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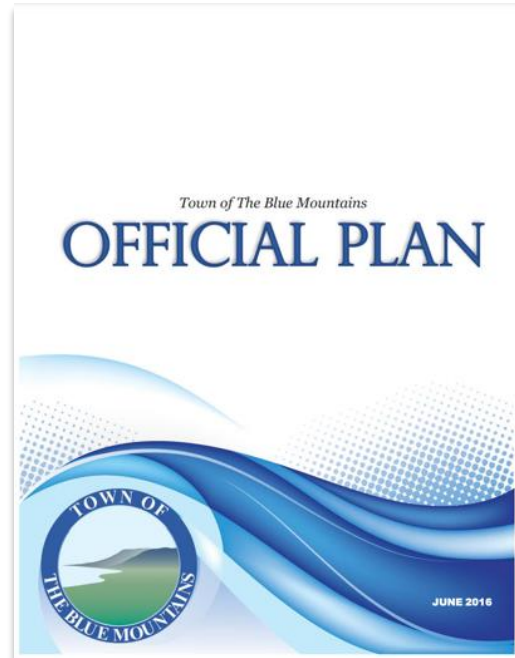
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1 Introduction

1.1 Purpose

The Town of the Blue Mountains is updating its Official Plan. The Blue Mountains Official Plan is the primary planning document that will direct the actions of the Town and shape growth and development. It establishes a unified vision for the future, land use structure for the Town and policies guiding growth and development.

Over the past years, the Town has been experiencing unprecedented growth which is expected to continue due to demographic changes, technological advances and the physical attraction and amenities of the Town. The Official Plan sets the foundation for where and how growth is to occur while ensuring it is balanced to protect the unique rural, environmental and community characteristics of the Town.



The purpose of this Environment and Climate Change Background Paper is to present considerations for the continued bolstering of sustainable growth, development and design policies within The Blue Mountains Official Plan to 2046. The Paper draws on the applicable policy frameworks, lessons and best practices from relevant contexts, as well as climate change considerations which are projected to be significant in the development of a resilient community. Recommended policies on building climate change resiliency in the Town of Blue Mountains, including climate change mitigation and adaptation, reflecting green energy priorities, transportation, building sustainability, and other matters.

The Town of The Blue Mountains has been proactive in the declaration of a climate emergency in order to hasten actions which mitigate the impacts of climate change. The Town has developed reports and plans which share pragmatic policies and opportunities for the sustainable development of the community and County, including the Blue Mountains Future Story (Community Sustainability Plan), and the Energy Conservation and Management Plan, which are further described in Section 2.

1.2 Report Structure

This Environment and Climate Change Background Paper is structured as follows:

Section 1 – Introduction: Provides an introduction to the Background Paper and its purpose.

Section 2 – Regulatory and Policy Framework: Provides an overview of the applicable policies and direction from the Province, County, and other local plans, as well as a summary of the Town’s current Official Plan policies for sustainable growth and development.

Section 3 – Climate Change and Environmental Considerations: Summary of the forecasted environmental and climate trends for Grey County, as well as community trends and relevant connections to public health, economy, agriculture, and transportation.

Section 4 – Policy Gaps, Opportunities and Recommendations: Key takeaways and considerations for the environmental and climate change related policies in the Blue Mountains Official Plan.

2 Policy and Regulatory Framework

2.1 Provincial Framework

The Provincial Policy Statement (PPS) broadly states that the Province's natural heritage resources, water resources (including agricultural resources, mineral resources and cultural heritage), and archaeological resources, provide important environmental, economic and social benefits. The wise use and management of these resources over the long term is of key provincial interest. Municipalities are tasked with ensuring that resources are managed in a sustainable way to conserve biodiversity; protect essential ecological processes and public health and safety; provide for the production of food and fibre; minimize environmental and social impacts; provide for recreational opportunities (e.g. fishing, hunting and hiking); and meet long-term needs of communities.

The pillars of economic, social and environmental sustainability can be tied to language in the PPS which states that strong communities, a clean and healthy environment and a strong economy are inextricably linked. Long-term prosperity, human and environmental health, and social well-being should take precedence over short-term considerations.

The following key policy directions from the PPS are important to shaping the Town of The Blue Mountains Official Plan from a sustainability perspective:

- Accommodating a mix of affordable and market-based housing, including housing for older persons, long term care homes, and other uses to meet long term needs;
- Prioritizing transit supportive and freight supportive development and intensification patterns, and planning for efficient development and land use patterns that are financially sustainable;
- Improving accessibility for persons with disabilities and older persons by addressing land use barriers which restrict their full participation in society;
- Long range planning of services and infrastructure to minimize land consumption and servicing costs;
- Preparing for regional and local impacts of climate change;

- Providing opportunities for a thriving rural economy, diversification of the employment base, local tourism and value-added business, and sustainable management of resources;
- Engagement with Indigenous communities on land use planning matters
- Coordination with various agencies to plan for emergency and disaster response, as well as economic, environmental, and social planning considerations to support efficient and resilient communities;
- Planning for a broad range of employment opportunities, identifying specific lands for business development, and taking into account the needs of current and future businesses;
- Planning and providing for a full range and equitable distribution of publicly accessible built and natural settings for recreation, including facilities, parklands, public spaces, open space areas, trails and linkages, and, where practical, water-based resources;
- Planning public streets, spaces and facilities to be safe, meet the needs of pedestrians, foster social interaction and facilitate active transportation and community connectivity;
- Planning for wastewater, water, stormwater, waste, energy supply, and transportation, with efficiency and optimization in mind, as well as impacts of a climate change and financial viability;
- Protecting and enhance sensitive environments and biodiversity.

2.2 The Grey County Official Plan

The Grey County Official Plan was approved in 2019, and is predicated on sustainable development, acknowledging some of the projected impacts of climate change. The Plan offers a significant look into current sentiments of sustainability and how this relates to the County:

- Parks and open spaces provide opportunities to increase tree canopy and woodland cover across the County;
- The proper construction, maintenance, and upgrading of infrastructure is essential in maintaining its capacity to function currently and under the effects of climate change;
- Green technologies and construction methods will be used whenever possible and feasible for new construction and the replacement of civic infrastructure;

- Monitoring the impacts of climate change on our systems, for example the natural heritage system, will allow us to adjust management activities, to best maintain their integrity and resiliency;
- Under climate change, the risks associated with natural hazards may change and this should be considered as we plan for the future;
- Active transportation provides an opportunity for communities to reduce their carbon footprint;
- Mixed use development and housing intensification allows for more efficient use of existing and planned infrastructure and should be encourage;
- Encourage reduction of building demolition waste through the adaptive reuse of older and existing building stock; and,
- Promote retrofits for energy efficiency in built heritage structures while maintaining their cultural integrity.

The key themes of the Grey County Official Plan consist of the following:

- **Cultivate Grey:**
 - Food production and support for the local food movement
 - Growing the rural economy through innovation
- **Develop Grey:**
 - Downtowns as a recognized place for economic growth
 - Land allocation needs to accommodate population growth
- **Natural Grey:**
 - Protection of environmental features and systems
 - Climate change preparedness
- **Live Grey:**
 - Healthy community needs
 - Community inclusion
 - Encouraging mixed-use development
- **Move Grey:**
 - Accessible public transit

- Active transportation infrastructure
- Waste management and protecting our water

2.3 Current Town Policies and Town of the Blue Mountains Official Plan

As part of Phase 1 of the Town’s Official Plan Review, proposed updates relating to sustainability were released in the July 2022 draft version of the Plan. The proposed amendment addressed climate change mitigation and offered policies to better meet goals established around sustainability in other strategies, such as, the “Going Green in Grey” Climate Change Action Plan. The Official Plan offers policies to meet the Plan’s sustainability goals and objectives through the prioritization of compact development, protecting and contributing to natural and cultural heritage, promoting active transportation and prioritizing a reduction of pollution through land use and development policies.

In the context of sustainability, the following policy directions in the Official Plan are important in shaping the community:

- Increase Minimum Density Target from 20 units per net hectare in the Primary Settlement Area of Thornbury-Clarksburg, to 25 units per net hectare;
- Protect and enhance natural heritage features and areas and their associated ecological functions so they can be enjoyed by current and future generations and serve as a legacy of the community’s desire to protect their role and function;
- Guide climate change mitigation and/or adaptation actions that result in reduction in greenhouse gases, promote energy efficiency, and other measures to increase our community’s resilience to the effects of climate change;
- Establish an integrated transportation system that safely and efficiently accommodates various modes of transportation including walking, cycling, public transit, automobiles and trucks. The system promotes a connected and safe active transportation (non-motorized) network between neighbourhoods, downtown areas, paces to work, schools, parks/open space, other amenities and adjacent municipalities;
- Protect agricultural and rural areas, including specialty crops, and to encourage the establishment of a broad range of agricultural uses, agriculture related uses and on-farm diversified uses to ensure that the agricultural industry can continue to thrive and innovate;
- Increase density through enacting minimum density targets and allowing for the development of additional dwelling units on existing residential properties;

- Allow the construction of additional residential dwelling units.

Sustainable Development Strategic Objectives

- Ensure development is built with the environment, social wellbeing and climate change as top priorities;
- Minimize the Town's ecological footprint and the impacts of growth by encouraging new development that is based on the principles of sustainable development;
- Promote the use of leading-edge sustainable development and energy conservation policies designed to reduce greenhouse gas emissions; and
- Reduce the per-capita consumption of energy.

Natural Environment Strategic Objectives

- Protect and seek out opportunities for net-gain enhancements to significant natural heritage and hydrologic features and their associated habitats and ecological functions;
- Maintain and enhance all source water resources including surface and groundwater resources in sufficient quality and quantity to meet existing and future needs on a sustainable basis; and
- Discourage the loss or fragmentation of significant woodlands and provincially significant wetlands, and the habitats and ecological functions they provide.

Climate Change Action Strategic Objectives

- Recognize the Blue Mountains declaration of Climate Change Emergency for the purpose of enhancing and accelerating action on our commitment to protect our community, our economy, and our ecosystems from the impacts of climate change;
- To be adaptive and resilient to the impacts of climate change and extreme weather;
- Achieve nature-based solutions in reducing flood risk and preventing shoreline erosion;
- Encourage active transportation and other transportation modes instead of relying upon single person cars; and
- Encourage higher-density, mixed use developments, infilling, and additional residential units.

2.4 The Blue Mountains Future Story

The Town developed this Integrated Community Sustainability Plan at the culmination of a two-year process to gather data and feedback to inform the Plan, which a foundational document to guide direction for other initiatives in the Town, inform the organization of the Town as a local government, and provide inspiration and direction for community initiatives.

The Blue Mountains Future Story was developed under the pretext that:

- The Blue Mountains is in a state of climate change emergency;
- The Blue Mountains is the second-fastest growing municipality in Canada; and
- Housing is increasingly unattainable in The Blue Mountains.

The Report found 6 primary systems to make systemic change sustainable change in The Blue Mountains which included:

- The Natural Environment;
- The Built Environment ;
- The Economy;
- Community & culture;
- Social Well-Being; and
- Governance.

A set of twenty “Bold Actions” were identified which would occur into 2027 to help the Town reach their sustainability goals. The actions relevant to land use planning and the development of the Official Plan are as follows:

Bold Actions	Relevant to Official Plan
Expand low-carbon transportation options to include regional electric vehicle infrastructure and greening the TBM municipal fleet	<ul style="list-style-type: none"> • Electric Car Charging Options in new development • Bike lanes for electric bikes
Develop a Climate Change Adaptation Plan with Grey County’s Climate Change Action Plan	<ul style="list-style-type: none"> • Identify areas of potential investment and development / building standards modification for the Town
Develop an action plan to create a natural asset inventory to include climate vulnerabilities and inform asset management planning	<ul style="list-style-type: none"> • Creation of a Climate Change Adaptation Plan

Bold Actions	Relevant to Official Plan
Develop a Biodiversity Strategy	<ul style="list-style-type: none"> Tracking of the current forest canopy and state of biodiversity in The Blue Mountains.
Expand production of sustainable local food	<ul style="list-style-type: none"> Conduct research and create a rationale and list of amendments to update the zoning bylaw to remove barriers for community gardens and urban agriculture
Develop and implement Green Development Standards	<ul style="list-style-type: none"> The Town's Official Plan update process will consider if/how future County-wide Green Development Standards might be supported by local Official Plan policies
Improve the conditions for attainable housing	<ul style="list-style-type: none"> Thresholds for attainable funding will be added to the Official Plan

2.5 Blue Mountains Energy Conservation and Demand Management Plan

The 2019 Energy Conservation and Demand Management Plan (ECDMP) was developed by the Town with a view towards mitigating greenhouse gas emissions resulting from corporate operations, with a goal of reducing emissions by 40% below 2005 levels by 2025, and ultimately to achieve net carbon neutrality by 2050. The ECDMP is the five-year update to the 2014 Plan, as Provincially directed under *O.Reg 507/18*.

Of the fourteen initiatives in the Plan, half relate to Town buildings and facilities, three relate to fleet and equipment, and the remaining four are corporation-wide, including addressing policy and capital planning elements needed to achieve the goals of the Plan. While these initiatives are not targeting community-based activities, operations, or development, they serve as a reference point for policies relating to any corporate-based development, and as encouragement for private sector development to emulate. The Town's Official Plan can reinforce and support the success of the ECDMP through policies that reflect the following priorities:

- Efforts relating to energy performance monitoring, renewable energy growth, and passive design to support climate comfort;
- Building energy conservation through investment in higher efficiency low-carbon technologies;
- Naturalizing parkland areas to reduce fuel consumption from landscaping equipment; and
- Laying the foundation for Town-wide sustainable infrastructure policies and carbon neutral policies.

2.6 Grey County Climate Change Action Plan

Grey County recently released their 2022 Climate Change Action Plan. The Plan seeks to address contributions to global greenhouse gas emissions, while also addressing areas where the County can improve its sustainability more generally. The action plan

lays out targets for both the Corporate and Community levels. As a community target, Grey County has aimed to reduce greenhouse gas emissions by 30% below 2018 levels by 2030. The Climate Change Action Plan establishes measures which are most likely to have the highest level of greenhouse gas reductions.

At a community level, the Action Plan lays out 8 themes, each with a collection of actions which offer opportunities for integration with the Town's Official Plan and consider the complexities of climate change and sustainability in the context of equity, environmental conservation, food security, energy conservation and resiliency, waste management, integrated mobility, sustainable tourism, and mitigating climate change risks from heat, flooding, and extreme weather:

1. Theme 1 - Nature-based Solutions & Agriculture

- a. Action 1: Afforestation, Habitat and Biodiversity Protection
- b. Action 2: Conservation and Protection of Wetlands
- c. Action 3: Facilitate Ongoing Capacity Building in Sustainable Agricultural Best- Practices
- d. Action 4: Continue to Promote Locally Grown Food

2. Theme 2 - Waste

- a. Action 5: Collaborate with Member Municipalities to Support Waste Diversion
- b. Action 6: Support Re-Use/Re-Build It Centers and Programs

3. Theme 3 - Transportation

- a. Action 7: Zero-Emission Vehicle Adoption
- b. Action 8: Active Transportation
- c. Action 9: Rural Bus, Ride Share and On-demand Transit Program

4. Theme 4 - Buildings and Development

- a. Action 10: Compact, Mixed-Use Development in Designated Settlement Areas
- b. Action 11: Green Standard for New Buildings
- c. Action 12: Residential Building Energy Efficiency Retrofit Program
- d. Action 13: Institutional/Commercial/Industrial/Agricultural Building Energy Efficiency Retrofit Program

5. Theme 5 - Energy

- a. Action 14: Support Renewable and Emerging Energy Technologies
- b. Action 15: Promote Biogas Capture and Conversion

6. Theme 7 - Climate Adaptation

- a. Action 16: Develop Climate Adaptation Plan
- b. Action 17: Reducing the Risk of Flooding
- c. Action 18: Prevention of Shoreline Erosion

7. Theme 8 - Outreach & Engagement

- a. Action 19: Establish a Climate Action Engagement Program
- b. Action 20: Promote Sustainable Tourism Programs & Incentives to Operators
- c. Action 21: Establish a Climate Action Implementation Advisory Group

3 Climate Change and Environmental Considerations

This Section explores the core aspects of the Town's natural, built, and human environment and the intersections between them in identifying considerations and concerns for the updated Official Plan.

3.1 Environmental Overview

The Town of The Blue Mountains is situated in Grey County, southwestern Ontario, on the southern banks of Georgian Bay to east end of Lake Huron, where the Beaver River meets the Georgian Bay. The Blue Mountains themselves are a feature of the "Niagara escarpment", a Paleozoic bedrock ridge formed through the differential erosion by ice, water, and wind over millions of years which runs from Wisconsin, through Ontario. The escarpment crosses through the community boundaries.

The Blue Mountains is in the Meaford ecodistrict of Ontario. Natural ecosystems include deciduous, mixed and coniferous forests, as well as marshes and ferns. Almost half of the land base in the ecozone has been converted into agricultural and pasture land. (Ministry of Natural Resources and Forestry, 2018)

A vast majority of the land within the town consists of rural countryside which includes agricultural areas, specialty crop areas, hamlets, natural features/areas/systems and waterfront areas for conservation, recreation and tourism purposes.

3.1.1 Temperature

According to The Climate Atlas, Collingwood, the closest town to The Blue Mountains, could see up to 25 very hot days (over 30 degrees Celsius) per year in the immediate future, amounting to an increase of 15.5 days compared to 1976 - 2005. This raises to a potential average of close to 50 very hot days per year in the near term (The Prairie Climate Center, 2019), which marks a substantial increase in extreme heat.

The steady increase of very hot days presents challenges for all living beings, both human and non-human. Plants and animals are less likely to be tolerant to large temperature discrepancies such as these, therefore the range of plants and animals will likely change. This presents challenges for the management of urban forests, as well as potential stresses on recreation and agricultural land uses. The rate of this change presents a particular challenge for ecosystems. For example, the rate of projected climate change is expected to be 10 to 100 times faster than the ability of trees to migrate in Canada (Natural Resources Canada, 2021).

For humans, substantial changes in summertime hot days and heatwaves presents a variety of health concerns. This has reaching implications on the Town's nature-based tourism industry, management of urban ecosystems, community health and wellbeing, and should be considered in implementing Official Plan policies for elements such as landscaping and urban tree management.

In terms of cold weather, the quantity of days that see cold temperatures below -15 degrees Celsius could shift from 22.5 days to just 3.9 in a year. For days below -5 degrees Celsius (the temperature needed for many ski hill operators to make artificial snow) the days could reduce from 84.5 days to 63.6 in the immediate future, and just 42.8 days in the near future (The Prairie Climate Center, 2019). These projected temperature changes are significant in relation to economic implications for the tourism sector. Further implications on people and the economy relating to water use will be discussed later in this Paper.

Ultimately, an overall warming trend for The Blue Mountains presents a challenge for winter activities in the community and increased threats to community wellbeing during the summer months. This presents opportunities to encourage the development of shaded areas in the Town's Community Design Guidelines and ensure that dense areas also have sufficient tree cover to prevent urban heat island effects.

3.1.2 Weather Events

Precipitation and Drought

Generally, precipitation is projected to moderately increase trending towards 2080 based on the Climate Atlas of Canada for Collingwood, which may need to be considered when considering drainage plans and nature-based drainage solutions. The risk of drought is projected to remain consistently low. Therefore, measures to mitigate the impact of drought, such as water catchment, cover crops, moisture promoting landscape modifications and permeable surfaces, would be recommended primarily as a precautionary measure. (More information can be found in **Appendix 1**).

Thunderstorms and Tornadoes

Another key climate concern to The Blue Mountains, as identified in the Town's Disaster Management Plan, relates to tornadoes. Largely, tornadoes are not expected to increase in overall occurrences, but they may cluster more densely in time.

The spreading and sprawl of development has been suggested to increase the probability of a tornado's impact and the scale of disaster (Strader, Walker, Pingel, & Krmeneć, 2018). In relation to land use planning, it is therefore suggested that promoting the concentration and density of development would be useful in decreasing the potential impact of tornadoes. (For more information see **Appendix 1**).

3.1.3 Erosion

Erosion along Georgian Bay has been identified in recent years as a considerable challenge for shoreline communities. The extent to which climate change will make this erosion more severe is complicated.

Generally, due to its hard bedrock shoreline and projected net decrease in the water level of Lake Huron, erosion is likely not expected to be a major consideration in relation to climate adaptation in The Blue Mountains (See **Appendix 1** for a more detailed explanation). Existing land use policies in the Town's Official Plan (Policy C2.1) require a 30 metre riparian buffer from river, streams, lake, or Georgian Bay, a policy which aligns with the Grey Sauble Conservation Authority guidance, and should continue to be followed and updated in conjunction with any adaptations to legislation.

The shorelines of the Great Lakes can generally be classified as hard bedrock, soft bedrock or cohesive sediments such as sand (Wuebbles, et al., 2016). Much of Eastern Georgian Bay, including the shoreline of The Blue Mountains, is classified as hard bedrock. Though increased winter storms and changing ice dynamics are expected to have a significant impact on the erosion of soft bedrock and cohesive sediment sections, hard bedrock is expected to experience minimal impact from the effects of climate change erosion. (Wuebbles, et al., 2016, p. 38).

The mean lake level and the range of fluctuations of Lake Huron generally is dependent on precipitation in upstream environments and evaporation/evapotranspiration over the lake and its basin (Wuebbles, et al., 2016). Climate models suggest that temperatures will likely increase, leading to increased evaporation of the lake and potentially lower lake levels (particularly on Lake Huron), however, the expected effect of this has been considered modest, with a consistent lake level within historic limits, and a slight decrease in water level projected (Wuebbles, et al., 2016). Decadal-scale fluctuations should still be expected (Wuebbles, et al., 2016). Seasonally, summer water levels may be lower, with higher levels in the winter (Wuebbles, et al., 2016).

Within the Town, erosion on hillsides and other inland landscapes may be impacted by increased precipitation, particularly rain. Higher runoff water levels can result in substantially more erosion. Increased intensity of storm events and quick temperature changes which result in rapid snowmelt could also lead to increased erosion. That considered, no site-specific study has been conducted on the matter. Erosion hazard mapping may be a useful consideration moving forward, with policies in place to mitigate erosion such as site surveys and studies before development. Work done by the Blue Mountain Watershed Trust in 2016 identified that some areas within The Blue Mountains have been subject to erosion, and noted the effect of land management practices on increased creek turbidity and erosion in general (Powell, 2016). To make specific recommendations for inland erosion control and slope stability would require a more detailed study, however such a study would occur outside of the context of the Town's Official Plan Review.

This considered, the Official Plan could include policies and objectives which support the use of nature-based solutions and preservation of existing foliage to mitigate erosion. This could include deep-rooted foliage which is expected to thrive in 100-year climate conditions including trees or grasses. If development must occur on erosion prone areas, it would be important to ensure that development is not critical infrastructure, and that clear warnings and policies exist relating to erosion risk and hazards.

3.1.4 Water

Drainage and Flooding

The Drainage Plan for The Blue Mountains is in the process of being updated. With projected increases in the intensity of precipitation events, considering the long term effects on drainage in relation to The Blue Mountains is significant. Additionally, considering how nutrients are being translocated by precipitation, particularly water that is allowed to flood on agricultural fields, is significant when considering increased precipitation in agricultural zones and impact on surrounding waterbodies.

Opportunities within the Drainage Plan to address climate change considerations include integrating permeable surfaces and natural drainage options to help with water filtration and prevent the pooling and flooding of drainage; in addition, the impact of land uses should be considered to minimize the impact of changing precipitation events.

The Official Plan could consider ways that Nature Based Drainage Solutions and techniques such as mandating permeable pavements, bioswales, green roofs or rooftop water collection in certain zones or districts, are methods that could be implemented to allow for the infiltration of water into the water table, or prevention of increased runoff. Collaboration with Indigenous groups to identify potential wetlands to be collaboratively reclaimed, identifying that land, and designating it a local wetland could be an excellent opportunity for both collaboration and adaptation.

Watershed Quality

With increased hot days, the protection of water quality becomes increasingly significant. Leaching of fertilizers from agriculture paired with warm weather can have a substantial impact on eutrophication (leading to algae blooms and potential for anoxic conditions downstream) (Wuebbles, et al., 2016). Eutrophication can both accelerate and be accelerated by climate change, while also causing detrimental impacts on the ecology of water features. Georgian Bay is currently one of the few UNESCO Biosphere Reserves in Canada (Burke, et al., n.d.). Since the Beaver River flows into this Bay, ensuring that the nutrient load in the water remains manageable is important in protecting the bay and mitigating the impact of The Town of the Blue Mountains on nutrient cycling.

Freshwater species are also very sensitive to large temperature fluctuations and changing nutrient levels in streams. Currently, Google Maps shows inconsistent riparian areas including low tree cover along certain sections of the Beaver River (as well as other rivers in the watershed). This could present threats for spawning fish and general stream temperature regulation. Currently, the river supports Rainbow Trout, Chinook Salmon and Brown Trout (Blue Mountain Watershed Trust, n.d.). Stream and water temperature, oxygen level rate all have distinct impacts on fish reproduction (Devkota & Kathayat, 2020). Current agriculture land use along the river presents long sections which are exposed directly to the sun, and more vulnerable to nutrient leaching from the bordering agricultural practices. As temperatures increase, it is significant to consider the impact the lack of trees will have on fish species, eutrophication and biodiversity more generally.

Currently, The Town of the Blue Mountains Official Plan prohibits the development of any buildings within 30 meters of any top of bank of any river, stream or lake or Georgian Bay unless authorized by the conservation authority. These buffers are placed around “Environmental Protection Zones” which allow the use of the land for agriculture which existed prior to the plan’s passing. Incentivising the planting of trees resilient to climate change along the river bed may be useful in ensuring the long-term sustainability of these water bodies.

Drinking Water

The Town of The Blue Mountains is supplied by the Thornbury Drinking Water System, and is in the Saugeen, Grey Sauble, Northern Bruce Peninsula Source Protection area. The raw water intake extends 430m into Nottawasaga Bay (Georgian Bay) (Saugeen, Grey Sauble, Northern Bruce Peninsula Source Protection Region, 2017). A small eastern portion of the Town is also located within and governed by the South Georgian Bay, Lake Simcoe Source Protection Plan (see the Official Plan Review - Source Water Protection Policies Background Paper for more details).

The increase in large precipitation events is expected to increase the presence of nitrogen and dissolved phosphorous from human activities. These increases are likely to increase algae blooms, which will decrease the level of dissolved oxygen which both have significant impact on the water quality of lake ecosystems. (Wuebbles, et al., 2016). Some contributors to these water quality challenges involve increased fertilizer usage both for agricultural crops and domestic crops such as lawns, increase lake acidification (Council of the Great Lakes Region, n.d.). Large storms, and their increase, are also expected to result in the possible overflow of manure pits and increase sewage bypass which may also increase nutrient load in the water supply (Wuebbles, et al., 2016).

The long-term quality of drinking water therefore becomes a significant consideration and is related to water runoff from all existing land uses of the communities which border the Georgian Bay. Current policies in the Town’s Official Plan note aspects of

water quality management relating to herbicides, fertilizers, and other contaminants, and can be strengthened through additional public awareness of the impact of lawn care products on watershed nutrients, as well as regulations on manure pit form and fail safes, and regulations on timing and quantity of fertilizer applied in agricultural zones.

Instituting design guidelines which prevent monoculture, high water and fertilizer intensity, lawn crops such as Texas Blue grass and promote low water usage Xeriscaping could be another best practice in terms of climate change adaptation. Similar considerations can be made for parking lots, where natural drainage, medians and tree planting can be used to mitigate parking lot heat islands and excessive drainage leaching into drinking water. (The Government of Canada, 2012).

3.2 Human Geography

3.2.1 Public Health

Climate change is expected to increase the frequency of dates with poor air quality, particularly during the summer time. Increase in forest fires due to climate change is just one of the factors which will add to this. Poor air quality has the chance to greatly impact those who are most vulnerable (the elderly, people with respiratory illness, people with disabilities, and those who are unhoused) (Wuebbles, et al., 2016). As temperatures increase, so too does the probability of disease or pathogens. The range of insect borne disease such as Lyme Disease or West Nile Virus are projected to expand as temperatures rise (Ebi, Anderson, Berry, Paterson, & Yusa, 2016). Outside of insect vectors, across the board, a warming climate makes the environment more hospitable to pathogens.

Within the Great Lakes, there is the potential for increased microcystin, pathogens and bacteria. Harmful algal blooms (HABs) can also produce several toxins which can enter the body through a variety of pathways and can enter fish tissues. These toxins have the potential to cause rashes and irritation, as well as respiratory issues with continued inhalation (Wuebbles, et al., 2016). The Blue Mountains has an aging population. Compared to Ontario, the median age is close to 20 years older in The Blue Mountains (58.8 The Blue Mountains, 41.6 Ontario) which is a significant difference.

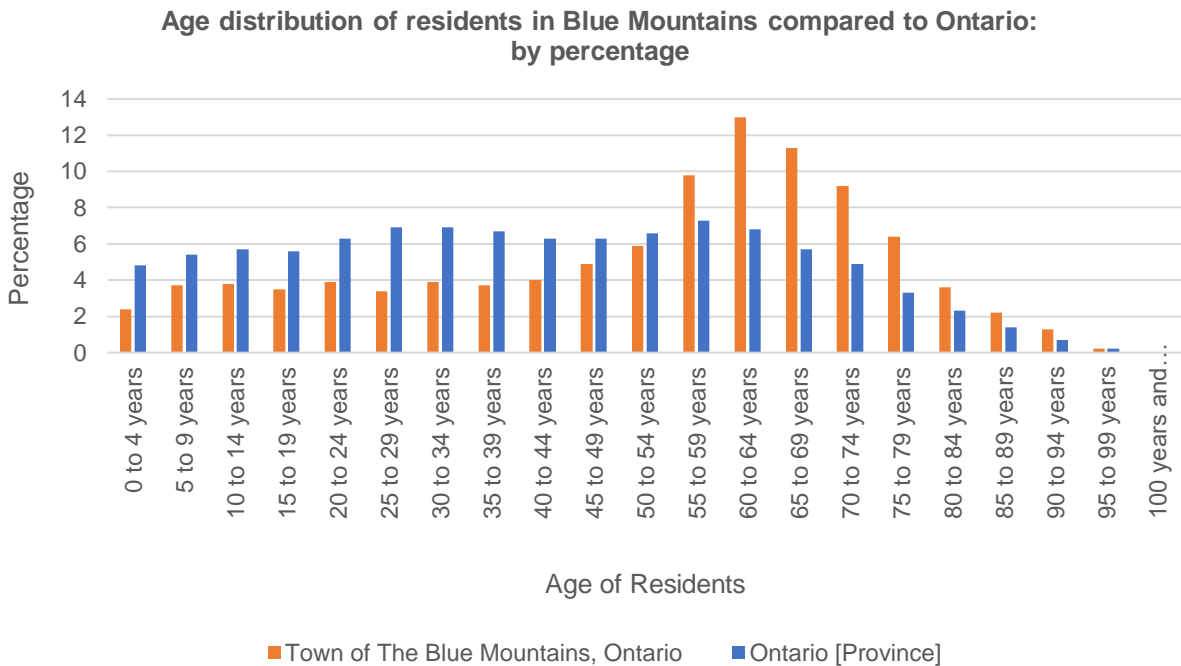


Figure 3-1 Age distribution comparison for Blue Mountains and Ontario. Source: Statistics Canada, 2023

As temperatures rise, older adults may have unique challenges which make them more susceptible to large temperature changes. Older adults are generally more heat-vulnerable, there are some physiological characteristics which may contribute to increased vulnerability to heat, which include (Ebi, Anderson, Berry, Paterson, & Yusa, 2016):

- Reduced thirst sensation
- Reduced fitness level
- Reduced sweating ability
- Increased susceptibility to chronic dehydration
- Visual, cognitive, and hearing impairments
- Agility and mobility challenges
- Differing perceptions of risks and vulnerabilities based on life experiences
- Reduced literacy
- Social isolation

People with Increased Exposure to Climate Effects

Other groups may also have unique challenges, including people with disabilities who do not have access to indoor cooling or back-up supply of electricity in an extreme heat or storm event, those who are inadequately housed or who are homeless, and who have limited access to clean water and cool places. Newcomers to Canada who are not accustomed to the potential health impacts of extreme heat and storms are also at risk without proper communication and access to indoor cooling. Language and literacy barriers for those who do not speak English or French are a key consideration when developing communication around climate change adaptation managing personal and property-level risks.

Occupational groups, such as migrant workers, farmers, construction workers, miners, or tree planters all also have increased exposure rates to weather fluctuations, in addition to restaurant workers and those in occupations with exposure to the outdoors, additional heat or high humidity. These populations are significant in The Blue Mountains within the agriculture and tourism/hospitality sectors. Providing policies to protect these groups become important options to consider, such as requiring indoor cooling for housing/lodging, increased shade infrastructure, options for free cool-down related leisure, emergency and back-up energy in an extreme storm event and access to sufficient emergency food and water. Those who are physically active are also at an increased risk of exposure to higher temperatures caused by climate change.

Considerations for Migration

As the world continues to warm, climate change-induced migration to Canada and Ontario in particular will become increasingly noticeable. Already, in the North American context, recent years have seen record levels of migration from countries close to the equator. Though migration is a complicated process, the migration currently observed could have significant ties to climate pressures (Lustgarten, 2020). Currently, 1% of the world is in a “barely livable hot zone”, a number which could increase to 19%, including the homes and agriculture of billions of people (Lustgarten, 2020).

While the Canadian federal government has recently committed to accepting 500,000 immigrants and refugees per year by 2025, this immigration is particularly focused on economic immigration (Immigration, Refugees and Citizenship Canada, 2022). As climate pressures mount, there is an increased probability of increased climate refugee claimants or illegal immigration which may result in pressures for communities to provide housing and support.

For communities like The Blue Mountains where climate change will most likely not lead to an uninhabitable climate in the near future, pressures posed by climate migrants may be more noticeable and lead to increased demand for housing, jobs and community

resources. Appropriate planning to welcome newcomers in conjunction with local settlement services agencies would therefore be key.

3.3 Economy

Currently, The Blue Mountains is heavily reliant on Tourism. Food and accommodation services make up 1,945 jobs, the next nearest category is retail trade (533), followed by arts entertainment and recreation (425) (Economic Development Division, 2021). As a resort town, one of the main economic drivers for The Blue Mountains is alpine skiing and other winter sports. In the summer this is supplemented by other summer activities which make use of the Town's natural features.

A 2006 report focused specifically on The Blue Mountains and region suggested that by 2080, ski resorts along the Georgian Bay could see ski season durations reduce by 90 days from 2006 levels, and the need for manufactured snow would increase by up to 170% within the same timeline. (Scott & Jones, 2006). While much has changed since 2006, even more recent studies suggest that under high-emissions scenarios, all but three southern Ontario ski areas would likely no longer have viable ski season durations (Steiger, Ruddy, Marc, & Johnson, 2019). The result is likely that manufactured snow will be a strong reliance of many Ontario ski hills, and even with this manufactured snow, the frequency of very short seasons (even with snow makers) would likely increase in frequency. The Blue Mountains would therefore see an increase in demand for electricity and water-taking related to these snow makers, creating additional pressures on ground and surface water resources.

3.4 Agriculture

In terms of agriculture, status quo carbon emissions may see a significant increase in the length of the growing season (frost-free season) by up to 23.8 days in Collingwood (data available for the closest town to The Blue Mountains), climbing to a total of 191.3 days per year (The Prairie Climate Center, 2019). This would mean that some plants which previously had been difficult to grow in the region may be more likely to perform well. This also includes potentially invasive species which would need to be managed.

Plants and trees which require colder winter temperatures may be negatively affected. Depending on the species, their range could shrink and be replaced by more competitive plants which thrive in warmer climates. Dry days are projected to remain relatively consistent, with the quantity of dry days decreasing slightly by 0.6 days (The Prairie Climate Center, 2019). This offers opportunities to introduce new, potentially higher valued crops, including some types of grapes for vineyards, or fruit trees.

Though the increase in the length of growing season may be beneficial in some regards, Growing Degree Days (based on 15 degrees Celsius), are expected to rise (The Prairie Climate Center, 2019). This indicator conveys the quantity of days where the temperature is above 15 degrees Celsius, and can be used to predict favourable

environments for the hatching of some insects and pests. This suggests that as time progresses there may be an increased risk for crop pests in the community. Land management strategies that make crops more resistant to pests, such as preventing monocultures, and increasing habitats for beneficial insects such as pollinators, would be prudent.

The warming climate in the context of The Blue Mountains presents opportunities to grow more types of food over a longer period time. At the same time, population and employment growth in Southern Ontario due to climate migration may mean that development will expand towards smaller communities such as Blue Mountains. As time progresses, it is likely that agricultural land will come under increased pressure from development which may create conflict between land use types. Establishing long term protections for sustainable agricultural land use types, or considering ways that agricultural land uses can be supported by other land uses, could prevent the encroaching on this land or incentivize its preservation.

Encouraging food production which takes long-term impacts to natural systems into account is key. Practices such as mitigating impact to, and improving, soil and watershed quality, would be significant in the long-term sustainability of agricultural systems. Therefore, when addressing land use in some agricultural areas it would be prudent to understand how existing land uses and practices support local and community-based food production, with specific emphasis on the long-term sustainability of agricultural practices.

3.5 Commuting

The Town of The Blue Mountains has somewhat similar commuting statistics for its employed labour force compared to the Ontario average, but with far fewer people who take public transit. Based on the 2021 Census (Statistics Canada, 2021), there are also far more people who travel outside of their census division for work (in this case Grey County), amounting to 40% compared to the Ontario average of 23.5%. This indicates that there is a large proportion of the community who travel a substantial distance to work, likely to larger surrounding communities such as Collingwood, Barrie and Owen Sound for work or other daily needs. Given the amount of people who commute over 60 minutes to work (11.5%), a number of residents would also be commuting to further communities within the GTA. However, there is also a significant portion of the labour force that works from home (approximately 42%).

The main mode of transportation by 87% of residents in the Town involves commuting by car, truck or van, which is higher than the Ontario average. The use of active transportation is generally lower than the Ontario average, except for walking which is slightly higher at 7.2% compared to Ontario's at 4.6%.

The community is serviced by the South Georgian Bay Regional Transit System. The Blue Mountains Transit link connects the Town to Collingwood, and runs every hour, 7

days a week. The single transit line with limited frequency makes relying on transit challenging, and significantly reduces the convenience. There are opportunities for the Town to work more closely with regional bus service providers to consider opportunities to support broader regional connectivity by transit as the community grows.

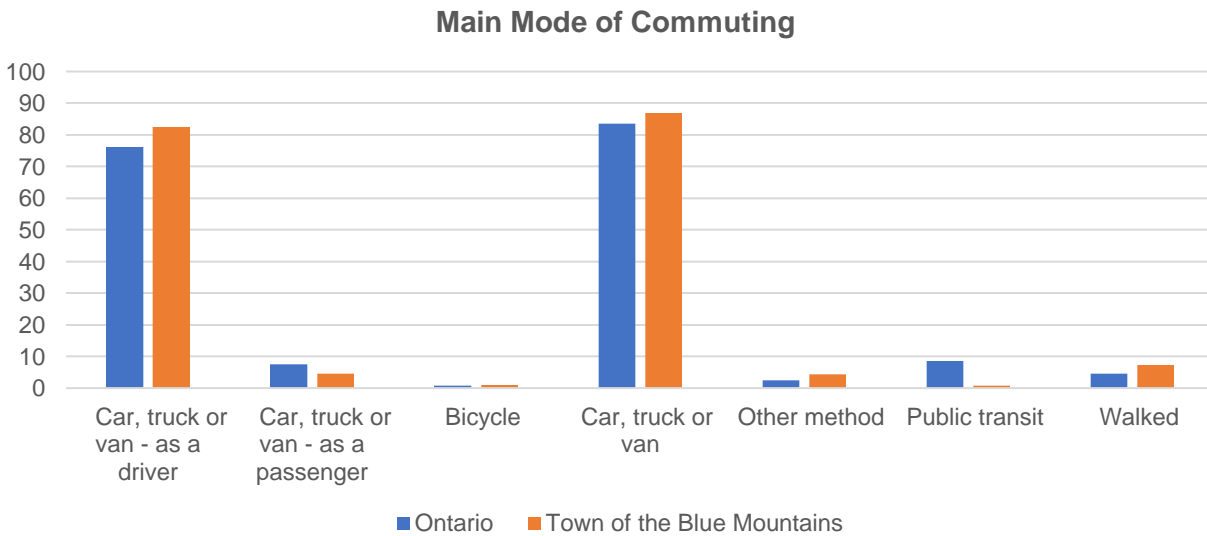


Figure 3-2: Main mode of travel for Blue Mountains residents compared to Provincial average

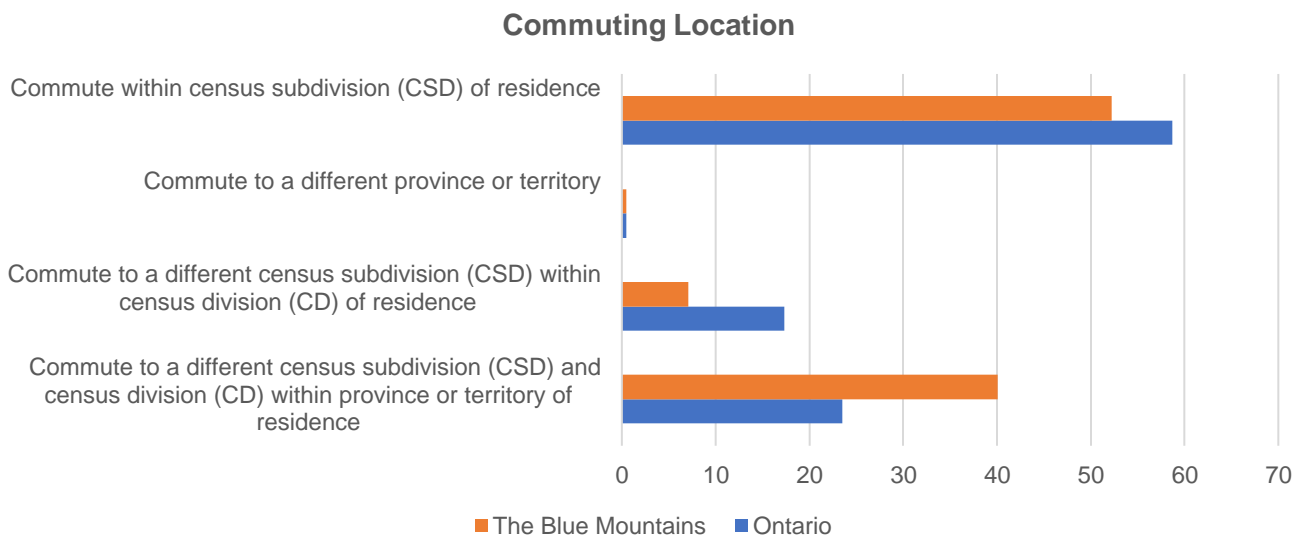


Figure 3-3: Commuting locations for Blue Mountains residents compared to Provincial average

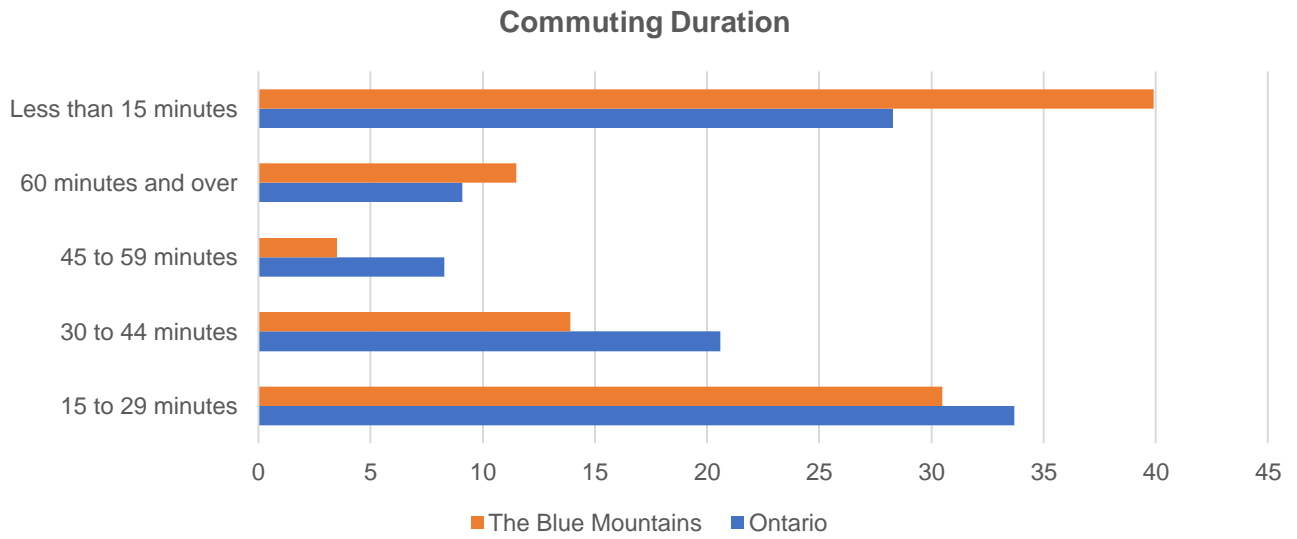


Figure 3-4 Commuting duration for Blue Mountains residents compared to Provincial average

4 Policy Gaps, Opportunities and Recommendations

The Official Plan already has a significant amount of information and regulations which are centered on environmental considerations, including mitigating impacts to water, erosion, carbon emissions, as well as many other considerations. This considered, the Official Plan could improve on contextualizing the Town in the larger watershed context, including factoring in impacts to the Georgian Bay biosphere.

The following provides a summary of the preliminary recommendations to update the Town's Official Plan policies:

4.1 Language in the Plan

- Including language in the objectives of the Plan that highlight the ways that climate change disproportionately impacts specific populations and supporting actions to mitigate community-wide impacts.
- Including language throughout the plan acknowledging the existence of climactic changes in the long term outlook will help further frame the community plan.
- Using clear language to highlight measures integrated to plan for inclusive communities that are accessible to people with disabilities, age-friendly, and supportive of people across a range of income levels as well as newcomers.

4.2 Land and Resource Stewardship

- There is a gap in the incorporation of Indigenous land management techniques, traditional knowledge, and opportunities for co-management. Committing to collaboration with local First Nations as rights-holders and land stewards would be beneficial in ensuring that indigenous land management as well as cultural and stewardship practices are considered and implemented in meaningful ways.
- Management of groundwater quality did not make significant mention of agriculture and domestic crops such as lawns (particularly mentions of top soil, fertilizer etc.). Although management of fertilizer was mentioned in Section C8, there is a focus on new development and current residents. There is an opportunity to directly address impacts from industrial activity on groundwater. While the OP does reference promoting reduction in fertilizer and pesticides so long as productivity is not reduced (Section 3.7), in some cases it may be beneficial to reduce productivity to ensure a more consistent and sustainable agricultural industry.

- “Forestry” is broadly defined and is included under a definition section titled “Forest Management or Forestry” and includes some invasive activities along with other less invasive activities saying “for the production of wood and wood products, including maple syrup”. The definition may better be split between uses which remove forest cover and uses which preserve forest cover. Additionally, the impact of forestry on the environment differs greatly depending on management technique. Clear cutting and selective logging would result in much different impacts. These broad definitions could inadvertently lead to deforestation in select land use designations where it may not be wanted.
- Increasing human interaction with environmental interfaces can be an important consideration for mitigating the impact of climate change. Though it is challenging to quantify the impact of indirect mitigation methods, they can be useful in promoting human connections to the natural environment which can partially be attributed to continued environmental decline.
- In the context of the built environment this can look like ensuring that proper buffers are maintained between streams and the built environment, promoting the daylighting of hidden streams and protecting forests and tree buffers as recreation priority areas.
- Reducing metabolic rift (the disconnection between humans and the supply chains of their consumption) can also be an indirect goal of urban development. This would look like creating policies which allow for local agro-tourism, promotion of small scale farming, and community gardens to support local food security as well and strengthen connections between communities and local food sources as pressure on agricultural lands increases into the future.

4.3 Mobility and Active Transportation

Ensuring viable alternatives to personal vehicle use is a critical consideration in relation to climate change mitigation. While there are a wide variety of carbon emissions sources, the emissions resulting from cars account for a considerable amount of personal emissions. Ensuring that all streets have sidewalks, and that sidewalks in the community’s urban areas are wide enough and designed with curb cuts and access to account for an array of users, particularly people with disabilities, older adults, and children. Street activation such as through small patios or store displays that do not take up sidewalk or cycling lane space will increase the pleurability of walking, rolling, and cycling, and will encourage those in the community to select other modes than driving where feasible.

- As the Town continues to grow, investing in a range of transit options including micro-mobility, ride-sharing and taxi services at bus and stations, and frequent

transit along key routes will be central to managing traffic and providing meaningful alternatives to car travel.

- Ensuring that bike lanes are well designed, safe, and approachable for an array of users, makes biking a more attractive option for commuters. Well implemented bike lanes that are straightforward, connected to community hubs, cleared of snow, and well-marked will have a large impact on those who chose to bike. With biking, it can be hard to attract even the most thrill-seeking riders if shoulders are too narrow, the streets are not interesting, and there are frequent close calls with other vehicles.
- Ensuring that transportation planning considers traffic calming methods can be useful to promote biking on side streets. For example, transportation planning can direct cars to arterial routes through transecting some side road intersections with a bike only barrier, or planters. This limits the connectivity available in side streets and prevents drivers from using side roads as through roads.

4.4 Complete and Healthy Communities

- Integrating ‘gentle density’ and a range of built form types to accommodate growth can contribute to the Town’s climate change adaption by supporting lower heat island effect and encouraging more green space, in addition to providing options for multi-general, affordable, and accessible housing. Promoting density can be accomplished through other much lower impact methods. For example allowing laneway homes, reducing the size of setbacks in new development, and encouraging midrise development in strategic locations can make walking distances shorter, reduce the quantity of services required, and provide more housing units.
- Considering how density is distributed in the community is also significant. Ensuring that critical community stores are a reasonable distance from residential zones is important in ensuring that a community reaps the benefits of more density.
- Incorporate a public health lens into planning and policies, considering the social determinants of health and planning for location of community services close to where people live, and universal design principles as key in the design of new and growing areas of the Town.
- It could be beneficial to identify where current community cores (or community nodes) are, and promote dense, mixed use development, with commercial street frontage in these zones. With future development, identifying several future community cores throughout the community at increments of no further than 30 minutes distance from each other (allowing for community cores to be no more

than a 15 minute walk from any location within the community) would allow for the community to spread out its development in a way that promotes accessibility and prevents car focused sprawl.

- Where walkability is high, considerations could be made to eliminate parking minimums for development, provide paid street parking on main roads, and direct parking to side roads and or an offset parking lot, with park and ride services or active transit options, for those who are commuting from outside of the community.

4.5 Climate Change Adaptation and Mitigation

- Include policy statements in the community to indicate a commitment to minimizing the effects of flooding. (This could include a commitment to nature based solutions or drainage plans (and methods) which reduce the impact of localized flooding); and,
- Use GIS systems (including flood hazard mapping and topography) and climate models to guide development away from flood prone areas, integrate nature-based solutions, and visualize areas where extreme heat can concentrate based on built conditions, in order to identify appropriate policies for cooling.
- Plan for concentrated, compact development while encouraging infill. This has many advantages including, reducing the distance between trips, allowing for communities to be more efficient with their services, increases walkability, makes communities better prepared for district energy projects, and prevents sprawl leading to habitat loss.
- Designate areas of the municipality for more concentrated, compact development.
- Cluster ex-urban and rural development adjacent to existing development where services currently exist, with a mix of uses to support access and community growth.
- Plan for energy needs to be met at the community level (including district geothermal, or heat pumps), rather than individual building or household level. Plan ahead to accommodate renewable energy wherever possible, and consider the utility of community facilities such as schools or large recreational facilities to accommodate solar panels and other renewable energy installations.
- Indicate a commitment to providing a variety of transportation options, including policies which promote effective development of bike lanes, connectivity for walking paths and public transit.
- Encourage development of high efficiency multiplexes and midrise apartments with passive heating and cooling in mind. Heat sharing can reduce overall energy usage in the colder months, while passive cooling can help manage the duration

of use for mechanical cooling. This development form also encourages active mobility.

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Appendix 1. Expanded Environmental Considerations

Precipitation and Drought

The Max 1-Day Precipitation amount, the projected greatest amount of precipitation in a given day is projected to rise from 40mm to 44mm, over 5 days the number would shift from 62mm to 67mm, a 9% increase. In the near future (2051-2081), there could be an increase from 40mm to 47mm increase in maximum 1 day rainfall and 62mm-71mm in 5-day rainfall (The Prairie Climate Center, 2019). Though this increase is notable, the impact can be mitigated through appropriate drainage and erosion measures.

The quantity in mean wet days and mean dry days under a high carbon future, are expected to remain relatively consistent with the average increasing by one more dry day from 182.8 in the recent past to 183.7 in the near future (2051-2081). (The Prairie Climate Center, 2019). Luckily, this suggests that drought is not a substantial risk for The Blue Mountains. This is further supported by Natural Resources Canada data which predicts that the region, which is currently classified as “very wet” with a Climate Moisture Index (CMI)¹ of over 40 cm, to change to “wet” with a CMI between 20-40 CM (NRCAN CFS, 2018). The impact of this change largely depends on current water usage. Though it may be prudent to promote water preservation methods, there does not seem to be an impending threat of increased drought which makes these measures much less. Precipitation is likely to remain relatively similar, with more frequent large precipitation events and a slight decrease in the overall precipitation.

Tornadoes and Thunderstorms

The effect of climate change on the frequency of tornadoes is complicated, and research is still underway to determine if more frequent tornadoes are to be expected as the climate changes. Generally, extreme thunderstorms and high winds are expected to increase in relation to climate change (Brooks, 2012). Though conditions that prove beneficial for the development of thunderstorms are often beneficial for tornadoes too, projections suggest that “high-shear” environments will be less common, which may produce storms with high wind, but not tornadoes or hail (Naishadham & Seth, 2021).

¹CMI is calculated as the difference between annual precipitation and potential evapotranspiration; the potential loss of water vapour from a landscape covered by vegetation. Positive CMI values indicate wet or moist conditions and show that precipitation is sufficient to sustain a closed-canopy forest. Negative CMI values indicate dry conditions that, at best, can support discontinuous parkland-type forests. The CMI is best suited to evaluating moisture conditions in dry regions, such as the Prairies. (NRCAN, 2021)

Though the quantity of distinct tornado events may remain the same or decrease, some suggest that tornadoes will likely be clustered closer together in timeline, and their intensity may also increase with warming weather and the trend of more intense storms (Naishadham & Seth, 2021). The Town of The Blue Mountains is located in an area with history of tornado activity and tornado warnings. Regardless of the impact of climate change, it would be prudent to model land use to reduce the potential of tornado impact.