buildABILITY CORPORATION

Phase 1: Energy and Climate Change Assessment Report

Elfrida Boundary Expansion Area

November 18 2024

prepared for:

Elfrida Community Builders Inc.

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1. Introduction

BuildABILITY Corp. has been retained by the Elfrida Community Builders Group Inc. to develop an Energy and Climate Change Assessment Report (the “ECCA Report”) for the Elfrida Urban Boundary Expansion Area (“Elfrida UBEA”) to be submitted to the City of Hamilton. The ECCA Report will be prepared “to demonstrate the impact of the potential settlement area expansion on the City’s ability to achieve carbon neutrality and demonstrate the opportunities to reduce climate change impacts and avoid climate change risks.”[1]

1.1 What is an Energy and Climate Change Assessment Report?

Energy efficiency and greenhouse gas (GHG) emissions reduction are critical strategies in addressing climate change, an increasingly urgent priority as its impacts become more apparent every year. While climate change is a global challenge, its effects are felt at a local level. The City of Hamilton has long been at the forefront of climate action. In 2019, Council declared a climate change emergency, leading to the formation of a Corporate Climate Change Task Force tasked with identifying actions to reach net zero by 2050.[2]

Within the context of the Elfrida UBEA, this ECCA Report provides a strategic framework for aligning the proposed development with the City’s climate change objectives, unique to its built environment. This report will enable Elfrida's communities to integrate energy and emissions considerations early in land-use and infrastructure planning.

With a strong commitment to sustainability and low environmental impact, Elfrida will be developed with a focus on both mitigating and adapting to the effects of climate change. In addition, the ECCA Report outlines a path toward building a low-carbon community that remains mindful of affordability for homebuyers. Ultimately, it aims to demonstrate that growth can be achieved affordably without placing an unreasonable burden on the environment at a price that homebuyers can continue to afford.

1.2 Living Document

At this time, the Energy and Climate Change Assessment Report provides a high-level plan for the community, serving as a Phase 1 Report. It is the intent that Phase 2 of the Report will be developed at the Secondary Plan stage, providing greater detail once the community unit mix, housing types, unit counts, and local infrastructure become better defined.

This ECCA Report is a living document that will evolve and adapt through ongoing review, monitoring and consultations as the community builds out. Updates will be undertaken at various phases of the development approvals process to address any necessary changes resulting from innovations in technology, new trends, and any changes in the market and regulations.

1.3 Location and Description of the Lands

The lands subject to this ECCA Report are generally bound by Upper Centennial Parkway, Mud Street East, Second Road East/Hendershot Road, Golf Club Road, Trinity Church Road and a Hydro Corridor (see Figure 1.1). The subject lands have an area of approximately 1,209 hectares and includes many individual properties that vary considerably in size, shape, and land use.

The current Concept Plan, dated November 13th, 2024 includes the following land uses ((refer to Concept Plan in Appendix A):

- Potential Residential
- Potential Intensification Hub
- Potential Intensification Corridor
- Preliminary Natural Heritage Area
- Existing Developed Industrial / Commercial Uses

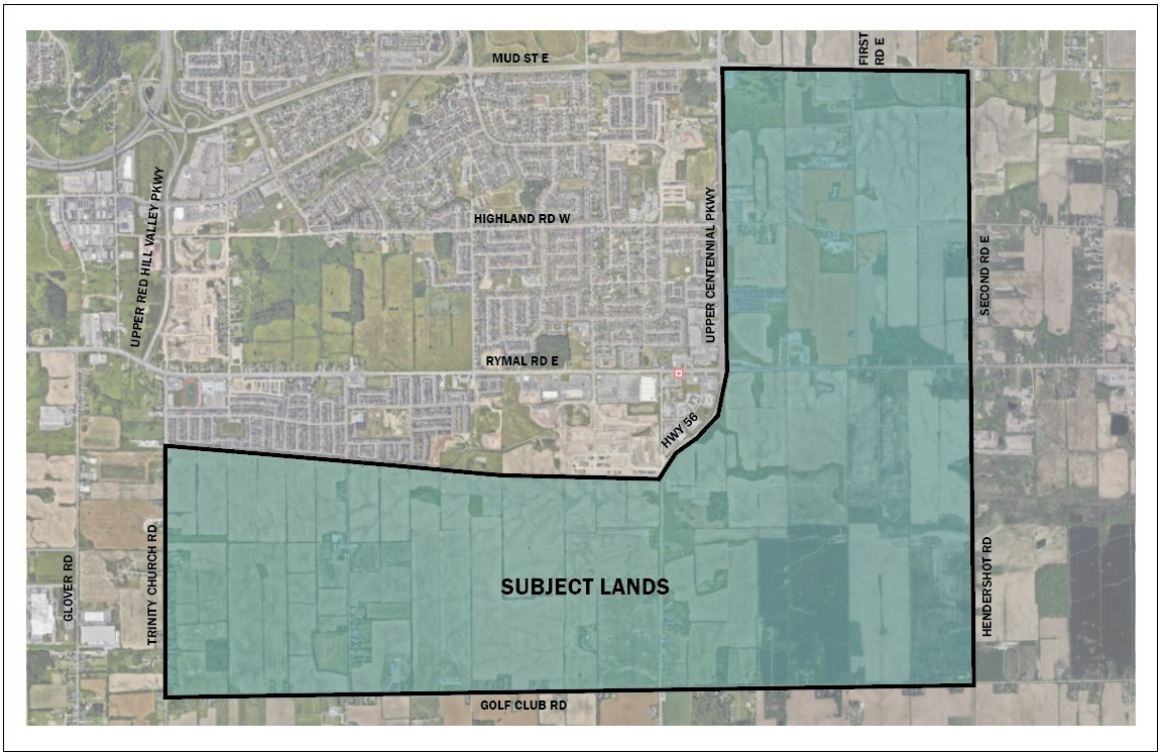


Figure 1.1. Location of subject lands.

1.4 Policy Context

The ECCA Report aligns with, and reflects, the common goals, policies and recommendations described in local, regional and provincial planning policies.

1.3.1 City of Hamilton Plans

ReCharge Hamilton: Community Energy and Emissions Plan (2022)

Recharge Hamilton: Community Energy and Emissions Plan (CEEP) identifies a pathway for the City to become net-zero by 2050, outlining strategies and actions to reduce greenhouse gas emissions, increase the resiliency of the energy systems and improves economic prosperity in the City. It identifies five Low-carbon Transformations to support the transition, namely:

(1) Innovating our Industry,
(2) Transforming Our Buildings,
(3) Changing How We Move,
(4) Revolutionizing Renewables, and
(5) Growing Green.

In Hamilton, industrial emissions make up the largest portion of the city's total emissions, with transportation coming in a distant second and residential emissions third. This ECCA Report focuses on reducing GHG emissions in the residential and transportation sectors within the built environment of Elfrida subject lands.[3]

The net-zero scenario within the building sector puts precedence and priority on energy efficiency in order to minimize the societal and environmental costs of the low-carbon transition, emphasizing that fuel switching to low-carbon/renewable energy sources could only be considered once energy efficiency measures are in place. **The CEEP establishes a target for new dwellings to be 60% more energy efficient in 2031, compared to 2016 levels, and commercial buildings to be 60% lower is energy use than 2016 levels by 2050.**[4] This ECCA Report will position Elfrida to align with the objective of the CEEP, promoting sustainable, energy efficiency, resilient communities within the subject lands.

Hamilton Climate Change Impact Adaptation Plan (2022)

The Hamilton Climate Change Impact Adaptation Plan (CCIAP) presents a plan for Hamilton to become more resilient to impacts of the changing climate. In Hamilton, the impacts of climate change have become increasingly evident, with extreme heat events, waterfront flooding, escarpment erosion, extended power outages, among other challenges. Following the City's declaration of a Climate Emergency in 2019, the CCIAP draws on the latest climate projections to identify all of the ways that climate change may affect the City operations and the community at large. Four Resilient Themes are identified in the plan: (1) Built Environment, (2) People and Health, (3) Natural Environment, Water and Agriculture, and (4) Energy and Economy.[5] Each

theme outlines various actions, action details, and supporting actions that will be reflected in this ECCA Report.

The CCIAP establishes a vision that "the City of Hamilton will be a national leader on Climate Adaptation; namely, as a healthy, equitable, vibrant, and sustainable community that responds to the needs of residents, businesses and institutions, and is resilient in the face of a changing climate."[6]

Urban Hamilton Official Plan (2024)

The ECCA Report will align with the Urban Hamilton Official Plan (UHOP) policies. Complete communities require a mix of land uses, including housing, which provide goods and services, and a range of transportation modes including public transit, all of which depend on energy.[7] Policy 3.7.2 promotes the efficient use of energy and the environmentally-friendly development through the following:

a) approval of planning applications, including applications for zoning by-law amendments, site plan approval, and plans of subdivision or condominium, as appropriate;

b) the use of environmental building rating systems such as certification under the Leadership in Energy and Environmental Design (LEED) program, R-2000 Home, Passive House, Canadian Green Building Council's Zero Carbon Standard, or an equivalent rating system or building techniques for upgrading/retrofitting of existing development and new development; (OPA 167)

c) designs which use renewable energy systems or alternative energy systems;

d) designs which use cogeneration energy systems;

e) designs which minimize building heat loss and capture or retain solar heat energy in winter, and minimize solar heat penetration in summer. Consideration shall be given to such measures as green roofs or reflective roofs, discouraging excessive surface parking, allowing direct access to sunlight, and effective landscaping;

f) building or structure orientations that maximize solar or wind energy designs that encourage sustainable forms of transportation, including active transportation, transit, as well as alternative fuel and energy conserving vehicles; (OPA 167)

g) designs that facilitate cooperation/joint energy efficiency between developments to optimize the efficient use of resources, including district energy systems; (OPA 167)

h) energy conservation initiatives, including energy demand management;

i) water and storm water conservation/management practices and low impact development techniques, such as green roofs, water recycling systems, urban storm water swales, etc.; (OPA 167)

j) promoting building conservation and adaptive reuse; (OPA 167)

k) encouraging the use of locally sourced and reclaimed building materials to reduce the amount of embodied carbon as appropriate; (OPA 167)

l) pilot projects and community energy plans as appropriate; and,

m) other environmental development standards that encourage energy efficiency and environmental design as contained in the City's approved engineering policies and standards and master planning studies, and are supported by the City's financial incentive programs.[8]

Hamilton City-Wide Green Building Standards (2024)

The City of Hamilton City-Wide Green Building Standards (GBS) were endorsed by Council on October 9th, 2024. To achieve net zero greenhouse gas emissions by 2050, the GBS establishes sustainability performance requirements and metrics applicable to all new residential, institutional, commercial and industrial uses in the urban area. These standards apply to all site plans and aim to promote energy-efficient, sustainable communities. Although this ECCA Report pertains specifically to the Urban Boundary Expansion application, it is crucial to recognize the GBS requirements, which will be applicable at later stages of the planning process.

The GBS is structured into two Tiers: Tier 1, which includes mandatory requirements, and Tier 2, which consists of voluntary targets. These standards are further organized into five key Impact Categories

1. Energy and Carbon
2. Ecology and Biodiversity
3. Water
4. Waste and Management and Materials
5. Community and Urban Design[9]

1.3.2 Provincial Plans

Provincial Planning Statement (2024)

The Provincial Planning Statement (PPS), effective October 20, 2024, replaces the Provincial Policy Statement, 2020, and A Place to Grow: Growth Plan for the Greater Golden Horseshoe, consolidating both into a single land use policy document. Policy 2.9 requires planning authorities to plan to reduce GHG emissions and prepare for the impacts of a changing climate. Approaches that could be taken include:

- supporting the achievement of compact, transit-supportive, and complete communities;
- promoting energy conservation and efficiency;
- encouraging green infrastructure, low-impact development, and active transportation; and
- building community resilience to the impacts of a changing climate.[10]

2. The Vision

The vision for Elfrida is to develop a complete, transit-supportive, mixed-use community that is compact, well connected and both environmentally and economically sustainable. It aims to establish a new vibrant mixed-use community that respects neighboring land uses, promotes sustainability and increases both walkability and opportunities for active transportation and transit use. The development will promote and protect existing natural heritage features, minimize impacts and consumption of agriculture lands, and be compatible with adjacent planned and existing land uses.

2.1 Guiding Principles

This Energy and Climate Change Assessment Report is founded on the Low-carbon Transformations as described in the City of Hamilton's Community Energy and Emissions Plan. The guiding principles of this ECCA Report are as follows:

1. **Transforming our buildings**

   Objectives that support improving the energy efficiency and GHG profile of new buildings.

2. **Revolutionizing renewables**

   Objectives that encourage renewable energy generation.

3. **Changing how we move**

   Objectives that promote active transportation and reduce the number of trips taken with single-occupancy vehicles to reduce GHG emissions.

4. **Growing green**

   Obejctives that promote carbon sequestration through the growth of tree canopies and preserving existing natural heritage features.

Transformation 1: Innovating Our Industry from the CEEP is not included in this ECCA Report's guiding principles, as there will be little to no heavy industrial uses (e.g. steel mills) within the Elfrida subject lands.

2.2 Areas of Impact

To align with local and provincial policies, this ECCA Report will focus on the following areas of impact:

1. Energy and Carbon

This section address energy efficiency and carbon reduction efforts to align with the emission targets, established in the CEEP. Key areas addressed are Site Design, Land Use Pattern, Building Design, and Overall GHG Emissions.

2. Low-carbon Energy Solutions

This report will explore opportunities for low-carbon energy solutions, such as reduced use of carbon fuels, solar, air and ground-source heat pumps, fuel switching, and district energy systems, that may be feasible and appropriate to the built environment of Elfrida.

3. Sustainable Mobility and Active Transportation

A sustainable community is one that reduces car dependency, facilitates active transportation, and supports public transit. Emphasis on mobility not only reduces energy use and GHG emissions, but also contributes to improved public health and quality of life. This Report, along with the Transportation Impact Study by C.F. Crozier & Associates Inc, will explore opportunities to promote sustainable modes of transportation.

4. Natural Environment and Water

The Elfrida Lands include a variety of Natural Heritage features that run through the development. It is the intent of the development to protect and enhance existing natural heritage features, minimize impacts and consumption of agricultural lands, and be compatible with adjacent planned and existing land uses.

5. Climate Resilience

Resilience in the context of emergency preparedness and climate change adaptation refers to a building's ability to withstand extreme weather events while ensuring occupant safety and comfort. Achieving this requires a holistic, integrative design process that views the building as a system and addresses foreseeable challenges. This section will explore resilience strategies through the built environment and building enclosure.

3. Energy and Carbon

At full build-out, Elfrida is projected to include over 39,000 housing units, as a compact, mixed use, transit-supported, active transportation friendly, and complete community in support of the City's growth. The Elfrida Urban Boundary Expansion Area represents a unique opportunity to promote sustainable urban growth by integrating thoughtful energy efficiency and emissions strategies from the initial planning stages through to construction and occupancy.

The City of Hamilton established a target that, by 2031, new dwellings are 60% more energy efficient relative to 2016 and that only 20% of new dwelling are single detached by 2050.[11] For commercial buildings, the City set a target to achieve 60% lower energy use intensity than 2016 by 2050.[12] This section explores how Elfrida will advance local and provincial policies on energy-efficient, low-carbon communities.

3.1 Site Design

It is the objective of Elfrida to monitor, maintain and improve the diversity and resiliency of urban trees and forests to mitigate the urban heat island effect (CCIAP Objective 8). The existing Natural Heritage System within the subject area, as delineated by Stantec, will be protected in a manner that is consistent with the PPS 2024. The development will aim to use green infrastructure, including parklands, stormwater management systems, and street trees, to maintain and increase carbon sequestration (CEEP 6.5). Elfrida will consider the implementation of the City's Urban Forest Strategy (2021) to maintain a healthy and resilient urban forest (CCIAP Action 8.2).

In addition, the Elfrida community will also be designed to mitigate urban heat island effect. The urban heat island effect is a phenomenon where urban areas experience higher temperatures than surrounding rural areas due to factors like reduced vegetation and increase heat absorption by buildings and pavement. The Elfrida community will consider measures, such as designing buildings with green roofs or cool roofs, increase tree canopies along for shade, and using paving materials with high solar reflectance index (SRI) (GBS CD6.1).

3.2 Land Use Pattern

The Concept Plan for Elfrida envisions a Potential Intensification Hub with high-density residential areas and a Potential Intensification Corridor with medium-density residential areas that extend along the east-west and north-south axes of the subject area. Commercial Uses may be permitted on the ground floor of the buildings in these designations, providing residents with amenities within

safe and convenient walking distances. This compact urban form promotes easier access to destinations, encourages active transportation, reduces vehicular travel, and lowers GHG emissions (UHOP B3.3.2.8). In addition, Elfrida will aim to construct a network of cycling facilities and multi-use paths, providing safe and direct routes that encourage walking and cycling (GBS CD1.2). Active Transportation is further explored in Section 5.

3.3 Building Design

"Transforming Our Buildings" is a key pillar of the CEEP, highlighting energy efficiency as the top priority for reducing GHG emissions in the building sector (CEEP 6.2). Buildings within the subject lands will aim to achieve better than Code energy efficiency and conservation levels.

Applicable to Draft Plan / Site Plan Applications, the development will aim to align with the requirements of the Council-approved Hamilton Green Building Standards. This involves designing, constructing, and labeling Part 9 low-rise residential to meet ENERGY STAR for New Homes (ESNH) v17.1, enabling new homes to be approximately 20% more energy efficient than a typical home built to Code minimum (GBS EC1.1). An ESNH certified home typically features more energy efficient space conditioning systems, ENERGY STAR certified fenestration produces, higher levels of insulation, enhanced airtightness, and reduced energy loads.

In addition, energy use and GHG emissions in large buildings will also aim to meet the targets outlined in the GBS. This applies to buildings that exceed 600m^2 and are under the scope of Part 3 of the Ontario Building Code (OBC), including those within the Potential Intensification Hub and Potential Intensification Corridor. Key considerations include meeting the specified Total Energy Use Intensity (TEUI), Thermal Demand Use Intensity (TEDI), and Greenhouse Gas Emissions Intensity (GHGI) (GBS EC1.3). Achieving lower values of these key metrics reduces the environmental impact of building operations.

While GHGI focuses on operational carbon, embodied carbon should also be given consideration, as outlined by the GBS. Embodied carbon refers to the carbon emissions associated with the manufacture and supply of all of the materials, components, and systems used in the construction of a house, building, or community. It is encouraged that a Materials Emissions Assessment and a whole building life cycle assessment by conducted to measure carbon emissions generated at different phases of the material's life (GBS EC2.1).

Furthermore, to promote the use of electric cars and lower GHG emissions, the development could consider constructing building parking spaces in residential buildings that are EV-ready (GBS EC11.1). This involves providing a rough in for the future installation of EV charging stations.

3.4 Overall Carbon Emissions

The estimated total overall carbon emissions of the community at full build out could be modelled to assess alignment with the City's emission targets. Once building archetypes and unit counts are established, this modelling process could include an analysis of energy consumption and

carbon emissions across various whole-community scenarios. This analysis can be included in a Community Energy Plan as required by the GBS (GBS EC5.1).

Each modeled scenario could represent incremental improvements in energy efficiency and carbon reduction, with the Ontario Building Code minimum requirements serving as the baseline and Net Zero Energy and Emissions as the most ambitious target—a goal set by the CEEP by 2050. A scenario where buildings satisfy the Hamilton Green Building Standards could also be incorporated. These scenarios will be defined by building measures and practices of each building archetype, incorporating a range of potential technologies and strategies. Consideration should also be given to the economic and technical feasibility of each scenario to ensure that increased energy efficiency and low-carbon measures do not compromise homebuyer affordability.

By comparing the energy and emissions outcomes of each scenario, developers and builders can identify a pathway to align with the City of Hamilton's energy and emissions targets effectively.

4. Low Carbon Energy Solutions

In addition to improved energy efficiency and GHG reduction measures, Elfrida could consider alternative energy solutions that can provide low-carbon energy solutions to the community and potentially the surrounding area.

The City of Hamilton set a target that starting in 2031, all new homes will have 30% of its annual load covered by solar PV, before the introduction of heat pumps. In addition, starting in 2026, all new commercial buildings will include rooftop solar PV panels.[13]

4.1 Solar

Low-rise homes may benefit from roof-mounted solar PV technologies. Due to large roof areas, the energy benefits may offset a good portion of the home's energy consumption. High-rise on the other hand, have little roof space and high energy use. If solar energy were to be implemented in the community, installation of roof-mounted solar photovoltaic (PV) on low-rise homes could be prioritized. A key barrier to on-site generation in many communities is the ability of the local electric company to utilize the site generated electricity.

The City of Hamilton's Green Building Standards outlines that all new buildings must be designed and constructed to be solar-ready (GBS EC5.2).[14] A solar-ready home is one that is built to allow for the installation of a future solar PV system. Under NRCan's guidelines, it includes design considerations for roof space, solar PV conduits, plumbing connections to a hot water heater, an electrical outlet, mechanical room floor space and mechanical / electrical room wall space.[15] In addition, the GBS requires builders to include an opt-in for new owners to install solar PV or thermal systems at the new owner's expense, where applicable (GBS EC5.2).

Building-integrated Photovoltaics (BIPV) offers an innovative solution for high-rise buildings, where there is limited roof space but ample façade surface area available for solar installations. In recent years, BIPV technologies have become more advanced and cost-effective, making them a viable option. Beyond reducing operational energy costs and enhancing energy supply resiliency, BIPV systems have the potential to generate excess energy that can be sold back to the grid, creating a direct profit stream for building owners while significantly increasing property value.[16]

4.2 Ground-source Heat Pump

Ground-source heat pumps (GSHP), or also known as geo-exchange heat pumps, are electric heat pumps that transfer heat between the building and the ground, which maintains a constant

temperature of around 10 degrees Celsius year-round. In Ontario, residential homes benefit from electric heat pumps as they are among the most cost-effective and climate-aligned technologies available for space and water heating.[17] The installation of ground-source heat pump is encouraged but not mandated by the GBS Tier 2 metric (GBS EC5.3).

In the context of Elfrida, installing GSHPs in each low-rise unit may be impractical due to the community's scale. A more viable option is to install GSHP systems underneath the high-density residential buildings in the Potential Intensification Hub. A study suggests that GSHPs in multi-unit residential buildings (MURB) can achieve a 33% reduction in annual energy use and a 47% decrease in GHG emissions compared to conventional 2-pipe fan coil unit HVAC systems.[18] A feasibility study conducted in later planning stages could be considered to assess heating and cooling loads of the building(s), evaluate if GSHP systems are a good fit, and explore ownership structures.

One of the main advantages of GSHPs is their high efficiency throughout the year and lower lifetime costs compared to conventional gas systems or air source heat pumps, despite their higher initial upfront costs.[19] Engaging with a third-party to own and operate GSHPs in large buildings can help lower capital costs. Furthermore, opportunities for government-initiated incentives, such as the Clean Technology (CT) Investment Tax Credit (ITC), could be explored to reduce capital cost.

4.3 District Energy

When tackling carbon emissions, it is crucial to address on space heating and domestic water heating. Space heating was reported to have the highest share of emissions by end use in the residential sector, followed by water heating.[20] A District Energy (DE) system, which consists of a network of pipes distributing thermal energy to multiple buildings within a community, sources this energy from a centralized heating and cooling center.

A district energy system is not unfamiliar in the Hamilton Region. The McMaster Innovation Park (MIP) DE system provides a centralized heating and cooling plant for three MIP buildings with a total GFA of 441,000 sqft, which generates, extracts, and shared thermal energy through the use of highly efficient geothermal and combined heat and power (CHP) engines, and mechanical equipment.[21][22] The captured thermal energy is distributed through a network of underground pipes where it is used for space and water heating.

To evaluate the potential for a district energy system in Elfrida (GBS EC6.1), a comprehensive feasibility study could be conducted by the City's DE company. This study would assess the technical and economic viability of the system, analyze the community's thermal energy demand, and involve active engagement with developers, the City of Hamilton, and potentially third-party organizations to oversee ownership and/or operations of the system.

5. Sustainable Mobility and Active Transportation

The City of Hamilton set a long-term target to lower the share of daily trips made by singe-occupant vehicles from the 2011 baseline if 67% to 53% by 2031 (see Figure 5.1).[23]

It is the intent of the development to create a transit-supportive community that is compact and well-connected to increase both walkability and opportunities for active transportation. Measures to promote active transportation will reduce trips made by single-occupancy vehicles, leading to lower carbon emissions, and improved air quality and health benefits.

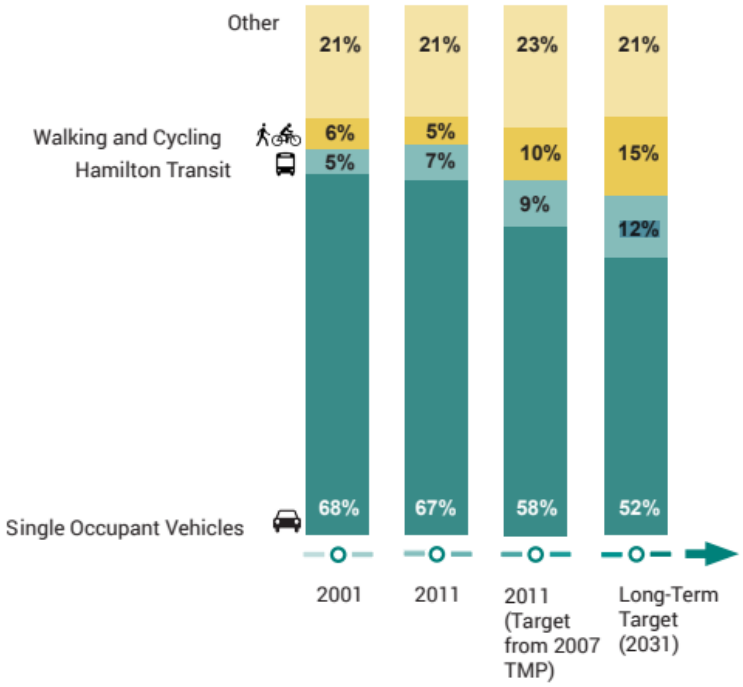


Figure 5.1. Share of daily trips made by different modes of travel. Source: City of Hamilton

5.1 Active Transportation

Elfrida will aim to provide safe and direct routes that encourage the use of active transportation modes (GBS CD1.3). The subject lands will include a network of suitable cycling facilities and multi-use paths which also connects to the bicycle network (GBS CD1.2).

Section 8.3.2 of the Transportation Impact Study by C.F. Crozier & Associates Inc. highlights Elfrida's Future Active Transportation Infrastructure and Initiatives.

The City plans to incorporate bike routes along Highland Road, and multi-use paths along Regional Road 56 and First Road East. Additionally, the following route was proposed: "Improved cycling infrastructure on Rymal Road would be desirable to maximize active transportation shares from Elfrida and other new growth areas. One major opportunity outlined in GRIDS 2 that could support greater levels of active transportation under the ambitious density scenario is the development of a major east-west spine pathway system. The major east-west spine would follow the hydro corridor between Rymal Road and Twenty Road, as envisioned in the Recreational Trails Master Plan." The proposed Hydro Corridor Active Transportation Route can connect to the Chippewa Trail to the west and the Natural Heritages Systems throughout the subject lands. Potential Active Infrastructure Routes are provided in Figure 5.2.

In addition, the Elfrida Community will aim to meet the GBS target of providing long-term and short-term bicycle parking space that meet or exceed the minimum rates identified (GBS CD3.1).

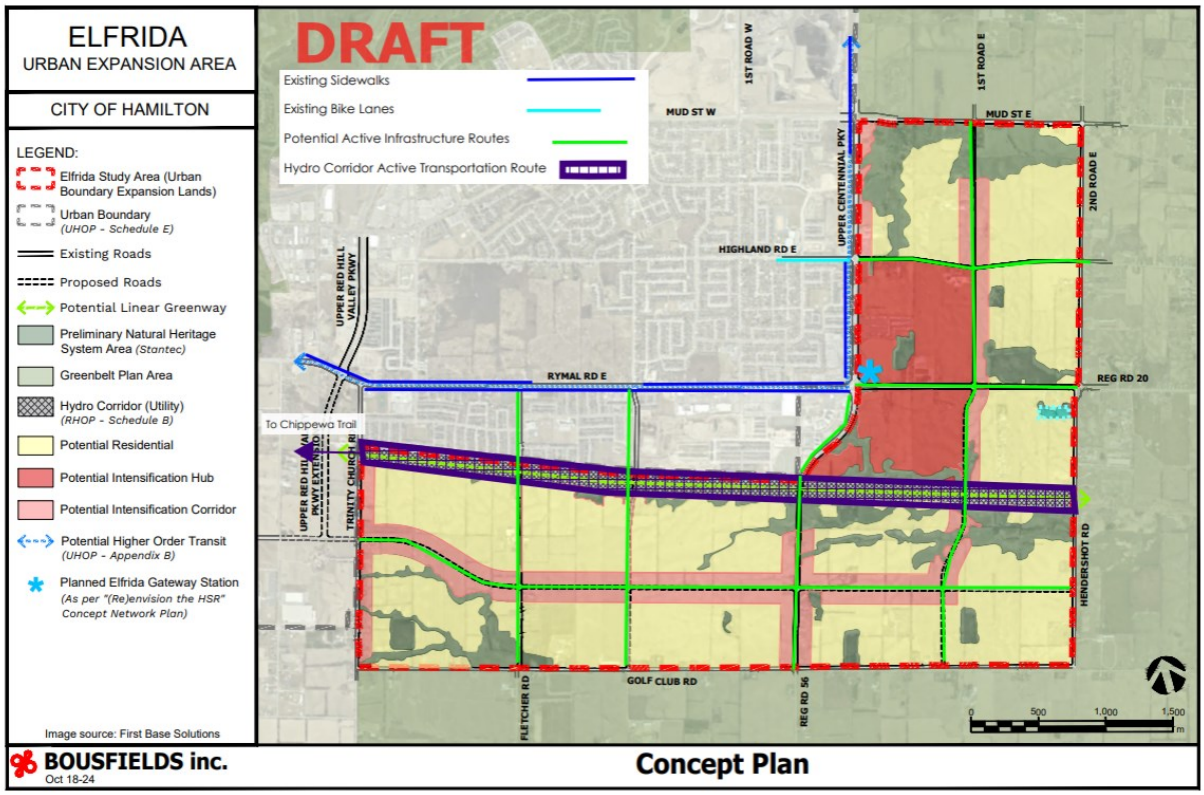


Figure 5.2. Potential active transportation network. Source: C.F. Crozier & Associates Inc.

5.2 Transit Infrastructure

The City of Hamilton set a long-term target to achieve 12% of daily trips being made by Hamilton Transit by 2031.[24] It is the intent of the Elfrida lands to develop a transit-supportive community that is compact and well-connected.

Section 9.2.2 of the Transportation Impact Study by C.F. Crozier & Associates Inc. highlights Elfrida's Future Transit Infrastructure and Initiatives. As per the City's Rail Ready System Map, the City envisions the development of major transit hubs across the City, including a hub located at Rymal Road East and Upper Centennial Parkway labeled as the Elfrida Gateway. It is envisioned that Hamilton Street Railway (HSR) routes 44 and 43 are modified to connect to the Elfrida Gateway hub and provide serviced to the rest of the community via this hub, connecting Elfrida residents to more accessible transit.

The BLAST Network is a plan for a frequent rapid transit system across the City, consisting of five different lines that are envisioned as either light rail transit (LRT) services or bus rapid transit (BRT) services. The S-Line of the network is envisioned as BRT system that would run across the Elfrida community, connecting the community to the rest of the BLAST network and with the GO station, located at the end point of the S-line. The target densities of the Elfrida community would support the investments in the S-line. However, no specific timeline has been provided regarding the S-line, despite the target deadline for the line was originally 2041.

New bus routes could also be considered to serve the Elfrida community in line with the City's transit goals. Routes such as the Hamilton Airport via Twenty Road East, and HSR routes numbers 36 and 40, could be extended into the Elfrida community. For new services, transit stops are envisioned to be located at major intersections, providing accessible coverage within typical walking distances (see Figure 5.3) (GBS CD1.2). It is expected that more refined service plans in coordination with HSR will be undertaken during the next stages of evaluation as the plans develop.

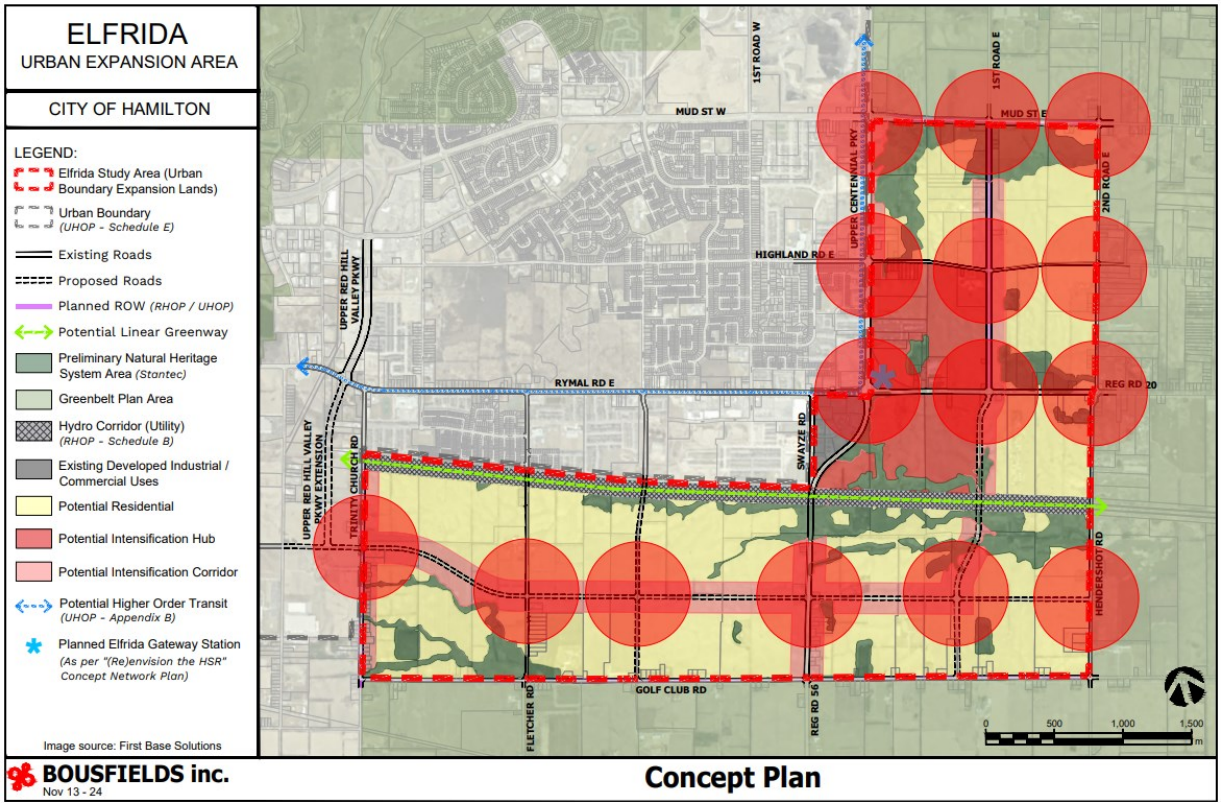


Figure 5.3. Potential transit stop location at intersections. Source: C.F. Crozier & Associates Inc.

6. Natural Environment and Water

6.1 Protect and enhance the Natural Heritage System

The Elfrida lands include a variety of Natural Heritage features, including woodlands, wetlands, and streams. The largest such Natural Heritage feature is located in the approximate centre of the site and is bisected by the hydro corridor, creating a large natural heritage corridor between Hendershot Road in the east and approaching Fletcher Road in the west. These areas of Natural Heritage and associated Linkage Areas are identified on the Preliminary Structure Plan based environmental mapping prepared by Stantec. As the planning process proceeds, including for a Secondary Plan and subsequent site-specific development applications, additional field work and more detailed mapping will occur to identify and confirm the limits of these features and their associated buffers.

Elfrida will be developed in a manner that is sensitive to the natural environment as per the UHOP and the PPS. The Preliminary Opportunities and Constraints Mapping report concludes that the subject site can be developed in a responsible manner to minimize impacts and provide a net ecological benefit to the natural heritage features and constraints that exist within the subject site.

Furthermore, an Agricultural Impact Assessment (AIA) for the Elfrida Lands have been undertaken by Colville Consulting Inc. The AIA states that prime agricultural areas cannot be avoided to accommodate the identified land needs for the City's projected population growth. The subject lands are lower priority agricultural lands within a prime agricultural area and represent a reasonable located for an Urban Boundary Expansion. The report concluded that potential impacts associated with the Elfrida Urban Expansion Area are primarily limited to the loss of prime agriculture land, cultivatable land, agricultural infrastructure, and agricultural land improvement. Recommendations have been proposed to ensure potential impacts will be avoided or mitigated to the extent possible. The net indirect impacts will be negligible with the implementation of the recommended mitigation measures.

6.2 Low Impact Development

Low Impact Development (LID) encompasses a range of strategies to increase the infiltration of rainwater into the ground to reduce the impact of contaminated runoff flowing into water streams. These strategies not only address stormwater management, but also provide social

and economic benefits, including health benefits, and improved property aesthetics and property value.[25]

Key LID best practices include bio-retention / rain gardens, permeable pavements, green roofs, bio-swales, and rainwater harvesting. By leveraging landscape-based development and green infrastructure, LID supports stormwater flow control, promotes the creation of native habitats, and boosts local biodiversity.

Aligned with the Green Building Standards (GBS), Elfrida will comply with the Green Standards and Guidelines for Low Impact Development to meet the City's stormwater quantity and quality requirements.

6.3 Water

It is the intent of the Elfrida Lands to support efficient and sustainable use of water resources, including water conservation (GBS). The development will consider incorporating rainwater capture systems in residential development for water capture/irrigation and/or local food growing, aligning with the City's CCIAP.[26] Buildings within the development will aim to conserve water use by using efficient water fixtures, balanced irrigation practices, and through ongoing monitoring, reporting and benchmarking (GBS W1,2,3).

7. Climate Resilience

Resilience can be understood in the context of emergency preparedness and climate change adaptation.[27] It refers to the ability of buildings to withstand disruptions caused by extreme weather events, while continuously providing shelter that ensures occupants are safe and comfortable until conditions are restored. Building resiliency must be taken into consideration through an integrative process involving all key players and stakeholders. It is important to approach building design through a holistic building-as-a-system principles, ensuring that all reasonably foreseeable challenges have been considered, and that buildings are durable, energy efficient, and can perform under extreme weather events.[28] Key measures that Elfrida could consider are described below.

7.1 Built Environment Resilience Strategies

- **Community Planning, Infrastructure and Services**: Critical considerations at the community scale include the planning of detours and evacuation routes in the event of automobile accidents, chemical spills, fires or flooding.[29]
- **Low Impact Development (LID) and Building Sites**: Natural landscapes are more resilient and adaptable than man-made infrastructure. LID is a stormwater management strategy designed to mitigate runoff and mimic natural water absorption processes. LID practices that could be considered include, but are not limited to, rain gardens (bio-retention basins), bio-swales, green roofs, and permeable pavements.[30]

7.2 Building Enclosure Resilience Strategies

- **Resilient Building Envelope:** Building enclosures serve as the first line of defense against extreme weather events. A high-performing building envelope has the ability to regulate temperature, keeping heat both in during colder months and out during warmer ones. They are able to utilize heating inertia, passively maintaining occupant comfort for extended period, even during power outages.[31]1234
- **Basement flooding and sewer backup protection:** Climate change has increased the frequency and severity of extreme rainfall events, resulting to increased risks of basement flooding. Key considerations include installing backwater valves to prevent sewer backups, ensuring proper drainage in basements, and grading the lot to direct runoff away from the building.

8. Conclusion and Next Steps

The Energy and Climate Change Assessment Report provides a roadmap for Elfrida to develop an energy-efficient, low-carbon community that aligns with local and regional policies and targets. Through five Areas of Impact, the ECCA Report demonstrates that growth can be achieved affordably without placing an unreasonable burden on the environment at a price that homebuyers can continue to afford.

At this time, the ECCA Report provides a high-level plan for the community, serving as a Phase 1 Report. It is the intent that Phase 2 of the Report will be developed at the Secondary Plan stage. This report will be a living document that will go through multiple iterations, with greater clarity and detail in each iteration. Through an iterative process, involving many stakeholders, including developers, builders, planner, and City staff, the ECCA Report will guide the development of the Elfrida community into a complete, transit-supportive, mixed-use area. The report will ensure the development is compact, well-connected and both environmentally and economically sustainable, all while promoting and protecting existing natural heritage features, minimize impacts and consumption of agricultural lands, and be compatible with adjacent planned and existing land uses.

Appendix A

Elfrida Urban Boundary Expansion Concept Plan

Date: November 13th, 2024

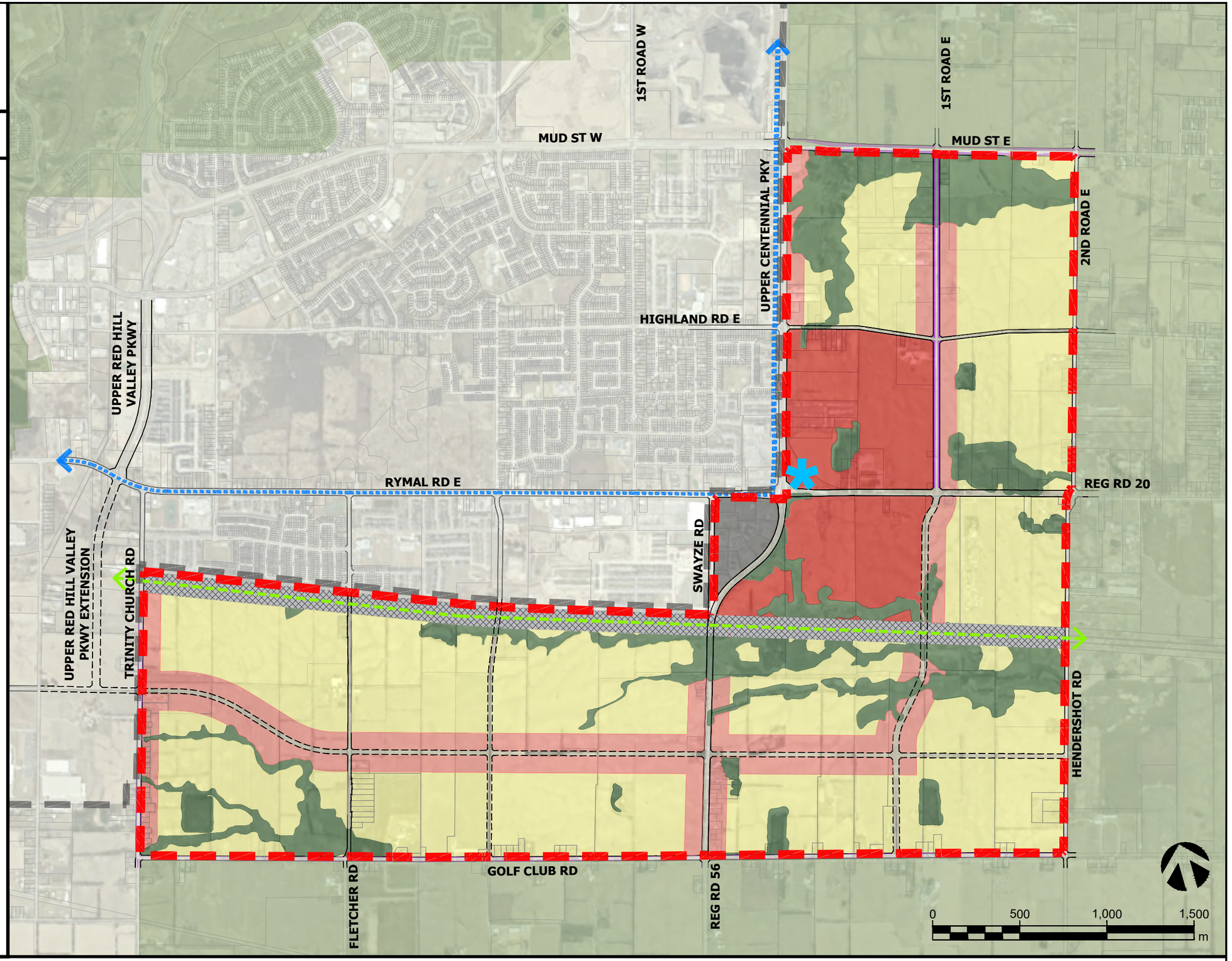
ELFRIDA
URBAN EXPANSION AREA

CITY OF HAMILTON

LEGEND:

- Elfrida Study Area (Urban Boundary Expansion Lands)
- Urban Boundary *(UHOP - Schedule E)*
- Existing Roads
- Proposed Roads
- Planned ROW *(RHOP / UHOP)*
- Potential Linear Greenway
- Preliminary Natural Heritage System Area *(Stantec)*
- Greenbelt Plan Area
- Hydro Corridor (Utility) *(RHOP - Schedule B)*
- Existing Developed Industrial / Commercial Uses
- Potential Residential
- Potential Intensification Hub
- Potential Intensification Corridor
- Potential Higher Order Transit *(UHOP - Appendix B)*
- Planned Elfrida Gateway Station *(As per "(Re)envision the HSR" Concept Network Plan)*

Image source: First Base Solutions



BOUSFIELDS inc.
Nov 13 - 24

Concept Plan

Endnotes

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