

TOWN OF AJAX

GREEN DEVELOPMENT AND ENVIRONMENTAL DESIGN GUIDELINES REPORT

March 2022





GREEN DEVELOPMENT AND ENVIRONMENTAL DESIGN GUIDELINES REPORT

TOWN OF AJAX

REPORT (VERSION 3.0)
CONFIDENTIAL

PROJECT NO.: 17M-01593-00
DATE: MARCH 2022

WSP
2300 YONGE STREET
SUITE 2300
TORONTO, ON, CANADA M4P 1E4

T: +1 416 487-5256
F: +1 416 487-9766
WSP.COM

PRODUCTION TEAM

WSP

Project Director	Juhee Oh
Project Manager – Sustainability	Kirsten MacKenzie
Senior Planner – Planning	Robert Rappolt
Project Manager – Landscape Architecture	Jennifer Sisson
Planner	William Turman, Will Lamond
Landscape Architect	Melissa Poulin
Sustainability Analyst	Kimiko Marinacci

TABLE OF CONTENTS

1	BACKGROUND	0
1.1	Introduction	0
2	SUMMARY OF GREEN DEVELOPMENT STANDARDS	1
2.1	Impact Categories	1
2.2	Energy and GHG Emissions	2
2.2.1	Low-Density Residential	2
2.2.2	Medium to High-Density Residential and Non-Residential	3
2.3	Air	6
2.3.1	Low-Density Residential	6
2.3.2	Medium to High-Density Residential and Non-Residential	7
2.4	Water	9
2.5	Waste	10
2.5.1	Low-Density Residential	11
2.5.2	Medium to High-Density Residential and Non-Residential	11
2.6	Natural Assets and Habitat	12
2.7	Other	14
2.8	Emerging Trends	15
3	CONSULTATION SUMMARY	17
3.1	Policy Review Report Meeting	17
3.2	Workshop 1	17
3.3	Workshop 2	17
3.4	Items not Included in Draft GDEDG	17
3.5	Public Feedback	19
	IMPLEMENTATION	22
3.6	Development Process	22

3.7 Administration and Coordination23

3.8 Strengths, Weaknesses, Opportunities, and Challenges (SWOC) 24

3.8.1 Strengths24

3.8.2 Weaknesses..... 24

3.8.3 Opportunities.....25

3.8.4 Challenges25

1 BACKGROUND

1.1 INTRODUCTION

The Town of Ajax has initiated a project to establish Green Development and Environmental Design Guidelines (GDEDG) in pursuit of a more sustainable and resilient community. Note that the present report will refer to the project using the abbreviation “GDEDG”; however, it is suggested that an alternative name is selected. A new project name is currently under development with Town staff.

The GDEDG will be a tool available to municipal staff to aid in evaluating development applications through the lens of sustainability and climate change mitigation and adaptation by providing a suite of mandatory and optional metrics. The guidelines will be rooted in existing best practices, common strategies, and progressive standards and regulations to promote sustainable site and building design. The need for such a tool emerges in light of sustained population growth and economic prosperity that is anticipated to continue long-term in Durham Region and the Town of Ajax. The GDEDG is therefore not only a tool, but also an opportunity for the Town to directly influence positive short and long-term environmental outcomes at the municipal level, in concert with overall development and planning goals.

The ultimate purpose of the GDEDG is to improve the environmental performance of new residential, industrial, commercial, and institutional development within the Town of Ajax by establishing the following items:

- Mandatory and optional metrics with respect to building construction and design, natural environment and open space, mobility, infrastructure, etc.;
- A grading or scoring system to evaluate the performance of proposed developments against the metrics;
- Minimum information requirements to be submitted with development applications to inform the evaluation of the proposed development against the GDEDG; and
- Incentives available to developments that exceed the minimum requirements.

This report reflects the work that the WSP team has completed thus far in conducting a background review and analysis, consulting with City staff, in support of the development of draft metrics. This report contains the following sections:

- Review of existing documents and similar assessment tools from other municipalities
- Overview of emerging trends
- Consultation and engagement summary
- Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis of the application and implementation of the GDEDG within the Town

2 SUMMARY OF GREEN DEVELOPMENT STANDARDS

2.1 IMPACT CATEGORIES

Other municipalities in southern Ontario that have implemented best practices in sustainable development standards have done so using educational guidelines or with more stringent prescriptive and performance-based requirements. Elements of these standards, guidelines, and requirements may inform how the guidelines will be applied, which projects they will apply to, and how compliance will be tracked.

In their respective green development standards, each municipality establishes overarching environmental requirements that are grouped according to their targeted goal (e.g. GHG reduction, Indoor Water Use, etc.). These overarching themes will hereinafter be referred to as Impact Categories. Following stakeholder workshops, six Impact Categories were identified as focus areas for the Town of Ajax. For additional details on the stakeholder workshops, see section 3 Consultation Summary. The Impact Categories that were identified as priorities to the Town are outlined in Table 2-1 and will be further discussed in the report sections below. The purpose of this report is to explore a range of potential categories for the GDEDG within each area of focus.

Table 2-1: Impact Categories and their related sub-categories

1	2	3	4	5	6
Energy & GHG Emissions	Air	Water	Waste / Materials	Natural Assets and Habitat	Other
Energy Conservation	Green Parking (carpooling, carshare)	Water Conservation	Construction Waste Reduction and Management	Habitat Corridors	Urban Agriculture
Energy Performance & Emissions	EV Charging	Stormwater Management	Operational Waste Reduction and Management	Bird Friendly Design	Community Sustainability Outreach
Renewable Energy	Heat Island Effect – Non-Roof	Permeability		Native species	Green Upgrades
Lighting	Heat Island Effect – Roof	Water Quality		Natural Heritage Systems	Innovation – Sustainability Assessment
	Pedestrian Friendliness	Environmental Protection		Drought-Tolerant Landscaping	
	Active Transportation			Trees and Soils	

The municipal standards reviewed typically consist of both mandatory and optional criteria. In the case of some municipalities, higher tiers or performance levels (e.g. Tier 2, Silver level, etc.) can be achieved by demonstrating enhanced sustainable design beyond the minimum requirements.

For the purposes of this background review and analysis, the following municipal green standards have been considered:

- Thinking Green! Development Standards, Town of East Gwillimbury
- Toronto Green Standard, City of Toronto
- Green Development Standards, Town of Halton Hills
- Design Guidelines for Stable Residential Communities, Town of Oakville
- Sustainable Development Checklist & User Guide, Town of Oakville, North Oakville Secondary Plan
- Priority Green Clarington, Municipality of Clarington
- Sustainable Development Guidelines, City of Pickering
- Sustainability Community Development Guidelines, City of Vaughan, City of Brampton, City of Richmond Hill
- Whitby Green Standard, Town of Whitby

2.2 ENERGY AND GHG EMISSIONS

The Energy and GHG Emissions Impact Category focuses on buildings and their energy performance during the operational stage. In each of the municipal standards reviewed, energy was invariably found to be a predominant focus area, and while GHG emission targets were not always explicitly separated from energy targets, the two are closely related and were typically addressed.

2.2.1 LOW-DENSITY RESIDENTIAL

At the low-density residential scale, the Energy and GHG Emissions Impact Category focuses primarily on reducing buildings' energy consumption through both energy conservation and renewable energy production.

ENERGY CONSERVATION TARGETS

While applicable building codes provide minimum energy efficiency targets, a number of the municipal standards reviewed mandate low-density residential developments to achieve higher energy performance than otherwise required. One of the main ways that the municipal standards benchmark building energy efficiency at this scale is through third-party standards. For example, Toronto and Whitby both require that all low-rise residential buildings are designed to achieve at least Energy Star for New Homes, version 17 or R-2000 requirements. Similarly, East Gwillimbury requires that all residential developments 3-storeys or less achieve Energy Star for New Homes certification or a minimum rating of 83 when evaluated in accordance with Natural Resources Canada's (NRCan) EnerGuide Rating: 0-100 Scale. Energy Star for New Homes requirements, higher EnerGuide ratings, or Built Green certification levels as well as alternate high-performance standards such as the Passive House Standard, LEED (meeting Minimum Energy Performance targets), and the Canadian Home Builders' Association (CHBA) Net Zero Home Labelling Program are also presented as optional/higher tier measures in multiple municipal green development standards.

It should be noted that NRCan retired the EnerGuide 0-100 rating system on December 31st, 2018 and as of January 1st, 2019, a new, consumption-based rating scale using gigajoules per year (GJ/year). The new EnerGuide rating system demonstrates the energy performance of a home, rather than an indicator of energy efficiency. It is a more intuitive scale that provide homeowners with more information regarding their home's energy consumption.

ENERGY CONSERVATION MEASURES

In addition to setting performance-based energy conservation targets, municipalities may also implement prescriptive energy conservation measures through their green development standards. These measures are typically optional/higher tier and can cover a wide range of strategies. For example, Toronto, Whitby, and Halton Hills each have optional/higher tier measures regarding high efficiency, Energy Star certified appliances. Energy Star appliance labelling applies to clothes washers, clothes dryers, dishwashers, refrigerators, light fixtures, and ceiling fans, among others.

Other measures that reduce a building's overall energy consumption include providing indoor or outdoor clotheslines to discourage the use of electric clothes dryers, providing zonal HVAC heating and cooling controls, installing occupancy and motion sensors for interior and exterior lighting controls, using triple pane windows with low emissive coatings, and supplying on-demand water heating. These measures are all optional in the Halton Hills Green Development Standard and on-demand hot water heating is required in East Gwillimbury.

RENEWABLE ENERGY

Once a building's energy consumption is reduced as much as possible through performance-based energy conservation targets and prescriptive energy conservation measures, renewable sources of energy can be used to further reduce the building's impact on the environment. At the low-density residential scale, using renewable sources of energy in lieu of non-renewable sources is encouraged by municipalities in varying degrees. The least stringent of the guidelines is mandated by Whitby, which requires a feasibility study of on-site energy generation from renewable resources. East Gwillimbury requires that buildings are designed to be solar-ready (accommodate future use of solar technologies), while Vaughan, Brampton, Richmond Hill, Toronto, and Whitby include this measure as optional/higher tier.

A more proactive approach than designing buildings to be solar-ready is to encourage the installation of on-site renewables. East Gwillimbury, Vaughan, Brampton, Richmond Hill, and Whitby each encourage that projects provide a percentage of on-site renewable energy supplied, based on the building's total energy use. These percentages range from 1% to 30%. The Toronto Green Standard is the only municipal standard reviewed that requires a minimum percentage (5%) of each building's annual energy consumption be supplied by on-site renewable energy; however, this requirement applies only to City-owned, low-rise residential buildings.

EXTERIOR LIGHTING

Reducing the energy consumption and light pollution caused by exterior lighting are community design measures that are both addressed by East Gwillimbury by mandating that 100% of exterior light fixtures are LED and are shielded or downfacing to reduce the amount of glare and light trespass experienced by neighbouring properties. Similarly, Toronto requires pedestrian-scale lighting be provided to illuminate sidewalks, paths, and outdoor public spaces, while also being downlit and Dark Sky Compliant to reduce light pollution. There is also an optional target of installing timers or motion sensors to turn exterior lights off when not in use in both the East Gwillimbury and Halton Hills standards.

Vaughan, Brampton, and Richmond Hill also recommend the use of LEDs and/or photocells on all exterior (exposed) lighting fixtures (applies to streetlights, park lights, pedestrian walkways) to reduce energy use.

2.2.2 MEDIUM TO HIGH-DENSITY RESIDENTIAL AND NON-RESIDENTIAL

At the medium to high-density residential and non-residential scale, the Energy and GHG Emissions is also focused on reducing buildings' energy consumption energy conservation and renewable energy production. At this scale; however, most municipalities are moving beyond energy conservation and are setting performance-based energy and emissions targets.

ENERGY CONSERVATION TARGETS

While applicable building codes and standards provide minimum energy efficiency targets, many of the municipal standards reviewed mandate further energy consumption reductions when compared to those codes and standards. For example, the City of Pickering has an optional measure to reduce the design energy consumption of commercial buildings to comply with Natural Resources Canada’s Commercial Building Incentive Program (CBIP) requirement for a 25% reduction relative to the consumption of the reference building designed to the Model National Energy Code for Buildings (MNECB) 1997. Optional measures for further reductions of 30 to 60% relative to MNECB 1997 are also included in the city’s green development standard. It should be noted, however, that the City of Pickering’s Sustainable Development Guidelines were developed in 2007 and many of its targets are now outdated. For example, in 2011, the MNECB was updated and renamed the National Energy Code for Buildings (NECB). NECB 2011 included an average 25% performance improvement over its predecessor, MECB 1997. The most current version is now NECB 2015.

Another standard that can be used to benchmark minimum requirements for energy-efficient design of buildings is American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1. The Halton Hills green development standard includes an optional metric to achieve 10% or better energy efficiency improvements over ASHRAE 90.1-2010, as demonstrated by third party certification.

The Town of Whitby and the City of Toronto both set their energy performance targets relative to the Ontario Building Code (OBC), Supplementary Standard SB-10 (SB-10), Division 3 (2017). Both Toronto and Whitby’s green standards require a 15% energy efficiency improvement above OBC, SB-10, Division 3 (2017), and Toronto encourages 25% improvements through an optional/higher tier measure.

While the Toronto Green Standard and Whitby Green Standard both currently include building energy performance requirements related to OBC, SB-10, they also include Total Energy Use Intensity (TEUI), Thermal Energy Demand Intensity (TEDI), and Greenhouse Gas Intensity (GHGI). These targets are more comprehensive and progressive than those described in this Energy Conservation Targets section and will be discussed in greater detail in the Energy Performance and Emissions section below.

ENERGY PERFORMANCE AND EMISSIONS

Requirements to design to TEUI, TEDI, and GHGI performance metrics are included in certain municipal green development stands at the medium to high-density residential and non-residential scale. These requirements typically include mandatory targets as well as optional and aspirational targets. As new, more stringent versions of municipal green development standards are implemented, the mandatory, optional, and aspirational targets also become more stringent.

TEUI is a measure of a building’s energy use as a function of its size and a lower TEUI corresponds to a more energy efficient building. Leading TEUI targets from other municipal green development standards are presented in Table 2-2.

Table 2-2 Annual TEUI Targets

	TEUI (kWh/m ² /yr)	
	Mandatory	Optional / Aspirational
MURB (> 6 storeys)	135	100 to 75
MURB (< 6 storeys)	130	100 to 70
Commercial Office	130	100 to 65
Commercial Retail	120	100 to 70

TEDI is a measure of a building’s heating energy demand as a function of its size and a lower TEDI represents a higher level of energy efficiency. Leading TEDI targets from other municipal green development standards are presented in Table 2-3.

Table 2-3 Annual TEDI Targets

	TEDI (kWh/m ² /yr)	
	Mandatory	Optional / Aspirational
MURB (> 6 storeys)	50	30 to 15
MURB (< 6 storeys)	40	25 to 15
Commercial Office	30	22 to 15
Commercial Retail	40	25 to 15

GHGI is a measure of the GHG emissions associated with a building's energy use, as a function of its size. A lower GHGI indicates that a building emits fewer GHG emissions, with a GHGI of 0 representing a net zero building. Leading GHGI targets from other municipal green development standards are presented in Table 2-4.

Table 2-4 Annual GHGI Targets

	GHGI (kg CO ₂ e/m ² /yr)	
	Mandatory	Optional / Aspirational
MURB (> 6 storeys)	15	10 to Net Zero
MURB (< 6 storeys)	15	10 to Net Zero
Commercial Office	15	8 to Net Zero
Commercial Retail	10	5 to Net Zero

As municipalities continue phasing outdated energy conservation targets, TEUI, TEDI, and GHG are increasingly used to set performance-based energy and emissions targets.

ENERGY CONSERVATION MEASURES

In addition to setting performance-based energy and emissions targets, municipalities may choose to include prescriptive energy conservation measures in their green development standards. These measures are typically optional/higher tier and can cover a wide range of strategies, as discussed in section 2.2.1.

At the medium to high-density residential and non-residential scale, green roofs may also be considered as a passive energy conservation strategy due to their ability to increase building energy efficiency by reducing heat transfer through the roof. The thermal mass of growing medium along with the cooling effect of evapotranspiration from plants reduces extreme swings in roof temperature and can result in lower overall energy use by heating, ventilation, and air conditioning (HVAC) systems. Green roofs are discussed in further detail in section 2.3 Air.

RENEWABLE ENERGY

In addition to being encouraged at the low-density residential scale, the use of renewable sources of energy in lieu of non-renewable sources is also encouraged at the medium to high-density residential and non-residential scale. Metrics related to renewable energy production are similar at both scales discussed. Halton Hills and encourages projects to be solar-ready while East Gwillimbury, Vaughan, Brampton, Richmond Hill, Whitby, and Toronto each encourage projects generate 1 to 30% of a building's total energy with on-site renewable sources. These sources may include solar, wind, water, biomass, and geothermal energy.

ENERGY CONSERVATION IN PUBLIC SPACES

In addition to conserving energy within buildings themselves, it is also important to consider energy conservation in public spaces. For example, Clarington's green standard includes a mandatory requirement for developments to integrate techniques to maximize energy efficiency (e.g. LED, solar powered) into the design of streetscapes, parks, and other outdoor public spaces (e.g. street lighting, parking lighting, traffic lights). Similarly, North Oakville and East Gwillimbury require all exterior light fixtures to be high efficiency/LED and East Gwillimbury further

encourages 100% of exterior light fixtures, with the exception of streetlights, to be installed on timers or motion sensors to turn lights off when not in use.

LIGHT POLLUTION REDUCTION

Closely related to energy conservation of outdoor lighting is light pollution reduction. Measures that minimize light trespass from buildings or sites reduce development impact from lighting on nocturnal environments, reduce sky-glow to increase night sky access, and improve nighttime visibility through glare reduction. Vaughan, Brampton, and Richmond Hill each require all exterior fixtures to be Dark Sky Compliant (no uplighting). Similarly, North Oakville and East Gwillimbury require the all exterior lighting to be full cut-off and/or contain a cut-off shield and/or down-facing to reduce the amount of glare and light trespass experienced by neighbouring properties.

Whitby has a similar optional metric that encourages at least 75% of exterior luminaires within private laneways or parking lots to be shielded such that no light emits at or above 90° above nadir, with the exception of ornamental street lighting, which adheres to the uplight control requirements of Table H of the Joint International Dark-Sky Association (IDA) and the Illuminating Engineering Society (IES) Model Lighting Ordinance (MLO) per lighting zone.

Another approach to reducing light pollution is taken in the Toronto Green Standard, which encourages developments to turn off any architectural rooftop and façade lighting between 11 pm and 6 am.

2.3 AIR

The Air Impact Category focuses on improving local outdoor air quality by mandating requirements or restrictions on airborne pollutant source control and reductions.

2.3.1 LOW-DENSITY RESIDENTIAL

At the low-density residential scale, the Air Impact Category focuses on improving local air quality by providing infrastructure for Electric Vehicle (EV) charging, reducing the urban heat island effect, and increasing pedestrian friendliness, as discussed in the following section.

EV CHARGING

Promoting the use of electric cars by providing EV charging stations directly impacts local air quality and is a measure that East Gwillimbury implements at the low-density residential scale. While these measures are more commonly addressed in larger scale developments, East Gwillimbury requires that grade related (3-storeys or less) residential developments provide a minimum of 1 vehicle parking space per unit in a garage, carport, or driveway that is designed to permit the future installation of EV supply equipment. There is also an optional higher-tier measure which encourages the installation of the EV supply equipment.

HEAT ISLAND EFFECT - ROOF

Reducing the urban heat island effect through the use of cool (highly reflective building materials) and/or green roofs is encouraged by several municipalities in the context of larger scale developments, but Toronto and Halton Hills both target the low-density residential scale as well. Halton Hills and Toronto employ the same strategy in their optional measures related to cool and green roofs. Both municipalities encourage the implementation of one out of three options for available roof area: install a green roof for at least 50% of the available roof space, use cool roofing materials for 100% of the available roof space, or use a combination of green roof and cool roof materials for a minimum of 75% of the available roof space. Toronto also specifies that roof area used for solar photovoltaics (PV) can count towards the 75% minimum in the latter option.

Urban heat island effect can also be reduced with non-roof measures, which will be further discussed in the following section.

HEAT ISLAND EFFECT – NON-ROOF

Vaughan, Brampton, Richmond Hill, and Whitby’s green development standards include optional measures that aim to reduce the heat island effect from the built form; however, it is noted in each of the standards that the measures do not apply to low-rise residential buildings. Conversely, East Gwillimbury and Toronto have both mandatory and optional measures relating to heat island reduction that are applicable at the low-rise residential scale. The mandatory requirements in either municipality are to use a combination of strategies such as high-albedo paving materials, permeable paving, and shade from trees, to treat a minimum amount of the site’s non-roof hardscapes (driveways, walkways, etc.). Toronto is more stringent with the minimum requirement being 50% of the site hardscaping, while East Gwillimbury requires only 25%. In addition to the minimum requirement, both municipalities further encourage the treatment of up to 75% of site hardscaping to reduce the heat island effect.

Various non-roof strategies that are used to minimize the urban heat island effect also have synergies with the Water Impact Category, which will be discussed in section 2.4.

PEDESTRIAN FRIENDLINESS

Street and block design also impact the use of diverse forms of mobility and the promotion of active transportation. For example, creating street and block patterns using grid or modified grid patterns, discouraging the use of cul-de-sacs, and designing streets with medium to short block lengths (400 m to less than 250 m) and perimeters (550 m to 400 m) encourages active transportation and reduces automotive trip lengths. Additionally, providing mid-block pedestrian connections and other continuous pedestrian infrastructure throughout further promotes active transportation. The implementation of these strategies is recommended in Halton Hills, East Gwillimbury, and Whitby’s respective green development standards.

Providing streetscape amenities such as benches, street trees, waste receptacles, pedestrian scaled lighting, bicycle racks, and water bottle fill stations can also create a more attractive pedestrian environment and further encourage active transportation. Providing streetscape amenities is a mandatory target in East Gwillimbury and a recommended measure in Halton Hills, Vaughan, Brampton, Richmond Hill, and Whitby. None of these municipalities define specific thresholds that must be met in order to achieve this measure, but simply provide general guidance and require a yes or no answer.

It is also important to note that pedestrians include people with disabilities using mobility aid devices.

2.3.2 MEDIUM TO HIGH-DENSITY RESIDENTIAL AND NON-RESIDENTIAL

In comparison to the low-density residential scale, municipal green development standards tend to include more metrics in the Air Impact Category at the medium to high-density residential and non-residential scale. In addition to EV charging, heat island effect, and pedestrian friendliness, this scale typically includes measures for green parking and active transportation.

EV CHARGING

Measures related to EV charging are more frequently implemented at the medium to high-density residential and non-residential scale. These measures are also often mandatory, as is the case in Vaughan, Brampton, Richmond Hill, who require that electric vehicle supply equipment (EVSE) is provided to serve 10% of the required parking spaces. These municipalities also include optional targets of providing EVSE to serve 20% of the required parking spaces or designing 50% or more of the required parking spaces to permit future EVSE installation (e.g. rough-in). Toronto has a more stringent approach and requires the installation of EVSE for 20% of the parking spaces, with the remainder of spaces designed to accommodate the future installation of EVSE. East Gwillimbury has the same requirement for mid to high-rise (4 storeys and greater) residential developments and increases the percentage of required EVSE to 30% for non-residential developments. Other municipalities such as Halton Hills, Clarington, Pickering, and Whitby include optional measures related to EV charging in their green development standards.

GREEN PARKING

In addition to providing infrastructure for EV charging, certain municipalities consider additional measures related to green vehicle parking. For example, Toronto requires that parking spaces above the minimum required are dedicated to low-emitting vehicles. Vaughan, Brampton, and Richmond Hill require that developments satisfy all municipal parking standards and dedicate 3% of parking spaces on-site to carpooling and/or carshare/zip car (does not apply to compact cars). 5% is set as an optional target. Finally, Whitby has an optional requirement that carpool or shared-use vehicle parking spaces are provided for at least 10% of the total off-street parking spaces for each non-residential and mixed-use building.

HEAT ISLAND EFFECT - ROOF

At the medium to high-density residential and non-residential scale, many municipal green development standards include metrics aimed to reduce the urban heat island effect via strategies implement on building roofs. Of the municipalities with mandatory requirements, East Gwillimbury is the least stringent and requires that 75% of the new roof area of flat-roofed buildings, excluding the areas used to provide mechanical equipment, is a cool roof (light coloured and high reflectance). Vaughan, Brampton, and Richmond Hill have more stringent requirements which mandate that a cool roof is installed for 100% of the available roof space. Toronto also requires that a cool roof is provided for 100% of available roof area in mid to high rise residential and non-residential developments; however, developments may also provide a green roof for 50% of roof area (in accordance with the City of Toronto Green Roof Bylaw) or a combination of green roof, cool roof, and solar PV for at least 75% of roof. The green development standards in Halton Hills, North Oakville, Pickering, Clarington, and Whitby each have similar metrics to those outlined above, however, the metrics are optional in each of these municipalities.

In addition to cool roofs, green roofs can be used to reduce the urban heat island effect. Green roofs also provide benefits related to energy and GHG emissions. East Gwillimbury, Vaughan, Brampton, and Richmond Hill each have optional requirements that encourage the use of green roofs for 50 to 75% of available roof area.

HEAT ISLAND EFFECT - NON-ROOF

Halton Hills, Pickering, Clarington, North Oakville, East Gwillimbury, Toronto, Vaughan, Brampton, Richmond Hill, and Whitby's green development standards each include measures that aim to reduce the heat island effect from the built form via non-roof strategies. These non-roof strategies include using a combination of high-albedo paving materials, permeable paving, and shade from trees, to treat 25 to 75% of the site's hardscapes (driveways, walkways, etc.). For medium to high-density residential buildings, East Gwillimbury requires that any combination of these strategies is used for 25% of the site's non-roof hardscaping. Toronto, Vaughan, Brampton, and Richmond Hill's have more stringent requirements with these strategies being required for 50% and encouraged for 75% of non-roof hardscaping. Additionally, Toronto, Vaughan, Brampton, and Richmond Hill all require non-residential buildings to place a minimum of 75% of the required parking spaces under a cover.

PEDESTRIAN FRIENDLINESS

Each of the pedestrian friendliness strategies listed in the low-density residential section above (creating street and block patterns using grid or modified grid patterns, providing continuous pedestrian infrastructure, providing streetscape amenities, etc.) is also applicable to the medium to high-density residential and non-residential scale.

ACTIVE TRANSPORTATION

Active transportation is closely related to pedestrian friendliness, but also include other non-motorized modes of transportation such bicycling. Promoting and facilitating modes of active transportation helps reduce air pollution and GHG emissions related to car use and reduces fuel-dependency, traffic congestion, and noise pollution. As such, it is commonly included in municipal green development standards. Active transportation may be encouraged by providing secured bicycle parking, connected bike lanes and multi-use pathways, and bike share locations. These types of requirements are included in the green development standards in North Oakville, Halton Hills, Clarington, Pickering, Whitby, East Gwillimbury, Toronto, Vaughan, Brampton, and Richmond Hill. In addition to providing exterior infrastructure, municipalities may also encourage active transportation by providing trip end facilities such

as showers and changing facilities in non-residential buildings. For example, Pickering's Sustainable Development Guidelines include an optional metric to provide trip end facilities such as bike storage facilities and showers in commercial buildings. A more specific optional requirement is provided in Halton Hills, where workplaces are encouraged to provide 1 shower and changing facility where the number of bicycle parking spaces does not exceed 30. Where more than 30 bicycle parking spaces are provided, 1 additional shower and changing facility should be provided for every 30 spaces or part thereof.

It is also important to note that bicycles include adaptive bikes, trikes, and scooters for people with disabilities.

2.4 WATER

The Water category focuses on reducing the use of potable water for indoor and outdoor water uses, as well as rainwater management. Reducing potable water use, harvesting, and re-using stormwater, and managing the quantity and quality of stormwater are all common themes in this Impact Category. Each of the municipal standards reviewed include requirements that address one or more of these themes. Note that this section does not distinguish between the low-density residential and the medium to high-density residential and non-residential scales, as the requirements in the Water Impact Category typically apply to both scales.

WATER CONSERVATION

Reducing indoor potable water use by installing low-flow indoor fixtures, fittings, and appliances is one of the main targets that municipalities have adopted at all residential and non-residential scales. Vaughan, Brampton, and Richmond Hill mandate specific maximum flow rates for toilets, bathroom faucets, and showerheads (6 LPF, 8.3 LPM, and 9.5 LPM, respectively). Another approach that ensures high-efficiency fixtures are used is via the US EPA WaterSense labelling program. WaterSense labeled products are 20% more water efficient than average products in that category and perform as well or better than their less efficient counterparts. East Gwillimbury requires that all toilets and bathroom faucets are WaterSense labeled and Halton Hills includes WaterSense labeling of water fixtures as an optional measure.

Requiring a specific reduction over baseline water fixtures and appliances (not including irrigation) is a common approach that the municipal standards reviewed take to reducing indoor potable water use. East Gwillimbury, Vaughan, Brampton, Richmond Hill, Whitby, and Toronto all have optional or higher tier measures that encourage reductions ranging from 10% to 50%. The baselines used to calculate the percent reductions achieved vary depending on the municipality, but the baselines used in the LEED Indoor Water Use Reduction credit are most typical.

In addition to reducing indoor potable water use, municipal green development standards also aim to reduce outdoor potable water use. Reducing potable water use for irrigation starts with the selection of plants which are well-suited to the local climate, and site microclimate, in which they are to be planted. The use of drought-tolerant species which can withstand periods of dryness once established is key to reducing the need for frequent irrigation. In addition, where irrigation is used, it should occur early in the morning or later in the evening when temperatures are cooler, in order to reduce loss of water to evaporation. These strategies have synergies with the Natural Assets and Habitat Impact Category, which is discussed in greater detail in section 2.6.

Similar to the approach taken to indoor water, specifying a percent reduction in potable water used for irrigation is another common measure in municipal green development standards. Vaughan, Brampton, Richmond Hill, and Whitby each have optional measures that encourage reductions ranging from 50% to 100%.

Using non-potable water such as captured stormwater, recycled wastewater, or other non-potable water source, is a strategy that could enable the greatest reductions in potable water use. While none of the municipal green development standards reviewed mandate the use of greywater for indoor or outdoor potable water use reduction, Vaughan, Brampton, and Richmond Hill do require that buildings are designed for rainwater and greywater re-use readiness (e.g. plumbing infrastructure rough-ins or dedicated cistern space for indoor rainwater or greywater use or greywater irrigation that may be connected in the future are included in the building). Other municipalities including North Oakville, Pickering, Halton Hills, Clarington, and East Gwillimbury have various optional measures related to

designing buildings for rainwater and greywater re-use readiness and actually reusing the rainwater or greywater is captured on-site.

STORMWATER MANAGEMENT

In addition to water conservation, stormwater management is a key component of the Water Impact Category. Both the quantity and the quality of stormwater runoff are important considerations in proper stormwater management. Minimizing the quantity of stormwater that leaves a site is key to reducing issues with flooding and improving the quality of stormwater runoff that does occur reduces pollutants entering the watershed. Both stormwater quantity and quality can be addressed in municipal green development standards.

Using low-impact development (LID)/green infrastructure (GI) practices to deal with stormwater close to the source can improve infiltration, thereby reducing stormwater runoff quantity and improving runoff quality. At the larger watershed scale, the Low Impact Development Stormwater Management Planning and Design Guide published by the Credit Valley Conservation Authority (CVC) and the Toronto and Region Conservation Authority (TRCA) provides comprehensive guidance for developers, consultants, municipalities and landowners in better understanding and implementing sustainable stormwater management planning and design practices during the development planning process.

Halton Hills encourage the incorporation of on-site stormwater management features, but does not have any specific or mandatory requirements. Other municipalities have more stringent requirements and use varying metrics to measure the quantity of stormwater runoff. For example, East Gwillimbury has a mandatory requirement that that post-development peak flow rates are equal to or do not exceed pre-development peak flow rates for the 2- to 100-year storm events and a minimum volume and that a minimum volume reduction of 5mm is achieved. Further volume reductions (12.5mm and 25mm) are also presented as options but are not mandatory. Whitby also compares pre- and post-development runoff volumes in optional measures that encourage the on-site retention (i.e. infiltration, evapotranspiration, or collection and reuse) of runoff from the developed site. Further, Whitby encourages the reduction of local rainfall event runoff by an additional 5% to 15%, and water balance modeling for the one to ten years post-development.

A different approach that is taken by Toronto, Vaughan, Brampton, and Richmond Hill is to require that the runoff generated from a minimum 5mm depth of rainfall be retained on site. Retaining the runoff volume from the 5mm rainfall event on-site is a mandatory requirement in each of these municipalities, while retaining the runoff volume from the 10mm to 25mm rainfall events is optional.

In addition to managing the quantity of stormwater leaving the site, managing its quality is also important. The municipal green development standards in East Gwillimbury and Toronto both include a mandatory requirement that at least 80% of total suspended solids (TSS) on an annual loading basis be removed from all runoff leaving the site. Vaughan, Brampton, and Richmond Hill's standards also include this mandatory requirement; however, it is notes as not applicable to single family homes.

Many locally focused resources for the selection and implementation of LID and GI techniques to reduce runoff quantity and improve runoff quality are available. These include the Low Impact Development Stormwater Management Planning and Design Guide (CVC and TRCA), the Toronto Green Streets Technical Guidelines, and resources available on the Sustainable Technologies Evaluation Program (STEP) website (CVC, TRCA and the Lake Simcoe Region Conservation Authority).

2.5 WASTE

The Waste Impact Category focuses on reducing the waste generation during construction, and during the operational phases of the development.

2.5.1 LOW-DENSITY RESIDENTIAL

At the low-density residential scale, the Waste Impact Category focuses mainly waste reduction and management at the construction stage, with few requirements at the operational stage.

CONSTRUCTION WASTE REDUCTION AND MANAGEMENT

Applicable standards and regulations related to construction waste management are in place and must always be met, but the further reduction of construction waste is a best practice that Toronto specifically addresses in their municipal green development standard for low-density residential developments by including optional criteria for diverting 75%-95% of waste from landfill during construction.

Whitby takes a less prescriptive and more educational approach to construction waste reduction by encouraging the development and implementation of a waste stream management narrative and plan focusing on waste diversion demonstrating the hierarchy of waste or source reduction (including prevention, minimization and reuse), recycling and materials recovery, and then disposal. This waste stream management plan, along with the specific waste reduction and diversion criteria above create a robust approach to construction waste mitigation.

OPERATIONAL WASTE REDUCTION AND MANAGEMENT

Waste in the operational phase is not typically addressed at the low-density residential scale; however, Toronto does address this topic via mandatory and optional measures. In terms of mandatory requirements, Toronto provide specific minimum floor space requirements that must be dedicated to waste and recycling collection (2 m² for every 5 units for garbage, 2 m² for every 4 units for recycling/bulky items, 2 m² for every 4 units for organics). Toronto also requires a ventilated internal space, external to the living area and on private property, for the storage of separated recycling, organics, and garbage generated between collections. To achieve the higher tier optional measure, separated cabinet space in all kitchen suites for segregated collection of recyclables, organics, and garbage must be provided. While these measures are included in the Toronto Green Standard for low-rise residential developments, it should be noted that they only apply to development less than 4 storeys with a minimum of 5 dwelling units.

2.5.2 MEDIUM TO HIGH-DENSITY RESIDENTIAL AND NON-RESIDENTIAL

At the medium to high-density residential and non-residential scale, the construction waste reduction and management strategies do not differ greatly from those at the low-density residential scale. The operational waste reduction and management strategies, however, are more common.

CONSTRUCTION WASTE REDUCTION AND MANAGEMENT

Applicable standards and regulations related to construction waste management are in place and must always be met, and Toronto includes these in their green standard by requires that mid to high rise residential and all new non-residential development manage construction and demolition waste in accordance with Ontario Regulation (O. Reg.) 103/94. Further reductions of construction and demolition waste is a best practice that Toronto, Clarington, and Pickering, address by encouraging developments to divert 50 to 95% of total construction and demolition materials from landfill.

As described above, Whitby takes a less prescriptive approach to and encouraging the development and implementation of a waste stream management narrative and plan. Pickering has a similar approach and requires the development of a Waste Audit and Waste Reduction Plan as defined in O. Reg. 102/94.

OPERATIONAL WASTE REDUCTION AND MANAGEMENT

For medium to high-density residential developments, operational waste is a topic that many municipalities address through prescriptive requirements in their green development standards. The vaguest requirement is in North Oakville, where high-density residential developments are required to demonstrate that recycling disposal is at least

as convenient or more convenient than garbage disposal. East Gwillimbury, Toronto, Vaughan, Brampton, and Richmond Hill require that residential developments provide a waste sorting system for garbage, recycling, and organics such as a three chute (tri-sorter) system on each floor. Minimum waste storage areas may also be specified, which is the case in Vaughan and Brampton, who require that residential developments provide accessible waste storage rooms with a minimum 25m² floor space for the first 50 units plus an additional 13m² for each additional 50 units to accommodate containers and compactor units. An additional requirement to provide at least 10m² for bulky and special collection items applies to residential developments in Toronto, Vaughan, and Brampton. Finally, Toronto encourages residential developments to provide cabinet space in kitchen suites for in-suite segregated collection of waste, recycling, and/or organics.

For non-residential developments, Toronto, Vaughan, Brampton, and East Gwillimbury each require a fully enclosed/internal waste storage space to accommodate separate recycling, organics, and garbage storage.

In addition to garbage, recycling, and organics, household hazardous waste can also be addressed in the Materials Impact Category. For example, Whitby, Toronto, Vaughan, Brampton, and Richmond Hill each encourage developments to provide a dedicated collection area or room for household hazardous waste and/or electronic waste.

2.6 NATURAL ASSETS AND HABITAT

The Natural Assets and Habitat Impact Category focuses on the preservation, restoration, and enhancement of the site and surrounding areas. The municipal requirements reviewed focus on landscaping strategies to promote biodiversity and enhance the natural spaces surrounding the built environment.

NATURAL HERITAGE SYSTEMS AND HABITAT CORRIDORS

Conserving existing natural areas and restoring damaged areas to provide important ecological services and promote biodiversity are key considerations that are often addressed in existing plans and policies but may also be mandated through municipal green development standards. For example, North Oakville requires that all lands within the Natural Heritage system are in public ownership and that the Natural Heritage System is shown to comply with the North Oakville Sub watershed Study. Whitby requires developments to meet the environmental management policies of Whitby's Official Plan and the Central Lake Ontario Conservation Authority guidelines (if the project is within their jurisdiction) and further encourages the provision of an enhanced buffer planting plan adjacent to identified key natural heritage features and/or key hydrologic features above and beyond the site specific development requirements. East Gwillimbury requires a Natural Heritage Evaluation and a Restoration and Enhancement Plan to be provided when a site is located within 120 metres of the Natural Heritage System. East Gwillimbury also encourages developers to provide enhanced connections to the Natural Heritage System through the creation of wildlife movement/passage enhancements at appropriate road crossings (as demonstrated by a qualified professional) or enhancements to a Proximity Linkage or Environmental Corridor identified in the Town's Official Plan, beyond the minimum requirements.

Finally, Vaughan, Brampton, and Richmond Hill's green development standards also include various measures regarding connections and enhancements to natural heritage systems. Namely, developments are required to provide physical public connections (such as public access blocks, single loaded roads, parks, sidewalks, etc.) to 25% of the length of the natural heritage system that abuts the proposed development (interface between development and natural heritage systems). 50% is also included as an optional target. Other optional targets in these municipalities include providing habitat structure(s) for species at risk, such as bird structures, butterfly boxes, and hibernaculum. Exceeding municipal requirements to provide a form of natural heritage restoration/enhancement that provides a net ecological gain, and delivering a linear continuous/uninterrupted naturalized corridor that creates a functional linkage between at least two natural heritage features.

NATIVE AND DROUGHT-TOLERANT LANDSCAPING

Landscaping and biodiversity are typically the main factors included in impact categories related to land. Landscaping and green space on a site become part of connected network of natural and green spaces within the wider community, and provide key benefits including supporting biodiversity of flora and fauna, improving air

quality, improving water quality and improving the quality of life for residents. Native plants and plant communities can provide the greatest benefit to the ecosystem as they are already well-adapted to local climate conditions and often have established ecological relationships that support other native plants, animals and insects. In this way the use of a variety of native species in landscaping contributes to the overall biodiversity and resiliency of the local ecosystem.

Halton Hills, East Gwillimbury, Toronto, and Whitby each have requirements for a minimum percentage of site landscaping that must be native/adaptive or drought tolerant. Toronto has a mandatory requirement that at least 50% of the landscaped site area be planted using native plants (including trees, shrubs and herbaceous plants). East Gwillimbury has a similar mandatory requirement, but requires that 100% of new vegetation, including sodded and landscaped areas, are planted with native plant species. Halton Hills and Whitby each have similar optional requirements with encouraged percentages ranging from 50% to 80%.

Biodiverse and native species support pollinators, which Toronto recognizes in an optional measure that recommends that a minimum of 30% (including the building footprint) of all portions of the site identified as previously disturbed be restored or protected with native vegetation that includes at least two native flowering species that bloom at all periods over the growing season.

TREES AND SOILS

The urban forest is a term encompassing all of the trees in an urban area, including trees on public and private land, in parks, and along streets. Urban forests bring a multitude of quantifiable benefits to their communities including reduction of air pollution and energy use, carbon sequestration, facilitating stormwater infiltration and uptake, supporting biodiversity, as well as promoting mental well-being and facilitating physical activity.

Trees and tree canopy were key considerations of the Natural Assets and Habitat Impact Category in each of the municipal green development standards reviewed. Requirements typically centered around preserving or replacing existing trees and ensuring that adequate soil quantities and qualities are provided.

East Gwillimbury's green development standard includes a mandatory requirement that street trees are provided on both sides of new and existing streets within the development adjacent to the vehicle travel lane at a rate of 1 tree per unit for low-rise residential developments and 1 tree per 8 metres of property line abutting a street for mid to high-rise (4 storeys and greater) residential and non-residential developments. The Toronto Green Standard also includes a mandatory measure to create tree planting areas within the site and in the adjacent public boulevard that meet minimum required soil volume to provide tree canopy. Toronto and Halton Hills also require developments that are providing surface parking lots to plant a minimum of 1 shade tree for every 5 parking spaces. Note that shading hardscapes with trees also helps reduce the urban heat island effect, as discussed in section 2.3 Air. Finally, Vaughan, Brampton, and Richmond Hill take a different approach and require all developments to provide an Arborist Report identifies and evaluates where on-site healthy mature trees will be protected (in-situ or moved) or removed.

Multiple optional measures are also included in many municipalities. For example, Vaughan, Brampton, and Richmond Hill encourage new trees (excluding street trees) be provided on site (or as determined by the municipality) to mitigate the lost canopy coverage of the trees removed. Developments in Clarington that must remove healthy mature trees above 100 mm diameter are encouraged to provide a number of new trees (not including street trees) on site to mitigate the lost canopy coverage (i.e. no net loss). East Gwillimbury, on the other hand, encourages developments to increase the existing on-site tree canopy coverage by 25 to 50%, as demonstrated by an analysis of existing on site tree canopy coverage.

The soil volume that is available to trees is an important consideration to ensure that the new and retained trees have adequate space for root growth to allow them to thrive. While minimum soil volumes may be addressed in other municipal standards and guidelines, the green development standards in Toronto, Vaughan, Brampton, and Richmond Hill each include mandatory minimum requirements for soil volume for new and retained trees. There are many methods and technologies which can be used within the built environment to increase the soil volume available to trees, including shared planting pits, soil cell technologies, and structural soils. For example, East Gwillimbury encourages all new street trees to be accompanied by the installation of enhanced street tree planting

technology, such as permanent irrigation or watering systems that utilize non-potable water sources only, silva cells, etc.

Soil quality also plays an important role in the longevity and health of urban trees. For example, Vaughan, Brampton, Richmond Hill, and Clarington's green development standards encourage all tree pits, trenches, or planting beds to have an uncompacted topsoil layer with an organic matter content of 10 to 15% by dry weight and a pH of 6.0 to 8.0.

BIRD FRIENDLY DESIGN

Bird Friendly Design helps reduce the dangers that buildings pose to migratory birds. Requirements related to bird friendly design can be mandatory or optional but typically apply to glazing at both the low-density residential scale and the medium to high-density residential and non-residential scale. For example, Toronto has a mandatory requirement to use a combination of Bird Friendly Design strategies to treat a minimum of 85% of all exterior glazing within the first 12 m (for low-rise residential developments) or 16 m (for mid to high-rise residential and all non-residential developments) of the building above grade or the height of the mature tree canopy, whichever is greater. Vaughan and Brampton each have a similar optional target to apply Bird Friendly Design strategies on at least 85% of the exterior glazing located within the first 12 m of the building above-grade. Richmond Hill also includes the same optional target in their green standard but increases the requirement to apply to exterior glazing located within the first 16 m of the building above-grade. Examples of Bird Friendly Design strategies include features such as low reflectance and opaque materials, visual patterns on glass, building-integrated structures to mute reflections on glass surfaces, window films, and fenestration patterns.

2.7 OTHER

The Other Impact Category contains the elements of sustainable development that do not fall within any of the previously discussed Impact Categories. These elements may affect factors such as education, human health, and satisfaction.

GREEN UPGRADES

Providing the option for green upgrades in residential applications helps home buyers and residents implement green options to conserve energy/water and reduce environmental/economic impact associated to living spaces. The Halton Hills green development standard includes an optional green upgrades measure that works to promote and educate home buyers on green technologies. The measure requires each home purchaser(s) to be provided with the opportunity to select at least one additional green building option such as solar water and space heating; 100% native, non-invasive and/or drought-resistant xerophytic landscaping; advanced energy saving features; or universal accessibility packages.

INNOVATION - SUSTAINABILITY ASSESSMENT

Sustainability Assessments could help to reduce a building's environmental impacts by assessing sustainability opportunities that could be employed in the development. Sustainability Assessments may also provide developers an opportunity to implement sustainability features that go above and beyond or are otherwise not captured in the GDEDG. It could therefore be greatly beneficial to require low-density residential as well as medium to high-density residential and non-residential developments to provide a Sustainability Assessment which demonstrates how the development supports the goals and objectives of the Town's Community Sustainability Plan & maximizes energy efficiency.

COMMUNITY SUSTAINABILITY OUTREACH

Community sustainability outreach focuses on the promotion and communication of green building features and technologies to help educate the homeowners and tenants on sustainable design of their homes. Not all

municipalities focus specifically on this type of education in their green development standards, but a few do include specific measures related to community sustainability outreach.

For example, the only two mandatory requirements in the entire Halton Hills Green Development Standard are both focused on education and communication. The requirements are to familiarize the homeowner(s) with the entire dwelling's green building features as part of the Pre-Delivery Inspection and to provide a Homeowner's Information Package outlining all of the dwelling's green building features, neighbourhood conveniences and information that promotes green lifestyle choices. The Package must also provide information on the proper use and maintenance of the home's green features and will include a copy of the Town's Green Plan and Community Sustainability Strategy. The Halton Hills Green Development Standard also includes a similar mandatory requirement for non-residential buildings, which requires developers to familiarize building occupants with the building's green development features through provision of printed and/or digital material as part of the lease or sales agreement.

East Gwillimbury also requires that all new building owners/tenants be provided with a Town-approved sustainability handout outlining sustainability features, such as green building materials, waste management programs, transit stop locations and encouraging other activities. The sustainability handout shall also include an itemized list of all green technologies and programs that the applicant has committed to undertake within the green development standard.

Finally, while Whitby does not require the development and distribution of a sustainability handout to new residents to understand green/sustainable elements in homes/buildings, it is included in the standard as an optional measure.

URBAN AGRICULTURE

Urban agriculture focuses on access to gardens and encouraging the infrastructure to support the availability of local food. While it is not as commonly adopted as other requirements, it is incorporated into a few municipalities' standards and presents a unique opportunity that is growing in interest and utility. Access to gardens and local food also contributes to the community's social well-being, and the resilience of the local economy and supply chains. This is discussed further in section 2.8 Emerging Trends.

Vaughan, Brampton, Richmond Hill, and Clarington do not have any mandatory targets related to urban agriculture, but they do have an optional measure to provide 80 ft² per dwelling unit of garden space dedicated to urban agriculture. Additionally, Clarington's green development standard includes an aspirational target to dedicate 15% of available roof space for local food production. Finally, Whitby has an optional measure related to food; however, it does not specify minimum requirements, but rather indicates that where possible, community gardens, rooftop gardens, and spaces that support farmers' markets should be incorporated in appropriate locations to contribute to the accessibility of locally grown produce in urban areas.

2.8 EMERGING TRENDS

The following are examples of growing trends that are being slowly implemented in other municipalities and present an opportunity for the Town of Ajax to become a leader in these new areas of sustainable development.

GREENHOUSE GAS EMISSION REDUCTION

As described in section 2.2 Energy and GHG Emissions, municipalities currently focus on energy efficiency and passive design principles; however, higher tier requirements for TEDI/GHGI indicate the aspiration of reaching 2050 Climate targets. The federal government has recently updated its previous commitment to achieve an 80% reduction of 2005 carbon emissions by 2050 to a target of net zero carbon by 2050. Provincially, the Ontario Environmental Plan targets a 30% reduction below 2005 levels by 2030. Many municipalities are also establishing local reduction targets in line with, or beyond these federal and provincial goals.

LIFE CYCLE COST ANALYSIS

Performing a life cycle cost analysis, which accounts for all costs related to the construction, operation, maintenance and disposal of materials at the end of the life of a constructed feature (structure or infrastructure) can reveal the overall cost benefit of using longer-lasting materials, which results in an inherent waste reduction.

URBAN AGRICULTURE

As described in Urban Agriculture under section 2.7 Other, a few Municipalities have incorporated local food production, but this Impact Category is not considered in most other Sustainability Standards. An example of how urban farming can thrive when permitted by local by-laws is in Vancouver, where an organization converts regular yards into vegetable plots and maintains the crop with a team of urban farmers. Homeowners exchange part of their front or back yards for a share of the vegetables grown in the local plots. While this is not specifically encouraged in any of the municipal standards reviewed, removing potential barriers such as planting requirements for lawns are key to allowing for innovative solutions like the example noted above.

RESILIENCE

Climate Change, and the resulting changes to temperature, shifting precipitation patterns, and more frequent and severe weather events will have an increasingly significant influence on infrastructure. Durham Region is focused on improving disaster resilience of low-rise residential buildings and has structured their Standard to focus on Basement Flooding, Extreme Heat and Extreme Wind Protection to mitigate the impact climate change has on homeowners. Other Municipalities are starting to incorporate these criteria into their Standards by implementing more stringent stormwater management as described in section 2.4 Water, or the heat island effect per section 2.3 Air.

The draft Toronto Green Standard v4 which will come in effect next year, requires mid-high rise developments to conduct a Climate Resilience Assessment that identifies the main hazards of concerns, their expected impacts, and means of mitigating those impacts in project design. The standard also includes a Resilience Planning New Construction Checklist that is specific to the City that is required to be completed at the design development stage.

AIR TIGHTNESS

This criterion measures the uncontrolled inward or outward leakage of air in a building. Buildings can perform testing to identify any leakage points or areas of weakness in the building envelope. Once identified the air barrier can be sealed to reduce air leakage and heat transfer. Superior air tightness can improve a building's energy performance, occupant comfort and durability¹. Few municipals require a Whole Building Air Leakage Testing (WBALT) for mid-high rise developments to improve the quality and air tightness of the building envelope. However, these municipals provide a clear air tightness testing protocol and process guideline.

¹ It is important to note that an air-tight building may cause mould or humidity issues if the materials selected for the envelope assembly promote condensation. As such, measures to ensure that this does not occur (e.g. Engaging a building science professional) may be beneficial.

3 CONSULTATION SUMMARY

3.1 POLICY REVIEW REPORT MEETING

A meeting with Town staff was held on June 22, 2021 to discuss the Policy Review Report. The Policy Review Report provided a comprehensive summary of applicable documents related to climate change, sustainability, green development, and environmental design. These documents included plans, policies, and strategies at the Provincial, Regional, Conservation Authority, and Town levels. The Policy Review Report and subsequent meeting helped identify the principles and key directions that will inform the development and implementation of the GDEDG.

3.2 WORKSHOP 1

Workshop 1, which took place on July 16th, 2021, was used to collect feedback from Town staff on the Energy, Air, Water, and Waste Impact Categories. The metrics that were identified as important to the Town are discussed in detail in sections 2.2 Energy and GHG Emissions, 2.3 Air, 2.4 Water, and 2.5 Waste. They will also be included in the Draft GDEDG Metrics.

3.3 WORKSHOP 2

Following the same format as Workshop 1, Workshop 2 was held on August 12th, 2021 and focused on the Transportation, Land Use, Natural Assets and Habitat, and Other Impact Categories. The metrics that were identified as important to the Town are discussed in detail in sections 2.6 Natural Assets and Habitat and 2.7 Other and will be included in the Draft GDEDG Metrics.

It should be noted that the Transportation and Land Use metrics that were found to be of interest to the Town have been merged into the Air Impact Category as they contribute to the category's intent.

3.4 ITEMS NOT INCLUDED IN DRAFT GDEDG

Per the discussions in Workshops 1 and 2, various metrics were identified as inapplicable or low priority for the GDEDG. These metrics will be outlined below and were not included in the draft GDEDG Metrics.

- **Passive Energy Conservation Strategies:** Improving building energy efficiency can be achieved via passive strategies that reduce a building's overall energy consumption. These strategies typically consider the building orientation for optimal solar gain, natural ventilation from local predominant winds, and a high-performing building envelope to reduce heat loss and unnecessary heat gain.
- **District Energy:** Requirements related to district energy may include carrying out a district energy feasibility study if the development is in an area where district energy has been deemed viable or, where district energy is available for hook-up, providing the necessary infrastructure and a connection to the District Energy System. Optional/higher tier requirements even include constructing a District Energy System, other communal energy system, or combined heat and power system for heating and/or cooling for the development. These requirements have not been included in the GDEDG as they would be localized to Downtown Ajax and may disadvantage other sites.

- **Indoor Air Quality:** Toxic emissions from Volatile Organic Compounds (VOC) found in building products are a common source of indoor air contaminants that can be mitigated or eliminated by selecting interior finishes (e.g. paints, adhesives, sealants, flooring) with low or even zero VOC content; however, this is not commonly addressed in municipal green building standards. Due to this fact and the feedback received from Town staff, requirements regarding Indoor Air Quality have not been included in the GDEDG.
- **Sustainable Procurement of Building Materials:** Using sustainable building materials is a typical way to mitigate solid waste from construction activities. For example, municipal green standards may include requirements to use construction materials that are reclaimed, have recycled content, regionally sourced, or meet responsible production and harvesting criteria. These types of requirements have been identified as difficult to manage and have not been included in the GDEDG.
- **Development Proximity, Development Density, and Land Use Mix and Diversity:** Municipal green development standards may include various requirements related to proximity to amenities, development density, intensification, Floor Space Index, land use mix, mixed-use developments, and diversity in housing. These types of requirements were identified as low priority for the GDEDG as the majority of developments in the Town will be through intensification.
- **Arts and Culture:** Public spaces can be improved through the inclusion of public art and/or connections to local culture; however, these types of measures are typically vague and not often included in municipal green development standards. Requirements related to arts and culture were identified as low priority to the Town and have not been included in the GDEDG.
- **Equity, Inclusion, and Accessibility:** Universal design to promote physical accessibility is a feature that is already accounted for in local building codes and by-laws, but certain municipal standards encourage developments to exceed the minimum that is otherwise required. For example, equity, inclusion, and accessibility can be promoted through strategies such as the use of design features (beyond zoning by-law requirements) for people with disabilities, the inclusion of amenities for senior users, the provision of residential units with barrier-free paths of travel from the street, and the construction of residential units in accordance with International Code Council (ICC)/American National Standards Institute (ANSI) Universal Design Standards. As various accessibility requirements are already captured in existing codes and standards, they have not been included in the GDEDG.
- **Economic Accessibility:** Measures related to economic accessibility promote affordable housing, rentals units, and a variety of housing types. Economic accessibility is often addressed by municipalities that have a social well-being or equivalent Impact Category in their green development standard.
- **Social Wellbeing – Safety:** Certain municipal green development standards include measures centred around Crime Prevention Through Environmental Design (CPTED), which is a multi-disciplinary design philosophy that uses urban and architectural design along with effective use of the built environment to reduce the fear and occurrence of crime. Safety measures such as CPTED strategies were not identified as a high priority for inclusion in the GDEDG.
- **Protection of Heritage Buildings:** The protection of heritage properties is already addressed through other Town tools such as heritage registers, heritage designation, and easement agreements. As such, metrics related to the protection of heritage buildings have not been included in the GDEDG.
- **Erosion and Sedimentation Control:** While certain municipalities specifically address construction erosion and sedimentation control in their green development standards, these requirements are typically implemented through other guidelines or by-laws, such as the Toronto and Region Conservation Authority (TRCA) Erosion and Sediment Control Guideline for Urban Construction. Specific metrics related to erosion and sedimentation control during construction have therefore not been considered for the GDEDG.

3.5 PUBLIC FEEDBACK

Due to ongoing COVID-19 restrictions, the public consultation was completed using a modified, virtual format. To collect public feedback, the draft GDEDG documents (Draft Report, Guidebook, and Checklist Tool) were uploaded to the Town of Ajax In My Opinion (IMO) Hub on December 3rd, 2021. The 60-day public commenting period remained open until January 31st, 2022. Comments were received from individuals in the community as well as the following organizations and municipalities:

- The Ajax Youth Advisory Committee
- The Atmospheric Fund
- Central Lake Ontario Conservation Authority
- Toronto and Region Conservation Authority
- Climate Justice Durham
- FLAP Canada
- The Town of Whitby
- The Regional Municipality of Durham
- Clean Air Partnership
- Ledim Developments Ltd.

Feedback received during the public commenting period is summarized in Table 3-1 below.

Table 3-1 Feedback Received During Public Commenting Period

Impact category	Summary of comments received
General	<ul style="list-style-type: none"> — Ensure that the GDEDG is not a static document, but rather one that changes over time — Include a timeline for updates and make the core requirements increasingly stringent — Explicitly allow for alternate compliance paths to core requirements — Address operational/implementation elements to ensure that requirements continue to be met when homeowners take ownership of property — In future updates to the GDEDG, consider requirements related to embodied carbon and building resilience
Air	<ul style="list-style-type: none"> — Include further consideration for the transportation needs of people with disabilities, especially people that are hard hearing or have impaired vision — Increase the EV Ready requirements for mid to high-density residential and non-residential developments — Remove requirement for sidewalks on both sides of non-main, arterial roads
Energy	<ul style="list-style-type: none"> — Include energy efficiency requirements as mandatory under Tier 1 — Align the Tier 1 energy requirements with those in the Whitby Green Development Standard to build consistency across local area municipalities in Durham Region

	<ul style="list-style-type: none"> — Remove references to obsolete building standards — Include Building Commissioning as a Tier 2 (core) requirement to ensure that buildings designed to be high-performing are also built to be high-performing.
Natural Assets and Habitat	<ul style="list-style-type: none"> — Limit the requirements under Bird Friendly Design to Tier 1 and revise the details to reflect the Canadian Standards Association’s (CSA) Bird Friendly Building Design standard A460 — Mention how responsible light reduction practices can also help reduce the overall risk of nocturnal bird-building collisions — Elaborate on the incorporation of habitat corridors into roadway design to ensure clarity in its application to new and existing road infrastructure — Amend the details of Habitat Corridors to state that the proposal should be consistent with the TRCA Post-Construction Restoration Guidelines and plantings should be compatible and complementary to the targeted vegetation communities for the area — Define terms such as “medium” trees and “native species”
Waste and Materials	<ul style="list-style-type: none"> — Emphasize the use of reused and locally sourced materials
Water	<ul style="list-style-type: none"> — Define terms such as “permeable” area — Address resiliency as it relates to stormwater management, including enhanced stormwater and overland flood provisions

The following draft GDEDG metrics have been modified based on the feedback received:

— Low-Density Residential

- E1. Energy Conservation Targets: This metric has been updated to be in line with the requirements of the Whitby Green Development Standard. The Tier 1 requirement is now to achieve or exceed ENERGY STAR® for New Homes, version 17, R-2000® requirements, or equivalent. Tier 2 core and optional requirements reference the CHBA Net Zero Home Labeling Program and the Passive House Standard. Reference to Natural Resources Canada’s EnerGuide Rating have been removed.
- N2. Bird Friendly Design: This metric has been added. The Tier 1 requirement to design the building(s) in accordance with the guidelines laid out in the Canadian Standards Association’s (CSA) Bird Friendly Building Design Standard A460.

— Mid to High-Density Residential and Non-Residential

- A2. Electric Vehicle Infrastructure: This metric has been updated to be in line with the Low-Density Residential metric A1. Electric Vehicle Infrastructure. For projects providing 20 or more parking spaces, the Tier 1 requirement has been increased and is now to design and construct 50% of all parking spaces to have EV charging stations or be EV Ready. The Tier 2 (core) and Tier 2 (optional) requirements have also been increased to 75% and 100%, respectively.
- E1. Energy Performance & Emissions: This metric has been updated to be in line with the requirements of the Whitby Green Development Standard. The Tier 1 requirement is now to achieve at least 15% energy efficiency improvement over OBC, SB-10, Division 3 (2017). Tier 2 optional and core requirements related to TEUI, TEDI, and GHGI remain unchanged. An additional Tier 2 core requirement to achieve at least 25% energy efficiency improvement over OBC, SB-10, Division 3 (2017) has been added for building types not covered by the Tier 2 TEUI, TEDI, and GHGI targets.
- N2. Bird Friendly Design: This metric now has a Tier 1 requirement only. The Tier 1 requirement is now to design the building(s) in accordance with the guidelines laid out in the CSA Bird Friendly Building Design Standard A460.

To ensure that the GDEDG remains in line with current industry standards, it is recommended that the metrics are reviewed annually and that a comprehensive update be completed and implemented no earlier than every 3 years and no longer than every 5 years.

In addition to the feedback summarized in Table 3-1 above, several comments unrelated to the GDEDG were received. For example, the operation of public transit, changes to existing infrastructure assets, and implementation of other sustainability regulations are outside the scope of the GDEDG. These comments have not been addressed in the updated GDEDG; however, they will be taken into consideration by the Town as they relate to other applicable policies.

IMPLEMENTATION

3.6 DEVELOPMENT PROCESS

The GDEDG will be incorporated and implemented within the course of the development process. This section will discuss how the GDEDG will be applied through the development application and review process to encourage or require its application.

PROCESS

The GDEDG is principally intended to be implemented through Site Plan Control and Draft plan of Subdivision. For Official Plan Amendments, Zoning By-law Amendments and Minor Variances, the GDEDG may be used as a tool to communicate the Town's expectations to applicants through Site Plan Control or Draft Plan of Subdivision, where appropriate.

Official Plan Amendments, Zoning By-law Amendments, and Minor Variances: The GDEDG will be used for communication during OPA and ZBAs (where appropriate based on the nature of the application) but will not be administered through those applications.

Site Plan and Draft Plan of Subdivision: The GDEDG is mandatory for Site Plan applications and Draft Plan of Subdivision applications.

Pre-Consultation: The GDEDG will be presented and communicated through pre-consultation for Site Plan Control or Draft Plan of Subdivision, as appropriate. Town staff who are responsible for administering the GDEDG will review the application and provide comments related to the GDEDG checklist. It is anticipated the Guide Book will be made available applicants through this process. Staff may be required to communicate the purpose and metrics of the GDEDG, which metrics might apply as either mandatory or discretionary, and explain the incentives and benefits of implementing the requirements of the GDEDG. Part of this communication may give consideration to any administrative or review timelines for developments subject to the GDEDG.

Initial Complete Submission of Site Plan and/or Draft Plan of Subdivision Application: The GDEDG checklist is required as part of the submission package for Site Plan Control or Draft Plan of Subdivision applications. Based on preliminary consultation with the Town, it is understood that staff will undertake priority review of the application to verify the overall goal for implementing the GDEDG and if the GDEDG checklist has been satisfied based on the application. If the application targets include ambitious metrics (possibly an internal metric with the understanding that the targets might change or the number of applicants who surpass the threshold may be large or small), the application may be incentivized by expediting and/or supporting it through the development process. Staff may offer comments regarding meeting mandatory or discretionary metrics that have been identified, but for which the application does not qualify. In addition, staff may provide comments on how to exceed the minimum requirements. It is recommended that approval will not be given for an application that does not satisfy a mandatory metric.

Resubmission: The GDEDG checklist is also required for any re-submission and circulation of Site Plan or Draft Plan of Subdivision applications, including any changes or updates. Through the initial submission of an application, the proponent will include a completed GDEDG checklist. Town staff will review the checklist and evaluate which are implemented appropriately based on the contents of the submission. When the Town issues comments in response to the proponent, any mandatory metrics that are not satisfied will be identified, any incorrectly claimed metrics will be noted, and an overall score will be provided to the proponent accompanied by the targets and incentives.

Final Submission: The GDEDG checklist is recommended to be included in the final submission, and the final satisfaction of GDEDG metrics will be the basis for providing incentives, as deemed appropriate.

INCENTIVES

Incentives will be provided to encourage developers to pursue optional GDEDG targets and measures. The awarding of the incentives might be based on the overall pursuit of higher GDEDG standards, or excellence in an area. The incentives for the GDEDG will be non-financial, but may have an impact on the development process, such as by expediting the process or supporting the proponent through the development process. Other incentives are awarded after the completion of the development and the proven attainment of high GDEDG standards, such as through design awards.

Potential, non-financial incentives include:

- Expedited review;
- Improved marketing through Ajax networks and potential new website page;
- Annual awards presented by Mayor and Council; and
- Concierge Staff member to support Tier 2 projects through the planning process.

3.7 ADMINISTRATION AND COORDINATION

As the GDEDG represents additional administrative considerations for the Town, it is important to balance the requirements of the GDEDG with available resources. In addition, the amount of administration and monitoring that may be required to appropriately maintain the GDEDG must be aligned with available resourcing. It is anticipated that the GDEDG will be administered and coordinated by a new Environmental Planner position at the Town with the support of the planning department. This section explores the administrative considerations for implementing the GDEDG.

TRIAL-PERIOD

As the GDEDG is a new program for the Town, it is likely that long-term implementation will benefit from a trial period. The trial period should be undertaken for a pre-determined length of time, as determined by staff. During this time, the metrics, incentives and uptake will be constantly evaluated and adapted to refine the GDEDG. This period will be used to make necessary adjustments to the metrics and implementation considerations. This period will be important to ascertain the implementation requirements of the GDEDG and receive feedback from applicants.

MONITORING

Following a test period, it is expected that the GDEDG will benefit from regular updates as the Town's land use planning regime evolves over time. This includes updates to the Town's Official Plan, Zoning By-law and other applicable municipal guidelines that may occur. There may also be a desire or need to update the GDEDG as the provincial policy framework evolves. Additionally, as development practices change in response to the incentives of the GDEDG, the targets and metrics of the GDEDG may need to be updated to continue encouraging increasingly sustainable design.

The Town will need to consider a plan monitoring and evaluation framework that includes a preferred method of ongoing administration. Since the goal of the GDEDG is to encourage improved sustainable design, key metrics for monitoring might include overall uptake of the GDEDG, achievement of satisfying the criteria, and administrative considerations, such as review timelines, for example. Other stakeholders may also be engaged to understand how the GDEDG impacts area of interest. The monitoring and evaluation framework could be newly developed or adapted from existing monitoring frameworks currently administered by the Town.

COMMUNICATION WITH STAKEHOLDERS

Communication with stakeholders is critical to the long-term success of the GDEDG. Since the GDEDG is a new program that aims to work with stakeholders to increase sustainable design, ensuring that the GDEDG is clearly

communicated to and understood by all relevant stakeholders is critical. Communication with stakeholders may take place prior to and throughout the development process.

In the initial phases of implementing the GDEDG, it will be necessary for staff to communicate and educate stakeholders on the expectations of how to use the GDEDG, as well as to communicate what benefits they offer the Town, developer and the purchaser and/or user. The GDEDG also establishes different metrics that may apply to various development typologies or contexts, which is important for proponents to understand.

3.8 STRENGTHS, WEAKNESSES, OPPORTUNITIES, AND CHALLENGES (SWOC)

3.8.1 STRENGTHS

- **Broad range of green development and environmental design considerations contemplated:** In the preparation of the metrics for the GDEDG, tools and metrics were evaluated from many Ontario jurisdictions. Metrics range from sustainable considerations in the building process, to operational sustainability, and considered options at different scales of development.
- **Reduce Environmental Impacts through development:** The GDEDG represents an important opportunity for the Town to reduce environmental impacts that may occur as an outcome of development. The GDEDG provides the Town with an ability to measure potential environmental impacts from development and implement a solution-oriented framework to reduce undesirable outcomes in this regard.
- **Robust study process with input from a range of interested and affected parties:** The process to develop the GDEDG has engaged a broad range of stakeholders and facilitated input from the people who will be implementing the GDEDG as well a broad range of stakeholders.
- **Precedence for the GDEDG as evidenced in other Canadian municipalities:** There is an emerging precedence among Canadian municipalities to advance and promote sustainable development standards for site and building design.
- **Applicable to a range of development typologies:** By establishing the GDEDG to be applicable to all forms of development, the Town can make environmental design commonplace in the local development industry and may realize improvements to construction practices, site design and building performance that results in the more efficient use of municipal infrastructure, better conserves water and energy and enhances the natural environment.
- **Inherent flexibility of the GDEDG regarding mandatory and optional criteria:** The range of mandatory and optional criteria allow developers to choose the metrics that are most suitable to their context while still holding development to an environmental standard. The optional criteria are inherently flexible and can encourage a more widespread consideration of the benefits of the GDEDG in a range of future developments.

3.8.2 WEAKNESSES

- **Need to ensure the intent and the associated metric(s) are aligned:** With so many metrics using similar programs to incentivize development, there is a need to ensure that the incentives are directed to development that accomplishes its stated goals and objectives.
- **Some requirements and associated metrics are more complex than others:** Green development standards typically evaluate a full range of impact categories through various technical metrics. While this may be necessary to meaningfully evaluate specific impact categories, the technicality of green development standards may pose a challenge in implementation by the Town and uptake by the development industry.

- **Resourcing, administration, implementation and monitoring:** The GDEDG will require a heightened administrative effort from Town staff during the planning application and approval process. Consideration will also need to be given to what, if any, impact the administration of the GDEDG will have on the overall planning application and approvals timeline.
 - **Encouraging ‘optional’ requirements:** Optional requirements and metrics in the GDEDG is a strength in that it permits increased flexibility for developers to adapt the GDEDG to different contexts, it may also be a challenge to get uptake of the optional requirements. Unless there is inherent value for developers to implement the optional requirements, it is likely they will not be applied in the absence of an incentive.
 - **Future Development:** Application of the GDEDG may need to be carefully monitored within the context of future development and building trends and best practices.
 - **Definable Impact Categories:** Certain impact categories will require careful consideration to how they are defined and measured through the GDEDG. These definitions will need to be measurable to ensure that an applicable impact category can be meaningfully evaluated through the GDEDG.
 - **Coordination with By-laws and other Town plans:** The requirements and metrics of the GDEDG will require a certain degree of coordination with Town plans and external plans. The metrics must be consistent with zoning requirements, the Official Plan, and Provincial plans and policies.
-

3.8.3 OPPORTUNITIES

- **Effectiveness:** Green development standards are demonstrated to be an affective opportunity for municipalities to meaningfully realize more sustainable development practices and resilient communities. Many municipalities throughout Ontario and across Canada have adopted a similar approach that is implemented through the land use planning application and approvals process.
 - **Breadth:** The breadth of potential metrics included in the GDEDG enables the Town to evaluate a full range of metrics that contemplate various green development and sustainability considerations.
 - **Advance Complimentary Municipal Priorities and Policies:** The GDEDG represents an opportunity for the Town to advance various local sustainability initiatives and policies.
 - **Enhance collaboration and cooperation between the Town and developers:** Codifying guidelines for development gives a clear message to developers as to how to achieve the Town’s plans, making it easier for them to interpret plans and provide desirable products.
 - **Other Town Plans:** The GDEDG may consider other Town plans that share common or related goals and objectives. There is an opportunity to align these other plans with the GDEDG and vice versa to increase the effectiveness and reach of the GDEDG.
-

3.8.4 CHALLENGES

- **Ongoing resourcing and administration:** For the GDEDG to be successful in the long term, there are costs associated with ongoing administration, monitoring and updates.
- **Requires municipal and private sector ‘champions’:** The success of the GDEDG will necessarily require ongoing public education, awareness and communication from the Town.
- **Capital Costs:** In addition to resourcing and administration costs, there is potential for increased capital costs. Certain impact categories and associated metrics may result in heightened capital costs as a result of increased development and building costs required to satisfy the GDEDG.
- **Industry adoption and potential resistance:** The success of the GDEDG relies on widespread adoption by the development industry. If the criteria are too restrictive or not feasible for development, or if the incentives are not strong enough, there is a risk that developers may push back on the GDEDG.
- **Consistent application of the GDEDG:** The GDEDG is designed to be flexible and used in different contexts, but this also makes it challenging to apply consistently and objectively between different development applications.

APPENDIX

A GDEDG GUIDEBOOK

APPENDIX

B GDEDG CHECKLIST TOOL