

Bulletin

Sustainable Large Developments

Effective September 1, 2018

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Authority: Director of Planning

Intent

This bulletin is intended to inform applicants seeking to comply with the Rezoning Policy for Sustainable Large Developments.

Large developments are those that:

- Involve a land parcel or parcels having a total site size of 8,000 m² (1.98 acres) or more, or
- Contain 45,000 m² (484,375 ft²) or more of new development floor area

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 developments
- Projects that contain less than 4,700 m² (50,590 ft²) of new development.

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

Applicants should review the process and requirements articulated in this document. This document is to be used in conjunction with: typical permit application documents; the applicable District Schedule of the Zoning and Development By-law; and any other relevant policies or guidelines.

Note that this policy works with two other Sustainability policies, as follows. The Green Building Policy for Rezoning applies to rezoning applications of any size, some large development rezonings may fall under the Higher Building Policy; both of these policies are *in addition* to the requirements in this policy.

This policy has eight sections, as follows:

1. Sustainable Site Design
2. Sustainable Food Systems
3. Green Mobility
4. Potable Water Management
5. Rainwater and Groundwater Management
6. Zero Waste Planning
7. Affordable Housing
8. Resilience

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1 Sustainable Site Design

1.1 General Information

Large site developments should follow principles of sustainable site design in land development and management practises.

Walkable neighbourhoods reduce driving, reduce GHG emissions, reduce the cost of living and reduce rates of obesity, high blood pressure, heart disease, and diabetes. Walkable neighbourhoods are characterized by proximity to amenities and services, a pedestrian orientation that minimizes car dependence, and well established density and land use diversity thresholds. Applications should contribute to creating a walkable, complete community.

Retaining or mimicking natural processes and modelling healthy living systems should be done wherever possible. Including nature in the city improves the health and wellbeing of the community, provides habitat, enhances ecosystem function and services, creates public open spaces for people to gather and socialize, and creates opportunities for people to directly experience nature in the city.

The allocation and design of public open space or spaces can provide significant public amenity and ecosystem services, such as rainwater management, urban forest canopy, food production and habitat. The response to open space and built form requirements will depend on the site typology which is divided for the sake of this section as follows:

- **Site Type A:** These sites are typically master planned and subject to one rezoning application. They contain multiple parcel or multiple buildings under individual development applications. By design, they are characterised by having at least one substantial, contiguous park or open space having a natural soil profile and growing conditions. In addition, there will be a mixture of private, semi-private and public open spaces throughout the site that are located at grade and on top of structure.
- **Site Type B:** These sites are typically master planned and subject to one rezoning application. They contain multiple parcel or multiple buildings under individual development applications. As differentiated from Type A, the majority of open space is provided on top of building structure, roofs, plazas and at the perimeter of buildings.
- **Site Type C:** These sites are single parcel large sites subject to a rezoning application and occasionally qualify under the Policy for Higher Buildings. They are generally characterised by building(s) on top of excavated underground parking garages. Open space is typically provided through a mixture of publicly accessible plazas, semi-private common courtyards and amenity decks, private decks and rooftops. Landscapes are established on slab in non-continuous soils. Access to grade oriented, continuous natural soil profile is challenged or limited to the perimeter of the building.

Sustainable Site Design should, in addition to the requirements specified in the policy, consider the following:

- The Rainwater Management Plan must be coordinated with the open space plan, site plan, and landscape plan. This requires an integrated approach to site planning throughout the design process. See the Rainwater Management section of this policy for complete rainwater management requirements.
- Consider the effects of micro-climate, solar aspect, shading, wind, elevation, temperature in the overall landscape design and plant selection. By looking at wind effects and other site conditions, buildings can be pre-modelled early in the design process to optimise growing conditions and improve the quality of outdoor space for habitants. This can result in changes to building location and shape.
- The grading plan and the landscape design must demonstrate water conservation and rainwater management. This can be done by employing landscape grading techniques and hardscape design strategies, such as: use permeable hardscaping materials that allow

sub-grade water infiltration, direct water to soil infiltration zones and/or sub-grade or rooftop water storage systems, employ “treatment train” strategies. Refer to the Rainwater Management section for more details. Refer to the City of Vancouver’s Waterwise Landscape Guidelines.

- For sites with open space having continuous soils (Type A), irrigation requirements should be phased out following an establishment period of two (2) years.
- Early in the design process, the structural design should anticipate slab strength and modifications (lowering or angling) to ensure that sufficient soil volumes are provided for trees. Tree planters on roofs should be permanent, substantial and cast in place, wherever possible. Avoid ‘container’ planting.
- Biodiversity - from micro-organisms living in the soil to all the flora and fauna sharing the urban landscape - is essential to the health of city wide and regional ecosystems. All proposals should incorporate habitat design, plant diversity and soil health principles. For further direction on these requirements, refer to the *Urban Forest Strategy, Bird-Friendly Design Guidelines, Biodiversity Strategy and ReWilding Strategy*.

Dog Relief Area Design Considerations:

These are well-draining areas, ideally at grade, that are easily cleaned. Elements should include deep pea gravel surfacing (minimum 500mm), a hose bib for cleaning and dog washing, trash receptacle and bag dispenser, pee post and decorative elements, and other attractive landscaping elements. Dog relief areas are small in size with a minimum area of approximately 9 m².

1.2 Submission Requirements, Additional Information

1.2.1 Trees

Applications must provide an arborist report evaluating the condition of existing trees on site (refer to Protection of Trees By-law, No. 9958, section 7.2). Applications should refer to Vancouver’s Urban Forest Strategy to understand the citywide goals and objectives related to protecting and enhancing the urban forest. The current Urban Forestry Strategy goal is to increase tree canopy cover to a city-wide average of 22 % by 2050. Tree canopy cover is generally proportional to permeable surface cover. At the neighborhood and development site scale, there are many factors that determine feasibility of tree canopy coverage. Larger sites (Type A and B) should target the minimum of 22% tree canopy cover on public and private property, to the greatest extent practicable.

1.2.2 Targets

Tree canopy (Total site)		Vegetative cover		Continuous soils at grade	
Type A	20-25 %	Total site	30 %	Private property parcel	10 %
Type B	15-20 %	Private property parcel	40 %		
Type C	10-15 %				

Definitions

Total site - Public and private property

Vegetative cover - Sum of all vegetation cover forecast at maturity, including tree canopy, landscaped areas, green roofs

Continuous soils at grade - Soil zones that maintain the qualities of the existing disturbed or undisturbed natural soil profile and hydrology through to bedrock and are not located on top of structure and are generally open to the sky

Calculations

Tree canopy and vegetative cover should be calculated by using forecasted tree canopy cover area at time of tree maturity in an urban setting, which will vary based on species, expressed as a ratio of total site area. Existing tree canopy cover can use the current canopy size or the forecasted maturity size, whichever is greater. The canopy and vegetation plans can be presented in plan view (two dimensional) using an area overlay sheet with calculations.

At the scale of the overall large site (Type A and B), the site area is defined by the boundary of the project, including all public and private property. At the development parcel scale, calculations include all tree and vegetation on private property; and, adjacent canopy coverage and plantings on city property in the immediate proximity, but cannot be counted twice for different parcels.

1.2.3 Park and Open Space Plan contents:

- area calculations to differentiate between accessible open space with continuous soil and non-continuous soil (landscapes on structure);
- area calculations to differentiate between outdoor open spaces shown as public, semi-private, and private to highlight how access to nature is provided. City streets, sidewalks and lanes are necessary public corridors and should not be included in the calculations. Pedestrian oriented, alternate street types such as a mews or woonerf can be counted; and
- site analysis to identify any natural site features, including existing tree protection that can be integrated into the open space plan.

2 Sustainable Food Systems

2.1 General Information

The City of Vancouver's overarching food related policy and guidelines include:

- Vancouver Food Strategy (2013) <http://vancouver.ca/files/cov/vancouver-food-strategy-final.PDF>
- Greenest City 2020 Action Plan (GCAP) (2011, 2015)
- Vancouver Food Charter (2007) http://vancouver.ca/files/cov/Van_Food_Charter.pdf
- Park Board's Local Food Action Plan (2013) <http://vancouver.ca/files/cov/Local-food-action-plan.pdf>

Available food asset options to be included in the development:

- Community gardens, shared garden plots, and community learning gardens
- Urban farm
- Edible landscaping
- Community kitchen
- Community food market
- Farmers market
- On-site organics management
- Other food system assets (e.g. other food processing, storage, or distribution infrastructure)

To select food assets to deliver, explore the community context and needs, and any positive or negative impacts on the surrounding neighbourhoods. Replacing or enhancing any previous on-site food assets is encouraged. Opportunities for on-site delivery of food assets are preferred.

The City will consider other food asset proposals that are in accordance with the vision, principles and goals defined in the Vancouver Food Strategy or the Park Board's Local Food Action Plan. Consider linkages between the food assets and other sustainable site infrastructure goals such as rainwater management, access to nature, and zero waste planning.

2.2 Community Gardens, Shared Garden Plots, or Community Learning Gardens

2.2.1 Characteristics

Community gardens or shared garden plots are managed by groups of individuals 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. Community gardens 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 is ideally suited for many locations in new developments:

- Rooftops
- Balconies
- Around buildings
- Courtyards
- Boulevards
- Open space

For reference:

- Urban Agriculture Guidelines for the Private Realm (2009) - <http://vancouver.ca/files/cov/urban-agriculture-guidelines.pdf>

2.2.2 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.

Siting and Access

- (a) Locate garden plots to maximize sunlight access.
- (b) Where garden plots are located on rooftops, consider the need for windscreens.
- (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 gardeners who have mobility restrictions.

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/or outdoor seating areas.

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) Each garden plot should be a minimum of 24 square feet, with a minimum soil depth of 18". Plots with enhanced universal accessibility features should have a height of 2.5 feet.
- (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.

Support Facilities

- (a) Must provide hose bibs within 20 feet of any garden plot.
- (b) Must provide a storage room or shed for tools, a composting system, and a potting bench.
- (c) Consider additional facilities such as a greenhouse, electrical outlets, and area lighting.

2.3 Urban Farm

2.3.1 Characteristics

Urban farms differ from community gardens and other urban agriculture in that the food is primarily grown for sale. Urban farms grow fruits and vegetables and are typically managed or operated by a for-profit, non-profit, or a social enterprise organization. In addition to creating economic opportunities, urban farms provide many benefits such as greening the city, engaging community members, and educating residents about local food systems.

Many factors enable the success of an urban farm including location, size, on-site infrastructure, and business model. Because there are a number of different business and operational models, there is no one factor that will enable a farm to flourish. For that reason, there may be opportunity to modify the infrastructure list below.

For reference:

- Urban farm guidelines - <http://guidelines.vancouver.ca/U003.pdf>

2.3.2 Design Guidelines

Size

- If growing in soil, an ideal minimum space size would be 20,000 sq. ft. Minimum size of space for other growing mediums depends on business and market plan.

Location

- May be indoors or outdoors. If outdoors, may be on the ground, on a podium, or on a roof.

Access

- Incorporate the design and interface of the farm into the overall design of the building; including, allowing for other users/uses of the building to have passive and active interactions and access in the farm area.
- If located on a roof, must have elevator access (e.g. receiving annual soil amendments).
- Should have access to a loading bay.

Access to water

- Must have water access for growing
- Must have a handwashing station, preferably with hot water, as well as a washing station for cleaning, sorting and packaging produce

Storage and packaging

- Should have an indoor and/or covered area to store, prepare, package produce, and provide administration functions
- Should have storage space for tools and equipment

Other

- Consider an on-site organics composting system, one of sufficient size and utility to match the needs of the urban farm, to be available and utilized on site
- Should have an access to a washroom

2.4 Edible Landscaping

2.4.1 Characteristics

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

For reference:

- Summary of plants commonly used for edible landscape design (2009) <http://vancouver.ca/files/cov/urban-agriculture-guidelines.pdf>
- Guidelines for Urban Honey Beekeeping (2015) <http://bylaws.vancouver.ca/bulletin/U001.pdf>

2.4.2 Design Guidelines

- (a) Must demonstrate comprehensive edible landscape design efforts that integrate with existing and proposed landscape features. In addition to urban agriculture, edible plants can be used as ornamentals as part of the landscape design.
- (b) Must provide educational or interpretive signage adjacent to plantings.
- (c) Should locate edible trees and other plants in areas that are accessible to residents or the public.
- (d) Should consider co-locating near complementary amenities such as picnic benches, bbq areas, and / or community kitchens.

2.5 Community Kitchen

2.5.1 Characteristics

Community kitchens are designed for food skills programming including teaching and demonstrating food preparation, healthy eating and preservation skills. Community kitchens may also be used for preparing and serving meals and snacks to community members. 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.

Community kitchens are ideally suited in facilities such as neighbourhood houses or other social service facilities, community centres, social housing, or churches.

In some circumstances, contributions could be made to renewal or upgrading of an existing community kitchen or new community kitchen located off-site

For reference:

- City-affiliated facility kitchen design guidelines - <http://vancouver.ca/files/cov/kitchen-design-guidelines.pdf>

2.5.2 Design Guidelines

Community kitchens function best when they are designed with all of their intended uses in mind. Comprehensive design considerations are outlined in the City-affiliated facility design guidelines document. At a minimum, ensure:

- (a) Sufficient space to accommodate a minimum of 12 people in a teaching environment.
- (b) Appropriate equipment (cold / freezer storage; dry storage; dishwasher and sink configuration, stove/oven and ventilation, sink configuration) for the intended use.

- (c) Adjacent multi-purpose space or room for eating and congregating.
- (d) Incorporation of enhanced accessibility features to accommodate wheelchairs, mobility devices and teaching and demonstration screens/aids.
- (e) Consider co-locating near complementary amenities such as picnic benches, BBQ areas, and / or community gardens.

2.6 Community Food Market

2.6.1 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 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.

Community food markets are ideally suited to facilities such as neighbourhood houses or other social service facilities, community centres, social housing, churches, or office spaces.

For reference:

- Administration of Community Food Markets (2014)
<http://bylaws.vancouver.ca/BULLETTIN/C005.pdf>

2.6.2 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 access to a class B loading bay without reliance on stairs.
- (g) Consider co-locating near complementary amenities such as picnic benches, bbq areas, gardens, and / or community kitchens

2.7 Farmers Market

2.7.1 Characteristics

Farmers markets bring together a community of farmers, fishers, artisans, and food producers who supply locally-grown foods to neighbourhoods. They provide several functions including: vendor sales, meal provision through food trucks, and live entertainment. Farmers markets may run during any season of the year and they can be held indoors or outdoors.

Many factors enable the success of a farmers market including location, size, accessibility for customers and vendors, and on-site infrastructure. There is typically no one factor that will cause a market to flourish and for that reason, there may be opportunity to modify the infrastructure listed below if there are many other strong elements for the proposed site. Farmers markets could occur on private or public land, including park, plaza or other open space.

There are a limited number of farmers in BC, and starting a new farmers' market location needs to be done thoughtfully to avoid over-saturating the market or causing loss of sales to BC farmers.

For reference:

- Farmers Market policy (2013) <http://guidelines.vancouver.ca/F013.pdf>

2.7.2 Design Guidelines

Size

- An ideal space would allow for 45-50 vendors or more (15,000-25,000 sq. ft.). Sites that fit a minimum of 30 vendors could be considered, though ideally are able to grow over time.

Location

- Visibility to and access by pedestrians, cyclists, and vehicle traffic is required.
- Consider business proximity. If further than 1.5km from an existing business community, then the market should be a destination / larger scale market.
- Maintain a distance from existing farmers markets to avoid oversaturating the market.
- A flat surface grade is required.

Power access

- Access to power ensures food safety especially for products such as meat, poultry, and eggs, and helps limit loud on-site generators.
- The number of vendors will dictate the number of power hook ups needed. E.g. for every 11 vendors, install 1 high voltage to support food trucks / coffee and 2 regular outlets to support freezers, refrigerators, etc.

Access to water

- Vendors need water access for hand washing, cleaning, and food preparation.
- Preferably, in addition to a hose bib for water access, there is a handwashing station, ideally with hot water. The stations could also include a water fountain. For larger markets, a second water / handwashing station is beneficial.

Vehicle access and vendor parking

- Farmer and artisan products can be very heavy and they must be able to unload product at the location where they will be selling. Most vendors will be arriving by car or truck.
- Larger /destination markets: the ability to park next to their vendor booths is required.
- Smaller/ neighbourhood markets: Vendors may be able to unload and park nearby. In this case, a flow through design works best, allowing vendors to unload product and then exit via a second access point, and park nearby.
- For every vehicle that cannot be parked on-site, nearby parking must be available.

Washrooms

- Vendors, staff, and volunteers may be on-site 8 hours or more. They must have washroom access.
- Nearby washroom access is also helpful for customers, including accessible stalls.

On-site storage

- Farmers markets require large and heavy equipment including tents, tables, wagons, sand bags for tents, and at times road barricades.
- Larger /destination markets: require a minimum of 10'x20' on-site storage container or space nearby.
- Smaller/ neighbourhood markets require a minimum of 10'x10' on-site storage container or space nearby.

Coverage from the elements

- Partial or full coverage are helpful in summer and winter alike. Consider alternate uses for the covered space to add advantage for other users.

Consider other value added amenities such as outdoor /indoor kitchen space to enable food demonstration and cooking classes; seating areas. Be aware of how the location of these elements may restrict access or layout, including vehicle access. Consider designing for additional uses of the space when the farmers market is not operating (e.g. festivals, performances, sports).

2.8 On-Site Organics Management

2.8.1 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.

For reference:

- On-site Composting Technology Study - Information and examples of various composting systems available (2012)
<http://www.metrovancouver.org/services/solid-waste/SolidWastePublications/MV-ON-SITECOMPOSTINGTECHNOLOGYREVIEWOct2012.pdf>
- Metro Vancouver On-site Organics Management Options Review Report (2014):
[www.metrovancouver.org/services/solid-waste/SolidWastePublications/On-site Organics Management Options Review-Dec-14.pdf](http://www.metrovancouver.org/services/solid-waste/SolidWastePublications/On-site%20Organics%20Management%20Options%20Review-Dec-14.pdf)
- More information about on-site composting: <http://vancouver.ca/home-property-development/on-site-organics-management-systems.aspx>

2.8.2 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.

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

2.9 Other Food System Assets

The City will consider other food asset proposals that are in accordance with the vision, principles and goals defined in the Vancouver Food Strategy and the Park Board Local Food Action Plan.

Opportunities for on-site delivery of food assets are preferred. Examples of possible off-site food assets could include:

- Funding to secure caretakers or operators of a food asset, or ensuring active programming and maintenance. (e.g. funding a non-profit organization to offer programming at a community kitchen). *Note that sites over 40,500 m² (ten acres) are required to provide this in addition to three food assets.*
- Contributions to a neighbourhood food network or non-profit organization to support food programming or infrastructure improvements to expand the organization's impact
- Contributions to community centre or park food assets

3 Green Mobility

3.1 General Information

For information on Transportation Demand Management Requirements, refer to the Parking By-law and the Administrative Bulletin: Transportation Demand Management for New Developments in Vancouver

3.2 Submission Requirements, Additional Information

3.2.1 TDM Requirements

The primary deliverable is a separate Transportation Demand Management (TDM) Plan or additional chapter within a Transportation Assessment and Management Study (TAMS) which outlines TDM measures that will be incorporated into the Development Project as well as information detailing how the program will be delivered. This is a requirement of the Parking By-law.

3.2.2 Electric Vehicle Charging Requirements

If applicable, evidence of compliance with electric vehicle charging requirements should be included in the project statistics tables or where other vehicular parking information is documented. Publicly accessible fast charging hub locations should be identified on site plans.

4 Potable Water Management

4.1 Submission Requirements, Additional Information

4.1.1 Water Balance

The water balance provides a framework for understanding and planning for an integrated systems approach to water resource management on the site and within its buildings. The aim in taking the integrated water approach is to achieve sustainable, reliable and resilient water systems.

The water balance shall include input water sources including potable water, and rainwater, and outflows to the sanitary, combined, and storm sewers. The Water Balance shall be produced for the 'baseline' and 'proposed' scenarios and demonstrate compliance with the minimum potable water use reductions over baseline specified in D.3.2 and D.3.3, achieved by taking an integrated approach to water management at the site scale

4.1.1.1 Indoor Potable Water Use Baseline

The indoor potable water use baseline shall be calculated using the specified fixtures, baseline flow rate / water use per flush values, duration and daily uses specified in Table 1 for the estimated occupancy. Where sufficient justification is provided, daily uses can be modified based on the proposed occupancy type(s) proposed for the building(s) or site. Occupancy shall be based on projected occupancy figures, or where not available, estimated based on floor area using the following:

- Detached Dwellings: 55 m²/capita
- Apartments: 35 m²/capita
- Commercial: 23 m²/capita

The indoor potable water use for the proposed scenario shall utilize the same number of occupants, fixture types, duration and daily uses as the baseline scenario. Potable water use reduction shall be demonstrated through the use of more efficient fixtures with a reduced baseline flow rate / water use per flush and/or supplementing toilet and urinal flushing with non-potable water.

Note: Calculations must be provided to quantify the volume of non-potable water sources collected and utilized to demonstrate compliance with the potable water reduction target.

Table 1: Indoor Potable Water Use Baseline

Fixture Type	Baseline Flow Rate & Water Use per Flush ¹	Duration	Daily Uses ²
Lavatory Faucet (for private use)	5.7 L/min	0.25 min	5
Lavatory Faucet (for public use)	1.9 L/min	0.25 min	3
Kitchen Faucet (non-residential)	8.3 L/min	0.25 min	1
Kitchen Faucet (residential)	6.3 L/min	1 min	4
Shower Head	7.6 L/min	8 min	1
Water Closet (Tank Type and Direct Flush) – Male	4.8 L/flush	1 flush	1 male
Water Closet (Tank Type and Direct Flush) – Female	4.8 L/flush	1 flush	3 female
Urinal (Tank Type and Direct Flush) - Male	1.9 L/flush	1 flush	2 male

¹ Baseline Flow Rates and Flush Cycle figures from the City of Vancouver Plumbing By-law.

² Note that daily use can vary based on type of occupant (i.e. Employees, Visitors, Retail Customers, Students and Residential). Daily uses may be adjusted as appropriate based on type of occupant.

4.1.1.2 Outdoor Potable Water Use Baseline

The outdoor water use baseline shall be calculated using the most recent version of the LEED Outdoor Water Use Reduction Calculator or other approved method. The following instructions refer to the use of the LEED v4 Outdoor Water Use Reduction Calculator¹.

The outdoor water use baseline shall be calculated by inputting the site’s proposed total landscaped area (including all pervious / landscaped areas, such as planted landscapes on structures) along with the historical average monthly rainfall and average monthly evapotranspiration (ETo) figures provided in Table 2 into the ‘Baseline Calculation’ tab in the LEED calculator.

¹ LEED calculator <https://www.usgbc.org/resources/outdoor-water-use-reduction-calculator>

Table 2: Historical Average Rainfall and Evapotranspiration Rates for Vancouver

Month	Historical Average Monthly Rainfall (mm) ¹	Historical Average Monthly Evapotranspiration (ETo) (mm) ²	Watering Demand (mm)
January	207	14	-193
February	107	24	-83
March	123	41	-82
April	102	64	-38
May	75	92	17
June	68	105	37
July ³	43	120	77
August	48	102	54
September	59	66	7
October	157	35	-122
November	234	18	-216
December	191	13	-178

¹ Source: Environment Canada Climate Normals 1981-2010 Station Data for Vancouver Oakridge (http://climate.weather.gc.ca/climate_normals/index_e.html)

² Source: Farmwest Historical Average Data for Vancouver Airport (<http://farmwest.com/climate/et>)

³ The month of July requires the greatest outdoor watering demand in the City of Vancouver.

The outdoor water use baseline is determined using the evapotranspiration figure for the month with the peak watering demand. For the City of Vancouver, the peak watering demand takes place in the month of July, and as such the baseline monthly outdoor potable water use shall be calculated as:

$$\text{Outdoor Potable Water Use Baseline (L/month)} = 120\text{mm} \times \text{Site's Total Proposed Landscaped Area (m}^2\text{)}$$

The outdoor water use for the proposed scenario shall be calculated using the 'Landscape Water Requirement' tab of the LEED calculator. The total proposed landscaped area shall be the same for both the baseline and the proposed scenarios unless sufficient justification is provided. Potable water use reduction shall be demonstrated through more water efficient plant type / landscape features, irrigation type and/or supplementing outdoor irrigation with non-potable water.

Note: Calculations must be provided to quantify the volume of non-potable water sources collected and utilized to demonstrate compliance with the potable water reduction target.

5 Rainwater and Groundwater Management

5.1 Submission Requirements, Additional Information

5.1.1 Groundwater Management

Refer to the City's [Groundwater Management Bulletin](#).

Hydrogeological Study

The Hydrogeological Study must include the following components:

- (1) Review of site hydrogeology, including but not limited to: underlying stratigraphy, existing and planned wells, local groundwater extraction/diversion (e.g. dewatering) rates and locations, water levels, and any relevant known information about the site's groundwater regime, as appropriate.
- (2) A Groundwater Management Plan, outlining how no discharge of post-construction dewatering of groundwater to City sewer infrastructure will be achieved, including a site plan and/or cross-sections showing any engineered groundwater solutions as required. This may also include the following, as applicable:
 - (a) Aquifer characteristics (including water level record, estimated hydraulic conductivity, and estimated hydraulic gradient);
 - (b) A plan of elevation contours for the seasonal water table elevation, superimposed on a ground surface elevation plan;
 - (c) A site cross-section indicating the elevation of the deepest subsurface works (e.g. elevator shafts, parkades) and the low and high water table elevations; and
 - (d) An estimate of the groundwater flow rate into the proposed development and the anticipated groundwater flow rate and location of temporarily discharged groundwater during construction.
- (3) An impact assessment demonstrating that no significant negative impacts result from groundwater extraction/diversion, which must include the following where applicable:
 - (a) Anticipated flow rates;
 - (b) Ground subsidence;
 - (c) Impact to nearby wells;
 - (d) Evaluation of potential effects on known contaminant plumes; and
 - (e) Discharge water quality.

5.1.2 Rainwater Management

Onsite rainwater management is needed to mitigate the impacts of increased yearly precipitation due to climate change, increased development density, and decreased pervious surfaces that allow rainwater to infiltrate, all of which when combined will increase the occurrence of excess rainwater overwhelming the sewers leading to combined sewer overflows. The use of water sensitive site design and green infrastructure practices or source controls keeps harmful stormwater pollutants from entering our receiving waters and adds resiliency to the City's drainage system, which is predicted to experience wetter winters, drier summers, and more frequent occurrence of intense storms.

5.1.2.1 Volume Reduction

The first 24 mm of rainfall falling on all pervious and impervious surfaces across the site shall be retained on site by means of infiltration, evapotranspiration, and/or re use for the purpose of reducing the volume of rainfall entering the City's sewers. To achieve this on-site retention target the rainwater management system shall manage rainfall in accordance with the green infrastructure tiered approach outlined below.

Note: Landscaped areas designed with the appropriate depth of growing medium over native subsoil may be deemed to meet the 24 mm retention criteria. Appropriate growing medium depths shall be based on providing sufficient storage volume within the media to meet the retention criteria and meet horticultural needs as outlined in the Metro Vancouver Source Control Guidelines.

Use of Tier 1 approaches are to be prioritized. Justification must be provided for the use of a lower tier (i.e. Tier 2 or Tier 3). The tiers are as follows:

- **Tier 1 Priority Green Infrastructure Practices:** Provide volume reducing green infrastructure practices. For example, rainwater can be kept on site for rainwater harvesting for re-use, green roofs, and soil infiltration.
- **Tier 2 Priority Green Infrastructure Practices:** Provide treatment and retention in non-infiltrating landscapes. For example, rainwater can be directed to absorbent landscape on slab, closed bottom planter boxes, and lined bioretention systems.
- **Tier 3 Priority Green Infrastructure Practices:** Provide treatment and detention as per the permitted peak flow rate discharged to the sewer.

Acceptable Exemptions

Justifications for not using Tier 1 green infrastructure practices will be reviewed at the discretion of the City Engineer. Exemptions may include, but are not limited to, the following:

Tier 1 Priority Green Infrastructure Practices Exemptions

- Low infiltration capacity (e.g. less than 1.5 mm/hr)
- Limited available space for engineered infiltration systems due to onsite conditions such as tree retention
- Seasonally high groundwater table or bedrock within 0.6m of the bottom of the practice
- Contamination concerns (as supported by a preliminary geotechnical study, see submission requirements below)
- Slope stability concerns (as supported by a preliminary geotechnical study, see submission requirements below)

Tier 2 Priority Green Infrastructure Practices Exemptions

- Limited available space for non-infiltrating facilities due to onsite conditions such as tree retention

5.1.2.2 Release Rate

The rainwater management system for the building(s) and site shall be designed such that the peak stormwater flow rate discharged to the sewer under post-development conditions is not greater than the pre-development peak flow rate for the return period specified in the City of Vancouver's Intensity-Duration-Frequency curves (IDF curves). The City of Vancouver's 2014 IDF curve shall be utilized for pre-development design flow calculations, and the City of Vancouver's 2100 IDF curve, which takes into account the effects of climate change, shall be utilized for post-development design flow calculations.

5.1.2.3 Water Quality

The first 24 mm of rainfall from all pervious and impervious surfaces shall be treated to remove 80% Total Suspended Solids (TSS) by mass prior to discharge from the site. For impervious surfaces with high pollutant loads, including roads, driveways, and parking lots the rainfall depth to be treated increases to the first 48 mm of rainfall. Treatment can be provided by either one green infrastructure practice or structural Best Management Practice (BMP) or by means of a treatment train comprised of multiple green infrastructure practices or structural BMPs that can be demonstrated to meet the 80% TSS reduction target.

Vegetated practices or absorbent landscapes that infiltrate or filter the appropriate water quality volume (based on the type of pollutant generating surface) through a minimum of 450mm of growing medium are assumed to meet the quality requirement. The Metro Vancouver Stormwater Source Control Design Guidelines referenced above outline growing medium specifications.

For proposed proprietary treatment devices:

- (a) Provide product information for all treatment practices.
- (b) Products need to meet the above standard and be certified by either the Washington State Department of Ecology's Technology Assessment Protocol – Ecology Program (TAPE) or Environmental Technology Verification (ETV) Canada verified technologies. The applicant may propose other technologies but must provide supporting information that shows the technology meets the standard.

Design Resources:

The Metro Vancouver Stormwater Source Control Design Guidelines is available as a design resource.

<http://www.metrovancouver.org/services/liquid-waste/LiquidWastePublications/StormwaterSourceControlDesignGuidelines2012StormwaterSourceControlDesignGuidelines2012.pdf>

5.1.2.4 Rainwater Management Plan

A Rainwater Management Plan (RWMP) shall be provided that details how the proposed rainwater management system meets the requirements specified in the Policy. The Plan shall be prepared by a subject matter expert, and include at minimum:

- (1) Pre-development site plan showing orthophoto and existing drainage areas and appurtenances;
- (2) A proposed site plan that delineates drainage areas, including the area measurements for pervious/impervious areas, and identifies appropriately sized green infrastructure practices for each of those areas;
- (3) Geotechnical study, as described below;
- (4) Hydrologic and hydraulic analysis prepared by a qualified professional in the area of rainwater management showing how the site will meet the requirements of the Policy;
- (5) If lower tier green infrastructure options are chosen, then justifications must be included in the RWMP report;

- (6) Details on how the targets will be achieved through the development phases AND once all development phases are complete; and
- (7) Include supplementary documentation for any proprietary products that clearly demonstrates how they contribute to the targets;

A Geotechnical Study shall be undertaken at the site that evaluates the potential and risks for onsite rainwater infiltration. The study shall be prepared by a subject matter expert, and include at minimum:

- (1) Infiltration testing at likely locations for infiltration practices and a proposed design infiltration rate;
- (2) Soil stratigraphy;
- (3) Depth to bedrock and seasonally high groundwater; and
- (4) Assessment of infiltration risks such as slope stability and soil contamination.

6 Zero Waste Planning

6.1 General Information

6.1.1 Mandatory Requirements for Zero Waste Initiatives

The site design must provide dedicated space to accommodate waste diversion initiatives, in addition to residual waste collection. Ample space allocations must 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 Zero Waste Design and Operations Plan must show how the application meets these design requirements.

Note: Multi-use buildings must meet the requirements contained in all relevant tables.

6.1.1.1 Multifamily complexes

Must provide:	
Each residential unit	<ul style="list-style-type: none"> 1. Space for organics bin under the sink. 2. Space for recycling bins under the sink (Recycle BC program requires separation of paper, containers, glass).
Common areas (e.g. lobby and corridors)	<ul style="list-style-type: none"> 3. Recycling and organics containers always placed with garbage containers (twinning).
Re-use, Recycling and Organics storage space in building	<ul style="list-style-type: none"> 4. A sufficient number of carts/containers to meet the needs of the entire building.* <i>*see City of Vancouver -Garbage and Recycling Storage Facility Design Supplement.</i> 5. Signage to instruct occupants on the appropriate use of the organics and recycling containers. 6. Create a program for managing reuse, recycling and removal of bulky items. 7. Programs to ensure items banned from disposable as garbage are not put in garbage http://www.metrovancouver.org/services/solid-waste/bylaws-regulations/banned-materials/Pages/default.aspx 8. Designed to ensure all waste collection day activities occur on-site (as opposed to placing bins onto City property for collection)
Exterior areas (e.g. public sidewalks, pathways and landscaping)	<ul style="list-style-type: none"> 9. Infrastructure and maintenance plan to maintain a litter-free environment.

6.1.1.2 Office and retail buildings

Must provide:	
Each retail/office unit	<ol style="list-style-type: none"> 1. Design to accommodate recycling bin(s) in each working space. 2. Provide a common area space that can accommodate recycling and organics carts.
Common/public areas (e.g. lobby and corridors)	<ol style="list-style-type: none"> 3. Recycling containers always placed with garbage containers (twinning). 4. Provision of organics containers with garbage and recycling containers where appropriate (eg. In eating/kitchen areas)
Re-use, Recycling and Organics storage space in building	<ol style="list-style-type: none"> 5. A sufficient number of recycling and organics carts/containers to meet the needs of the entire building.* <i>*see City of Vancouver -Garbage and Recycling Storage Facility Design Supplement.</i> 6. Signage to instruct occupants on the appropriate use of the organics and recycling containers. 7. Programs to ensure items banned from disposable as garbage are not put in garbage http://www.metrovancouver.org/services/solid-waste/bylaws-regulations/banned-materials/Pages/default.aspx 8. Designed to ensure all waste collection day activities occur on-site (as opposed to placing bins onto City property for collection)
Exterior areas (e.g. public sidewalks pathways and landscaping)	<ol style="list-style-type: none"> 9. Infrastructure and maintenance plan to maintain a litter-free environment.

6.1.1.3 Food Services

Must provide:	
Work spaces	<ol style="list-style-type: none"> 1. Design to accommodate convenient source segregation of organics, greases and recyclables in food handling and preparation work spaces. 2. Allocate space for organics and recycling containers in all other work spaces.
Customer/public spaces for food consumption	<ol style="list-style-type: none"> 3. Convenient customer/public source segregation of organics, beverage containers and other recyclables in clearly marked disposal containers (twinning) which follow Metro Vancouver's suggested colour schemes for material streams: http://www.metrovancouver.org/services/solid-waste/recycling-signage-campaigns/recycling-signage-colours/Pages/default.aspx .
Organics and recycling storage space in building/complex	<ol style="list-style-type: none"> 4. A sufficient number of carts/containers to meet the needs of the entire building (including organics, grease and recycling).* <i>*see City of Vancouver -Garbage and Recycling Storage Facility Design Supplement.</i> 5. Signage to instruct occupants on the appropriate use of the organics and recycling containers. 6. Programs to ensure items banned from disposable as garbage are not put in garbage http://www.metrovancouver.org/services/solid-waste/bylaws-regulations/banned-materials/Pages/default.aspx 7. Designed to ensure all waste collection day activities occur on-site (as opposed to placing bins onto City property for collection)
Exterior areas (e.g. public sidewalks, pathways and landscaping)	<ol style="list-style-type: none"> 8. Infrastructure and maintenance plan to maintain a litter-free environment.

6.1.1.4 Large venues (greater than 2,000 visitors per day)

Must provide:	
Individual units	<ol style="list-style-type: none"> 1. Design to accommodate recycling bin(s) in each working space. 2. Provide a common area space that can accommodate recycling and organics carts.
Common/public areas (e.g. mall corridors, green spaces, public washrooms)	<ol style="list-style-type: none"> 1. Recycling containers always placed with garbage containers (twinning). 2. Convenient customer/public segregation of beverage containers, organics and other recyclables in clearly marked disposal containers. 3. Allocate space and provision of organics bins for staff or customers, as appropriate, to ensure organics diversion .
Recycling/organics storage space in building	<ol style="list-style-type: none"> 4. A sufficient number of carts/containers to meet the needs of the entire building.* *see <i>City of Vancouver -Garbage and Recycling Storage Facility Design Supplement</i>. 5. Signage to instruct occupants on the appropriate use of the organics and recycling containers. 6. Programs to ensure items banned from disposable as garbage are not put in garbage http://www.metrovancouver.org/services/solid-waste/bylaws-regulations/banned-materials/Pages/default.aspx 7. Designed to ensure all waste collection day activities occur on-site (as opposed to placing bins onto City property for collection)
Exterior areas (e.g. public sidewalks and landscaping)	<ol style="list-style-type: none"> 8. Infrastructure and maintenance plan to maintain a litter-free environment.

6.1.2 Additional Zero Waste Actions: Recycling, Organics, and Waste Collection Systems

Waste is generated at numerous points in a large development. It is expected that the system as a whole will be designed to facilitate zero waste (through waste avoidance, reduction, re-use, composting and recycling infrastructure, programs and services), increase collection efficiency and minimize GHG and other emissions.

The Zero Waste Design and Operations Plan must show how the applicant intends to meet this expectation by choosing and implementing at least seven of the initiatives listed below:

- (1) Maintain space on-site for a re-use/freeware/materials exchange facility (shelving and signage) and for the temporary storage of bulky items (e.g. furniture). [Multifamily complexes only]
- (2) Facilitate establishment of on-site product stewardship take-back program or take-back depot (for large venues with public access).
- (3) Installation of additional publicly accessible on-site diversion initiatives via non-profit/charitable programs for items such as clothing, textiles and used books.
- (4) Engage a single hauler for all waste streams generated on site in order to reduce pick up vehicle trips.
- (5) Reduce GHG emissions related to collection. Example: compactor systems to reduce trip frequency.
- (6) Provide a service or billing model that offers occupants incentives to reduce, re-use or recycle rather than to dispose waste.
- (7) Ensure that any residual waste is disposed in facilities operated by the City of Vancouver or Metro Vancouver.
- (8) Create “depots” on each floor for residents to centralize disposal of recycling and organics. [Multifamily complexes only]

- (9) Implement waste reduction strategies in the design of public washrooms, such as hot-air hand-dryers instead of paper towels.
- (10) Space (in the recycling room) and collection programs for recycling of three or more provincial product stewardship programs (e.g. electronics, batteries, soft plastics, foam packaging). [Multifamily complexes only]
- (11) Space and collection programs for recycling of three or more provincial product stewardship programs (e.g. electronics, batteries, soft plastics, foam packaging) [large venues or office and retail only].
- (12) Provide leading edge on site processing of compostable organic material.
- (13) Allocate space in the recycling storage area or in another common areas for an interoffice materials exchange, bulletin board, and zero waste information kiosk. [Office/retail only]
- (14) Allocate space to enable the reduction of disposable foodware (e.g. include space for dishwashers, reusable dishware storage and return in food service areas). [Food services only – e.g. food court]
- (15) Allocate space and implement a reusable bag or dish share program (Office/retail only)
- (16) Allocate space and outfit a designated area for residents to repair items for re-use. [Multifamily complexes only]
- (17) Provide reusable dishware and a dishwasher for residents to use in shared common areas where food is consumed. [Multifamily complexes only]
- (18) Specific innovation proposed by applicant that is an acceptable alternative to items listed here, as determined by the General Manager of Engineering.

6.1.3 Occupant/Public Education and Outreach Actions

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 must include the following:

- (1) Educate new occupants, and all occupants annually, in the implementation of the zero waste initiatives and collection systems (as per Solid Waste By-Law). It may be necessary to provide a hands-on training program for large-scale occupants such as anchor retailers.
- (2) Direct occupants and the public to use the zero waste collection systems provided on site via use of signage and visual cues such as bin colour and shape.
- (3) Choose at least three of the following procedures and actions that provide occupants with continuous encouragement and support in implementing/participating in the Zero Waste Design and Operations plan:
 - (a) Employ a “Greencierge” or Zero Waste support staff to assist residents and business owners to adopt the most sustainable practices as possible. The Greencierge would be a staff resource to spearhead the zero waste effort, provide information, source products, track diversion rates, troubleshoot diversion problems, etc.
 - (b) Establish a building-level zero waste/sustainability team among occupants to engender a community culture around zero waste.
 - (c) Provide regular newsletters to occupants/tenants that report on successes and identify dissues and challenges.
 - (d) Establish a zero waste leadership award program for occupants on site and promote it.
 - (e) Provide or facilitate annual on-site consultations on ways occupants can improve their performance.
 - (f) Conduct an annual waste audit and share the results with occupants to assess additional opportunities for diversion.

- (g) Specific innovation proposed by applicant that is an acceptable alternative to items listed here, as determined by the General Manager of Engineering.

6.2 Submission Requirements, Additional Information

6.2.1 Zero Waste Design and Operations Plan

The Zero Waste Design and Operations Plan must clearly illustrate how the applicant will meet the City's requirements and how the plan will be implemented. The following are expectations and considerations that must be addressed in the plan. The applicant is encouraged to put forward additional or alternative ideas that meet the intent of this policy.

6.2.1.1 Vision Statement

The vision statement should reflect the intent of this policy – to facilitate achievement of the City of Vancouver's Zero Waste 2040 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.

6.2.1.2 Description of Project and Diversion Objectives

- Consideration of deconstruction opportunities and practices in the removal of any existing buildings on site, 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 avoided/reduced/diverted, based on the proposed design and operations plan.

6.2.1.3 Site/Development Infrastructure Design

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. The plan should show how the applicant intends to meet these design expectations.

The plan must identify the seven specific zero waste actions that will be implemented from the list of options provided in this Admin Bulletin. The plan must provide implementation details for each planned action.

6.2.1.4 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 the following.

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 identify:

- How new occupants, and all occupants at least annually, (as required by the Solid Waste By-Law) 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.

The plan must identify which three actions from the list provided in the Admin Bulletin will be implemented.

Facility Operations Training and Support

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

Therefore the plan should indicate:

- Which zero waste actions will be implemented from the list of Recycling, Organics, and Waste Collection Systems list and how they will work operationally.
- 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.
- Identification of maintenance plans to ensure a litter-free environment.
- 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, and development of on-going litter collection programs.

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 Plan should include confirmation of the intent to submit this plan, including details for how the report will be delivered and by whom.

6.2.1.5 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 or centralized vacuum systems for waste removal.

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 this bulletin and should meaningfully address each of these headings.

6.2.2 **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 implementation report shall include:

- Types and quantities of waste diverted.
- Types and quantities of waste disposed.
- Names and locations of recycling processing facilities, and landfills used.

- Identification of which seven zero waste actions were implemented and the successes and challenges associated with each.
- Description of on-site re-use options, product stewardship facilities, non-profit/charitable drop-off bins, etc. and estimates of amount of waste reduced through those initiatives.
- Overview of exterior litter removal program.
- Description of annual education initiatives undertaken.
- Summary of initiatives to reduce GHG emissions related to waste and diversion.
- Summary of any other initiatives undertaken to facilitate zero waste on-site.

Additional References

- City of Vancouver Garbage and Recycling Storage Facility Design Supplement, Revised November 2016
vancouver.ca/files/cov/Garbage_and_Recycling_Storage_Facility_Supplement.pdf
- City of Vancouver Solid Waste By-law 8417
- City of Vancouver Greenest City Action Plan 2020 (Goal 5: Zero Waste)
vancouver.ca/greencity
- City of Vancouver Green Demo By-law
vancouver.ca/home-property-development/demolition-permit.aspx
- City of Vancouver Zero Waste 2040 Strategic Plan
vancouver.ca/green-vancouver/zero-waste-vancouver.aspx
- Metro Vancouver's Banned and Prohibited Materials List (see Metro Vancouver web-site)
- Extended Producer Responsibility (EPR) Stewardship Programs (see Recycling Council of BC website).

7 Affordable Housing

7.1 General Information

The Affordable Housing requirements in the Rezoning Policy for Sustainable Large Developments is one of the mechanisms outlined in the 10 Year Affordable Housing Delivery and Financial Strategy to deliver deeper affordability for moderate- and lower-income households. Its purpose is to contribute to the delivery of the “right supply” of housing as set out in the Housing Vancouver Strategy (2018-2027).

Applicants should meet with City staff at the pre-application stage to discuss the appropriate mix of incomes, household types and tenures.

Set out below are further details with regards to the Affordable Housing requirements for large developments:

1. Moderate Income Housing

Moderate income housing is rental housing affordable to households with moderate incomes of between \$30,000 and \$80,000/year. These units may be privately owned, however the units will be secured as rental housing with below-market rents through a Housing Agreement with the City.

2. Affordability in Moderate Income Housing Units

The moderate income housing target (10% housing target) is designed to encourage the delivery of secured affordable rental housing targeted to households earning between \$30,000 and \$80,000 /year.

Targeted Rents in Moderate Income Rental Units (at project opening):

Unit Type	Rental Rate
Studio	\$950
1-Bed	\$1,200
2-Bed	\$1,600
3-Bed	\$2,000

For further information on moderate income rental housing, refer to the Moderate Income Rental housing Pilot Program Administration Bulletin

(<http://vancouver.ca/files/cov/moderate-income-rental-housing-pilot-program-bulletin.pdf>).

3. Moderate Income Housing Requirements for Project Proponents

As a condition of development approval, applicants will be required to enter into a Housing Agreement with the City of Vancouver. The agreement will include the following requirements for the proponent regarding the operation of the moderate income rental units.

The Proponent will verify eligibility for new tenants in Moderate Income Rental Units:

- For new tenants, household income cannot exceed 4 times the annual rent for the unit (i.e. at least 25% of income is spent on rent).
- There should be at least one occupant per bedroom in the unit.

The Proponent will verify eligibility for existing tenants in Moderate Income Rental Units:

- Building operator will test existing tenants to ensure eligibility every 5 years after initial occupancy.
 - For existing tenants, household income cannot exceed 5 times the annual rent for the unit (i.e. at least 20% of income is spent on rent)
 - There should be at least one occupant per bedroom in the unit.
- If an existing tenant no longer qualifies for their moderate income rental unit, the operator will issue a notice to end tenancy in accordance with the BC Residential Tenancy Act. The notice will take effect 6 months after the date of issuance.
- Note: In order to support stability of tenure, Provincial regulations allow additional flexibility for operators who meet the definition of a “housing society.” The City will consider alternative proposals for ensuring that moderate income units continue to serve targeted households over the long term while ensuring that existing tenants have stability of tenure.

The Proponent will provide an Annual Report to the City of Vancouver on the operation of the Moderate Income Rental Housing Units:

- The report will be designed to ensure that the City can confirm that the building is operating as agreed and will include information on:
 - Rents collected in all units
 - Unit turnover and incomes of new tenants
 - Updated incomes for households who have occupied the unit for 5 years
- The City may audit the information provided in the annual report.

4. Consideration for alternate delivery of affordable housing requirements

Inclusionary housing requirements for large developments are a minimum of 30% of total residential floor area set aside for affordable housing comprising a 20% social housing target and 10% moderate income housing target. Developing large sites is complex and each site has a unique set of opportunities and constraints. Unencumbered dirt sites are the priority mechanism to enable the delivery of the minimum 20% social housing.

In special circumstances all or some of the social housing requirement may be delivered with ownership transferred to the City in the form of an Air Space Parcel. In these circumstances supporting evidence must be provided by the proponent to demonstrate that the requisite unencumbered dirt site cannot be provided. Evidence may include supporting drawings, legal or technical information and should be presented at pre-application stage. An example of an exception site may be high-density areas where separating out a largely residential land parcel in a mixed-use development is not feasible.

On complex sites, the General Manager of Planning, Urban Design and Sustainability may recommend alternative approaches to Council when there is clear rationale in the context of the project. If an alternate approach to delivery of the affordable housing requirements is proposed, that approach must demonstrate clear progress towards Housing Vancouver objectives and targets.

5. Affordable Housing Design

Both Social Housing and Moderate Income Housing must be provided designed in accordance with all applicable City by-laws and policies.

The design of the social housing must comply with the Housing Design and Technical Standards (see: <http://vancouver.ca/files/cov/housing-design-and-technical-guidelines.pdf>). This document provides guidance on a broad range of topics including:

- Location and Site Planning
- Indoor and outdoor Amenity Spaces
- Dwelling Unit Floor Areas
- Wheelchair Accessible and Adaptable Units
- Energy and Environmental Design
- Crime Prevention Through Environmental Design
- Construction Standards

Additional References

The City of Vancouver's overarching strategic direction for affordable housing, and related policy and guidelines include:

- Housing Vancouver Strategy (2018-2027): <http://council.vancouver.ca/20171128/documents/rr1appendixa.pdf>
- Affordable Housing Delivery and Financial Strategy (2018-2027): <http://vancouver.ca/files/cov/affordable-housing-delivery-and-financial-strategy.pdf>
- Housing Design and Technical Guidelines: <http://vancouver.ca/files/cov/housing-design-and-technical-guidelines.pdf>
- Rental Housing Stock ODP: <https://bylaws.vancouver.ca/odp/RHS.pdf>
- Tenant Relocation and Protection Policy: <http://vancouver.ca/files/cov/Tenant-relocation-and-protection-policy.pdf>

7.2 Submission Requirements, Additional Information

At the time of rezoning application, provide the following that show how the affordable housing requirements will be achieved:

- Summary table demonstrating how the minimum 20% social housing target will be met including:
 - total proposed residential floor area for the development
 - proposed residential floor area set aside for social housing
 - assumptions regarding unit type (i.e. number of bedrooms) and size etc. which were used to determine the site size to be transferred to the City
- Summary table demonstrating how the minimum 10% affordable rental housing target will be met including:
 - total proposed residential floor area for the development
 - proposed residential floor area set aside for affordable rental housing
 - proposed unit types, sizes and associated rental rates
- If applicable, a Tenant Relocation Application Form and supporting documents (<http://vancouver.ca/people-programs/tenant-relocation-resources-for-owners-and-developers.aspx>)
- If the proponent is proposing an alternative delivery option for the minimum 30% requirement than what is outlined above, written rationale for why the requirement cannot be met as outlined in this policy and proposed alternate approach with associated floor area for affordable housing, unit types and sizes and proposed rental rates.

At the time of development permit application:

- Updated summary tables demonstrating how the minimum 20% social housing target and minimum 10% social housing target will be met.
- If applicable, an updated Tenant Relocation Plan and supporting documents.

8 Resilience

8.1 General Information

Projects should consider social and physical resilience and incorporate design responses that increase resilience.

A resilient project is one built to withstand, or recover quickly from natural and human-caused hazards and disasters, and that delivers co-benefits to people and systems in the absence of hazards and disasters. In Vancouver, we are exposed to a range of hazards including but not limited to flooding, sea level rise, earthquakes, fires, and hazardous materials incidents. Investing in resilience today will protect lives and investments in the future.

In the context of hazards, Vancouver's geography and dense population means that evacuation is a major challenge. The safety and resilience of residents and our community is closely tied to the ability to remain in, or return quickly, to their homes or workplaces when hazards strike. Sites that are designed to be inherently resilient will ensure the least amount of disruption to community and business.

Preventing damage and ensuring capacity to withstand future threats and disasters also enhances the wellbeing of people and systems regardless of if disaster strikes. Many features that contribute to resilience also contribute to meeting the City's Healthy City Strategy goals.

Note that the City of Vancouver is undertaking two initiatives related to resilience:

- A broader Resilience Strategy, with forthcoming policies related to Vancouver specific shocks and stresses
- The Climate Change Adaptation Strategy, adopted by Council in 2012, is being updated with new climate projections and actions.

The outcomes of these two initiatives should be referred to in future to inform resilient design.

8.2 Submission Requirements, Additional Information

The following Resilience Worksheet must be submitted at time of rezoning application, filled out to the degree possible given the level of design detail available at the time. For large, master-planned sites with multiple buildings, a refined worksheet may be required at Development Permit application when building-level details are better known.

RESILIENCE WORKSHEET

Planning

What is the estimated full useful life of the project?

_____ years

Please list the risks and hazards that you considered to your project and occupants both today and throughout the useful project life.

Identify any local risk or hazard studies that you have completed or are referencing.

e.g., floodplain mapping (<http://guidelines.vancouver.ca/F014.pdf>), seismic assessment, hazardous materials list.

Describe how hazard mitigation and risk management efforts been included in the project.

Describe how impacts and risks to inhabitants have been considered and mitigated.

Have you consulted the projected climate conditions for the useful project life?

yes no

Vancouver Climate Change Projections *are attached to this worksheet.*

Please indicate projection year used.

2050s 2080s 2100 other

Describe any strategies or design features that support rapid recovery after a hazard event.

Describe any targets for recoverability/re-occupancy of the project in the event of structural damage.

Have you incorporated these into the design?

yes no

Describe how your project fosters community connections and interaction.

e.g., trusted spaces for people to congregate, communication mechanisms, etc.

Describe how the project has been designed for an aging population and to ensure accessibility of spaces for people with mobility challenges.

Essential Safety

Will there be emergency plans in place for buildings?

yes no

Can drinking water be supplied without power?

yes no

Will toilets and sinks work without power?

yes no

Can the project maintain habitable temperatures without power during a heat wave and during the winter?

yes no

Consult Vancouver Climate Change Projections for future maximum/minimum temperatures.

Will the project include hook-ups for temporary generators and boilers?

yes no

Has solar energy been considered to provide back-up power capacity?

yes no

Renewable energy systems avoid the anticipated difficulty of accessing and transporting fuel post-event.

If yes, what is system size?

_____ kW

Describe the back-up power capacity of this project:

- What is it, which systems will it power and for how long?
- If fuel is needed, is there a contract in place to obtain it following a disaster?

Are there safe, accessible locations for occupants to gather in the event of an earthquake, flood, or other event causing structural damage to the project?

yes no

Is there space for 72 hours of emergency supplies in the facility?

yes no

Please describe this space.

Heat

Review climate projections for temperature, cooling degree days and summer extremes. Consider the urban heat island effect resulting in higher temperatures in urban areas.

Summarize the impacts of heat on the project that have been considered.

- Include:*
- *Material change or degradation of structural integrity at accelerated rates*
 - *Health and safety impacts on occupants vulnerable to heat*
 - *Increased failure or reduced efficiency of electrical or mechanical systems*
 - *Need for landscape material hardy to summer drought*

Describe how the building and its systems will be adapted to efficiently manage future higher average temperatures, higher extreme temperatures, additional annual heatwaves, longer heatwaves and longer periods of drought.

Describe all the building/site measures to reduce heat-island effect at the site and in the surrounding areas.

Precipitation

Review climate projections for annual rainfall, rainfall extremes and precipitation as snow. Review Vancouver IDF curves – both current and future-proofed.

Summarize the impacts of changing precipitation patterns on the project that have been considered.

- Include:*
- *Increasing instances of mould*
 - *Potential for greater frequency of stormwater management systems being overwhelmed, low areas flooded and sewer back-ups*
 - *Impacts to the durability of materials*

Describe main strategies employed to infiltrate, evaporate, detain or reuse rainwater to achieve water volume reductions for system resiliency.

Is there a program in place to keep catch basins clear?

yes

no

How are areas below grade protected from flooding? Are there mechanical or electrical systems below grade? If so, how are they flood-proofed?

Coastal Storms and Sea Level Rise

Review Vancouver floodplain mapping and flood construction levels. Consider design for flood resilience.

Is the project located in a floodplain?

If no, the remaining questions can be left blank.

yes

no

Map at:

<http://guidelines.vancouver.ca/F014.pdf>

What flood construction level (FCL) is the project designed to?

_____ metres (or not applicable)

If in a flood plain, describe site design strategies for adapting to sea level rise including building access during flood events, elevated site areas, hard and soft barriers, etc.

If in a flood plain, describe how the design is adaptable. Can the FCL be raised further in future or can increased protection of critical systems be implemented?

If in a flood plain, confirm that mechanical and electrical systems and all hazardous materials are not located below the FCL. Describe their location within the building.

CITY OF VANCOUVER 2016 CLIMATE CHANGE PROJECTIONS

All projections to year 2050

Climate Variable	Description of Metric
Precipitation	
5% in winter increase 7% in spring and 12% in fall with 19% decrease in summer	Average seasonal changes
Length of dry spells increase 23% (from 23 to 29 days on avg. per year)	Max length of consecutive days with precipitation less than 1mm
63% more precipitation on extremely wet days	Annual total precipitation that falls on days where precipitation exceeds 99 th percentile of precipitation (intensity and frequency)
33% more precipitation on very wet days	As above but 95 th percentile
A 1:20 year return precipitation event will increase in intensity by 36%	Max daily precipitation expected to occur on average once in 20 years (intensity only)
Temperature	
2.9°C average increase	Annual average temp increase
Summer days above 25°C more than double from 18-43	Frequency of summer days where maximum temperature is above 25°C
Warmest summer day is 3.9°C warmer	Maximum temperature of the warmest summer days
Coldest winter nights 4.9°C warmer (from -9.4°C to -4.7°C)	Min temp of the coldest day in winter
Very cold days are projected to warm from -16°C to -11°C Very hot days increase in intensity from 32°C to 37 °C	Minimum and maximum daily temp expected to occur on average 1:20 years
Hot summer days that occur only once per year on average are projected to occur 12 times annually	Days above 30°C
Heating and Cooling	
29% fewer HDD	Total of the number of degrees below 18°C that occur daily, summed over each day of the year. Indicator for heating demand.
CDD from 60 to 250 days (25% more than Portland's historic average)	Total of the number of degrees above 18°C that occur daily, summed over each day of the year. Indicator for cooling demand.
Snowpack	
For our watersheds as a whole, April 1 snowpack projected decrease 58%	Lower elevations will no longer have snowfall
Growing Season	
15% increase in length of growing season	Growing season length is the length between the first span of six days above 5°C in spring, and the first span of six days below 5°C in the fall.
72% decrease in number of frosty days	Annual count of days when maximum temperature is below 0°C
44% increase in growing degree days	Total of the number of degrees above 5°C that occur daily, summed over each day of the year. Indicator for plant growth.