

# Climate Change and Energy Studies

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## **Purpose:**

*The purpose of Climate Change and Energy Studies are to evaluate how the proposed development could alter the climate by impacting: wind; shadow and sunlight penetration; urban heat island effects (extreme heat); flooding and to determine the appropriate design measures to reduce the impacts of climate change and mitigate the contribution of greenhouse gas emission.*

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The following should be read in conjunction with Sub-section 8.6.2.3 of the Official Plan. During the pre-application process the City will determine the components of the Climate Change Study required.

## **Energy, Greenhouse Gas (GHG) Emissions and Mitigation Study**

The intent of this study is to understand the GHG emissions and energy impact of the development, along with the opportunities to support the community's efforts to mitigate climate change.

1. Does the proposed development promote:
  - i. A compact urban form that encourages and facilitates walking, cycling and the use of public transit;
  - ii. A development pattern where public parks, small-scale convenience retail and other appropriate neighbourhood serving uses are provided within an approximate 5 minute walk from all residents;
  - iii. The electrification of various transportation modes, including the installation of electric charging for electric vehicles and bicycles;
  - iv. The use of low carbon construction, including but not limited to concrete and steel; and
  - v. Green building certifications of any kind.

## **Energy Strategy**

The intent of this study is to further encourage energy efficient building design.

1. The Energy Strategy is designed to facilitate the following key outcomes:
  - i. Energy and GHG emissions reductions above base case;
  - ii. Explore alternative energy systems, renewable energy systems, district energy systems and distribution and demand management plans to accommodate current and projects needs of the community;
  - iii. Energy resiliency; and
  - iv. Innovative residential and public building designs that contribute to the low carbon design, energy reduction and natural resource conservation.

## **Climate Resiliency Study**

The intent of this study is to examine the risk and resilience of the development to a climate change related disruption or impact. The primary climate change risks in the City of Windsor are attributed to Extreme Heat (Urban Heat Island), Flooding and Biodiversity loss. However, additional climate hazards may be identified due to location of the development or updated climate data.

### *1. Heat Island Reduction Brief*

Within the Climate Resiliency Study, the heat island reduction brief should include factors influencing and opportunities to address the urban heat island. This may include but not be limited to:

- i. Changes to permeable surfaces resulting from the development and associated impacts on heat retention and reflection;
- ii. Changes to vegetation cover and canopy and impact on heat island affects;
- iii. Changes to retention of storm water on the site and the associated impacts on-site and downstream; and
- iv. Measures taken to reduce the heat island effect including but not limited to:
  - a) Maintaining or restoring tree canopy;
  - b) Provisions for shading;
  - c) Maintaining vegetative surfaces such as green or cool roofs; and
  - d) Use of retained stormwater for water vegetation or water features.
- v. This brief shall be supported by any required landscape plan.

### *2. Flood Reduction Brief*

Within the Climate Resiliency Study the flood reduction brief shall include:

- i. A short summary of the findings from any required Stormwater Study, focused on Climate Change analysis, findings and solutions;
- ii. Measures taken to reduce risks in the event of flooding, including but not limited to:
  - a) Location and protection of essential building components;
  - b) Green infrastructure to complement existing infrastructure, including the requirement for innovative low impact development opportunities and best practices that minimize the risks associated with natural hazards.
- iii. This Study shall also review if the development occurs in a location that is at risk or vulnerable to other climate influenced natural hazards and measures that may be taken to reduce risk.

### *3. Sustainability Brief*

It is the intent of the Sustainability Brief to understand any development's contribution to the overarching sustainability objectives of the City beyond those encapsulated by the climate change studies. Where a Sustainability Brief is required, it shall include measures taken to promote:

- i. Waste diversion, including recycling and organics;
- ii. Bird Friendly Architecture (ex. Windows and lighting);
- iii. Potential for local food production or pollinator habitat;
- iv. Electric Vehicle Infrastructure;
- v. Use of Environmentally preferable materials and products;
- vi. Water Conservation energy conservation, air quality protection and integrated waste management opportunities;
- vii. Compact urban form that encourages walking, cycling and the use of public transit

- viii. A development pattern where public parks, small-scale convenience retail and other appropriate neighbourhood serving uses are provided within an approximate 5 minute walk from all residents; and
- ix. Alternative energy systems, renewable energy systems, district energy systems and distribution and demand management plans to accommodate current and projected needs of the community;
- x. Innovative residential and public building designs that contribute to low carbon design, energy use reduction and natural resource conservation; and
- xi. Green infrastructure to complement existing infrastructure, including the requirement for innovative low impact development opportunities and best practices that minimize the risks associated with natural hazards.

#### 4. *Shadow Study*

Where a Shadow Study is required, such study should include:

- i. Include diagrams showing extent of shadows at different intervals over different months;
- ii. Include diagrams showing surrounding topographic context;
- iii. Include a digital copy of the 3-D model used by the consultant to generate the shadow diagrams;
- iv. Include architectural elevation indicating building height at rooftop, mechanical equipment and average grade around building foundation; and
- v. Include diagrams showing the vertical extent of shadows upon adjacent lands.

#### 5. *Wind Study*

Where a Wind Study is required, such Study shall include:

- i. The height of the proposed development in relation to the height of surrounding structures;
- ii. The orientation and general massing of the development with respect to the primary wind directions;
- iii. The location and shape of specific design features that induce wind activity;
- iv. The orientation of the development with respect to sun angles;
- v. The potential impact of wind speed increases created by the development on the surroundings, pedestrians and birds in all four seasons; and
- vi. An outline of mitigation features to be included in development design including base and podium conditions, canopies, tower orientation and landscaping.

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### ***Qualifications:***

*A Climate Change Study, and its various individual components may require a host of professionals with a variety of areas of expertise. All elements of a Climate Change Study shall be carried out by qualified professionals with expertise in the appropriate area of study, to the satisfaction of the City.*

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