

ZONING BYLAW RENEWAL INITIATIVE

DISCUSSION PAPER



CLIMATE RESILIENCE & ENERGY TRANSITION

Edmonton

HOW TO USE THE DISCUSSION PAPERS

The discussion papers provide an entry point into the world of zoning by breaking it out into understandable parts and allowing Edmontonians to select topics that interest them. They explore various aspects of zoning and the new Zoning Bylaw, and provide the preliminary thinking and direction for the approach it may take. Please refer to the [Overview and Philosophy of the New Zoning Bylaw](#) for more information.

These papers are a **first attempt** at exploring potential directions for new zoning regulations. All Edmontonians – from developers to residents – are encouraged to explore the topics that interest them and provide feedback through the [Engaged Edmonton](#) platform. Information gathered through the discussion paper conversation will be used to help inform how the new Zoning Bylaw will be written.

TOPICS



**PHILOSOPHY OF THE
NEW ZONING BYLAW**



NODES & CORRIDORS



RESIDENTIAL ZONES



**COMMERCIAL &
INDUSTRIAL ZONES**



**AGRICULTURE &
RURAL ZONES**



**OPEN SPACE &
CIVIC SERVICES ZONES**



SPECIAL AREA ZONES



**DIRECT CONTROL
ZONES**



**NOTIFICATIONS &
DEV. OFFICER AUTHORITY**



OVERLAYS



SIGNS



**CLIMATE RESILIENCE &
ENERGY TRANSITION**



ECONOMY

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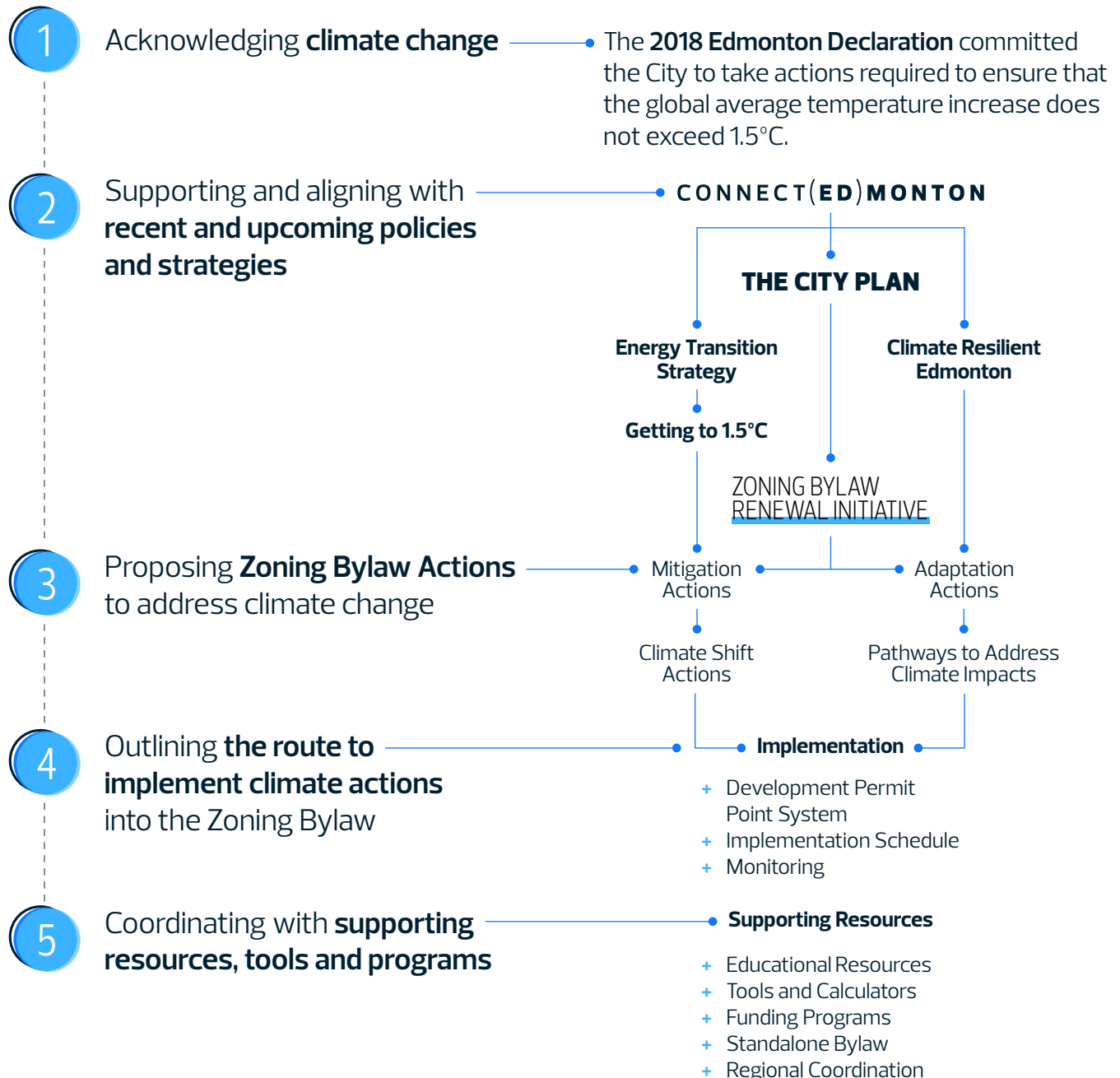
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CONVERSATION STARTER

What can the new Zoning Bylaw do to help our city become **climate-resilient**?

This paper shows that the new Zoning Bylaw can help by



Please provide us feedback at engaged.edmonton.ca

GUIDING QUESTIONS

This discussion paper seeks to explore the following questions:

- + What kind of **climate change challenges** does the City of Edmonton face?
- + What is directing the new Zoning Bylaw towards **incorporating climate actions**?
- + What potential actions can the new Zoning Bylaw implement to help **address energy transition and climate mitigation and adaptation**?
- + What could the process to implement **climate-related zoning regulations** look like over time?
- + How might **climate regulations be prioritized** for implementation?

INTRODUCTION

According to the **Climate Resilient Edmonton, Adaptation Strategy and Action Plan**, **Edmonton has been warming at one of the fastest rates of any city in the world over the last 50 years**. While Edmonton historically has one day a year above +30 degrees Celsius, by as early as the 2040s this could rise to more than 15 days and by the 2070s it could be more than 33 days. Edmonton may also experience temperature highs not previously seen.

Additionally, it is expected that atmospheric conditions due to rising temperatures from greenhouse gas emissions, will cause Edmonton to experience more frequent and intense extreme weather events, such as heavy rainfall or drought. By the 2050s, the city's annual precipitation from rain and snow is expected to increase from 458mm to 498mm. The likelihood of urban flooding events affecting our homes and businesses will almost double by the 2050s.

Edmonton will also be warmer and drier overall. Extreme heat (or heat waves) can have health implications, especially for more vulnerable populations. This shift will also have an ecological impact by replacing today's forested and parkland

ecosystems with more grassland ecosystems. As the ecosystem conditions change and trees become stressed, risks of more invasive species and wildfire will increase. More water may be needed to maintain existing urban trees, which are effective at reducing heat within cities. Different landscaping requirements may be required in a new climate, including the need for more low impact development designs and growing plants that require little to no water.

Infrastructure and buildings for new neighbourhoods approved for construction today could be significantly impacted by climate change and the projected conditions noted for the 2050s. It is therefore important for municipalities

to incorporate climate adaptation measures now in order to prepare for the future, protect these investments, and to minimize the cost of responding to and recovering from climate change effects.

According to the [joint report](#) from the Federation of Canadian Municipalities and the Insurance Bureau of Canada, climate change costs Canadian taxpayers, governments and businesses billions of dollars every year. Economic analysis indicates that climate impacts could cost Edmonton and its residents an additional \$8.0 billion by the 2050s and \$18.2 billion by the 2080s (compared to today). However, Public Safety Canada estimates that every dollar invested in climate change adaptation saves \$3 to \$5 in recovery costs. Additional economic modelling also suggests that residents and businesses could save at least \$2.5 billion in energy costs by investing in low-carbon and emissions reduction solutions.

Edmontonians have an economic, environmental, health, and equity interest in working together to make sure everyone has the ability to address

climate change in their lives. Edmonton and other cities around the world are taking two main approaches to address climate change. The first is centered on reducing greenhouse gas emissions by making changes to increase renewable energy use, improve energy efficiency, and expand low carbon transportation options. The second approach is focused on adapting the city to deal with climate change impacts.

These two approaches form the climate resilience strategy for Edmonton. Although some progress is being made, more work needs to be done. This discussion paper identifies opportunities for the new Zoning Bylaw to help residents and businesses mitigate and adapt to climate change in Edmonton. It will consider some approaches to integrate climate regulations into the Zoning Bylaw and factors that will affect its implementation.

Municipal Government Act / City Of Edmonton Charter

The Municipal Government Act (MGA) establishes the role of the Zoning Bylaw to regulate how buildings and land are used “in any manner the council considers necessary.” Edmonton City Council’s Climate Emergency Declaration, and the land use impacts associated with climate change, provide a rationale to establish zoning regulations that address Edmonton’s climate risks.

The MGA allows the Zoning Bylaw to control the design of subdivisions and what type of buildings are allowed on a site, where they are placed, their size and form, and other elements found on a property. Any proposed actions to address climate adaptation or energy transition through the new Zoning Bylaw should be implemented within this established scope. The Alberta Building Code governs how buildings should be built safely, but its rules take precedence over any similar rule established in the Zoning Bylaw. Any proposed zoning rules for climate action must not regulate within the scope of the Alberta Building Code.

The Province of Alberta recently recognized that Alberta’s two major cities, Calgary and Edmonton, have a shared interest in implementing programs that could improve social outcomes, transportation options, and environmental stewardship. As a result, the Province granted these two cities additional powers through City Charters in 2018 to pass bylaws that could help achieve these objectives. Edmonton now has additional powers that could be used to address climate change adaptation and greenhouse gas emission reduction, the protection of biodiversity and habitat, and the conservation and efficient use of energy. These charter powers would also provide similar legal authority to issue rules and regulations on climate adaptation and energy transition through the new Zoning Bylaw.

GUIDING THE NEW ZONING BYLAW

The proposed actions for how the new Zoning Bylaw can support climate resilience and energy transition **are based on recent strategies and action plans developed by the City** (see [Energy Transition and Greenhouse Gas Emissions Reduction](#) and [Climate Change Mitigation / Adaptation](#)). These climate strategies will likely be completed through a combination of new Zoning Bylaw regulations, other changes to the provincial Safety Codes Act, and complementary support programs and initiatives.

ConnectEdmonton



[ConnectEdmonton](#), the City of Edmonton's strategic plan, identifies Climate Resilience as one of four strategic goals. This goal is further reflected in the directions and intentions in the Draft City Plan. Zoning is one tool that can support and enable climate resilient development. The Zoning Bylaw Renewal Initiative provides an opportunity to integrate climate resilience into our land use planning rules, helping advance one of the four goals of ConnectEdmonton.

ConnectEdmonton Goals:



HEALTHY
CITY



URBAN
PLACES



REGIONAL
PROSPERITY



CLIMATE
RESILIENCE

"Edmonton is a city transitioning to a low-carbon future, has clean air and water and is adapting to a changing climate."

City Plan Intentions and Directions



[The Draft City Plan](#) provides direction on how Edmonton will sustainably grow to a population of 2 million residents. The plan sets ambitious stretch targets associated with the five Big City Moves to ensure the City's actions are achieving tangible changes. Climate targets for the Big City Move *Greener as We Grow* include targets to plant 2 million more trees in Edmonton and to emit less than 135 megatonnes of CO₂ by 2050. Edmonton currently emits 20 megatonnes per year on average. This means the city needs to emit no more than 6.75 years' worth of CO₂ over 30 years.

To achieve this, The Draft City Plan proposes numerous policies that will improve energy efficiency and reduce emissions by constructing more sustainable buildings and changing the way Edmontonians move through the city. These policies will inform decision making to create Zoning Bylaw regulations that support energy transition and climate adaptation (see [Appendix 1](#)).

The new Zoning Bylaw has an opportunity to implement The Draft City Plan policies in the following areas:

Energy-efficient buildings

Through regulations or incentives for new and renovated residential and non-residential buildings to be built or renovated to a zero emissions standard.

Renewable energy systems

By creating opportunities to generate renewable energy on-site.

Efficient land use and transportation

Through better neighbourhood design to help people get to work, access services, and enjoy amenities that are within 15 minutes of where they live using a variety of transportation options.

Natural systems

Protecting, maintaining and enhancing existing natural areas, providing more natural spaces within the city, and improving our urban tree canopy.

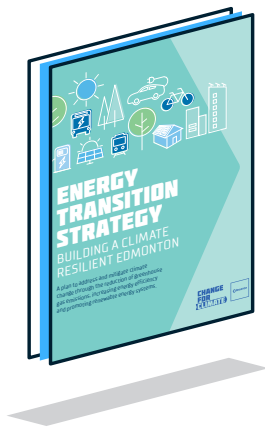
Adaptation to impacts

Designing, regulating, and maintaining green infrastructure and buildings that can withstand and reduce impacts (such as flooding) that are expected to occur or increase due to climate change.

Ongoing support

Continued support for residents, organizations and businesses to transition to a low-carbon future and adapt to climate change impacts.

Energy Transition Strategy



The 2015 [Energy Transition Strategy](#) approved by Council identified three targets to reduce greenhouse gas emissions and energy consumption:

TARGET 1: Community greenhouse gas emissions to be reduced by 35% below 2005 levels by 2035.

TARGET 2: Per capita energy use to be reduced by 25% below 2005 levels by 2035.

TARGET 3: 10% of electricity used in Edmonton to be from renewable sources and produced locally by 2035.

The Energy Transition Strategy also identifies actions that can address climate change by reducing greenhouse gas emissions, increasing energy efficiency, and making renewable energy more available in order to meet these targets. Some of the actions outlined that the new Zoning Bylaw could address include:

- + Encouraging or establishing low-carbon or net-zero energy efficiency standards for new buildings
- + Identifying opportunities for district energy systems
- + Ensuring areas are built at higher densities without blocking access to solar energy
- + Encouraging eco-industrial standards for industrial development

Getting to 1.5°C

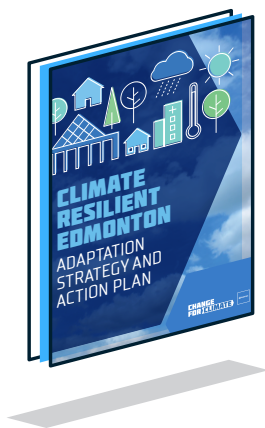


After the Energy Transition Strategy was approved, The United Nations and its member countries developed the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement in 2016. Canada ratified this agreement through Parliament, committing

to work with other governments towards the goal of limiting the average global temperature rise to below 2.0°C and further striving for a maximum increase of 1.5°C. With the 2018 [Edmonton Declaration](#), Edmonton joined 4,500 other cities around the world in a shared commitment to prevent global average temperature increase from exceeding 1.5°C. Edmonton has set a target to emit a maximum of 155 megatonnes of greenhouse gases between 2019 and 2100.

In 2019, the City of Edmonton produced [Getting to 1.5°C](#) in response to the Edmonton Declaration. It proposes actions to reduce greenhouse gas emissions that will need to be faster and more effective than what was originally proposed in the Energy Transition Strategy. This includes needing new buildings to be emissions neutral by 2025 and retrofitting all existing buildings to be emissions neutral by 2050. Further to this, City Council elevated the urgency of addressing climate change by declaring a state of climate emergency in 2019. Work is already underway to provide an updated action plan based on this motion. When completed, this work will further inform the regulatory approach that the new Zoning Bylaw can take to address climate change.

Climate Resilient Edmonton: Adaptation Strategy and Action Plan



The [Climate Resilient Edmonton: Adaptation Strategy and Action Plan](#) was finalized in 2018 and prepared with the support of academic, business, public institution, and government stakeholders. It outlines strategic principles, goals, and actions that the City and its citizens can take to be more resilient to climate impacts. Using evidence-based decision making, the plan identifies five paths to make Edmonton more resilient to changing temperatures, precipitation, weather extremes and ecosystems. The new Zoning Bylaw will use the applicable paths to help determine the appropriate set of rules to implement climate adaptation actions.

GENERAL APPROACH

The current Zoning Bylaw has become a long document, full of complicated and sometimes confusing rules about how land can be used and developed in Edmonton. In creating a new Zoning Bylaw, **Edmonton has the opportunity to rethink how land and development is regulated and to collectively question whether we are regulating the right things.** The new Zoning Bylaw aims to:

1. Align with strategic policies and directions
2. Provide regulations that support better development outcomes
3. Be user friendly for all audiences, with clear, purposeful and enforceable regulations
4. Be efficient, effective and adaptable

As climate-related zoning regulations are developed along with other rules, there is a need to balance different priorities and objectives. The [philosophical approach](#) of the new Zoning Bylaw is to streamline and simplify zones and regulations where possible to allow for flexibility and innovation. However, there may be a greater emphasis on regulations and requirements to ensure certain climate resilience measures are implemented as new development and redevelopment occurs. This means choosing the climate regulations with enough rigour to fulfill the City's climate change commitments now and in the future, while being flexible enough to evolve and respond to changing circumstances.

In determining which climate action to adopt, the City will need to be strategic in its use of regulations and incentives. The following two sections ([Energy Transition and Greenhouse Gas Emissions Reduction](#) and [Climate Change Mitigation / Adaptation](#)) will propose the types of zoning actions that could most effectively contribute to emissions reduction and climate change mitigation/adaptation. These sets of actions will guide the development of the regulations and how they can be adopted. It will be important to use the experiences and expertise of others to create effective rules (see [Implementation](#)). Regulations related to climate resilience and sustainability need to address the

urgency of climate risks. This will require regular monitoring in order to adjust the City’s course of action as necessary.

Finally, the new Zoning Bylaw is one of many tools the City will use to address climate change impacts

and meet emissions reduction targets. Identifying complementary programs and supporting resources outside of the new Zoning Bylaw will ensure that there is positive synergy in the city’s efforts to create an equitable climate resilient city (see [Supporting Resources, Tools and Programs](#)).

ENERGY TRANSITION AND GREENHOUSE GAS EMISSIONS REDUCTION

Using [Getting to 1.5°C](#) as a guide, the following describes a set of actions that could be incorporated into the new Zoning Bylaw to contribute to some of the "Climate Shifts" that are needed for Edmonton to be carbon-neutral by 2050. As the Climate Shift actions continue to evolve and change as a result of ongoing research and modeling directed by the 2019 Climate Emergency Council motion, **[the proposed Zoning Bylaw actions will also be reviewed to ensure they align with the new direction.](#)**

Table 1. Climate Shift Actions and Proposed Zoning Bylaw Actions

Climate Shift Actions and Percent contribution toward becoming carbon-neutral by 2050		Proposed Zoning Bylaw Action to enable:
Actions to absorb or sequester carbon	21%	<ul style="list-style-type: none">+ The preservation of natural areas in a development restrictive zone to allow vegetation to absorb carbon+ Requirements for on-site landscaping, diverse plant material, and tree preservation
Retrofitting commercial and residential pre-2017 buildings to achieve thermal and electrical savings of 50%. Scaling up over time until 100% are complete in 2050	7%	<ul style="list-style-type: none">+ Emission reduction standards and incentives for the change of use or expansion of existing buildings
Scaling up to have 85% of new and existing buildings installed with solar panels by 2040	5%	<ul style="list-style-type: none">+ The layout of new subdivision lots to optimize sun exposure to allow for passive solar heating (via windows) and/or solar energy systems+ Emission reduction standards and incentives for new development to be designed, or ready to be designed, with solar energy systems+ The removal of regulatory barriers for solar energy development, including energy storage

Climate Shift Actions and Percent contribution toward becoming carbon-neutral by 2050	Proposed Zoning Bylaw Action to enable:
Increasing population density by directing population growth to mature and core neighbourhoods	4% <ul style="list-style-type: none"> + The creation of mixed-use zones with higher residential densities in/along nodes and corridors (refer to Nodes and Corridors Discussion Paper) + More business opportunities in residential neighbourhoods + The opportunity to develop housing forms and configurations that increase density in a sensitive manner + The preservation of natural areas by continuing to restrict or limit development in flood risk areas in the North Saskatchewan River Valley and Ravine and Floodplain Protection Overlays + Agricultural zones to limit urban expansion as much as possible for the long-term (see Agriculture and Rural Zones Discussion Paper)
Reducing industry energy use by 75% by 2050	3% <ul style="list-style-type: none"> + The removal of regulatory barriers for solar energy development, including energy storage + Emission reduction standards and incentives for new development + The installation of more highly reflective roofing, cool paving technologies, green walls, landscaping, etc., to reduce energy consumption in developments
Increasing energy efficiency for all new residential buildings incrementally over time to net zero by 2025	3% <ul style="list-style-type: none"> + The development of housing designs that increase energy efficiency through performance standards and incentives + The removal of regulatory barriers for solar energy development, including energy storage + The layout of new subdivision lots to optimize sun exposure to allow for passive solar heating (via windows) and/or solar energy systems
Installing 20 megawatts of ground-mounted solar (and other renewables) per year from 2020 to 2050 on ~5300 acres of land in Edmonton so 600 megawatts installed by 2050	2% <ul style="list-style-type: none"> + The removal of regulatory barriers for solar energy development, including energy storage + Emission reduction standards and incentives for new development to be designed, or ready to be designed, with solar energy systems

CLIMATE CHANGE ADAPTATION

According to the [joint report](#) from the Federation of Canadian Municipalities and the Insurance Bureau of Canada, there are six areas requiring significant investment in mitigation and adaptation, [three of which apply to Edmonton: flood risk, buildings and roads](#). [Climate Resilient Edmonton: Adaptation Strategy and Action Plan](#) identified five “pathways” to address these climate impacts using science-based decision making. The pathways set specific goals and actions to support climate resilient infrastructure and built form. The following proposed Zoning Bylaw actions will help implement the actions laid out in each pathway:

Table 2. Pathways to Address Climate Impacts and Proposed Zoning Bylaw Actions

Pathway 1 – Science and Evidence Based Decisions	
Actions	Proposed Zoning Bylaw Action to enable:
<p>Action #4: The City of Edmonton in partnership with community stakeholders develops and integrates climate adaptation and resilience standards into urban and strategic planning, design, and development approval processes</p> <ul style="list-style-type: none">+ Integrate climate adaptation and resilience into City Plan and Zoning bylaw updates+ Develop planning tools to integrate climate change resilience into planning processes+ Integrate climate resilience into development permitting and approval processes	<ul style="list-style-type: none">+ Implementing any of the proposed Zoning Bylaw actions listed below for each of the pathways will achieve the recommendations set out in Action #4.

Pathway 2 – Preparing for Changing Temperatures	
Actions	Proposed Zoning Bylaw Action to enable:
<p>Action #9: Develop and implement a “Cool Edmonton” program to reduce the impacts of urban heat island effect</p> <p>Action #10: The City of Edmonton in partnership with EPCOR and other stakeholders develops and implements a drought management program</p>	<ul style="list-style-type: none"> + The installation of more highly reflective roofing, cool paving technologies, green walls, landscaping etc. in areas where development is likely to contribute to urban heat island effect + Requirements for on-site landscaping, diverse plant material, and tree preservation + The use of Low Impact Development techniques, techniques, such as rain garden, bioswales, green roofs, and storage tanks to reduce urban heat island and manage drought + The use of performance metrics or regulations with standardized options for Low Impact Development techniques + The use of drought tolerant plant material as part of landscaping requirements where appropriate + The preservation of natural areas in a development restrictive zone

Pathway 3 – Preparing for Changing Precipitation	
Actions	Proposed Zoning Bylaw Action to enable:
<p>Action #12: The City of Edmonton in partnership with the Province of Alberta and other stakeholders researches, develops and implements a river and ravine flooding resilience program</p> <p>Action #13: The City of Edmonton in partnership with EPCOR develops and implements an urban flooding resilience program</p>	<ul style="list-style-type: none"> + The preservation of natural areas by continuing to restrict or limit development in flood risk areas in the North Saskatchewan River Valley and Ravine and Floodplain Protection Overlays + Flood proof design regulations for development in flood prone areas, e.g. no habitable space within basements or minimum floor elevation levels for homes in flood prone areas + The use of Low Impact Development techniques, such as rain gardens, bioswales, green roofs, storage tanks, and permeable paving to reduce stormwater runoff at its source + The use of performance metrics or regulations with standardized options for Low Impact Development techniques



Pathway 4 – Preparing for Changing Weather Extremes	
Actions	Proposed Zoning Bylaw Action to enable:
<p>Action #14: Integrate changing climate extremes into coordinated emergency management programs including preparedness, prevention, response and recovery</p> <p>Action #15: The City of Edmonton identifies and assesses opportunities to increase the resilience of Edmonton's energy systems</p>	<ul style="list-style-type: none"> + The adoption of a wildfire-risk map that identifies where wildfire-risk areas are located in Edmonton in the Zoning Bylaw + The use of wildfire hazard assessments to outline how development would be restricted in specific areas to reduce wildfire risk + The use of guidelines or regulations from Alberta FireSmart to limit the use of flammable exterior building materials, integrating fire resistant roofing on all structures, control the types of vegetation allowed near structures, and outline storage standards for firewood and other combustible material in wildfire-risk areas + The removal of regulatory barriers for solar energy development, including energy storage + Emission reduction standards for new development + The layout of new subdivision lots to optimize sun exposure to allow for passive solar heating (via windows) and/or solar energy systems + Requirements for on-site Electric Vehicle Infrastructure

Pathway 5 – Preparing for Changing Ecosystems	
Actions	Proposed Zoning Bylaw Action to enable:
<p>Action 17: The City of Edmonton develops and implements an ecosystem services based program, including ecological restoration, that supports climate resilience</p> <p>Action 18: The City of Edmonton will research, develop and integrate climate change food resilience and agribusiness programs into Edmonton's Food and Urban Agriculture Strategy</p>	<ul style="list-style-type: none"> + The preservation of natural areas in a development restrictive zone + The use of Low Impact Development techniques, such as rain garden, bioswales, green roofs, storage tanks and permeable paving to reduce demand on city infrastructure and support ecosystem services + The use of performance metrics or regulations with standardized options for Low Impact Development techniques + The use of Low Impact Development techniques, such as rain garden, box planters and raised beds to support urban agriculture + Urban agriculture to be permitted in all non-industrial zones without requiring a permit (see Agriculture and Rural Zones Discussion Paper) + Agricultural zones to limit urban expansion as much as possible for the long-term (see Agriculture and Rural Zones Discussion Paper) + More edible landscapes through landscaping requirements + Requirements for on-site landscaping, diverse plant material, and tree preservation + The use of drought tolerant plant material as part of landscaping requirements where appropriate

IMPLEMENTATION

How climate actions are incorporated into the new Zoning Bylaw will be crucial in determining its success in contributing to the City's energy transition and adaptation goals. **The broad range of proposed actions means that different considerations are needed to adopt these regulations, as discussed below.**

Development Permit Point System

A Development Permit Point System is proposed for the new Zoning Bylaw to enable future development and redevelopment to incorporate different climate measures. This point system would apply to most new developments and redevelopment. Each type of climate action is assigned a specific point value based on a variety of factors such as effectiveness, cost, or complexity. Instead of regulating or mandating that a green roof or solar panels be required for every development, different types of development would be required to achieve a set number of points.

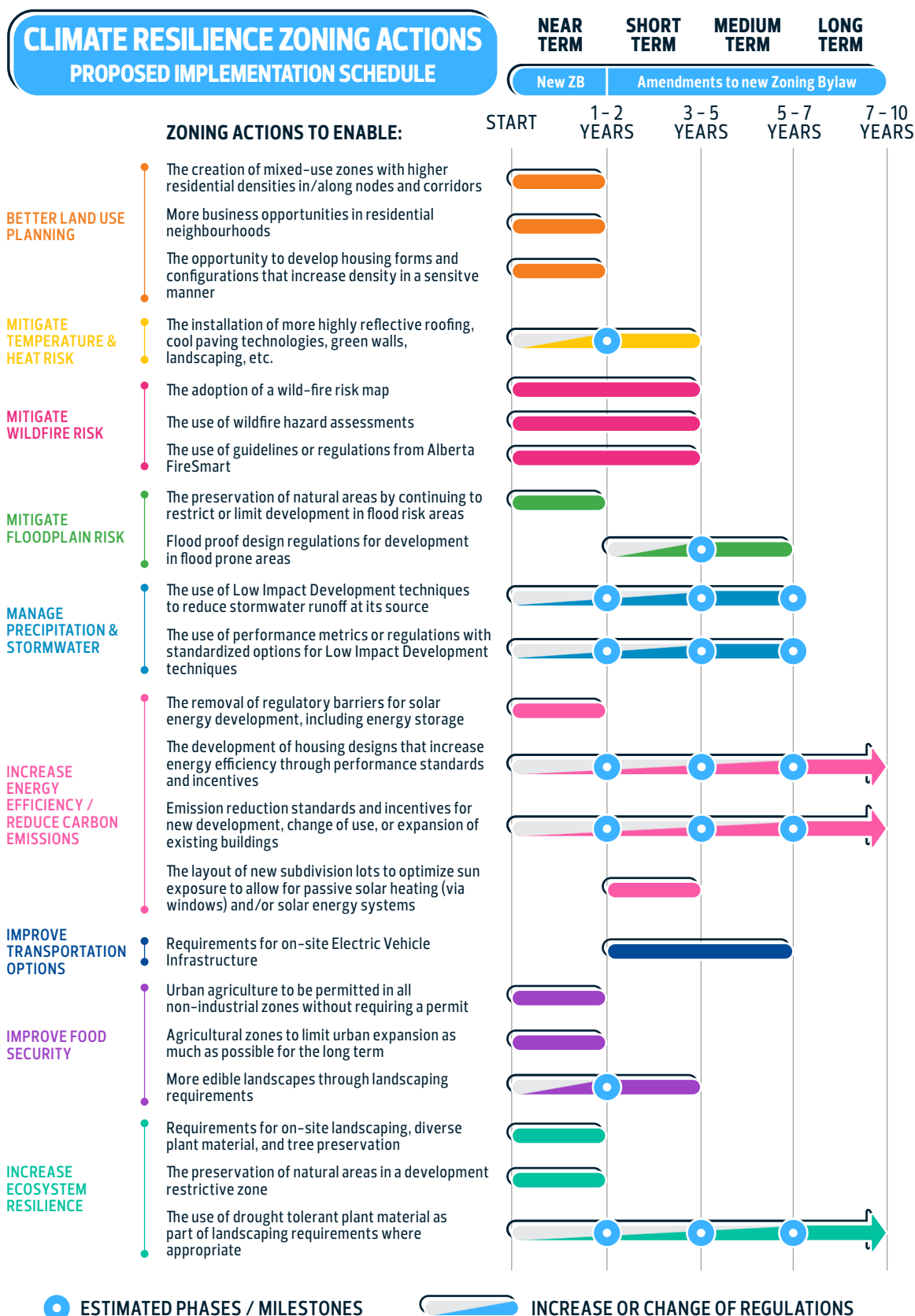
Similar systems have been used in Norfolk, Virginia, and Minneapolis, Minnesota (see [Appendix 2](#)). For example, developments in Minneapolis that apply this standard are required to achieve a total of 10 points in any combination.

The benefit of a point system is its adaptability and flexibility. It provides flexibility to developers in being able to choose the most suitable actions for their development based on their analysis. It provides opportunity for innovation as the regulations could be based on a measurable target or outcome and would not dictate the method or technology to achieve the specific action. The point system allows the City to achieve an efficient and effective mix of incentives and regulations. The point values could also be adjusted as conditions, targets, and priorities change over time. Assigning higher point values to priority actions would ensure that the overall point system aligns with Edmonton's priorities.

Implementation Schedule

While recognizing the urgency to address climate impacts and reduce carbon emissions, Administration is not proposing to introduce all of the proposed actions immediately. **Instead, different actions are proposed to be adopted over time.** A variety of factors were considered to determine the timing for implementation, as outlined in the proposed implementation schedule.

Fig 1. Proposed Implementation Schedule



Note:
Years for each phase are estimates and are intended to align with other work in progress and are subject to change. Specific zoning actions also subject to change as Zoning Bylaw Renewal Initiative progresses.

The following factors will influence the proposed timing of implementing different Zoning Bylaw actions.

Number of Co-benefits

This considers the number of actions from the Energy Transition Strategy and/or the Climate Resilient Edmonton Strategy that a proposed zoning action would contribute towards. The greater the number of co-benefits, the stronger the case that could be made to implement this sooner.

Other Work In Progress

The City of Edmonton and other organizations are currently conducting research into specific climate issues such as wildfire risk and floodplain mapping, and building code updates for emissions neutral buildings, which could have policies or recommendations affecting the new Zoning Bylaw.

The City is also exploring the use of a [pathways approach](#) to implementing climate adaptation measures. This is a type of monitor-and-adapt decision making tool (see [Appendix 3](#) for more details) that takes into account the uncertainty around the timing and size of climate change impacts. A pathways approach will help ensure the City is not locked into decisions that add cost without achieving climate resilience and sustainability benefits due to unanticipated climate change impacts.

It would be premature to introduce zoning regulations prior to completing other work in progress as their outcomes and zoning rules could conflict. Aligning the timing of the new zoning regulations' adoption with the completion of this research would help ensure the research outcomes and recommendations are considered and consistent with any proposed zoning rules.

Level of Climate Risk

The timing and size of the impacts will vary for different climate risks. Risks that have larger impacts and/or are likely to occur sooner would prompt the need to implement zoning regulations with more urgency.

Reimagine – Strategic Response to COVID-19

[Reimagine](#) is the City's strategy to chart Edmonton's future recovery from the current health and economic crisis. It identifies that the

goals and objectives of ConnectEdmonton and The Draft City Plan remain key components for a prosperous and safe Edmonton. It also recognizes that interest in climate change action may decrease or be lower priority within the City, businesses, and households because of real or perceived affordability and funding challenges in our current economic state. This could mean making hard choices and considering difficult tradeoffs between these constraints, Edmonton's climate commitments, and the estimated future economic benefits of taking action now.

The principles of Reimagine – being bold, agile, brave, and smart – can and should be applied as the City works towards an equitable climate future for Edmonton. This means continuing the work to integrate climate resilience into the new Zoning Bylaw, being creative with cost-effective solutions, prioritizing which regulations to adopt based on maximum effectiveness, and being ready and willing to adjust and change quickly.

Other Considerations

Successful adoption of zoning regulations around climate resiliency and sustainability can be inhibited by many factors. This includes a regulation's complexity, the ability to leverage external resources, and industry's existing capacity to develop climate resilient sites on a wide-scale. Staggering the introduction of these regulations would allow communities and the development industry to increase their understanding and adapt their design skills to incorporate climate measures. This will help expand the capacity of businesses to provide climate resilience services at a larger scale.

Given the factors discussed, the implementation schedule identifies actions that the new Zoning Bylaw is likely able to implement in the near term. However, the precise timing to other future actions beyond this timeframe are subject to change based on the uncertainties of a rapidly changing future. A longer time frame for implementation allows the City to adapt to these changing circumstances and priorities in order to tailor the appropriate measures to the future state that is likely to emerge. This a fine balance that still signals the City's long-term commitment to achieve its climate goals by providing everyone with timelines and expectations on when standards would come into effect or become more stringent.

Resources and Training

As part of the adoption of climate regulations into the new Zoning Bylaw, the City will need to determine the resources, staff, and training necessary to review the new climate regulations as part of any development permit or rezoning applications. The level of resources, amount of training, and availability of new staff or redeployment of existing staff needed would be dependent on the complexity of the regulations, level of expertise and knowledge that City staff currently have, and when the regulations are scheduled to be implemented. There may also be processes established where coordinating review with external agencies would be required. Using third party certification such as LEED and Passive House could be considered as an alternative to having City staff verify that some climate requirements are met. However, this would likely increase costs to the applicant.

Monitoring

The Draft City Plan and Getting to 1.5C include targets and measurable outcomes to determine if climate actions are working. The City will track progress on energy transition and climate resilience goals through ConnectEdmonton indicators and an Annual Report to City Council. Monitoring these targets and outcomes, as well as the actual climate impacts that emerge, will be crucial as indicators to whether regulations are working, need to be changed or removed, if new rules are required, or if existing standards need to be more stringent. This helps to account for the uncertainty around when climate impacts could occur or whether further changes to emissions reduction targets are needed. These indicators can guide and inform the best decision-making on implementing the right Zoning Bylaw regulations at the right time.

SUPPORTING RESOURCES, TOOLS AND PROGRAMS

Energy transition and climate change adaptation actions in the new Zoning Bylaw **will be more successful if working in concert with other climate resources, tools, and programs managed by the City of Edmonton or other organizations.** These can range from providing educational tools to grant programs to specific bylaws or policies adopted by the municipality. The following sections highlight examples from Edmonton and other municipalities for how similar tools and resources can complement the proposed Zoning Bylaw actions.

Educational Resources or Guides

Resources or guidelines can better help residents and businesses understand how to be climate resilient. These resources can provide ideas, additional details and technical specifications towards implementing a climate action. These can be most effective when a regulation applies a certain standard but allows the associated

document to provide options to meet this standard. The guide can also be updated to reflect current best practices without needing to amend the bylaw regulation. Depending on the specifics of the new zoning approach, guides may need to be updated or new guides created as part of the implementation of the new Zoning Bylaw.

Table 3. Educational Resources or Guides

Proposed Zoning Bylaw Action	Edmonton Examples of Guides
<ul style="list-style-type: none"> + The use of Low Impact Development techniques + The use of performance metrics or regulations with standard options for Low Impact Development Techniques 	<ul style="list-style-type: none"> + City of Edmonton's Low Impact Development Best Management Practices Design Guide + City of Edmonton's Change For Climate program + EPCOR's conservation resources like Rain Garden In a Box and Rain Barrels
	<p>Other Municipal Examples of Guides</p> <ul style="list-style-type: none"> + The City of Vancouver's Integrated Stormwater Management Best Management Practice Toolkit + Credit Valley Conservation Authority's Low Impact Development Guidance Documents + City of Los Angeles Low Impact Development Approval Process
<ul style="list-style-type: none"> + The development of housing designs that increase energy efficiency through performance standards and incentives 	<p>Edmonton Examples of Guides</p> <ul style="list-style-type: none"> + City of Edmonton's Lighting Efficiency Community Guidelines + EPCOR's energy resources such as Outdoor Lighting
	<p>Other Municipal Examples of Guides</p> <ul style="list-style-type: none"> + Passive House Certification Guide – used for City of Vancouver certification + City of Vancouver Zero Emissions Building Catalyst Bulletin
<ul style="list-style-type: none"> + The use of wildfire hazard assessments + The use of guidelines or regulations from Alberta FireSmart 	<p>Other Municipal Examples of Guides</p> <ul style="list-style-type: none"> + Alberta Wildfire's FireSmart Resources
	<p>Other Municipal Examples of Guides</p> <ul style="list-style-type: none"> + City of Vancouver's Urban Agriculture Guidelines for the Private Realm
<ul style="list-style-type: none"> + Urban agriculture to be permitted in all non-industrial zones without requiring a permit + More edible landscapes through landscaping requirements 	
	<p>Other Municipal Examples of Guides</p> <ul style="list-style-type: none"> + City of Vancouver's Water Wise Landscape Guidelines

Tools and Calculators

Web-based tools or calculators can help residents and businesses **calculate the costs and benefits of energy conservation, transition, and adaptation measures** in order to make the right decision for them. These can be developed by the City or be provided by other organizations as needed.

Table 4. Tools and Calculators

Proposed Zoning Bylaw Action	Example of Tool
+ Requirements for on-site landscaping, diverse plant material, and tree preservation	+ National Tree Benefit Calculator
+ The use of Low Impact Development techniques	+ Green Infrastructure Sizing Calculator
+ Emission reduction standards and incentives for new development to be designed, or ready to be designed, with solar energy systems	+ Identify home heat loss areas to improve energy efficiency through myheat.ca
+ The removal of regulatory barriers for solar energy development, including energy storage	+ Identify potential for home solar energy generation through myheat Solar

Funding Programs

Residents, designers, and builders are starting to learn and create a body of knowledge necessary for mass adoption of climate-friendly measures into their homes and businesses. Complementary funding programs can help subsidize the cost of adopting these measures. These funding programs can be standalone or aligned with provincial or federal funding commitments. Providing cash subsidy, material, or labour support programs has several benefits.

By offsetting some of the increased upfront costs, more climate-friendly designs can be incorporated to provide benefits sooner. Increasing demand for these designs and products can help expand the market and has the added benefit of further diversifying our economy. These types of funding programs could also be critical to help people who typically may not have resources to be able to access climate-friendly measures. This will be important when the City begins to consider the need to retrofit existing buildings at a large-scale.

Table 5. Funding Programs

Proposed Zoning Bylaw Action	Edmonton Examples of Funding Programs
<ul style="list-style-type: none"> + The development of housing designs that increase energy efficiency through performance standards and incentives + The removal of regulatory barriers for solar energy development, including energy storage + Emission reduction standards and incentives for new development + The layout of new subdivision lots to optimize sun exposure to allow for passive solar heating (windows) and/or solar energy systems 	<ul style="list-style-type: none"> + City of Edmonton's Residential Solar Rebate through the Change For Climate program + Edmonton Climate Innovation Fund
	Other Municipal Examples of Funding Programs <ul style="list-style-type: none"> + Cash incentives such as Infrastructure cost refunds – City of Toronto's Toronto Green Standard

Proposed Zoning Bylaw Action	Edmonton Examples of Funding Programs
+ Requirements for on-site Electric Vehicle Infrastructure	+ City of Edmonton's Electric Vehicle Rebate through the Change For Climate program + Edmonton Climate Innovation Fund

Standalone Bylaw

Adopting a standalone bylaw could be an alternative means to address a specific climate issue that may not be addressed through the Zoning Bylaw or the Alberta Building Code. The City of Edmonton Charter Regulation provides Edmonton with powers to specifically pass bylaws that address the well being of the environment, including bylaws to administer programs for climate change and adaptation, greenhouse gas emission reduction, energy efficiency, environmental

conservation and stewardship, etc. A specific bylaw could create a comprehensive set of regulations to provide a coordinated focus to climate resilience for any given site. This would need to ensure there is clarity and separation between what this bylaw would regulate and what the new Zoning Bylaw or Building Code would regulate, for example. There would be a need to identify the expertise, resources, and organizational structure required to administer such a bylaw.

Table 6. Standalone Bylaw

Proposed Zoning Bylaw Action	Edmonton Examples of Standalone Bylaws
+ The removal of regulatory barriers for solar energy development, including energy storage + Emission reduction standards and incentives for new development	+ City of Edmonton's Blatchford Renewable Energy Utility Bylaw
+ The use of performance metrics or regulations with standardized options for Low Impact Development techniques	Other Municipal Examples of Standalone Bylaws + City of Toronto's Green Roof Bylaw

Regional Coordination

The City and its residents' efforts on addressing climate change could be more effective in collaboration with our regional municipal partners. When Edmonton and its neighbours identify the need to coordinate efforts, this could be advanced

through an existing regional forum or with interested municipalities to provide pooled resourcing, economies of scale and broader knowledge sharing. Examples of this type of action include [Metro Vancouver's Climate Change Programs](#).

NEXT STEPS

These ideas are the first attempts at expressing how the new Zoning Bylaw can be one of many tools that the City of Edmonton uses to ensure new development and redevelopment contribute positively to a climate resilient city. The overall framework to incorporate climate regulations into the new Zoning Bylaw **will provide the necessary rigour and flexibility to signal the city's commitment to becoming a climate resilient city**, while being able to adapt and respond to changing conditions over time.

The conversation with the public and stakeholders will continue, and feedback will change and evolve these ideas until the new Zoning Bylaw has the right mix of regulations, standards, and incentives to maximize adoption of these actions at the lowest cost and difficulty. **This will ensure that Edmonton can reduce both its greenhouse gas emissions to meet emissions targets and adapt to climate change impacts to ensure the city and its residents are prepared for future climate disruptions.**

GET INVOLVED!

- Submit your feedback about this discussion paper at engaged.edmonton.ca
- Visit edmonton.ca/zoningbylawrenewal
- For all other ideas and feedback regarding Zoning Bylaw Renewal Initiative, please use the [General Feedback Form](#)
- Subscribe to our [newsletter](#)
- Contact us at zoningbylawrenewal@edmonton.ca



Appendix 1 | City Plan Intentions and Directions on Climate Change and Resilience

I want to BELONG and contribute.		
Outcome	1.4	Edmontonians demonstrate shared leadership as stewards of the environment.
Intention	1.4.1	Support Edmontonians' transition to a low carbon future in their daily lives.
Direction	1.4.1.1	Facilitate energy efficient redevelopment and retrofits.
Direction	1.4.1.2	Design and deliver mass transit and active transportation network infrastructure to enable energy efficient mobility.
Direction	1.4.1.3	Facilitate the use of local renewable energy.
Direction	1.4.1.4	Avoid waste at its source, improve diversion rates, and reuse and recover resources.
Direction	1.4.1.5	Provide support for residents, organizations and businesses to reduce energy use and greenhouse gas emissions and adapt to climate change.
Intention	1.4.2	Ensure Edmonton's air, land and water is safe and clean.
Direction	1.4.2.1	Protect, restore, maintain and enhance a system of conserved natural areas within a functioning and interconnected ecological network.
Direction	1.4.2.2	Partner to effectively manage, monitor and communicate air, land and water quality to protect human and ecosystem health.
Direction	1.4.2.3	Expand and enhance a healthy and sustainable urban forest.

I want to LIVE in a place that feels like home.		
Direction	2.1.2.3	Manage the impact of environmental stressors on people and natural systems including excessive noise, air and light pollution.
Direction	2.1.2.4	Incorporate nature and natural systems into the built environment.
Direction	2.2.1.5	Facilitate housing and job growth and intensification within nodes and corridors.
Direction	2.2.1.6	Enable ongoing residential infill to occur at a variety of scales, densities and designs within all parts of the residential area
Direction	2.2.2.5	Facilitate local urban agricultural opportunities through education, supportive programming and regulation.
Outcome	2.4	Edmonton is a leader in efficient, sustainable and resilient community design, development and living
Intention	2.4.1	Support ecological function and energy efficiency of Edmonton's built environment
Direction	2.4.1.1	Through relationship building, integrate Indigenous values and knowledge with environmental management and stewardship practices to enhance environmental protection.
Direction	2.4.1.2	Conserve, restore and reconnect natural areas and ecological networks within the built environment for human and ecosystem health.
Direction	2.4.1.3	Pursue emissions-neutral and net-positive infrastructure, buildings and neighbourhoods.
Intention	2.4.2	Ensure public buildings and infrastructure are sustainable and resilient.
Direction	2.4.2.2	Enable green energy generation and distribution systems.
Direction	2.4.2.6	Prioritize and enable green infrastructure including low impact development solutions.

I want opportunities to THRIVE.

Outcome	3.4	Edmonton cultivates a diverse economy by embracing services and technologies responsive to the impacts of climate change.
Intention	3.4.1	Support Edmontonians in building individual and community capacity to take action on climate change.
Direction	3.4.1.1	Expand community relationships to build awareness of actions that residents and businesses can take on climate change.
Intention	3.4.2	Support innovation and private investment in climate resilient industries and businesses.
Direction	3.4.2.1	Prioritize climate related research, industry, technology and businesses through partnerships, programs, processes and grants.
Direction	3.4.2.2	Encourage businesses to test ideas, products and services that support climate change mitigation and adaptation.
Direction	3.4.2.3	Encourage Edmonton's businesses to become climate resilient and achieve emissions-neutral operations.
Direction	3.4.2.4	Collaborate with regional partners to advocate for climate resilient businesses.

I want ACCESS within my city.

Outcome	4.4	Edmontonians benefit from improved public transit and high quality active transportation networks which reduce greenhouse gas emissions.
Intention	4.4.1	Support a low carbon mobility system.
Direction	4.4.1.1	Encourage a shift to transit and active transportation options.
Direction	4.4.1.2	Enable publicly accessible electric vehicle charging and encourage new developments to be electric vehicle ready.

I want to PRESERVE what matters most.

Intention	5.1.2	Promote the conservation and restoration of natural systems to improve ecological connectivity and reduce habitat fragmentation.
Direction	5.1.2.2	Expand and diversify Edmonton's urban tree canopy and native vegetation.
Direction	5.1.2.3	Pursue the protection, management and integration of wetlands into new and existing developments.
Direction	5.1.2.6	Steward ecological networks and systems to ensure ongoing function, long-term sustainability and ecological connectivity within Edmonton and the region.
Direction	5.2.1.3	Steward historic resources so they are resilient to climate change to ensure their protection and preservation for future generations.
Direction	5.3.1.1	Facilitate urban agricultural activities and protect agricultural operations through regulation, programming, land use and design.
Direction	5.3.3.3	Implement Edmonton's carbon budget through ongoing development decisions.
Outcome	5.4	Edmonton's natural and physical systems provide security and resilience against extreme weather events and other environmental hazards.
Intention	5.4.1	Ensure the safety and security of Edmonton's water supply, food systems, infrastructure and natural systems to support long term resilience to flooding, droughts and extreme weather events.

I want to PRESERVE what matters most.

Direction	5.4.1.1	Manage stormwater runoff and improve water quality through the design and development of the built environment.
Direction	5.4.1.4	Adapt management practices in response to changes in native and invasive species.
Direction	5.4.1.5	Conserve agricultural land in order to improve food system resilience, support the long term viability of the agricultural sector and mitigate climate change.
Direction	5.4.1.6	Prevent, mitigate and respond to environmentally harmful events to minimize the impact to the urban environment.

I want to be able to CREATE and innovate.

Intention	6.4.1	Promote economic development opportunities to support energy transition.
Direction	6.4.1.1	Encourage innovation to reduce non-residential process energy and carbon footprint.
Direction	6.4.1.2	Partner with businesses and organizations testing and implementing new to Edmonton solutions and technologies that support increased climate resilience.
Intention	6.4.2	Ensure Edmonton plans and implements climate change mitigation, adaptation and resilience.
Direction	6.4.2.1	Align, implement and monitor climate change mitigation and adaptation planning to meet local, national, and international commitments.

Appendix 2 | A sampling of the possible amenities within the Minneapolis Alternative Amenity Standard

Points	Amenity	Standards
10	Green roof	Installation of an extensive, intensive, semi-intensive, modular or integrated green roof system that covers a minimum of fifty (50) percent of the total roof area proposed for the development.
10	Leadership in Energy and Environmental Design (LEED)	The proposed development shall meet the minimum standards for LEED Silver certification. The project does not have to achieve actual LEED certification; however, the developer must submit the LEED checklist and documentation to the City, approved by a LEED Accredited Professional (LEED-AP), that shows that the project will comply with LEED Silver requirements.
10	Minnesota Sustainable Building Guidelines (B3-MSBG)	The proposed development shall meet the minimum required and recommended MSBG standards that would equal a LEED silver certification. The developer must submit documentation to the City including the MSBG checklist and a letter, signed by the owner or a licensed design professional, that shows that the project will comply with MSBG required and recommended standards equivalent to a LEED Silver certification. The recommended standards utilized should be those that most closely align with City sustainability goals.
5	Garden(s) or on-site food production	Permanent and viable growing space and/or facilities such as a greenhouse or a garden conservatory at a minimum of sixty (60) square feet per dwelling unit to a maximum required area of five thousand (5,000) square feet, which provide fencing, watering systems, soil, secured storage space for tools, solar access, and pedestrian access as applicable. The facility shall be designed to be architecturally compatible with the development and to minimize the visibility of mechanical equipment.
5	On-site renewable energy	Use of a photovoltaic or wind electrical system, solar thermal system and/or a geothermal heating and cooling system for at least seven (7) percent of the annual energy costs in new and existing buildings. Geothermal systems shall not use vapor compression systems. The applicant must demonstrate that the quantity of energy generated by the renewable energy system(s) meets the required percentage through a whole building energy simulation.
3	Living wall system	Provide a living wall system on at least one (1) building elevation. The living wall shall be composed of panels that total a minimum of sixty (60) percent of the wall area on the building elevation, or five hundred (500) square feet, whichever is greater. Window area is included in the calculation of the wall area, but in no case shall the living wall cover windows. A portion of the plantings shall provide greenery year round.
3	Natural features	Site planning that preserves significant natural features or restores ecological functions of a previously damaged natural environment.
1	Enhanced stormwater management	Provide capacity for infiltrating stormwater generated onsite with artful rain garden design that serves as a visible amenity. Rain garden designs shall be visually compatible with the form and function of the space and shall include for long-term maintenance of the design. The design shall conform to requirements of the stormwater management plan approved by public works.
1	Heated drives or sidewalks	Heated drives or sidewalks that are designed to provide snow and ice free surfaces.

Appendix 3 | Pathways Approach to Climate Adaptation

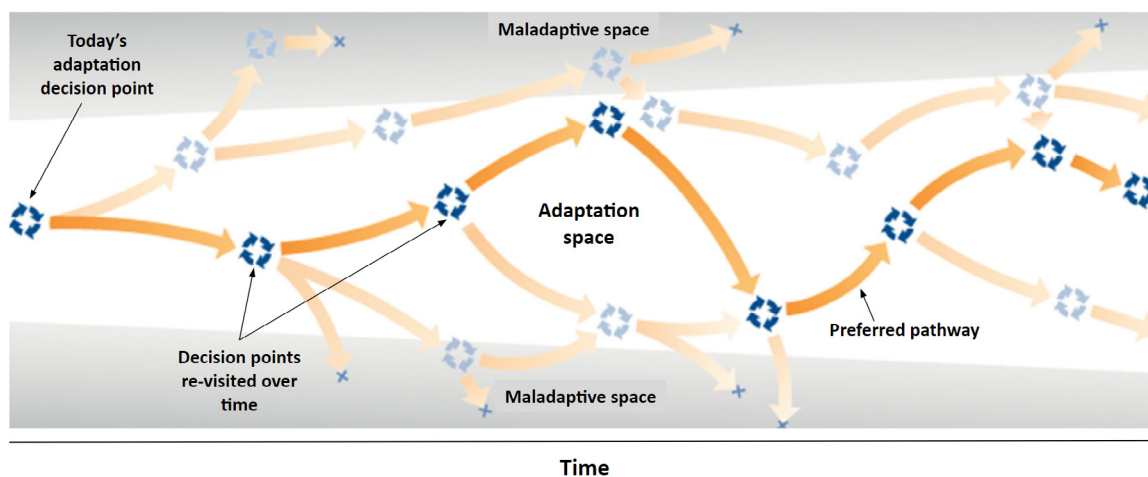
Climate resilience is a complex problem requiring many different solutions to address the various effects of climate change. One approach to choosing the best solution is to use adaptive management with a monitor-and-adapt decision making tool. This type of tool takes into account the uncertainty of the timing and size of climate change impacts as governments make decisions to try to find the best solution over time.¹

Fig 2 below shows a diagram to how this approach would work. For example, a decision is made to approve a regulation requiring a type of climate adaptation action ("Today's adaptation decision point"). This regulation is reviewed at certain times ("Decision points re-visited over time") to either continue with the existing regulation or to make changes to ensure that the regulation continues to achieve the goals of the climate adaptation action ("Preferred pathway"). This ensures that the City is not tied to a decision that creates inefficiencies if climate change impacts occur differently than what the climate models project ("Maladaptive space").

These inefficiencies can arise if the adaptation action addresses too much or too little of the impact or the timing of adaptation occurs too early or too late.

This approach builds in flexibility by adapting to the actual climate impacts and other drivers of change that occur over time, but long term options are left open to deal with possible different futures. The strategy is then monitored over time for 'signals' or 'triggers' that indicate when the next step of a pathway should be implemented. An example of this is provided in **Fig 3** for a proposed adaptation pathway to coastal flooding for Lakes Entrance in Australia. Here, a series of increasing impacts to the coastal area are identified ('Triggers'). There is also a corresponding set of actions to each trigger ('Steps'). The presence of each impact is the trigger to review and determine if the corresponding action is required to be activated, rather than relying on a time-based approach to make this decision.

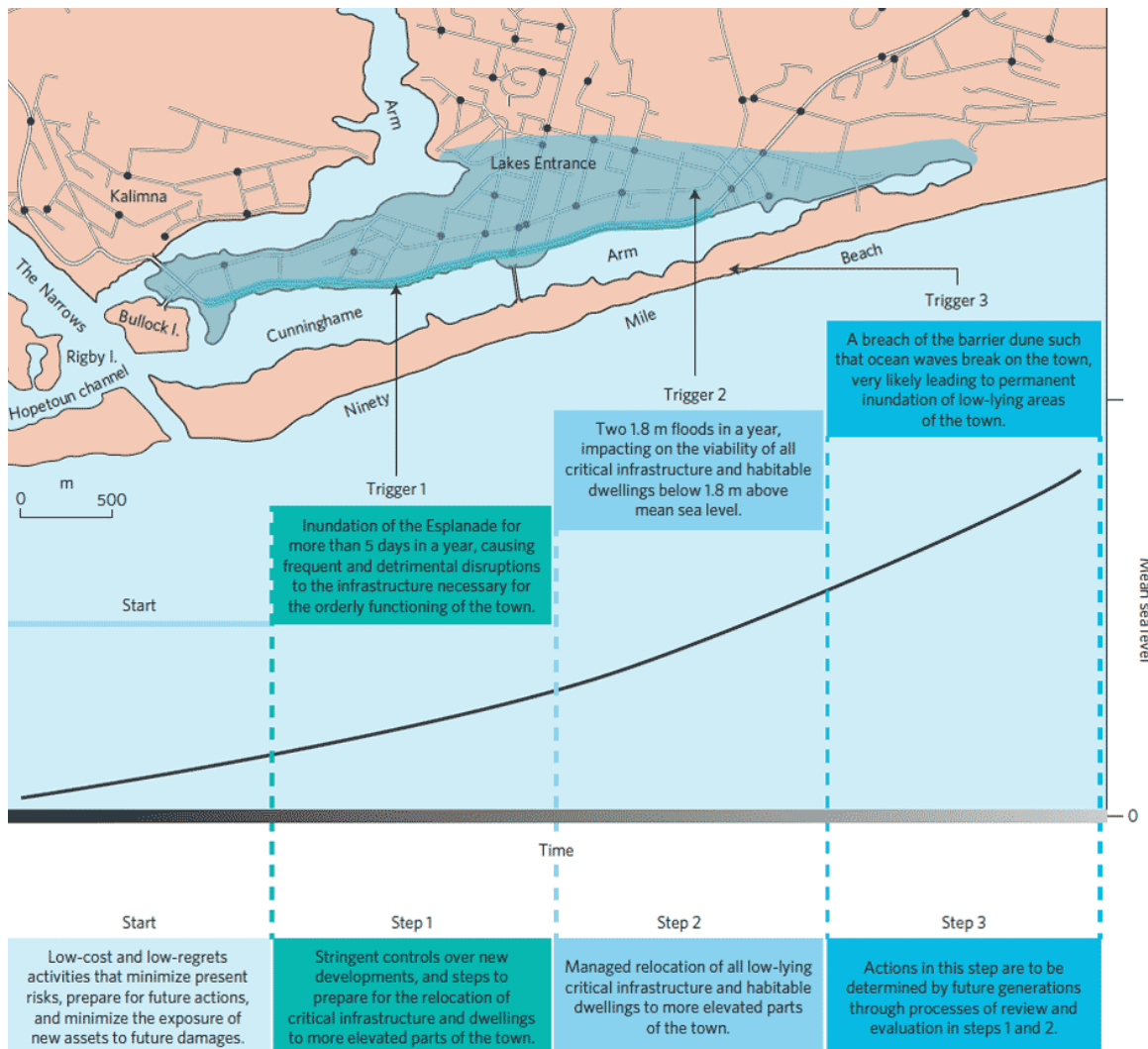
Fig 2. Adaptive Management



A diagram explaining the concept of adaptive management and using multiple decision points over time to ensure that the best pathway to a solution is chosen. Source: Boyd, R., Zukiwsky, J. and Prescott, S., 2020: *Developing adaptation pathways for Edmonton's Climate Action Plan*. All One Sky Foundation, Calgary, AB. Another version of this diagram be found [here](#).

¹ Boyd, R., Zukiwsky, J. and Prescott, S., 2020: *Developing adaptation pathways for Edmonton's Climate Action Plan*. All One Sky Foundation, Calgary, AB

Fig 3. Adaptation Pathway Example



An example of an adaptation pathway developed for a coastal area in Australia showing the sequence of impacts that affect certain areas, thereby creating the triggers to activate specific policy actions. Source: Barnett, J., S. Graham, C. Mortreux, R. Fincher, E. Waters, and A. Hurlimann, 2014: A local coastal adaptation pathway. *Nature Climate Change*, 4, 1103–1108. A digital version of this diagram be found [here](#).

The proposed climate regulations considered for the new Zoning Bylaw would be one aspect of the overall Climate Adaptation Pathway that the City of Edmonton would implement. The pathway would identify the appropriate level of climate impact

that would signal or trigger the necessary review process to decide on whether to activate the next set of actions within the new Zoning Bylaw and other City of Edmonton climate programs.

ZONING BYLAW RENEWAL INITIATIVE

Edmonton

