

alternative scenarios

how do we know we're doing better?

In order to determine the sustainability performance of the master concept plan for Emerald Hills Urban Village, it was necessary to understand the greater context and range of design options that shape developments and impact performance in a broad range of theme areas. To this end, alternative site design scenarios were produced that explore the range of possibilities, and show how each one relates to the proposed vision and goals for the project. The alternative scenarios described on the following pages include:

scenario 1: status quo

In this scenario, the site design represents a business-as-usual development approach typical in Strathcona County.

scenario 2: initially proposed

This scenario represents the site design proposed for the Emerald Hills Urban Village prior to it being selected as a Sustainable Urban Neighbourhood Pilot Project.

scenario 4: deep green

This scenario explores the integration of sustainability best practices, and represents one possible site design iteration based on sustainable design strategies.

energy consumption data:

Accompanying each scenario is a page showing the building archetypes used in the software modeling, the assumptions regarding energy consumption for each building type, and annual energy consumption figures.

Together, Scenarios 1, 2, and 4 provided a context in which the design for the Urban Village could be situated and understood relative to performance measures of sustainability. Each scenario was measured using software modeling tools to determine its performance relative to a set of indicators. These measures were then used to frame the desired performance of the master concept plan scenario by proposing a target for each sustainability indicator. The Emerald Hills Urban Village Master Concept Plan, therefore, represents SCENARIO 3, the preferred option. It is the scenario that is presented in detail in this SUN Guidelines document.

scenario I : status quo



The Status Quo scenario reflects development patterns typical to the Summerwood Phase 1, R1C zoning. Land uses, densities and lot sizes illustrate those found in and near the study area under the North of Lakeland Drive Area Concept Plan.

In this scenario Clover Bar Road is a conventionally designed limited access high volume arterial with fenced, bermed verges onto the site. Emerald Drive, Eton Boulevard and Aspen Trail are collector scale roads with reduced access and without street facing buildings. The interior open space area is fenced with limited access through development areas adjacent to it.

Residential land uses are developed apart from commercial land uses. Residential lands uses are primarily (75%) single family and, single family residential housing types are developed separately from multifamily residential types. Site infrastructure and buildings are designed to conventional codes and standards.

LAND USE

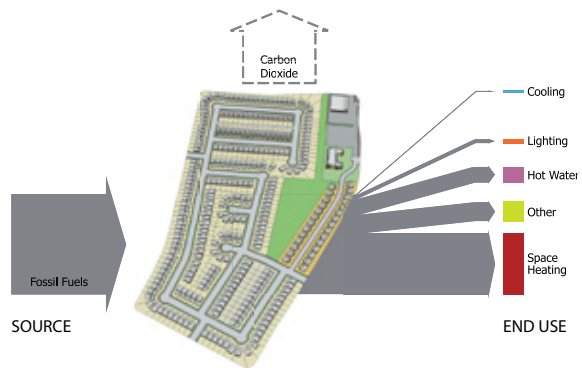
Residential Land Area:	13.2 ha	(67%)
Commercial Land Area:	0.7 ha	(3%)
Institutional Land Area:	0.0 ha	(0%)
Open Space Land Area:	1.6 ha	(8%)
Mixed Use Land Area:	0.0 ha	(0%)
Dwelling Units:	361	
Retail Space:	1572 m ²	
Office Space:	0 m ²	



ENERGY

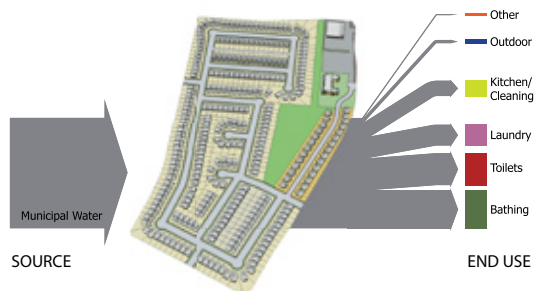
Single use buildings are organized on site according to conventional curvilinear street patterns with no attention to solar orientation. Buildings are designed to meet local building codes, but include no additional measures for energy efficiency. All energy consumed on site is considered to come from non-renewable sources, specifically natural gas and electricity generated through the burning of fossil fuels.

Total Energy Use per 100 m²:	33,333 kWh
Percent Renewables:	0%
Carbon per 100 m²:	6,234 kg


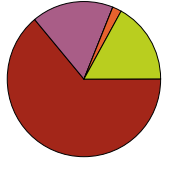

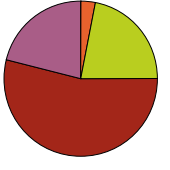

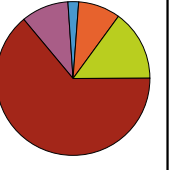

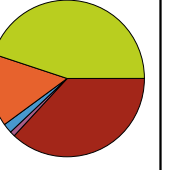


WATER

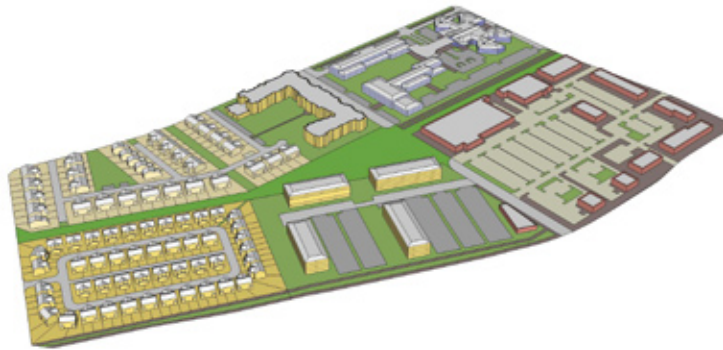
Low density single use buildings are designed to meet local building codes, and include no additional measures for water conservation. Landscaping does not consider local climatic conditions and requires additional irrigation during the summer. All water, including outdoor uses, is considered to come from the municipal supply of potable water. Once used, all water is directed to the municipal sanitary sewer system.



scenario I : status quo

BUILDING TYPE	ASSUMPTIONS	AVERAGE ANNUAL ENERGY CONSUMPTION PER 100 m ²
	<ul style="list-style-type: none"> ■ Heating: standard efficiency furnace, natural gas ■ Hot Water: standard hot water supply boiler, natural gas ■ Cooling: natural ventilation ■ Lighting: standard residential incandescent lighting ■ Other: standard appliances 	 <ul style="list-style-type: none"> ■ 20,622 kWh (64%) ■ 5,647 kWh (17%) ■ 0 kWh (0%) ■ 726 kWh (2%) ■ 5,371 kWh (17%) <p>Total Annual Energy: 32,366 kWh % Renewable: 0% Carbon: 6,032 kg</p>
	<ul style="list-style-type: none"> ■ Heating: standard efficiency furnace, natural gas ■ Hot Water: standard hot water supply boiler, natural gas ■ Cooling: natural ventilation ■ Lighting: standard residential incandescent lighting ■ Other: standard appliances 	 <ul style="list-style-type: none"> ■ 18,996 kWh (54%) ■ 7,241 kWh (21%) ■ 0 kWh (0%) ■ 1,062 kWh (3%) ■ 7,698 kWh (22%) <p>Total Annual Energy: 34,997 kWh % Renewable: 0% Carbon: 6,679 kg</p>
	<ul style="list-style-type: none"> ■ Heating: standard efficiency fan fed coil, natural gas ■ Hot Water: standard hot water supply boiler, natural gas ■ Cooling: standard electric air conditioning unit ■ Lighting: standard residential incandescent lighting, 10 W/m² ■ Other: standard appliances 	 <ul style="list-style-type: none"> ■ 18,305 kWh (64%) ■ 2,722 kWh (10%) ■ 667 kWh (2%) ■ 2,555 kWh (9%) ■ 4,194 kWh (15%) <p>Total Annual Energy: 28,443 kWh % Renewable: 0% Carbon: 5,456 kg</p>
	<ul style="list-style-type: none"> ■ Heating: standard constant volume rooftop unit, natural gas ■ Hot Water: standard efficiency boiler, natural gas ■ Cooling: standard electric air conditioning rooftop unit ■ Lighting: standard supermarket lighting, 30 W/m² ■ Other: standard equipment, refrigeration included 	 <ul style="list-style-type: none"> ■ 28,528 kWh (37%) ■ 500 kWh (1%) ■ 1305 kWh (2%) ■ 11,750 kWh (15%) ■ 35,194 kWh (45%) <p>Total Annual Energy: 77,277 kWh % Renewable: 0% Carbon: 16,733 kg</p>

scenario 2: initially proposed



The Current Approved scenario reflects the more intense and integrated development patterns enabled by the Emerald Hills Urban Village zone. Land uses, densities, lot sizes and building types illustrate those found in October 2006 schematic plans proposed by project developers.

In this scenario Clover Bar Road remains a conventionally designed limited access bermed high volume arterial along the lower density half of the site's frontage. Emerald Drive, Eton Boulevard and Aspen Trail remain collector scale roads with greater access and less fence relative to the status quo scenario. Some sections have street facing buildings. The interior open space area remains fenced. Greater access is provided to and from multiple unit residential and commercial areas with greater pedestrian connectivity within and between commercial and residential areas.

Residential land uses are still developed apart from commercial land uses. Both commercial and residential land uses are more dense. Retail floor area is roughly 6 times greater than the Status Quo scenario. Residential areas are roughly 3 times more dense. A long term care facility is proposed in the north west corner.

LAND USE

Residential Land Area:	6.6 ha	(33%)
Commercial Land Area:	4.8 ha	(24%)
Institutional Land Area:	1.4 ha	(7%)
Open Space Land Area:	2.0 ha	(10%)
Mixed Use Land Area:	0.0 ha	(0%)

Dwelling Units: 991

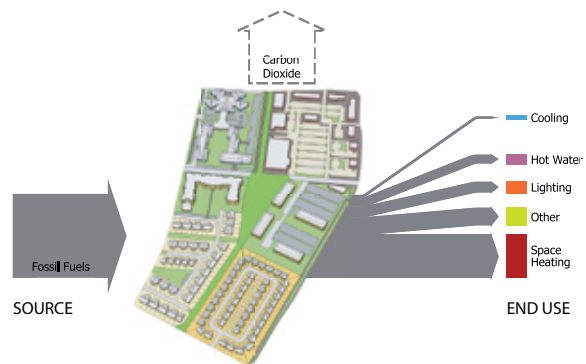
Retail Space: 9903 m²
Office Space: 0 m²



ENERGY

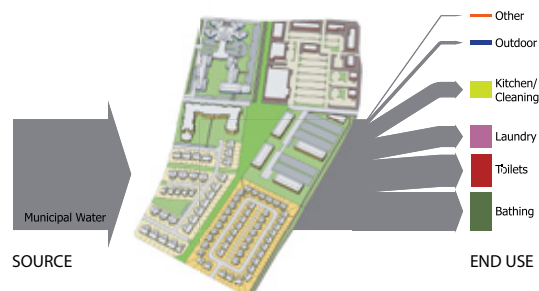
Increased densities improve skin to floor area ratios which decrease heat loss through the building envelope. Buildings are designed to exceed local building codes, with commercial buildings and extended care facilities on the northern side of the site considered to perform 25% better than the Model National Energy Code (CBIP compliant). Most of the energy consumed on site comes from non-renewable sources, specifically natural gas and electricity generated through the burning of fossil fuels.

Total Energy Use per 100 m²:	26,500 kWh
Percent Renewables:	0%
Carbon per 100 m²:	5,291 kg


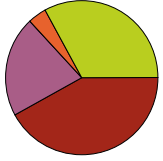

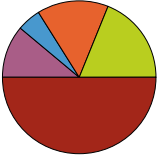

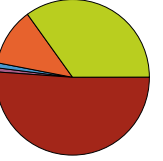

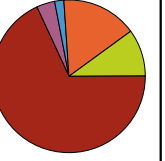

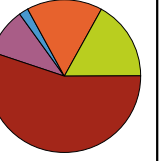


WATER

Buildings improve on local building codes by including additional measures for water conservation; however, no strategies for water harvesting or reclamation are included. Large areas of turf within the site including private yards in the south will still require additional irrigation during the summer. All water, including outdoor uses, is considered to come from the municipal supply of potable water. Once used, all water is directed to the municipal sanitary sewer system.



scenario Z: initially proposed

BUILDING TYPE	ASSUMPTIONS	AVERAGE ANNUAL ENERGY CONSUMPTION PER 100 m ²
	<ul style="list-style-type: none"> ■ Heating: high efficiency furnace, natural gas ■ Hot Water: high efficiency hot water supply boiler, natural gas ■ Cooling: natural ventilation ■ Lighting: standard incandescent lighting ■ Other: energy star appliances 	 <ul style="list-style-type: none"> ■ 10,935 kWh (42%) ■ 5,417 kWh (21%) ■ 0 kWh (0%) ■ 1,062 kWh (4%) ■ 8,694 kWh (33%) <p>Total Annual Energy: 26,108 kWh % Renewable: 0% Carbon: 5,205 kg</p>
	<ul style="list-style-type: none"> ■ Heating: high efficiency fan fed coil, natural gas ■ Hot Water: high efficiency condensing boiler, natural gas ■ Cooling: standard electric air conditioning unit ■ Lighting: standard residential incandescent lighting, 10 W/m² ■ Other: energy star appliances 	 <ul style="list-style-type: none"> ■ 10,861 kWh (50%) ■ 2,361 kWh (11%) ■ 1,028 kWh (5%) ■ 3,250 kWh (15%) ■ 4,055 kWh (19%) <p>Total Annual Energy: 21,555 kWh % Renewable: 0% Carbon: 4,310 kg</p>
	<ul style="list-style-type: none"> ■ Heating: mid efficiency rooftop unit, natural gas ■ Hot Water: standard efficiency boiler, natural gas ■ Cooling: mid efficiency electric rooftop unit ■ Lighting: reduced commercial lighting intensity, 15 W/m² ■ Other: mid efficiency equipment, refrigeration included 	 <ul style="list-style-type: none"> ■ 24,250 kWh (51%) ■ 500 kWh (1%) ■ 528 kWh (1%) ■ 5,861 kWh (12%) ■ 16,722 kWh (35%) <p>Total Annual Energy: 47,861 kWh % Renewable: 0% Carbon: 9,899 kg</p>
	<ul style="list-style-type: none"> ■ Heating: mid efficiency rooftop unit, natural gas ■ Hot Water: standard efficiency boiler, natural gas ■ Cooling: mid efficiency electric rooftop unit ■ Lighting: reduced commercial lighting intensity, 18 W/m² ■ Other: mid efficiency equipment 	 <ul style="list-style-type: none"> ■ 29,555 kWh (68%) ■ 1,472 kWh (4%) ■ 889 kWh (2%) ■ 6,972 kWh (16%) ■ 4,306 kWh (10%) <p>Total Annual Energy: 43,194 kWh % Renewable: 0% Carbon: 8,330 kg</p>
	<ul style="list-style-type: none"> ■ Heating: standard efficiency constant volume, natural gas ■ Hot Water: standard efficiency boiler, natural gas ■ Cooling: standard electric air conditioning unit ■ Lighting: standard extended care lighting, 16.6 W/m² ■ Other: standard equipment 	 <ul style="list-style-type: none"> ■ 23,194 kWh (55%) ■ 4,222 kWh (10%) ■ 639 kWh (2%) ■ 6,667 kWh (16%) ■ 7,305 kWh (17%) <p>Total Annual Energy: 42,027 kWh % Renewable: 0% Carbon: 8,296 kg</p>

scenario 4: deep green



The Deep Green scenario illustrates one model of best practice related to the 12 sustainability theme areas of the project.

In this scenario, Clover Bar Road has been redesigned as a more pedestrian friendly limited access high volume arterial. Eton Boulevard, Aspen Trail and Emerald Drive are also redesigned to be pedestrian and transit friendly collector scale roads with safe pedestrian routes and street facing buildings. Open space has been expanded to reconstruct some hydrologic functions lost through development. New streets have been added to improve all connectivity on and off site and to increase frontage available to support increased retail and service uses.

The south half of the site is developed with ground oriented residential building types. The north half is developed with mixed retail, office and residential uses. Retail areas are all ground- and pedestrian-oriented. Significant first and second office and service oriented floor area has been added in anticipation of a wide range of work place opportunities associated with the hospital and a diverse household mix. Most commercial parking is structured. Residential areas are roughly double the Current Proposed Scenario (approximately equal in density to Centre in the Park).

LAND USE

Residential Land Area:	8.8 ha	(44%)
Commercial Land Area:	0.0 ha	(0%)
Institutional Land Area:	0.0 ha	(0%)
Open Space Land Area:	6.5 ha	(33%)
Mixed Use Land Area:	3.3 ha	(17%)

Dwelling Units: 1975

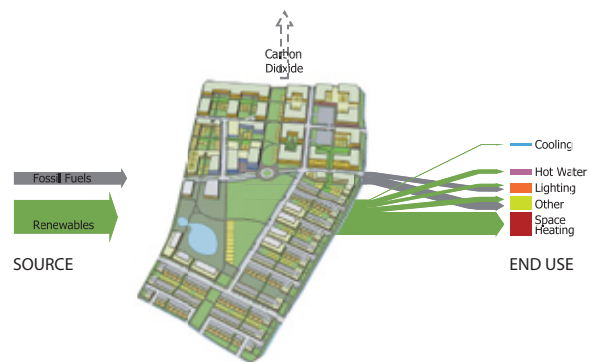
Retail Space: 9404 m²
Office Space: 11665 m²



ENERGY

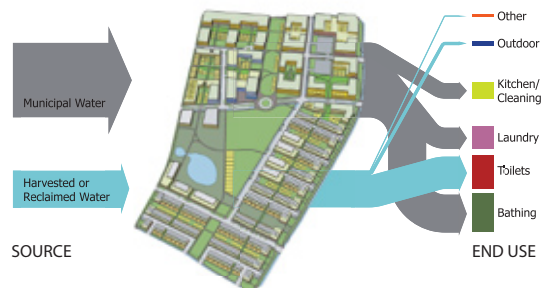
Energy consumption is reduced first through the utilisation of natural services available on site, including daylighting and natural ventilation. These services are maximised through south-facing buildings and narrow building footprints. Buildings are designed to high performance standards including increased densities and high-efficiency building envelopes and internal systems. Energy consumed on site comes primarily from renewable sources, specifically a district heating system fuelled by biomass and rooftop photovoltaics for base building electricity loads.

Total Energy Use per 100 m2:	15,306 kWh
Percent Renewables:	73.5%
Carbon per 100 m2:	984 kg


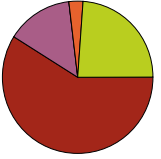

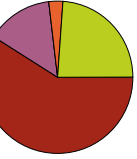

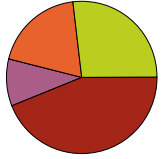

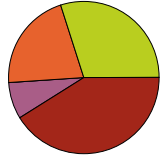

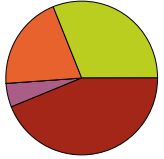

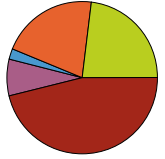


WATER

Water consumption is reduced not only through low-consumption appliances and fixtures, but also through the strategic reclamation of water within buildings and the harvesting of rain water on site for appropriate uses. Precipitation, as well as water discarded from bathing and laundry, will be used as needed for irrigation of landscaping and gardens. Collected water will also be recycled for toilet flushing prior to being directed to the sanitary sewer system.



scenario 4: deep green

BUILDING TYPE	ASSUMPTIONS	AVERAGE ANNUAL ENERGY CONSUMPTION PER 100 m ²
	<ul style="list-style-type: none"> ■ Heating: district heat from biomass ■ Hot Water: district hot water from biomass ■ Cooling: natural ventilation ■ Lighting: residential compact fluorescent lighting ■ Other: energy star appliances 	 <ul style="list-style-type: none"> ■ 7,255 kWh (59%) ■ 1,739 kWh (14%) ■ 0 kWh (0%) ■ 309 kWh (3%) ■ 2,938 kWh (24%) <p>Total Annual Energy: 12,241 kWh % Renewable: 83% Carbon: 472 kg</p>
	<ul style="list-style-type: none"> ■ Heating: district heat from biomass ■ Hot Water: district hot water from biomass ■ Cooling: natural ventilation ■ Lighting: residential compact fluorescent lighting ■ Other: energy star appliances 	 <ul style="list-style-type: none"> ■ 7,255 kWh (59%) ■ 1,739 kWh (14%) ■ 0 kWh (0%) ■ 309 kWh (3%) ■ 2,938 kWh (24%) <p>Total Annual Energy: 12,241 kWh % Renewable: 83% Carbon: 472 kg</p>
	<ul style="list-style-type: none"> ■ Heating: district heat from biomass ■ Hot Water: district hot water from biomass ■ Cooling: natural ventilation ■ Lighting: residential compact fluorescent lighting, 10 W/m² ■ Other: energy star appliances 	 <ul style="list-style-type: none"> ■ 6,028 kWh (44%) ■ 1,305 kWh (10%) ■ 0 kWh (0%) ■ 2,639 kWh (19%) ■ 3,778 kWh (27%) <p>Total Annual Energy: 13,750 kWh % Renewable: 72% Carbon: 930 kg</p>
	<ul style="list-style-type: none"> ■ Heating: district heat from biomass ■ Hot Water: district hot water from biomass ■ Cooling: natural ventilation ■ Lighting: compact fluorescents, reduced lighting intensity ■ Other: energy star appliances, high efficiency equipment 	 <ul style="list-style-type: none"> ■ 5,667 kWh (41%) ■ 1,056 kWh (8%) ■ 0 kWh (0%) ■ 2,889 kWh (21%) ■ 4,083 kWh (30%) <p>Total Annual Energy: 13,695 kWh % Renewable: 69% Carbon: 1,071 kg</p>
	<ul style="list-style-type: none"> ■ Heating: district heat from biomass ■ Hot Water: district hot water from biomass ■ Cooling: natural ventilation ■ Lighting: compact fluorescents, reduced lighting intensity ■ Other: energy star appliances, high efficiency equipment 	 <ul style="list-style-type: none"> ■ 10,167 kWh (44%) ■ 1,056 kWh (5%) ■ 0 kWh (0%) ■ 4,639 kWh (20%) ■ 7,038 kWh (31%) <p>Total Annual Energy: 22,944 kWh % Renewable: 69% Carbon: 1,711 kg</p>
	<ul style="list-style-type: none"> ■ Heating: district heat from biomass ■ Hot Water: district hot water from biomass ■ Cooling: standard electric air conditioning unit ■ Lighting: standard extended care lighting, 16.6 W/m² ■ Other: high efficiency equipment 	 <ul style="list-style-type: none"> ■ 15,055 kWh (46%) ■ 2,556 kWh (8%) ■ 694 kWh (2%) ■ 6,667 kWh (21%) ■ 7,278 kWh (23%) <p>Total Annual Energy: 32,250 kWh % Renewable: 72% Carbon: 2,129 kg</p>