		4	
1.3: Water Use Reduction Specify maximum water fixture flow rates that achieve potable water consumption reductions over OBC maximum rates.	☐ Completed water reduction calculator	30%		1	
		40%		2	
1.4: Energy & Water Reporting Report key performance characteristics for development. Declare that this data can be made publically accessible.	☐ Signed declaration letter listing all performance metrics	If provided		1	
Ecology					
2.1: Minimum Soil Depth Preserve or re-instate a minimum depth of at least 30cm of high quality topsoil across the site.	☐ Signed narrative describing strategy	30cm		1	
2.2: Minimum Planter Soil Volume Provide a minimum of 30m3 of soil volume per tree.	☐ Landscaping drawings noting strategy	30m3		1	

	Submission Requirements	Threshold & Potential Points		Targeted Points
2.3: Native & Drought Resistant Vegetation Demonstrate that there is no need for site irrigation, or that at least 75% of vegetation will be native and/or drought-tolerant.	☐ Landscaping drawings noting strategy	75%	1	
Resiliency				
3.1: Stormwater Quantity Retain run-off from a minimum of 10-mm depth of rainfall from all site surfaces through infiltration, evapotranspiration, and reuse	☐ Stormwater management plan and supporting calculations	10mm	2	
		27mm	3	
3.2: Stormwater Quality Remove at least 85% of total suspended solids from run-off leaving the site.	☐ Stormwater management plan and supporting calculations	85%	1	
3.3: Resiliency Checklist Complete resiliency checklist to demonstrate awareness of site climate change risks.	☐ Completed climate change resiliency checklist and supporting narrative	If provided	1	
Transportation				
4.1: TDM Plan & Electric Vehicles Demonstrate a percent reduction in fossil fuel single occupancy vehicle trips for the site through: cycling, walking, transit, and/or electric vehicle infrastructure.	☐ Transportation demand management plan with supporting calculations	30%	4	
		50%	5	
		70%	6	
		90%	7	
Innovation				
5.1: Innovation Quantitively demonstrate that another strategy achieves environmental benefits equal or greater than other GDS measures.	☐ Narrative and calculations supporting the case	Case for number of eligible points to be made by applicant	1	
			2	
			3	
			4	
			5	

Total Targeted Points:
(minimum of 20 required)

1. Energy & Water

Acting on the Climate Emergency as declared by the Town of Halton Hills in May 2019, these measures will help mitigate climate change by ensuring that new developments are designed to higher performance energy and water use thresholds, and by encouraging renewable energy generation.

1.1 Energy Use Reduction

Requirements for Part 3 Buildings

Part 3 buildings (i.e. **all mid to high-rise residential, and all non-residential**) shall demonstrate a minimum energy performance level of at least the percent shown in the below table, better than that of the Ontario Building Code's 2017 Supplementary Standard SB-10 Divisions 1 and 3.

Threshold:	15%	25%	40%	Net-zero Energy
Points:	5	8	11	14

Compliance with this pathway shall be demonstrated using an energy model for the entire building project, using an approved third-party building energy simulation software. Acceptable software includes eQuest, EnergyPlus, and IES Virtual Environment. The energy model must be completed using industry best practices and in accordance with the requirements of SB-10 Division 3, except for the following exception: once the 15% minimum threshold is demonstrated, onsite renewable energy can be used to reach higher thresholds.

Requirements for Part 9 Buildings

Part 9 buildings (i.e. **low-rise residential**) shall be designed to meet or exceed the minimum energy performance level of at least the percent shown in the below table, better than that of the Ontario Building Code's 2017 Supplementary Standard SB-12.

Threshold:	10%	20%	40%	Net-zero Energy
Points:	5	8	11	14

Compliance with this pathway shall be demonstrated using the computer simulation software HOT2000 (v10.51 or later). Other software allowed under Section A-2.1.2.1 of SB-12 may be accepted at the discretion of the Town's Administration. The energy model must be completed using industry best practices and in accordance with the requirements of SB-12, except for the following exception: once the 10% minimum threshold is demonstrated, onsite renewable energy can be used to reach higher thresholds.

Submission Documentation

1. Energy performance report that includes at a minimum:
    a) Summary of key energy model inputs and building characteristics;
    b) Annual building energy usage broken down by end-uses and fuel-type; and
    c) Explanation of any externally calculated energy performance or modelling software limitations.
2. Simulation files and any external calculations.
3. Building Envelope Design Brief on designer's letterhead.
4. Mechanical and Electrical Design Brief(s) on designer's letterhead.

Rationale

The Town of Halton Hills' focus on reducing greenhouse gas emissions requires the inclusion of an energy-use reduction metric for new developments. The above better than reference building approach was chosen for its flexibility and familiarity in the industry. Currently, the 15% better than SB-10 pathway follows similar municipal level green standard approaches (e.g. the Toronto Green Standard), to incrementally improve energy efficiency without significantly altering the economic feasibility of that development.

In the City of Toronto's Zero Emissions Building Framework, which forms the background of the Toronto Green Standard's energy performance requirements, the economic implications of higher performance buildings were quantified in a costing exercise. That study estimated a construction cost premium for reaching performance 15% better than SB-10 2017 requirements to be around: 0.5% for multi-unit residential building that fall under Part 3 of the OBC; 0.7% for retail buildings; and 2.3% for commercial office buildings.

Because the above-mentioned costing was for Part 3 buildings only, a costing exercise was also performed for three Part 9 building typologies: a large single family detached home; a townhouse, and a low-rise multi-unit residential. Two potential paths were costed for each typology, one that includes air tightness testing, and a second path that does not require air tightness testing. The resulting estimates are summarized below.

	Large Single Family Detached, 10% better than SB-12 Example		**Townhouse, 10% better than SB-12 Example**		**Multi-unit Residential, 10% better than SB-12 Example**	
Description	2-storey with basement, Above grade: 3,680 ft2		3-storeys, Above grade: 1,900 ft2		3-storeys, 15 units, above grade: 18,782 ft2	
Example Suite of Additional Measures Above SB-12	2.5 ACH DHW 94% TE ER29 windows R-5 exterior insulation	DHW 94% TE ER29 windows R-5 exterior insulation R-10 underslab	3.0 ACH Heating & DHW 95% TPF ER29 windows Remove R-5 ext. insul.	Heating & DHW 95% TPF ER29 windows	3.0 ACH Heating & DHW 95% TPF ER29 windows Remove R-5 ext. insul.	Heating & DHW 95% TPF ER29 windows
Annual Energy Use Savings Above Code	4,978 ekWh	5,495 ekWh	4,191 ekWh	4,512 ekWh	39,968 ekWh (for building)	37,070 ekWh (for building)
Annual CO2e Savings	984 CO2e	891 CO2e	744 CO2e	685 CO2e	7,233 CO2e (for building)	6,734 CO2e (for building)
Annual Energy Cost Savings	$132	$121	$161	$168	$60	$53
Estimated Capital Cost Increase	$5,747	$8,652	-$288	$2,036	$60	$1,001
Comments	Meets ESNH BOP requirements, includes fee/model type to verify compliance and air test	No air test, rental mech unit, added fee for modeling	Meets ESNH BOP requirements, includes fee/model type to verify compliance and air test. Removal of ci results in capital cost savings.	No air test, rental mech unit, added fee for modeling	Meets ESNH BOP requirements, includes fee/model type to verify compliance and air test. Cost is per unit within MURB	No air test, rental mech unit, added fee for modeling (typically done as entire block)

Resources

1. The City of Toronto Zero Emissions Buildings Framework https://www.toronto.ca/wp-content/uploads/2017/11/9875-Zero-Emissions-Buildings-Framework-Report.pdf
2. ENERGY STAR for New Homes https://www.nrcan.gc.ca/energy/efficiency/housing/new-homes/energy-starr-new-homes-standard/14286
3. Ontario Building Code Supplementary Standard SB-10 http://www.mah.gov.on.ca/Page15255.aspx
4. Ontario Building Code Supplementary Standard SB-12 http://www.mah.gov.on.ca/Page15256.aspx
5. National Energy Code of Canada for Buildings 2015 (NECB 2015)
6. ANSI/ASHRAE/IES Standard 90.1-2013
7. Industry best practices energy modelling guidelines:
    a. Energy Efficiency Report Submission & Modelling Guidelines for the Toronto Green Standard Version 3 https://www.toronto.ca/city-government/planning-development/official-plan-guidelines/toronto-green-standard/toronto-green-standard-version-3/energy-modelling-guidelines-version-3/
    b. Energy Modelling Guidelines for the BC Hydro Commercial New Construction Program https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/power-smart/builders-developers/energy-modeling-guidelines.pdf

1.2 Low Carbon Energy

Requirements

All buildings can achieve the below points by demonstrating additional percent reductions in carbon dioxide equivalency (CO_2e) emissions beyond that of the energy efficiency reduction that they have already demonstrated under *1.1 Energy Use Reduction*.

Incremental Percentage Point Increase in CO_2e beyond 1.1 Energy Use Reduction Percent:	Energy Reduction Percent, Plus 5%	Energy Reduction Percent, Plus 10%	Energy Reduction Percent, Plus 15%	Energy Reduction Percent, Plus 20%
Points:	1	2	3	4

Compliance with this measure shall be demonstrated using the same energy model and results submitted for *1.1 Energy Use Reduction.* No change to that model is needed to apply for additional points under this measure.

All of the same modelling rules described under measure *1.1 Energy Use Reduction* apply here, except that the following alternations can be made to the already modelled reference building's results:

- The CO_2e emission benefits associated with the proposed design's renewable energy (if applicable), can be added as a debit to the reference building's CO_2e number (therefore making the reference building's CO_2e higher) ; and
- Natural gas CO_2e emission factors can be applied to the reference building's modelled heating and domestic hot water heating energy uses, regardless of the reference building system's fuel source.

CO_2e emissions factors from SB-10's Division 3 Table 1.1.2.2 are to be used for this measure. Different CO_2e factors may be used with appropriate methodological justification, and at the discretion of the Town's Administration.

If considering renewables, the development must also consult with Halton Hills Hydro Inc. to confirm the applicability and site-specific requirements for an on-site renewable generation system within the local infrastructural context.

Submission Documentation

1. All of the same documentation submitted under 1.1 Energy Use Reduction will be required for claiming points under this measure, but with an additional CO2e calculation and supporting narrative added to the energy report.
2. For development's with renewable energy, analysis and calculations should be performed using a third-party renewable energy modelling tool, such as RETScreen, or other reputable energy simulation software.

Measure Rationale

As an example, if an applicant demonstrated a 20% energy performance improvement over the reference building for measure *1.1 Energy Use Reduction*, it would be eligible for additional points under this *1.2 Low Carbon Energy* measure if it could demonstrate that the proposed design's CO2e was 25% or better than the altered reference building results (i.e. an incremental increase of at least 5 percentage points above the 20% energy improvement originally demonstrated).

In support of the Town of Halton Hill's goal to be a Net Zero municipality by 2030, all new developments should be encouraged to explore technologies and strategies that result in lower CO2e intensity (e.g. electrification, air-source heat pumps, geo-exchange, wind, photovoltaics, solar thermal, solar ventilation preheat equipment). CO2e is being used here to encompass the climate change impacts of all relevant greenhouse gases (e.g. CO2, CH4, and N2O). By designing and constructing buildings with CO2e intensity in mind, we are also better positioning new buildings for a future that is likely to place a meaningful price on emissions.

Despite the importance of selecting strategies with lower CO2e intensity, energy modelling requirements typically require a reference building's system to take on the same fuel (and similar system type) of the proposed design. The reference building therefore also gets many of the same advantages of the proposed design, and in the case of electrification this means that reference building will also have higher efficiencies and lower CO2e intensity. This measure allows for some of those reference building advantages to be diluted without requiring an additional energy model.

This measure also further incentivizes onsite renewable energy generation since the onsite renewables can earn a development points under both *1.1 Energy Use Reduction* and *1.2 Low Carbon Energy*.

Resources

1. Halton Hills Hydro Inc. Guidelines for Applicants Connecting Distributed Generation https://storage.googleapis.com/website-245714.appspot.com/1/2017/12/HHHI-Guidelines-for-Applicants-Connecting-DG-Public-Document-April-2015.pdf
2. NRCan RETScreen software https://www.nrcan.gc.ca/maps-tools-publications/tools/data-analysis-software-modelling/retscreen/7465
3. Economics of Solar Power in Canada https://www.cer-rec.gc.ca/nrg/sttstc/lctrct/rprt/cnmcsfslrpwr/rslts-eng.html
4. U.S. Solar Photovoltaic System Cost Benchmark: Q1 2017 https://www.nrel.gov/docs/fy17osti/68925.pdf

1.3 Water Use Reduction

Requirements	Specify maximum water fixture flow rates that achieve the below reductions in potable water consumption (not including irrigation) over the maximum flow rates for water supply fittings and maximum water consumption per flush cycle for sanitary fixtures listed in the Ontario Building Code article 7.6.4. Water Efficiency. Threshold: 30% 40% Points: 1 2 Refer to the Ontario Building Code O.Reg 332/12 for current baseline flush and flow rates. Compliance with this requirement is demonstrated using the Indoor Water Use Reduction Calculator (found on the Town of Halton Hills website), which follows the methodology used by LEED v4 Water Efficiency Credit Indoor Water Use Reduction.
Submission Documentation	1. Completed Indoor Water Use Reduction Calculator (located here) to demonstrate that the design fixture flush and flow rates will meet the reduction requirement.

Measure Rationale

This measure aims to reduce potable water use in buildings by improving water-use efficiency. Doing so also reduces the energy and infrastructure required for municipal-scale treatment and distribution of potable water, and the collection and treatment of wastewater.

The minimum reduction of 30% was selected as a threshold that has proven to be feasible across residential, commercial and industrial buildings with little to no impact on capital costs or operations. For illustrative purposes, provided below are some example fixture flow rates that have been used to put residential and commercial/industrial projects within reach of the 30% threshold.

Typical residential targets:

- 3.8 LPM Water Closets
- 5.7 LPM Lavatory Faucets
- 6.8 LPM Shower Head Fixtures
- 6.0 LPM Kitchen Faucets

Typical commercial / industrial targets:

- 3.8 LPM Water Closets
- 0.5 LPM Urinals
- 1.8 LPM Lavatory Faucets
- 6.8 LPM Shower Head Fixtures
- 6.0 LPM Kitchen Faucets

Resources

1. Indoor Water Use Reduction Calculator (Town of Halton Hills website link to calculator)
2. LEED v4 WE credit Indoor Water Use Reduction https://www.usgbc.org/credits/new-construction-core-and-shell-data-centers-new-construction-warehouse-and-distribution-cen?return=/credits/New%20Construction/v4/Water%20efficiency

1.4 Energy and Water Reporting

Requirements	Using the development's energy model (see *1.1 Energy Use Reduction* measure) and indoor water use reduction calculator (see *1.3 Water Use Reduction* measure), document and make public the project's modelled absolute performance.
	1. Total Energy Use Intensity (ekWh/m^2/year).
	2. Greenhouse Gas Intensity (kg CO_2e/m^2/year).
	3. Natural Gas Consumption (ekWh)
	4. Electricity Consumption (kWh)
	5. Other Fuel Consumption (ekWh)
	6. Thermal Energy Demand Intensity (kWh/m^2/year) for:
	  a. Heating; and
	  b. Cooling.
	7. Total Indoor Water Use Intensity (m^3/m^2/year).
	
	Threshold: Provided
	Points: 1

Submission Documentation	1. Signed letter listing the above metrics and declaring that the data points can be made public. A template letter can be found on the Town's website here.

Rationale

This measure is included to create the transparency required for future energy plans, analysis and benchmarking. As more developments (of varying types, sizes and designs) upload energy, greenhouse gas and thermal energy data, a better understanding of the energy consumption associated with the Town's built environment can be achieved. This will inform future energy reduction targets, provide helpful comparisons between different developments, help identify new emerging best-practices throughout the industry, and facilitate the tracking of energy consumption trends over time.

Resources

1. Template declaration letter for 1.4 Energy and Water Reporting [insert link to website]
2. Energy Efficiency Report Submission & Modelling Guidelines for the Toronto Green Standard Version 3 https://www.toronto.ca/city-government/planning-development/official-plan-guidelines/toronto-green-standard/toronto-green-standard-version-3/energy-modelling-guidelines-version-3/

2. Ecology

To help maintain and restore the Town’s natural water infiltration, watershed, and ecological environment.

2.1 Minimum Soil Depth

Requirements	Preserve or re-instate a minimum topsoil depth of 30cm, or 45cm where soil has been compacted, across the site with a high-quality soil composition that is at least as good as pre-development conditions. Threshold: 30 cm (or 45cm where compacted) Points: 1 High quality soil is well drained, un-compacted soil that is comprised of 5 to 15 % organic material with a pH level of 6.0 to 8.0. If native soil does not meet these criteria, consultation with Town staff would be necessary to establish an alternative approach to compliance.
Submission Documentation	1. Narrative describing the strategy for achieving minimum soil depth coverage and indicating both the existing and targeted post-development soil composition and percolation rates.

Rationale

To promote natural infiltration, provide a nutrient rich seedbed for the germination and rooting of local plant species, and nurture a community of beneficial micro-organisms that play a vital role in decomposition and the recycling of nutrients.

The 30cm depth was established from the Sustainable Technologies Evaluation Program, outlined in their analysis *Preserving and Restoring Healthy Soil: Best Practices for Urban Construction*. This depth of topsoil re-instatement ensures proper site drainage and ecological balance.

Resources

1. TRCA Preserving and Restoring Healthy Soil: Best Practices for Urban Construction
2. Credit Valley Conservation Authority Case Study: Schoolyard Transformation in Progress

2.2 Minimum Planter Soil Volume

Requirements	Provide a minimum of 30 m^3 of soil volume per individual tree on-site, and 20 m^3 per tree for grouped plantings (e.g. 80 m^3 for four trees). Threshold: 30m^3 Points: 1
Submission Documentation	1. Landscape drawing(s) indicating: a) Tree locations b) Planter type(s) c) Soil quality per installation

Rationale

Providing trees throughout the site with enough soil area to grow to maturity will improve local ecology, soil stability, and reduce the heat island effect.

The 30m3 threshold is established from previous precedents set in municipalities such as York Region, Toronto, Markham, and Oakville. Successful implementation of planter soil minimums has resulted in more robust tree vegetation and other ecological benefits (e.g. increased local flora and fauna).

Resources

1. “Ontario Sets Standard for the Urban Forest”, 2015, Michael James
2. City of Markham, Streetscape Manual, 2009
3. Soil Volume Minimum for Street Trees Established in Oakville, ON, 2012

2.3 Native & Drought Resistant Vegetation

Requirements	Demonstrate that no potable water will be needed for irrigation, or ensure that at least 75% of specified vegetation shall be native and/or drought-tolerant species. Threshold: 75% Points: 1 For sites within Conservation Halton Regulated Areas and/or Natural Heritage System Areas, 100% of plantings must be native. Note that in these instances, the site would also be subject to Conservation Authority regulations.
Submission Documentation	1. Landscape drawing(s) indicating: a) List of all species being proposed for the site with their native / drought tolerant classification b) Proposed location and area of coverage of each species

Rationale

The inclusion of native species will aid in maintaining similar stormwater management to previous conditions, as well as help protect existing habitats. The inclusion of the drought-resistant vegetation will also improve site resiliency to future climate trends, which are anticipated to bring increases in the severity of storms and drought.

Resources

1. Conservation Halton Landscaping and Tree Preservation Guide Appendix 1 (https://conservationhalton.ca/policies-and-guidelines)
2. The Credit Valley Conservation Plant Selection Guideline Document www.creditvalleyca.ca/wp-content/uploads/2013/04/Credit-Valley-Conservation-Plant-Selection-Guideline-FINAL-March-2013-_2_.pdf
3. Fusion Landscaping: Environmental Benefits for Residential Properties, 2017, Peel Region
4. What is Fusion Landscaping? https://www.fusionlandscapeprofessional.ca/what-is-fusion/
5. Native and Drought Resistant Plants of Halton Region, https://www.halton.ca/Repository/Native-Drought-Tolerant-Plant-Selections

3. Resiliency

To adequately prepare infrastructure for changing climate conditions. This will take the form of stormwater management, preparedness planning and other design considerations.

3.1 Stormwater Quantity

Requirements	Develop a stormwater quantity strategy to retain run-off generated from a minimum of 10-mm depth of rainfall – or as otherwise determined through consultation with Conservation Halton and the Credit Valley Conservation Authority - from all site surfaces through infiltration, evapotranspiration, and water harvesting/reuse. Threshold: 10mm 27mm Points: 2 3 As the site allows, detail the quantity of water each method will yield (retention, evapotranspiration, stormwater management, etc).
Submission Documentation	1. Stormwater Management Plan including: a) Preliminary location for designated systems on a site plan. b) Details on the stormwater retention measures used to retain runoff and their capacities. c) Calculations to verify a retention of 10mm of rainfall compared to pre-development conditions.

Rationale

Incorporating these stormwater management measures help to improve the natural ability of water to infiltrate into the soil, but also reduce potable water consumption through greywater use. Employing a variety of strategies to retain the 10-mm depth of rainfall increases the flexibility of the measure.

The 10mm threshold aligns with best practices outlined by the similar municipal standards as of the date of GDS v3's publication. However, this 10-mm depth of rainfall is anticipated to eventually increase to the 90th percentile of harvest, which corresponds to approximately 27mm within the Region of Halton. The stormwater management standards implemented by the Ministry of Environment and Climate Change will soon require this 90th percentile of retention on-site through re-use, infiltration, evapotranspiration and other LID measures across the province.

Future CVC thresholds will seek to meet this updated provincial standard for stormwater retention.

Resources

1. Refer to the STEP LID Planning and Design Wiki Guide for guidance on how to design LID features to meet the design criteria (https://wiki.sustainabletechnologies.ca/wiki/Main_Page)
2. Planning & Permits — Conservation Halton (https://conservationhalton.ca/planning-permits)
3. Refer to STEP website (https://sustainabletechnologies.ca/) for costing tools, planning tools.
4. MECP's 90th percentile – 27 mm http://www.downloads.ene.gov.on.ca/envision/env_reg/er/documents/2017/012-9080_Runoff.pdf

3.2 Stormwater Quality

Requirements	Remove 85% of Total Suspended Solids (TSS) on an annual loading basis from run-off leaving the site. Threshold: 85% Points: 1
Submission Documentation	1. Stormwater Management Plan including: a) List of filtration measures proposed to suite the existing site conditions. b) Calculation demonstrating percent TSS removed from 25mm rainfall event based on pre-existing condition c) Proposed location for these measures

Rationale

Removing total suspended solids (TSS) from water systems will reduce loading to municipal wastewater treatment facilities, improve aquatic ecosystems, and nurture plant life. Example strategies for achieving this removal rate are provided in the Credit Valley Conservation Authority's Low Impact Development Stormwater Management Planning and Design Guide. Some components that help remove TSS from effluent water include: bioswales; retention ponds; filters; and oil-grit separators.

The individual TSS removal rate is dependent on the specific parameters of the system, necessitating site-specific design. The applicable strategy will require the relevant calculations from the Credit Valley Conservation Authority: Low Impact Development Stormwater Management Planning and Design Guide.

For example, green roofs were noted to reduce TSS in effluent waters by 89% compared to conventional roofing systems (Van Seters et al, 2009). Similarly, infiltration trenches may reduce 70%-90% of effluent TSS depending on the design of the system. Vegetation strips were shown to demonstrate a larger variance in TSS removal (20%-80%).

Resources

1. MOE SWM Planning & Design Manual (March 2003)
2. Wet Weather Flow Guidelines, Toronto, 2006
3. Credit Valley Conservation Authority: Low Impact Development Stormwater Management Planning and Design Guide
4. Toronto Green Standards Tier II

3.3 Resiliency Checklist

Requirements	Complete the Resiliency Preparedness Checklist. This checklist is essentially an awareness exercise that requires design teams to define the key criteria to which they are designing. Threshold: Provided Points: 1
Submission Documentation	1. Submit a Climate Resiliency Checklist outlining the following considerations: a) Time period of climate data used; b) Temperature minimums/maximums; c) Extreme heat events (temperature, duration, and frequency); d) Extreme overland flooding (daily max rainfall, annual frequency) e) Wind speed (max, duration, frequency); f) Snow (max depth, frequency); g) Changes to freeze-thaw cycles 2. Describe considerations taken to improve the resiliency of various development systems and components, including, but not limited to: a) Building envelope (R value, QA protocol, window characteristics); b) Mechanical systems (location, capacity); c) Electrical systems (location, system types); d) Plumbing systems; e) Stormwater retention measures; f) Landscaping; g) Flood mitigation (sump pumps, check valves, leak detection sensors, etc.) h) Backup power; i) Refuge areas; j) Entrances and exits; k) Occupant considerations (are any of the intended occupants at an elevated risk)

Rationale

While mitigation efforts against climate change are fundamentally important, developments must also consider adaptation strategies to improve resilience to the more extreme weather events that are becoming more frequent. The intent is to make teams more aware and mindful of how the design will accommodate future changes in climatic conditions.

Resources

1. Town of Halton Hills Resiliency Checklist (found here)
2. Climate Atlas, www.climateatlas.ca

4. Transportation

The transportation demand management (TDM) plan is used to establish estimated baseline trip generation statistics and then demonstrate a reduction in single occupancy vehicle (SOV) trips using various TDM measures. Reducing SOVs and the associated greenhouse gas (GHG) emissions is essential for the ultimate goal of reducing overall Town GHGs towards net-zero. The reduction and document submission requirements reduction percentage and submission documents must follow the requirements set out in the Town of Halton Hills Green Development Standards (GDS).

4.1 Transportation Demand Management Plan

Requirements

A TDM plan must be submitted that consist of at least the below components, and collectively demonstrate the below percent reduction in fossil fuel single occupancy vehicle (SOV) trips:

Threshold:	30%	50%	70%	90%
Points:	4	5	6	7

- Trip Generation Statistics: Outline the base trip generation statistics and quantify the reduction in fossil fuel SOV trips due to the various TDM measures planned for implementation.
- Cycling:
  - Identify connections with existing cycling routes and destinations.
  - Describe the quantity, location, and features of both short- and long-term bicycle parking stations.
  - Describe amenity spaces for riders ending their trip at the development. This can include showers, lockers, changing rooms, etc.
- Walking:
  - Describe the walking/pedestrian networks on the development site and their connection to pedestrian routes beyond the site boundaries.
  - Describe the pedestrian amenities implemented to support active transportation, variable mobility, and safety.
- Transit:
  - Describe development's connection with existing transit routes and stops.
  - Describe any transit service or fare incentive programs.
  - Describe any alternative commute services (e.g. dedicated shuttle buses, bike share).
- Parking and Electric Vehicle Charging:
  - List the quantity, type, and location of parking spots equipped with dedicated electric vehicle charging stations.
  - Outline the parking provisions: quantity of spaces, quantity of those reserved for tenants/employees, quantity of carpool spaces, etc.
- Wayfinding and Travel Planning:
  - Describe wayfinding and signage that will make traveling within and beyond the site easier.

Describe available resources, such as active transportation maps, customized trip planning, and community resources to assist travel decisions.

Note that this section presents minimum requirements for completion of the TDM plan and is not exhaustive. The applicant is encouraged to discuss the required contents with Town of Halton Hills staff prior to initiating the strategy.

Submission Documentation	Provide a TDM demonstrating a strategy to reduce single-occupancy vehicle use of fossil fuel vehicles. The structure of the TDM plan will vary based on development type and location, but may employ the following strategies: 1. Cycling - Information on cycling routes/destination - Ensure there is connection to existing bicycle network - Secure, indoor bicycle storage spaces - Providing end-of-trip amenities for tenants/employees 2. Walking - Safe and attractive walkways - Ensure there is connection to existing sidewalk network - Enhanced pedestrian amenities on-site 3. Transit - Transit information - Transit fare incentives - Private transit service 4. Parking - Implementation of paid parking for tenants/employees - Cash-in-lieu of parking to fund public parking or sustainable transportation - Provide dedicated electrical parking charging station 5. Alternative Commute Services - Provide dedicated publicly available parking spaces for car share vehicles - Provide on-site bike-share facility - Provide improved and/or additional short-term pick-up/drop-off passenger spaces - Provide free local shuttle bus services to between the development site and regional transit hubs, commercial centres, and residential areas for customer, employees and visitors. 6. Way Finding and Travel Planning - Provide travel planning resources such as active transportation maps, community resources, etc. - Wayfinding signage - Personalized trip planning 7. Education, Promotion and Incentives - Contribute to building a strong TDM brand - Provide discounted transit passes, care-share memberships and/or bikeshare memberships for tenants/employees.

Rationale

The intent is to create a plan through which fossil fuel single-occupant vehicle trips can be reduced, therefore lowering the community's associated greenhouse gas emissions.

A sample TDM calculation is provided below for illustrative purposes:

- Occupants of a multi-unit residential building: 140
- Expected visitors: $140 \times 2\% = 7$
- Total trips: $147 \times 2\ trips\ per\ day \times 60\%\ estimated\ working\ adults =$ 176 single occupancy vehicle trips
- Targeted reduction of 40%: $176 \times 40\% = \mathbf{70}$

Potential path towards reducing 70 fossil fuel single-occupancy vehicle trips:

1. Install ten dedicated electric car charging stations = $10 \times 2\ trips\ per\ day = 20$
2. Ride sharing program for commuters = $6\ Vehicles \times 2\ trips\ per\ day = 12$
3. Locating development next to bus line = $10\ Riders\ X\ 2\ trips\ per\ day = 20$
4. Locating development next to bicycle network, or installing connection from development to closest access point = $9\ Riders\ X\ 2\ trips\ per\ day = 18$

These changes result in a decrease of 20 + 12 + 20 + 18 = **70** fossil fuel SOV trips.

Resources

1. Town of Halton Hills Cycling Master Plan - https://www.haltonhills.ca/en/residents/cycling-master-plan.aspx
2. Town of Halton Hills Active Transportation Management Plan - https://www.haltonhills.ca/en/residents/active-transportation-master-plan.aspx
3. LEED v4 and October 2017 Technical Bulletin "Tips and Tricks – Transportation Demand Management (TDM) Plans" https://www.cagbc.org/CAGBC/LEED/Technicalbulletins/CAGBC/Programs/LEED/CommercialInstitutional/FAQs.aspx?hkey=b8969ea0-ea23-4816-b7b7-0f04f5107527
4. City of Vancouver – https://vancouver.ca/files/cov/transportation-demand-management-for-developments-in-vancouver.pdf
5. City of Hamilton – https://www.hamilton.ca/develop-property/policies-guidelines/transportation-demand-management-land-development-guidelines
6. Region of Peel – http://walkandrollpeel.ca/projects/sts/pdf/peel-TDM-plan.pdf
7. City of Ottawa – https://documents.ottawa.ca/sites/documents/files/tdm_measures_checklist_en.pdf

5. Innovation

Recognizing that development opportunities are constantly evolving, this category offers some additional flexibility for accommodating new and emerging ideas and technology that may not have been contemplated for GDS v3.

5.1 Innovation

Requirements	Demonstrate to the satisfaction of the Town's Administration the value of an innovative green development strategy or technology being integrated into the design. Up to 5 points are available in this category. Acceptance of point threshold or a given strategy will be determined in collaboration with the Town's Planner, and based predominantly on the applicant's ability to quantitatively demonstrate that the strategy achieves environmental benefits that are the equivalent to, or greater than, other measures within GDS v3 that have a similar point threshold being claimed here.
Submission Documentation	1. Narrative making the case for the innovative green development strategy or technology, including calculations supporting that the initiative has a quantifiable environmental impact equivalent or greater to another measure within GDS v3.

Threshold:	To be determined				
Points:	1	2	3	4	5

Rationale

This measure has been included to reflect the fact that green development opportunities are constantly evolving, and to offer additional flexibility to the development team to ensure that innovation is not stifled. The hope is that this category can accommodate new and emerging ideas and technology that fall outside of those contemplated for GDS v3.

Resources

1. LEED Innovation in Design Credit Library https://www.usgbc.org/innovationcatalog?Version=%22v4%22&Rating+System=%22New+Construction%22

Definitions

Definitions

Bioswales	Chanel with natural filter to convey stormwater
Building Envelope Design Brief	Description of the primary intended envelope components for the building, inclusive of minimum clearfield effective thermal performance values for opaque wall, roof, floor, and glazing systems; as well as a description of how thermal bridging will be reduced at key interfaces (e.g. wall to roof transitions, window to wall transitions, structural components, floor junctions, balconies). To be placed on architectural / envelope designer's letterhead.
Drought-resistance	Vegetation that is uniquely adept at enduring drought-conditions. Theses are specific to each region; *Native and Drought Resistant Plants of Halton Region* provides those specific to Halton Region.
EV Charging	Plug-in capability to re-charge electric vehicles
Evapotranspiration	Method by which water is evaporated from vegetation and soil
Greenhouse Gas Intensity (GHGI)	The annual greenhouse gas emissions resulting directly from fuel consumed on site (e.g. natural gas) or indirectly from purchased energy (e.g. electricity), per unit of modelled floor area. Measured in kg CO_2e/m^2/year. Greenhouse gas emission factors shall be per the Ontario Building Code 2012 Supplementary Standard SB-10 2017 Division 3, Chapter 1, Table 1.1.2.2. "CO_2e Emission Factors."
Greywater	Rainfall that has been captured for re-use
Heat Island Effect	Dense urban development leads to more solar thermal energy being reflected; natural elements absorb and reduce this heat
Infiltration	Method by which water is passed through soil from the ground surface
Low Impact Development (LID)	Strategies to reduce impact of development on watershed, ecology, environment
Mechanical and Electrical Design Brief	Description of the key intended mechanical and electrical design attributes. It is to include a list of specific minimum energy performance metrics for space heating, space cooling, and ventilation. The brief shall also describe hot water heating strategy, and list maximum water fixture flow rates for all potable water consuming fixtures. On the electrical side, a description of the lighting strategy (fixture type, controls), and a description of renewable energy systems (if applicable). To be placed on mechanical and electrical designer's letterhead.
Modelled floor area	The total enclosed floor area of the building, as reported by the energy simulation software, excluding exterior areas and indoor parking areas. All other spaces, including partially-conditioned and unconditioned spaces are included in the modelled floor area. Measured in m^2.

Part 3 Buildings	Buildings that are subject to Part 3 of Division B of the Ontario Building Code, per Article 1.1.2 O.Reg. 332/12: Building Code. This includes buildings exceeding 600 m^2 in building area or exceeding three storeys in height.
Part 9 Buildings	Buildings that are subject to Part 9 of Division B of the Ontario Building Code, per Article 1.1.2 O.Reg. 332/12: Building Code. This includes buildings of three or fewer storeys in height or with a building area not exceeding 600 m^2.
Process energy	Energy consumed in support of a manufacturing, industrial, or commercial process other than conditioning spaces and maintaining comfort and amenities for the occupants of a building.
Renewable Energy	Renewable energy is derived from natural processes that are replenished at a rate that is equal or faster than the rate at which they are consumed. For the purposes of the GDS, eligible renewable energy systems include: photovoltaics; solar thermal; wind; and low-impact hydroelectricity. Only energy that can be consumed (or stored and then consumed) on the site shall be counted.
Resiliency	Ability to withstand changing conditions
Retention Pond	Artificial pond to alleviate excess stormwater
Single-Occupancy Vehicle (SOV)	A vehicle whose operator is the sole passenger
Solar-ready	A building that has been designed and built to enable the installation of solar photovoltaic and/or solar heating systems at some time after the building is constructed.
TEDI – Cooling	The annual heat rejection required to offset heat gain from a building's envelope and ventilation, after accounting for all passive heat gains and losses, per unit of modelled floor area. Measured in kWh/m^2/year.
Thermal Energy Demand Intensity (TEDI) – Heating	The annual heat input required to offset heat loss from a building's envelope and ventilation, after accounting for all passive heat gains and losses, per unit of modelled floor area. Measured in kWh/m^2/year.
Topsoil	Outer-most layer of earth, from surface to 5-10" deep
Total Energy Use Intensity (TEUI)	The sum of all energy consumed on site annually (e.g. electricity, natural gas, district heat), including all process energy, per unit of modelled floor area. Measured in ekWh/m^2/year.
Trip Generation Statistics	Beginning metric quantifying the required transportation from the site