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A PARTNERSHIP OF LANDSCAPE ARCHITECTS AND PLANNERS

CITY OF SASKATOON BYLAW 8770 ENVIRONMENTAL ZONING BYLAW REVIEW

Submitted to:

THE CITY OF SASKATOON

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EXECUTIVE SUMMARY

In the Spring of 2022, Crosby Hanna & Associates was retained by the City of Saskatoon (City) to undertake an Environmental Zoning Review of the City's Zoning Bylaw No. 8770. The purpose of the review is to provide the City with examples of environmental regulations used by other urban municipalities that have similar considerations, constraints, and/or climate to the City of Saskatoon. Furthermore, the intent of the study is to develop new or amended regulations for Bylaw 8770 that support the City's environmental and sustainability targets and goals.

A study of 24 Zoning Bylaws and Ordinances ranging across 5 countries was conducted to draw upon regulatory best practices to inform the development of environmental regulations and amendments to Bylaw No. 8770 for the City of Saskatoon.

The following topics were reviewed, and recommendations were made concerning whether proposed amendments to bylaw 8770 should be considered:

- Green Buildings (LEED, BREAM, Passive Housing, Net Zero Homes, and Solar Ready Homes);
- Green Roofs/Roof Top Gardens;
- Low Impact Development;
- Adaptive Reuse and Infill Development;
- Landscape Regulations;
- Parking Standards;
- Electric Vehicle Parking Standards; and,
- Dark-Sky Compliant Lighting.

Within each topic, the report provides the following:

- Topic definition;
- Review of existing regulations;
- Municipal comparison;
- Stakeholder consultation;
- Recommendations; and
- Proposed amendments.

External stakeholders were consulted in February and March, 2023. The consultations were undertaken in person, virtually, and in written form. Stakeholders were provided with proposed recommendations at the time of consultation. Written and verbal feedback were then synthesized and used to refine the recommendations and proposed amendments.

Previous work undertaken by the City of Saskatoon focused on reduction in GHG emissions concluded that the most significant difference to the reduction in GHG emissions in the City is going to be through changes to stationary energy use (energy required to heat, cool, and power residential, industrial, commercial, institutional, and municipal buildings), second to transportation.

This study does not identify any 'magic bullet' recommendations which will, on a stand-alone basis, have a significant impact on GHG emissions. Rather positive changes will be achieved through the cumulative impacts of the amendments recommended herein. The implementation of the following recommendations will be of the most significance in achieving these positive cumulative impacts:

1. Bonusing and other provisions which will encourage the development of Green Buildings;
2. Amendments which will facilitate the development of buildings which will use solar energy; and,
3. Requirements to provide Electric Vehicle Charging Stations in new developments.

1 INTRODUCTION

1.1 Purpose and Scope

In the Spring of 2022, Crosby Hanna & Associates was retained by the City of Saskatoon (City) to undertake an Environmental Zoning Review of the City's Zoning Bylaw No. 8770. The purpose of the Environmental Zoning Review is to provide the City with examples of environmental regulations used by urban municipalities around the world that have similar considerations, constraints, and/or climate to the City of Saskatoon. The desired outcome of the report is to provide amendments to the City's Zoning Bylaw No. 8770 that will address environmental and land use pressures caused by climate change over the next 30 years. This report is a synthesis of information gathered throughout 2022 and 2023 which forms an up-to-date, comprehensive picture of the current policies and regulations that pertain to emission reductions and climate resilience. To those ends, this report contains recommendations for potential new regulations or amendments to existing regulations along with the local and global context that informs them.

1.2 Methods

To determine the recommendations in this report, a comprehensive review of existing policy frameworks, strategies, and plans was initially conducted to determine any areas of development the Province of Saskatchewan and the City of Saskatoon have previously identified as having significant environmental implications.

A review of the current Zoning Bylaw No. 8770 and amendments thereto was also undertaken to determine where the City has provided regulations that meet the goals and objectives laid out within any existing policy frameworks.

A study of 23 Zoning Bylaws and Ordinances ranging across 5 countries was conducted to draw upon regulatory best practices to inform the development of environmental regulations and amendments to Bylaw No. 8770 for the City of Saskatoon.

2 CONTEXT

2.1 Council's Authority

In September 2015, Council directed staff to develop a report regarding climate adaptation planning in Toronto and options for developing an adaptation strategy for Saskatoon.

On June 26, 2017, City Council set greenhouse gas reduction targets for Saskatoon based on the City's 2014 GHG emissions inventory. They include:

- Reducing the City of Saskatoon's emissions by 40% below 2014 levels by 2023; and 80% by 2050;
- Reducing the community's emissions by 15% below 2014 levels by 2023; and 80% by 2050.

In the Spring 2018 Council approved the baseline inventory gathering information to inform the Green Infrastructure Strategy. In November 2018 Council directed staff to develop the recommendations report outlining opportunities for the city to reach emissions targets.

In August 2019 Council was presented with the Low Emissions Community Plan outlining the actions required to meet both community and corporate GHG emissions reduction targets for 2023 and 2050.

In February 2020 Council received the Green Infrastructure Strategy as information. This strategy outlines a vision for Saskatoon's Green Network and addresses risks to the network.

In September 2021, the City of Saskatoon and University of Saskatchewan signed a collaborative Climate Commitment and Call to Action pledging to accelerate the transition to a low-emission community.

In June 2022 Council approved Pathways for an Integrated Green Network (Green Pathways), the implementation plan for the Green Infrastructure Strategy.

2.2 Existing Policies

Potential implementable actions from the City of Saskatoon's strategies, plans and policies were drawn from the following sources:

(1) City of Saskatoon Official Community Plan;
(2) City of Saskatoon Low Emissions Community Plan (LEC); and,
(3) City of Saskatoon Green Infrastructure Study.

A brief summary of existing policies, which have potential effects on zoning standards are summarized below.

2.2.1 City of Saskatoon Official Community Plan

Sections E G and H of the City of Saskatoon Official Community Plan details goals, objectives and policies as it relates to Environmental Protection, Sustainable Growth, and Moving Around. Table 1 below summarizes the policies that are already realized within the City's OCP that have or could have potential impacts on the zoning bylaw. The right-most column links to the policies to applicable sections of this report. It is noted that the specific zoning amendments are being developed and will be provided in each relevant section of this report.

Table 1 City of Saskatoon Official Community Plan – Environmental Leadership Policies

Section E – Environmental Protection **Subsection 1 – Environmental Protection**		
1.1 Environmental Stewardship	Policy 1.1(2)(d) Pursue opportunities for dark sky compliant lighting, especially in or near sensitive natural areas, to mitigate disturbance and maintain a resilient ecology.	See Section 9 – Dark Sky Compliant Lighting.
1.2 Water	Policy 1.2(2)(c) Promote and support water efficient land use planning and development of public and private landscaping that reduce water consumption.	See Section 5 – Low Impact Development and Landscaping.
1.4 Land	Policy 1.4 (1) (a) Promote and facilitate brownfield redevelopment through the appropriate management and transformation of contaminated lands. (b) Reduce risks to soil health and human health through reduction of pesticide and chemical use (c) Promote and facilitate brownfield redevelopment through the appropriate management and transformation of contaminated lands.	See Section 6 – Adaptive Reuse and Infill Development.

Table 1 City of Saskatoon Official Community Plan – Environmental Leadership Policies		
Subsection 2 – Natural Systems		
2.1 Integration with Urban Environment	Policy 2.1 (2) (c) Pursue opportunities to incorporate green infrastructure during development and redevelopment projects. (d) Integrate storm water management and natural areas protection in land use planning processes	See Section 4 – Green Roofs and Section 5 – Low Impact Development and Landscaping.
Subsection 3 - Energy		
3.1 Energy Conservation and Efficiency	Policy (2) (b) Promote and support energy efficient land use planning through urban forms and infrastructure that support innovative energy production and reduced energy consumption, while increasing the livability of the city. (c) Support actions that lead to energy and fuel efficiency in all modes of transportation and support innovation in transportation technologies. (d) Reduce fuel use and GHG emissions of the City's corporate vehicle fleet through best practices, such as right-sizing and using alternative fuels and energy sources.	See Section 3 – Green Buildings.
3.2 Renewable Energy	Policy (2)(a) Seek opportunities to increase energy generation from innovative energy sources and green technology, such as solar, hydropower, and landfill gas collection.	See Section 3 – Green Buildings
3.3 Sustainable Buildings	Policy 2(b) Support initiatives to raise energy efficiency standards and encourage	See Section 4 – Green Buildings and Section 6 – Adaptive Reuse and Infill Development.

Table 1 City of Saskatoon Official Community Plan – Environmental Leadership Policies		
	sustainable building techniques for new construction and building renovations throughout the city.	
Section G – Sustainable Growth **Subsection 1 – City Growth**		
1.3 Infill Growth	Policy 2 (a) Direct higher density infill growth to the Downtown, Corridor Growth Areas, Strategic Infill Areas, and Community Focal Points where adequate levels of service and appropriate intensity and land use can be accommodated. (c) Facilitate and promote the development or redevelopment of infill sites by addressing regulatory barriers and through the use of incentives and partnerships.	See Section 6 – Adaptive Reuse and Infill Development.
Section H – Moving Around **Subsection 3 – Parking Management**		
Policies	Policy 2(f) The Zoning Bylaw may permit underground parking facilities to project into required yards, provided the parking structure is below grade and does not interfere with the public right-of-way including amenities and public spaces. Ramps must not interfere with the adjacent street, cycling, and pedestrian network. (i) The City may introduce maximum parking requirements to reduce an over-supply of parking spaces in a defined area when needed, to support alignment with the vision for that area.	See Section 7 – Parking Standards

2.2.2 City of Saskatoon Low Emissions Community Plan

The Low Emissions Community Plan (LEC Plan) sets a framework for electricity to be almost completely provided by renewable energy sources. The objective of the LEC is "a long-term road map for achieving the City of Saskatoon's established greenhouse gas (GHG) reduction targets through changes to policy and investments in projects, programs and partnerships."

The LEC identifies 40 mitigation actions through the categories of:

- Buildings and Energy;
- Transportation;
- Land Use;
- Renewable Energy;
- Water Conservation; and
- Waste Management.

Alternative Currents, An Implementation Plan for Saskatoon's Renewable and Low-Emission Energy Transition is a plan that outlines the opportunities and challenges for Saskatoon to switch fuel sources and support the growth of renewable energy to sustainably cool and power buildings, fuel vehicles, and enable industrial and commercial processes. Alternative Currents identifies 12 of the renewable and low-emissions energy actions in the LEC Plan and the initiatives and timelines to complete these actions.

Several of the 40 action items provided in the LEC plan can be considered in the context of zoning regulations. However, more of the action items relate to energy efficiency in municipal and privately-owned buildings, which are primarily regulated through the City's building bylaw. The potential actions which could be applied within the zoning bylaw, as identified in the LEC Plan, are provided in Table 2, below. The LEC targets, as provided through Alternative Currents, are also included in Table 2.

Table 2

Low Emissions Community Plan – Potential Zoning Considerations

Action Item	LEC Target	Potential Zoning Actions
Action #1 Apply energy efficiency standards (build to Passive House) to all new municipal buildings.	Install 24 MW of solar capacity by 2026 on municipal buildings. Reduce a total of 236,000 tonnes CO2 between 2020 and 2050.	Amendments that support and encourage Passive Housing, Net Zero Housing, and Net Zero and Solar Ready Housing. Elements controlled through zoning include regulations that would allow for the installation of solar panels through building height allowances in all districts.
Action #7	Action not included in Alternative Currents.	Provisions that would allow for the installation of solar panels through

Table 2

Low Emissions Community Plan – Potential Zoning Considerations

Action Item	LEC Target	Potential Zoning Actions
Require new homes to include roof solar Photovoltaic (PV) installations in the final year of a municipal step code.		building height allowances (bonuses) in all districts.
Action #27 Build complete, compact communities through infill development, mixed-use buildings, and compact housing.	Action not included in Alternative Currents.	Zoning regulations currently consider several densities of residential development and provides for mixed use development.
Action #28 Focus development on densification in previously developed areas, increasing the number of multi-family buildings.	Action not included in Alternative Currents.	Zoning regulations that allow for additional infill development opportunities in a range of residential districts.
Action Item #30 Install solar PV systems on municipal lands	Install a 1 MW capacity solar system on Parcel M (Dundonald Avenue Solar Farm) or similar land area by 2022.	Provide for stand-alone PV systems in applicable districts.
Action Item #32 Encourage existing residential building owners and mandate new buildings to install solar PV systems.	Install 10 MW of residential solar capacity by 2030, 50 MW by 2050. Reduce a total of 195,000 tonnes CO2 between 2020 and 2050.	Provisions that would allow for the installation of solar panels through building height allowances in all residential districts.
Action Item #33 Encourage existing Industrial, Commercial and Institutional (ICI) building owners and mandate new buildings to install solar PV systems through programming and bylaw.	Install 20 MW of ICI solar capacity by 2030, 200 MW by 2050. Reduce a total of 1,147,000 tonnes CO2 between 2020 and 2050.	Provisions that would allow for the installation of solar panels through building height allowances in all ICI districts.
Action Item #34	Install 20 MW of solar capacity by 2030, 300 MW by 2050. This includes the MW capacity from Dundonald Avenue Solar Farm.	Provide for stand-alone PV systems in applicable districts.

Table 2

Low Emissions Community Plan – Potential Zoning Considerations

Action Item	LEC Target	Potential Zoning Actions
Install new solar PV utility-scale facilities within or adjacent to city boundaries	Reduce a total of 1,626,000 tonnes CO2 between 2020 and 2050.	

2.2.3 City of Saskatoon Green Infrastructure Strategy

In February of 2020, the City of Saskatoon was presented with the Green Infrastructure Strategy (Strategy) as information. The Strategy outlines a vision and actions to create an integrated green network that provides sustainable habitat for people and nature. The implementation plan for the Strategy, "Pathways for an Integrated Green Network (Green Pathways)", was approved by City Council in June 2022. The actions identified within the Strategy that can inform the regulatory framework of the Official Community Plan, Neighbourhood Level Planning Stage, or Zoning Bylaw, are provided below, and were drawn directly from the Green Infrastructure Strategy:

- Action 2: Inspire citizen-drive transformation of the Green Network
  - 2.2: Seek opportunities to incentivize green infrastructure in private and commercial areas.
- Action 3: Increase food production in the Green Network:
  - 3.1 Update policies to improve urban agriculture outcomes and community or regional partnerships.
- Action 4: Invest in the Green Network within the City of Saskatoon
  - 4.1 Improve Green Network planning by updating City work pans, policies, and initiatives to increase green infrastructure across Saskatoon.
- Action 11: Protect, restore, and manage significant natural areas.
  - 11.2: Protect significant natural areas using a variety of available protection tools.
  - 11.5: In partnership with landowners, direct development in a way that helps retain and protect high quality arable land connecting to the regional agricultural network.
- Action 12: Connect and naturalize the Green Network in built-up areas.
  - 12.1: Naturalize parks, storm water infrastructure, and other open space where appropriate.
  - 12.3: Increase the City's use of native species in restoration and naturalization work.
- Action 13: Improve biodiversity and ecosystem health throughout the Green Network.
  - 13.1: Develop dark sky and low noise zones, prioritizing sites to reduce ecological stress.
  - 13.2: Develop and integrate wildlife friendly standards into development, including bird friendly standards in highly built-up areas.
- Action 14: Integrate natural waterbodies and drainage courses into development using green infrastructure.

- 14.1: As the city expands, incorporate wetlands, and natural drainage paths into the storm water network in greenfield development areas.
- 14.2: Identify how green infrastructure can increase the storm system's capacity to respond to intense rain events.
- 14.3: Evaluate opportunities to increase naturalization of existing storm ponds to improve water quality and habitat, while balancing community recreation and other considerations.

- Action 15: Increase the use of Low Impact Development.
  - 15.1: Incorporate Low Impact Development pilots into City projects to show leadership, prioritizing high-pedestrian areas such as BRT corridors and downtown.
  - 15.2: Continue partnering with research institutions and conservation agencies to determine best practices for Low Impact Development.
  - 15.3: Update bylaws and regulations to allow more permeable surfaces.
  - 15.4: Encourage commercial, institutional, and residential installation of Low Impact Development and on-site storm water management through education and incentives.
  - 15.5: Pilot raw water use projects.

2.3 Bylaw 8770 – City of Saskatoon Zoning Bylaw

The City of Saskatoon Zoning Bylaw No. 8770 currently provides a number of regulations that have the potential to help mitigate GHG emissions that stem from future developmental pressures. It is important to note that the City of Saskatoon is located within a region of future climatic suitability as average temperatures begin to rise and the North American settlement patterns begin to display preference for higher latitude regions of the continent. A change in climatic suitability in the region around Saskatoon may cause an influx in migration towards the City. Therefore, it is important for the City to consider regulations that will fulfill both immediate infrastructural pressures from flood hazards and stormwater runoff, as well as developmental pressure caused by population increases.

Zoning can play a role in developing a community that is affordable, livable and functional. It can also encourage a community to make development decisions that directly impact GHG emissions and energy use. The Zoning Bylaw can primarily have an impact on GHG emissions from a Transportation and Stationary Energy use (buildings) perspective. Figure 1 below shows the disbursement of GHG emissions from five broad categories. In 2021, Transportation and Stationary Energy was responsible for 94% of all GHG emissions within the City, with stationary energy accounting for a total 62% of CO2 emissions. Stationary energy refers to use of energy (natural gas, propane and electricity) to heat, cool, and power residential, industrial, commercial, institutional, and municipal buildings.

Given the data presented in Figure 1, below the most significant difference to the reduction in GHG emissions in the City of Saskatoon is going to be through changes to transportation, second to stationary energy use.

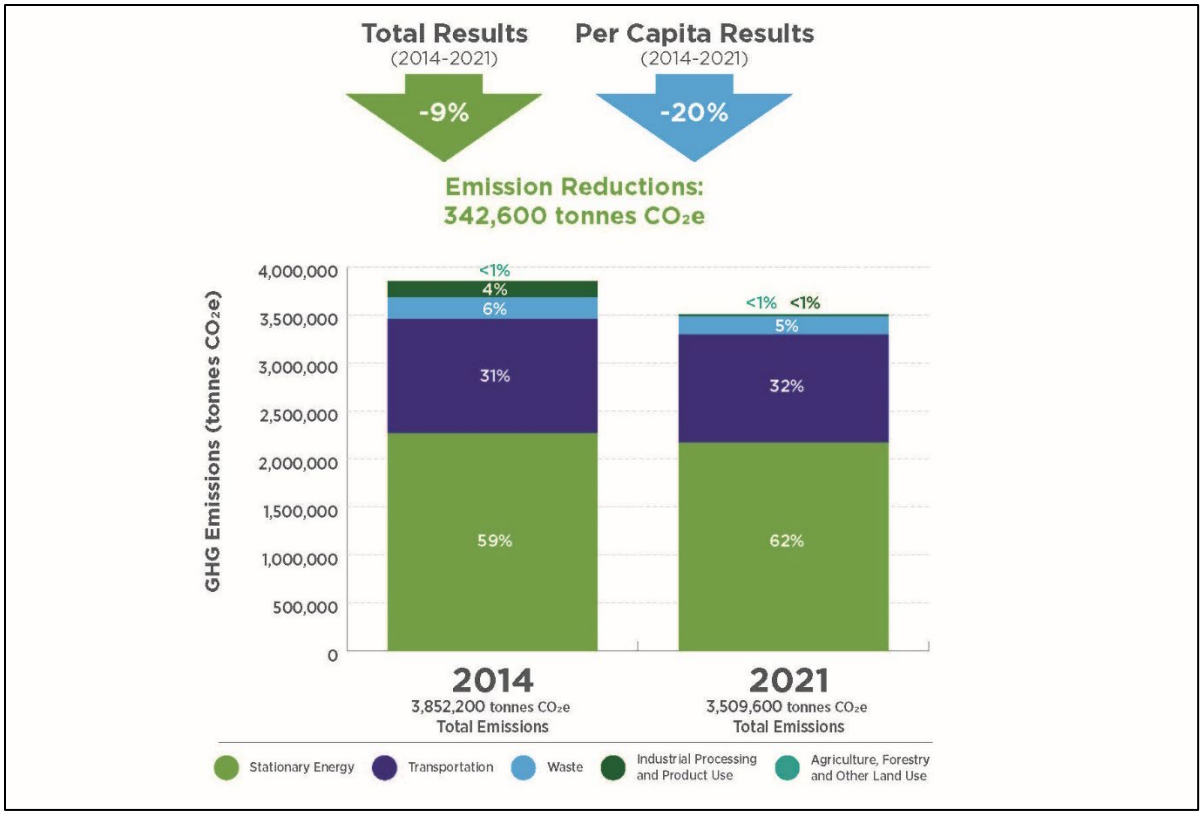

Figure 1. Disbursement of GHG Emissions from Five Categories

(Source: City of Saskatoon - Climate Action Plan Progress Report 2021)

This report provides a summary of data gathered over 2022 and 2023 identifying zoning / ordinance regulations that could be implemented in the City of Saskatoon in the context of achieving a reduction in GHG emissions, particularly as it relates to stationary energy and transportation. Other land uses (e.g. low impact development/landscaping) are also provided.

A study of 24 Zoning Bylaws, Ordinances, and other legislation was conducted to draw upon regulatory best practices to inform the development of environmentally conscious regulations and amendments to Bylaw No. 8770 for the City of Saskatoon. The municipalities involved in the study include those in Canada, the United States, Germany, Japan, and Mexico and were chosen due to having a similar climate to the City of Saskatoon, or for showing unique practices for regulating and enforcing sustainable principles within their respective Zoning Bylaws, Ordinances, other legislative means, or Planning Policies. The municipalities from which information was drawn directly include the following:

- City of Edmonton, AB
- City of Regina, SK
- City of Vancouver, BC
- City of Toronto, ON
- Colorado State, USA
- City of Stuttgart, Germany
- City of Tokyo, Japan

- City of Tacoma, WA
- Town of Ware, Massachusetts
- Town of Amherst, Massachusetts
- City of Coquitlam, BC
- City of Chicago, IL
- Mexico City, Mexico
- City of Kingston, ON
- City of Pittsburgh, PA
- Town of Bon Accord, AB
- Township of Muskoka, ON
- City of Chilliwack, BC
- District of Saanich, BC

The municipal scan also included a review of bylaws from the below municipalities, from which no best practices were drawn:

- City of Winnipeg, MB
- City of Calgary, AB
- City of White Rock, BC
- City of Brandon, MB
- City of Red Deer, AB

It is important to note that some of the topics identified within sections 4 to 9 below are not directly achievable through the Zoning Bylaw alone and may require the development of new policies or amendments to various municipal bylaws and other strategies in order to be successfully implemented.

3 GREEN BUILDINGS

3.1 Definition

Green building (also known as green construction or sustainable building) refers to both a structure and the application of processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from planning to design, construction, operation, maintenance, renovation, and demolition.

According to the World Green Building Council, a 'green' building is also a building that, in its design, construction or operation, reduces or eliminates negative impacts, and can create positive impacts, on the climate and natural environment. Green buildings preserve precious natural resources and improve quality of life.

There are several features which can make a building 'green'. These include:

- Efficient use of energy, water and other resources;
- Use of renewable energy, such as solar energy;
- Pollution and waste reduction measures, and the enabling of re-use and recycling;
- Good indoor environmental air quality;
- Use of materials that are non-toxic, ethical and sustainable;
- Consideration of the environment in design, construction and operation;
- Consideration of the quality of life of occupants in design, construction and operation; and,
- A design that enables adaptation to a changing environment

3.1.1 LEED and BREEAM

Leadership in Energy and Environmental Design (LEED) is a set of rating systems for the design, construction, operation, and maintenance of green buildings which was developed by the U.S. Green Building Council. Other well-known certificate systems that confirm the sustainability of buildings are the British BREEAM (Building Research Establishment Environmental Assessment Method) for buildings and large-scale developments. Both LEED and BREEAM systems are third-party verified.

3.1.2 Passive Housing

Passive Housing is a voluntary standard for energy efficiency in a building, which reduces the building's ecological footprint. It results in ultra-low energy buildings that require little energy for space heating or cooling. The standard is also not confined to residential properties. The design is not an attachment or supplement to architectural design, but a design process that integrates with architectural design. Although it is generally applied to new buildings, it has also been used for refurbishments. Given that many elements of Passive Housing are tied to the energy efficiency of a building itself, not many elements can be identified or encouraged through zoning regulations. The exception would be through provisions which allow for the installation of solar panels on the roof of a property, or exceptions which allow for changes to the building's exterior (e.g. yard projections relating to insulation or mechanical heating/cooling systems).

3.1.3 Net Zero Homes / Net Zero Ready Homes

Net Zero Homes promote energy efficiency in a building therefore reducing a building's ecological footprint. According to the Canadian Home Builder's Association, Net Zero Homes, whether new or renovated, produce as much clean energy as they consume but are also up to 80% more energy efficient than the average new home and use renewable energy systems to produce the remaining energy they need. Every part of the house works together to provide consistent temperatures throughout, prevent drafts, and filter indoor air to reduce dust and allergens. According to the City of Saskatoon Net Zero homes consume on average 60% less energy per year, than the average new home and 78% less energy than homes built 30 years ago.

Not every Net Zero home is the same, but they all include their own sources of renewable energy. Many use solar photovoltaic panels that can typically produce energy for lighting, heating and cooling systems, hot water and appliances. Energy from solar panels can be stored in a battery for use later, or sent into the local electricity distribution system and sold to the local power company.

Net Zero homes also use highly efficient heating and cooling systems, such as air-source and ground-source heat pumps. Air-source heat pumps draw in outside air and warm it during the winter, and pull warm air outside the house during the summer to keep it cool. Ground-source (also known as geothermal) heat pumps use thermal heat from underground to warm a home during the colder seasons, and pump heat outside during the summer.

Net Zero Homes can incorporate the following elements:

- Passive solar building design;
- Continuous insulation;
- Under slab insulation;
- Efficient water mechanical systems;
- Smart devices to adjust temperature and water heating;
- Smart devices to turn off electronics and appliances when not in use;
- Energy STAR lighting and appliances;
- High performance windows and doors;
- Air tightness;
- Proper ventilation;
- Solar Panels;
- Water conservation (low flow toilets, faucets and showerheads), and rain barrels for landscaping/gardening; and,
- Natural vegetation.

Net Zero ready homes Net Zero Ready Homes are built to the exact same efficiency standards as Net Zero Homes. The only difference is that the renewable energy system (i.e., solar panels) have not yet been installed. Net Zero and Net Zero Ready Homes are verified by government-licensed third-party Service Organizations

3.1.4 Solar (Photo-Voltaic) Homes and Solar Ready Homes

Photo-voltaic (PV) panels, or solar panels, are identified in a separate sub-category in the review of green buildings, as they have the potential to significantly reduce reliance on other forms of energy in all types of buildings.

According to the National Renewable Energy Laboratory, based in Colorado, USA, once a structure is built, structural and solar access issues can prevent a solar project from being cost effective, and, in some cases, can make it entirely infeasible. Currently, when developers and solar installers assess buildings as potential solar sites, they sometimes dismiss buildings that are incompatible with a solar installation. While solar could be pursued, the potential solar production is significantly reduced, making payback periods longer and financing less appealing. Homes and commercial buildings built "solar ready" offer a solution to overcoming this installation barrier to renewable energy.

A solar ready building is engineered and designed for solar installation, even if the solar installation does not happen at the time of construction. The solar ready design features, if considered early in the design process, are typically low cost. Attention to building orientation, available roof space, roof type, and other features is key to designing solar ready buildings.

It is important to recognize that solar ready itself does not reduce energy use or replace conventional energy with green energy. Solar ready does not contribute toward carbon emissions reduction until actual solar capacity is installed. Instead, solar ready has the potential to act as a catalyst for future installations and market expansion by reducing balance of system costs at the time of installation. In order to see this benefit, solar ready must become a widespread practice.

If it is not cost-effective or feasible to install solar at the time of construction or retrofit, creating a solar ready structure will save money and time when solar is pursued at a later date. This would eliminate barriers to future solar applications and facilitate market growth. In addition, certifying a building or home as solar ready helps the building owner advertise solar ready status and signifies the potential of the structure to take advantage of solar technologies later in the building's life. Not only does it help raise awareness among property owners who may otherwise not have considered solar from the outset, it also increases a home's re-sale value in the long run.

An easy way to make sure a building is solar ready would be to find out if it has been solar ready certified. This label could be government based like ENERGY STAR or nonprofit backed like LEED. Local jurisdictions can also consider creating a solar ready certification and label. Any building may be able to earn a solar ready certification label if the building meets the established building code and zoning requirements.

3.2 Existing regulations

The City of Saskatoon currently incentivizes green buildings through bonus provisions in the B6 – Downtown Commercial Zoning District for green building development.

Within the B6 – Downtown Commercial Zone, the following density bonus options are provided (see Table 3 below). All bonusing options are height bonuses:

Table 3: Existing Density Bonusing within the B6 – Downtown Commercial Zoning District

Bonus Option	Type of Bonus	Amount
Green Roof. The roof must cover a minimum of 50% of the building footprint at grade level.	Height Bonus	Providing a green roof will permit an additional 10% building height beyond the 76 m maximum (e.g. 76 m x 10% = 7.6 m, or an extra 2 to 2.5 storeys).
A minimum of 5 publicly available parking spots within a structured parking facility	Height Bonus	Providing at least 5 parking spots in structured parking facility will permit an additional 5% of building height (e.g. 76 m x 5% = 3.8 m, or an extra 1 to 1.5 storeys).
Sustainable building practices (LEED and BREEAM)	Height Bonus	Providing a Sustainable Building as defined, permits a range of additional building heights beyond the 76 metre maximum in the B6 Zoning District. For Example: for LEED Buildings (or Equivalent): • Certified 10% (2 to 2.5 storeys) • Silver 15% (3 to 3.5 storeys) • Gold 20% (4 to 5 storeys) • Platinum 25% (6 storeys)

The City of Saskatoon has also adopted an overlay zoning district within the B5B – Broadway Commercial Zone. This overlay district is known as the AC2 – B5B zoning district. While the AC2-B5B architectural controls recommend many sustainable building practices (green roofs, above-grade parking, building lighting), they are guidelines which are considered as part of the overall architectural design of the building.

The City of Saskatoon Zoning Bylaw also includes bonusing provisions related to the provision of enclosed parking for multiple-unit dwellings and for accessible dwelling units.

As noted in Table 3, provisions for solar panels are provided in the B6 – Downtown Commercial Zoning District, through the application of sustainable building standards.

3.3 Comparable Municipalities

3.3.1 City of Vancouver

The City of Vancouver's Greenest City Action Plan (Part 1 and Part 2) has laid out policies and recommendations to be a leader in green building, design and construction. The City has targeted reducing both energy use and Greenhouse Gas Emissions in existing buildings by 20% over 2007 levels and requiring all buildings constructed from 2020 onward to be carbon neutral in operations. Furthermore, the City is targeting zero-emission new building construction by 2030, which will result in additional amendments to the City's building bylaw.

It is important to note that the City of Vancouver is considered a "Charter City", which means the municipality has the authority to amend their building bylaw without having to receive provincial approval.

The most significant change to energy use in buildings and GHG emissions in Vancouver has been the City's focus on establishing and expanding low-carbon neighbourhood energy systems. City policy has shifted the design of new condominium and apartment towers away from electric baseboard heating to water-based heating systems that enable buildings to connect to, and benefit from, neighbourhood systems. While this has resulted in a significant decrease in the use of electricity in these buildings, it has only led to modest reductions to overall building GHG emissions in the short term. Once low-carbon neighbourhood energy systems are established and provide heat to these buildings, significant GHG emission reductions will follow as the use of natural gas for heating is replaced with the use of renewable energy.

The City of Vancouver has also passed a policy indicating that all rezoning applications submitted after May 1, 2017, are now required to meet near zero standards or low GHG emissions targets (City of Vancouver Green Buildings Policy for Rezoning). This requirement can be met by constructing to Passive House, CHBA Net Zero Home, or another accepted standard.

The policy lays out what is required both in terms of the building permit application and the development permit application, in addition to the rezoning application.

The incorporation of green building elements into policy and zoning though two types of buildings that are now accepted as a part of their green building policy for rezoning, including:

(1) Near Zero Emissions Buildings; and,
(2) Low Emissions Green Buildings.

Near Zero Emissions Buildings includes projects designed to Passive House requirements which must prove certification through a Certified Passive House Designer and Passive House Building Certifier once constructed. Low Emissions Green Buildings includes all projects except residential dwellings have to register with the Canadian Green Building Council and must achieve LEED Gold Certification for Building Design + Construction (BD+C), or an equivalent green rating system. Additionally, the City of

Vancouver has recommended updating their building bylaw to require retrofits to existing buildings to further reduce energy use and greenhouse gas emissions.

In other Green Building initiatives, the City of Vancouver has developed Bird Friendly Design Guidelines. The guidelines can be used to encourage the design of buildings and landscaped areas on both private and public property. While there are landscape considerations provided within the Bird Friendly Design Guidelines, there are also a series of building considerations including the following:

- Increasing glass visibility;
- Dampening of glass reflection;
- Reduction in the dangers of attractants and landscape reflections (e.g. ensuring outdoor landscaping is an appropriate distance from glass);
- Reduction in lighting pollution;
- Reduction in open pipes, drains, and ventilation grates.

According to the UBC Bird Friendly Design Guidelines, Bird friendly design strategies can be strategically applied to the most hazardous parts of a building rather than the entire building. This includes the first 4 storeys or up to the highest mature tree height. Building audits can be performed that identify the most hazardous glazing in an existing building helping to target the appropriate windows for retrofit solutions.

3.3.2 State of Colorado, USA

In Colorado, Bill 1149 was enacted in May 2009, requiring builders of single-family homes to offer solar as a standard feature to all prospective homebuyers. Builders are required to give the buyer the option to either have a PV system or a Solar Hot Water system installed on the new home, or to have all the necessary wiring and/or plumbing installed so that the homeowner can easily add a solar system at a later date. The builder must also provide the buyer with a list, maintained by the Governor's Energy Office, of every solar installer in the area so the buyer can obtain expert help in determining if the home's location is suitable for solar and what the estimated cost savings would be.

3.3.3 City of Tacoma

The City of Tacoma has also approached green building standards through density bonusing. Bonusing options include both height bonuses and Floor Area Ratio (FAR) bonuses. FAR can be defined as floor area / total lot area. For example, a four storey building with each floor being 250m^2 has a total floor area of 1,000m^2. On a 1,000m^2 lot, this means a FAR of 1000/1000, which equals 1.0 FAR. FAR does not dictate design but dictates the amount of floor area permitted, which can be built based on the height, lot coverage, and setback regulations, all of which are found in the Zoning Bylaw.

In the City of Tacoma, the bonusing is allocated based on location of development (e.g. planned residential, downtown development, and mixed-use development). The standards are applied as follows:

- Planned Residential – Built Green Stars 4 or LEED Gold Classification for Building Design and Construction: An additional 0.5 times the underlying district density is permitted through the provision of affordable housing units.

- Downtown Development - For each of the following incorporated design standards, the allowable FAR can be increased by 0.5 times (up to a maximum, as prescribed by the development standards):
    - Exterior public space equivalent to at least five percent of the site area with options including trees and other plantings; and solar exposure during the summer;
    - Landscaping covering at least 15% of the surface of the roof and/or the use of vegetated roofs;
    - Retention and renovation of any designated or listed historic structure(s) located on the site.
- Mixed Use District – Height Bonus - Eligible projects increase the standard maximum height limit through the incorporation of one or more public-benefit features, up to the maximum allowed height, including:
    - A height bonus of 10 feet may be granted for integrated systems that use low impact development (LID) techniques such as permeable surfaces, roof rainwater collection systems and bioretention/rain gardens, etc.;
    - A height bonus of 10 feet may be granted for vegetated roofs which cover at least 60% of the building footprint;
    - A height bonus of 10 feet may be granted for solar energy system installation that provides at least 15% of a building's expected annual operating energy;
    - A height bonus of 10 feet may be granted for energy reduction beyond prerequisite standards by at least 20% for new structures and 10% for existing structures or existing portions of structures. Projects shall use an energy cost budget analysis to demonstrate energy savings over current standards;
    - A height bonus of five feet may be granted for projects that include transit stop/station improvements of twice the level of improvements that are required by code;
    - A height bonus of 10 feet may be granted if at least 50% of the floor area is for residential use;
    - A height bonus of 10 feet may be granted for projects that include at least 50% of the required parking within the building footprint (above or below ground).

3.4 Stakeholders

Please refer to the following in Appendix A:

- Subsection A.1 – Saskatoon & Region Homebuilders' Association;
- Subsection A.2 – Saskatchewan Environmental Society;
- Subsection A.3 – Living Sky Rehabilitation;
- Subsection A.4 – Energy Management Task Force; and,
- Subsection A.7 – COS Sustainability Department.

3.5 Recommendations

Based on the municipal scan, it is apparent that the development of "green buildings" are left to the individual developer or homeowner. While a number of municipalities provide information concerning Net Zero, Net Zero Ready, Passive Housing, Solar Ready, and LEED/BREEAM building standards (e.g.

City of Calgary, City of Winnipeg, City of Red Deer), specific site regulations are generally not provided in the zoning bylaw, unless the green initiative is linked to a density bonus. For example, the City of Calgary, City of Winnipeg, and City of Red Deer provide information on their website and include links to green building policies. The exception to this conclusion is the City of Vancouver.

It is recommended that the following be undertaken to encourage and facilitate green buildings within the zoning bylaw:

1. Definition of green building should be added to the zoning bylaw.
2. Provide for exceptions to building height maximums if a building is being retrofitted for solar panel installation.
3. In instances where a building is being constructed or upgraded to a green building standard, that there should be exceptions to the required minimum yard setback requirements to accommodate thicker walls related to energy efficient installations.
4. Include bird friendly structures in the definition of green buildings.
5. Provide a variety of bonusing options including greater gross floor space ratio, site coverage, and building height to encourage the development of green multiple-unit residential and mixed-use buildings. Note, with respect to commercial buildings, bonusing provisions are already in place in the B6 District and the existing zoning requirements in the B5, B5B, and B5C already provide for high density development and further bonusing provisions are not likely to be utilized.
6. Provide more favourable consideration to discretionary use and contract zoning applications which incorporate green building elements, dark sky compliant lighting, and low impact landscaping or xeriscaping including reduced development standards as appropriate.

It is noted that recommendations number 5 above is subject to change, based on stakeholder consultations, in particular with the Saskatoon Home Builders Association.

3.6 Proposed Amendments

3.6.1 Definitions

The following definition should be added to the zoning bylaw:

"Green Building" means a resource-efficient method of construction that produces buildings which have less impact on the environment and cost less to maintain. Green buildings are more energy and resource efficient, use renewable energy, and work with the environment around them. A green building includes building elements such as solar panels; high-efficiency heating, cooling and ventilation systems; high levels of insulation; energy efficient windows; bird friendly structures; low-flow water fixtures and waterless urinals; energy star appliances; stormwater management incorporated into the design; bicycle storage and change facilities to encourage alternative forms of commuting; green roofs; electric vehicle ready parking; and dedicated carpool parking.

3.6.2 Solar Panels

Amend Section 5.11(1) of the zoning bylaw to specifically add solar panels to the list of building features exempted from building height limitations.

3.6.3 Building Setback Requirements

Amend the zoning bylaw to provide that where a building is being constructed or upgraded to a green building standard, required minimum yard setback requirements may be reduced by the specific amount required to accommodate thicker walls related to energy efficient construction.

3.6.4 Green Building Bonusing

Amend the Zoning Bylaw to provide site coverage bonusing for green buildings in the RMTN, RMTN1, RM1, RM2, RM3, RM4, RM5, and M2 Districts.

Amend the zoning bylaw to provide density (gross floor space ratio) bonusing for green buildings in the RM2, RM3, RM4, RM5, M2, M3 and M4 Districts.

Amend the zoning bylaw to provide height bonusing for green buildings in the RM3, RM4, M2 and M3 Districts.

NOTE: Specific bonusing provisions for green buildings have not been addressed as part of this review. City staff, who specialize in the administration of the zoning bylaw, are in the best position to determine appropriate bonusing amounts considering the impacts of these zoning provisions on the purpose and intent of these requirements and in considering the impact of other bonusing provisions such as the provision of enclosed parking for multiple-unit dwellings and for accessible dwelling units.

3.6.5 Discretionary Use and Contract Zoning Considerations

Amend the zoning bylaw to include the following provision for contract zoning and discretionary use applications:

“More favourable consideration will be provided to contract zoning and discretionary use applications which incorporate green building elements, dark sky compliant lighting, and low impact landscaping or xeriscaping including reduced development standards as appropriate.”

4 GREEN ROOFS

4.1 Definition

Green Roofs are defined in the City of Saskatoon's zoning bylaw as follows:

"A **green roof** is an engineered roofing system that permits the planting and growth of permanent vegetation on a rooftop."

The Resource Manual for Municipal Policy Makers concerning Green Roofs, as published by the Canadian Mortgage Housing Commission, includes a much more in-depth definition is provided for Green Roofs. The definition is stated as follows:

"A green roof is a conventional flat or sloped roof amended with some or all of the following layers or elements:

- structural support
- vapour control
- thermal insulation
- a waterproofing membrane
- a roof drainage layer
- a root-protection layer
- synthetic planting media
- hardy, drought-resistant plants."

The definition goes further to differentiate between "intensive" and "extensive" green roofs. Extensive green roofs, which have a thin growing medium, are the most typical.

According to the CMHC, **extensive green roofs** use a substrate depth ranging between 5 and 15 cm (1.97 and 5.91 in.) and weigh between 72.6 and 169.4 kg/m2 (160.06 and 373.46 lb./sq. ft.). This shallow planting media (low weight, soil-less) helps minimize costs and the total structural load. These low-weight synthetic planting media, combined with the challenging winds, drought and high-temperature microclimates on an elevated surface, make hardy, low-height, drought-resistant plant species necessary. Comparatively less maintenance is needed to install and maintain an extensive green roof; however, the success of any roof is measured by the survival of the plants. Ongoing plant and substrate research is contributing to green roof success across North America.

Intensive green roofs can be designed for unique and esthetic amenity or recreational space, including public access. Intensive green roofs feature deeper planting media, irrigation systems, complex landscaping features and a broad range of plant species. They can support large plant species such as trees, shrubs, ponds, waterfalls and other decorative features. Engineered roof surfaces that can accept heavier weights support the deeper growing media of intensive green roofs. Intensive green roof retrofits may require roof structure upgrades. They may also cost more for materials, labour, design features and heavy equipment, such as overhead cranes to get materials to the roof.

A third category of green roofs, **semi-intensive green roofs**, are thought of as a hybrid of the two green roof categories. A typical growing medium depth for a semi-intensive green roof is 150 to 200 mm (6 to 8 inches). This system is able to retain more stormwater than an extensive system and provides the potential to host a richer ecology. Though higher in maintenance requirements, this green roof system has the potential for a formal garden effect.

Roof-top gardens are gardens on a building's roof. They involve the installation of planter boxes and are used to grow fruits and vegetables. They do not require the same level of engineering, including load management, and maintenance as green roofs.

4.2 Existing Regulations

Green roofs are defined in the density provisions in Appendix E of the zoning bylaw. The City of Saskatoon currently allows for a height bonus in the B6 Zoning District, in conjunction with the development of a green roof. The green roof must cover 50% of the building footprint at grade level. The height bonusing states that an additional 10% height may be added to a building, not exceeding 7.6 m, or 2 to 2.5 storeys.

4.3 Municipal Comparison

Compulsory green roof installation can ensure that a specific geographic area or urban space roofscape is greened. Regulatory measures can achieve specific and sustainable urban goals such as improvements in air quality, urban heat island effect, stormwater management and amenity space. Regulatory measures can also set minimum properties for the green roof, such as growing medium thickness or types of plants used. This approach has been widely used in Germany.

The following is a regulation from the German municipality of Stuttgart: All buildings with flat and sloping roofs up to an incline of 15 degrees are to be permanently greened with ground-covering plants. Areas of vegetative decline greater than and equal to five m^2 are to be replanted. Roofs with a total area less than 10 m^2 are exempt from this rule, however, must be kept in good state. Growing medium depths must be at least 8 to 10 cm in depth and plants, seeds, or sprouts must be indigenous to the area. Municipalities can also mandate compulsory roof greening for public buildings. Stuttgart sets aside funds every year to "green the roofs" (install green roofs) of public buildings. Tokyo requires at least 20% of a roof to be greened in new developments or extensions to existing developments larger than 1,000 m^2 (10,764 sq, ft.) for private developments and 250 m^2 (2,691 sq. ft.) for public developments. Failure results in a penalty of approximately 200,000 yen ($1,887 CAD).

Green roofs are a recognized technology that can help designers and developers achieve LEED credits. Green roofs may contribute up to 11 LEED building credits by providing stormwater retention, energy savings through shading, heat island reduction by evaporative cooling, acoustical insulation, improved air quality and airflow, water conservation, wildlife habitat and other environmental benefits.

With much of Canada subjected to below-freezing temperatures and snow; snow load, planting depths, plant choices and vegetation performance bring unique challenges to our green roof technology. When

considering green roof technology the current National Building Code demands assessment of structural loading, roof drainage capacity, waterproofing and warranties, wind protection, fire safety, public accessibility and exit planning. However, it does not otherwise regulate the use of green roofs.

The City of Saskatoon regulates the construction of green roofs through the building bylaw, which is based on the National Building Code (NBC). Moving forward, the City will need to be cognizant of any changing building regulations within the NBC related to green roof technology.

In some cities (Charter Cities including Vancouver and Toronto), it may be simpler to adopt new standards through their own bylaws. In these instances, the City can have recommended standards for planting media, depth of media, vegetation cover and maintenance that the applicants must follow.

4.3.1 City of Toronto

The City of Toronto has passed a Green Roof Bylaw. Within the bylaw, the City requires every building or building addition constructed after January 30, 2010, with a gross floor area 2,000 m^2 or greater shall include a green roof with a coverage of available roof space in accordance with the following (see Table 4 below):

Table 4
City of Toronto Green Roof Bylaw Requirements

Gross Floor Area (Size of Building)	Coverage of Available Roof Space (Size of Green Roof)
2,000 to 4,999 square metres	20 percent
5,000 to 9,999 square metres	30 percent
10,000 to 14,999 square metres	40 percent
15,000 to 19,999 square metres	50 percent
20,000 square metres or greater	60 percent

For industrial buildings, or additions thereto, constructed prior to April 29 2012, with a Gross Floor area of 2,000 square metres or greater, the provisions above do not apply, but the building or addition requirements are outlined below:

(1) a Green Roof with a minimum coverage of Available Roof Space (ARS) that is equal to the lesser of 2,000 square metres or 10 % of the ARS of the building or addition; or

(2) a roof that uses Cool Roofing Materials for 100% of the ARS and complies with the stormwater management performance measures required through the Site Plan Approval process, pursuant to Section 114 of the City of Toronto Act, 2006, or where Site Plan Approval is not required, retains or collects for re-use at least the first 5 millimeters from each rainfall or 50 percent of annual rainfall volume falling on the roof through systems that incorporate roof surfaces.

4.3.2 City of Edmonton

The City of Edmonton passed several urban design regulations in 2016. Within the Urban Institutional Zoning District, the Zoning Bylaw states:

> "For all new development and expansions to existing structures of more than 500 m^2, the development shall provide enhancements to improve rooftop aesthetics wherever roofs are visible from adjacent developments. Enhancements may include patios, gardens, green roofs, other amenity areas, architectural treatments, or other measures that in the opinion of the Development Officer serve to enhance rooftop aesthetics."

Within low density residential districts, the area of building coverage developed with a Green Roof is not included in the calculation of impermeable material, which affects drainage requirements. In Edmonton, the private drainage system is the responsibility of residential and commercial property owners.

The City of Edmonton also provides FAR and Height Incentives, based on points earned according to the sustainable development initiatives added to the bylaw. Incentive Level 1 can be achieved by accumulating 15 points, Incentive Level 2 can be achieved by accumulating 30 points and Incentive Level 3 can be achieved by accumulating 50 points. Some points must be accumulated in each of the 8 categories. Green roofs covering 50% of the roof's surface help the developer accumulate 4 points. Submission requirements include a roof plan and landscape plan. FAR's range from 3.5 m to 7.5 m, and height incentives range from 7 m to 150 m.

FAR and Height Incentives are limited to specific areas within the City of Edmonton known as "The Quarters, Downtown", made up of the Civic Quarter, the Heritage Quarter, the McCauley Quarter, and the Fiver Corners Quarter.

4.4 Stakeholder Consultations

Please refer to the following in Appendix A:

- Subsection A.1 – Saskatoon & Region Home Builders' Association
- Subsection A.2 – Saskatchewan Environmental Society;
- Subsection A.4 – Energy Management Task Force;
- Subsection A.6 – Green Roofs; and,
- Subsection A.7 – COS Sustainability Department.

4.5 Recommendations:

It is recognized that the City of Saskatoon has developed guidelines for green roofs within the "Low Impact Development Design Guide". Within this manual it is stated that the designer of the green roof should provide a site-specific operation and maintenance plan detailing what must occur to ensure the success of the green roof. The green roof will require a minimum of monthly inspections during the first few growth seasons. Maintenance will include caring for the plantings until they are established. Initial care will include irrigation, fertilizer, and weeding. Irrigation can be as simple as roof access with a hose or may include a spray or drip irrigation system.

Additional considerations with respect to green roofs, include the following:

(1) In some cases, green roofs require maintenance in perpetuity;

(2) Green roofs are far easier to construct on new structures, as opposed to retrofitting an existing structure, given that there are several structural elements that are required to maintain the weight of a green roof.
(3) Access to the green roof is a consideration, as irrigation is integral to the establishment of the plant species in the beginning.

It is recommended that the following be considered with respect to amending the City's Zoning Bylaw to encourage green roof development:

(1) Green roofs should be included as part of the Green Buildings initiatives contained in Section 3.0.

4.6 Proposed Amendments

Please refer to Section 3.6.

5 LOW IMPACT DEVELOPMENT AND LANDSCAPING

Low Impact Development (LID) generally refers to the management of stormwater runoff, and by virtue of its definition, it is inherently linked to landscaping. As such, these two categories have been combined in this section, below.

5.1 Low Impact Development Definition

According to the City of Saskatoon's Low Impact Development Design Guide, Low Impact Development, or LID "…is a term used in Canada and the United States to describe a land planning and engineering design approach to manage stormwater runoff. It emphasizes on-site features and systems that help to lower runoff quantity, lower peak runoff volumes and flow rates, and improve runoff water quality. LID seeks to improve and maintain natural hydrologic processes on site: absorption, infiltration, evaporation, evapotranspiration, filtration through soils, pollutant uptake by select vegetation, and biodegradation of pollutants by soil microbes."

It is noted that there are several parallels between LID provisions and other forms of green development, including Green Roofs, and Green Buildings. As seen in Sections 3 and 4 of this report, LID practices can be employed in achieving LEED and BREEAM certification.

5.2 Landscaping Definition

Landscaping is defined within the City of Saskatoon Zoning Bylaw as follows:

"**landscaping**" means the provision of horticulture and other related compatible features or materials designed to enhance the visual amenity of a site or to provide a visual screen consisting of any combination of the following elements:

> (i) Soft landscaping consisting of vegetation such as trees, shrubs, vines, hedges, flowers, ornamental grasses, lawn and ground cover;
> (ii) Hard landscaping consisting of non-vegetative materials such as concrete, unit pavers, brick pavers or tile, but does not include rock, gravel, shale, or asphalt. Hard landscaping may include pathways, walkways, non-necessary driveways, non-required parking or other similar hard surfaces that may be in addition to what is required under this Bylaw; and
> (iii) Intensive landscaping means a planting ratio of trees and shrubs per linear metre that is at least 25% greater than the planting ratio otherwise required by this Bylaw."

The City also provides for xeriscaping, bioswales, and rain gardens as alternative means of landscape design standards but the bylaw does not provide definitions for each.

As noted previously, landscaping is inherently linked to Low Impact Development (LID). There are several landscape elements which could be defined within the zoning bylaw which have been pulled from the Low Impact Design Guide, 2016, but for the purposes of this report, they are considered in the

"definitions" section of the review. Each of these elements are identified below and have been pulled directly from the Low Impact Design Guide, 2016.

5.2.1 Xeriscaping

Xeriscaping is the process of landscaping, or gardening, that reduces the need for irrigation.

5.2.2 Permeable Pavement

There are many variations of permeable pavement: porous asphalt, porous concrete, permeable unit pavers, and open grid pavers. Permeable pavements reduce the impermeable area of the development without compromising functionality. These are best suited to low traffic areas such as parking lots or driveways. Proper construction of a permeable pavement surface will consist of four layers: permeable pavement layer, bedding layer of washed stone, reservoir layer of washed uniformly graded aggregate or a matrix of open weave boxes, and a perforated underdrain if required. Proper drainage will ensure that winter does not damage the permeable pavement.

5.2.3 Rain Gardens (Bioretention)

Bioretention (also called a rain garden) is directing surface runoff into a shallow landscaped depression that mimics a forested ecosystem to filter and evapotranspirate excess runoff. Bioretention is best suited to serve impervious drainage areas less than 0.8 hectares (2 acres) in size. A bioretention cell uses a filter of layered sand, soil, and organic material to allow runoff into an underdrain system that connects to the main storm sewer. In some situations, the underdrain and sewer connection can be omitted, but this requires permeable soils capable of infiltrating the runoff in a reasonable amount of time. Rain gardens are a small scale bioretention facility usually installed on an individual residential lot. They can also apply to parks and urban spaces. A bioretention area will appear like a conventional planting bed, but the bioretention bed uses designed, layered soils and carefully selected vegetation to capture and treat rainwater. It is located at a low point in the landscape to capture runoff naturally.

5.2.4 Box Planters

Box planters are rain gardens in a container. They use layers of amended soil and carefully selected plants to filter and retain runoff water. A box planter is a more obvious structure (a box) that may be above ground or sunk into the ground. There are three categories of box planters: contained with outlet only by overflow, flow-through planters with an underdrain outlet, and infiltration planters that drain through deep infiltration. Box planters are often constructed from concrete to help contain roots and protect nearby sidewalks and foundations from root damage. They may be designed to receive runoff from downspouts or sidewalks. Box planters provide biofiltration to improve water quality, and retain some runoff in the planter to be evapotranspirated by the plants, as well as delaying peak flow (Low Impact Design Guide 2016).

5.2.5 Bioswales

Bioswales are swaled drainage courses with gently sloped sides filled with plants, compost, and/or riprap. They are designed to be wide and allow runoff time to infiltrate into the underlying soil. A bioswale will

improve water quality, attenuate peak flows, and contribute positively to both infiltration and evapotranspiration. In some situations, a bioswale may be used in place of an underground storm sewer pipe. A bioswale differs from a simple grassed swale because the constructed soil layers enhance infiltration and storage beyond what the compacted native soil of a grassed swale can absorb.

5.2.6 Structural Soils / Soil Cells

Structural soils are a commonly used medium that's compacted under a pavement system to give structural support, creating only small void spaces for tree roots to grow. It's made up of 80% gap-graded levels (crushed stones) and 20% soil. Since structural soils have fewer minerals and nutrients, urban trees planted in it often suffer from weak roots and restricted growth.

Soil cells, on the other hand, are purpose-designed urban landscape solutions which equip trees with suitable soil conditions that enable them to flourish without causing damage to local infrastructure. Soil cells also provide non-compacted soil volumes and an on-site stormwater management system that protects trees from damage through absorption, evapotranspiration and interception.

The City of Saskatoon provides specifications within the Parks Standard Specifications for soil cells, and not within the zoning bylaw. Although the specifications relate to Silva Cells, there are other viable options (Strata Cells) that can be utilized.

5.3 Existing regulations

According to the Low Impact Development Design Guide, the City of Saskatoon currently employs wet ponds, dry ponds, constructed wetlands, grassed swales, vegetated buffer strips, oil/grit separators, soak-away pits and on-lot ponding areas. There have been occasional installations of bioretention cells.

Section 6 of the City of Saskatoon's Design and Development Manual (2017) addresses the storm water drainage system. Planning and design of LID-Beneficial Management Practices (BMPs) influence the required Storm Water Drainage Plan submission at the neighbourhood concept stage. These facilities need to be included in the storm water model submitted for review.

The Zoning Bylaw currently states the following with respect to general regulations for parking and loading facilities: "Hard surfacing (of parking lots) may include permeable, or porous pavements capable of withstanding expected vehicle loads including porous asphalt, porous concrete, permeable unit pavers and open grid pavers. Permeable pavement is not permitted for gas bars, service stations, public garages, trucking terminals and similar uses with potential ground contamination or in heavy industrial districts."

The City has developed a series of general landscape regulations, as well as specific landscaping regulations within each zoning district, as landscaping is required across the board. It is noted that the City provides for flexible (reduced) landscaping requirements within the B, I, M, and MX districts (within Established Neighbourhoods, C.N. Industrial Area and Airport Business Area), at the discretion of the Development Officer.

Within residential zoning districts (R1, R1A, R1B, R2, and R2A), which are the single family lots in the City of Saskatoon, the zoning bylaw requires that the first 4.5m of the front yard must be developed as a landscaped strip. The City also has specific landscaping requirements for multiple-unit zoning districts.

The City has also developed a "Healthy Yards Program" where a host of information concerning composting, viable plant species, screening guidelines, landscape design ideas, gardening basics, low-water gardening, biodiversity, lawn care, and others are detailed for residential property owners. These topics do not impact the existing regulations provided in the zoning bylaw.

The City has a long-standing "Community Gardens" program which provides residents with the opportunity to become engaged in a healthy recreation activity. This program includes Allotment Gardens, which are operated by the City and rented out to individuals, Community Gardens, which provide opportunities for volunteer and community groups, and Vacant Lot Gardening, which provides opportunities for non-profit community organizations to use vacant City-owned property to grow food.

5.4 Comparable Municipalities

5.4.1 City of Edmonton

The City of Edmonton has developed a series of sustainable development standards on a points-based system for the Quarters Downtown area. The standards are broken down into 8 categories, including:

- Design
- Energy
- Water
- Matter
- Air Quality
- Movement
- Community
- New Innovation

Depending on the location of the development within the Quarters area, the incentives for Level 1 can be achieved by accumulating 15 points, Incentive Level 2 can be achieved by accumulating 30 points and Incentive Level 3 can be achieved by accumulating 50 points. Level 1 results in a FAR of between 3.5 m and 7.5 m and a height bonus of between 23 m (6 storeys) and 50 m (15 storeys). Level 2 results in an increased FAR of between 6 m and 8 m and height bonus between 50m (15 storeys) and 85 m (28 storeys). Level 3 results in an increased FAR between 10 m and 11 m and height bonus between 113 m (33 storeys) and 150 m (45 storeys).

Within the 8 categories, many of the environmental / sustainable initiatives are considered "Low Impact Development" (LID) standards. Although many of the standards are based on the construction of the building itself, as regulated by either the building bylaw or other bylaws/plans/regulations (e.g. water management plans, letters from architects and engineers), the incentives to achieve an increased FAR and height bonus is regulated by the zoning bylaw through a development permit, including:

- Provide for green roofs for at least 50% of roof surfaces. Where feasible, developments should provide gardens or patios on the top of podium level and building rooftops to improve rooftop aesthetics and provide additional amenity space;
- Specify drought resistant and/or native indigenous planting species.
- The design of the project does not exceed 20% of the site area for surface parking;
- Reduced parking on a hard-surfaced lotas follows:
    - For commercial projects, ensure that end of trip facilities are provided e.g. for bicycle commuters, such as change rooms, lockers and secure storage; and,
    - Provide a car-share vehicle with a designated stall for every 50 dwelling units, or provide a stall and have a car-share cooperative supply commuter vehicles.

In addition to the general landscape requirements, and zone-specific landscape requirements, the City of Edmonton also provides incentives for preserving existing trees and shrubs. The zoning bylaw allows for the Development Officer to approve the following:

(1) utilization of an existing deciduous tree (minimum caliper of 100 mm) or coniferous tree (minimum height of 4.0 m) to satisfy the requirements one tree.
(2) Utilization of an existing deciduous tree (minimum caliper of 200 mm) or existing coniferous tree (minimum height of 7.0 m) to satisfy the landscape requirements of two trees.

Preserved shrubs may also be credited towards the landscaping requirements, at the discretion of the Development Officer.

5.4.2 City of Vancouver

The City of Vancouver has developed a series of requirements for each zoning district, but has also developed a number of guidelines, including the following:

(1) Water Wise Landscape Guidelines; and,
(2) Green Renovation Guidelines

Each of these strategies provide a series of guidelines for the City of Vancouver to consider upon reviewing proposed development, but they are not requirements, as prescribed within each zoning district.

5.5 Stakeholder Consultations

Please refer to the following in Appendix A:

- Subsection A.2 – Saskatchewan Environmental Society;
- Subsection A.3 – Living Sky Wildlife Rehabilitation,
- Subsection A.7 – COS Department of Sustainability; and,
- Subsection A.8 – Meewasin Valley Authority.

5.6 Recommendations

LID emphasizes on-site features and systems that help to lower runoff quantity, lower peak runoff volumes and flow rates, and improve runoff water quality. Although consideration can be given to

architectural, engineering, and landscape provisions to enhance LID-style development, the City of Saskatoon manages this largely through the building permit process, and at the neighbourhood design stage.

It is recommended that the City consider amending the zoning bylaw to provide additional incentives for LID-style development. Amendments could include height bonusses and reduced parking requirements for proposed developments that utilize LID techniques such as permeable surfaces, roof rainwater collection systems and bioretention/rain gardens, etc.

In low density residential areas of the City, the amount of impermeable surface area can be regulated to further reduce surface water run off that puts pressure on municipal storm water infrastructure. It is recommended that the City continue to allow bioretention areas, rain gardens, and bioswales as means of landscape development. It is further recommended that box planters be permitted within required setback areas and allow these areas to fulfill the landscaping requirements as outlined in the Zoning Bylaw.

With respect to landscape provisions, the following recommendations are detailed in subsections 5.6.1 to 5.6.3 below.

5.6.1 Turf and Plantings

Turf (both grass and artificial turf) are both allowed as soft landscaping materials within the City's zoning bylaw.

Artificial turf provides zero ecological benefit, as it does not ensure proper drainage, and does not allow for a reduction in GHG emissions. It is recommended that artificial turf be removed from the City's bylaw as an acceptable soft landscape material.

It is recommended that the bylaw be amended to permit alternative forms of landscaping. This would provide the following benefits:

(1) Increases in bio-diversity;
(2) Improved means of stormwater management; and,
(3) Reduced GHG emissions.

It is recommended that the City prescribe a minimum of three different species of trees / shrubs to be planted at any given development. While the zoning bylaw currently requires that plant materials (trees and shrubs) be a species capable of healthy growth in Saskatoon and shall conform to the standards of the Canadian Nursery Trades Association for nursery stock, it is recommended that the minimum type be expended to three. This would lead to resilience against disease and infestation in a monoculture situation. In 2018, approximately 50% of ash trees died due to an infestation.

Currently, the Zoning Bylaw requires plant species to be a certain size caliper to be meet the City's standard. Some species do not come in the size required by the zoning bylaw, which means they cannot be planted (e.g. several fruiting plants do not meet the Zoning Bylaw's minimum caliper size). From a biodiversity perspective, this limits the types of trees and shrubs that are allowed. Additionally, smaller trees catch up in size within a few years. Lastly, there is a known plant-stock shortage in Canada, which

limits availability of trees and shrubs; and the larger size plants will likely be hardest to source. It is recommended that amendments which reduce minimum caliper size be developed, in consultation with the Sustainability Group.

5.6.2 Xeriscaping

Given the nature of xeriscaping, it is recommended that it should be further encouraged, or even required, in certain areas of the city (e.g. industrial areas), as plants utilized in xeriscape projects are drought resistant and require minimal irrigation.

It is noteworthy that the City currently provides for xeriscaping as an alternate means of landscaping within the zoning bylaw provided the landscape plan is endorsed by a registered member of the Saskatchewan Association of Landscape Architects and approved by the Development Officer. For this reason, it is recommended that a definition of xeriscaping be added to the Zoning Bylaw.

The City of Saskatoon is one of very few municipalities that allows for this type of landscaping to fulfill landscape requirements.

5.6.3 Structural Soils and Soil Cells

Neither soil cells nor structural soils are defined within the City's zoning bylaw. Despite being related to landscape provisions, soil cells would be identified on a landscape plan, and the construction specifications are currently provided within the City's "List of Standard Construction Specifications". No zoning amendments would be proposed at this time.

5.7 Proposed Amendments

5.7.1 LID Landscaping

Amend Section 7.5 of the zoning bylaw to specifically encourage the use of Alternative Landscaping Design, notably xeriscaping, and Flexible Landscaping in all industrial districts.

Amend Section 7.5(1)(c) of the zoning bylaw to specifically include box planters as a part of rain garden.

5.7.2 Landscaping in Industrial Districts

Amend Section 7.7.7 (1) of the zoning bylaw to delete provisions for the use of artificial turf as a landscaping option.

5.7.3 Requirements for Planting Materials

Amend Section 7.3(2) of the zoning bylaw to require a minimum of three tree species.

Amend Section 7.3(3) of the zoning bylaw to reduce the minimum caliper for deciduous trees from 45 mm to 35 mm and the minimum height for coniferous trees from 1800 mm to 1200mm.

5.7.4 Definition of Xeriscaping:

The following definition of xeriscaping should be added to the zoning bylaw:
"**Xeriscaping**" means a form of landscaping that utilizes water conserving techniques such as the use of drought-tolerant plants, mulch, and efficient irrigation."

6 ADAPTIVE REUSE AND INFILL DEVELOPMENT

6.1 Definition

The City of Saskatoon defines infill development as "the development of vacant or under-utilized land within established areas". This definition is provided within the City's Official Community Plan (Bylaw 9700).

Adaptive re-use is a process of converting buildings by recycling their usable components for a new use, as well as a method and strategy that can be used to preserve cultural heritage. It is a process of renovating the old or obsolete building while maintaining the historic and cultural heritage and create a new dynamism in line with the spirit and requirements of the times (Zahraa Adil Abdulameer and Sana Sati' Abbas 2020).

While the adaptive reuse of structures is often employed to preserve historic buildings, there are obvious environmental implications, regarding sustainability. Adaptive reuse can help mitigate negative effects of new development and construction relating to GHG emissions. Additionally, much less waste/debris is created, resulting in more sustainable construction.

6.2 Existing regulations

The City of Saskatoon currently utilizes "The Vacant Lot & Adaptive Reuse Incentive Program" as a means of encouraging development on existing vacant or brownfield sites, and the reuse of vacant buildings in established areas of the city, including the City Centre. The term "brownfield" refers to previously developed land that is not currently in use. Brownfield sites may be affected by contamination, but it is not required for a site to be considered a brownfield site.

The existing program provides financial and/or tax-based incentives to owners of eligible properties. Under the Incentive Program, a maximum incentive amount is determined, equivalent to the increment between the existing property taxes (city portion) and the taxes paid upon completion, multiplied by five years. It is noted that there are no zoning implications associated with this incentive program.

Within the Zoning Bylaw, the City provides for infill development in the R2A Zoning District (Low Density Residential Infill District). The intent of this zoning district is to provide for residential development in the form of one and two-unit dwellings, while facilitating certain small-scale conversions and infill developments, as well as related community uses.

The Low Density Multiple Unit Dwelling District (RM1) also provides for residential development in the form of one to four-unit dwellings, while facilitating certain small and medium scale conversions and infill developments, as well as related community uses.

More recently, the City has developed a Corridor Transformation Plan, which is a long-term visionary plan which highlights the opportunities and methods for implementing core initiatives of the Growth Plan to Half a Million people. The Corridor Growth initiative explores ways to encourage growth and

redevelopment along Saskatoon's major transportation corridors in order to reduce outward growth pressures, provide more housing options close to employment areas, and enhance transportation choices throughout the City. Corridor Growth explores opportunities for developing complete communities along major corridors, supported by improved transit services. Within this Plan, it is stated that a long-term infill target of 50% of new growth to be accommodated through strategic infill opportunities (25%), corridor growth (15%) and neighbourhood infill (10%). The study further states that the target of 15% infill growth along the corridors equates to approximately 22,000 new dwelling units.

Although the policy framework for the Corridor Transformation Plan has been completed, implementation is currently under way. One method of implementation is through amendments to the City's Zoning Bylaw. Preparation of new zoning districts for each new corridor land use designation are currently being undertaken. The Plan indicates that there are also a range of tools and incentives that could be implemented to help encourage infill development within the Corridor Growth Area, including:

- Financial Incentives;
- Development Approval Timelines; and,
- Development Rights (e.g. defined bonus provisions).

It is anticipated that any future zoning amendments which are developed to support the Corridor Plan, specifically infill development, would complement the environmental and sustainable zoning initiatives developed as a part of this study.

6.3 Comparable Municipalities

To encourage property owners to bring underutilized or vacant parcels of land back into productive use or to discourage demolition or long-term vacancy of obsolete or underutilized buildings, many Massachusetts municipalities have amended the zoning in these areas to allow a wider array of uses, densities, and dimensional requirements. Some municipalities even renamed these rezoned areas with market-appealing terms to encourage the revitalization of these areas.

In Massachusetts, it has been recognized that a municipality has two zoning options to encourage development or redevelopment.

(1) Amend zoning districts in a designated area to allow for a wider range of uses, higher densities, and reduced setbacks.
(2) Establish an overlay district with by-right or special permit approval for compatible residential, commercial uses, or mixed uses.

In Amherst, Massachusetts, two zoning amendments to the General Business District increased allowable residential density and relaxed the dimensional requirements for mixed use buildings to promote infill development and adaptive re-use of existing buildings.

The Town of Ware, Massachusetts, established an Infill Development Overlay District to encourage development on parcels of land in the downtown area that did not meet minimum dimensional requirements of the Ware Zoning Bylaw. Within the boundaries of the Infill Development Overlay

District, a lot with at least 5,000 square feet (464 m^2) of area and 50 feet (15 m) of frontage could serve as the location for a single-family dwelling, two-family dwelling, or mixed-use development.

Comparatively speaking, the City of Saskatoon currently allows many uses, including higher density residential, commercial, institutional, and mixed-use development, within the B6 – Downton Commercial Zoning District. The City has also adopted an architectural overlay district within the B5B – Architectural Control Overlay Zoning District. The overlay district provides direction regarding the quality of design for built form elements only for existing and vacant sites.

6.4 Stakeholder Consultations

Please refer to the following in Appendix A:

- Subsection A.2 – Saskatchewan Environmental Society;
- Subsection A.3 – Living Sky Wildlife Rehabilitation, and,
- Subsection A.7 – COS Department of Sustainability.

6.5 Recommendations

Adaptive reuse of existing buildings may be an effective strategy for optimizing the operational and commercial performance of built assets. Rejuvenating an existing building must ensure that the finished product will serve the needs of the market, and that it will be within a reasonable price range for a developer to undertake.

There are currently no zoning implications of the Vacant Lot and Adaptive Reuse Incentive Program.

It is recommended that the following changes could be considered with respect to infill / adaptive reuse and vacant lots within the City's zoning bylaw:

(1) It is recommended that the Zoning Bylaw allow for reduced off-street parking requirements to accommodate a green building initiative or adaptive reuse where appropriate.

(2) In residential areas, the City of Saskatoon Zoning Bylaw currently allows for a 1.0 metre eaves overhang in the front yard, in many cases this maximum overhang is not sufficient due to its latitude. Buildings on a south facing lots are required to be built away from the front site line if the builders wish to properly implement a passive solar design. It is recommended that the City enlarge the front yard permitted projection for eaves on south facing lots, or corner sites, which would enable the building to take advantage of passive solar energy without having to sacrifice rear yard space. It is recommended that a similar amendment be made for sites where a substantial un-obstructed building wall faces south, provided the projection does not encroach on the side yard beyond 0.75 m.

6.6 Proposed Amendments

6.6.1 Reduced Off-street Parking Requirements

Amend Section 6.0 of the zoning bylaw be amended by adding a clause which provides that minimum off-street parking requirements which result from a change of use or intensity of use to accommodate the adaptive re-use of an existing building or a green building initiative may be reduced where it can be demonstrated that the parking which will be provided will approximate the parking demand for said use through the provision of on-site and street parking as appropriate.

6.6.2 Eave Provisions for Passive Solar Buildings

Amend Section 5.8(2)(c) of the zoning bylaw to provide that eaves which are part of the design of a passive solar building may project 1.5 metres into any required front yard.

Amend Section 5.8(4)(c) of the zoning bylaw to provide that, in the case of a site where the side yard flanks a street or a registered lane, eaves which are part of a passive solar building may project to the side site line.

7 PARKING STANDARDS

7.1 Background

Parking standards which support environmental / sustainable approaches refers to both the construction / development of parking lots, as well as a review of required parking spaces and/or options for reduction in parking spaces.

Updating the City's parking standards to better manage auto dependency and achieve a better balance between building too much or too little parking ultimately contributes to building a more sustainable and healthy community. The City of Saskatoon could be facing major challenges including a climate emergency; decreasing housing affordability; and increasing demand for mobility. While not sufficient on its own to overcome these challenges, more strategic, thoughtful management of the parking supply will contribute to addressing all of these challenges.

According to the Institute of Transportation and Development Policy (ITDP), a total of 41% of global emissions come from passenger cars alone. Therefore, there is a strong need for more efficient management, pricing, and reduction of on and off-street parking to help de-incentivize driving, mitigate emissions, and reclaim valuable public space.

According to the ITDP “Uneven parking policy has also had a number of implications on equity within cities. Allocating public resources to building free and low-cost parking ultimately shifts the costs onto everyone, so that low-income communities end up having as big of a role in subsidizing infrastructure that tends to benefit wealthier car owners and those able to afford recurring fuel costs. At the same time, public transit systems — whose ridership tends to be composed of lower-income populations — remains perpetually underfunded in many cities. Those that stand to benefit most from the continued expansion of parking infrastructure on streets and in commercial and residential developments are those that are already well-resourced, although all of us end up shouldering the related economic and environmental costs.”

In the past decade, it has become clear that the provision of expansive and low-cost parking serves to induce more driving and unsustainable uses of urban space. Systemic policies that have created so much available parking space has led to built environments that are overall less walkable and cycling-friendly, and less accommodating for key public transit networks.

Specific to the City of Saskatoon, among others, the amount of available surface parking has created an urban transport system that makes driving appear to be the optimal choice for both essential and non-essential trips and has led to a number of negative consequences for the environment, particularly when it comes to rising GHG emissions and worsening air quality. Additionally, existing lots are being utilized for surface parking, which is considered valuable development space in the B6 (Downtown) commercial zone.

7.2 Existing regulations

The City of Saskatoon currently utilizes a time-tiered metered parking system user-pay parking in the several areas for street parking, including the following:

- Downtown from Spadina Crescent to Idylwyld Drive, 19th Street to 25th Street (no parking is provided on 25th Street), and portions of 1st and 2nd Avenues, to 26th Street;
- Broadway and portions of 9th Street, 10th Street, 11th Street, 12th Street and Main Street;
- Riversdale including 20th Street and portions of Avenues A, B, and C, as well as a portion of 19th Street, and Sonnenchen Way and Saunders Place;
- Central Avenue and portions of 109th Street, 110th Street, 111th Street, and 112th Street, to the west of Central Avenue only.

The City does not have off-street parking requirements within the B6 Commercial District.

Specific parking requirement reductions also exist within the City's zoning bylaw, and are captured in sections 7.2.1 and 7.2.2, below. Bicycle parking provisions are provided in Section 7.2.3.

7.2.1 Commercial Districts

In commercial zoning districts, the City has prescribed standards based on proposed land use. However, the City allows for a reduction in the number of parking spaces at one space for 30 m^2 of site area used exclusively for the transit terminal.

In commercial districts, the parking and loading requirements are provided in Section 6.0 of the Zoning Bylaw. Some uses require a certain number of parking/loading spaces based on building floor area. Others uses require a certain number of parking/loading spaces for gross floor area, and other uses have a minimum number of parking/loading spaces for gross leasable floor area.

Parking requirements in other commercial districts, including Direct Control Districts (DCD) differ compared to those provided in Section 6.0 of the Zoning Bylaw. In all Direct Control Districts that consist of big-box oriented commercial development, the parking / loading requirements are the same in DCD-3, DCD-5, and DCD-6. The regulations state that one parking / loading space is required for every 20 m^2 of gross floor area for all permitted and discretionary uses.

7.2.2 High Frequency Transit Corridors

The reduction to the minimum parking requirements for multiple-unit dwellings applies to sites located along the high-frequency transit corridors is provided in the City's zoning bylaw as follows:

> "Where a transit terminal is located on a shopping centre site, the number of required parking spaces for the shopping centre shall be reduced at the rate of one space for every 20 square metres of site used exclusively for the transit terminal."

7.2.3 Bicycle Parking

The City of Saskatoon already provides for bicycle parking by use and zoning district.

7.3 Comparable Municipalities

In recent years, several municipalities have chosen to reduce parking requirements for a variety of reasons, including to encourage public transportation, lessen dependency on single-occupant vehicles, encourage other forms of transportation (bicycle commuting and walking), among others.

7.3.1 City of Chicago

The City of Chicago provides for reduced parking requirements as follows:

- Residential developments in Chicago's Business (B), Commercial (C) and Downtown (D) districts may reduce their off-street parking requirements by up to 50 percent when their location is one-quarter of a mile from a rail station entrance or "bus line corridor roadway segment." The distance may be increased to a half-mile when the location is next to a "pedestrian street" as specifically defined in the ordinance.
- Parking requirements may be reduced by up to 100 percent upon City approval in the B, C, D and Manufacturing (M) districts when developments are zoned for non-residential uses and within a quarter-mile of a railway entrance or bus line corridor roadway segment, with the same half-mile extension applying when the building in question is next to a pedestrian street.

7.3.2 City of Toronto

Housing affordability is a significant challenge in Toronto. The cost of constructing and maintaining associated parking is significant and minimum parking requirements limit the ability of homeowners to avoid those costs.

In a recent parking study, the City of Toronto has recommended a number of changes be made to the zoning bylaw. These proposed changes are provided below:

- Eliminate most minimum parking standards;
- Introduce maximum parking standards where they do not already exist, for most uses;
- Maintain or increase accessible parking requirements;
- Introduce requirements for electric vehicle infrastructure and permissions for charging equipment within required parking space dimensions; and,
- Amend zone-specific regulations related to parking to accommodate the replacement of parking minimums with parking maximums.

7.3.3 Mexico City, Mexico

While climatically very different than the City of Saskatoon, it is worthwhile introducing the parking management strategy in Mexico City. Hailed as the most populous City in North America, this municipality has well-known traffic and parking issues.

In 2017, the Mexico City announced changes in the construction code that would curtail the development of further off-street parking in new developments. This change transformed traditional minimum parking requirements to parking maximums which has helped mitigate rising GHG emissions.

With these recent reforms, real estate developers now have the opportunity to design developments that utilize space for more housing or commercial purposes rather than car storage. As a result, an estimated 11,000-17,000 cars will be removed from Mexico City's roads per year between 2017 and 2030. In addition, any developer who seeks to build parking at certain levels above the maximums would incur additional charges — revenues which the city then funnels towards improving public transit networks. Overall, these changes serve to reduce incentives for driving and, hopefully, enhance infrastructure for more sustainable and equitable transport modes.

7.3.4 City of Coquitlam, BC

In the City of Coquitlam, BC, the zoning bylaw provides for shared parking opportunities in areas adjacent to the Evergreen Line Core and Shoulder Station Areas (areas adjacent to the SkyTrain rapid transit system). In this instance, shared parking spaces are permitted on sites with two or more land uses that share a common off-street parking structure, which could reduce the total parking supply requirements for each of the individual land uses alone. The types of uses available for shared parking spaces are: residential visitor, commercial office, assembly, and civic.

7.4 Stakeholder Consultations

Please refer to the following in Appendix A:

- Subsection A.4 – Energy Management Task Force; and,
- Subsection A.7 – COS Department of Sustainability.

7.5 Recommendations

The City of Saskatoon is looking to densify along the major public transportation corridors. While zoning for higher density development along the proposed BRT network will play a major role in achieving this, thought needs to be put into changes that will allow for an increase in population in the vicinity of minor public transportation corridors in existing neighborhoods. Consideration should also be given to reducing parking requirements in such areas and/or providing for shared parking spaces in areas adjacent to the proposed BRT network.

Given the potential impact of parking for businesses and residents alike, it is recommended that the City of Saskatoon consider the following:

(1) The City of Saskatoon's parking requirements vary significantly, based on either building floor area, gross floor area, and leasable floor area. In addition, as noted above, parking demand along and in the vicinity of BRT routes requires further analysis. In this respect, it is recommended that the City undertake a parking study evaluating minimum parking requirements in all zoning districts to ensure that zoning requirements are consistent with actual parking demand.

(2) Section 4.2(3) of the zoning bylaw provides for the reduction of various development standards, including parking, where two or more community facilities, owned by a non-profit corporation or public authority, are developed in an integrated manner. Provision should also be made to allow for a reduction in the total number of parking spaces, if an application is made to share required parking between two or more uses operating at different peak-usage times. An application to

share parking spaces would need to identify how the spaces would be utilized at different peak times and provide for agreements between landowners as appropriate.

With respect to bicycle parking, the City of Saskatoon amended the zoning bylaw in 2022 to provide for bicycle parking by use and zoning district. No further amendments are recommended at this time.

7.6 Proposed Amendments

7.6.1 Shared Parking Requirements

Amend Section 6.0 of the zoning bylaw to include the following provision for shared parking:

"Where two or more uses are cohesively integrated within one site, or a combination of sites, the Development Officer may reduce the normal development standards related to parking, provided that the overall integrated development is generally compatible with nearby uses and properties in terms of the demonstrated demand for parking. Appropriate agreements shall be required where parking is proposed to be shared on more than one site."

8 ELECTRIC VEHICLE PARKING STANDARDS

8.1 Definition

Electric vehicles (EV) are cars that run off electricity, instead of gasoline. They are powered by rechargeable batteries, which are charged by everyday electricity. Some types of electric vehicles also include a gasoline engine to extend the car's maximum driving range.

Charging stations are used to supply electricity to the car and can be built into someone's home and can be found at certain locations in Saskatoon.

As EV are becoming more commonplace in Canada, changes have been introduced to electric vehicle parking requirements for single-family homes, multi-unit residential homes, commercial buildings, and civic facilities, to support the increased use of such vehicles.

Charging station types are typically distinguished as different “levels” contingent on charging speed. Most often, levels 1 & 2 are allowed in all zones while level 3 stations are restricted to specific zoning district (industrial or highway commercial zoning districts). Charging stations are generally provided as permitted uses, whether the use is considered a principal use or as an accessory use on a site.

According to Natural Resources Canada (NRCAN), “Electric Vehicle Supply Equipment (EVSE) refers to the cables, connectors and other devices that function to safely transfer power and enable the exchange of information between the electric circuit and the vehicle.”

NRCAN also provides definitions for different charging stations, as provided below:

1. Level 1 Charging: defined as a charging station that involves a standard electrical outlet, a 120 volt (V) alternating current (AC) and a standard three-prong household plug. Level 1is the slowest charging type. Almost all EV makes and models come with at least a Level 1 cordset charger as standard equipment. It generally takes between 8 and 30 hours to fully recharge an EV battery, making it most suitable for locations where a vehicle will be parked for long periods of time.
2. Level 2 Charging requires the use of a 240V, AC plug. Depending on the vehicle’s battery size, it can take between 4 and 10 hours to fully recharge, adding between 30 km and 50 km of range per hour. Level 2 charging stations are practical for charging at home, the workplace and in public locations, such as restaurants, parks or parking lots and can also be programmed to charge during off-peak periods.
3. Level 3 Charging Stations / Rapid Charging Stations / Direct Current Fast Charging Stations are charging stations where power is supplied through a 480V direct current (DC) plug. DCFC stations can charge a vehicle in approximately 25 to 30 minutes. The use of a Level 3 station is best suited to driving applications where it is necessary to recharge in a short period of time, such as along major highways.

8.2 Existing Regulations

Bylaw No. 8770 does not currently provide definitions or regulations as it relates to EV charging stations, or associated infrastructure.

8.3 Comparable Municipalities

8.3.1 City of Chilliwack, BC

In the City of Chilliwack, BC, several recent amendments were made to the zoning bylaw to allow for EV charging stations, and associated infrastructure. In addition to the requirements outlined below, definitions have been provided for EVSE.

According to the zoning bylaw, all new residential developments require the installation of Electric Vehicle (EV) Charging Stations. A brief summary of the Zoning Bylaw requirements and the specifications of Level 2 Charging Stations has been provided below.

(1) Single Family homes: All single family homes require a minimum of 1 Level 2 energized outlet (EV Ready)
(2) Townhouses: Each unit must have a minimum of 1 Level 2 energized outlet (EV Ready), but visitor parking spaces do not require EV Charging Stations.
(3) Apartments: Install Level 2 raceway/conduit to all parking spaces (no outlets required) and Level 2 energized outlets to 25% of parking spaces (EV Ready)

8.3.2 District of Saanich, BC

Within the District of Saanich, BC, the municipality has approached EV parking / Minimum Energized Spaces requirements on a percentage basis. “Minimum Energized Spaces” refers to the minimum number of parking spaces for which Energized EV Outlets or EVSE must be provided, expressed as a percentage of the total off-street parking spaces required for the use or as a whole number. The minimum charging level applied to the EV parking spaces is either categorized as Level 2, or Level 2M (Level 2 with energy management enabled). Where Level 2 charging is specified, an energy management system is not permitted.

Energy Management Systems were developed recognizing that most buildings today have insufficient capacity to accommodate the electrical load of uncontrolled EV charging. EVEMS offers opportunities to maximize the capacity of the existing electrical infrastructure by controlling the electric supply to the Electric Vehicle Supply Equipment- EVSE through connecting/disconnecting, increasing/decreasing charge, and load management.

For new development, the City of Saanich generally requires the following:

(1) Lower density residential development: between 1-2 minimum energized spaces per dwelling unit, and Level 2M charging requirements.
(2) Residential development containing 3 or more dwelling units for seniors or low income housing: 1 to 1.5 spaces per dwelling unit, and Level 2M charging requirements.

(3) Accessory residential units in buildings with commercial users: 1.5 spaces per dwelling unit and Level 2M charging requirements.
(4) Institutional uses: requirements range from 5% of required parking to be dedicated to energized spaces and between 1 and 12 EVSE. Charging stations are either identified as L2 or L2M, depending on the use.
(5) Commercial uses: requirements range from 5% of required parking, between 2 and 6 EVSE, and either L2 or L2M charging. It is noted that some uses do not require EV parking, or EVSE such as convenience stores, drive-thru and fast food restaurants, and liquor stores.

8.3.3 City of Kingston, ON

The City of Kingston provides for both EV parking, but also gives consideration to future potential for electric vehicle parking, or "Electric Vehicle Ready". The definition for such is provided below:

"Electric Vehicle Ready means a parking space designed and constructed to be ready for the future installation of electric vehicle supply equipment through the installation of conduits that enable the installation of electrical components in the future or through other similar means."

According to the City of Kingston's zoning bylaw, electric charging stations are permitted at gas stations. The City also allows for additional parking spaces to be provided in both residential and commercial areas, beyond the minimum requirements if the parking spaces are electric vehicle ready in all parking areas.

8.3.4 City of Regina, SK

The City of Regina recently adopted a new zoning amendment which provides for 'EV Capable Parking'. The bylaw allows for construction to include the following: electrical panel capacity, wiring and/or continuous conduit or raceway (as applicable) from the panel and terminating at a junction box near the designated EV parking space(s), including allocating space for all additional electrical and EV charging infrastructure required to energize the circuit and supply power to future Level 2 EV chargers.

Initially, City Council considered an amendment that would have required new residential developments to pre-wire an energized electrical outlet capable of providing Level 2 EV charging for a minimum of one parking space per dwelling unit. However, following the public hearing, Council authorized the bylaw to be altered to revise the amendment such that new residential development require a "rough-in" specified electrical infrastructure at the time of construction to enable a future owner/occupant to complete the necessary connection.

8.4 Stakeholder Consultations

Please refer to the following in Appendix A:

- Subsection A.1 – Saskatoon & Region Home Builders' Association;
- Subsection A.4 – Energy Management Task Force; and,
- Subsection A.7 – COS Department of Sustainability.

8.5 Recommendations

To provide for electric vehicle parking and charging infrastructure, definitions for charging stations and other infrastructure are required.

It is understood that the City of Saskatoon is currently developing a Community Electric Vehicle Adoption Strategy. While it is essential that the proposed requirements align with the strategy recommendations, the following recommendations are made:

(1) Add a definition for "Electric Vehicle Charging Stations" and "Electrical Vehicle Ready".
(2) Allow for any required parking space to be substituted with an electrical vehicle charging station.
(3) Non-residential land uses, which require 20 or more parking spaces, should have at least one barrier-free electrical vehicle charging station.
(4) For new multiple unit residential developments, it is recommended that an energized electrical outlet capable of providing Level 2 electrical vehicle charging for a minimum of one parking space per two dwelling units be required and that the remaining required parking spaces be electrical vehicle ready.
(5) Ensure that electrical vehicle charging stations are permitted in Commercial and Industrial Districts by specifically including them in the definitions of gas bars and public garages.

8.6 Proposed Amendments

8.6.1 Definitions

The following definitions should be added to the zoning bylaw:

"**Electrical Vehicle Charging Station** means a parking space that is served by battery charging station equipment that has as its primary purpose the transfer of electrical energy to a battery or other energy source device in an electrical vehicle."

"**Electrical Vehicle Ready** means the installation of an electrical panel capable of serving battery charging station equipment and electrical conduit from the electrical panel to future electrical vehicle parking spaces."

Amend the definitions of "Gas Bar" and "Public Garage" to specifically include Electrical Vehicle Charging Stations.

8.6.2 Development Standards for Electrical Vehicle Charging Stations

Amend Section 6.0 of the zoning bylaw to include the following development standards:

"Requirements for Electrical Vehicle Charging Stations

(1) Any space used as an Electrical Vehicle Charging Station shall be considered a parking space provided it complies with all requirements contained herein for parking spaces.

(2) All uses, other than multiple-unit dwellings, which require a minimum of twenty parking spaces, shall provide a minimum of one Electrical Vehicle Parking Station for every ten required parking spaces.

(3) For new multiple-unit dwellings, a minimum of one Level 2 (medium charging) Electrical Vehicle Charging Station shall be provided for every two required parking spaces. The remaining required parking spaces shall be Electrical Vehicle Ready."

9 DARK SKY COMPLIANT LIGHTING

9.1 Definition

According to the International Dark Sky Association, dark sky compliance is defined as outdoor lighting fixture passes the IDA Fixture Seal of Approval program. The IDA is the International Dark-Sky Association and is the voice for light pollution. They educate designers, manufacturers, committees and the public about controlling light pollution.

The IDA's "Fixture Seal of Approval Program" certifies outdoor lighting fixtures as being Dark Sky Friendly, meaning that they minimize glare while reducing light trespass and skyglow. All products approved in the program are required to be fully shielded and to minimize the amount of blue light in the nighttime environment.

In outdoor environments, common light sources include low-pressure sodium ("LPS"), high-pressure sodium ("HPS"), metal halide, and, most recently, light emitting diodes ("LEDs"). LPS is an old technology that is no longer being manufactured. It was favored for use around observatories and some environmentally sensitive areas. Narrow-band amber LEDs emulate the color. HPS is commonly used for street lighting in many cities. Although it still emits an orange-colored light, its coloring is more "true to life" than that of LPS.

In areas where it's necessary to use white light, two common choices are metal halide and LEDs. One of the advantages of LED lighting is that it can be dimmed. Thus, instead of always lighting an empty street or parking lot at full brightness, LEDs can be turned down or off when they aren't needed and then brought back to full brightness as necessary. This feature both saves on energy and reduces light pollution during the night.

It is crucial to control both upward-directed light and the colour of light. Both LED, and metal halide fixtures contain large amounts of blue light in their spectrum. Because blue light brightens the night sky more than any other color of light, it's important to minimize the amount emitted. Exposure to blue light at night has also been shown to harm human health and endanger wildlife. IDA recommends using lighting that has a color temperature of no more than 3000 Kelvins.

Lighting with lower color temperatures has less blue in its spectrum and is referred to as being "warm." Higher color temperature sources of light are rich in blue light. IDA recommends that only warm light sources be used for outdoor lighting. This includes HPS and low-color-temperature LEDs. In some areas, the white light of even a low-color-temperature LED can be a threat to the local nighttime environment. In those cases, narrow-spectrum amber LEDs are the preferred choice.

9.2 Existing Regulations

According to the City of Saskatoon, all roadways (except back alleys) are illuminated, and the City has approximately 35,000 lights. The principal purpose of street lighting is to allow accurate and comfortable visibility at night of possible hazards in sufficient time to allow for appropriate action.

Saskatoon Light and Power is in the process of replacing 17,000 of its current HPS street light fixtures with LED technology in residential neighbourhoods, commercial areas and along major streets. Notably, the City has indicated that they will see an energy savings of 8,878,386 kWh resulting in a reduction of around 5,787 tonnes of greenhouse gas emissions. That is equivalent to removing approximately 1,250 passenger cars off the road. In addition, these new LED streetlights are International Dark-Sky Association compliant. This means that they are 3000 degrees kelvin and do not emit any light above 90 degrees. The optics of the streetlights are designed such that the light is better directed to the roadway, reducing the amount of light trespass.

Bylaw 8770 states the following:

"Outdoor lighting for all developments shall be located and arranged so that no direct rays of light are pointed at nearby properties, or interfere with the safe operation of nearby roadways or traffic control devices."

This bylaw requirement is intended to address land use conflicts.

9.3 Comparable Municipalities

The municipal scan of several zoning bylaws and ordinances did not result in many examples of best-practices as it relates to dark-sky compliant lighting. The two examples provided in this report include bylaws that require certain lighting provisions. It is recognized that the Township of Muskoka, ON represents an example of a bylaw with the strongest requirements, given that the municipality is located in "cottage country" in northern Ontario.

9.3.1 City of Pittsburgh, Pennsylvania

The City of Pittsburgh, Pennsylvania recently passed an ordinance that all newly constructed and renovated City-owned facilities and parks comply with Dark Sky Lighting principles and mandates that all streetlights to be replaced as part of the streetlight retrofit utilize Dark Sky-compliant fixtures.

9.3.2 Town of Bon Accord, AB

In 2015, the Town of Bon Accord, AB and in recognition of the town's actions to protect its dark night skies, the International Dark-Sky Association (IDA) designated Bon Accord as an International Dark Sky Community.

As part of its bid for IDA status, Bon Accord enacted one of the most progressive and comprehensive outdoor lighting policies in Canada. The Light Efficient Community Standards Bylaw 2015-07, based largely on the Model Lighting Ordinance developed jointly between the IDA and the Illuminating Engineering Society of North America, calls for fully shielded light fixtures and limits on the total amount of light allowable on public and private properties. It also establishes a series of lighting "zones" throughout the town where allowable light levels are based on expected ambient light conditions.

The Town brought nearly all its municipally owned lighting into compliance with the bylaw's requirements. Further efforts to support dark skies in Bon Accord involved ramping up messaging to the community about dark skies through local media, and public outreach and in local school curricula.

While not a zoning standard, specifically, the Town was able to change over municipally owned lighting and had the support of residents to install IDA approved lighting on individual properties, through a series of lighting zones.

9.3.3 Township of Muskoka, ON

Within the Township of Muskoka, Ontario, the municipality has passed a separate bylaw to regulate outdoor illumination to ensure responsible lighting, light pollution mitigation and conservation of the dark sky environment.

The bylaw differentiates the requirements for outdoor areas, municipal streets, structural illumination, property illumination, recreational facilities, and new developments (residential, commercial, industrial, and institutional).

With respect to street lighting, the bylaw states the following:
"The Township will install and maintain outdoor street lights that have the following:

a) Uniform light levels within the urban area that do not exceed uniformity ratios recommended by the IESNA and supported by the International Dark Sky Association;
b) Minimum light used for safety that does not exceed the standards contained in a) above; and
c) Full-Cut-Off fixtures"

9.4 Stakeholder Consultations

Please refer to the following in Appendix A:

- Subsection A.3 – Living Sky Wildlife Rehabilitation;
- Subsection A.4 – Energy Management Task Force;
- Subsection A.5 – Saskatchewan Light Pollution Abatement Committee,
- Subsection A.7 – COS Department of Sustainability; and,
- Subsection A.8 – Meewasin Valley Authority.

9.5 Recommendations

Dark Sky lighting is becoming easier to find and should become the required standard for outdoor lighting in all zoning districts where lighting is specified. Currently, Bylaw 8770 provides the following:

"Lighting of Sites: Outdoor lighting for all developments shall be located and arranged so that no direct rays of light are pointed at nearby properties or interfere with the safe operation of nearby roadways or traffic control devices."

It is recommended that the City consider the following:

1. Extend the required use of Dark Sky compliant lighting throughout the City. Priority locations should include buildings adjacent to: natural areas, the river valley, parks, and other green spaces.
2. Include dark sky compliant lighting as part of the Green Buildings initiatives contained in Section 3.0.

9.6 Proposed Amendments

Please refer to Section 3.6.

10 IMPLEMENTATION

10.1 Provincial Legislation

10.1.1 Official Community Plan and Zoning Bylaw

Any proposed amendments to the City's Official Community Plan and Zoning Bylaw will have to adhere to all government legislation (acts and regulations).

The City's Official Community Plan provides a long-term vision for the municipality through the statement of objectives and policies, that guides planning and land use. The zoning bylaw is the primary legal and administrative means of implementing the OCP. As per *The Planning and Development Act, 2007 (The Act),* an OCP must contain statements of policy with respect to:

- sustainable current and future land use and development in the municipality;
- current and future economic development;
- the general provision of public works;
- the management of lands that are subject to natural hazards, including flooding, slumping and slope instability;
- the management of environmentally sensitive lands;
- source water protection;
- the means of implementing the official community plan;
- the co-ordination of land use, future growth patterns and public works with adjacent municipalities;
- the implementation of the intermunicipal development agreement (if applicable);
- the provision of municipal reserve for school purposes, including policies that:
    - ensure the creation of municipal reserve sites suitable in size to be used for school purposes;
    - designate the locations of municipal reserve sites to e used for school purposes; and,
    - provide for the dedication of land or money in-lieu of land through the subdivision process that supports equity for all subdivision applicants and municipalities within the region; and,
- the management of lands that are in proximity to existing or proposed railway operations.

As detailed in this report, several other policy documents (Low Emissions Community Plan, Green Infrastructure Strategy) can also have policies that can be implemented through the application of zoning regulations.

The City of Saskatoon is identified as an "Approving Authority" under *The Act*. The City may alter the zoning bylaw without having to receive approval from the Community Planning Branch at the Ministry of Government Relations, provided the amendment meets the requirements of *The Act*. Amendments to the City's Official Community Plan, however, requires ministerial approval by the Minister of Government Relations.

10.1.2 Saskatchewan Environmental Code

The Saskatchewan Ministry of Environment has moved to the Saskatchewan Environmental Code, which is the regulatory structure that incorporates the required outcomes into regulations but leaves the specific methods on how to achieve that outcome up to the proponent (in this case, the City of Saskatoon).

The Saskatchewan Environmental Code contains 16 chapters referencing five regulations and 28 environmental standards. The activities covered include: impacted sites, forest resource management, water mains, sewage mains, hydrostatic testing, halocarbon control, and industrial source air quality. For City-led developments, the City will be required to apply the Environmental Code. Depending on the proposed development, consideration needs to be given to the following:

- Land Management and Protection;
- Water Management and Protection; and,
- Air Management and Protection.

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APPENDIX A – STAKEHOLDER CONSULTATIONS

STAKEHOLDER CONSULTATIONS

Consultations with a number of interest groups were undertaken by Crosby Hanna & Associates throughout the months of February and March 2023. The following individuals/groups were presented with a summary report of the findings in advance of the meetings and were asked to provide input on the following topics:

- Green Buildings (LEED, BREAM, Passive Housing);
- Green Roofs/Roof Top Gardens;
- Low Impact Development;
- Adaptive Reuse and Infill Development;
- Landscape Regulations;
- Parking Standards;
- Electric Vehicle Parking Standards;
- Dark-Sky Compliant Lighting; and,
- Grey Water Re-Use.

The topic of grey water re-use was eliminated from consideration, following a request by City Administration in March, 2023.

Feedback was gathered from select stakeholders to determine whether the proposed amendments would be favorably received, what type of uptake would be expected from the community, and barriers to successful uptake.

The following interest groups / individuals were consulted:

- Saskatchewan Environmental Society;
- Living Sky Wildlife Rehabilitation;
- Energy Management Task Force;
- Saskatchewan Light Pollution Abatement Committee;
- Higher Groundwork - Green Roofs;
- Meewasin Valley Authority;
- Sustainability Department – City of Saskatoon; and,
- Saskatoon & Region Home Builders' Association.

Additional interest groups were provided with the summary report, but did not provide a response, including:

- Saskatchewan Architectural Association (SAA);
- North East Swale Watchers; and,
- North Saskatoon Business Association;

Meetings were undertaken both virtually and in-person, depending on the preference of the interest groups. Some comments were received in written form following the meetings, and some were provided verbally.

A.1 Saskatoon and Area Homebuilders Association

From a broader association perspective, our primary concern is that the potential impact on affordability be considered and heavily weighted within any proposed recommendations/changes. Some other comments include:

- City Planning and Development Department should word these bonuses as trade-offs and not bonus incentives;
- Regarding Green Roofs/Roof Top Gardens - prior to recommending green roofs, additional research should be done on Cities who have adopted this initiative and at what state they are currently are. E.g. most green roofs in downtown Vancouver were left unmaintained, weeded and dry;
- Regarding Electric Vehicle Parking Standards - the minimum number of charging outlets on multi-unit dwellings recommended seem to be a bit excessive at 1 parking space per dwelling unit.

A.2 Saskatchewan Environmental Society

March 1, 2023
Representative: Bert Weichel

The following verbal feedback was provided by Bert Weichel, Board Member of the Saskatchewan Environmental Society:

- Permit urban agriculture in appropriate areas to allow for edible landscaping.
- Investigate the potential to create a solar co-op. The SES Solar Co-op owns and operates solar energy installations that any Saskatchewan resident can invest in.
- Allow for free standing solar arrays in residential zoning districts and investigate whether they can be community owned.
- Solar panels are far more cost effective compared to green roofs.
- Investigate opportunities for grey water re-use, including in community gardens.
- Investigate opportunities for to develop sheltered parking with solar panels.

A.3 Living Sky Wildlife Rehabilitation

February 3, 2023
Representative: Jan Shadick

The following verbal feedback was provided by Jan Shadick, Executive Director of Living Sky Wildlife Rehabilitation:

- Windows are the biggest threat to songbirds.
- The first five storeys of a building are the highest risk to birds.

- The Canadian Standards Association (CSA) developed bird friendly building guidelines that should be followed (Bird-Friendly Building Design Standards - https://birdsafe.ca/design-standards/).
- FLAP – an organization out of Toronto provides the best-case scenario for bird friendly building guidelines.
- Birds migrate at night, therefore light pollution is a concern.
- During the day, the reflectivity of windows is a concern, particularly corner windows.
- Bird-friendly glass (walker glass) that reduces reflectivity should be utilized wherever possible.
- The City should advertise housing that is green and bird friendly.
- Dark-sky compliant lighting throughout the City should be utilized, although it is easier to implement in newer neighbourhoods.
- Question as to whether solar panels could be incentivized on roofs.

A.4 Energy Management Task Force

March 1, 2023
Representatives: Martin Boucher, Angie Bugg (Chair)

The following verbal feedback was provided by Board Members of the Energy Management Task Force:

- Changes to allow for R40 insulation (18 inch walls) are needed.
- Consider allowing solar panels on the building and possibly fences.
- In some areas, shading from adjacent neighbour trees prevents solar panels from being effective.
- Industrial areas have a significant number of roofs that could benefit from solar panels.
- For industrial buildings, roof supports should automatically be built in to allow for solar panels and snow load.
- Allow for small wind turbines in industrial areas.
- Transit-oriented development incentives need to be considered beyond parking (e.g. further reductions in parking requirements along BRT routes).
- Elements that reduce sprawl will make the biggest difference, including the reduction or removal of minimum parking requirements.
- Development and construction of parking is costly.
- Investigate housing and car-share coops.
- Provide for EV enabled parking and reduce overall parking requirements.
- Provide bike locker boxes.
- Provide for rentable electric vehicles.
- Rain water collection
- Provide for grey-water re-use and run sanitary sewer at off-peak hours.

A.5 Saskatchewan Light Pollution Abatement Committee

March 8, 2023
Representative: Rick Huziak

Written feedback was received by Rick Huziak on behalf of the Light Pollution Abatement Committee. It is attached at the end of this document. High-level points include the following:

- Even though the Dark-sky Policy was passed by Council in 2005 it has never even written down as a comprehensive policy. Each City department uses the term "dark-sky compliant" though each department has their own version of this definition, and some departments feel they are exempt. Likely the most "compliant" to the principle are Saskatoon Light & Power and the Parks division.
- (The bylaw) states the absolute minimum that a dark-sky policy can without being blank. That direct rays are not pointed at nearby properties provides very poor guidance, is a poor guide for any type of planning or design and is basically unenforceable since it is open to very large interpretation. It really does not categorize all for the different "types" of light pollution nuisance, or does it provide any mitigation guidance.
- It also does not recognize the importance of a 24-hour natural day-night cycle for the preservation of the health of the natural environment for humans, animals, and plants. To maintain maximum biodiversity and the least disruption to the environment, control of excessive lighting is important.
- Light Pollution is the light that is wasted by shining in directions that does no useful work, usually upward (causing sky glow and energy waste) or sideways (causing glare).
- Light that does useful work is not regarded as light pollution, though lights that are too bright for the task are usually included as light pollution since over-lighting generally reflected light pollution and is almost always too bright for natural and naturalized environments.
- ALL light pollution is waste and thus can be conserved with simple measures – if we truly care to do so.
- Dark-sky compliance is defined as lighting that does not cause light pollution. From an environmental standpoint, (direct) lighting that does actual work must be of appropriate brightness (generally much dimmer than "usual" and of appropriate correlated color temperature (CCT) toward the yellow/end of the spectrum. (Much of the details of environmental lighting is probably better entered into the Building Bylaw and other next-tier bylaws.)
- Bylaw 8770 is rarely enforced because the bylaw is weak in specific content (and contains few punitive outcomes for violators.) The Bylaw also contains rigid boundaries between different zones, which does not work for the harder-to-define nuisance-style issues, such as sound, vibration, radiation, dust, and light (the "less tangible" pollutants, which are better-defined as nuisances.) Often, these nuisances cross boundaries due to their nature – their infraction does not stop at a line on the map. So, to be effective, Bylaw 8770 must:
    - define these nuisances across zones/boundaries by allowing for buffer zones to contain them,
    - assure that these nuisances do not have a bias that prefers commerce over environmental and citizens' rights.
    - protect (with some weight,) citizens and the environment from these nuisances in the first place through better definition of light nuisance (and other nuisances) within the bylaw.
    - Provide some recourse for citizens' complaints either though more tangible definitions or allowable levels below the nuisance level.
    - Possible "punitive" actions for non-compliance, such as non-issuance of building permits, or required retrofit of non-conformances.

- Bylaw 8770 should do the following:
    - Should control the intensity and correlated colour temperature (CCT) of general-purpose utility lighting (i.e., streetlighting, parking lot lighting, building perimeter lighting (wall packs) and security lighting.
    - Protect citizens from nuisance lighting.
    - Protect parks, naturalized areas (parks), natural area (swales) and waterway environments from bad lighting design that disrupts wildlife and the general environment.
    - Reduce energy waste and environmental degradation from decorative lighting both in quantity and duration, such as limiting seasonal lighting, turning decorations off between 10 pm (depending on area or zone) and 6 am
    - Put severe limitations on lighting adjacent to or within viewing distance of natural areas though imposing buffer or keep-out zones around sensitive areas.
    - Eliminate light clutter (such as within Isinger Park which has 126 streetlights within a two city block area which wastes power and destroys any natural environment, with no one using the park after 6 pm on most days.)
    - Eliminate layering of different lighting schemes (by different authorities) in the same area. (Poorly planned areas may have streetlights, floodlights, decorative lights, etc. all competing within the same local area.
    - Implement a Master Lighting Plan, by adopting different allowable lighting schemes within zoned areas.
    - Assure all residential, industrial, commercial and civic buildings and grounds follow International Dark-sky Association (IDA) lighting rules (or are subject to reviewed lighting plans in lieu of following IDA), no matter what zone they are in, though intensities levels differ within different zones.
    - Assure that architectural lighting does not create light pollution (mostly through decorative uplighting or over-lighting.
    - That trees and micro-forests are protected from string lighting that damage trees and sterilizes the environment for bugs and birds.
    - Assure that the Right to Darkness is guaranteed though proper good-neighbour lighting requirements such as mandatory sharp shielding of light to contain the light fully within the originating property. Dark yards allow flora and fauna to thrive, providing safe environments for animals and plants to live. Default should be darkness since it is not the right of anyone to impose an unwanted nuisance on another as an allowable default.
    - That lights that are not absolutely essential (and most are not) are turned off overnight and when they are not doing useful work.
    - Promote the use of motion-sensed light or other methods of reducing time of use.
    - Minimum lighting levels from industry standards (LEED, IESNA, CaGBC, TAC, TC, etc.) should be adopted over maximum lighting levels in order to save energy and reduce glare and lighting contrast issues.
    - Assure light (and windows) do not cause bird collisions.
    - Control lighting during bird spring and fall migration times.
    - Limit the brightness and duration of advertising lighting by better controlling lit signs and electronic message boards. Signage should be off when businesses are closed.

- Light by itself does not create "security" unless active surveillance (and natural surveillance) is present. Areas devoid of light are safer with respect to crime. Graffiti is reduced with darkness.

A.6 Green Roofs

February 21, 2023
Representative: Michael Molora – Higher Ground

The following verbal feedback was provided by Michael Molora of Higher Ground:

- Green roofs can work well in our climate.
- Changes to the bylaw should be considered so that requirements are more firm in the wording.
- In 2019 a storm-water credit program was available. This should be considered again.
- Case New Holland developed a green roof on a 5,000 ft^2 building.
- The City of Toronto has a green roof building bylaw that has been in force since 2010. The City provides a $5 square foot incentive, which costs roughly $15/square foot.
- The City could build green roofs on civic facilities, especially if it is accessible. People would benefit from being able to see them.
- If the roof is accessible to the public, there should be a bonus to the owner.
- The College of Law roof is not accessible even to maintenance staff.
- Lots of lessons were learned in the development of this roof, as 80-85% of plant life was lost.
- Residential green roofs are better from an ownership and maintenance perspective, compared to commercial and big box development.
- Developers need less red tape in getting permits for green roofs (e.g. move them to the top of the permitting pile).
- Need engineers to consider other formulas to equate the effect of green roofs on runoff.
- The Low Impact Development (LID) guidelines are out of date.
- Green roofs help reduce the ambient temperature of the roofs themselves.
- Urban agriculture should be permitted on brownfield development sites, particularly if there are containers on top of the soil.
- Grey water re-use is not recommended in the LID guidelines, but green roofs could re-use grey water.

A.7 Sustainability Department, City of Saskatoon

March 7, 2023
Representative: Shannon Dyck

The following written feedback was provided by Shannon Dyck, Sustainability Department, City of Saskatoon:

- Green Buildings:

  - Consider floor space exclusions from property taxes for exterior wall thickness; Suggest property taxes should be based on interior floor area, rather than building footprint. Currently, adding more insulation may lead to higher property taxes.
  - The intention of floor space exclusions is to (a) facilitate better thermal performance (i.e. higher insulation value) by constructing thicker walls, (b) remove the disincentive of higher property taxes or loss of usable floor area to construct thicker walls, and (c) repair and replace walls on buildings which have been subject to leaks or damage.
  - Review idea of allowing some right to solar access.
  - Review idea that panels are NOT included in the building height.
- Green Roofs:
  - Should an expanded footprint be allowed, in case the structural elements to support the weight of a green roof or roof top garden increase the wall thickness?
  - Should increased balcony area, eaves, overhangs, or similar be allowed so there is an expanded area for the green roof or roof top garden?
  - Explore the suitability of the rooftops and feasibility for Biosolar technology- Green roof and Solar.
  - Review more/higher incentives for neighbourhoods/areas (especially infill) with stormwater issues/difficulties. Green Roofs delay the peak runoff.
  - Could reduce/remove the annual stormwater charge as incentive?
  - Agree with increasing incentives for green roofs. Consider increased incentives in areas with low green space and high heat-island effect. Supports climate resilience and heat response strategy.
  - Where a green roof consists of a roof a top garden, additional safety (railings), water access, and safe access points may be needed. Must ensure that other aspects of bylaw would not inhibit features that would make roof top production practically feasible.
  - Bird collision prevention on large glass windows.
- LID and Landscape Recommendations:
  - Should gravel be considered a permeable surface option in some cases?
  - "recommended that artificial turf be removed from the City's bylaw as an acceptable soft landscape material." - 100% agreed.
  - "recommended that the bylaw be amended to prescribe maximum amounts of turf as a form of landscaping" - Agreed, but also consider:
    - (a) a maximum amount of hard surfacing within the landscape footprint; and
    - (b) a maximum amount of artificial turf to disincentivize this material.
  - "recommended that the City prescribe a minimum of three different species of trees / shrubs to be planted at any given development." - Also agreed. This would help the City achieve its goal of diversifying its canopy cover (as mentioned in the City of Saskatoon's Pathway to a Sustainable Urban Forest: Implementation Plan - 2022).
  - Artificial turf: agreed. Artificial turf contributes to heat island effect, rather than providing cooling function of green space.
  - Perhaps revisit the size / caliper requirements of trees and shrubs as specified in the Zoning Bylaw. Some species do not come in the size required by the zoning bylaw, which means they cannot be planted (e.g. several fruiting plants do not meet the Zoning Bylaw's minimum caliper size). From a biodiversity perspective, we do not want to

unintentionally be limiting the types of trees and shrubs we will allow. Plus, smaller trees catch up in size within a few years. Also, there is a known plant-stock shortage in Canada, which limits availability of trees and shrubs; and the larger size plants will likely be hardest to source.

- Consider allowing a developer to meet the tree planting requirements by planting on other locations on their property, not just along the frontage and sides of the property. There are sometimes limitations in terms of space to plant trees and shrubs along the front or side, so perhaps it would be acceptable from a canopy cover stand point to allow the tree planting requirements in the other landscape areas.
- Impermeable surfaces, including other surface water management in setback areas: agreed. Required for climate resilience, climate projections indicate increased frequency and intensity of heavy precipitation events, increased risk of flooding.
- Allow greenhouse structures in yards in order to produce food.
- Agreed that xeriscaping should be encouraged.
- I would caution against saying xeriscaping plants "do not require irrigation." All plants require irrigation to become established, and many plants (even drought tolerant ones) will require water in times of high heat and/or low rain fall. Some xeriscaping projects have failed due to lack of irrigation.
- I would also mention that there is a misunderstanding that artificial turf and gravel are suitable xeriscaping techniques, which it's not (just FYI).
- Xeriscaping: agreed. Increasing drought tolerant species increases climate resilience.
- Xeriscaping: as long as this in not just rock mulch which doesn't improve heat island effect. More appropriate term might be "low water" rather than no irrigation. If we could encourage the use of smart irrigation that would be great - including using non-potable water, moisture sensors and automated controls to water at night
- Review more/higher incentives for neighbourhoods/areas (especially infill) with stormwater issues/difficulties. Green Roofs delay the peak runoff.
- Could reduce/remove the annual stormwater charge as incentive?
- Consider Climate Adaptation and Resilience. Wilder, Wetter, Warmer.
- Additional incentives for stormwater could provide a great benefit when reviewing future weather trends. Additional stormwater features, like rain gardens could help City infrastructure.
- Support increasing incentives and requirements for greater on-site stormwater management and infiltration (drainage to permeable surfaces, rain gardens, etc.). Climate projections indicate increased frequency and intensity of heavy precipitation events, increased risk of flooding.
- Consider updating plant species requirement to be capable of healthy growth in projected future climate conditions in Saskatoon (heat, drought tolerance).
- Downtown core: incentive for high albedo paint to reduce heat island impact.
- Agree with encouraging rainwater collection and use to replace use of drinking/potable water where possible.
- Agree with use of water collection systems, swales, etc. in setback areas.

- Adaptive Reuse and Infill Development:

  - Review the Vacant Lot and Adaptive Reuse application form and remove things that are out of the developer's control (and therefore, penalize developers based on the location of the vacant lot) - e.g. "Transit Oriented Development (located within 175m of an existing transit stop)"; "Walkable Community (a minimum Walk Score of 70)"
  - Being close to a transit route should potentially allow a developer to reduce the parking requirements, but should not be part of the Vacant Lot and Adaptive Reuse application.
  - Car shares and bike parking = reduced parking requirements?
  - Exterior insulation alterations and allowances are hugely important for net-zero retrofits and will be required in the future. It is expected that this type of retrofit will be growing and a resolution to this should be determined. Vancouver has dealt with this.
  - South facing overhang: agreed. Residential buildings need to be adapted for greater passive cooling to prepare for increased summer temperatures, longer and more frequent heat waves.
  - Incentivize design for solar access? South facing roof tops, optimize for passive solar etc. (An infill house was recently constructed in North Park and I swear it went in backwards. It would be well designed for passive solar and optimal rooftop PV solar, but the whole thing is backwards....obvious cookie cut design, with no understanding of it's purpose).
  - Exterior Insulation is going to become more popular given the need for increased energy efficiency. Many MURB, commercial buildings will need to look at exterior insulation to achieve net zero targets.
- EV Parking
  - EV charging parking spaces shall use appropriate signages. For example, NO PARKING EXCEPT WHILE CHARGING
  - The ticketing shall be defined, or ticketing bylaw shall be linked for anyone who is using the parking but not charging
  - Number of EV parking shall be defined either in percentage or in absolute numbers based on the overall density of the parking
  - Considering that there could be future plans to expand EVCS, the number of EV Capable Stations should also be defined along with EV ready (level1 with sockets)) or EV installed (level 2 with charge heads) stations
  - EV/ EVC has no less risk of hazards as compared to ICE vehicles. In fact, it further adds the electric hazards to the parking space. Hence, the appropriate electric and fire safety standards should be considered for the parking space.
  - Definition of "EV charging station" to distinguish between stations where charging is freely available, available freely but charges an hourly rate/cost, or limited access to certain users. I expect different criteria for different property types and different charger types will continue to expand.
  - Multi- Unit Residential development EV charging: often electrical outlets are in place for block-heaters. These often cycle power on and off every 10 min when temperatures are below -10 degrees (for energy conservation) instead of providing power 24/7. Specify that provision of powered outlets for charging (Level 1) must be continuous in winter months (as an interim requirement, if requirement of Level 2 charging isn't immediate).
- Dark-Sky Compliant Lighting:

- Define Dark Sky Lighting in the Zoning Bylaw, and extend its required use throughout the City. It is not just the outer edges of the City that have wildlife that are affected. Priority locations also include buildings adjacent to: natural areas, the river valley, parks, and other green spaces. Dark Sky lighting is becoming easier and easier to find and should become the required standard for outdoor lighting (in other words, it should be the rule rather than the exception).
- Should bird friendly window treatments be a requirement for buildings in certain areas or of a certain height?
- Consider warm color temperature for exterior light fixtures (<3500K). Lots of research on how blue light is worse for humans and animals.
- Consider dimming/sensors for parking lot lighting.
- Dark-sky compliant everywhere. Not just limited to shining on other properties and roadways. Light should also not be shining onto natural areas or obstruct the view of users on multi-use pathways.
- Should be considered for all areas of the City.

- General:
  - General comment - there are some knowledge gaps (by the City, developers, builders, consultants, engineers, and professionals) in terms of how to design and install some of these improvements. There are also limited vendors and/or high costs to do some of this work (e.g. to stamp drawings, do design, install, etc.). So Zoning Bylaw improvements on their own may not be sufficient to encourage sustainable development (e.g. if the learning curve to do some of this work outweighs the incentives or if there's time or money required that could impact development timelines or budgets, it's more unlikely to occur).
- Other:
  - Ways to incentivize this work further:
    - Waive permit fees for solar panels, green roofs, and other sustainable construction.
    - Consider tax abatements for sustainable projects.
    - Increase the amount of the Storm Water Incentive, and improve process so more applicants apply.
    - The City should pay landowners (purchase land) if an easement is required on the landowner's property.
    - Allow projects to take their projects to the Appeals Board in advance / design stage, rather than requiring the building permit to fail before they will be considered for an appeal.
    - Increase the value of the Vacant Lot & Adaptive Re -Use Incentive, as it is currently insufficient to meet its objective of attracting significant redevelopment of chronically vacant lands within Saskatoon’s historic neighbourhoods. Another consideration would be to offer both the grant and tax abatement for particularly deserving projects.
    - Cost sharing between the City and developer for infrastructure improvements so these costs are not entirely borne by the developer (e.g. sidewalks, back lanes, fire hydrant improvements).

        - Waive offsite levies and/or allow offsite levies to be paid down incrementally over 5 years.
    - Consider "Inclusionary zoning" to allow diverse types of homes to be built in restrictively zoned districts? e.g. conversion of garages to housing, garden flats, granny flats, rooming houses, or duplex or triplex units in neighbourhoods that previously had restrictions for primarily single-family homes.
    - Any possibilities the zoning bylaw could allow tiny houses or similar? Perhaps even for temporary usage? For some, this is considered a greener option, and for others it may provide a more affordable housing option.
    - Consider adding incentive for reflective or light-coloured rooftop and pavement to reduce solar heating for climate resilience.
    - Grey water - This is an area where we are actively trying to understand the opportunities and barriers, so we might have recommendations by next year. Using the term non-potable water instead would capture a wider spectrum of opportunities - storm water, recycled water, raw water, etc.

A.8 Meewasin Valley Authority

March 10, 2023
Representatives: Mike Velonas, Renny Grilz, Alan Otterbein

The following verbal feedback was provided by MVA representatives:

- Dark sky compliant lighting is important, especially during periods of bird migration.
- There are currently no regulations concerning dark sky compliant lighting or bird friendly standards.
- There are concerns with vertical and horizontal light spill, and brightness of the light colour itself.
- Dark sky compliant lighting should be installed in sensitive areas including the Northeast Swale, and South Saskatchewan River Valley.
- Consideration could also be given to having lights set to a timer where they are off from 12 pm to 5 am, as turning lights off at night helps considerably.
- The MVA has concerns about a number of invasive species, including but not limited to:
    - Eastern Red Cedar;
    - Russian Olive; and,
    - Common and Glossy Buckthorn.
- Consideration should be given to requiring or endorsing native plant material to be installed in landscaped areas.
- Aquatic invasive species regulations and Saskatchewan Weed Control Regulations list invasive plant and aquatic species. Developers should not use these plants.
- Front yard gardens – They should be allowed.