A&J Energy Consultants
"your success is our success"

Energy Conservation Report

969, 979 & 989 Mapleview Drive East, Barrie ON

Sandy Creek Estates Inc. Phase 2

Prepared for: Corporation of the City of Barrie

December 2, 2024

EXECUTIVE SUMMARY

On behalf of the Corporation of the City of Barrie, Sandy Creek Estates Inc. retained A&J Energy Consultants (AJEC) to complete an Energy Conservation Report for the proposed development at 969, 979, and 989 Mapleview Drive East.

This development consists of 328 units, to include:

- Single Detached – 28 units
- Townhouses – 209 units
- Back-to-Back Townhouses – 22 units
- Condo Townhouses – 69 units

Using Natural Resource Canada's HOT2000 energy modelling protocols (Version 11.11), AJEC compared conceptual project designs to minimum Ontario Building Code SB-12 2017 performance requirements. Sandy Creek Estates Inc. indicated that the performance of the single-family dwellings was of particular interest, and thus is highlighted where appropriate.

This report outlines the specific strategies modeled to achieve lower energy use, reduce energy demand, and reduce greenhouse gas emissions, as well as the assessment of opportunities for low-carbon energy solutions both on- and off-site. High-performance strategies assessed include but are not limited to: added exterior continuous insulation, higher performance windows, energy efficient lighting, high efficiency mechanical and hot water heating systems, and improved ventilation systems for superior indoor air quality.

Entire Site (328 Units)	**SB-12 A1 Reference**	**Proposed Design**
Energy Use Intensity (ekWh/m^2)	165.4	128.2
Energy Savings Over from SB-12 A1	-	22.5%
Greenhouse Gas Intensity (kg of $C0_2e/m^2$)	2777.2	15.1
Greenhouse Gas Emissions Savings Over from SB-12 A1 (%)	-	99.5%
Total Natural Gas Consumption (ekWh)	7,933,092,104.0	2,994,830.8
Natural Gas Savings Over from SB-12 A1 (%)	-	100.0%
Total Water Consumption Per Year (US Gal/yr)	4,473,413.6	3,561,037.0
Total Water Savings Over from SB-12 A1 (%)	-	20.4%

Single Detached (28 Units)	SB-12 A1 Reference	Proposed Design
Energy Use Intensity (ekWh/m^2)	184.2	141.2
Energy Savings Over from SB-12 A1	-	23.3%
Greenhouse Gas Intensity (kg of $C0_2e/m^2$)	3589.2	17.2
Greenhouse Gas Emissions Savings Over from SB-12 A1 (%)	-	99.5%
Total Natural Gas Consumption (ekWh)	690,758,203.9	281,564.7
Natural Gas Savings Over from SB-12 A1 (%)	-	100.0%
Total Water Consumption Per Year (US Gal/yr)	4,473,413.6	3,561,037.0
Total Water Savings Over from SB-12 A1 (%)	-	20.4%

Townhouse (209 Units)	SB-12 A1 Reference	Proposed Design
Energy Use Intensity (ekWh/m^2)	159.9	124.1
Energy Savings Over from SB-12 A1	-	22.4%
Greenhouse Gas Intensity (kg of $C0_2e/m^2$)	3436.4	14.8
Greenhouse Gas Emissions Savings Over from SB-12 A1 (%)	-	99.6%
Total Natural Gas Consumption (ekWh)	5,606,413,940.7	2,039,650.3
Natural Gas Savings Over from SB-12 A1 (%)	-	100.0%
Total Water Consumption Per Year (US Gal/yr)	4,473,413.6	3,561,037.0
Total Water Savings Over from SB-12 A1 (%)	-	20.4%

Back-to-Back Townhouse (22 Units)	SB-12 A1 Reference	Proposed Design
Energy Use Intensity (ekWh/m^2)	194.5	155.5
Energy Savings Over from SB-12 A1	-	20.0%
Greenhouse Gas Intensity (kg of $C0_2e/m^2$)	2429.3	16.9
Greenhouse Gas Emissions Savings Over from SB-12 A1 (%)	-	99.3%
Total Natural Gas Consumption (ekWh)	244,952,325.5	143,262.7
Natural Gas Savings Over from SB-12 A1 (%)	-	99.9%
Total Water Consumption Per Year (US Gal/yr)	4,473,413.6	3,561,037.0
Total Water Savings Over from SB-12 A1 (%)	-	20.4%

Condo Townhouse (69 Units)	**SB-12 A1 Reference**	**Proposed Design**
Energy Use Intensity (ekWh/m^2)	170.5	131.3
Energy Savings Over from SB-12 A1	-	23.0%
Greenhouse Gas Intensity (kg of $C0_2e/m^2$)	23.0	15.0
Greenhouse Gas Emissions Savings Over from SB-12 A1 (%)	-	35.0%
Total Natural Gas Consumption (ekWh)	1,390,967,633.9	530,353.1
Natural Gas Savings Over from SB-12 A1 (%)	-	100.0%
Total Water Consumption Per Year (US Gal/yr)	4,473,413.6	3,561,037.0
Total Water Savings Over from SB-12 A1 (%)	-	20.4%

CONTENTS

INTRODUCTION

Purpose

According to the City of Barrie's *Community Energy and Greenhouse Gas Reduction Plan*, the city aims to reduce overall greenhouse gas emissions to 45% below 2018 levels by 2030, and become net zero by 2050.[1] Decisive action is required to meet these targets, including the goal of producing near zero emissions in both new and existing buildings.

This Energy Conservation Report, completed by A&J Energy Consultants (AJEC), identifies specific opportunities for energy conservation, reduction in greenhouse gas emissions, and use of low carbon solutions for Sandy Creek Estates Inc.'s proposed development at 969, 979, and 989 Mapleview Drive East in Barrie.

Based on AJEC's assessment of the proposed development, this Energy Conservation Report identifies and evaluates opportunities to:

- Achieve low energy use
- Reduce energy demand
- Implement low-carbon energy solutions, both on-site and off-site
- Reduce greenhouse gas emissions

These recommendations will help guide the development of a proposed site design that takes full advantage of the currently available products, tools and techniques to create energy efficient spaces to live and work in Barrie.

Proposed Development

- Sandy Creek Estates Inc.'s proposed development at 969, 979, and 989 Mapleview Drive East consists of 328 units, which includes 28 units of Single Detached, 209 units of Townhouses, 22 units of Back-to-Back Townhouses, and 69 units of Condo Townhouses.

[1] Building Barrie. (2021) *Community Energy & Greenhouse Gas Reduction Plan.*

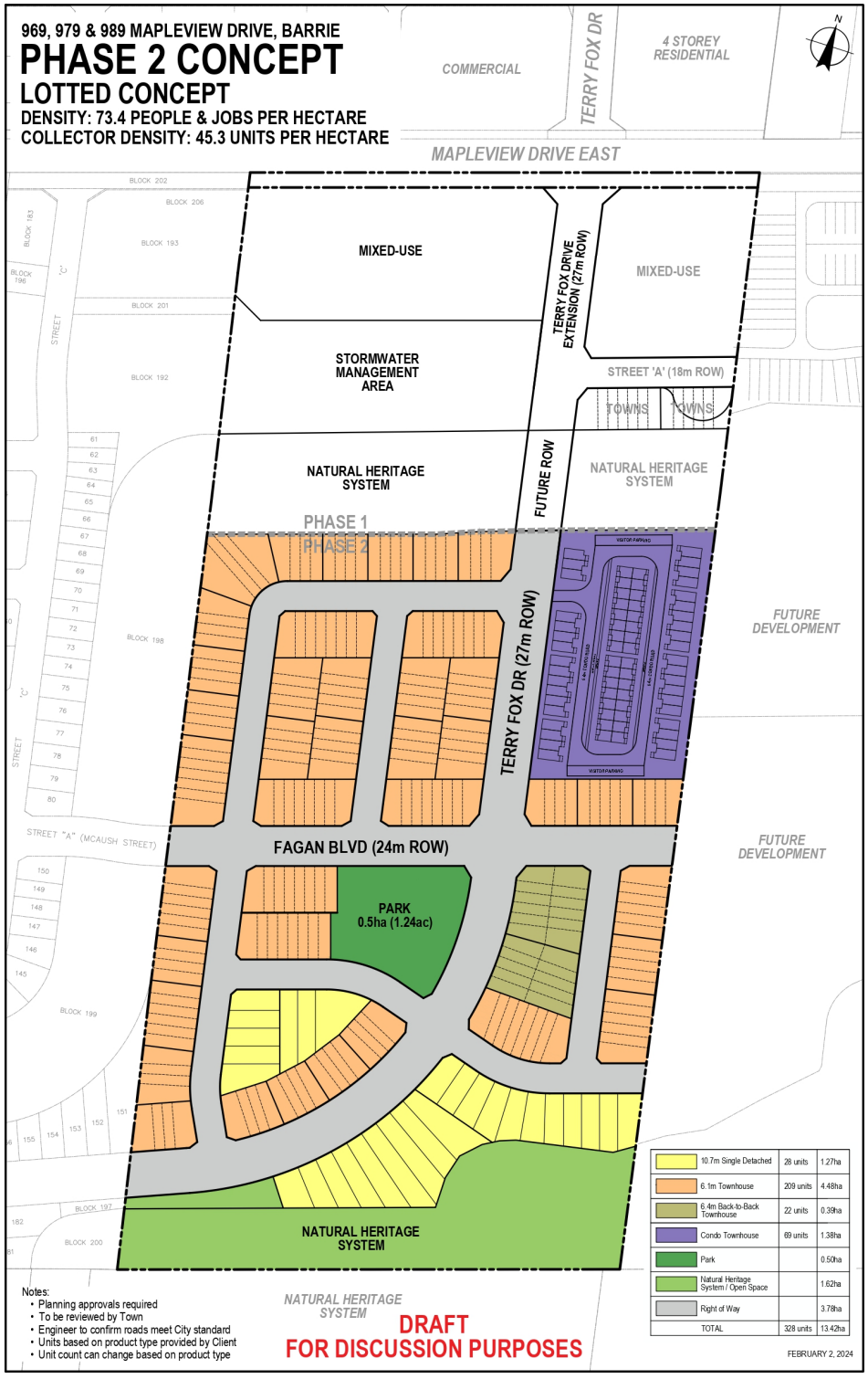

Figure 1 - Conceptual Site Plan

At a minimum, this project will meet all Ontario Building Code (OBC) SB-12 2017 requirements; however, this report explores opportunities to achieve lower energy use, reduce energy demand, and other areas, which may be incorporated in the design and construction process.

Methodology

AJEC used conceptual designs to estimate the energy consumption, water consumption, and greenhouse gas emissions of the proposed development using Natural Resource Canada's HOT2000 energy modelling protocols, Version 11.11.

The assessed models includes:

- Single Detached units consisted of 6 model types.
- Townhouse consisted of a left end, a middle, and a right end unit type.
- Back-to-Back consisted of a left end, a middle, and a right end unit type.
- Condo Townhouses consisted of a left end, a middle, and a right end unit type

The proposed units' performance were compared against fifteen references models using minimum OBC SB-12 2017 performance requirements to assess potential energy savings.

Assumptions

Energy modelling was performed on drawings assumed to be comparable to the final designs; however, designs have yet to be completed.

All procedures and recommendations follow the EnerGuide Rating System (ERS) Procedures Version 15.10. Consumption rates are based on placeholders provided by the ERS procedures, and do not represent final demand by the end user, which may vary depending on individual behaviours.

Consumption assumptions were based upon the following levels of occupancy:

- 2 adults, 1 child at home for 50% of the time for all models

Limitations

HOT2000's (Version 11.11) energy modelling protocols are unable to perform energy modelling on:

- Solar controls
- Daylighting design strategies

As building orientation was already defined by the conceptual site plan and restricted by existing site infrastructure, changes to building orientation for greater passive solar gains were not assessed. Similarly, due to existing site infrastructure, identification and assessment of advanced energy conservation measures (such as district energy, combined heat and power, and heat recovery from sewer lines) are outside the scope of this report.

PERFORMANCE OVERVIEW

Metrics Used to Evaluate Performance

Energy Use Intensity

Energy use intensity is measured in ekWh/m^2 (ekWh/ft^2). This is calculated by annual building energy use divided by conditioned floor area (including retail space).

Greenhouse Gas Intensity

Greenhouse gas intensity is measured in kg$C0_2$e/m^2 (kg$C0_2$e/ft^2), and is calculated by annual building greenhouse gas emissions divided by conditioned floor area.

Assumptions:

- Greenhouse gas emissions for grid-supplied electricity assumed to be 0.050 kg$C0_2$/kWh as per OBC SB-10
- Greenhouse gas emissions for natural gas assumed to be 1.899 kg$C0_2$/m^3 (0.191 kg$C0_2$/ekWh) as per OBC SB-10[2]

Recommended Design Modifications

Recommended modifications to the OBC reference building design include:

- Added insulation for main walls above grade (2”x6” @ 16" o.c. R20 BATT + R5 C.I.)
- Improved windows performance (U = 1.4 / ER = 29)
- Space Heating (Air Source Heat Pump @ 8.2 HSPF + 96% AFUE Gas Furnace Backup)
- Space Cooling (ASHP @ 14 SEER)
- Energy Recovery Ventilator (75% SRE with ECM)
- Hot Water Heater 94% Thermal Efficient / 0.88 UEF (Condensing Tank)
- Lighting (> 75% ENERGY STAR Certified Bulbs @ 295 kWh/yr)
- Low flow water bathroom faucets and showerheads

[2] Government of Ontario. (2017). *Supplementary Standard SB-10 Energy Efficiency Requirements 2017*.

Recommended Builder Option Package (BOP)

Sandy Creek Estates Inc. Phase 2 **Mapleview Drive East (969, 979 + 989)**	2017 OBC SB- 12 - Package A1 (Reference Building Design)	**Performance Draft BOP** **(Proposed Building Design)**
Ontario Zone	Zone 1 < 5000 HDD	Zone 1 < 5000 HDD
INSULATION		
Ceiling with Attic Space	R60	R60
Ceiling without Attic (Cathedral or Flat Roof)	R31	R31
Raised-Heel Trusses (All Ceiling Types, min 10")	N/A	N/A
Main Walls (Above Grade)	2”x6” @ 16" o.c. R22 BATT	2"x6” @ 16" o.c. R20 BATT + R5 C.I.
Rim Joists	Same as Main Walls	Same as Main Walls
Exposed Floor	R31	R31
Basement Walls Below Grade	R20 C.I.	R20 C.I.
Below Grade Slab Entire Surface > 600 mm Below Grade	R10	R10
Heated Slab or Slab ≤ 600 mm Below Grade	R10	R10
Edge of Below Grade Slab ≤ 600 mm Below Grade	R10	R10
WINDOWS AND DOORS		
Windows/Sliding Glass Doors WWR ≤ 17%	U = 1.6 / ER = 25	U = 1.4 / ER = 29
Skylight	U = 2.8	U = 2.8
Decorative Windows (< 20 sq ft)	Low E, Argon Filled	Low E, Argon Filled
Exterior Doors	As Per OBC (R3.97)	As Per OBC (R3.97)
MECHANICALS		
Space Heating Equipment	96% AFUE	ASHP @ 8.2 HSPF + 96% AFUE Gas Furnace Backup
Space Cooling Equipment	13 SEER	ASHP @ 14 SEER
Heat/Energy Recovery Ventilator	75% SRE	75% SRE with ECM
Domestic Hot Water	0.80 Energy Factor	94% Thermal Efficient / 0.88 UEF (Condensing Tank)
Combined Space and Water	N/A	N/A
Radiant Heating Equipment	N/A	N/A
Fireplace	Sealed w/ Spark Ignition (If Applicable)	Sealed w/ Spark Ignition (If Applicable)
Duct Work	As Per OBC	As Per OBC
Thermostat	Programmable	Programmable
ELECTRICAL		
Lighting	As Per OBC	> 75% ENERGY STAR Certified Bulbs @ 295 kWh/yr
Exhaust Fans	As Per OBC	As Per OBC
In Home Energy Display	N/A	N/A
All Off Electrical Switch	N/A	N/A
OTHER		
Drain Water Heat Recovery	≥42% Efficiency – Two Showers	N/A
Solar Photovoltaics	N/A	N/A
Air Tightness Target (ACH @ 50 Pa)	OBC 2017 Default Airtightness Targets	OBC 2017 Default Airtightness Targets

Note: C.I. = continuous insulation

ENERGY CONSUMPTION

Building Envelope

Walls Above Grade

The OBC Prescriptive A1 Package is the most used building package for residential developments in Ontario. This package consists of a 2"x 6" studs @ 16" on centre (o.c.), completed with R22 insulation batts inside the stud cavity.

For the proposed building design, AJEC is recommending a one-inch exterior continuous insulation on the walls above grade. This upgrade:

- Improves the thermal performance of the building envelope assembly up to 25%
- Increases thermal comfort for the occupants
- Improves the durability of the building envelope, with reduced chances of condensation within the stud cavity
- Lowers the heat loss/gain for space heating and cooling equipment

Additional savings in both materials and energy costs would be realized by increasing the stud spacing on exterior walls from 16" o.c. to 24" o.c.

Fenestration (Windows, Sliding Doors, and Skylights)

OBC SB-12 requires that fenestration products do not exceed a U-Value of 1.6, or that they meet a minimum Energy Rating (ER) of 25. Using fenestration products with better performance than these minimum requirements will deliver better results.

AJEC recommend using fenestration products that do not exceed a U-Value of 1.4, or that meet a minimum Energy Rating of 29. It is important to note that a Solar Heat Gain Coefficient of 0.42 is assumed for these products to avoid overheating during cooling seasons.

Airtightness Testing

Blower door testing and on-site inspections of building envelope airtightness will be a critical part of achieving the energy efficiency targets and savings as modelled. Not only do these quality assurance processes ensure that products meet airtightness targets, but they also result in better overall trade performance, fewer homeowner call-backs, a healthier home, and improved homeowner satisfaction.

OBC SB-12 states the Normalized Leakage Area is 0.28 CFM50/ft^2 (2.27 cm^2/m^2) for attached product.[3] Energy modelling for the proposed design did not include airtightness above code, though many units will perform better than this base level standard, providing additional savings.

[3] Government of Ontario. (2016). *Supplementary SB-12 Energy Efficiency for Housing 2017*.

Attaining the increased airtightness requirements of an ENERGY STAR for New Homes' Normalized Leakage Area (NLA) of 0.26 CFM50/ft^2 (2.12 cm^2/m^2) for attached product[4] is very achievable for production building. This represents an improvement of airtightness of 14% or better, and results in lower heat loss/gain, improved indoor comfort, and improved indoor air quality (with controlled mechanical ventilation).

Mechanicals

Air Source Heat Pumps

OBC SB-12 standard does not stipulate the use of an Air Source Heat Pump (ASHP); however, an ASHP is an energy efficient way to keep living spaces comfortable. These electrically driven mechanical systems operate like a reverse air conditioner, drawing heat from the outside air during the heating season and distributing that heat through the blower of a conventional furnace. It operates as a standard air conditioner during the summer cooling season. Typical ASHPs' coefficient of performance is between 3 and 5, meaning that 1 kW of electricity used to run the ASHP can produce between 3 and 5 kW of heating energy. ASHP systems are common in the Canadian market, with over 700,000 installed units across Canada.

AJEC recommends the installation of ASHP for all planned units. The advantages of reducing natural gas consumption for heating by switching to electricity through the installation of an ASHP are significant. Assuming that the units on Mapleview Road East will have air conditioning as a standard, it is a minor cost upgrade (approximately $1,000) to upgrade the air conditioner to an ASHP. Most often used during the shoulder seasons, spring and fall, a natural gas furnace would augment the heating during the coldest days of the year. This would reduce carbon emissions by offsetting any heat produced by natural gas.

When installed, the ASHP is also the perfect match for a small solar photovoltaic energy array, where the energy generated by the panels can be directly consumed by the ASHP.

Heat/Energy Recovery Ventilators

OBC SB-12 2017 requires either a Heat Recovery Ventilator (HRV) or Energy Recovery Ventilator (ERV) to meet the Sensible Heat Recovery (SRE) as per the applicable compliance package.[5] However, the OBC has no requirements for how much electricity is used to meet these efficiencies. The metric used to measure the electrical efficiency is cubic feet per minute of airflow achieved per watt of electricity consumed at that required SRE rating.

The energy performance difference between an HRV and an ERV is negligible. However, installing either one with an electronic commutated motor (ECM) is preferable in terms of total energy consumption. AJEC recommends usage of ERVs for this development due to the location's proximity to Lake Simcoe. ERVs can control and/or retain the moisture level of the

[4] Natural Resources Canada. (2020a). *ENERGY STAR® for New Homes Standard Version 17.1 - Revision 2*.
[5] Government of Ontario. (2016). *Supplementary SB-12 Energy Efficiency for Housing 2017*.

indoor air during both heating and cooling seasons, as required. As well, an ERV does not require installation of a condensate drain. This feature is beneficial both for homeowner comfort and the durability/longevity of the building materials.

Domestic Hot Water

The OBC Prescriptive A1 Package requires an energy factor of 0.80 for water heating equipment. For the proposed design, AJEC recommends a 94% Thermal Efficient / 0.88 UEF condensing tank.

Baseloads

Lighting

AJEC recommends that more than 75% of the entire house use ENERGY STAR certified LED light bulbs, which will account for more than 295 kWh/year in electrical savings.[6]

Smart Thermostats

The effect of smart thermostats cannot be effectively included in the assessed energy model; however, these devices have been shown to consistently reduce household energy consumption, especially when used with this goal in mind.[7]

Many smart thermostats learn the household's temperature preferences, and automatically establish a schedule that adjusts to energy saving temperatures when residents are asleep or out of the house. With an internet connection, individuals can also remotely monitor and control household temperatures when off-site, including while on vacation.

Additionally, smart thermostats can provide homeowners with data regarding equipment usage and household temperature trends, enabling better understanding, management, and optimization of personal energy usage and associated costs.

[6] Natural Resources Canada. (2016). *ENERGY STAR® for New Homes Standard Version 17.0 - Ontario*

[7] Government of United States of America, Department of Energy. (2020). *Energy Star - Perfect Climate Inside and Out*. https://www.energystar.gov/sites/default/files/tools/ES_SmartTherm_Factsheet_2020-1.pdf

Other Opportunities

Water

AJEC recommends use of ENERGY STAR certified dishwashers and washing machines for this development. As such machines will not be installed or provided as standard to the purchaser, their use should be written into the homeowner purchasing agreement. An ENERGY STAR certified dishwasher is estimated to use 20 kWh/year, while an ENERGY STAR certified clothing washing machine is estimated to use 25 kWh/year.[8]

Similarly, AJEC recommends use of WaterSense bathroom faucets and showerheads for all units. Not only do these faucets and showerheads use less water as compared to conventional designs, they also reduce energy consumption as less water is required to be heated without any additional behavioural change on the part of the homeowner.

Homeowner Education

Homeowner behaviour has a significant effect on energy use and conservation, making homeowner education an important tool in the reduction of energy demand.

AJEC recommends at minimum that all homeowners receive an easy-to-read manual at occupancy that explains all of the energy features of the house, and that the mechanicals have been “right sized” for their house to save energy and reduce their utility bills. The customer needs to understand “bigger isn’t always better”.

Additional advice in the manual should include how to:

- Properly maintain appliances (cleaning filters and coils, yearly professional maintenance)
- Use the smart thermostat to reduce energy usage and lower heating bills
- Take full advantage of PowerStream Time of Use pricing
- Use an energy monitor to modify energy consumption and track consumption trends over time
- Access further resources to help improve household energy efficiency (such as Alectra, Ministry of the Environment, Conservation and Parks, Save on Energy, Kilowatt Way)

[8] Natural Resources Canada. (2016). *ENERGY STAR® for New Homes Standard Version 17.0 - Ontario*.

Performance Analysis

Please note: All models are single-family dwelling units

Community Energy Use Intensity	SB-12 A1 Reference	Proposed Design
Entire Site – (ekWh/m^2)	165.4	128.2
Total Savings	-	**22.5%**
Single Detached – (ekWh/m^2)	184.2	141.2
Total Savings	-	**23.3%**
Townhouse – (ekWh/m^2)	159.9	124.1
Total Savings	-	**22.4%**
Back-to-BackTownhouses – (ekWh/m^2)	194.5	155.5
Total Savings	-	**20.0%**
Condo Townhouses – (ekWh/m^2)	170.5	131.3
Total Savings	-	**23.0%**

Table 1 – Predicted Energy Use Intensity by Product Type

NATURAL GAS CONSUMPTION AND GREENHOUSE GAS EMISSIONS

Moving from Natural Gas to Electricity

Natural gas produces 3.80 times more greenhouse gas emissions per ekWh than electricity in Ontario:

- Natural gas – 1.899 kg of $C0_2e/m^3$ is equivalent to 0.191 kg of $C0_2e$/ekWh [9]
- Electricity – 0.050 kg of $C0_2e$/kWh[10]

Moving energy consumption from natural gas sources to electricity thus represents a significant potential decrease in overall greenhouse gas emission. For example, using an ASHP instead of a standard air conditioning condensing unit, as discussed above, the emission reduction is expected to be double digit percentage savings.

Household Water Fixtures

Pumping and treatment of municipal water and sewage represent a significant source of greenhouse gas emissions. For example, while data for the City of Barrie was not available, in 2017 the City of Toronto had a greenhouse gas emission factor of 114.4 g CO_2e per m^3 of water due to water pumping and treatment and sewage pumping and treatment.[11]

According to 2019 data, water operations represented 20% of the City of Barrie's city-wide energy consumption, and utility costs of $1.92 million. Wastewater operations consume a further 12% of the total energy use for the City of Barrie, at a cost of $1.15 million.[12] Reducing these service areas represents a significant opportunity to improve Barrie's overall energy performance, as well as reduce associated costs.

To reduce the household water use in the proposed development, AJEC recommends use of ENERGY STAR certified dishwashers and washing machines for all homeowners. In addition to the reduction in total energy consumption and electrical savings discussed in sections above, these machines also use less water, and will reduce the volume of water entering Barrie's sewage and water treatment system.

Similarly, AJEC recommends use of WaterSense labelled toilets, bathroom faucets, and showerheads, which will result in less water used overall, and thus a reduced volume of water entering the sewage treatment system than with conventional fixtures. These savings are in addition to the energy savings from needing to heat a smaller volume of water.

---

[9] Government of Ontario. (2017). *Supplementary Standard SB-10 Energy Efficiency Requirements 2017*.
[10] Government of Ontario. (2017). *Supplementary Standard SB-10 Energy Efficiency Requirements 2017*.
[11] Toronto 2030. (2022). *Data & Definitions*. https://www.toronto2030platform.ca/data-and-definitions
[12] City of Barrie. (2019). *City of Barrie : Conservation & Demand Management Plan 2020-2024*.

Electrification

Private vehicles are responsible for a significant use of energy and emissions. To reduce this, AJEC recommends the rough-in of electric vehicle charging stations be installed as a standard, which will support future homeowners' choice to purchase and run an electric vehicle.

Performance Analysis

Community Greenhouse Gas Intensity	SB-12 A1 Reference	Proposed Design
Entire Site – (ekWh/m^2) Total Savings	2777.2 -	15.1 **99.5%**
Single Detached – (ekWh/m^2) Total Savings	184.2 -	141.2 **99.5%**
Townhouse – (ekWh/m^2) Total Savings	3436.4 -	14.8 **99.6%**
Back-to-BackTownhouses – (ekWh/m^2) Total Savings	2429 -	16.9 **99.3%**
Condo Townhouses – (ekWh/m^2) Total Savings	23.0 -	15.0 **35.0%**

Table 2 – Predicted Greenhouse Gas Intensity by Product Type

Community Natural Gas Consumption	SB-12 A1 Reference	Proposed Design
Entire Site – (ekWh/m^2) Total Savings	7,933,092,104.0 -	2,994,830.8 **100%**
Single Detached – (ekWh/m^2) Total Savings	690,758,203.9 -	281,564.7 **100.0%**
Townhouse – (ekWh/m^2) Total Savings	5,606,413,940.7 -	2,039,650.3 **100.0%**
Back-to-Back Townhouses – (ekWh/m^2) Total Savings	244952325.5 -	143262.7 **99.9%**
Condo Townhouses – (ekWh/m^2) Total Savings	1,390,967,633.9 -	530,353.1 **100%**

Table 3 – Predicted Natural Gas Consumption by Product Type

WATER CONSUMPTION

Household Water Fixtures

As reviewed in sections above, AJEC recommends use of ENERGY STAR certified dishwashers and washing machines for all homeowners, as well as use of WaterSense labelled toilets, bathroom faucets, and showerheads, to reduce household water use in the proposed development.

Landscaping

AJEC recommends that the proposed development use Xeriscaping, which is the practice of designing landscapes to limit the need for sod. Xeriscaped landscapes:

- Use drought-tolerant vegetation to reduce water consumption
- Need little or no water beyond what nature provides through rainfall
- Financially benefit both the homeowner and the city

Performance Analysis

Community Water Consumption from Faucets and Showerheads	SB-12 A1 Reference	Proposed Design
Entire Site – (ekWh/m^2) Total Savings	4,473,413.6 -	3,561,037.0 **20.4%**
Single Detached – (ekWh/m^2) Total Savings	4,473,413.6 -	3,561,037.0 **20.4%**
Townhouse – (ekWh/m^2) Total Savings	4,473,413.6 -	3,561,037.0 **20.4%**
Back-to-BackTownhouses – (ekWh/m^2) Total Savings	4,473,413.6 -	3,561,037.0 **20.4%**
Condo Townhouses – (ekWh/m^2) Total Savings	4,473,413.6	3,561,037.0 **20.4%**

Table 4 – Predicted Water Consumption by Product Type

CONCLUSIONS

According to modelling, when constructing the proposed development to the recommended building option package, Energy Use Intensity is reduced by 22.5%, Greenhouse Gas Intensity is reduced by 99.5%, Natural Gas Consumption is reduced by 100%, and washroom faucet and shower head Water Consumption is reduced by 20.4% annually. These represent significant improvements; however, it is important to test and verify performance throughout construction to ensure the products achieve the modelled performance.

When assessing energy efficient options for this development, AJEC focused on proven technologies and products that do not add excessive construction costs, and thus, help keep the price lower for purchasers. However, according to the 2021 CHBA Homebuyer Preference Study, purchaser appetites for energy efficient homes are rising. 45.86% of respondents indicated that they would invest in energy efficient features to lower their utility costs, 21.53% cited an interest in protecting the environment, while 7.59% credited the increase in construction quality as their primary motivation.

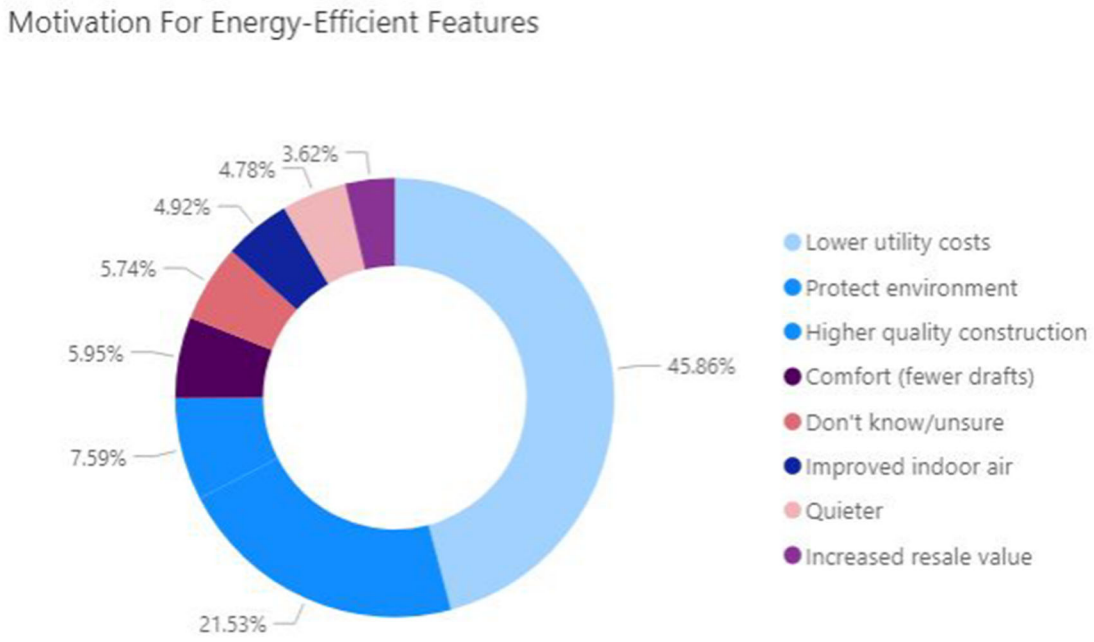

Figure 2 - Buyer Motivation for Energy Efficient Features

Given the range of benefits that energy efficient options provide, buyers are also willing to pay more for an energy efficient home: in the 2021 CHBA Homebuyer Preference Study, **92.75%** of

respondents indicated that they would be willing to pay more for their home in order to reduce long-term utility costs.[13]

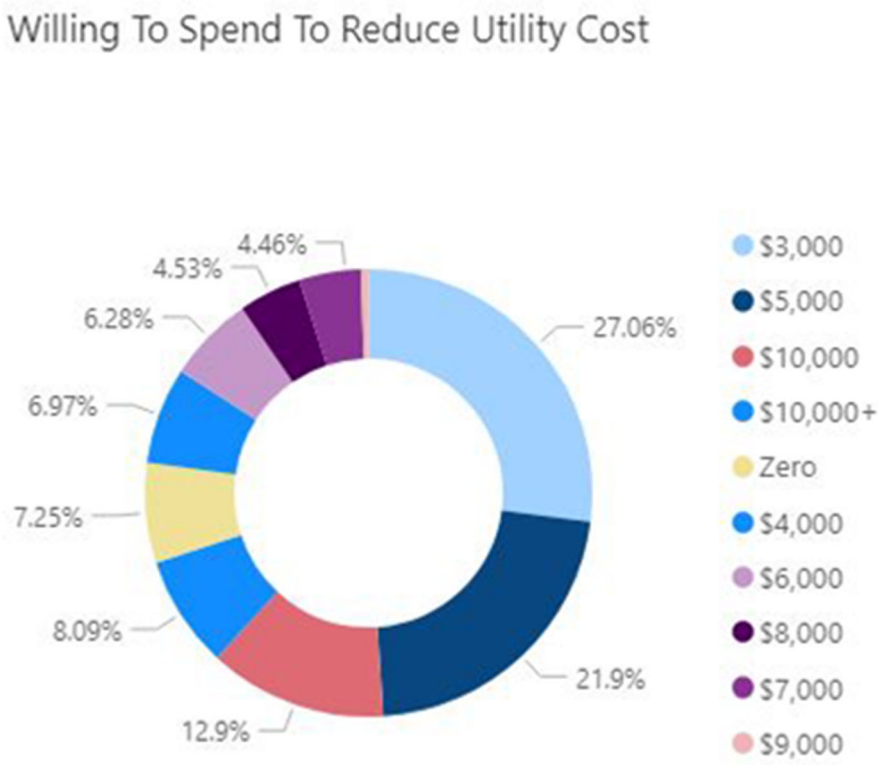

Figure 3 - Buyer Willingness to Spend

Increased energy efficient construction practices and products have also been demonstrated to reduce service calls, increase occupant comfort, and improve buyer satisfaction. While not modelled, Sandy Creek Estates Inc.'s team is encouraged to explore the feasibility and cost of options that can deliver even greater benefits to energy conservation and the homeowner alike. Such options may include:

- Lower air tightness targets
- Low Volatile Organic Compound paints
- Xeriscaped landscapes

Both modelling and real-world experience demonstrates that building sustainable, energy efficient homes can be cost-effective and affordable, while delivering comfort and value for homeowners for years to come.

[13] Canadian Home Builders' Association. (2021) *2021 CHBA Homebuyer Preference Study, powered by Avid Ratings.*

REFERENCES

Building Barrie. (2021). *Community Energy & Greenhouse Gas Reduction Plan*. https://www.buildingbarrie.ca/communityenergy

Canadian Home Builders' Association. (2021). *2021 CHBA Homebuyer Preference Study, powered by Avid Ratings*.

City of Barrie. (2018). *Energy Conservation Report - Terms of Reference*.

City of Barrie. (2019). *City of Barrie : Conservation & Demand Management Plan 2020-2024*.

City of Barrie. (2021). *City of Barrie Official Plan 2051 "One City, One Vision, One Plan."* https://www.barrie.ca/City Hall/Planning-and-Development/Documents/Official Plan - January 2018.pdf

Government of Ontario. (2016). *Supplementary SB-12 Energy Efficiency for Housing 2017*.

Government of Ontario. (2017). *Supplementary Standard SB-10 Energy Efficiency Requirements 2017*.

Government of United States of America, D. of E. (2020). *Energy Star - Perfect Climate Inside and Out*. https://www.energystar.gov/sites/default/files/tools/ES_SmartTherm_Factsheet_2020-1.pdf

Home Ventilating Institute (HVI). (2022a). *Aldes Canada - H280SRG - HRV Model Details*. https://hvi-1491.quickbase.com/db/bh6688vwb?a=dr&ifv=1&rid=12070&dfid=12

Home Ventilating Institute (HVI). (2022b). *VanEE - V150H75NS - HRV Model Details*. https://hvi-1491.quickbase.com/db/bh6688vwb?a=dr&ifv=1&rid=15490&dfid=12

Natural Resources Canada. (2016). *ENERGY STAR® for New Homes Standard Version 17.0 - Ontario*.

Natural Resources Canada. (2020a). *ENERGY STAR® for New Homes Standard Version 17.1 - Revision 2*.

Natural Resources Canada. (2020b). *Photovoltaic potential and solar resource maps of Canada*. www.nrcan.gc.ca/18366

Sustainable Buildings Canada. (2018). *2018 Savings By Design Program Guideline And Modelling Protocols*.

The Atmospheric Fund. (2019). *A Clearer View on Ontario's Emissions: Electricity Emissions Factors And Guidelines*.

Toronto 2030. (2022). *Data & Definitions*. https://www.toronto2030platform.ca/data-and-definitions