City of Vancouver *Planning - By-law Administration Bulletins*
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REZONING POLICY FOR SUSTAINABLE LARGE DEVELOPMENTS

(Formerly: EcoCity Policies for Rezoning of Sustainable Large Sites)

Authority - Director of Planning
Effective December 15, 2010
Amended May 16, 2013, August 1, 2013 and December 16, 2014

GENERAL INFORMATION

In June 2008, Council approved the EcoDensity/EcoCity Revised Charter and Initial Actions. Revised Action A-2 established policies to achieve higher sustainability standards as an essential component in the rezoning of large development sites.

The policy was revisited in 2013 to refine the definition of a large site to include large developments, and better articulate the requirements associated with this policy and their association with the Greenest City 2020 goals and targets. The policy is now known as the Rezoning Policy for Sustainable Large Developments, and can be found online at: vancouver.ca

In essence, the policy states that development proposals put forward though rezoning applications that:

- involve a land parcel or parcels having a total site size of 8,000 m^2 (1.98 acres) or more, or
- contain 45,000 m^2 (484,375 sq. ft.) or more of new development floor area

will be considered to be large developments. For large developments, the City requires defined plans or studies on the following:

1. Sustainable Site Design
2. Access to Nature
3. Sustainable Food Systems
4. Green Mobility
5. Rainwater Management
6. Zero Waste Planning
7. Affordable Housing
8. Low Carbon Energy Supply

Projects that are limited in scope may be excluded from the requirements of this policy, including:

- text amendments to the existing zoning for minor changes to large sites, or
- projects that contain less than 4,700 m^2 (50,590 sq. ft.) of new development

In such cases, a request for partial exemption from the policy requirements should be discussed with the rezoning planner prior to zoning application submission. Alternatives can be considered and, if warranted, some of the requirements may be waived by the General Manager of Planning and Development Services (under Director of Planning authority).

For rezoning sites of any size, there are minimum requirements for green buildings that must be met – for more information, please see EcoDensity/EcoCity Action A-1 and the "Green Rezoning Process" Planning By-law Administration Bulletin.

In the following sections, this bulletin discusses the large development requirements, and options to consider toward meeting them. But first, it outlines the typical process involved in the rezoning of a sustainable large development.

PROCESS

In general, the following process should be followed, noting the applicant's responsibilities:

Rezoning Pre-Application

The applicant and rezoning planner will meet to discuss the Rezoning Policy for Sustainable Large Developments requirements, and the applicant and planner will together determine any further meetings to be scheduled with City staff regarding the policy. At the initial meeting, the applicant will be provided with Rezoning Policy for Sustainable Large Developments submission requirements.

Rezoning Application

The applicant will submit the rezoning package, including the Rezoning Policy for Sustainable Large Developments requirement documents specified. The package should contain specific language on how the applicant is addressing the policy, and include any reports/appendices. City staff will review the application package to ensure that the intent of the Rezoning Policy for Sustainable Large Developments requirement has been met, and provide comments and conditions of approval.

Development Permit Pre-Application

The applicant and City staff team will meet to review the Rezoning Policy for Sustainable Large Developments requirements. The applicant will provide preliminary drawings and other materials that demonstrate how they intend to meet the requirements of the policy. References to these conditions will be incorporated into the drawings submissions for the development permit.

Development Permit Application

The applicant will submit the development permit application package, including any materials, drawings and documents related to the Rezoning Policy for Sustainable Large Developments that were unresolved from the rezoning and pre-app phases. The project facilitator will circulate the application to the appropriate City staff team members for review. Occupancy requirements will be identified by review staff and added to the file address.

Building Permit Application

As per standard building permit submissions, the plans at this stage must be detailed and reflect the refinements made at the development permit stage. The project coordinator will circulate the application to the appropriate City staff team members for compliance. The applicant must fulfill any requirements to submit materials, drawings, and documents related to the Rezoning Policy for Sustainable Large Developments that remain unresolved from the rezoning and development permit stages.

Occupancy Permit Application

The applicant must fulfill any requirements to submit materials, drawings, and documents related to the Rezoning Policy for Sustainable Large Developments that were identified at previous stages. Any Occupancy holds will be required to be addressed to the satisfaction of each jurisdiction prior to release of the Occupancy Permit.

There will be periodic random review of projects for compliance post-occupancy.

1.0 SUSTAINABLE SITE DESIGN

1.1 Objective

The City will require a Sustainable Site Design Plan that considers approaches to layout and orientation that reduce energy needs and facilitate passive design solutions, and where appropriate provides a written strategy and plan illustrating the approaches.

This will contribute to our Greenest City target on Green Buildings – to achieve carbon neutral new construction by 2020.

1.2 Intent

The intent of passive site design is to reduce energy needs by reducing reliance on mechanical systems for heating, cooling and lighting, and making increased use of solar power, wind direction and other climatic effects for building needs. By leveraging the natural environment, sites and buildings that incorporate passive design can reduce utility bills, improve the comfort of the interior environment, and reduce GHG emissions.

1.3 Primary Deliverables

The primary deliverable is a Sustainable Site Design, composed of a study, site plan, and design rationale (written and illustrated statement) evaluating the opportunities for optimized layout, and site structure and orientation. The Sustainable Site Design should also demonstrate how it supports the Access to Nature and Sustainable Food System Plans noted in sections 2.0 and 3.0.

Applicants should be prepared to demonstrate how strategies for passive heating, cooling and ventilation have been applied to their proposal, and to identify the specific design elements employed in each development, including:

- siting and orientation,
- tree retention,
- landscape plan,
- building shape and massing, and
- solar shading.

Sustainable site design should be used in conjunction with passive building design, including the use of buffer spaces, thermal mass, insulation and strategic window placement. Particular consideration should be given to building orientation and responding to the different conditions of each façade in the design. For example, the south façade can capture desirable solar gains during winter when the sun angle is low making it ideal for passive solar heating during winter, but it must be well shaded during summer. For more information, see the City of Vancouver's two Passive Design Toolkits (2009).

The influence and benefits of the urban tree canopy on the micro-climate of neighbourhoods must be considered when designing the landscape. Healthy trees must be retained wherever possible.

2.0 ACCESS TO NATURE

2.1 Objective

The City will require an Access to Nature Plan that demonstrates how the project will contribute to improving access to nature.

This will contribute to our Access to Nature Greenest City targets – by 2020 ensure that every person lives within a five-minute walk to a natural space, and to plant 150,000 additional trees between 2010 and 2020.

2.2 Intent

The intent of improving access to nature in the city is to improve the health and wellbeing of the community, to provide habitat, to enhance ecosystem function and services, to create public open spaces for people to gather and socialize, and to create opportunities for people to directly experience nature in the city.

2.3 Primary Deliverable

The primary deliverable is a detailed Access to Nature Plan demonstrating how the project will contribute to improving access to nature. The Plan should seamlessly integrate with the Sustainable Site Design and Sustainable Food System Plans (see sections 1.0 and 3.0), aiming to optimize opportunities for nature and food production together. The Plan should illustrate how the applicant intends to contribute to the City's Access to Nature goal and targets in the Greenest City 2020 Action Plan (2011)[1]. These include but are not limited to:

- trees planted on the project site, with particular attention to opportunities for growing large trees,
- habitat created on the site,
- contributions toward planting trees in other public spaces (i.e. streets, parks),
- provision of public open space/park space on the project site, and
- contributions to new park space on other land (i.e. new park acquisition, conversion of streets to parks), particularly how these contributions might increase the number of people living within a five-minute walk of a park[2].

Note: Staff anticipate a metric will be added to this section when it is reviewed as part of the Urban Forest Strategy. Changes will be made by updating this administrative bulletin, as well as through information bulletins, related policy or reporting.

2.4 Plan Components

Components of the Access to Nature Plan may include:

- pre-development plan indicating existing trees, other planting, habitat, and public open space;
- a landscape plan demonstrating plant locations and species;
- an ecological study demonstrating contribution of the project to habitat provision;
- detailed design of any public open space provided on the site;
- number of trees anticipated to be planted on the site; and
- details about the specific contributions to improving access to nature in areas outside of the project site, including financial and other contributions to tree planting, street-to-park conversions, and park acquisition.

The Access to Nature Plan must demonstrate how opportunities to maximize access to nature on the project site have been realized, as well as how opportunities created through the development of this project will contribute to improving access to nature in the city of Vancouver. Because large development design can vary widely, both on- and off-site contributions to improving access to nature should be considered, and it is expected that there will be a reasonable balance between those two potential strategies.

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[1] Access to Nature long-term goal: Vancouver residents enjoy incomparable access to green spaces, including the world's most spectacular urban forest. 2020 targets: 1) Every person lives within a five-minute walk of a park, beach, greenway or other natural space; 2) Plant 150,000 additional trees in the city.

[2] Review map showing areas of the city not within a five-minute walk of a park, beach, or green space and the full Access to Nature plan starting on pg. 98 : http://issuu.com/greenestcity/docs/greenestcity2020actionplan/1 Request most up-to-date map at rezoning pre-application stage.

3.0 SUSTAINABLE FOOD SYSTEMS

3.1 Objective

The City will require applicant to demonstrate the overall increase of food system assets. Food assets are defined as resources, facilities, services or spaces that are available to residents of the city (either at the citywide or neighbourhood scale) and which are used to support the city's food system.

This will contribute to our Greenest City target of supporting Local Food – by 2020, to increase city and neighbourhood food assets by a minimum of 50% over 2010 levels.

3.2 Intent

The intent of creating a sustainable food system is to improve the resilience of Vancouver's food system in accordance with the vision, principles and goals defined in the Vancouver Food Strategy (2013).

3.3 Primary Deliverable

The primary deliverable is the demonstration of the delivery of a minimum three food assets. The application should illustrate how the applicant intends to deliver a minimum of three food assets and meet the City's food system vision, goals and principles as reflected in current City food policies, initiatives, and guidelines.

For reference, City of Vancouver food related policy and guidelines include

- Administration of Community Food Markets (2014)
- The Vancouver Food Strategy (2013)
- Farmers Market policy (2013)
- Greenest City Action Plan (GCAP) (2011)
- Urban Agriculture Design Guidelines for the Private Realm (2009)
- Operational Guidelines for Community Gardens on City Land Other than Parks (2009)
- Vancouver Food Charter (2007)
- Guidelines for Urban Beekeeping (2005)

3.4 Components

Food assets are defined as resources, facilities, services or spaces that are available to residents of the city (either at the citywide or neighbourhood scale) and which are used to support the city's sustainable food system. In order to meet the requirements, applicants are required to provide a detailed description of how a minimum of three food system assets from the following list will be included and delivered in the development:

- Community gardens / community orchards
- Edible landscaping
- Community kitchen
- Community food market
- On-site organics management
- Facilities to support neighbourhood food networks

In lieu of three food assets, the City may also consider a contribution to a broader scope, citywide food processing/storage/distribution infrastructure/operation and would assess this on a case-by-case basis. The applicant must outline why the three on-site food assets cannot be delivered, and how the contribution will contribute to other citywide food assets.

These guidelines define and describe the physical features and attributes of the six food assets. The success of a food asset is determined by effective programing and maintenance. The applicant is encouraged to work with City staff to identify potential users and caretakers well in advance. In many cases, non-profit organizations could assist in governing the food asset, and a community use agreement could be developed to clearly define roles and responsibilities of parties involved.

The following sections contain characteristics and design guidelines of each of the six food system assets to further assist applicants in incorporating sustainable food infrastructure.

3.4.1 Urban Agriculture, Community Gardens and Shared Garden Plots

Urban Agriculture

Urban agriculture is the growing of food crops in urban areas. Urban agriculture can occur at various scales and entail a variety of methods including raised garden plots, balcony pots, rooftops, vertical growing, or growing in soilless mediums.

Urban agriculture can be integrated into many locations in new developments:

- Rooftops
- Balconies
- Around buildings
- Courtyards
- Boulevards
- Park areas
- Other open space

Community Gardens or Shared Garden Plots

Characteristics

Community gardens or shared garden plots are managed by groups of individuals and residents to grow and harvest food and ornamental crops. The harvested food is typically used by those cultivating the land and their households, or can be used in the programs of non-profit organizations such as community centres, neighbourhood houses or neighbourhood food networks.

Design Guidelines

Community gardens and shared garden plots can be provided as part of consolidated common outdoor amenity space. The incorporation of garden plots should enhance the overall design of that common outdoor amenity and should be considered as one of the variety of programmed uses of those spaces. Where this is not generally provided, opportunities for gardening could be considered in private outdoor spaces: patios, balconies and roof decks.

Siting and Access

(a) Locate garden plots to maximize sunlight access; this may include locating garden plot areas on rooftops, where possible.
(b) Where garden plots are located on higher rooftops, provide windscreens subject to overall design and location.
(c) Provide easy access to and from the garden plots for hauling larger items, such as soil and produce. Consider the need to use wheelbarrows for this purpose.
(d) Some garden plots should incorporate enhanced accessibility features to accommodate wheelchairs, strollers and senior gardeners who have mobility restrictions.
(e) Locate garden plots as far away from vehicle traffic as possible.

Co-locating with Other Amenities

Consider incorporating a covered outdoor space for shelter; an outdoor children's play area; an indoor amenity room with kitchen, washroom and an eating area; and outdoor seating areas for rest and social interaction adjacent to, or near the gardening area.

Number and Size of Garden Plots

(a) Garden plots should be provided for 30% of the residential units that do not have private outdoor space of more than 100 square feet.
(b) Garden plots should be a minimum of 24 square feet (ideally 3 feet by 8 feet), not including plot dividers, for maximum growing potential.
(c) Large, undivided planting areas equal in square footage to individually separated plots may be provided in cases where individual plots are not desired or suitable.

Design of Garden Plots

(a) There should be a maximum reach of 18 inches from the perimeter to the middle of the plot.
(b) The height of garden planters should be a maximum of 2 feet for easy reaching into planter beds. Plots with enhanced universal accessibility features should have a height of 2.5 feet.
(c) Ensure a minimum soil depth should of 18 inches.
(d) Garden plots should be integrated into the overall landscape design and may be accommodated in flexible, non-rectilinear forms.
(e) Ensure that toxins (heavy metals, salinity and hydrocarbons) are not present in soils being used in garden plots and that toxic materials, such as pressure-treated wood, should not be used where they will come into contact with soils that are growing food.
(f) Protection of the roof membrane and soil drainage issues should be taken into consideration.

Support Facilities

(a) Provide hose bibs within 20 feet of any garden plot.
(b) Provide a storage room or shed for tools; consideration should be given to providing smaller, personal storage for individual gardening tools.
(c) A composting facility that is rodent-resistant, provides the ability to turn compost, and is of sufficient size to match garden capacity should be provided.
(d) A greenhouse, of minimum 9 x 12 feet, to extend growing season is encouraged.
(e) Consider providing: a potting bench, an electrical outlet, and area lighting.

3.4.2 Edible Landscaping

Characteristics

Edible landscaping is the use of plants that produce food in place of more commonly used ornamental plants. Many of these plants provide ornamental quality while also producing edible leaves, flowers, nuts and berries. Edible landscaping is encouraged in areas that are easily accessible for harvesting, and that are protected from potential contamination. Edible landscaping can be incorporated as part of any landscaped areas.

Design Guidelines

(a) Demonstrate comprehensive edible landscaping efforts that integrate with existing and proposed landscape features.
(b) Provide educational or interpretive signage adjacent to plantings where possible.
(c) Locate edible landscaping that may drop fruits and berries adjacent to high pedestrian traffic areas to encourage harvesting, but such that fruit dropped on sidewalks is minimized.

Please see http://vancouver.ca/files/cov/urban-agriculture-guidelines.pdf for a quick reference summary of recommended edible plants commonly used for edible landscaping.

3.4.3 Community Kitchens

Characteristics

Community kitchens are designed for food skills programing including teaching and demonstrating food preparation, healthy eating and preservation skills. A community kitchen is a purpose-designed and built publically accessible facility where people have the opportunity to come together to learn, and/or share the cost, planning and preparation of healthy meals. Community kitchens can be organized to serve specific populations groups or people with dietary interests and function as community gathering place where space, skills and resources are shared.

Design Guidelines

Community kitchens function best when the following elements are present:

(a) Sufficient space to accommodate a minimum of 12 people in a teaching environment.
(b) Energy efficient and accessible cold storage including freezer space. Consider walk-in coolers.
(c) Sufficient and secure (lockable) dry storage for dry goods and small equipment. Consider walk-in dry storage.
(d) Sufficient sink and washing station.
(e) Durable quality 4- to 6-burner stove.
(f) High quality ventilation systems adequate to allow for the widest possible range of cooking activities. In a mixed-use building consider "exhaust scrubbing" technology to minimize potential conflicts over smell.
(g) Adjacent multi-purpose space or room for eating and congregating.
(h) Incorporation of enhanced accessibility features to accommodate wheelchairs, mobility devices and teaching and demonstration screens/aids.

3.4.4 Community Food Markets

Characteristics

Community food markets are venues or sites that enable farmers or third party operators to sell healthy, fresh foods directly to the public. The emphasis for community food markets is on providing access to fresh, healthy and affordable foods to individuals and families but who may not be able to afford to shop at a farmers market or have the means to travel to one. In some cases, community food markets provide opportunities to promote healthy eating for employees in large organizations or offices. Combined with unique public realm elements, they can contribute to vibrant public space while offering a focal point for residents and/or employees to gather.

As per the Administration of Community Food Markets Bulletin, community food markets operate as an extension of, or ancillary use to, social service, cultural, recreational organizations or programs, or similar. As such, the applicant should consider design and siting of community food markets to operate in conjunction with one in the following list:

(a) Institutional Uses: Social Service Centres, Churches;
(b) Service Uses: Neighbourhood Houses;
(c) Culture and Recreation: Community Centres;
(d) BC Housing Sites: listed at: http://www.bchousing.org/Options/Subsidized_Housing/Listings;
(e) Other uses which meet the intent of community food markets may be approved on a case-by-case basis.

Design Guidelines

(a) The space provided should be sufficient for a minimum of ten (10) stalls or booths, with a minimum size of 3 m2 for each stall.

(b) Space can be provided indoor or outdoor, and if outdoor, a covered area would be encouraged.
(c) The design of the area or structure should encourage social interaction and be publically accessible.
(d) Consideration should be given to a design that is flexible for other uses.
(e) Incorporate double receptacle outlets at a minimum of every 3 m, if stalls are 3 m wide.
(f) Provide direct access to a class B loading bay without reliance on stairs.

For more information regarding community food markets, visit
http://former.vancouver.ca/commsvcs/bylaws/BULLETIN/C005.pdf

3.4.5 On-Site Organics Management

Characteristics

An on-site organics management system is used to process organic compostable materials (food scraps and yard trimmings) into products that can be beneficially used such as compost, mulches, and soil conditioners. The on-site system is intended for residents, restaurants or other commercial tenants to bring their food scraps to a communal system. Once decomposed, the compostable materials can be used as nutrient rich soil conditioners in local gardens. Installation and use of an on-site system should be considered as an alternative or an additional option to complement any food scraps collection program used to divert compostable materials away from being disposed as garbage.

Design Guidelines

The applicant is encouraged to provide innovative infrastructure solutions and technologies to increase compostable organics management, while maintaining the end product (e.g. compost) for on-site use. There are different on-site systems available depending on requirements of the building.

For more detailed information and examples of various composting systems available, please see the On-site Composting Technology Study:
http://www.metrovancouver.org/planning/development/AgricultureAndFood/Documents/MV-ON-SITECOMPOSTINGTECHNOLOGYREVIEWOct2012.pdf

And the Metro Vancouver On-site Organics Management Options Review Report, 2014:
http://www.metrovancouver.org/services/solidwaste/Resources/Pages/ReportsandStatistics.aspx

Additionally, more information about on-site composting can be found here:
http://vancouver.ca/home-property-development/on-site-organics-management-systems.aspx

Recognizing each system will have different specifications and requirements, applicant should consider whether the following features will be required to accommodate the on-site system:

(a) Accessible to all users
(b) Located on a relatively flat surface
(c) Access to power
(d) Access to water and sewer connection
(e) Concrete pad
(f) Cover
(g) Ventilated
(h) Fire Proofing/sprinkler
(i) Odour and pest control
(j) Sufficient size to match local garden, residence and/or retailer capacity

3.4.6 Facilities to Support Neighbourhood Food Network Activities

Characteristics

Neighbourhood Food Networks are coalitions of citizens, organizations and agencies that work collaboratively to address food system issues with the goal of improving access to healthy, affordable and nutritious food for all.

Neighbourhood Food Networks manage and organize programs and projects on food system issues, which may include learning, sharing and celebration opportunities connected to food and connecting consumers and producers, food storing, processing, and distribution. The intent of the design guideline is to provide a multipurpose facility, office or space for neighbourhood food networks to conduct their activities.

Design Guidelines

(a) Provide a multipurpose facility, office or space for neighbourhood food networks or other non-profit organization with food-related mandate to carry out their activities.
(b) Emphasis should be given to co-locating the multi-purpose facility with food assets or other non-profit organizations.
(c) Consideration should be given to the design of the facility that is flexible for other uses and users.

4.0 GREEN MOBILITY

4.1 Objective

The City will require a Green Mobility Plan that provides measures and strategies to prioritize more sustainable travel to and from the site. This will include prioritizing walking, cycling, and public transit over automobile use, and facilitating the incorporation of low-carbon vehicles, such as electric vehicles.

This will contribute to the Transportation 2040 and Greenest City targets of having walking, cycling and public transit trips make up at least 50% of all trips by 2020 and 66% of all trips by 2040 and to reduce motor-vehicle kilometres traveled per resident by 20% from 2007 levels. It will also contribute to the Greenest City target on Climate Leadership – to reduce community-based greenhouse gas emissions by 33% from 2007 levels.

4.2 Intent

The intent of encouraging sustainable transportation is:

- to reduce reliance on travel that consumes excessive energy and contributes to GHG emissions and poor air quality;
- to support a thriving economy, to improve the health of residents and the vibrancy of the city, and to enhance the natural environment; and
- to meet mobility needs while minimizing environmental impacts and providing long-term health benefits.

4.3 Primary Deliverable

The primary deliverable is a detailed Green Mobility Plan that assesses the site's transportation infrastructure and programming. The Plan should illustrate how the applicant intends to meet the City's transportation goals and principles from Transportation 2040 (2012) and other current City policies, including:

- Community Climate Change Action Plan (2005), and
- Greenest City 2020 Action Plan (2011).

The City's standard transportation requirements for new development can be found in the Parking By-law, the Vancouver Building By-law, the Zoning and Development By-law, and City design and study guidelines. The primary purpose of the Green Mobility Plan is to identify and evaluate opportunities to support sustainable transportation choices **beyond these minimum requirements**.

4.4 Plan Components

The Green Mobility Plan will include a detailed assessment of the potential for walking, cycling and transit trips to and from the site. Where deficiencies exist in these networks, or where opportunities exist to enhance the quality of infrastructure or programming, the Green Mobility Plan will evaluate the viability of incorporating these improvements into the project. Plan elements can range from small-scale changes, such as provision of additional bicycle racks, to larger scale improvements, such as the provision of safe and attractive cycling or pedestrian routes. While the specific emphasis will vary from site to site, priority should be given to providing walking, cycling, and transit infrastructure which is safe, accessible, and attractive for all ages and abilities.

The Plan will also include an assessment of the site's motor-vehicle facilities and programming. It will identify opportunities for projects to incorporate strategies to encourage use of low- and zero-carbon vehicles, as well as opportunities to support reduced vehicle ownership and use. Plan elements might include additional vehicle charging infrastructure, on-site car-sharing services, pricing policies, etc.

The Plan should also look for opportunities to reduce the impact of goods movement on the community and environment, such as through better matching of delivery vehicles to delivery size.

The Green Mobility Plan does not replace requirements for traffic impact analysis, travel demand management plans or other studies required to review and approve development or rezoning applications.

5.0 RAINWATER MANAGEMENT

5.1 Objective

The City will require a Rainwater Management Plan that recognizes rainwater as a resource to enhance the community and environment.

This will contribute to our Clean Water Greenest City target – to reduce per-capita residential water consumption by 20% by 2020. It also supports several other Greenest City goals.

5.2 Intent

The intent is to reduce stormwater discharge, reduce the generation of runoff, treat surface runoff to reduce contaminants, and where possible, conserve potable water use.

5.3 Primary Deliverable

The primary deliverable is a Rainwater Management Plan that addresses how the project will meet the following requirements (which are modelled on industry best practices):

Quantity

Goal: To limit interference with natural hydrology by maximizing pervious cover, increasing on-site infiltration opportunities, limiting runoff generation and reducing and/or eliminating pollution by not generating it.

Deliverable: Create a Rainwater Management Plan that illustrates the measures that will be employed to meet the following target: post-development runoff rate and volume = pre-development* runoff rate and volume for the two-year 24-hour duration storm. (*pre-development means the site's immediate preceding use.)

Quality

Goal: Manage rainwater runoff quality.

Deliverable: Create a Rainwater Management Plan that treats 90% of the average runoff volume. The practices used to treat runoff must be capable of 85% TSS removal. Preference will be given to landscape-based treatment systems integrated within the site's overall landscaping plan. However, mechanical filtration systems will be considered on a case-by-case basis. (TSS = total suspended solids)

5.4 Study Components

Applicants will be required to produce a Rainwater Management Plan that demonstrates how the project will meet the two above-noted requirements for quantity and quality.

The Plan must include the following elements:

- Pre-development site plan showing orthophoto and existing drainage appurtenances,
- Developed site plan showing general arrangement of proposed rainwater management works,
- Hydrologic and hydraulic analysis prepared by qualified professional in the area of rainwater management showing how the site will meet the requirements,
- Supplementary documentation for any pre-manufactured products, and
- A letter from a registered professional stating that all proposed systems and appurtenances required by the Plan meet the Vancouver Building By-law.

As well, the following must be considered and addressed/incorporated:

- Prioritize retaining existing healthy trees in the overall site design in consultation with an ISA Certified Arborist,
- Use waterwise planting selections (see the City of Vancouver Waterwise Planting Guidelines),
- Provide adequate planting medium depth for all plantings to be maintained on structures,
- Provide in-ground tree planting with sufficient planting medium area and connection to the natural water table,
- Locate rain gardens to capture runoff from hard-surface areas and to recharge soft landscape areas, and
- Utilize open space on rooftops for green roof plantings.

The Plan must demonstrate how the above six measures are integrated into the project design. If one of these measures is not feasible on a particular site, the applicant must provide an explanatory rationale and propose an alternative. All measures must meet the Vancouver Building By-law.

6.0 ZERO WASTE PLANNING

6.1 Objective

The City will require a Zero Waste Design and Operations Plan, that considers deconstruction, infrastructure design and post-construction operations, and meets or exceeds the City's GC2020 goals with respect to waste reduction, increased opportunities for material re-use and recycling, and reduced GHG emissions.

This will contribute to our Greenest City target on Zero Waste – to reduce solid waste going to the landfill or incinerator by 50% from 2008 levels.

6.2 Intent

The ultimate objective is to facilitate the reorientation of peoples' habits and practices toward the City's zero waste target. Therefore, the key objectives of a project's Zero Waste Design and Operations Plan are to foster ongoing waste reduction and increased diversion of products and materials from the waste stream through re-use, composting and recycling. The Plan should also aim to reduce operations-related environmental emissions, notably GHG emissions, through strategies such as reduced service-vehicle trips.

6.3 Primary Deliverable

The primary deliverable is a Zero Waste Design and Operations Plan composed of a site/development infrastructure design component, and an ongoing operations/maintenance component. For both the infrastructure design and the operations components, the plan will thoroughly describe the proposed zero waste strategies and alternatives, and the residual waste management considerations. The plan should be consistent with current policies, programs, mandates, initiatives, guidelines, etc., that are supported and/or used by the City of Vancouver.

For reference, these include:

- City of Vancouver Garbage and Recycling Storage Facility Design Supplement, Revised September 2012
  vancouver.ca/files/cov/Garbage_and_Recycling_Storage_Facility_Supplement.pdf
- City of Vancouver Solid Waste By-law 8417
  app.vancouver.ca/bylaw_net/ConsolidatedReport.aspx?bylawid=8417&txtSearch=solid+waste
- City of Vancouver Greenest City Action Plan 2020 (Goal 5: Zero Waste)
  vancouver.ca/files/cov/Greenest-city-action-plan.pdf
- City of Vancouver Demolition/Deconstruction Permit
  vancouver.ca/home-property-development/demolition-permit.aspx
- City of Vancouver Green Building Strategy
  vancouver.ca/home-property-development/green-building-and-renovating.aspx
- Metro Vancouver Banned and Prohibited Materials List (updated periodically)
  metrovancouver.org/services/solidwaste/disposal/Pages/bannedmaterials.aspx
- Metro Vancouver's Zero Waste Challenge (February 2011)
  metrovancouver.org/region/ZeroWasteConference/Documents/ZWCStrategy.pdf
- Current and future Metro Vancouver Solid Waste Management Plans
  metrovancouver.org/about/publications/Pages/default.aspx
  Publication Category: Solid Waste, Recycling and Garbage Publication
- Extended Producer Responsibility (EPR) Stewardship Programs
  rcbc.ca/recycling-programs/epr

6.4 Plan Components

The Zero Waste Design and Operations Plan should illustrate how the applicant intends to meet the City's requirements and how the plan will be implemented. The following are expectations and considerations for infrastructure design and ongoing, post-construction operations that must be addressed in the plan. The applicant is encouraged to put forward additional or alternative ideas that enhance the intent of this policy.

1. *Vision Statement*

The vision statement should reflect the intent of this policy – to facilitate achievement of the City of Vancouver's zero waste target by fostering waste reduction, by increasing diversion through re-use, composting and recycling, and by reducing GHG emissions in the design and operation of the proposed development's solid waste system.

2. *Description of Project and Diversion Objectives*

The Zero Waste Design and Operations Plan should provide:

- Consideration of deconstruction opportunities and practices, to reduce landfilled waste material and create opportunities for building material re-use and recycling;
- A summary of the types and number of units in the development (e.g. residential, retail, food, etc.);
- The types and estimated quantities of waste generated by unit type, consistent with City expectations for waste diversion in each type of unit;
- The types and estimated quantities of waste diverted, based on the proposed design and operations plan.
- As of January 1, 2015, the City of Vancouver Solid Waste By-law requires all properties to have a food scraps diversion plan. Some options on how to manage are:
  - Sign up for food scraps collection with your current solid waste provider or choose another provider from the following link. (vancouver.ca/home-property-development/list-of-food-scraps-haulers.aspx)
  - Consideration of an onsite organics management system to process organic compostable materials (food scraps and yard trimmings). Installation and use of an on-site system should be considered as an alternative or an additional option to complement any food scraps collection program. This alternative can help reduce the number of service collections needed for organics at this site and thus reduce the overall GHG emissions associated with each service trip. (See the information described earlier under Section 3.0 Sustainable Food Systems).

3. *Site/Development Infrastructure Design*

Space Allocation Expectations for Zero Waste Initiatives

The site design should provide dedicated space to accommodate waste diversion initiatives (i.e., re-use, organics, recycling), in addition to residual waste collection. Ample space allocation should be provided in all domains of occupancy – in the individual unit, within each building, and in shared public spaces. Detailed considerations for each type of development are shown below. The plan should show how the applicant intends to meet these design expectations:

For multifamily complexes, space should be allocated in:

(a) Each residential unit
  (i) Provide ample space for organics and recycling bins, preferably in the kitchen area under the sink or in cabinetry. The space allocation should take into consideration the number of recycling bins needed by the resident to meet current product stewardship programs (e.g. beverage containers on deposit) and City material segregation requirements (e.g. newsprint, mixed paper, mixed containers).

(b) Common areas such as lobby and laundry room
    (i) Design so that recycling containers are always placed with garbage containers in common areas (twinning).

(c) Re-use/recycling space in building
    (i) Design to accommodate a sufficient number of organics and recycling carts/containers to meet the needs of the entire building (see City of Vancouver "Garbage and Recycling Storage Facility Design Supplement").
    (ii) Design for the installation of signage to instruct occupants on appropriate use of the organics and recycling containers.
    (iii) Consideration should be given to the allocation of space in the recycling storage area for a re-use and materials exchange kiosk. Amenities such as shelving and a bulletin board should be supplied.

(d) On-site organics management space
    (i) Consideration of an onsite organics management system as an alternative or an additional option to complement any food scraps collection program.

For office and retail buildings, space should be allocated in:

(a) Individual retail/office units in retail/office complexes
    (i) Design to accommodate recycling bin(s) in each working space.
    (ii) Depending on size of building complex and overall waste collection plan, consider providing a common area space that can accommodate recycling carts (in accordance with product stewardship programs and City material segregation requirements).
    (iii) Allocate space for organics bins/carts to attract/accommodate sustainability-oriented occupant demand.

(b) Common/public areas such as lobby and corridors
    (i) Design so that recycling containers are always placed with garbage containers in common areas (twinning).
    (ii) Allocate space for organics bins to foster organics diversion opportunities.
    (iii) Consider waste reduction strategies in design, such as hot-air hand-dryers instead of paper towels in public washrooms.

(c) Recycling storage space in building
    (i) Design to accommodate a sufficient number of recycling carts/containers to meet the needs of the entire building (see City of Vancouver "Garbage and Recycling Storage Facility Design Supplement").
    (ii) Design for the installation of signage to instruct occupants on appropriate use of the recycling containers.
    (iii) Allocate space for organics bins/carts to foster organics diversion opportunities.
    (iv) Consideration should be given to the allocation of space in the recycling storage area or in another common area for an interoffice materials exchange bulletin board and zero waste information kiosk.

For food services, space should be allocated in:

(a) Work spaces
    (i) Design to accommodate convenient source segregation of organics, greases and recyclables in food handling and preparation work spaces.
    (ii) Allocate space for organics and recycling containers in all other work spaces.

(b) Customer/public spaces for food consumption
    (i) Design to facilitate convenient customer/public source segregation of organics, beverage containers, and other recyclables in clearly marked disposal containers (twinning).
    (ii) Consider waste reduction strategies in design, such as hot-air hand-dryers instead of paper towels in public washrooms.

(c) Organics and recycling storage space in building/complex.
    (i) Design to accommodate a sufficient number of organics, grease and recycling carts/containers to meet the needs of the entire building (see City of Vancouver "Garbage and Recycling Storage Facility Design Supplement").
    (ii) Design for the installation of signage to instruct occupants on appropriate use of the organics and recycling containers.

For large venues (greater than 2,000 visitors per day), space should be allocated in:

(a) Individual units in large venues
    (i) Design to accommodate recycling bin(s) in each working space.
    (ii) Depending on size of building complex and overall waste collection plan, consider providing a common-area space that can accommodate recycling carts (in accordance with product stewardship programs and City material segregation requirements).
    (iii) Allocate space for organics bins/carts to foster organics diversion opportunities.

(b) Common/public areas such as interior public/mall corridors, public washrooms, green spaces.
    (i) Design so that recycling containers are always placed with garbage containers in public areas. Facilitate convenient customer/public source segregation of beverage containers, and other recyclables in clearly marked disposal containers.
    (ii) Allocate space for organics bins to foster organics diversion opportunities.
    (iii) Consider waste reduction strategies in design, such as hot-air hand-dryers instead of paper towels in public washrooms.
    (iv) Consideration should be given to the allocation of space for a zero waste/sustainability information kiosk for occupants and the public.

(c) Recycling storage space in building.
    (i) Design to accommodate a sufficient number of recycling carts/containers to meet the needs of the entire building (see City of Vancouver "Garbage and Recycling Storage Facility Design Supplement").
    (ii) Design for the installation of signage to instruct occupants on appropriate use of the recycling containers.
    (iii) Allocate space for organics bins/carts to foster organics diversion opportunities.

<u>Space Allocation for Residual Waste Storage</u>

Sufficient space must be allocated for residual waste storage. See the City of Vancouver "Garbage and Recycling Storage Facility Design Supplement" for guidance on estimating space requirements and related design considerations.

In the assessment of space requirements, consider accommodating storage container systems and vehicles that will have the least environmental impacts during operation, particularly with respect to GHG emissions. For example, compactor systems can reduce trip frequency, which in turn can reduce GHG emissions.

4. *Operations*

The zero waste objective of this policy should be integrated into the design of the development's ongoing, post-construction operating systems. Therefore an operations component is required in the Zero Waste Design and Operations Plan, that addresses each of the following:

Recycling, Organics, and Waste Collection Systems

Waste is generated at numerous points in a large development, such as in each multifamily unit, as well as in corridors, public washrooms and retail outlets that might be part of the complex. Therefore, the recycling, organics, and waste collection system should be designed holistically to incorporate and integrate the various sources and points of generation. It is expected that the system as a whole will be designed to facilitate zero waste (through waste reduction, re-use, composting and recycling), increase efficiency, and minimize GHG and other emissions. The plan should show how the applicant intends to meet this expectation through initiatives such as:

- Maintaining an on-site re-use/freeware/materials exchange facility or bulletin board for occupants.
- Providing an on-site communal composting facility or system.
- Facilitating diversion of reusable and recyclable construction and renovation materials generated in individual units and components of the development.
- Facilitating establishment of on-site product stewardship take-back program or take-back depot (for large venues with public access).
- Facilitating installation of additional publicly accessible on-site diversion initiatives via NGO programs for items such as clothing, textiles and used books.
- Engaging a single hauler for all waste streams generated on site in order to reduce trips.
- Providing a service or billing model that offers occupants incentives to reduce, re-use or recycle rather than to dispose waste.

Occupant/Public Education and Outreach

The provision of training and ongoing outreach to occupants of the development is a critical factor in the successful implementation of the Zero Waste Design and Operations Plan. Therefore the plan should consider:

- How new occupants will be educated in the implementation of the zero waste initiatives and collection systems. It may be necessary to provide a hands-on training program for large-scale occupants such as anchor retailers.
- How, through signage and visual cues such as bin colour and shape, occupants and the public will be directed toward using the zero waste collection systems provided on site.
- Procedures and actions that provide occupants with continuous encouragement and support in implementing/participating in the Zero Waste Design and Operations Plan. Consideration could be given to:
    - Establishing a building-level zero waste/sustainability team to engender a community culture around zero waste.
    - Providing regular newsletters that report on successes and identify issues and challenges.
    - Maintaining a zero waste bulletin board in a prominent place for information and collaboration.
    - Establishing a corporate zero waste leadership award program for businesses on site and promoting it.
    - Providing or facilitating on-site consultations on ways individual businesses can improve their performance.

Facility Operations Training and Support

The success of the Zero Waste Design and Operations Plan will depend on continuous oversight, education and enforcement on the part of the designated property manager.

Therefore the plan should indicate:

- How the property will be managed (i.e. directly by the applicant or by a property management firm).
- The responsibilities of the property manager.
- The steps taken to ensure that the property manager is trained to implement and oversee the plan.
- The documents or standard procedures that are used to train staff on zero waste initiatives.

Consideration should also be given to how the operations plan will be implemented with respect to the selection, training and oversight of janitorial services. Janitorial services in large complexes play a significant role in aspects of the collection system such as whether and how recyclables are segregated. Janitorial services can also be addressed in terms of the minimization of toxic cleaning products and reduction of cleaning related wastes, such as containers and paper toweling.

Plan Implementation Report

The applicant is expected to provide the City with a report on implementation of the Zero Waste Design and Operations Plan within 18 months of occupancy. The criteria for the implementation report shall include:

- Types and quantities of waste diverted.
- Quantity of waste disposed.
- Names and locations of recycling processing facilities used.
- Description of on-site re-use options, product stewardship facilities, NGO drop-off bins, etc.
- Description of annual education initiatives undertaken.
- Summary of initiatives to reduce GHG emissions.
- Summary of other initiatives undertaken to facilitate zero waste on-site.

Value Added

The applicant is encouraged to consider innovative ideas that will enhance the Zero Waste Design and Operations Plan, such as smart metering for waste diversion measurement and centralized vacuum systems.

The final prepared Zero Waste Design and Operations Plan should be structured so as to replicate all of the numbered headings and their sub-headings in section 6.4 of this bulletin and should meaningfully address each of these headings.

7.0 AFFORDABLE HOUSING

7.1 Objective

The City will require – for large developments (as defined in this bulletin) accommodating housing – an Affordable Housing Plan that considers a range of unit types and tenures, and demonstrates how the project will meet or exceed the requirements of the City's Affordable Housing in New Neighbourhoods policy (the 20% policy). Providing affordable housing is a key focus for large development rezonings. Applicants are required to meet with City staff at the pre-application stage to discuss the appropriate mix of incomes, household types and tenures.

7.2 Intent

The intent is to create options for more housing affordability, types and choices, including housing for individuals and families that fall under the Housing Income Limits published by BC Housing, and purpose-built rental housing for moderate income households. Applicants should refer to the City's Affordable Housing in New Neighbourhoods policy (the 20% policy) for Council's priorities on achieving affordable housing through large developments.

For reference, there are a number of relevant housing policies, including:

- Mayor's Task Force on Housing Affordability – Priority Action Plan (2012) which contains a priority action to revise and clarify the City's inclusionary housing policy (20% Policy) to enhance flexibility in the delivery of affordable housing in large developments.

- Vancouver Housing and Homelessness Strategy 2012–2021, which contains strategic directions to:
  (a) increase the supply of affordable housing, including market and non-market rental housing; and
  (b) encourage a housing mix across all neighbourhoods.

- Rate of Change Policies and Regulations (2007), which affect all RM, FM and CD zoned properties, including those with Official Development Plans, and which are intended to protect the existing stock of affordable rental housing.

7.3 Primary Deliverable

The primary deliverable is to achieve a project with a balanced housing mix that gives consideration to a wide range of household types and income groups. Affordable housing units achieved through this policy will be secured through a Housing Agreement and any other legal mechanism deemed necessary by the Director of Legal Services and the Managing Director of Social Development.

7.4 Plan Components and Review

In assessing an Affordable Housing Plan and giving feedback to applicants on developing a plan that is socially sustainable, staff will look to the priorities identified in Council's inclusionary housing policies referenced above and will take into consideration the particulars of each site and the market conditions at that time.

Affordable Housing Plans will be developed and assessed on a case-by-case basis, as rezonings occur.

8.0 LOW CARBON ENERGY SUPPLY

8.1 Objective

The City will require a Low Carbon Energy Supply Feasibility Screening Study, performed by a qualified green energy consultant at the discretion of the City, to explore the viability of campus and/or district energy systems. If the business case is viable, a system will be required.

This will contribute to our Greenest City target on Climate Leadership and target to reduce community-based greenhouse gas emissions by 33% from 2007 levels. It will also contribute to the Greenest City target for Green Buildings, to reduce energy use and greenhouse gas emissions in existing buildings by 20% over 2007 levels.

8.2 Introduction and Purpose

The Terms of Reference for completing the required Low Carbon Energy Supply Feasibility Screening Study are outlined from this section (8.2) through to section 8.9. These Terms of Reference are to be followed for development projects requiring an evaluation of low-carbon

energy supply opportunities. Where the applicant is seeking BC Hydro co-funding for the study, BC Hydro's *Minimum Requirements for A Sustainable Communities District Energy Pre-Feasibility Study* must also be met. Although less detailed in scope, these City of Vancouver Terms of Reference have been designed to be compatible with BC Hydro's study requirements.

The purpose of this document is to provide an outline of the requirements for completing a Low Carbon Energy Supply Feasibility Screening Study (also known as a Pre-Feasibility or Phase I Study) to the satisfaction of the General Manager of Engineering Services. A Feasibility Screening Study is a preliminary technical and business case analysis used to assess whether viable district- or development-scale low-carbon energy opportunities are present warranting further evaluation. The purpose of such a study is to support the advancement of affordable, low-carbon energy solutions throughout Vancouver.

Modifications to these Terms of Reference may be warranted based on consideration of a specific project's location. For example, an abbreviated scope of work that focuses on solely on campus-scale low-carbon energy opportunities may be approved for projects located outside of the three key target areas for district energy, namely downtown, Cambie Corridor and Central Broadway, as discussed in the Vancouver Neighborhood Energy Strategy approved by Council on October 3, 2012. Modifications to these Terms of Reference and the required study scope of work shall be at the discretion of the General Manager of Engineering Services.

The Feasibility Screening Study must be completed by a qualified professional with proven expertise in the evaluation of low-carbon energy supply opportunities. Should the preliminarily results indicate that a district- or development-scale energy system may be viable and beneficial, a more detailed feasibility study may be required.

In locations where rezoning applications are being proposed for several nearby sites, the City strongly encourages developers to undertake joint studies of potential district energy solutions. This approach generally results in a higher probability of finding a viable low-carbon energy option and also typically results in a lower feasibility study cost for developers.

8.3 Implementation Objectives

The City's objectives with respect to the implementation of low-carbon energy supply technologies, including district systems, are reductions in GHG emissions, and the long-term flexibility to adapt to new and more sustainable technologies and fuels. The City also has an interest in improvements to energy efficiency and supporting the development of local green technologies and jobs.

The Low Carbon Energy Supply Feasibility Screening Study aims to identify the potential impacts of low-carbon energy supply options, relative to a realistic reference case scenario, on:

- Long-term GHG emissions,
- Long-term life-cycle energy costs to energy end-users,
- Risks to energy end users, including financial and reliability considerations,
- Qualitative benefits to energy end-users (e.g. reliability, quality of service, etc.),
- Resource consumption (e.g. electricity, natural gas or recovered waste), and
- Other significant environmental impacts or benefits (e.g. local air quality, waste management, water use, space requirements, etc.).

The evaluation of low-carbon energy supply opportunities is a phased process which begins with the completion of the Feasibility Screening Study. In cases where the Study suggests there are district- or development-scale low-carbon energy opportunities offering environmental benefits with lifecycle energy costs comparable or lower than a reference case approach, taking into consideration uncertainties in the capital and operating cost estimates. In these cases a Detailed Feasibility Study (also known as a Phase II study or business case analysis) may be required. The purpose of the Detailed Feasibility Study is to further confirm costs and benefits of preferred short-listed option(s), and to address implementation issues such as ownership and

operations strategies. In some cases (i.e. for smaller systems), a full Feasibility Screening Study may not be necessary and the developer may choose to proceed directly with identification of a utility provider, site testing, and/or other supplemental technical or financial evaluations supporting the development of a low-carbon energy system .

8.4 Primary Deliverable

The primary deliverable of the Low Carbon Energy Supply Feasibility Screening Study is a report identifying and ranking potential, technically viable, low-carbon energy supply solutions, both at a district and development scale, based on lifecycle energy costs and benefits. The study must focus on energy supply system options which reduce GHG emissions associated with space, ventilation, and domestic hot-water heating. Low-carbon energy supply options for cooling and power generation may be considered where there is a financial or GHG reduction benefit to doing so.

Completion of the Low Carbon Energy Supply Feasibility Screening Study, to the satisfaction of the General Manager of Engineering Services, is required as part of the rezoning application package to satisfy the requirements of this policy. Additional deliverables may be required at later stages of project permitting, which may include a more detailed feasibility study or business case analysis of low-carbon energy opportunities, and/or other specific documentation related to detailed design of the development's energy system.

8.5 Study Elements

The Low Carbon Energy Supply Feasibility Screening Study should include the following elements, at minimum:

1. Executive Summary

- Development location, size, and use;
- Regional context (potentially connectable surrounding loads of interest);
- Site loads and connectable surrounding loads including percentage of annual energy to be serviced through low-carbon technologies;
- Reference case energy supply scenario description with levelized reference case energy supply costs, GHG emissions, natural gas and electricity consumption;
- Low-carbon energy supply options short-listed with associated levelized energy supply costs and GHG emissions, natural gas and electricity consumption;
- Summary of risks associated with reference case and short-listed low-carbon energy supply options; and
- Recommended next steps.

2. Site and Neighbourhood Overview

General description of the site and surrounding area including:

- Project location;
- Site constraints and amenities;
- Planned site density and use mix;
- Regional context (current and planned surrounding land use by archetype and density);
- Proximity to other redevelopment sites and major infrastructure;
- Development timeframes; and
- Connectivity analysis to nearby buildings, future development sites and other district energy systems within 500 m radius of the site.

Note: Key connectable buildings must be identified which considers building size/load, existing heating/cooling mechanical design, age of equipment, and distance from the site, where information is available or reasonably easy to acquire or infer.

3. Energy Profile and Load Analysis

Base Case Loads:

Using proposed floor areas and City-approved end-use energy use intensity factors (energy use per m^2 of floor area), prepare an expected (base case) forecast of annual and peak end-use heating (space heating, domestic hot-water and ventilation air) and cooling demands for buildings within the development. Reflect the proposed phasing schedule in the demand forecasts. For larger sites, loads may be separated into subareas for the purposes of evaluating layout, siting, and phasing issues. (Note: Energy use intensity is a unit of measurement that describes a building's energy use, specifically the energy consumed per m^2 – or other area unit – of building floor space.)

Annual heating load duration curves must be provided for full build-out of the development including any existing buildings that will remain on site. Annual cooling load duration curves must also be provided where annual cooling loads exceed 5% of annual heating loads. The proposed percentage of peak and annual energy requirements to be served through low-carbon sources must be stated. A target of 70% annual heating energy to be met through low-carbon sources is recommended, however it is at the discretion of the energy consultant to select an appropriate split between low-carbon and conventional energy sources. Approval must be granted from the City to consider low-carbon energy approaches that serve less than 70% of annual heating energy requirements.

Energy use intensity assumptions are provided in section 8.8 – Supporting Information. Alternative demand scenarios may be prepared reflecting higher or lower energy demands based on higher end-use efficiency assumptions (beyond code requirements) or alternative development assumptions.

Neighbourhood Loads:

For the purpose of evaluating district energy opportunities, also identify and estimate existing or proposed loads within an approximate radius of 500 m of the site for the purpose of assessing district energy opportunities. For existing surrounding loads, only significant building energy loads that may be suitable for interconnection with a district energy system should be included. Potentially connectable loads are those which satisfy all of the following requirements:

- Heated floor space exceeding 2,000 m^2 per building,
- Existing hydronic heating systems with minimal electric-resistance heating or gas-fired roof-top ventilation air heaters (does not apply to proposed developments), and
- Located within 500 m of the site.

All nearby building loads satisfying these requirements should be summarized. Assumptions on connectability may be inferred based on building archetype and age, where building-specific mechanical information is not available.

Considering both on-site and potentially connectable off-site loads prepare combined heating and cooling load duration curves at full build-out. Where no connectable loads have been identified, consider entire site loads only. The combined load forecast should consider the effects of diversification on central equipment requirements.

Summarize the expected optimal sizing of any district energy solutions at full build-out, including the percentage of peak and annual energy to be serviced by low-carbon energy technologies and the percentage to be covered by conventional boilers, or alternative means, for peaking and back-up.

4. Reference case

Reference case energy supply scenario refers to the preferred form of the mechanical heating and cooling system in the absence of a low-carbon energy system. A description of the reference case energy supply scenario should indicate the delivery method for each heating and cooling end-use (i.e. residential, non-residential and common area space heating and cooling, make-up and ventilation air, and domestic hot water).

The reference case analysis should include the following:

- estimates of the levelized unit cost of energy ($/MWh/year) for the reference case over a 25-year timeframe (including annual boiler/heating equipment capital, operating and maintenance costs), and
- estimates of gas consumption, electricity consumption and GHG emissions over the analysis timeframe.

Estimates of costs, GHG emissions, and electrical and gas energy consumption should be Class D level estimates (estimate variance of -25%, +50%).

5. Screening of Low-Carbon Energy Sources

Review of Opportunities:

Identify potentially viable low-carbon energy sources for consideration, including, but not limited to, process/waste heat recovery, sewage heat recovery, geoexchange (open loop, closed loop, surface water exchange), air source heat pumps, bio-energy (biomass combustion, biogasification, anaerobic digestion), and other nearby district energy systems. Provide a high-level assessment of the technical and logistical viability of each potential opportunity considering study area loads, location and resource capacity. The opportunity to serve any existing buildings that will remain on site with low-carbon energy sources, as well as potential demand-side management strategies for existing buildings should be evaluated and summarized. Milestone: Sources under consideration must be approved by the City of Vancouver at the time of project kickoff.

Analysis of Short-listed Opportunities:

Create a short-list of low-carbon energy options deemed potentially technically viable at a development- and/or district-scale at full build-out for inclusion in a more detailed qualitative and quantitative analysis. Short-listed options may include scenarios which consider site loads only, but must also include scenarios which consider a district-scale approach incorporating surrounding proposed or existing connectable loads at full build-out, where present. Milestone: Short-listed options must be approved by the City of Vancouver prior to proceeding with further technical and financial analysis of short-listed opportunities.

Analysis for each short-listed option must include at minimum the following:

- Description of the high-level concept design of the proposed low-carbon energy system including equipment requirements, equipment sizing, system capacity, backup and peaking energy supply strategy, and distribution approach (i.e. distribution temperature, equipment centralization, etc.).
- Estimates of capital, operating and maintenance costs associated with the energy centre, distribution piping, building connection, and any retrofits or upgrades required to connect buildings under consideration. Provide an itemized summary of major cost components, and supporting assumptions.
- Estimates of levelized cost of energy ($/MWh/year) for each scenario over a 25-year time horizon. Compare results to reference case including percentage premium / saving over reference case.

- Estimates of total natural gas consumption (GJ/year), electric energy consumption (MWhr/year), and GHG emissions (tonnes/year) under each low-carbon energy supply scenario at full build-out. Compare results to reference case including percentage increase/decrease over reference case.
- Estimates of alternative fuel source consumption (i.e. biomass, biogas).
- High-level qualitative summary of relevant risks and benefits associated with each supply scenario (i.e. fuel price and supply stability, long term flexibility to adapt to other heat source options, air quality, water quality, social impacts).
- Details of applicable by-laws and/or other regulatory bodies that may need to be consulted prior to detailed design; as well as a description of the design implications of, and strategies for, achieving by-law compliance. A list of applicable by-laws can be found in the resources section. (This list is neither exhaustive nor prescriptive.)
- Ranking of opportunities based on GHG reduction and levelized cost of energy.
- Concept design schematics for the preferred (highest ranking) low-carbon energy option(s).

Estimates of costs, GHG emissions, and electrical energy consumption should be Class D level estimates (estimate variance of -25%, +50%). Clearly indicate any exclusions in the cost estimates provided. Major assumptions used throughout the analysis should be clearly stated (refer to "Study Assumptions and Cost Estimates").

6. Sensitivity Analysis

The City will assess the need for inclusion of a sensitivity analysis, based on the draft study findings. Where few or no low-carbon opportunities show levelized costs competitive with reference case, a sensitivity analysis of select input parameters and assumptions may be warranted.

Additionally, in the event that the lowest cost low-carbon energy supply alternative is more expensive than reference case, estimates of the size of grant, that would be required to make the low-carbon energy supply alternative equal cost to the reference case, must be provided.

7. Recommendations / Next Steps

Provide recommendations and next steps related, but not limited, to the following:
- Further evaluating the technical and economic viability of the preferred low-carbon energy supply option(s).
- Potential opportunities for improving the economic viability of the preferred low-carbon energy system.
- Strategies for demand-side management for any existing buildings to remain on site.
- Strategies for improving future flexibility for the development to connect to a hot water district energy scheme and/or other energy source options.
- Risks and sensitivities warranting further analysis moving forward.

8.6 Study Assumptions and Cost Estimates

Developers are expected to use the energy use intensity factors supplied by the City (refer to "Supporting Information") unless there is satisfactory evidence that alternative energy intensity factors are more accurate or relevant to the study.

Energy price forecasts, GHG emission multipliers for gas and electricity, and other key assumptions (other than EUIs) should agree with the *District Energy Assumptions* provided by BC Hydro's Sustainability Communities Program, or otherwise be approved by the City.

Key assumptions influencing load forecasts and levelized cost results should be clearly summarized, including but not limited to:

- energy use intensity,
- load diversification,
- annual average equipment efficiencies and coefficients of performance,
- low-carbon fuel prices,
- commodity prices (gas, electricity, carbon),
- GHG offset value,
- equipment selection and capacities (boilers, heat pumps, etc.),
- equipment capital costs for heat production and distribution,
- construction unit costs, where applicable,
- O&M costs,
- engineering, project management, and regulatory approval costs (can be estimated as a percentage of direct costs),
- contingency,
- equipment replacement schedule,
- discount rate,
- interest on debt,
- return on equity.

The developer must identify and discuss with the City where assumptions deviate from BC Hydro and City recommended assumptions, where present, and provide rationale for any discrepancy.

8.7 Milestones and Involvement of the City

To ensure that the work being undertaken meets the Terms of Reference specified herein for the Low Carbon Energy Supply Feasibility Screening Study and incorporates appropriate assumptions and site-specific considerations, regular involvement of City staff throughout the execution of the study is required.

Developers are encouraged to consult City staff on current or expected nearby loads as well as potential energy sources, in particular sources associated with City infrastructure (e.g. sewer heat opportunities).

The following milestones shall be incorporated into the Low Carbon Energy Supply Feasibility Screening Study schedule:

(a) Study Kickoff Meeting – This meeting provides an opportunity for the applicant, energy consultant, and City of Vancouver to discuss and define the scope of the study and appropriate assumptions surrounding low-carbon technologies and nearby building loads to consider. Studies for some larger sites may be eligible for BC Hydro co-funding. These opportunities should be investigated prior to study kickoff.

(b) Status Update Meeting – This meeting provides an opportunity for the energy consultant and applicant to share preliminary findings with the City of Vancouver, discuss and review assumptions and selected opportunities for short-listing, and work through any barriers or challenges encountered to date.

(c) Draft Report – The draft report should be issued prior to the draft results meeting. The City will provide a list of comments and questions within two weeks of receiving the draft report.

(d) Draft Results Meeting – This meeting provides an opportunity for the energy consultant and applicant to present findings summarized in the draft report and to discuss any sensitivity analysis which may be warranted.

(e) Final Report – The final report shall address all City comments and questions, and shall be issued to the City within one month of receiving City comments.

Sufficient time and budget should be allocated for addressing and responding to City comments and questions on the draft report, and integration of these comments into the final Low Carbon Energy Supply Feasibility Screening Study.

8.8 Supporting Information

Energy Use Intensity Factors

Table 5-1: EUIs for New Buildings

	Units	BCBC[1]	ASHRAE 90.1-2007[2]		
		Low-rise	Mid/High-rise	Office	Retail
Peak Space Heat Demand	W/m^2	41	47	47	63
Annual Space Heat Loads	$kW.h/m^2$	67	84	70	32
Peak DHW Demand	W/m^2	4	4	1	0
Annual DHW Loads	$kW.h/m^2$	24	24	3	1
Peak Space Cooling	W/m^2	N/A	14	60	38
Annual Space Cooling	$kW.h/m^2$	N/A	14	26	17

Notes:

[1] BC Building Code

[2] Assumes double pane thermal break window. Overall U-0.55.

Table 5-2: EUIs for Existing Buildings

	Units	Low-rise[1]	Mid/High-rise[2]	Office[3]	Retail[3]
Peak Space Heat Demand	W/m^2	41	51	83	66
Annual Space Heat Loads	$kW.h/m^2$	77	86	82	65
Peak DHW Demand	W/m^2	12	11	2	1
Annual DHW Loads	$kW.h/m^2$	36	35	7	5

Notes:

[1] EUIs based on City of North Vancouver MURB study. Assumes 1970s vintage.

[2] EUIs based on City of North Vancouver MURB study. Assumes 1990s vintage.

[3] EUIs based on BC Hydro 2007 Conservation Potential Review

EUIs for other building typologies (i.e. grocery stores, community and institutional buildings) should be assessed on a case-by-case basis.

8.9 Resources

Additional resources include:

(a) Commodity Prices and Other Assumptions – Please contact the City of Vancouver or BC Hydro for a copy of BC Hydro's latest commodity price forecasts and district energy study assumptions for use in conducting feasibility screening studies and business case evaluations.

(b) VanMap – Orthophoto images, cadastral (parcel) data, and other relevant property information may be viewed at: http://vancouver.ca/vanmap/index.htm. Information can be downloaded for GIS use from: http://data.vancouver.ca/datacatalogue/index.htm.

(c) Land Use Policies – Land use policy information can be found on the Community Services page at: http://vancouver.ca/commsvcs/guidelines/pol&guide.htm.

(d) Boiler Database – Information on installed boiler capacity for specific street addresses can be obtained from the BC Safety Authority.

(e) Building Details – Information on building square footage, age, etc. can be obtained from the BC Assessment Authority.

(f) The following by-laws and/or regulatory bodies will need to be referenced or consulted during the design process. This list is neither exhaustive nor prescriptive.
   (i) Waterworks By-law
   (ii) Sewer and Watercourse By-law
   (iii) Subdivision By-law
   (iv) Vancouver Building By-law
   (v) Utilities Commission Act (BC)
   (vi) Vancouver Coastal Health