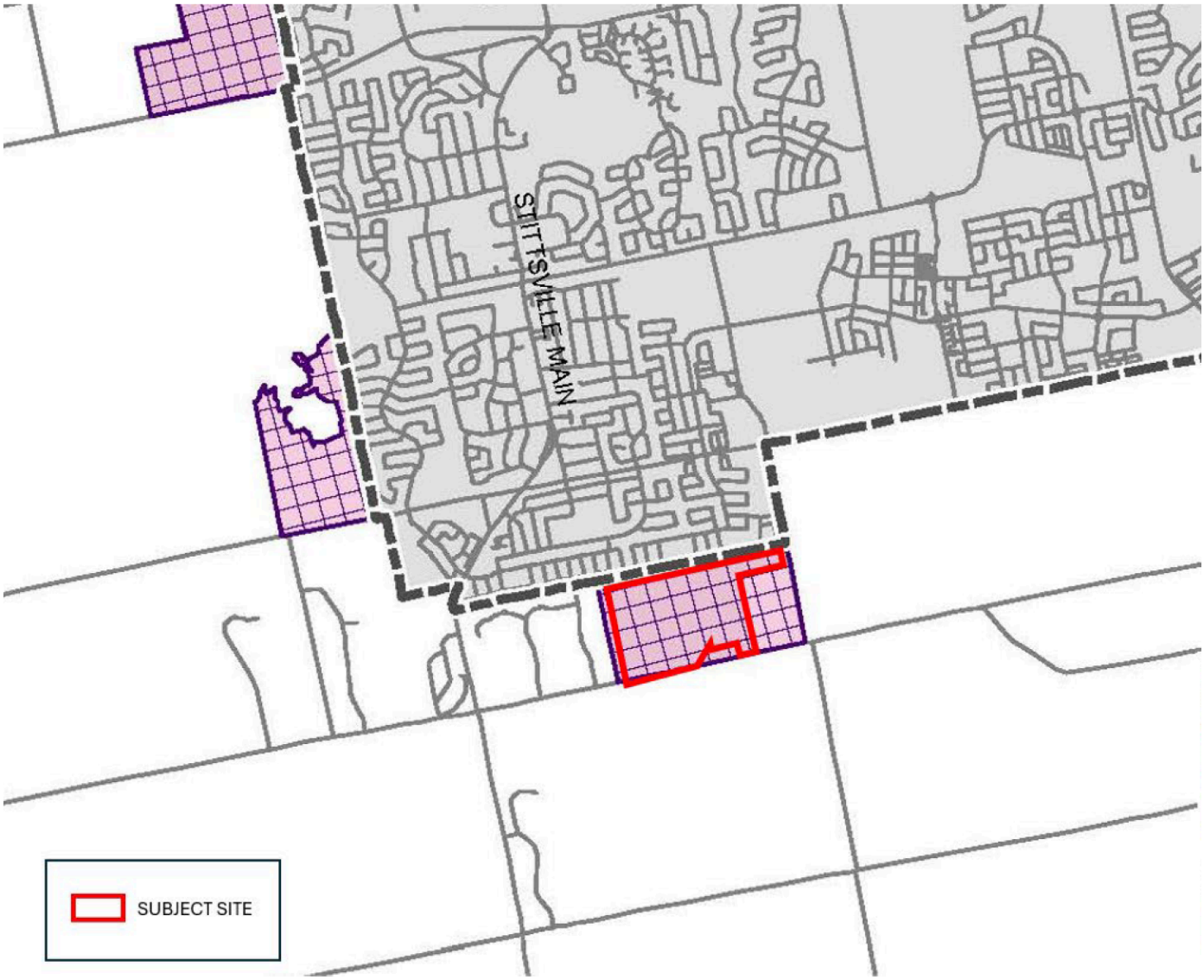
JULY 15, 2025



STITTSVILLE SOUTH

COMMUNITY ENERGY PLAN REPORT

Prepared by:

URBAN EQUATION

Prepared for

CAIVAN

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July 15th, 2025

Caivan
4100 Strandherd
Ottawa, ON
K2J 0V2
Attention: Sue Murphy

Dear Sue,

We are pleased to submit the Community Energy Plan (CEP) Report for Stittsville South for your review.

The development of these lands presents a unique opportunity to accommodate planned growth within the City of Ottawa through the development of a new community. This Report has been prepared on behalf of Caivan.

The purpose of the CEP is to provide a description of the anticipated energy use and related emissions of the Stittsville South community while presenting design and other considerations for advanced energy conservation and low-carbon generation.

Sincerely,

Steve Dulmage
Director, Sustainability

1 Introduction

On April 24, 2019, Ottawa City Council declared a climate emergency to underscore scientific warnings that Canada is warming roughly twice as fast as the global average, raising local risks of flooding, heatwaves and costly infrastructure damage. This action was meant to "name, frame and deepen" the city's commitment to safeguarding its economy, ecosystems and community from climate change, particularly after record Ottawa River floods and other extreme-weather events in the region.

Ottawa's building-sector decarbonization agenda is anchored in the City's Climate Change Master Plan (CCMP) and the companion Energy Evolution Strategy. Together they set a pathway to cut community-wide building emissions to *zero* by 2050. Energy Evolution is one of eight priorities in the Climate Change Master Plan – the City's overarching framework to reduce greenhouse gas emissions and respond to climate change imperatives. Its vision is to transform Ottawa into a thriving city powered by clean, renewable energy.

In addition to the climate crisis, Ottawa is also facing a housing crisis. The Canada Housing and Mortgage Corporation (CMHC) estimates that Canada needs approximately 3.5 million additional units by 2030 to restore affordability[1], with the Province of Ontario committing to building 1.5 million new units by 2031[2]. Building this much housing is, according to The Task Force for Housing and Climate, both a generational challenge and opportunity.

The Stittsville South development is addressing the housing crisis head on by helping Ottawa meet its housing needs. Furthermore, by leveraging its local, ABIC advanced manufacturing processes, Caivan is leaning into new and innovative ways to reduce the wider environmental impacts associated with homebuilding.

2 Description of Development

2.1 Development Overview

Stittsville South is planned to be a new residential community located in the western limits of the City of Ottawa. The 69-hectare Study Area is within the W-4 Stittsville Urban Expansion Area and designated in the Official Plan as a Future Neighborhood. The development is proceeding through a Concept Plan process recognizing the scale, accessibility to services and single ownership of the property. The development ties into the existing community to the north with road stubs, servicing connections and a sanitary pump station adjacent to the subject lands. The Stittsville South development is being guided by opportunities for innovation, sustainability, connectivity, and accessibility.

Stittsville South reflects objectives set out in The New Official Plan from the City of Ottawa, Urban Design Guidelines for Greenfield Neighborhoods (Ottawa, 2007), Building Better and Smarter Suburbs (Ottawa, 2015), Designing Neighborhood Collector Streets (Ottawa, 2019), Park Development Manual (Ottawa, 2017), and Traffic Calming Design Guidelines (Ottawa, 2019).

[1] https://www.cmhc-schl.gc.ca/professionals/housing-markets-data-and-research/housing-research/research-reports/accelerate-supply/housing-shortages-canada-updating-how-much-we-need-by-2030
[2] https://www.ontario.ca/page/tracking-housing-supply-progress

This Community Energy Plan (CEP) is a requirement of Official Plan Amendment application for lands designated future urban neighbourhood. It will provide a community-specific level of direction in terms of energy policy. More specifically, it seeks to:

- Identify potential on-site and off-site technologies that can be considered for future screening, development, analysis, and implementation; and
- Align potential solutions with broader sustainability strategies to address current and future effects of climate change.

This CEP follows the prescriptive path, and outlines potential strategies for consideration by developers, utilities, and other partners. Due to the stage of design and being adjacent to existing infrastructure, many strategies will not be feasible for Stittsville South, however the CEP will serve as a guide to future Caivan developments, and the subsequent Community Energy Brief required for the Draft Plan of Subdivision application.

The CEP is also being prepared alongside Life Cycle Assessments (LCA) of various Caivan housing typologies. While the CEP focusses on operational emissions, the LCAs will create a list of options that could be explored to reduce upfront carbon emissions associated with new construction. The list of options will be explored at the plan of subdivision stage. However, the LCA results will not be shared due to proprietary requirements.

2.2 Sustainability Drivers

Caivan is setting a new standard for sustainable residential development in Ottawa through its deep commitment to environmental stewardship and innovation. Central to this commitment is the company's advanced Building Innovation Centre (ABIC), a 105,000-square-foot prefabrication facility that embodies their ethos of innovation, sustainability and responsible, future-forward construction.

Unlike conventional building practices that generate significant material waste and emissions, Caivan’s processes eliminate waste entirely during structural assembly. Their zero-waste facility ensures optimal use of materials through precise digital design, cataloging, and cutting technique that drastically reduce landfill contributions compared to traditional methods.

Each home component is engineered with millimeter-level accuracy, resulting in airtight, high-performance building envelopes that contribute to greater energy efficiency. By shifting much of the construction process off-site, Caivan also minimizes the carbon footprint associated with on-site building activity.

For the Stittsville South project, the ABIC fully electrified production line, the use of sustainably sourced and kiln-dried SPF lumber, and a streamlined delivery system will help eliminate the thousands of vehicle trips and associated emissions commonly required for conventional construction. Additionally, ABIC-built homes arrive at site fully enclosed, minimizing the need for temporary propane heating and reducing the project’s overall carbon impact.

2.3 Development Characteristics

This Community Energy Plan is based on the Urban Design Brief as of March 2025 (see Figure 1).

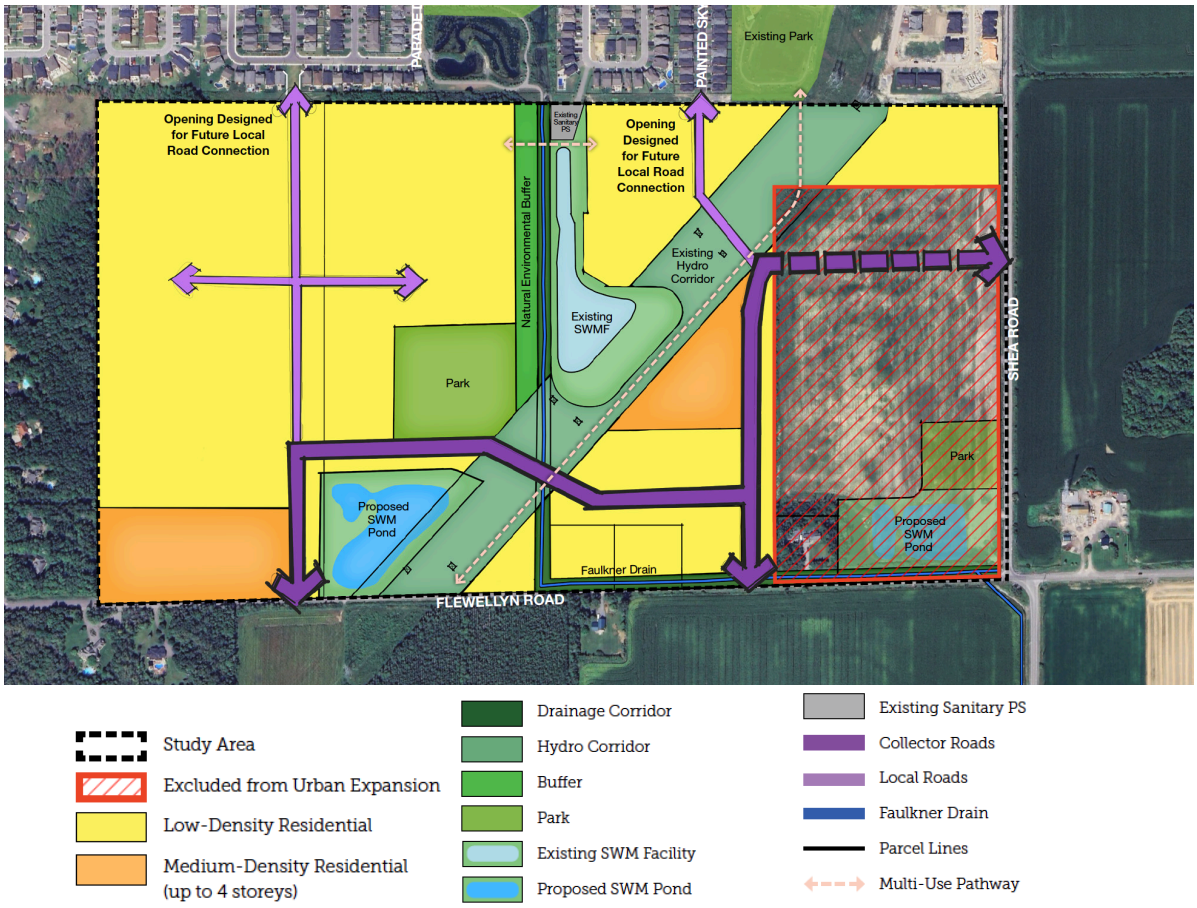

Figure 1: Stittsville South Concept Plan

The community design plan is defined by the following key components:

1. **Access and Visibility to Surrounding Natural Areas** is recognized as important function of enhanced livability. This will be achieved through retention and enhancement of a wooded buffer area along the Faulkner drain; a linked hydro corridor and open space system that provides visual and physical access.
2. **Fine-grained Network of Streets** with logical connections to adjacent existing communities including pedestrian connectivity that will provide an integrated neighborhood.
3. **Integrated Active and Passive Park and Open Spaces** provide a robust system for all ages and abilities to have all season access.
4. **High Quality and Attractive Built Form** will be provided through a variety of new housing forms and designs. The built form will showcase Cavan's commitment to quality architecture and thoughtful community design.

2.3.1 Preliminary Development Statistics and Phasing

The community will primarily showcase a mix of single detached and standard townhomes strategically interspersed, as well as stacked townhomes within the medium density blocks. Preliminary projections (see Table 1: Stittsville Development Statistics), have been prepared based on the Urban Design Brief prepared for the application. Best available information has

been used to inform this CEP, including technical engineering reports. The following assumptions have been used to define areas:

- New Land Area includes lot area + 50% of ROW in front of lot.
- Floor areas include the total area of each floor whether located above, at, or below grade per the Community Energy Plan Terms of Reference.
- Estimated floor area taken from an average unit size.

Table 1: Stittsville Preliminary Development Statistics

Density Zone	Building Archetype	Net Land Area (% of total)	Total Units (approx.)	Floor Area Per Unit (m^2) (estimated)	Total Floor Area (m^2) (estimated)
Low Density	Single Detached	36	667	263	175,421
	Standard Townhome	24	837	153	128,061
	Stacked Townhome	7	550	89.5	49,225
Total	**-**	**-**	**2054**	-	**352,707**

To better analyze the energy and carbon data within the context of the CEP Terms of Reference (TOR), Stittsville South's development characteristics were mapped onto the HPDS building archetypes (see Table 2: Stittsville Development Statistics – HPDS Archetypes).

It was assumed that back-to-back and stacked townhouses qualified as low-rise apartments, given their enhanced density over the traditional townhouse archetype and given their treatment as apartments in other applicable City of Ottawa processes, like Development Charge collection.

Table 2: Stittsville South Development Statistics - HPDS Archetypes

Ottawa HPDS Archetypes	Stittsville South Building Archetype	Floor Area (m^2)
Singles, Townhomes	Semi and Single Detached Family Homes, Townhomes and Stacked Towns.	352,707
Total	-	**352,707**

It is assumed that Stittsville will be steadily constructed over a seven-year period between 2027 and 2033.

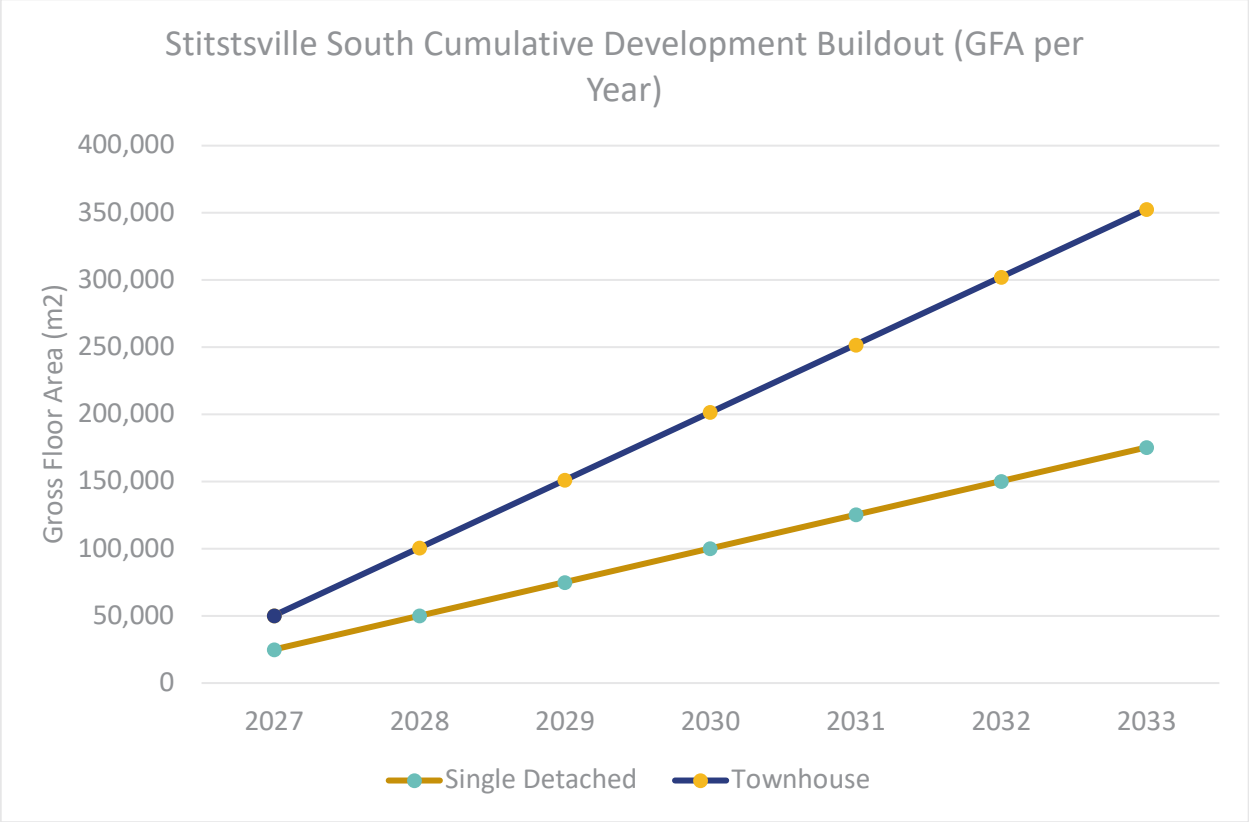

Figure 2: Cumulative Development Buildout (GFA per Year)

3 Existing Context

Currently, the Subject Site generally consists of undeveloped, vacant land. It is bordered by Flewellyn Road to the south, residential dwellings to the west, a residential development to the north, and agricultural land and residential dwellings to the east.

The site gradually slopes downward from the northwest to the southeast. The site also gradually slopes downward from the northeast and southwest to the central portion of the site, resulting in a shallow valley striking northwest southeast. There is an existing stormwater management facility centrally located on the subject lands, as well as the Faulkner Drain that runs north-south from the hydro corridor to Flewellyn Road which then runs east-west parallel to Flewellyn Road.

The property parcel of 5993 Flewellyn Road is void of trees and vegetation, whereas the property parcels comprising 6070 & 6115 Flewellyn Road are comprised of various treed areas. Further, an existing garage/storage building is located on the 6115 Flewellyn Road property.

4 Objectives of the Community Energy Plan

This Community Energy Plan sets objectives for energy and greenhouse gas emissions; it provides pathways and options for consideration that will act as guides to the preparation and

review of future CEP Reports/Briefs. Depending on Caivan's business objectives, it may contribute to the City's goal of net zero emissions by 2050, in alignment with the City's Energy Evolution Strategy.[3].

Future development applications will be complemented by a CEP Report/Brief that will speak to building-specific details of the development application. Therefore, the mitigation and resilience strategies identified in this CEP are intended to serve as a guide only for consideration that will be further evaluated at the community energy brief stage.

5 Partners

This project is being developed by Caivan, a leading Ontario-based land development and homebuilding company.

6 Data Sources and Methodologies

The data sources used to generate this CEP are as follows:

- The City of Ottawa's Community Energy Plan Terms of Reference.
- The City of Ottawa's Energy Evolution Strategy.
- Caivan Energy Model Reports

It has been assumed that the greenhouse gas targets outlined in this report are attributed to the ongoing operations of the buildings only, unless otherwise specified.

7 Consultations and Joint Working Group

Due to the nature of the Stittsville South development, specifically its proximity to existing energy infrastructure and development timeline with home construction starting in 2026, this development would not benefit from establishing a working group as other, larger scale developments would.

That said, communication was established with Ottawa Hydro to discuss the project in more detail, however at the time of writing no response was received. In the meantime, Caivan continues to engage its internal and external experts, to find ways to reduce its carbon footprint. Internally, Caivan is working with its ABIC teams, such as its HVAC Designers, to explore operational efficiencies.

Externally, Caivan is supported by Building Knowledge (energy modeling consultants) and Urban Equation (carbon and sustainability consultants), both leading sustainability / carbon consulting firms. Specifically, Urban Equation is completing life cycle assessments for key Caivan Building typologies to identify ways in which embodied carbon could be reduced. Urban Equation is also exploring other low-carbon opportunities on one other Caivan project. Where possible and relevant, Caivan will leverage lessons learned from each project to inform the other.

[3]https://documents.ottawa.ca/sites/default/files/energy_evolution_strategy_en.pdf

8 Energy Use and Carbon Emissions

8.1 Reference Scenarios

The Community Energy Plan requires that the project consider how the proposed solution (referred to as 'Scenario 4') will compare to three (3) reference scenarios. Per the City's CEP Terms of Reference, these include:

- Scenario 1: A Business As Planned (BAP). The BAP Scenario estimates 1,175kg equivalent annual CO^2 emissions added for every new home. Household energy for Ottawa's baseline year 2016 is estimated at 105.56GJ / household declining down to 65.93 GJ / household by 2050.
- Scenario 2: 50% Emissions Reduction. The Energy Evolution Strategy Model to 2050 reduces emissions 50% from the BAP scenario to 587kg equivalent annual CO^2 emissions per new home.
- Scenario 3: Near Zero Emissions. The Energy Evolution Strategy target scenario calls for near zero emissions for every new home built after 2030. Household energy use in this scenario is expected to reduce to 23.43 GJ / household in the target scenario, this consumption is offset by local renewable energy generation to achieve near zero emissions.

8.2 Proposed Scenario (Scenario 4)

This section outlines the proposed targeted thermal energy demand intensity (TEDI), energy use intensity (EUI) and greenhouse gas intensity (GHGI) targets for Stittsville South (see Table 3). These targets align with modelling conducted on archetype buildings within the typologies being constructed at Stittsville South.

Table 3: Proposed Scenario – Stittsville South

Building Archetype	EUI (kWh/m^2)	TEDI (kWh/m^2)	GHGI (kg$CO2_e$/m^2)
Single Detached	160	57	19
Townhouse	113	33	13
Apartment (<6 Storeys)	108	10	12

Caivan will continue to explore ways to reduce energy consumption and related greenhouse gas emissions as development takes place in the years to come. See the energy use and supply strategies described further in Section 8.3.

8.3 Mitigation Strategies

This section provides more detail on the potential energy consumption and carbon emission mitigation strategies that could be leveraged to assist Stittsville South in meeting the proposed approach. Due to the preliminary nature of design, updated modelling and actual mitigation strategies will be confirmed at the CEP Brief stage. The strategies have been broken down into the following categories:

- Community Infrastructure
- Building Design
- Embodied Carbon

As the project advances towards detailed development applications, the following strategies will be explored as the community and building designs continue to evolve. The strategies included in this section will inform and guide future assessment, both at the community and building infrastructure level. As Caivan continues to explore ways in which it can reduce carbon emissions, these strategies will be assessed based on costs, timing, emission reductions and availability of energy solutions. The ultimate goal is to provide a range of attainable housing types within the market that can quickly contribute to the City's housing pledge.

8.3.1 Community Infrastructure

Energy Infrastructure

The use of community-based energy systems can be an effective method to efficiently provide thermal and electrical energy to buildings. Stittsville South will tie into the existing hydro grid system and alternatives are unlikely within the development horizon. However, Caivan will continue to monitor industry advancements (technical, regulatory, partnerships) in order to determine if and how community scale solutions could support future development at Stittsville South, or elsewhere.

Transportation Network

Stittsville South will be equipped with a variety of different mediums for travel throughout the community, aligning with the larger vision of creating a connected and accessible community that promotes healthy living and social opportunities. These mediums aim to connect users to major greenspace elements, such as parks and the hydro corridor that leads to a wider range of recreational opportunities. The mediums that will encourage active mobility in Stittsville South are:

- Sidewalks
- Multi-Use Pathway along the Collector Road and
- Through the Hydro Corridor
- Recreational Trail that runs parallel to the NHS
- Walkway Blocks

Stittsville South will consider the following mitigating strategies (please see the Transportation Report for more detailed information, including projected mode share):

- **Connected and Active Transportation Networks:** Active transportation will be prioritized to make a pedestrian and bike-friendly community, thereby reducing the need to drive within the community to run local errands and travel to and from work and school.
- **Strong Transit Connection:** Stittsville South will enter into an Early Transit Service agreement with the City to extend local transit services to this new neighbourhood such that transit is available day one.

- **Electric Vehicle Charging Availability:** Stittsville South will continue to monitor the progression towards zero emission vehicles, and consider the infrastructure needed to reduce emissions related to automobile traffic.

8.3.2 Building Design

8.3.2.1 Passive Design Strategies

The most efficient energy source is energy that is not used. This means that one of the most effective solutions to creating an energy efficient community is reducing the work that building systems must carry out to maintain a comfortable environment. Below are examples of passive design strategies that will be considered to reduce total energy demand pending the financial implications.

Building Envelope

Given building design trends across Ontario: lower density building archetypes, such as townhouses and single detached homes, increasing insulation above minimum code requirements can improve envelope performance. These opportunities will be carefully considered during the detail design stage. Attainable home ownership is a key issue contributing to the housing crisis. Consideration of increasing energy standards and costs must be balanced with market pricing tolerances.

Glazing

High performance glazing products with low solar heat gain coefficients provide daylight while reducing over-heating in shoulder seasons and cooling loads in the summer.

Building and Street Orientation

The land use plan is premised on a well-connected grid network of local streets connecting in a logical and land-efficient way to the existing roads and sidewalks in the area. Therefore, there is limited opportunity to completely optimize the solar orientation of any new street networks.

8.3.2.2 Active Design Strategies

Once the thermal loads of buildings are reduced as much as is reasonable through passive design strategies, efficient building systems are used to further reduce energy use intensity. The following solutions do not leverage combustion as a means of building heating.

Given that building systems vary significantly between low density residential and higher density, multi-use residential buildings, they have been listed out separately. Examples of active design strategies are listed below.

Low-Density Building Archetypes

Caivan will consider the following (and other) active design strategies when preparing the specification level for the low-density building archetypes to improve performance if financially viable:

- EnergySTAR appliances.

- High-efficiency LED lighting, daylight and occupancy controls.
- Designing to achieve reductions in domestic hot water energy use through low flow plumbing fixtures.
- High efficiency HVAC and domestic hot water systems where appropriate, including:
    - Cold climate air source heat pumps.
    - Dedicated ground source heat pumps, either on a dedicated loop for each home, or on shared loop in smaller quantities (i.e. a block of townhouses may share a single loop, but each unit will maintain their own heat pump).

8.3.3 Embodied Carbon

Embodied carbon, the greenhouse gas emissions resulting from the extraction, production, transportation, and installation of building materials (as well as their end-of-life disposal), plays a significant role in the total carbon footprint of new development. Unlike operational carbon (emitted during a building's use) embodied carbon is "locked in" from the construction phase. Embodied carbon is important as it remains a significant portion of a building's emissions, more so as energy-efficient technologies reduce operational carbon.

Currently, the City of Ottawa does not provide guidance on the reduction of embodied carbon from material use and construction. Furthermore, few industry standards include targets for low-rise buildings, making targets difficult to establish. As such, Caivan is developing its own embodied carbon targets, drawing from industry research and best practice. This work is underway, and information that can be shared will be included in the CEP Brief.

Targets will apply to upfront embodied carbon from life cycle stages A1 to A5. Stages B (related to building use) and Stage C (end of life) will not be included but may be considered in the future. A1 to A5 (summarized below) typically represent more than 75% of a buildings' embodied emissions and are the focus of most industry goals.

- A1: Raw Material Supply
- A2: Transport (of Raw Materials to Manufacturer)
- A3: Manufacturing
- A4: Transport (of manufactured goods to construction site)
- A5: Construction/installation processes

Targets, including those for single family homes and townhomes, will be further evaluated where future CEP Reports/Briefs are requested, (i.e. Draft Plan of Subdivision application and conditions of approval).

8.3.3.1 Strategies to Reduce Embodied Carbon

The following embodied carbon reduction strategies will be considered, developed and finalized as additional building details are advanced.

Pre-design Stage

- Prefabrication: Modular and prefabricated components, such as those currently constructed at the Caivan AIBC manufacturing facility, can be lower in embodied carbon because they are manufactured in controlled environments thereby reducing material waste, optimizing resource use, and minimizing energy-intensive on-site processes.

- Framing Techniques: Optimizing the structural framing via stud and joist spacing can help reduce the amount of lumber used and thus lower carbon impact.

Design Stage

- Low Carbon Insulation: Where applicable in the assembly, substituting to a lower Global Warming Potential insulation will help lower impact.
- Local Lumber: Ensuring that lumber sourced is produced locally, where possible, can minimize transportation emissions and support sustainable forestry practices in the region.
- Salvaged Material: Incorporating salvaged timber, brick, or fixtures from deconstructed buildings, if available, can reduce demand for virgin materials.
- Low-Carbon Concrete: Using materials verified by Environmental Product Declarations (EPDs) can ensure they meet low-carbon performance standards. This includes innovative concrete, recycled steel, or alternative low-carbon products.
- Locally Sourced Materials: Specifying materials sourced within a certain radius of the construction site can ensure that emissions from transportation are reduced.

Construction Stage

- Circular Economy Practices: Reusing or recycling surplus materials from construction, such as steel formwork or optimizing concrete orders can minimize waste sent to landfills.
- Material Wastage: Collaborating with contractors to monitor and optimize material orders can help reduce waste. Implementing precise calculations can ensure efficient use of resources.

9 Energy and Carbon Emissions Analysis

Energy Evolution adopted a phased approach to setting building- and community-scale energy and emissions targets for the period from 2021 to 2030 in response to the climate crisis. The baseline “Business as Planned” metrics established for 2021 were designed to become progressively more stringent in 2025 and again in 2030, largely based on anticipated updates to the building code during that period.

However, for several reasons — including the impacts of COVID-19 and the ongoing housing crisis — baseline performance has not changed over the past five years. As a result, the City’s metrics no longer accurately reflect the likely performance of current developments. Put differently, Caivan’s products, which largely outperformed the “Business as Planned” scenario as recently as December 2024, now underperform against those metrics, despite no meaningful improvements to the building code or standards to incentivize better design.

In consultation with the City, it was agreed that extending the 2021 “Business as Planned” scenario through to 2029 would more accurately reflect current housing market conditions. Accordingly, the charts in this section assume that the 2021 baseline metrics remain static until 2029, while the City’s 2030 targets remain unchanged.

9.1 Thermal and Total Energy Consumption

A comparison between Stittsville's proposed thermal and total energy consumption along with greenhouse gas emissions and the reference scenarios included in the City of Ottawa's Terms of Reference are shown below.

Figure 3 shows Stittsville South's Sitewide Thermal Energy Use (MWh) and demonstrates that the current design is better than the revised 2021-2029 Business as Planned scenario.

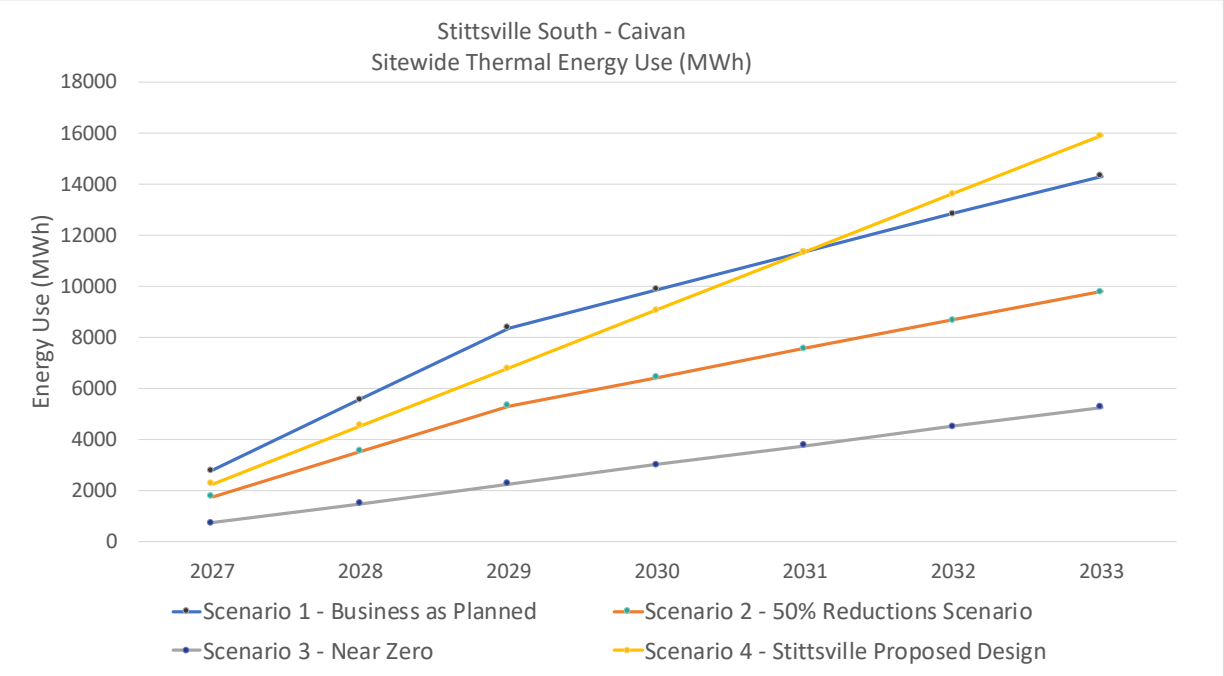

Figure 3 Stittsville Sitewide Thermal Energy Use for Scenarios 1-4 (MWh)

Sitewide energy consumption is shown in Figure 5. At the community scale, this figure shows that Caivan's current design slightly exceeds the Business as Planned scenario. This will undergo further evaluation by Caivan, with an update in the CEP Report.

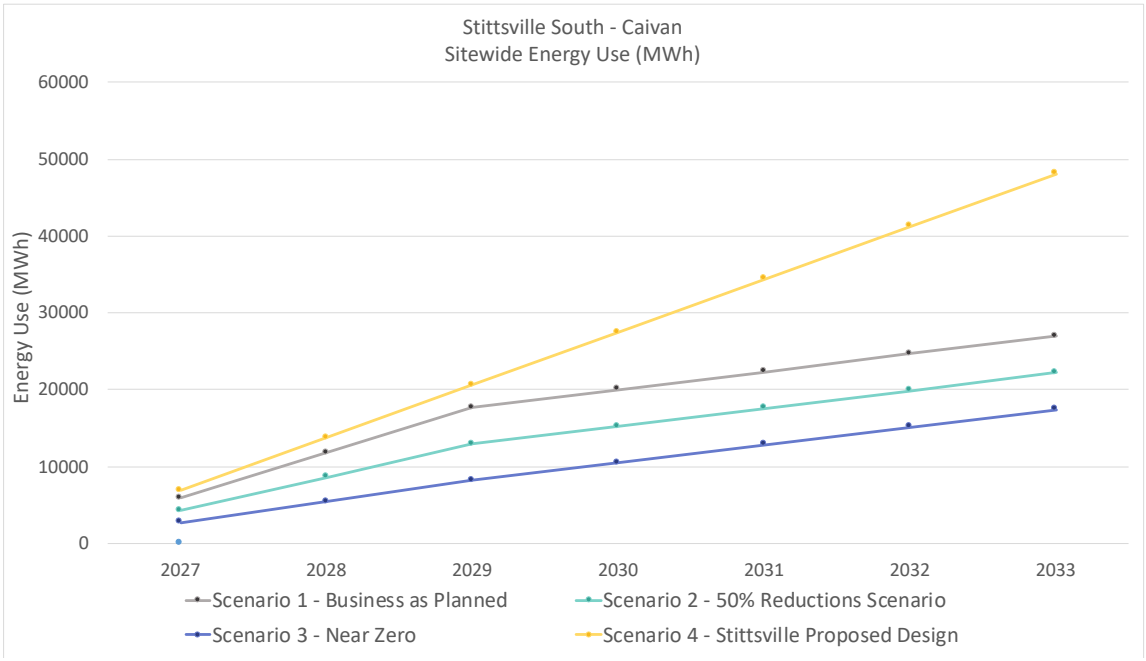

Figure 4: Stittsville Sitewide Energy Use for Scenarios 1-4 (MWh)

9.2 Operational Greenhouse Gas Emissions

Sitewide greenhouse gas emissions are shown below. Like the sitewide TEDI, the proposed design is better than Business as Planned (2021-2029), until the scenarios change in 2030. At the CEP Report phase, Caivan will comment on how evolving design can respond to these targets over time.

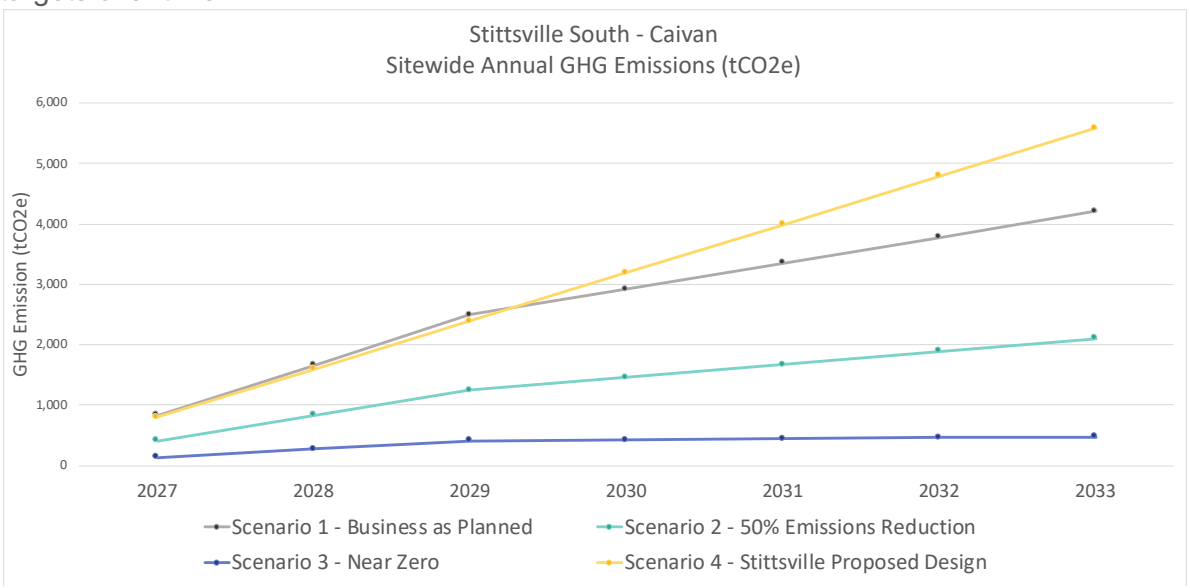

Figure5: Stittsville South Sitewide GHGI for Scenarios 1-4 (KgCO2e/m2)

In addition to the efforts underway to reduce the embodied carbon of our homes (not shown in this CEP), Caivan will continue to explore ways to reduce operational emissions across its communities.

10 Energy Resilience

As climate change progresses and weather events become more extreme and unpredictable, it will be critical for energy systems to be resilient to these changes. The shift towards higher average annual temperatures can lead to lower heating and higher cooling loads over the life of the building. Using up to date, or even predicted, weather data when doing early analysis can allow the project team to consider how the design will perform over the life of the building.

With increasing global temperatures, extreme weather events require designs to carefully evaluate back-up power solutions for emergency (life safety) requirements in certain buildings. Passive design strategies such as a relatively low window-wall ratio, high thermal mass elements within the building, and / or high R-values for the building insulation would assist in maintaining building temperature in the event of heating/cooling system failure.

11 Implementation Measuring and Monitoring

As the design progresses, the proponents shall continue to evaluate the feasibility of options that could improve upon the business as planned scenario mentioned in this report.

12 Conclusions / Recommendations

This Community Energy Plan captures a moment in time early in the development process; therefore, we see this CEP as a working document that will continue to be a consideration in the design of Stittsville South. Further updates will be reflected in the CEP Brief at a later date.

With respect to planning, the Official Plan Amendment area-specific policy would stipulate:

The Community Energy Plan will serve as a guide for the subsequent Community Energy Brief required for the Draft Plan of Subdivision.

This report was completed in draft by Darynne Hagen, P.Eng and completed by Steve Dulmage, Director, Urban Equation.