metrovancouver

Sustainable Infrastructure & Buildings Design Guide for Metro Vancouver

March 2021

TOC

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1. Introduction

Metro Vancouver developed this Sustainable Infrastructure and Buildings Design Guide ('the Design Guide') in collaboration with staff and stakeholders in support of the *Sustainable Infrastructure and Buildings Policy* ('the Policy' or 'SIBP'). The objective of the Design Guide is to clearly and effectively translate Metro Vancouver's sustainability priorities into a useful and applicable format for new construction and major renovation projects within the scope of regional operations.

The Design Guide was developed in alignment with six principles to ensure that it serves as practical tool for project teams and decision makers, which include the following:

01 **Ensure consistent application of Metro Vancouver's sustainability principles**	02 **Effectively communicate Metro Vancouver's sustainability priorities to a range of stakeholders**	03 **Reduce complexity and the burden on Metro Vancouver staff and design teams**
04 **Prioritize fiscal responsibility and remain within set project budgets that account for the resources and time necessary to meet the Policy**	05 **Allow flexibility in the achievement of sustainability outcomes**	06 **Ensure integration with relevant provincial and regional policies and standards, including the BC Energy Step Code**

1.1 Background: the Sustainable Infrastructure & Buildings Policy

Metro Vancouver's *Sustainable Infrastructure and Buildings Policy* was launched in October 2018, with the goal of establishing a consistent minimum standard for the sustainable design and construction of Metro Vancouver's infrastructure and buildings. The broad purpose of the Policy is ultimately to reduce the negative impacts of Metro Vancouver's buildings and infrastructure while enhancing their social and environmental benefits in a fiscally responsible manner. The Policy acknowledges the different types and scales of construction projects that Metro Vancouver manages, and adopts a performance-based approach to building and infrastructure sustainability. Areas of performance range from energy efficiency and greenhouse gas emissions reductions, to resource use efficiency and supporting ecological health.

The Policy adopts a performance-based approach to building and infrastructure sustainability, ranging from energy efficiency and greenhouse gas emissions reductions, to resource use efficiency and supporting ecological health.

The Policy and Design Guide are both applicable to new projects, as well as major retrofits and upgrades. Two broad categories of project are covered by the Policy, each with an associated rating system and targeted level of performance they are required to achieve:

	Eligible Infrastructure	Occupied Buildings
Refers to	Water treatment plants, wastewater treatment plants, pump stations, reservoirs, transfer stations, waste-to-energy facilities, works yards, and other industrial facilities	A building used by the public or with a primary function of housing or office space that is occupied by people on a regular basis
Rating system to follow	Envision	LEED
Targeted Performance level	Envision Gold	LEED Gold
Minimum requirements	N/A	Step 3 of the **BC Energy Step Code**, at a minimum

It should be noted that the Policy requires project teams to target these performance levels, but not to actually undertake full certification unless required as indicated in *Section 5*.

See **Appendix A** for a more detailed list of potential kinds of infrastructure and building projects covered by the Design Guide.

		Priority Performance Objectives (PPOs)
Energy Efficiency & GHG Emissions	**01**	Reduce operational energy consumption
	02	Reduce embodied energy of priority construction materials
	03	Reduce lifecycle GHG emissions
	04	Generate or recover renewable energy on-site
	05	Install advanced energy metering
	06	Facilitate accessibility to low-carbon and active modes of transportation
Materials & Resource Allocation	**07**	Use reclaimed or recycled materials in construction
	08	Divert construction and demolition waste from landfills
	09	Reduce potable water use and overall water use
	10	Minimize the impact on stormwater runoff quantity, rate and quality
Ecological Health	**11**	Select site to protect sensitive ecosystems and preserve and enhance habitat function
	12	Develop and implement an invasive species management plan
	13	Preserve soils and restore disturbed areas with appropriate soil to support healthy vegetation
	14	Prevent pollutants from contaminating surface water and groundwater
	15	Reduce air pollutant sources during construction

Table 1: Metro Vancouver's 15 Priority Performance Objectives as per the Sustainable Infrastructure and Buildings Policy

The Policy also notes 15 **Priority Performance Objectives** (PPOs) across three overarching areas to guide efforts and show measurable improvements in sustainability outcomes against business as usual, presented in ***Table 1*** above.

Projects that fall outside the definitions of Eligible Infrastructure and Occupied Buildings above (e.g. linear infrastructure) will be evaluated on a project-by-project basis to determine how the achievement of the PPOs should be addressed. As the Design Guide does not cover this process, projects that fall under this category should be reviewed with the appropriate senior staff member.

1.2 Planning Context

Metro Vancouver's Board of Directors adopted the *Sustainable Infrastructure and Buildings Policy* as a way to ensure Metro Vancouver's many buildings and facilities meet a set of sustainability priorities in a consistent manner. The Policy establishes a set of sustainability priorities, which in turn flow from a number of other regional plans and strategies. Those of greatest relevance to Metro Vancouver's buildings and infrastructure projects (and thus those that Metro Vancouver staff should familiarize themselves with) include the following:

Sustainability Framework: Outlines Metro Vancouver's commitment to putting sustainability at the centre of its operations and planning processes.

Climate 2050 Strategic Framework: Commits Metro Vancouver to demonstrating bold leadership in responding to climate change by:

- Creating a carbon neutral region by 2050, with an interim target of 45% emissions reductions by 2030 (over 2010 levels)
- Ensuring that infrastructure, ecosystems and communities are resilient to the impacts of climate change

Board Strategic Plan 2019-2022: Sets out a vision for "sustainable regional services that contribute to a livable and resilient region and a healthy natural environment now and into the future". This plan highlights the need to reduce pollutants, including greenhouse gases (GHG), to prevent waste, to conserve natural ecosystems, and to ensure the long-term viability of key services (i.e. water, liquid waste, solid waste and regional parks). It also affirms Metro Vancouver's commitment to show leadership on climate action, through the *Climate 2050 Strategic Framework*.

Regional Growth Strategy – Metro Vancouver 2040: Shaping Our Future: Establishes goals and strategies to guide the future growth of the region, in particular:

- **Goal 3.** Protect the environment and response to climate change impacts
- **Strategy 3.2.** Protect and enhance natural features and their connectivity
- **Strategy 3.3.** Encourage land use and transportation infrastructure that reduce energy consumption and greenhouse gas emissions, and improve air quality
- **Strategy 3.4.** Encourage land use and transportation infrastructure that improve the ability to withstand climate change impacts and natural hazard risks

These overarching principles have been built upon (or are reflected in) the many interconnected management plans that have been developed around the *Sustainability Framework*, including:

Integrated Air Quality & Greenhouse Gas Management Plan and the updated *Clean Air Plan*

Drinking Water Management Plan

Integrated Solid Waste & Resource Management Plan

Integrated Liquid Waste & Resource Management Plan

Regional Parks Plan and updated *Regional Greenways 2050*

Regional Food System Strategy

Affordable Housing Strategy

1.3 The Sustainable Infrastructure & Buildings Design Guide

Purpose of the Design Guide

This Design Guide was created to help Metro Vancouver project leads understand the *Sustainable Infrastructure and Buildings Policy*, and support achievement of the intent of the Policy in a way that makes sense given the nature of each specific project.

While the Policy identifies LEED Gold or Envision Gold as the level of performance to be achieved, the diversity of projects that Metro Vancouver undertakes means that Gold levels of performance are not always feasible, nor desirable (see Section 4 for further information on when to seek Gold certification). The Design Guide therefore acts as an *interpretation of the Policy* that ensures meaningful and measurable improvements in environmental performance are realized, using the Envision and LEED rating systems as tools to guide and measure those achievements.

Specifically, the Design Guide is focused on providing guidance for the achievement of Metro Vancouver's *Priority Performance Objectives* in a manner and extent that is commensurate with the complexities and opportunities associated with a specific project. The Design Guide:

- Provides Metro Vancouver project leads with guidance on when and how different requirements must be achieved
- Outlines the levels of performance that must be achieved for different kinds of projects
- Identifies the projects and circumstances for which it is appropriate or necessary to proceed with Envision Gold or LEED Gold certification

It is important to note that this Design Guide is not intended to act as a uniform strategy for all types of projects managed by Metro Vancouver. The Guide does not provide detailed information on all possible credits or points available under either LEED or Envision, nor does it seek to reproduce information already available in the LEED and Envision user manuals. Rather, it seeks to provide a combination of procedural and practical guidance designed to help focus and meaningfully reduce the time and effort necessary to meet the Policy. It has been created to provide guidance for project leads on how best to achieve the intent of the policy for a given project, as well as helpful resources to assist in the achievement of the PPOs.

Intended Users

The primary intended users of the Design Guide are Metro Vancouver project leads responsible for eligible building and infrastructure projects covered by the Policy. However, others will find useful resources in the Design Guide, including Metro Vancouver staff responsible for planning and/or procurement, staff of member municipalities, and members of design teams working on eligible building or infrastructure projects.

Training in the LEED and/or Envision standard (whichever is most appropriate) would offer significant benefits to users of the Design Guide and is encouraged wherever possible.

For information on becoming an Envision Sustainability Professional (ENV SP), visit the *Institute for Sustainable Infrastructure website*

For information on becoming an LEED Green Associate (GA) or Accredited Professional (AP), visit the *Canada Green Building Council website*.

1.4 Understanding the Design Guide

Important Acronyms

BCBC: British Columbia Building Code

CaGBC: Canada Green Building Council

CCM: Carbon Conservation Measures

CFC: Chlorofluorocarbon

CO_2: Carbon Dioxide

CO_2e: Carbon Dioxide Equivalent

Cx: Commissioning

EPD: Environmental Product Declarations

ENV SP: Envision Sustainability Professional

GHG: Greenhouse Gas

GHGI: Greenhouse Gas Intensity

GWP: Global Warming Potential

HVAC&R: Heating, Ventilation, Air Conditioning, and Refrigeration

IAQ: Indoor Air Quality

IDP: Integrated Design Process

LCA: Life Cycle Assessment

LEED: Leadership in Energy and Environmental Design

LEED AP: LEED Accredited Professional

O&M: Operations and Maintenance

PPO: Priority Performance Objective

RCx: Recommissioning

RFP: Request for Proposal

SIBP: Sustainable Infrastructure and Buildings Policy

TEDI: Thermal Energy Demand Intensity

TEUI: Total Energy Use Intensity

VOC: Volatile Organic Compounds

Guiding Resources

Primary resources that project leads should look to in using the Design Guide include:

- Metro Vancouver's *Sustainable Infrastructure and Buildings Policy*
- Additional Metro Vancouver plans and policies as per *Section 1.2* of this Design Guide
- *Envision v3: Sustainable Infrastructure Framework Guidance Manual*
- *LEED v4: Reference Guide for Building Design and Construction*
- *BC Energy Step Code*
- *BC Building Code*

Additional and complementary resources for specific subjects (e.g. renewable energy, low-carbon transportation, water quality) are available within the relevant sub-section for each requirement.

2. Sustainability Standards

This section provides a basic introduction to the two primary standards upon which both the Policy and the Design Guide are based. As noted above, compliance with the Policy does not uniformly require achievement of LEED Gold or Envision Gold. Rather, the credits and requirements in both standards have been used as a basis for setting requirements that meet the 15 *Priority Performance Objectives*.

2.1 The Envision Standard

The Envision standard is hosted by the *Institute for Sustainable Infrastructure*, based in Washington, DC . It represents a framework to help project teams identify the most sustainable approaches to infrastructure planning, design, construction, and operation.

The framework comprises specific sustainability criteria and performance objectives, split in 'credits'. A total of 59 core credits (and five innovation credits) span five credit areas:

01
Quality of life

02
Leadership

03
Resource Allocation

04
Natural World

05
Climate and Resilience

The framework provides for a maximum number of 1,000 points across the credits, which are allocated according to the level of achievement that can be demonstrated for a specific project. A total of five possible levels of achievement exist for each credit, which correspond to a growing number of possible points. While the details of how the achievement levels are defined differs according to each credit, sustainable performance and overall positive impact to the community are generally increased with each achievement level. The *Envision v3: Sustainable Infrastructure Framework Guidance Manual* defines the level of achievement as follows:

Improved
Performance that is above conventional and slightly exceeds (typical) regulatory requirements.

Enhanced
Sustainable performance that is 'on the right track' and where there are indications that superior performance is within reach.

Superior
Sustainable performance at a very high level.

Conserving
Performance that has achieved essentially zero negative impact.

Restorative
Performance that restores natural or social systems. Such performance receives the highest award possible and is celebrated as such, but is not applicable to all performance objectives.

Each level of achievement relates to distinct actions and outcomes that must be met for each credit, including the need to provide documentation and supplementary evidence to illustrate how the outcomes or actions were met. Minimum performance requirements are also outlined at each achievement level.

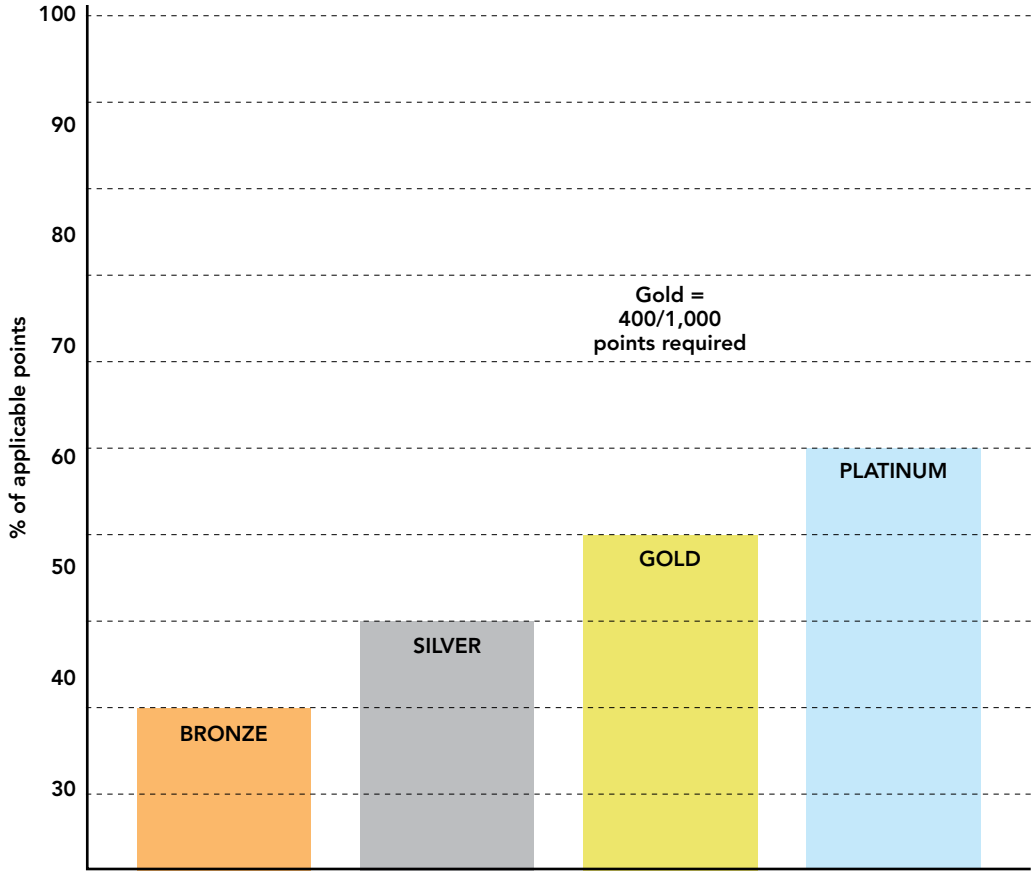


Figure 2-1: Envision Verification Award Levels

Four verification award levels are available under the Envision Framework as the means of recognizing project achievements. BRONZE is the lowest level of achievement (20% of points or 200 out of 1,000 points required), followed by SILVER (at 30% of points), GOLD (at 40% of points), and PLATINUM (at 50% of points) (see *Figure 2-1*).

At a high level, Envision can be applied to all types and sizes of infrastructure. However, in the context of this guide, **the Envision standard applies to all Eligible Infrastructure as defined by the Policy**. Refer to *Table 2* in Section 3.1 for a detailed list of infrastructure and building components.

2.2 The LEED Standard

Developed by the US Green Building Council and launched in 1998, LEED (or Leadership in Energy and Environmental Design) is the most widely used green building certification program in the world. This voluntary program serves as a framework for identifying, implementing, and measuring green building and neighborhood design, construction, operations, and maintenance.

There are a variety of LEED rating systems that can be used for different project types, with the following most relevant to Metro Vancouver's building projects:

BD+C
Building Design and Construction

ID+C
Interior Design and Construction

O+M
Building Operations and Maintenance

LEED Zero
Available for all LEED projects certified under the BD+C or O+M rating systems that are targeting net zero carbon.

LEED encourages the development of sustainable, high-performance buildings that use resources efficiently and promote positive health outcomes for occupants. Projects achieve points across nine credit categories that cover various aspects of sustainability and project planning:

01
Integrative Process

02
Location and Transportation

03
Sustainable Sites

04
Water Efficiency

05
Energy and Atmosphere

06
Materials and Resources

07
Indoor Environmental Quality

08
Innovation

09
Regional Priorities

110 points are available for achievement under LEED BD+C v4, with four levels of certification possible depending on the number of points achieved:

Certified
40-49 points

Silver
50-59 points

Gold
60-79 points

Platinum
80+ points

The LEED standard applies to all Occupied Buildings as defined by the Policy.

How LEED & Envision Intersect

While the LEED framework is geared towards buildings (i.e. occupied or dwelling spaces), the Envision framework is geared towards all infrastructure. However, there are points of crossover between the two frameworks.

For projects where there are several pieces of infrastructure and an occupied building space (e.g. a new water treatment plant that includes a new administration building), it is possible to rely on the LEED framework for the occupied building and to rely on the Envision Framework for the remaining infrastructure. However, in most cases, it is likely more suitable to use Envision for the entire scope of the project.

2.3 The BC Energy Step Code

Metro Vancouver new Occupied Building projects must also account for the *BC Energy Step Code* **('the Step Code').** Issued by the Provincial Government in 2017, this tiered performance standard establishes a consistent framework of incrementally higher energy performance for new Part 3 (e.g. multi-unit residential buildings, commercial offices) and Part 9 (e.g. single-family dwellings) buildings in BC, offering long-term direction and predictability for the building industry. It also enables local governments to mandate performance beyond the *BC Building Code* (BCBC) by requiring any tier of the Step Code and introducing it into municipal bylaws and policies.

In 2020, current base BCBC performance is equivalent to Step 1 in the Step Code (i.e. the requirement for energy performance modelling). Planned updates through to 2032 will advance base BCBC requirements to match higher steps, establishing a minimum implementation pathway for buildings in BC. All new construction projects subject to the Step Code will be required to meet incrementally higher levels of performance beginning in 2022.

For Part 3 buildings, of greatest interest to Metro Vancouver, the pathway that will be adopted as the minimum BCBC standard over time is as follows:

- **Step 2:** This level of energy performance is on par with 'best practices' in energy efficiency under the current code, approximately **20-40% better** than code. This will be adopted as minimum BCBC around 2022.
- **Step 3:** Considered to be a high-performance building, or **50% better** than current code. This will be adopted as minimum BCBC around 2027.
- **Step 4 (if applicable):** Equivalent to a **net-zero energy-ready** building. This will be adopted as minimum BCBC by 2032.

However, numerous member municipalities have elected to pursue an accelerated pathway to 2032 by adopting higher steps more quickly than the BCBC. For example, the City of Richmond has mandated that Part 3 commercial buildings achieve Step 3 by 2022 and the City of Surrey by 2024, ahead of the 2027 minimum.

These higher levels of building performance are measured using specific metrics for energy efficiency (see Figure 2-2). To demonstrate compliance with the Step Code, new construction projects must submit an energy model that shows that achievement of minimum performance thresholds for each metric. Prior to receiving an occupancy permit, project teams must also subject the building to an airtightness test and submit the results to the authority having jurisdiction.

	**Total Energy Use Intensity (TEUI):** Annual energy usage, normalized per square meter of floor area of conditioned space. Expressed in kWh/m2 year.
	**Thermal Energy Demand Intensity (TEDI):** Annual heating required for space conditioning and for conditioning of ventilation air, normalized per square meter of floor area of conditioned space. Expressed in kWh/m2 year.
	**Airtightness:** The rate at which air leaks through the envelope. Measured as Normalized Air Leakage Rate per unit of envelope area, and expressed as L/s·m² at 75 Pascals pressure differential.

Figure 2-2: Performance metrics for the BC Energy Step Code

How LEED & the Step Code Intersect

While performance target equivalencies between different levels of LEED certification and the increasing steps have not yet been established, the energy efficiency requirements of LEED can align and contribute to the achievement of the BC Energy Step Code.

However, the two standards aim to demonstrate energy performance in different ways. The BC Energy Step Code is focused almost entirely on energy efficiency and asks project to demonstrate compliance as annual energy consumption normalized over the project's size. Building performance is articulated as a holistic Total Energy Use Intensity (TEUI) and Thermal Energy Demand Intensity (TEDI).

The LEED approach to energy efficiency is a comparative analysis, in which the project is benchmarked against a design-case scenario and points are awarded based on the demonstrated differences between the baseline and design case. Further, LEED focuses on the energy cost difference between the baseline and design cases. Some versions of LEED (v4.1) consider carbon emissions as well.

As a result of these differences, there can occasionally be a disconnect between a higher efficiency project modeled under Step Code and the demonstrated energy costs savings relative to its baseline. For this reason, higher levels of energy performance do not assure increased energy points under LEED. As a default, projects achieving Step 2 of the Step Code are expected to achieve a minimum of 4 points under LEED v4 and v4.1. Should Project Leads be considering more points as part of their LEED Gold certification strategy, an additional specialized model following the LEED methodology could be considered to explore and maximize points under the rating system.

However, LEED's holistic approach ensures consideration of the broader aspects of sustainability (e.g. water efficiency, ecological impact), and the health and wellness of occupants, which could meaningfully contribute to a LEED Gold certification strategy in lieu of a high number of energy points. Accounting for both standards early in the planning process can enable project teams to maximize synergies and streamline achievement. Further guidance on energy performance in buildings and alignments between LEED and Step Code is provided in relevant portions of *Section 7*.

3. Meeting the Intent of the Policy

Project Leads using the Design Guide should begin to fulfill project requirements by taking the following steps:

			Resources	Documentation
01	**Choose the appropriate standard**	Identify the correct standard to follow (Envision vs. LEED) and corresponding section of the Design Guide to follow	*Choosing a standard at a glance*	
02	**Choose the correct pathway**	Identify the appropriate pathway to follow (Path A, Path B or full certification) and the corresponding set of requirements that must be followed	*Choosing a pathway flow chart*	
03	**Identify any alterations or exemptions to the selected pathway**	For projects following Path A or Path B, Identify any modifications *necessary* to the overall pathway for specific *Priority Performance Objectives*		*Infrastructure Path A Alterations and Exemptions Form* *Buildings Path A Alterations and Exemptions Form* *Infrastructure Path B Exemptions Form* *Buildings Path B Exemptions Form*
04	**Create final plan**	For projects following Path A or Path B, document the overall approach to fulfilling the appropriate set of requirements.		

All documentation must be submitted to and approved by the appropriate senior staff member. Details on each step are outlined in the sections below, with helpful materials for project leads to use in following each step in the Appendices.

3.1 Choosing a Standard

The Design Guide provides guidance for both infrastructure and building projects, which have been broken down into more granular components to allow for easy identification of the guidance and standard a given project should follow. In general:

Section 6
provides guidance for **infrastructure** projects based on the Envision standard

Section 7
provides guidance for **occupied building** projects based on the LEED standard

Project leads should determine which standard to pursue by first determining the nature of their project as outlined in the tables below. See *Appendix A* for a more detailed list of potential kinds of infrastructure and building projects.

Rating System	Component	Definition	Follow guidance
Envision	**Tankage**	Infrastructure used to store liquid or gas.	*Section 6*
	Indoor Storage/Shop	Enclosed or mostly enclosed space used to store equipment, parts, process consumables and other items, and conditioned as necessary primarily to support these purposes. Enclosed or mostly enclosed workshop space, conditioned as necessary primarily to support this use.	*Section 6*
	Outdoor Storage/Shop	Outdoor or mostly outdoor space used to store equipment, parts, process consumables and other items. Outdoor or mostly outdoor workshop space.	*Section 6*
	Indoor Equipment/Process	Enclosed or mostly enclosed space used to accommodate process and process-related equipment and conditioned as necessary primarily to support these purposes.	*Section 6*
	Outdoor Equipment/Process	Outdoor or mostly outdoor space used to accommodate process and process-related equipment.	*Section 6*
	Parking/Roads/Site scaping	Outdoor space surrounding process/equipment infrastructure that provides access, parking, visual aesthetics, etc.	*Section 6*
	Dams	Space and infrastructure associated with dams.	*Section 6*
	Underground Linear Infrastructure (Excluding Pipelines)	Infrastructure associated with buried forcemains and gravity mains, but excluding the pipeline itself.	*Section 6*
	Public Parks and Open Space	Community oriented outdoor amenities.	*Section 6*
LEED	**Dwelling Space**	Enclosed residential spaces that generally comprise continually habited and conditioned spaces. Dwelling spaces are inclusive of residential amenities, such as washrooms and bathing spaces, kitchens, sleeping areas, etc. Dwelling spaces can include either single family or multi-family configurations.	*Section 7*
	Habitable Space	Enclosed spaces that facilitate professional service. Habitable spaces are inclusive of working spaces supporting staff and is conditioned primarily to support the needs and productivity of people.	*Section 7*

Table 2: Infrastructure and building component definitions

Note: Where a *dwelling space* or a *habitable space* are a part of a larger infrastructure project, it is appropriate to include these spaces into the larger project scope and follow the guidance based on the Envision standard outlined in Section 6.

The LEED framework may be considered as a means of demonstrating compliance with a given PPO in lieu of the identified Envision credits where the rating system best fits the project scope. However, project leads of infrastructure projects are recommended to use the guidance provided based on the Envision standard.

3.2 Choosing a Pathway

Once the appropriate standard has been selected, project leads must then confirm the baseline pathway that must be followed. In general:

Under $3 million

are to follow **Path B: Alternative Compliance**

For infrastructure, see *Section 6*
For buildings, see *Section 7*

Between $3 million to $12 million

are to follow **Path A: Performance Requirements**

For infrastructure, see *Section 6*
For buildings, see *Section 7*

Over $12 million

are to explore achieving full Envision Gold or LEED **Gold certification**

See *Section 5*

Note: Projects that are required to achieve full Envision or LEED certification should consult Section 5 for further guidance on pursuing Gold certification, but will likely not need the full support of this Guide. Guidance for projects pursuing Gold certification should consult Section 5.

Requirements to pursue Gold will be reviewed by senior staff on a project-by-project basis. Project leads should choose the most appropriate pathway, subject to approval by senior staff.

Figure 3-1: Determining the correct pathway

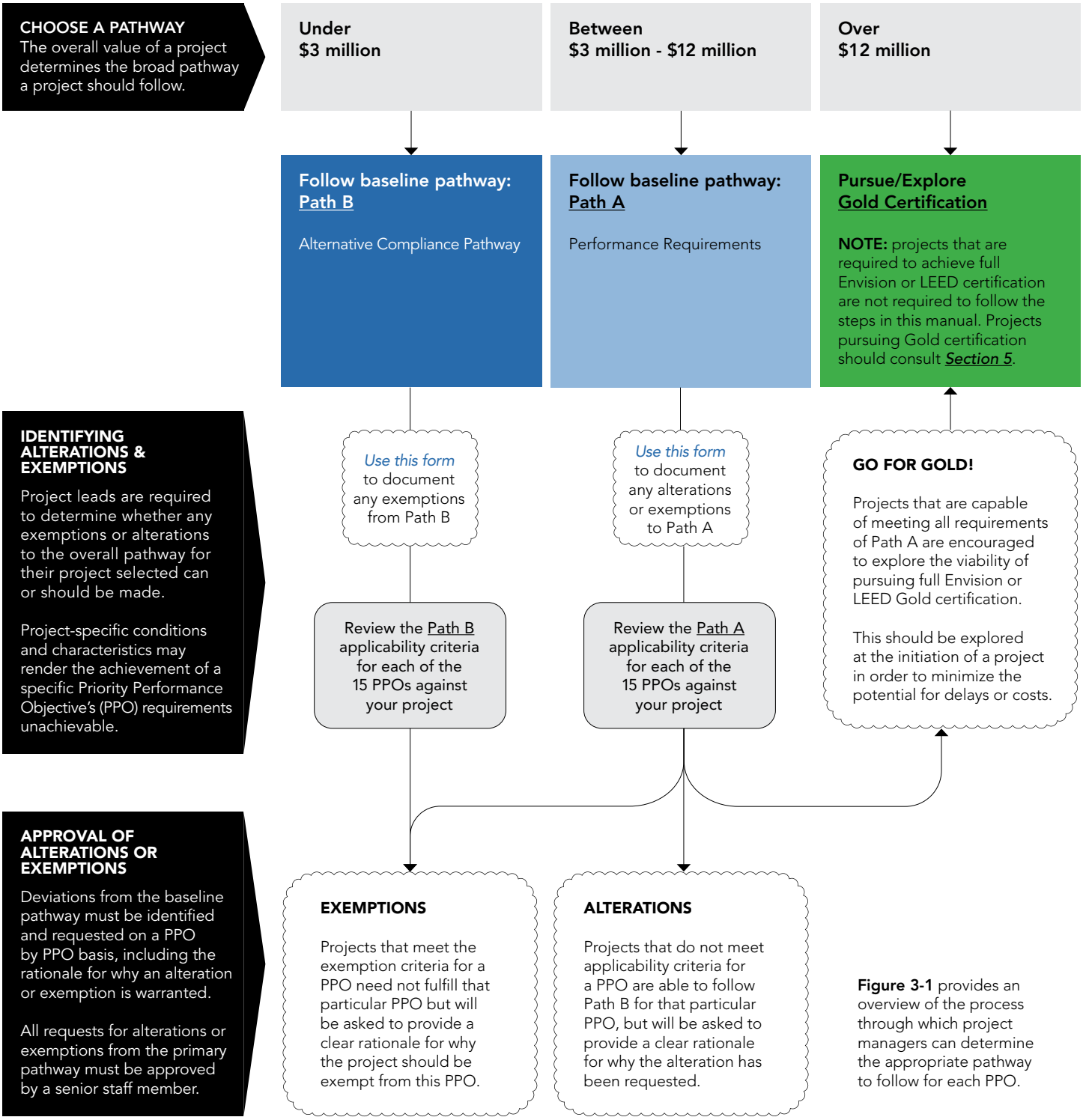


Figure 3-1 provides an overview of the process through which project managers can determine the appropriate pathway to follow for each PPO.

3.3 Identifying Pathway Alterations and Exemptions

Project leads must next determine whether any exemptions or alterations to the overall pathway selected can or should be made. This is because while overall project value determines the broad pathway a project should follow (as outlined in Section 3.2), there are project-specific conditions and characteristics that may render the achievement of a specific Priority Performance Objective's (PPO's) requirements unachievable. Deviations from the baseline pathway must be identified and requested on a PPO by PPO basis, including the rationale for why an alteration or exemption is warranted.

Alterations

Project leads required to follow Path A should consult the guidance on *Applicability* provided for each of the 15 PPOs to determine whether Path A for a given PPO is unfeasible. Example conditions that could make Path A unfeasible include overall project complexity, project scope, and others. Where these conditions are present for a given PPO, Project Leads may follow Path B *for that PPO*. Path A must still be followed for all remaining PPOs.

Exemptions

Project leads required to follow either Path A or Path B should consult the guidance on *Applicability* provided for each of the 15 PPOs to determine where a specific PPO cannot be achieved. Example conditions that could exempt a project from a given PPO *largely pertain to project scope* (e.g. where there is no relevant scope that makes it possible to achieve a PPO). Where these conditions are present for a given PPO, project mangers can receive an exemption from fulfilling *that specific PPO.* All other applicable PPOs must still be achieved.

All requests for alterations and exemptions to baseline pathway requirements must be submitted to the appropriate senior staff member for review and approval. See **Appendix B for the Exemptions and Alterations forms**, which should be used to identify and submit requests for any changes from the pre-determined pathway in Section 3.2.

Note: Projects that are capable of meeting all requirements of Path A are encouraged to explore the viability of pursuing full Envision Gold or LEED Gold certification. This should be explored at the initiation of a project in order to minimize the potential for delays or costs (see Section 5). Whether a project will be required to pursue full certification will be reviewed by the appropriate senior staff member.

3.4 Finalizing Requirements

The approved set of requirements for a given project, including all exceptions and alterations, can then be inserted into the overall project plan. Once approved, the final plan will be used as a basis for ongoing verification by an appropriate senior staff member that the project is on track to meet its requirements under the Policy. Verification will occur at key stages as indicated in Table 3.

Table 3: Stages of documentation submission and review by appropriate senior staff member

Stages	Deliverables
Definition	Submission for approval of proposed plan to meet SIBP objectives and verify that the appropriate pathway is being followed (i.e. which PPOs must be achieved and using which compliance pathway). Senior staff should ensure correct pathways have been selected and vet whether additional/higher requirements should be sought.
Design	Submission of relevant documentation by PPO to show progress on performance requirements, ensure correct pathway is being followed, and correct information is being gathered. Senior staff should consult the project plan to ensure appropriate pathways are being followed.
Construction	Submission of relevant documentation by PPO to show progress on performance requirements, ensure correct pathway is being followed, and correct information is being gathered. Senior staff should consult the project plan to ensure appropriate pathways are being followed.
Closeout	Submission of final documentation for verification that all performance requirements have been met and that the project complies with the SIBP. Senior staff should consult original plan to verify that correct pathways have been followed and file information for compilation and evaluation of the SIBP.

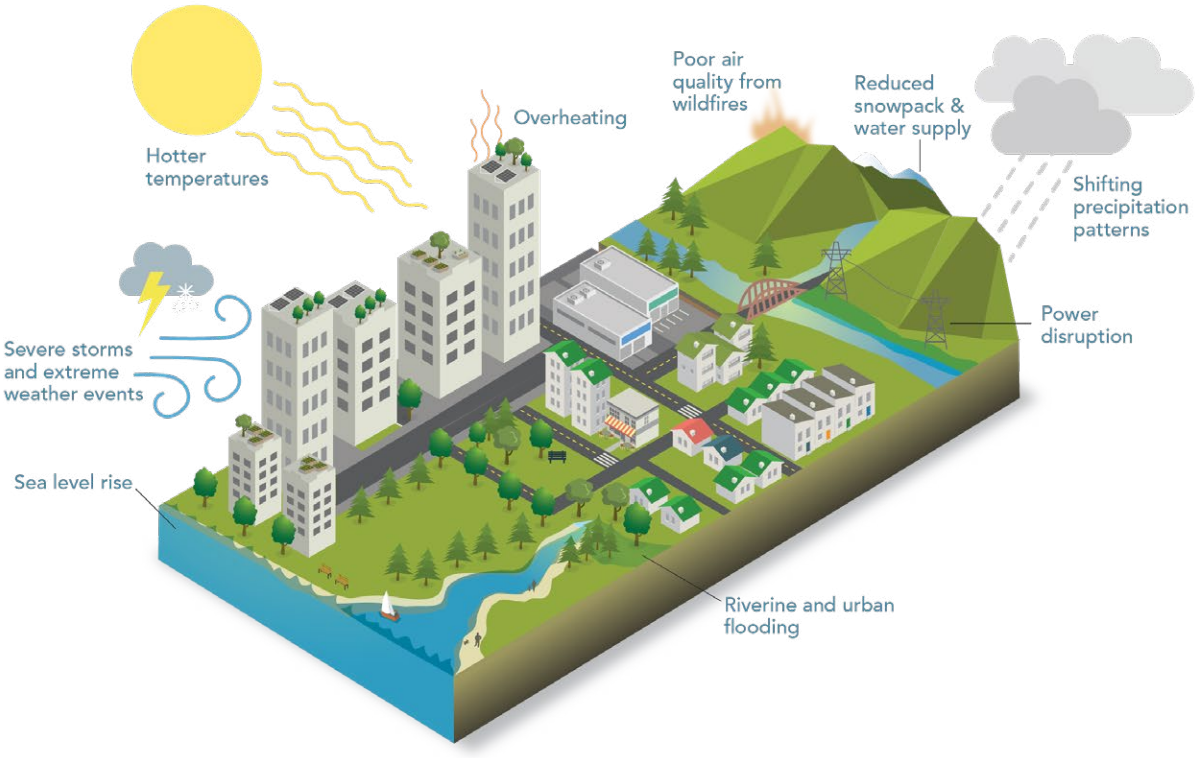
4. Considering Future Climate

Alongside improving the overall sustainability of building and infrastructure projects, Metro Vancouver has also issued a goal of making zero emission and resilient buildings standard practice for the organization by 2050, both for new construction and major retrofits. While energy and emissions performance are covered under the 15 PPOs, the goal of ensuring that infrastructure, buildings, communities and ecosystems are resilient to the impacts of climate change requires additional consideration.

Specific requirements for integrating resilient design practices into new infrastructure and buildings projects will be determined on a project-by-project basis. However, there is a need and opportunity for project teams to understand and address potential climate impacts alongside the achievement of the PPOs. Based on climate projections to the 2050s, the following changes and impacts are expected for Metro Vancouver:

- **Warmer temperatures overall**, with higher daytime and nighttime temperatures, and more hot summer days. These are anticipated to lead to an increase in the frequency and severity of heatwaves, wildfires, and droughts.
- **Shifting precipitation patterns**, including more rainfall in every season except the summer, and less precipitation falling as snow.
- **Increases in severe storms and extreme weather events**, including high winds and heavy rainfall.
- **Sea level rise**, with 0.5 metres expected by 2050, resulting in significant impacts for coastal communities.

EXPECTED CLIMATE CHANGE IMPACTS



4.1 Enhancing Climate Resilience

One of the first steps in designing climate resilient buildings and infrastructure is to understand the likely future climate conditions under which it will be operating throughout its full lifecycle. This requires the use of climate projections, which indicate how the local climate is changing and what future conditions may look like. Climate projections help support an understanding of the impacts that can be expected, both positive and negative.

The extent to which the climate will change depends directly on how effectively the global community coordinates to achieve greenhouse gas emissions reductions. Representative Concentration Pathways (RCP) are used to describe a number of possible GHG emissions scenarios for the 21st century, and are based on factors that drive human-caused GHG emissions (e.g. population growth, technology adoption). The RCP8.5 or 'business-as-usual' scenario is commonly used for climate adaptation planning.

Multiple climate models (i.e. multi-model ensembles that group results from multiple climate models together) that forecast future changes across a range of GHG emission scenarios should be used when assessing the potential impacts of climate change on a project.

Sources of climate projections

Metro Vancouver worked with the Pacific Climate Impacts Consortium to develop *regional climate projections* that provide an understanding of the details of how local climate conditions may change by the 2050s and 2080s

More information about how to access and use historical and future climate data can be obtained from the *Canadian Centre for Climate Services*

ClimateData.ca also provides high quality climate data to support decision making, including key metrics for temperature, precipitation and other variables

The *Canadian Climate Atlas* provides an interactive platform to visualize likely changes in climate across the country

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The *BC Climate Risk Assessment Framework*

Infrastructure Canada's *Climate Lens*

ISO 31000 Risk Management Standard

ISO 14090:2021 Adaptation to Climate Change: Guidelines on Vulnerability, Impacts and Risk Assessment

The *PIEVC Engineering Protocol*

4.2 Climate Risk Assessment

The need to conduct a full risk assesment process will be assessed in consultation with the relevant senior staff member. In these cases, it will likely be necessary to contract with a climate risk specialist or similar service provider with sufficient knowledge of methods, tools, and approaches to evaluating and mitigating project risks and vulnerability to climate change.

There are also credits under both the LEED and Envision rating systems that can be used to support climate assessments and enhanced resilience, as well the achievement of Gold certification (see *Section 5*):

LEED	Envision
• Pilot credit IPpc98: Assessment and Planning for Resilience • Pilot credit IPpc99: Design for Enhanced Resilience • Pilot credit IPpc100: Passive Survivability and Back-up Power During Disruptions	• CR2.1: Avoid Unsuitable Development • CR2.2: Assess Climate Change Vulnerability • CR2.3: Evaluate Risk and Resilience • CR2.4: Establish Resilience Goals and Strategies • CR2.5: Maximize Resilience

5. Pursuing Gold Certification

Projects that are required to pursue Envision Gold or LEED Gold are not required to follow the requirements outlined in this Design Guide. While the fulfillment of the PPOs should remain the priority focus of these projects, they will be required to achieve a greater number of requirements (and achieve a greater number of points) under the relevant rating system (i.e. Envision or LEED). Such projects will be required to take a more holistic approach to sustainability and will be subject to third party verification by the institutions responsible for administering the Envision or LEED standards.

Notes

- Projects that are capable of meeting all requirements of Path A are encouraged to explore the viability of pursuing full Envision Gold or LEED Gold certification. The Project Lead should evaluate this during the Initiate stage and consult with the appropriate senior staff member.
- Select projects valued at over $12 million may not be required to pursue Gold certification. This will be reviewed by the appropriate senior staff member.

Table 4 shows the key steps necessary for Project Leads to take when pursuing certification, with details provided in the sections below. Note that this table and those used in the remainder of the guide assume a Design-Bid-Build (DBB) approach. For a Design-Build (DB) approach, responsibility for the design phase is split between the Owner's Engineer and the DB team Designer.

Table 4: Key steps in pursuing Envision or LEED certification

Project Phase	Actor	Action	Documentation/ Deliverable
Definition	*Project Lead*	• Engage LEED Accredited Professional (LEED AP) or Envision Sustainability Professional (ENV SP) • Include a copy of the Design Guide and the SIBP into all relevant RFPs, and note the PPOs of key interest • Detail project scope	• RFP detailing Metro Vancouver Policy requirements • Design Brief outlining project components, space types, and systems scopes
Design	*ENV SP or LEED AP*	• Create preliminary Envision or LEED scorecard	• Preliminary rating system scorecard
Construction	*ENV SP or LEED AP*	• Create final Envision or LEED scorecard	• Final rating system scorecard
		• Collect applicable certification documentation	• Collect applicable certification documentation
Closeout	*ENV SP or LEED AP*	• Submit final Envision or LEED certification	• Certification package for submission to third-party certifiers

Why go for Gold?

Beyond projects that are already required to pursue Gold certification, there are several other considerations that may warrant consideration. Key considerations for pursuing certification under either Envision or LEED include the following:

- Enough complexity and scale to conduct the required activities and/or make the required project decisions to gain the necessary points to achieve an Envision Gold award
- Ability to meet all requirements of Path A (see Section *3.3*)
- External requirements to achieve Gold certification or above, such as municipal government requirements as a condition of permitting or conditions of grant funding
- High public interest or visibility where certification could be used as an educational opportunity
- Challenging projects where third-party assistance and/or verification could be seen as an asset

Certifying Under Envision

What do Project Leads need to know?

Addressing the many requirements related to Envision and maximizing the likelihood of achieving an Envision Gold award level requires careful planning, scheduling, and resourcing throughout the project. Strategies for achieving Gold should ideally be incorporated into the overall project plan. As there are many actions and decisions to be made throughout the project lifespan, starting as early as possible in the planning and procurement process is advised.

While verification under Envision can occur either *proactively* (in advance of construction) or *retroactively* (following construction completion), this Design Guide focuses on the proactive approach for meeting the credit requirements. Projects that pursue certification under Envision using the proactive approach are required to complete verification following the completion of the design phase of the project using a third-party reviewer. Following the completion of the project (i.e. once construction is complete, and the project is in operation), an additional review step is required to confirm that commitments made during the design phase of the project were implemented.

Envision has produced a range of materials to assist those involved in the Envision process, including:

- An Envision Manual (now on version 3) that provides details about the Envision process, seeking an award through third-party verification, and the requirements for each Envision credit.
- Guidance materials regarding the Envision process – including verification and ENV SP credentialing.
- Tutorial materials focused on improving competence of those involved in the Envision process.

To seek formal verification and award, an Envision Sustainability Professional (ENV SP) is required to be involved in the project from the outset. The ENV SP has several essential roles in the project:

- Providing advice regarding the Envision credits and verification process.
- Planning which credits will be focused on considering the desired award level and opportunities of the project.
- Planning credit-related activities and necessary decision-making so that credit points are realized.
- Gathering records and other project evidence.

Setting up for Success

The Envision rating system includes a full range of credits that are not project-specific, but rather are guided by Metro Vancouver processes at higher scales. These are credits speak to an organization's policies and strategies that may be in place (e.g. relating to procurement and planning practices).

While the target audience of this guide is the project lead, it is important to recognize that a significant portion of the points required to achieve Gold certification are out the control of the project lead, as they stem from these broader organizational (and less project-specific) credits. **The maximum number of points available through these credits is 350 points (*Table 5*). When striving for Gold, project leads should therefore work with the Envision SP early on to ensure that these credits are harnessed wherever possible.**

Table 5: Envision categories, credits and points available (as of December 2020)

Categories	Credits	Total Maximum Points
Quality of Life	QL1.3 Improve Construction Safety	14
	QL3.1 Advance Equity & Social Justice	18
Leadership	LD1.1 Provide Effective Leadership & Commitment	18
	LD1.2 Foster Collaboration & Teamwork	18
	LD2.1 Establish a Sustainability Management Plan	18
	LD2.2 Plan for Sustainable Communities	16
	LD3.1 Stimulate Economic Prosperity & Development	20
	LD3.2 Develop Local Skills & Capabilities	16
	LD3.3 Conduct a Life-Cycle Economic Evaluation	14
Resource Allocation	RA1.1 Support Sustainable Procurement Practices	12
	RA2.2 Reduce Construction Energy Consumption	12
	RA3.1 Preserve Water Resources	12
Natural World	NW2.3 Reduce Pesticide & Fertilizer Impacts	12
	NW2.4 Protect Surface & Groundwater Quality	20
	NW3.2 Enhance Wetland & Surface Water Functions	20
Climate and Resilience	CR2.2 Assess Climate Change Vulnerability	20
	CR2.3 Evaluate Risk and Resilience	26
	CR2.4 Establish Resilience Goals and Strategies	20
	CR2.5 Maximize Resilience	26
	CR2.6 Improve Infrastructure Integration	18

Certifying Under LEED

To qualify for LEED certification, a project's development team must work with a qualified LEED consultant to identify and document a building's different green building features and submit the certification application. The LEED certification process can be defined by six distinct phases:

1. **Selecting the right rating system:** During the Initiation phase, the project scope should be reviewed to determine the appropriate version of LEED to be used. The *LEED v4 Reference Guide for Building Design and Construction* contains supporting descriptions of the different rating system version and the best fits for a given project type.
2. **Registering the project:** Register any project intended for certification with the Canadian Green Building Council (CaGBC). Registration should be completed through *LEED Online*.
3. **Managing the project**: Throughout the design and construction of the project, continually manage and track the implementation of the different measures needed to satisfy the LEED certification target. Production of the necessary LEED compliance documentation should be considered throughout the project delivery process.
4. **Submitting for certification:** Project teams have the option to submit for certification as either a split (design-related credits first and construction-related credits second) or whole project certification submission. Given the time that elapses between the design and documentation of LEED credits and the certification submission which occurs after construction, it is generally recommended the project considered split certification review where feasible.
5. **Undergoing certification review:** During the certification review, project teams have one feedback and response cycle to respond to certification review feedback. Project teams should be efficient and concise with their responses to certification review comments to ensure the certification review process goes efficiently. Where credit compliance cannot be resolved through a single response cycle, individual credits can be appealed at a cost.
6. **Certification award:** Following the final certification review is complete the project is then certified. The appropriate plaques and documentation can be ordered. The project is not certified until that time.

Working with a LEED Accredited Professional

Fundamental to the success of a LEED certification is the engagement of a LEED Accredited Professional (LEED AP). A LEED AP has gone through specialized training and continuing education to maintain their specialization in the LEED rating system. Key issues to keep in mind when seeking a LEED AP:

- Should be sought with the correct specialty for the project (e.g. BD+C for new construction).
- Should be aware of new interpretations and information pertaining the to LEED credits.
- Should have experience with the administration of LEED credits including the best times to verify compliance with the different credits and the certification process.

Setting up for Success

When managing a LEED certification in pursuit of LEED Gold level certification, it is important to consider the administrative requirements of the rating system:

- Establish clear understanding of the responsibility each consultant and/or contractor has for the delivery of LEED credits in design, construction, and certification review.
- Continually review the project to ensure LEED credits under coordination are meeting the technical requirements of the credits.
- Produce LEED compliance documentation as soon as possible for each targeted credit. As the project continues into the construction it becomes more challenging to collect the relevant LEED documentation.

How can costs be managed?

High-performance projects, whether buildings or infrastructure, do not necessarily have to cost more than those constructed using more traditional approaches. Indeed, cost premiums associated with 'building green' depend on a variety of factors, including the approach to design, the experience of design team members, and others. Research on the costs of high-performance buildings has shown that cost premiums can vary considerably and can even result in cost savings. Both the LEED and Envision processes and associated tools also provide assistance and structure to the decisions and actions required to be successful at managing what can be often complex issues, which, if used appropriately, can serve to manage project costs.

Soft costs for both standards include certification costs and consultant costs (e.g. modelling, third-party certification). See *Table 6* and *Table 7* below:

Table 6: Certification costs for LEED BD+C

	Specialist-Members BD+C Fees	Advocate/Non-Members BD+C Fees
Registration	$1,500	$1,900
Precertification	$1,500	$8,500
Certification	• <2,500m2 = $4,800 • 2,501 – 25,000m2 = $0.45/additional m2 • 25,001 – 150,000m2 = $0.13/additional m2 • >150,000 = $0.08/additional m2	• <2,500m2 = $6,500 • 2,501 – 25,000m2 = $1.15/additional m2 • 25,001 – 150,000m2 = $0.30/additional m2 • >150,000 = $0.20/additional m2

Table 7: Certification costs for the Envision standard

Project Size ($M)	Registration Fees	Verification Pathway A: Design + Post-Construction		Verification Pathway B: Post-Construction	
		Member	Non-Member	Member	Non-Member
$5M	$2,000	$12,000	$14,000	$9,000	$11,000
$5M – $25M	$2,000	$17,000	$20,000	$14,000	$17,000
$25M – $100M	$2,000	$26,000	$30,000	$21,000	$25,000
$100M – $250M	$2,000	$33,000	$39,000	$28,000	$34,000
$250M – $500M	$2,000	$41,000	$48,000	$35,000	$42,000
$500M – $1000M	$2,000	$48,000	$56,000	$42,000	$50,000
$1000M	$2,000	*Contact ISI* for a quote.			

Hard capital costs come from the inclusion of various equipment and technologies specific to the credit intents and specification of materials and products supportive of the requirements, and are largely dependant on the certification strategy selected for a given project. Other requirements such as energy or emissions reduction targets derived from requirements outside certification can often help to offset the cost of pursuing credits in isolation. The most cost-effective approach to certification is one that identifies the synergies between external or internal design drivers and connects them with Envision or LEED requirements to minimize the number of credits targeted exclusively for the purpose of certification.

What are the costs?

Accounting for the up-front soft and hard costs, total cost premiums for achieving LEED Gold have generally been found to fall between 0% and 4%, with an average premium of 2.9%. This is based on a synthesis of five different studies conducted from 2003 to 2019[1,2,3,4,5], which encompass 126 case study buildings (note potential for overlap) and four modelled archetypes (office, multifamily, school, fire/police). Over the life of the asset, these costs can be offset by reduced operating costs found through improved operational efficiencies.

Where cost premiums do exist, these are generally derived from: increased time and effort from architects and engineers, modelling exercises and reporting; construction time spent implementing green building features; and the need for specialized equipment and less-common materials.

While some of these costs are out of the direct control of the project team, many can be managed by bringing together key stakeholders early in the design process and employing an integrated design process (IDP), which offers numerous benefits including:

- Providing valuable insight into what materials will eventually be needed, allowing time to order specialty products;
- Reducing wasted time and materials;
- Maximizing resource efficiency through the design and construction periods; and
- Avoiding unnecessary design draft iterations.

Integrated Design Process

Utilizing an integrated design process is the preferred method of achieving high-performance, sustainable construction projects. Put simply, IDP involves getting all the parties that will be involved in a project together to collaborate right from the outset, compared to the more siloed approach typical of conventional design. Key information on employing an integrated design process is available through the following:

Institute for Sustainable Infrastructure – Envision v3: LD1.2 Foster Collaboration and Teamwork

US Green Building Council (USGBC) – LEED v4: Integrative Process Credit and Supporting Worksheets

Public Services and Procurement Canada (PSPC) – Integrated Design Process

BC Green Building Roundtable – Roadmap for the Integrated Design Process

American National Standards Institute (ANSI) – Integrative Process (IP) ANSI Consensus Guide 2.0 for Design and Construction of Sustainable Buildings and Communities

In general, the earlier *sustainable* design solutions are incorporated into the design process, the lower the cost premium. Projects that set goals early on are often those that achieve their intended outcomes at little to no added cost. Trying to achieve Gold as an afterthought is more likely to result in cost overruns and suboptimal systems.

Finally, it is important to note that sustainable building projects can also offer potential improvements for occupant health and productivity which, though sometimes difficult to quantify, are universally valued and contribute to cost savings. Including these factors can help to highlight the value of Gold certification as an investment, rather than an additional cost.

1 G. Kats, L. Alevantis, A. Berman, E. Mills & J. Perlman. (2003). The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force.

2 L.F. Matthiessen, P. Morris. (2004). Costing Green: A Comprehensive Cost Database and Budgeting Methodology.

3 Steven Winter Associates. (2004). LEED Cost Study: A Report Submitted to the US General Service Administration (GSA).

4 US Green Building Council (USGBC). (2006). Greening America's Schools: Costs & Benefits.

5 WSP for the City of Alexandria. (2019). Green Building Strategies Cost Analysis.

6.

Performance Requirements for Infrastructure

The following sections provide guidance for infrastructure projects only (i.e. projects that are comprised of one or more of the following components as per Section 3.1):

- Tankage
- Indoor Storage/Shop
- Outdoor Storage/Shop
- Indoor Equipment/Process
- Outdoor Equipment/Process
- Parking/Roads/Site scaping
- Dams
- Underground Linear Infrastructure (Excluding Pipelines)
- Public Parks and Open Space

Note that these performance requirements have been developed to align with the Priority Performance Objectives of Metro Vancouver's *Sustainable Infrastructure and Buildings Policy.*

6.1 Reduce Operational Energy Consumption

The consumed energy that is required to operate infrastructure accounts for a substantial portion of GHG emissions in Metro Vancouver. Emissions are mostly sourced from mechanical systems that burn fossil fuels (e.g. natural gas, fuel oil), and are typically higher for older systems and structures. The intent of this PPO is to reduce this energy consumption, and both reduces GHG emissions from infrastructure and helps manage escalating operating costs. GHG emissions for infrastructure may be offset (and therefore reduced) with energy generation on-site.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects where energy is consumed during the project lifetime are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following conditions are present: • Projects with a limited number of primary components where opportunities for energy savings are also limited.
EXEMPTIONS	
Projects that do not consume energy over the project lifetime or where there is no demonstrated opportunity to save energy are exempt from any requirements for this PPO	

Path A: Performance Requirements

The strategies below reference Envision RA2.1: Reduce Operational Energy Consumption at an Enhanced level of achievement (12 points)

All projects following Path A must follow Metro Vancouver's Energy & Greenhouse Gas Emissions Management Design Memo Requirements in undertaking the following steps:

01	**Establish a baseline** that will be used to demonstrate a percentage reduction in operational energy. The intent of the baseline is to represent a standard approach to construction under typical/current conditions and using standard industry practice. The baseline should be set using one or more of the following:

- Evaluation of existing conditions
- Comparison of viable alternatives
- Standard practice
- A comparable existing project

02	**Identify options for meeting the project requirements and compare to the baseline.**

03	**Estimate the annual energy consumption of the project during operations.** Energy consumption of the project includes:

- Energy consumption of the project includes energy purchased from the grid, energy generated on site, fuels used on site.
- Provide the estimated annual energy performance as part of the model and business case.

04	**Undertake a financial analysis to evaluate options:**

- Using the Metro Vancouver Business Case Standard Economic Assumptions Unit Conversions and Energy Prices, develop a life cycle net present value analysis for the options.
- The financial analysis should identify and include available financial incentives.
- Per the Metro Vancouver Carbon Price Policy, the financial analysis shall rely on the Metro Vancouver carbon price.

05	**Undertake an annual energy consumption analysis over the life of the project to demonstrate 30% reduction:**

- Options should be evaluated and selected to ultimately result in a project with a reduction of 30%, compared to the baseline operational energy consumption.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	Project Lead	Engage a dedicated Energy Modeller	Outline scope of project during the development of an RFP
Design	Design Team	Select a suitable baseline for the project	Definition of baseline
	Energy Modeller / Mechanical Engineer	Identify options to be compared to baseline	Energy consumption model and report
		Calculate baseline energy consumption	
		Estimate operational energy of options, and document energy reduction	
		Undertake a financial analysis	
		Make final design selections Calculate and report the operational energy consumption of the project	Design drawings and technical specifications.
Construction	No action required		
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Fulfill the requirements of Metro Vancouver's Energy & Greenhouse Gas Emissions Management Design Memo Requirements.** To demonstrate continuous improvement in energy and GHG emissions management, the Energy and GHG Emissions Management Design Memo should summarize the processes followed through the project design phases and the resulting design decisions. Provide one memo for each of the two design phases: Preliminary and Detailed Design. Design teams are encouraged to identify and document opportunities that go beyond these minimum requirements to meet the intent of Metro Vancouver's energy and GHG emissions management objectives.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	Project Lead	Engage with Metro Vancouver Project and Energy Management Staff	Include as discussion point in kick-off meeting
Design	Design Team	Identify baseline and options	Metro Vancouver Energy & Greenhouse Gas Emissions Management Design Memo (Part 1)
		Calculate operational energy for baseline and for options	
		Undertake a life cycle net present value analysis	
	Energy Modeller / Mechanical Engineer	Refine operational energy model and life cycle net present value analysis	Metro Vancouver Energy & Greenhouse Gas Emissions Management Design Memo (Part 2)
		Make final design selections Calculate and report the operational energy consumption of the project	Design drawings and technical specifications
Construction	No action required		
Closeout	Contractor and operators	Provide O&M documentation and training, per Metro Vancouver Energy & Greenhouse Gas Emissions Management Design Memo requirements	No deliverable

Pursuing Certification

Additional credits may be considered in line with the intent of the Reduce Operational Energy Consumption PPO. These credits represent opportunities available under the Envision rating system and additional points available for project teams pursuing certification:

CR1.2 Reduce Greenhouse Gas Emissions

This credit addresses greenhouse gas emissions during operations and the project's contribution in reducing the impacts of climate change. Greenhouse gases are factored according to their global warming potential (GWP), resulting in a CO_2 equivalency (CO_2e). All greenhouse gas emissions calculations should be quantified in tons of CO_2e. Unavoidable CO_2e emissions can be offset by carbon sequestration, in which CO_2 is removed from the atmosphere.

RA1.1 Support Sustainable Procurement Practices

This credit encourages choosing suppliers that incorporate sustainability into their policies and daily practices and operations. Project teams should give preference to suppliers that have taken into account the environmental, economic, and social impacts of their products and have active programs in place for performance improvement.

Additional Resources

Metro Vancouver – Energy and Greenhouse Gas Emissions Management Requirements

Metro Vancouver – Business Case Standard Economic Assumptions, Unit Conversions and Energy Pricing Memorandum

Considering future climate. Finding opportunities for reducing energy consumption can help improve resilience to climate change in a few ways. Reduced thermal energy demand can translate into improved thermal resilience, or the ability of a space to maintain comfortable indoor temperatures under a power outage. Well-designed spaces that make use of passive design strategies (e.g. natural ventilation, well-designed envelopes) are less dependent on mechanical systems to provide indoor comfort. Reducing operational energy consumption also reduces reliance on the grid, which in turn improves over regional and energy system resilience.

Project teams should make use of future climate projections in energy modelling and if feasible, undertake a sensitivity analysis to understand the impact of future load projections.

Key resources on this topic include:

Metro Vancouver – Climate Projections for Metro Vancouver

Environment & Climate Change Canada – Climate Data Canada

Prairie Climate Centre – Climate Atlas of Canada

BC Energy Step Code Design Guide and *Design Guide Supplement on Overheating & Air Quality*

6.2 Reduce Embodied Energy of Priority Construction Materials

While our understanding of how to reduce operational energy has improved in recent years, 'embodied energy' (and its contribution to climate change) often goes unaccounted for. Embodied energy refers to the energy consumed over the life of a construction material from its 'cradle to grave' (i.e. extraction through to disposal), and is best understood through a life-cycle assessment (LCA). Though embodied energy currently represents a relatively low proportion of an average project's total carbon footprint, it will move to the forefront as operational emissions and energy efficiency continue to improve. The intent of this PPO is to recognize the importance of embodied energy and reduce the environmental impacts of new construction materials used in Metro Vancouver projects.

There are many existing tools and environmental product declarations (EPDs) available from construction material manufacturers to support the assessment and improvement of embodied impacts in projects. Significant efforts are also underway by organizations including the World Green Building Council and Natural Resources Canada to standardize processes and centralize information regarding embodied energy.

Applicability

Path A **Performance Requirements**	Path B **Alternative Compliance Pathway**
All projects that make use or consume materials during construction and operation are expected to comply with the requirements of **Path A**.	Projects are permitted to follow Path B if the following conditions are present: • The availability of low carbon alternatives is limited in supply such that competitive bids are not possible • Projects with simple assemblies that can only be sourced from a handful of suppliers
EXEMPTIONS	
Projects where the consideration of embodied carbon is demonstrably unfeasible (e.g. major equipment design supply and install package where the material used is fixed for performance and durability requirements) are exempt from any requirements for this PPO.	

Path A: Performance Requirements

The strategies below reference CR1.1: Reduce Net Embodied Carbon at an Enhanced level of achievement (10 points)

All projects following Path A must meet the following requirements:

01 **Establish a baseline** that will be used to demonstrate a percentage reduction in total embodied carbon. The intent of the baseline is to represent a standard approach to construction under typical/current conditions and using standard industry practice. The baseline should be set using any one or more of the following:

- Evaluation of existing conditions
- Comparison of viable alternatives
- Standard practice
- A comparable existing project (e.g. of similar size, type, etc.)

02 **Identify materials that are primary contributors.** Under Envision v3 it is acceptable to identify the materials that contribute up to 80% of the embodied carbon. Often, large volume materials may constitute major contributions to the total embodied carbon of the project. Examples of such materials include structural materials, envelope/ enclosure materials, and interior/finish materials.

03 **Identify options for meeting the project requirements and compare to the baseline.**

04 **Calculate the total embodied carbon** for the primary contributors (identified above in step 02) including:

- Embodied carbon of production, including raw material extraction, refinement, and manufacture.
- Embodied carbon of transporting materials to the project site.
- The replacement, repair, or refurbishment of materials over the life of the project.

05 **Undertake a financial analysis to evaluate options.**

- Using the Metro Vancouver Business Case Standard Economic Assumptions Unit Conversions and Energy Prices, develop a life cycle net present value analysis for the options.
- The financial analysis should identify and include available financial incentives.
- Per the Metro Vancouver Carbon Price Policy, the financial analysis shall rely on the Metro Vancouver carbon price.

06 **Demonstrate a minimum 15% reduction in embodied carbon** over an appropriate project baseline using strategies such as:

- Sizing the project to require less material
- Designing the project to use less material
- Choosing materials that have lower embodied carbon
- Reducing material needed for repair and maintenance
- Reducing material waste during construction
- Reducing material waste during operation
- Sourcing local materials to reduce transportation emissions
- Utilizing lower-carbon transportation modes

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	Project Lead	Engage a dedicated LCA Specialist	Outline scope of project during the development of an RFP
Design	Architect / Structural Engineer	Consider viable alternative material choices for the project (e.g. wood)	Alternative Material Evaluation Report
	LCA Specialist	Identify the baseline and calculate baseline equivalent of the project	Report results as a section in the Life Cycle Analysis Comprehensive Report
	Architect / Structural Engineer	Identify and document the primary materials that make up over 80% of the total estimated carbon of the project	Embodied Carbon Registry Report
		Document strategies/plans to reduce net embodied carbon	Report results as a Design Basis to be included in the Design Drawings and Design Report
	LCA Specialist	Calculate reductions in embodied carbon achieved for the baseline and for identified options	Report results as a section in the Life Cycle Analysis Comprehensive Report
		Undertake a financial analysis	
Construction	No action required		
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Identify materials that are primary contributors.** It is recognized that the availability of data on carbon intensity of materials is evolving and that often the large volume materials may constitute major contributions to the total embodied carbon of the project. Examples of such materials include structural materials, envelope/ enclosure materials, and interior/ finish materials. Under Envision v3 it is acceptable to identify the materials that contribute up to 80% of the embodied carbon. This will usually be included within those items listed above.

02	**Identify opportunities for material reuse.** Identify any materials available from any on-site or available project sites for integration into the project design.

03	**Select products**. Review and identify available suppliers with proven disclosure of the environmental impacts of their materials. Demonstrate best effort in selecting materials that would reduce the overall embodied carbon of the project.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	No action required		
Design	*Design Team*	Identify and document the primary materials that make up over 80% of the total estimated carbon of the project	Embodied Carbon Registry Inventory / Report
		Review market for opportunities for materials reuse and integrate into the design	Update to Embodied Carbon Registry Inventory / Report Design Drawings and Detailed Specifications
		Where possible, review and select material with reduced embodied carbon	
Construction	No action required		
Closeout	No action required		

Pursuing Certification

Additional credits may be considered in line with the intent of the Reduce Embodied Energy of Priority Construction Materials PPO. These credits represent opportunities available under the Envision rating system and additional points available for project teams pursuing certification:

CR1.2 Reduce Greenhouse Gas Emissions

This credit addresses greenhouse gas emissions during operations and the project's contribution in reducing the impacts of climate change. Greenhouse gases are factored according to their global warming potential (GWP), resulting in a CO_2 equivalency (CO_2e). All greenhouse gas emissions calculations should be quantified in tons of CO_2e. Unavoidable CO_2e emissions can be offset by carbon sequestration, in which CO_2 is removed from the atmosphere.

Additional Resources

Athena Sustainable Materials Institute – Athena Impact Estimator (free LCA software)

Carbon Leadership Forum – EC3 Tool

International Standards Organization (ISO) – ISO 14044:2006 (Environmental Management – Life Cycle Assessment – Requirements & Guidelines)

International Standards Organization (ISO) – ISO 14064 Part 2: Specification with Guidance at the Project Level for Quantification, Monitoring, and Reporting of Greenhouse Gas Emission Reductions or Removal Enhancements

RA1.1 Support Sustainable Procurement Practices

This credit encourages choosing suppliers that incorporate sustainability into their policies and daily practices and operations. Project teams should give preference to suppliers that have taken into account the environmental, economic, and social impacts of their products and have active programs in place for performance improvement.

RA1.2 Use Recycled Materials

The purpose of this credit is to reduce the use of virgin natural resources and avoid sending useful materials to landfills. Using recycled, reused, and renewable materials and products, including existing structures and materials on site, reduces demand for virgin materials and the embodied carbon emissions and environmental degradation attributed to their extraction and processing.

RA1.4 Reduce Construction Waste

The goal of this credit is to reduce construction waste and divert waste streams from disposal to recycling and reuse. Project teams can improve performance by considering the ability of waste generated during construction to be recycled or beneficially reused

RA2.2 Reduce Construction Energy Consumption

This credit addresses the important need to reduce construction energy consumption. As construction energy use is closely linked to emissions, many actions in this credit address energy efficiency, energy reduction, renewable energy use, and reduced emissions

LD1.4 Pursue By-product Synergies

By-product synergies can be accomplished in two ways: finding opportunities for a project's excess resources to be beneficially reused off site, or incorporating off-site excess resources into the project.

LD2.4 Plan for End-of-Life

This credit considers the impacts associated with a project's end-of-life. Consideration should be given to extending the useful life of the project by enabling reconfiguration, future expansion, or flexibility, or by finding a beneficial use for the project. Designs should consider whether materials can be easily disassembled/deconstructed, recycled, or repurposed.

6.3 Reduce Lifecycle GHG Emissions

The comprehensive lifecycle GHG emissions of a project, or its 'embodied carbon footprint', is a product of the emissions associated with and energy used during all phases of its life. This includes extraction, transportation, refinement and processing of raw materials, as well as installation, ongoing operations, decommissioning, and eventual disposal. The intent of this PPO is to build on and strengthen measures to reduce operational energy consumption (as described in *Section 6.1* Reduce Operational Energy Consumption) and measures to reduce embodied energy of priority construction materials (as described in *Section 6.2* Reduce Embodied Energy of Priority Construction Materials).

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that consume energy and produce GHG emissions during the lifetime of the project are expected to comply with the requirements of **Path A.**	Projects are permitted to follow Path B if the following conditions are present: • The project scope has a limited number of primary components that limit the ability to reduce GHG emissions
EXEMPTIONS	
Projects that do not consume energy and produce GHG emissions through the operations are exempt from any requirements for this PPO	

Path A: Performance Requirements

The strategies below reference CR1.2: Reduce Greenhouse Gas Emissions at a Superior level of achievement (18 points).

All projects following Path A must follow Metro Vancouver's Energy & Greenhouse Gas Emissions Management Design Memo Requirements in undertaking the following steps:

01	**Establish and define a baseline** to demonstrate a percentage reduction in total greenhouse gas emissions. The intent of the baseline is to represent a standard approach to construction under typical/current conditions and using standard industry practice. The baseline should be set using any one or more of the following:

- Evaluation of existing conditions
- Comparison of viable alternatives
- Standard practice
- A comparable existing project

02	**Identify options for meeting the project requirements and compare to the baseline.**

03	**Calculate greenhouse gas emissions for the baseline** over a period equivalent to the operational life of the project (e.g. 25 years). This will build directly on information developed under 'Path A' for the Reduce Operational Energy Consumption PPO. Calculations include all sources of emissions and are classified in the following categories:

- Off-Site Energy Generation
- Stationary Fuel Combustion Emissions (non-vehicular combustion occurring at the facility intended for energy production)
- Operations Transportation Emissions
- Waste Emissions
- Wastewater Emissions
- Biomass Emissions
- Industrial Process Emissions
- Fugitive Emissions

04	**Undertake a financial analysis to evaluate options:**

- Using the Metro Vancouver Business Case Standard Economic Assumptions Unit Conversions and Energy Prices, develop a life cycle net present value analysis for the options.
- Per the Metro Vancouver Carbon Price Policy, the financial analysis shall rely on the Metro Vancouver carbon price.
- The financial analysis should identify and include available financial incentives.

05	**Demonstrate a minimum 50% reduction in greenhouse gas emissions** by submitting calculations for the following:

- The project's estimated annual greenhouse gas emissions over the life of the project.
- Calculations of the percentage reduction compared to the baseline used over the same period.
- The operational life of the project over which the calculations are made (e.g. 2025-2050).
- Demonstration of a minimum 50% reduction in greenhouse gas emissions over the baseline.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	Project Lead	Engage a dedicated GHG Specialist	Outline scope of project during the development of an RFP
Design	Project Lead	Develop boundaries for GHG calculations	Scope outline for GHG calculations
		Select a suitable baseline for the project	Definition of baseline
	GHG Specialist	Confirm and calculate baseline GHG emissions	GHG Emissions Model and Report
	Design Team	Identify and evaluate options to obtain a reduction of 50%, compared to the baseline GHG emissions	
	GHG Specialist	Calculate GHG emissions for the options	
	Design Team	Undertake a financial analysis	
	Design Team/ GHG Specialist	Make final design selections Calculate and report the annual greenhouse gas emissions of the project	Design drawings and technical specifications.
Construction	No action required		
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Fulfill the requirements of Metro Vancouver's Energy & Greenhouse Gas Emissions Management Design Memo Requirements.** To demonstrate continuous improvement in energy and GHG emissions management, the Energy and GHG Emissions Management Design Memo should summarize the processes followed through the project design phases and the resulting design decisions. Provide one memo for each of the two design phases: Preliminary and Detailed Design. Design teams are encouraged to identify and document opportunities that go beyond these minimum requirements to meet the intent of Metro Vancouver's energy and GHG emissions management objectives.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	Project Lead	Engage with Metro Vancouver Project and Energy Management Staff	Include as discussion point in kick-off meeting
Design	Design Team / Mechanical designer	Identify baseline and options	Metro Vancouver Energy & Greenhouse Gas Emissions Management Design Memo (Part 1)
		Calculate operational energy for baseline and for options	
		Undertake a life cycle net present value analysis	
		Refine operational energy model and life cycle net present value analysis	Metro Vancouver Energy & Greenhouse Gas Emissions Management Design Memo (Part 2)
		Make final design selections Calculate and report the operational energy consumption of the project	Design drawings and technical specifications
Construction	No action required		
Closeout	Contractor and operators	Provide O&M documentation and training, per Metro Vancouver Energy & Greenhouse Gas Emissions Management Design Memo requirements	No deliverable

Pursuing Certification

Additional credits may be considered in line with the intent of the Reduce Lifecycle GHG Emissions PPO. These credits represent opportunities available under the Envision rating system and additional points available for project teams pursuing certification:

RA2.1: Reduce Operational Energy Consumption

This credit addresses energy consumption during operations, and encourages reducing the consumption over the project lifetime. This is directly related to the GHG emissions associated with a project.

RA1.1 Support Sustainable Procurement Practices

This credit encourages choosing suppliers that incorporate sustainability into their policies and daily practices and operations. Project teams should give preference to suppliers that have taken into account the environmental, economic, and social impacts of their products and have active programs in place for performance improvement.

Additional Resources

Metro Vancouver – Energy and Greenhouse Gas Emissions Management Requirements

Metro Vancouver – Business Case Standard Economic Assumptions, Unit Conversions and Energy Pricing Memorandum

Athena Sustainable Materials Institute – Athena Impact Estimator (free LCA software)

International Standards Organization (ISO) – ISO 14044:2006 (Environmental Management – Life Cycle Assessment – Requirements & Guidelines)

International Standards Organization (ISO) – ISO 14064 Part 2: Specification with Guidance at the Project Level for Quantification, Monitoring, and Reporting of Greenhouse Gas Emission Reductions or Removal Enhancements

6.4 Generate or Recover Renewable Energy On Site

Achieving the GHG emissions reductions that we need will require switching from fossil fuels to clean, renewable energy that is replenished over days or years instead of lifetimes. Both new and existing projects can incorporate a variety of renewable energy sources on site to meet their energy needs, including solar photovoltaic, solar hot water, small-scale wind turbines, waste-to-energy and biomass combustion, among others. In addition to driving down emissions, these alternative power sources can also serve to protect the project from energy price volatility and reliance on the power grid, while reducing the energy that is wasted in transmission.

The intent of this PPO is to encourage and guide on-site energy generation that suits Metro Vancouver's variety of projects. Some factors that influence the viability of on-site renewables are project location, size, and structure, along with daily and seasonal load variations.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that consume energy during the lifetime of the project are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following conditions are present: • The project scope has a limited number of primary components or process systems, which limits the opportunities to generate or recover renewable energy on-site. • The project scope does not include modifications to the electrical systems, which limits the ability to connect and utilize renewable energy on-site.
EXEMPTIONS	
Projects that do not consume energy through the lifetime of the project are exempt from any requirements for this PPO	

Path A: Performance Requirements

The strategies below reference RA2.3: Use Renewable Energy at an Improved level of achievement (5 points).

All projects following Path A must follow Metro Vancouver's Energy & Greenhouse Gas Emissions Management Design Memo Requirements in undertaking the following steps:

01	**Estimate the annual energy consumption of the project during operations.** Energy consumption of the project includes energy purchased from the grid, energy generated on site, and fuels used on site. Provide the estimated annual energy performance as part of the model and business case. This will build directly on information developed under Path A for the Reduce Operational Energy Consumption PPO.

02	**Identify potential renewable energy options.** Undertake an analysis to identify potential renewable energy options (i.e. electricity and/or fuel). Renewable energy sources may include:

- Solar energy
- Wind
- Water
- Biomass
- Geothermal
- Hydrogen/fuel cells
- Renewable transportation fuel or electrical vehicles

03	**Undertake a financial analysis to evaluate options:**

- Using the Metro Vancouver Business Case Standard Economic Assumptions Unit Conversions and Energy Prices, develop a life cycle net present value analysis for the options.
- Per the Metro Vancouver Carbon Price Policy, the financial analysis shall rely on the Metro Vancouver carbon price.
- The financial analysis should identify and include available financial incentives.

04	**Demonstrate 5% of the project energy needs are provided from renewable sources.** Submit calculations for the following:

- The project's estimate annual energy consumption.
- Calculations of the percentage consumed by the project from renewable energy sources.
- The project's estimated annual renewable energy production.
- Demonstration of a minimum 5% consumption of renewable energy to meet the annual energy requirements for the project.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	Project Lead	Engage a dedicated GHG Specialist	Outline scope of project during the development of an RFP
Design	Energy Modeller / Mechanical Engineer	Identify potential renewable energy sources	Preliminary Renewable Energy Source Report
		Estimate operational energy of options, and document energy reduction	Energy consumption Model and Report
		Select and quantify of renewable energy sources	Renewable Energy Business Case Report
		Documentation of renewable energy production	
		Undertake a financial analysis	
		Make final design selections Calculate and report the renewable energy production for the project	Design drawings and technical specifications
Construction	No action required		
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Fulfill the requirements of Metro Vancouver's Energy & Greenhouse Gas Emissions Management Design Memo Requirements.** To demonstrate continuous improvement in energy and GHG emissions management, the Energy and GHG Emissions Management Design Memo should summarize the processes followed through the project design phases and the resulting design decisions. Provide one memo for each of the two design phases: Preliminary and Detailed Design. Design teams are encouraged to identify and document opportunities that go beyond these minimum requirements to meet the intent of Metro Vancouver's energy and GHG emissions management objectives.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	Project Lead	Engage with Metro Vancouver Project and Energy Management Staff	Include as discussion point in kick-off meeting
Design	Design Team / Mechanical designer	Identify baseline and options	Metro Vancouver Energy & Greenhouse Gas Emissions Management Design Memo (Part 1)
		Calculate operational energy for baseline and for options	
		Undertake a life cycle net present value analysis	
		Refine operational energy model and life cycle net present value analysis	Metro Vancouver Energy & Greenhouse Gas Emissions Management Design Memo (Part 2)
		Make final design selections Calculate and report the operational energy consumption of the project	Design drawings and technical specifications
Construction	No action required		
Closeout	Contractor and operators	Provide O&M documentation and training, per Metro Vancouver Energy & Greenhouse Gas Emissions Management Design Memo requirements	No deliverable

Pursuing Certification

Additional credits may be considered in line with the intent of the Generate or Recover Renewable Energy On Site PPO. These credits represent opportunities available under the Envision rating system and additional points available for project teams pursuing certification:

CR1.2 Reduce Greenhouse Gas Emissions

This credit addresses greenhouse gas emissions during operations and the project's contribution in reducing the impacts of climate change. Greenhouse gases are factored according to their global warming potential (GWP), resulting in a CO_2 equivalency (CO_2e). All greenhouse gas emissions calculations should be quantified in tons of CO_2e. Unavoidable CO_2e emissions can be offset by carbon sequestration, in which CO_2 is removed from the atmosphere.

Additional Resources

Metro Vancouver – Energy and Greenhouse Gas Emissions Management Requirements

Metro Vancouver – Business Case Standard Economic Assumptions, Unit Conversions and Energy Pricing Memorandum

British Columbia Sustainable Energy Association (BCSEA) – Renewable Energy in British Columbia

Clean Energy BC – Solar Photovoltaic Power

Natural Resources Canada (NRCan) – Photovoltaic Potential and Solar Resource Map

Natural Resources Canada (NRCan) – RETScreen

PVSyst – PVsyst Photovoltaic Software

Considering future climate. Generating on-site renewable energy helps improve project resilience by reducing reliance on the power grid. Power disruptions due to overloaded grids in the summer, storm events in the winter, and flooding year-round is projected to increase in frequency and severity, making an independent source of energy an advantage. Project teams should also explore low-carbon back-up power solutions to help improve resilience while keeping emissions low.

Helpful guidance on this topic can be found at the following links:

National Renewable Energy Laboratory – Distributed Energy Planning for Climate Resilience

US Climate Resilience Toolkit – Energy

Resilient Design Institute – Passive Survivability

Climate Central – Battery Energy Storage

6.5 Install Advanced Energy Metering

Energy metering is based on the fundamental principle that order to effectively manage building energy consumption, it must first be measured and understood. Comprehensive energy metering allows building operators to track energy consumption over time, identify variations between uses, and precisely calibrate operational parameters in response. This process can show gaps between projected and actual efficiency performance, a vital component of energy management, and can highlight opportunities to remedy poorly performing buildings, reduce wasted energy, and decrease costs. The intent of this PPO is to ensure that adequate metering and measurement systems are in place to facilitate ongoing tracking of energy usage.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
• All projects where energy is consumed during the project lifetime are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** the following conditions are present: • Projects with a limited instrumentation and controls scope, which limits the ability to install monitoring equipment on-site.
EXEMPTIONS	
Projects that do not consume energy over the project lifetime are exempt from any requirements for this PPO.	

Path A: Performance Requirements

The strategies below reference RA2.4: Commissioning & Monitor Energy Systems at a Superior level of achievement (12 points).

All projects following Path A must meet the following requirements:

01	**Design equipment and software management tools** to monitor system performance centrally and report on performance.
02	**Identify the energy consumption and generation sources of the project during operations.** Energy consumption of the project includes energy purchased from the grid, energy generated on site, fuels used on site. Energy generation sources may include renewable energy.
03	**Develop an Operations/Commissioning Plan** to identify initial commissioning activities as well as ongoing commissioning activities during the project lifetime. This would be undertaken by a third-party commissioning agent (may be internal or external to Metro Vancouver, but completely independent of the project).
04	**Demonstrate commissioning of energy systems totalling 90% of all energy consumed or generated for the project** with the third-party commissioning agent.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	Project Lead	Engage a dedicated Third-Party Commissioning Agent*	Outline scope of project during the development of an RFP
Design	Project Lead	Review centralized monitoring and reporting system already in place, to allow for integration with the project	Include as discussion point in kick-off meeting with designers
	Mechanical Engineer	Identify energy consumption and generation sources for the project, and identification of 90% of the energy consumption to be monitored	Energy Consumption Design Basis Report
	EI&C Engineer	Make final design selection for equipment and software that ties into centralized system. Report on the improved efficient operation of the system using the gathered information	Design drawings and technical specifications
	Third-Party Commissioning Agent*	Develop plan for initial and on-going monitoring and review of energy systems (to extend useful life) for the duration of the project	Commissioning plan for on-going review
Construction	Third-Party Commissioning Agent*	Initiate commissioning of energy systems illustrating that 90% of the energy consumed by the project is accounted for	Initial Commissioning / Monitoring Report of Energy Systems
		Develop commissioning log of issues	Commissioning log of issues
Closeout	Metro Vancouver Project Team OR Third-Party Commissioning Agent	Continue to monitor and review Commissioning Plan along with updates to commissioning log of issues on a regular interval (i.e. yearly)	Review and revisions to Commissioning Plan Updated Commissioning log of issues Updated Commissioning/ Monitoring Report of Energy Systems

* External or internal to Metro Vancouver, but independent to the project

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Identify the energy consumption and generation sources of the project during operations.** Energy consumption of the project includes energy purchased from the grid, energy generated on site, fuels used on site. Energy generation sources may include renewable energy.

02	**Provide rationale summarizing why energy metering is will not be undertaken for the project** noting relevant limitations.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	No action required		
Design	Project Lead	Review centralized monitoring and reporting system already in place, to allow for integration with the project	Include as discussion point in kick-off meeting with Design Team
	Mechanical Engineer	Identify energy consumption and generation sources for the project	Energy Consumption Design Basis Report
	Metro Vancouver Project Team	Provide rationale for challenges with metering energy consumption – this may require input from an EI&C Engineer	Energy Metering Rationale Memorandum
Construction	No action required		
Closeout	No action required		

Pursuing Certification

Additional credits may be considered in line with the intent of the Install Advanced Energy Metering PPO. These credits represent opportunities available under the Envision rating system and additional points available for project teams pursuing certification:

RA2.1: Reduce Operational Energy Consumption

This credit addresses energy consumption during operations, and encourages reducing the consumption over the project lifetime. This is directly related to the GHG emissions associated with a project.

Additional Resources

Metro Vancouver – Energy and Greenhouse Gas Emissions Management Requirements

Metro Vancouver – Business Case Standard Economic Assumptions, Unit Conversions and Energy Pricing Memorandum

Efficiency Valuation Organization (EVO) – International Performance Measurement and Verification Protocol (IPMVP)

US Environmental Protection Agency (EPA) – ENERGY STAR Portfolio Manager Technical Reference Manual

6.6 Facilitate Access to Low-Carbon & Active Transportation

Metro Vancouver's transportation system serves the many needs of the region, but also contributes almost 45% of regional GHG emissions. Of this, the majority come from single-occupancy vehicles powered by fossil fuels. The intent of this PPO is to reduce the environmental impact associated with the transportation of staff and visitors to a completed project by encouraging the uptake of non-combustion vehicles (i.e. electric- or hydrogen-powered vehicles), active transportation (e.g. bicycles, scooters, wheelchairs) and higher density modes of transportation (i.e. carpooling and mass transit).

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that impact access and mobility as part of the project scope are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following conditions are present: • Projects with an existing site or limited new location options. • Projects with limited public access to site • Projects where use of the facility does not lend itself to active or public transit
EXEMPTIONS	
Projects that do not have the opportunity to either select sites with good active, shared, or mass transit connectivity, or to carry out public consultation and community engagement are exempt from any requirements for this PPO.	

Path A: Performance Requirements

The strategies below reference:
QL2.1: Improve Community Mobility & Access at an Improved level of achievement (1 point); and
QL2.2: Encourage Sustainable Transportation at an Enhanced Level of achievement (5 points).

All projects following Path A must meet the following requirements:

01	**Ensure consistency with local transportation plan**. In evaluating siting options for a project, and as part of confirmation of the preferred project site, project teams must:

- Review Metro Vancouver and local Transportation Plans as they relate to the following:
  - Parking stalls
  - Congestion reduction
  - Proximity of infrastructure to transit
  - Electric charging stations
  - Bike parking stalls
- Undertake community engagement to obtain feedback/input from stakeholders and members at large.
  - Confirm that the local Transportation Plan resonates with local residents

02	**Improve mobility through integration with connected network.** In evaluating siting options for a project, and as part of confirmation of the preferred project site, project teams must:

- Undertake a transportation planning study aimed at improving transportation and mobility efficiency, and outlining key implementation measures or strategies, including:
  - Reduced congestion
  - Improved traffic flow
  - Improved community livability and access

03	**Demonstrate proximity to active, shared, or mass transit.** In evaluating siting options for a project, and as part of confirmation of the preferred project site:

- Develop a map showing pedestrian proximity and accessibility to active transportation using a 10-minute walking radius.

04	**Increase the use of active, shared, or mass transit.** In evaluating siting options for a project, and as part of confirmation of the preferred project site:

- Identify possible gaps in active (cycling and walking), shared (carpooling), or mass transit (bus) routes that may impact connectivity to community.
- Identify options for the project to encourage transit, including but not limited to focussing on the following:
  - Walking score
  - Parking restrictions
  - Extension of trails, bike paths, walkways, etc.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	Project Lead	Engage a dedicated Engagement Specialist and Transportation Planner	Outline scope of project during the development of an RFP
Design	Project Lead	Complete evaluation of options for siting the project	Siting Options Memorandum
		Identify the existing transportation plans	Report results as part of the Siting Options Memorandum
	Engagement Specialist	Initiate public engagement	Public Engagement Plan
	Transportation Planner	Transportation map to be developed by Civil Transportation designer	Transportation Map
		Transportation planning study to be developed by Civil Transportation designer	Transportation Planning Study
		Tie-in inclusion of active transportation options into the design of the project	Results to be recorded in the Transportation Planning Study and incorporated into Design Drawings
Construction	No action required		
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Improve staff mobility to and from the project site.** Undertake a staff survey to establish demand for cycling and parking infrastructure at the project site. The survey results will then be used to inform transportation infrastructure specific for the project.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	No action required		
Design	Project Lead	Distribute staff survey to confirm demand for cycling and parking infrastructure at the project site.	Report results in a Staff Survey Memorandum
		Use staff results to inform transportation infrastructure (car/cycling) at the project site	Design Basis Memorandum
	Civil Engineer	Incorporate parking/cycling infrastructure into project site	Design drawings
Construction	No action required		
Closeout	No action required		

Pursuing Certification

Additional credits may be considered in line with the intent of the Facilitate Access to Low-Carbon & Active Transportation PPO. These credits represent opportunities available under the Envision rating system and additional points available for project teams pursuing certification:

QL2.3 Improve Access and Wayfinding

The intent of this credit is to promote safe access to site and navigation around the area by all users.

CR2.6 Improve Infrastructure Integration

This credit focuses on integration of a project with the community's network to maximize resilience in the community.

Additional Resources

Local transportation plan (as applicable)

TransLink – Trip Planner & Schedule Database

TransLink – Metro Vancouver Cycling Maps

City of Vancouver – Bicycle Parking Strategy

HUB Cycling – Not Just Bike Racks - Informing Design for End of Trip Cycling Amenities in Vancouver Real Estate

City of Toronto – Electric Vehicles

City of Vancouver – Electric Vehicles

Considering future climate. Low-carbon and active transportation opportunities can be made more resilient by ensuring sufficient safeguard measures against extreme weather events are in place. Project teams should provide adequate shading and drinking water infrastructure at transit stops for summer months, as well as appropriate measures to protect access to transit during heavy rainfall/snowfall events. Electric vehicle infrastructure can also be designed to allow bi-directional charging, allowing electric vehicles to be used as batteries for key services under power outages.

Useful resources to consider include:

BC Healthy Communities Society – Active Transportation

GreenCare – Active & Clean Transportation

Rand Corporation – Incorporating Resilience into Transportation Planning & Assessment

US Federal Transit Administration (FTA) – Bus Exportable Power Supply (BEPS) System Use Strategy

6.7 Use Reclaimed or Recycled Materials in Construction

New construction materials, especially those that are unable to be recycled, can consume large amounts of natural resources throughout their lifespan. Their production and distribution are responsible for both resource depletion and environmental impacts, while their eventual disposal after demolishment create significant quantities of waste. The intent of this PPO is to reduce the environmental impact of construction projects by encouraging the use of reclaimed materials (e.g. historical façades, timber from existing structures) and those with recycled content (e.g. concrete that incorporates crushed glass or wood chips).

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that make use or consume materials during construction are expected to comply with the requirements of **Path A.**	Projects are permitted to follow **Path B** if the following conditions are present: • Projects with simple assemblies that can only be sourced from a handful of suppliers.
EXEMPTIONS	
Projects in which materials are not consumed or used during construction (e.g. planning studies) are exempt from any requirements for this PPO.	

Path A: Performance Requirements

All projects following Path A must meet the following requirements:

01	**Develop a material inventory** of recycled content that may be used on the project:
	• Recycled material is defined per ISO 14021, defined based on a material being diverted from a waste stream. • Plants, soil, rock, and water are not included in this evaluation. • Recycled material or structures may also include existing material already on-site or repurposed from another site.
02	**Estimate the total material used for the project.** Establish the total quantity of material or structures use for the project to demonstrate a percentage from the total material used.
03	**Undertake a material evaluation to demonstrate 25% use of material for the project from recycled sources.** Options must be evaluated and selected to ultimately result in 25% of material classified as reused or recycled. Percentage calculations may be completed on the basis of cost, weight, or volume of material. For simplicity, mechanical and electrical equipment (specified based on efficiency) may be excluded from the calculation.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	Project Lead	Engage a dedicated Structural Engineer	Outline scope of project during the development of an RFP
Design	Project Lead / Design Team	Identify possible materials available to the project that may be re-purposed or re-used for the project	Inventory of Potentially Reusable Material
	Structural Engineer *	Calculate total amount of materials is structures for the project	Options Evaluation Memorandum for Recycled / Reused Material
		Identify and evaluate options for using material or structures containing recycled content or reusing existing material available for the project	Options Evaluation Memorandum for Recycled / Reused Material
		Make final design selections Calculate and report the reused or recycled material for the project	Design drawings and technical specifications
Construction	Structural Engineer *	Confirm that design intent is met during construction, with no changes to total percentage of material or structures that are classified as reused or recycled. This may include rejecting proposed alternates from the contractor	No deliverable
Closeout	No action required		

* With support from the rest of the Design Team

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Develop a material inventory** of recycled content that may be used on the project:
	• Recycled material is defined per ISO 14021, defined based on a material being diverted from a waste stream. • Recycled material or structures may also include existing material already on-site or repurposed from another site. • Plants, soil, rock, and water are not included in this evaluation.
02	**Undertake an options evaluation** for evaluating and selecting recycled material or structures**.**
03	**Provide a rationale summarizing why the use of recycled or reused material for the project is limited**.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	No action required		
Design	Project Lead	Identify possible materials available to the project that may be re-purposed or re-used for the project	Inventory of Potentially Reusable Material
	Structural Engineer*	Identify and evaluate options for using material or structures containing recycled content or reusing existing material available for the project.	Options Evaluation Memorandum for Recycled/Reused Material
	Metro Vancouver Project Team	Write up rationale explaining how the use of recycled or reused material for the project is not possible	Recycled/Reused Material Rationale Memorandum
Construction	No action required		
Closeout	No action required		

* With support from the rest of the Design Team

Pursuing Certification

Additional credits may be considered in line with the intent of the Use Reclaimed or Recycled Materials in Construction PPO. These credits represent opportunities available under the Envision rating system and additional points available for project teams pursuing certification:

RA1.1 Support Sustainable Procurement Practices

This credit encourages choosing suppliers that incorporate sustainability into their policies and daily practices and operations. Project teams should give preference to suppliers that have taken into account the environmental, economic, and social impacts of their products and have active programs in place for performance improvement.

RA1.4 Reduce Construction Waste

The goal of this credit is to reduce construction waste and divert waste streams from disposal to recycling and reuse. Project teams can improve performance by considering the ability of waste generated during construction to be recycled or beneficially reused

RA1.5 Balance Earthwork on Site

The goal of this credit is to reduce the quantity of soils or excavated material that are kept on site, in place of hauling or transporting the material off site. There is recognition that moving material off-site may result in social and environmental impacts, with the hopes of reducing these impacts.

RA2.2 Reduce Construction Energy Consumption

This credit addresses the important need to reduce construction energy consumption. As construction energy use is closely linked to emissions, many actions in this credit address energy efficiency, energy reduction, renewable energy use, and reduced emissions

LD1.4 Pursue By-product Synergies

By-product synergies can be accomplished in two ways: finding opportunities for a project's excess resources to be beneficially reused off site, or incorporating off-site excess resources into the project.

Additional Resources

International Living Future Institute (ILFI) – Declare Product Database

International Living Future Institute (ILFI) – Living Building Challenge: Materials Petal Intent

International Standards Organization (ISO) – ISO 14021: Environmental Labels & Declarations

Mindful MATERIALS – Mindful MATERIALS Library

UL Environment – SPOT

Vertima – Certified Products Directory

6.8 Divert Construction & Demolition Waste from Landfills

Construction and demolition waste represent a significant portion of the waste produced in Metro Vancouver, with much of it (e.g. wood, glass, plastics, and metals) being recyclable. The intent of this PPO is to ensure that that these products are managed properly instead of being sent to the landfill or incinerator, reducing the project's embodied emissions and overall impact on the environment.

A well-designed and well-executed construction waste management plan is essential to ensure that materials are handled correctly. Planning for construction waste management early in the process can make it easier to coordinate with local handlers for different material streams, and can highlight opportunities to lessen tipping fees and generate income by selling valuable scrap materials. Properly applied, these steps will help the region to transition to a more circular economy, where valuable materials are kept in active use over time.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects are expected to comply with the requirements of **Path A**.	There is no **Path B** for this PPO.
EXEMPTIONS	
Projects for which there is no construction phase are exempt from any requirements for this PPO.	

Path A: Performance Requirements

The strategies below reference RA1.4: Reduce Construction Waste at a Superior level of achievement (10 points).

All projects following Path A must meet the following requirements:

01	**Develop a Construction Waste Management Plan** with a plan and inventory to divert waste from construction activities from disposal at landfills.

• Diversion methods include: - Waste reduction - Reuse or recycle materials on site - Materials sent to recycling or reclamation facilities - Materials sent to manufacturers to be used post-consumer recycled content - Materials composted on site or sent to a composting facility - The use of material, if appropriate, as infill	• Unacceptable means of diversion include: - Burying waste material unsuited for infill

02	**Develop an inventory of all waste materials.** The inventory is to include a categorization of all waste materials produced on site.

03	**Estimate the total waste produced on site for the project.** Establish the total quantity of waste generated by the project to demonstrate a percentage from the total waste produced on site.

04	**Undertake a diversion evaluation to demonstrate 75% of waste material to be diverted from the landfill for the project.** Options should be evaluated and selected to ultimately results in a project with 75% of material diverted from the landfill. Calculations may be based on weight or volume percentage of total waste material produced on site. Hazardous waste material requires safe and appropriate disposal, and is therefore excluded from the calculation.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	No action required		
Design	Design Team	Require Contractor to submit Construction Waste Management Plan, detailing the percentage of material that is to be diverted from landfill	Technical Specifications
Construction	Contractor	Develop a Construction Waste Management Plan	Construction Waste Management Plan
		Develop an inventory and categorization of waste material to be diverted from landfill	Construction Waste Management Plan
		Estimate total waste material generated on site	Construction Waste Management Plan
		Make final selections. Calculate and report percentage of waste material diverted from landfill	Construction Waste Management Plan
Closeout	No action required		

Path B: Alternative Compliance

Not applicable for this PPO.

Pursuing Certification

Additional credits may be considered in line with the intent of the Divert Construction & Demolition Waste from Landfills PPO. These credits represent opportunities available under the Envision rating system and additional points available for project teams pursuing certification:

RA1.1 Support Sustainable Procurement Practices

This credit encourages choosing suppliers that incorporate sustainability into their policies and daily practices and operations. Project teams should give preference to suppliers that have taken into account the environmental, economic, and social impacts of their products and have active programs in place for performance improvement.

LD1.4 Pursue By-product Synergies

By-product synergies can be accomplished in two ways: finding opportunities for a project's excess resources to be beneficially reused off site, or incorporating off-site excess resources into the project.

Additional Resources

Metro Vancouver – Integrated Solid Waste and Resource Management

International Living Future Institute (ILFI) – Living Building Challenge - Materials Petal Intent

Province of Manitoba – Construction, Renovation and Demolition Waste Management Guideline

Recycling Certification Institute (RCI) – Certification of Sustainable Recyclers

City of Toronto – Long Term Waste Management Strategy

6.9 Reduce Potable Water Use & Overall Water Use

Metro Vancouver provides clean, safe drinking water through its member municipalities for 2.6 million residents across the region. Ensuring this service involves a complex network of watersheds, dams, treatment facilities, reservoirs, pump stations and water mains, along with rigorous treatment and testing. Though we have relatively abundant water supplies, these are facing mounting pressure – we are witnessing continued drawdown of aquifers and lowered reservoir levels, issues that will only be exacerbated by climate change and steady population growth. The intent of this PPO is to limit the use of potable water for purposes other than drinking, and to promote more sustainable water use patterns overall.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects where water is consumed during the project lifetime are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** the following conditions are present: • Limited irrigation or indoor plumbing fixtures that limit opportunities for water use reductions
EXEMPTIONS	
Projects that do not consume water over the project lifetime are exempt from any requirements for this PPO	

Path A: Performance Requirements

The strategies below reference RA3.2: Reduce Operational Water Consumption at an Improved level of achievement (4 points).

All projects following Path A must meet the following requirements:

01	**Establish a baseline** for potable water use and overall water use (including non-potable water) that will be used to demonstrate a percentage reduction in potable water use. The intent of the baseline is to represent a standard approach to construction under typical/current conditions and using standard industry practice. The baseline should be set using one or more of the following:
	• Evaluation of existing conditions • Comparison of viable alternatives • Standard practice • A comparable existing project

02	**Identify strategies for reducing water use (potable and non-potable) for the project during operations.** Strategies may include the use or treatment of non-potable water, reused water, recycled water, and/or stormwater.

03	**Undertake a water consumption analysis over the life of the project to demonstrate 25% reduction of potable water use.** Options should be evaluated and selected to ultimately result in a project with a reduction of 25%, compared to the baseline potable water use.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	Project Lead	Engage a dedicated Mechanical Engineer	Outline scope of project during the development of an RFP
Design	Mechanical Engineer	Select a suitable baseline project.	Definition of baseline
		Calculate baseline water consumption	Water Consumption Analysis Report
		Develop strategies for reducing overall water use	
		Document water use reduction	
		Make final design selections. Calculate and report the operational water consumption of the project.	Design drawings and technical specifications.
Construction	No action required		
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Demonstrate alignment with the 'We Love Water' campaign** including measures that may be implemented.

02	**Estimate the water consumed by the project during operations.** Water consumption of the project includes overall water use (i.e. both potable and non-potable).

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	Project Lead	Review and establish approach to align with Metro Vancouver's 'We Love Water Campaign'	Include as discussion point in kick-off meeting with design team
Design	Mechanical Engineer	Calculation of baseline water consumption	Water Consumption Analysis Report
	Metro Vancouver Project Team	Write up rationale explaining why the reduction of water use for the project is not possible	Water Use Memorandum
Construction	No action required		
Closeout	No action required		

Pursuing Certification

Additional credits may be considered in line with the intent of the Reduce Potable Water Use & Overall Water Use PPO. These credits represent opportunities available under the Envision rating system and additional points available for project teams pursuing certification:

RA3.1 Preserve Water Resources

This credit focuses on project's impact of water use in the context of the watershed. Specific measures are implemented to increase opportunity for improved impact on the watershed.

RA3.3 Reduction Construction Water Consumption

The goal of this credit is to reduce the quantity of potable water use during the construction phase of a project. This is measured through the number of strategies that are implemented by the contractor.

RA3.4 Monitor Water Systems

This credit focuses on identifying opportunities and implementing monitoring systems for water consumption, with the goal of understanding and improving water use.

Additional Resources

Metro Vancouver – Drinking Water Management Plan

Metro Vancouver – Drinking Water Conservation Plan

Metro Vancouver – We Love Water Campaign

International Living Future Institute (ILFI) – Living Building Challenge: Water Petal Intent

City of Toronto – Water Efficient Landscaping

City of Vancouver – Becoming a Water Wise City

City of Vancouver – Rainwater Management Bulletin

US Environmental Protection Agency (EPA) – WaterSense Calculator

Considering future climate. Reduced water supply as a result of reduced snowpack and hotter, drier summers strain supplies during times of year when demand is the greatest. Project teams should make use of future climate projections as a way of understanding future potential drought risk to building water supply and landscaping needs, and identify suitable design strategies to ensure water conservation both now and in the future.

Key resources include:

Metro Vancouver – Drinking Water Management Plan

Metro Vancouver – Drinking Water Conservation Plan

Province of BC – Drought Response Plan

Province of BC – Drought Information Portal

6.10 Minimize the Impact on Stormwater Runoff Quantity, Rate & Quality

There is a growing need to consider the impact that building and infrastructure projects can have on the hydrological cycle, especially stormwater runoff. Metro Vancouver's population is growing, hard surface areas are increasing, and climate change is increasing the frequency and severity of extreme precipitation events. If not properly managed, stormwater can lead to serious environmental impacts including erosion, downstream flooding, and the introduction of harmful sediments and pollutants into sensitive ecosystems. Scaling up grey infrastructure to meet these challenges is a time-intensive and costly endeavour and there may be opportunities on-site to leverage natural assets such as creeks, wetlands, and greenspace to enhance site drainage. The intent of this PPO is to guide the development of an on-site stormwater management plan that emphasizes green infrastructure and low-impact development strategies, while also creating more natural areas, reducing the heat island effect, and providing opportunities for cost savings.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that are expected to impact stormwater runoff are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects with a limited control of site landscaping and 'green infrastructure' where the opportunity for reducing stormwater runoff is limited.
EXEMPTIONS	
Projects that are completely indoors and do not impact stormwater are exempt from any requirements for this PPO	

Path A: Performance Requirements

The strategies below reference NW2.2: Manage Stormwater at an Improved level of achievement (2 points).

All projects following Path A must meet the following requirements:

01	**Develop a Stormwater Management Strategy.** Undertake an analysis and develop site plan drawings. Options should be evaluated and selected to ultimately result in a project that stores and treats 100% of the 85th percentile local 24-hour event. Metro Vancouver IDF curves (using rain relevant rain gauges or the relevant rainfall study and climate projections), together with municipality-specific IDF curves (the latter which may be more stringent) shall be utilized for design flow calculations.

02	**Limit stormwater runoff during construction and operations.** Undertake and analysis (calculations) and develop site plan drawings illustrating how stormwater runoff will be limited. Options should be evaluated and selected to ultimately result in a project that does not exceed the runoff rate associated with a 2-year 24-hr rainfall event.

03	**Develop an erosion, sedimentation, and pollutant control plan.** Identify and implement any available measures which reduces peak stormwater runoff quantities.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	Project Lead	Engage a dedicated Site Civil Engineer and Landscape Architect	Outline scope of project during the development of an RFP
Design	Site civil engineer / landscape architect	Develop stormwater management plan for the site, including identification of options for storing and treating stormwater	Stormwater Management Plan
		Calculate the 85th percentile local 24-hour event Calculate the quantity of runoff for the 2-year 24-hour rainfall event	Stormwater quantity calculations Site plan drawings illustrating stormwater runoff patterns
		Make final design selections Calculate and report the limit of the runoff rate, and the storage / treatment of stormwater	Design drawings and technical specifications
Construction	Contractor	Complete erosion, sedimentation, and pollutant control plan	Erosion, sedimentation, and pollutant control plan
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Develop a Stormwater Management Strategy.** Undertake an analysis and develop site plan drawings that recognizes the following attributes: • Landscape and native soils locations for infiltration. • Locations and opportunities for stormwater management infrastructure.
02	**Develop an erosion, sedimentation, and pollutant control plan.** Identify and implement any available measures which reduces peak post-development stormwater runoff quantities. Detail specific barriers to further developing stormwater infrastructure.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	No action required		
Design	Project Lead / Landscape Architect	Develop stormwater strategy	Preliminary report detailing locations for stormwater management infrastructure
	Project Lead / Landscape Architect	Develop stormwater management strategy	Comprehensive report detailing runoff rates, infiltration opportunities, and locations for stormwater management infrastructure
		Make final design selections Calculate and report the limit of the runoff rate, and the storage / treatment of stormwater	Design drawings and technical specifications
	Project Lead	Detail limitation to stormwater management	Brief report identifying stormwater management limitations
Construction	Contractor	Complete erosion, sedimentation, and pollutant control plan	Erosion, sedimentation, and pollutant control plan
Closeout	No action required		

Pursuing Certification

Additional credits may be considered in line with the intent of the Minimize the Impact on Stormwater Runoff Quantity, Rate, & Quality PPO. These credits represent opportunities available under the Envision rating system and additional points available for project teams pursuing certification:

RA3.3 Reduction Construction Water Consumption

The goal of this credit is to reduce the quantity of potable water use during the construction phase of a project. This is measured through the number of strategies that are implemented by the contractor.

NW 1.2 Provide Wetland & Surface Water Buffers

The goal of this credit is to support natural buffer zones around wetlands, shorelines, and waterbodies. This is measured through the types of buffers implemented.

Additional Resources

Erosion & Sediment Control Association of British Columbia (ESCA BC) – ESC Best Management Practices

International Living Future Institute (ILFI) – Living Building Challenge: Water Petal Intent

City of Vancouver – Citywide Integrated Stormwater Management Plan

City of Vancouver – Integrated Stormwater Management Vision, Principles & Actions

City of Vancouver – Integrated Stormwater Management Best Practice Toolkit

Considering future climate. Metro Vancouver already uses IDF curves to assess the impact of future runoff events. However, there are also opportunities to address the impact of storm and flood events on building sites and infrastructure themselves. While urban flooding from periods of extreme rainfall can cause immediate and long-term damage, these impacts can be addressed using careful site selection, structural and site drainage design decisions, prioritizing green infrastructure, the strategic location of key mechanical systems above grade, and careful materials selection.

Key resources include:

Metro Vancouver – Climate Projections for Metro Vancouver

Metro Vancouver – Template for Integrated Stormwater Management Planning

Province of BC – Stormwater Planning Guidebook

6.11 Select Site to Protect Sensitive Ecosystems & Preserve/Enhance Habitat Function

The region's rich and varied natural spaces perform critical functions called ecosystem services that capture and store carbon, clean the air and water, cool our city streets, and protect us from hazards, among others. However, pressure from human development is causing many of these areas to be lost or to change in function, which will have resounding impacts on the health and resilience of our communities. Metro Vancouver monitors and reports on the status of sensitive ecosystems through a number of plans, including *Metro 2040*, the *Ecological Health Framework*, and the *Natural Resource Management Framework*. In alignment with these initiatives, the intent of this PPO is guide projects that carefully consider sensitive ecosystems on site include measures to preserve and enhance the natural functions of these areas.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that are sited on new and/or undeveloped areas are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects with limited control of siting or landscaping areas, and where preserving or adding greenspace will be difficult • Projects where additional greenspace will compromise the ability to meet the project requirements or objectives (e.g. parking lots, works yards, etc.)
EXEMPTIONS	
Projects where the location is pre-determined and cannot be modified are exempt from any requirements for this PPO	

Path A: Performance Requirements

The strategies below reference NW1.1: Preserve Site of High Ecological Value at a Superior level of achievement (12 points).

All projects following Path A must meet the following requirements:

01	**Identify areas of high ecological value.** Undertake an analysis to identify and develop registry for areas of high ecological values (i.e. related to biodiversity, ecosystem function, etc.) near the project site.
02	**Avoid disturbance to site.** Develop documentations illustrating complete avoidance of and disturbance to area of high ecological value for project. Avoidance here refers to the preservation of existing habitat.
03	**Implement protective measures during construction.** Require the contractor to completely protect/avoid areas of high ecological value during the construction phase of the project.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	Project Lead	Engage a dedicated Environmental Scientist	Outline scope of project during the development of an RFP
	Environmental Scientist	Identify areas of high ecological value in the proximity of the project	Index of high ecological value areas in close proximity to the project
Design	Metro Vancouver Design Team	Develop options for project siting, illustrating avoidance of disturbance to areas of high ecological value	Drawing illustrating siting options.
Construction	Contractor	Implement measures to protect /avoid areas of high ecological value	Construction Management Plan and Standard Operating Procedures
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Identify areas of high ecological value.** Undertake an analysis to identify and develop registry for areas of high ecological values near the project site.

02	**Implement mitigation measures.** Provide rationale for why avoidance of siting project in area of high ecological value is not possible. Identify and stipulate mitigation measures or strategies to be implemented.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	Project Lead	Engage a dedicated Environmental Scientist	Outline scope of project during the development of an RFP
	Environmental Scientist	Identify areas of high ecological value in the proximity of the project	Index of high ecological value areas in close proximity to the project
Design	Environmental Scientist	Develop mitigation measures to be implemented for minimizing disturbance to areas of high ecological value, included as part of Environmental Management Plan	Mitigation Plan detailed in Environmental Management Plan
Construction	Contractor	Implement measures to mitigate for disturbance to areas of high ecological value	Construction Management Plan and Standard Operating Procedures
Closeout	No action required		

Pursuing Certification

Additional credits may be considered in line with the intent of the Select Site to Protect Sensitive Ecosystems & Preserve/Enhance Habitat Function PPO. These credits represent opportunities available under the Envision rating system and additional points available for project teams pursuing certification:

NW 1.4 Preserve Undeveloped Land

The goal of this credit is to avoid locating projects on undeveloped land, and rather use already developed land for siting a project.

NW 3.1 Enhance Functional Habitats

The goal of this credit is to enhance the ecological terrestrial habitat / ecosystem. This credit is measured through the quantity of ecosystem functions that are preserved or enhanced.

NW 3.2 Enhance Wetland & Surface Water Functions

The goal of this credit is to enhance the ecological water habitat / ecosystem. This credit is measured through the quantity of ecosystem functions that are preserved or enhanced.

NW 3.3 Maintain Floodplain Functions

The goal of this credit is to avoid locating projects on floodplain, and rather to preserve the functions of those floodplains. This is measure through the extent to which the project avoids or minimizes impacts to the floodplain.

Additional Resources

The Sustainable Sites Initiative (SITES)

US Environmental Protection Agency (EPA) – Ecoregions

Fraser Basin Council – Salmon Safe Certification

Considering future climate. Changes in climate will bring with them changes to ecosystem makeup and distribution as well. In evaluating options to preserve or enhance sensitive ecosystems, project teams should consider how any potential harmful impacts to local ecosystems may increase as a result of climate change, potentially increasing its overall sensitivity. Where selecting plant species for the site, consider how a warmer climate might impact their overall suitability into the future. Project teams may also wish to consider how natural assets such as mature trees, creeks, and wetlands can be retained, restored, and enhanced to provide ecosystem services.

Metro Vancouver offers several useful tools on this topic:

Metro Vancouver – Urban Forest Climate Adaptation Initiative

Metro Vancouver – Tree Species Selection Database

Metro Vancouver – Urban Tree List for Metro Vancouver in a Changing Climate

6.12 Develop & Implement an Invasive Species Management Plan

Invasive species are non-native plants and animals that cause environmental harm in areas where they are introduced. Without natural checks in place, they can quickly dominate a new region by outcompeting existing species for nutrients, light, physical space, water or food. Invasive species can have far reaching environmental, economic and social impacts, such as reducing soil productivity, causing crop losses, and causing the loss of traditional food and medicinal plants. Invasive species are introduced and spread in a number of ways, many of them unintentional, and major construction projects are a primary culprit. Metro Vancouver, in collaboration with the Invasive Species Council of Metro Vancouver and member jurisdictions, as been working to develop and implement best practise for managing existing invasive species and preventing future occurrences. In support of this work, the intent of this PPO is to guide projects that protect and enhance the natural environmental through invasive species management.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that are sited on areas containing invasive species, or that involves landscaping are expected to comply with the requirements of **Path A**.	There is no **Path B** for this PPO.
EXEMPTIONS	
Projects where there is no landscaping scope or that are not located in areas containing invasive species are exempt from any requirements for this PPO	

Path A: Performance Requirements

The strategies below reference NW3.4: Control Invasive Species at a Superior level of achievement (6 points).

All projects following Path A must meet the following requirements:

01	**Develop a non-invasive species registry** to be used on site, including type and quantity.
02	**Conduct a site assessment** to map invasive species on site by qualified professionals.
03	**Develop an Invasive Species Control Plan.** Develop a document to detail removal of invasive species during or post-construction. This document must also detail measures for controlling invasive species on site.
04	**Develop a Construction Management Plan** in alignment with local policies to follow and prevent invasive species from being used on site.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	Project Lead	Engage a dedicated Environmental Scientist and Landscape Architect	Outline scope of project during the development of an RFP
Design	Environmental Scientist / Landscape Architect	Develop registry for non-invasive species to be used as part of a project-specific Environmental Management Plan	Non-Invasive Species Registry within Environmental Management Plan
		Site investigation to identify invasive species on site	Site Assessment Report including map of identified invasive species
		Make final design selections	Design Drawings and Technical Specifications
Construction	Environmental Scientist	Identify procedure and methodology for controlling invasive species on site	Invasive Species Control Plan
	Contractor	Develop procedure to prevent introduction of invasive species on site and summarize methods implemented on site for major infestation events	Construction Management Plan
Closeout	Operator	Follow procedures identified in Invasive Species Control Plan	Operational Management Plan

Path B: Alternative Compliance

Not applicable for this PPO.

Pursuing Certification

Additional credits may be considered in line with the intent of the Develop & Implement an Invasive Species Management Plan PPO. These credits represent opportunities available under the Envision rating system and additional points available for project teams pursuing certification:

NW 1.1 Preserve Sites of High Ecological Value

The intent of this credit is to preserve areas of high ecological value through avoidance of project siting.

NW 3.1 Enhance Functional Habitats

The goal of this credit is to enhance the ecological terrestrial habitat / ecosystem. This credit is measured through the quantity of ecosystem functions that are preserved or enhanced.

Additional Resources

Metro Vancouver – Invasive Species Management Plan

Province of BC – Priority Invasive Species in BC

Province of BC – Status of Invasive Species in BC

Invasive Species Council of BC

Invasive Species Council of Metro Vancouver

Considering future climate. As ecosystems change, so too does the range and risk of invasive species. Project teams should consider how an invasive species management plan may need to address the introduction or dominance of invasive species within the project lifetime as a result of the changing climate.

Key resources to consider include:

Metro Vancouver – Invasive Species Management Plan

Province of BC – Climate Change Vulnerability of BC's Fish & Wildlife

Invasive Species Centre – Invasive Species in a Changing Climate

6.13 Preserve Soils & Restore Disturbed Areas with Appropriate Soil to Support Healthy Vegetation

The rich soils found across Metro Vancouver serve a multitude of functions – they store and regulate water and nutrients, support food security, and help to absorb carbon. Metro Vancouver has estimated that Delta's agricultural soils and vegetation alone store almost one million tonnes of carbon. However, construction activities can disturb soil health and disrupt these functions. Redistributed soil is less capable of absorbing stormwater and supporting vegetation, while compaction caused by construction equipment can kill surrounding plants and trees, and prevent future plant growth. The intent of this PPO is to ensure that disturbed soils are properly restored to be healthy and productive.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that impact or disturb soil during construction are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects with limited control of siting or landscaping areas, where preserving greenspace or adding greenspace will be difficult • Projects where additional greenspace will compromise the ability to meet the project requirements or objectives (i.e. parking lots, works yards, etc.)
EXEMPTIONS	
Projects where the location is pre-determined and cannot be modified are exempt from any requirements for this PPO	

Path A: Performance Requirements

The strategies below references NW3.5 Protect Soil Health at an Enhanced level of achievement (3 points).

All projects following Path A must meet the following requirements:

01	**Identify and quantify areas to be disturbed.** Undertake an analysis to identify and quantify the extent to which vegetated areas will be disturbed within the project site.
02	**Develop a plan detailing vegetated areas that will be distributed.** This will include drawings, and a plan that outlines how disturbed areas will be limited by the project implementation. Plan to include strategies and implementation measures for restoring 100% of disturbed vegetation surrounding the new construction building or structure following construction completion.
03	**Implement protective measures during construction.** Require the contractor to limit soil disturbance during the construction phase of the project.
04	**Implement restoration measures post-construction.** Restore vegetated areas that were previously disturbed during construction.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	Project Lead	Engage a dedicated Environmental Scientist	Outline scope of project during the development of an RFP
Design	Environmental Scientist	Identify vegetated areas to be disturbed	Index of vegetated area to be disturbed within the project site.
		Develop mitigation plan for preserving and restoring 100% of disturbed vegetated areas	Restoration of Disturbed Vegetated Area Plan, including drawing.
Construction	Contractor	Implement measures to limit soil disturbance during construction	Construction Management Plan and Standard Operating Procedures
Closeout	Environmental Scientist / Landscaper / Metro Vancouver Operations Team	Implement measures to restore disturbed areas, as outlined in the Plan	No deliverable

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Identify and quantify areas to be disturbed.** Undertake an analysis to identify and quantify the extent to which vegetated areas will be disturbed within the project site.
02	**Develop a plan detailing vegetated areas that will be distributed.** This will include drawings, and a plan that outlines how disturbed areas will be limited by the project implementation. A written explanation to be included in the plan that outlines the rationale for why 100% of the disturbed vegetation area cannot be restored. Plan to include strategies and implementation measures for extent of restoration that is possible.
03	**Implement protective measures during construction.** Require the contractor to limit soil disturbance during the construction phase of the project.
04	**Implement restoration measures post-construction.** Restore vegetated areas that were previously disturbed during construction.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	Project Lead	Engage a dedicated Environmental Scientist	Outline scope of project during the development of an RFP
Design	Environmental Scientist	Identify vegetated areas to be disturbed	Index of vegetated area to be disturbed within the project site.
		Develop mitigation plan for preserving and restoring the greatest portion of disturbed vegetated areas as possible	Restoration of Disturbed Vegetated Area Plan (including drawing), and detailed rationale for why 100% of the disturbed area cannot be restored
Construction	Contractor	Implement measures to limit soil disturbance during construction	Construction Management Plan and Standard Operating Procedures
Closeout	Environmental Scientist / Landscaper / Metro Vancouver Operations Team	Implement measures to restore disturbed areas, as outlined in the Plan	No deliverable

Pursuing Certification

Additional credits may be considered in line with the intent of the Preserve Soils & Restore Disturbed Areas with Appropriate Soil to Support Health Vegetation PPO. These credits represent opportunities available under the Envision rating system and additional points available for project teams pursuing certification:

NW 1.4 Preserve Undeveloped Land

The goal of this credit is to avoid locating projects on undeveloped land, and rather use already developed land for siting a project.

NW 3.1 Enhance Functional Habitats

The goal of this credit is to enhance the ecological terrestrial habitat / ecosystem. This credit is measured through the quantity of ecosystem functions that are preserved or enhanced.

NW 3.2 Enhance Wetland & Surface Water Functions

The goal of this credit is to enhance the ecological water habitat / ecosystem. This credit is measured through the quantity of ecosystem functions that are preserved or enhanced.

NW 3.3 Maintain Floodplain Functions

The goal of this credit is to avoid locating projects on floodplain, and rather to preserve the functions of those floodplains. This is measure through the extent to which the project avoids or minimizes impacts to the floodplain.

NW 1.1 Preserve Sites of High Ecological Value

The intent of this credit is to preserve areas of high ecological value through avoidance of project siting.

NW 1.4 Preserve Undeveloped Land

The purpose of this credit is to locate projects on land previously developed, rather than disturbing undeveloped land.

NW 2.3 Reduce Pesticide & Fertilizer Impacts

The intent of this credit is to reduce negative impacts resulting from pesticide and fertilize use. This may include negative impacts relating to toxicity, bioavailability, persistence, etc.

Additional Resources

Government of Canada – Soil Database & Maps

Province of BC – Contaminated Sites Registry

Province of BC – Soil Information Finder

Considering future climate. While not immediately apparent, a changing climate may also impact on overall soil health. Project teams should consider how climate hazards such as sea level rise, acidification, and salination may impact the ability to restore soil to support healthy vegetation.

Helpful resources on this topic include:

Province of BC – Sea Level Rise Adaptation Primer

Province of BC – Best Practices for Prevention of Saltwater Intrusion

6.14 Prevent Pollutants from Contaminating Surface Water & Ground Water

Construction projects often lead to erosion, sedimentation, and pollution that add to the challenge of keeping Metro Vancouver's water supplies clean. This can also lead to increased flooding potential, disruption of natural stream habitats, and altered water flow. Controlling these contaminants at the source is the most effective way to protect the viability of our water resources, rather than trying to clean up after pollution has already occurred. The intent of this PPO is to mitigate water contamination by capturing and treating water runoff before it enters the Metro Vancouver system or sensitive natural areas.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that include the use of material that has the potential of polluting or contaminating water (e.g. industrial runoff, chemical discharge) are expected to comply with the requirements of **Path A**.	There is no **Path B** for this PPO.
EXEMPTIONS	
Projects where there is no use of a hazardous (or potentially hazardous) material that may result in water contamination are exempt from any requirements for this PPO.	

Path A: Performance Requirements

The strategies below references NW 2.4 Protect Surface & Groundwater Quality at an Enhanced level of achievement (5 points).

All projects following Path A must meet the following requirements:

01	**Assess contamination potential to surface or ground water.** Develop an assessment exploring potential negative impacts (including temperature) to surface water or groundwater as a result of construction and operations.

02	**Develop a Spill Management Plan.** No new pathways for surface or groundwater contamination can be included in the plan.

03	**Implement mitigation measures.** Incorporate design and implementation risk mitigation measures for protection of surface and groundwater during construction and operations. Reduction and/or elimination of contamination is to be prioritized. If this is not possible, appropriate management of the polluting substance is required and may entail recycled use on site, limits off site use, etc.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	Project Lead	Engage a dedicated hydrogeologist and scientist	Outline scope of project during the development of an RFP
Design	Hydrogeologist / Scientist	Undertake assessment exploring impacts of the project to surface water or groundwater	Surface Water & Groundwater Contamination Potential Study
	Water Resources Engineer / Design Team	Develop Spill Management Plan for operations activities, including development of mitigation measures.	Spill Management Plan
Construction	Contractor	Develop and implement Spill Management Plan for Construction activities	Construction Management Plan and Standard Operating Procedures
Closeout	Operator	Implement and follow mitigation measures identified in Spill Management Plan	No deliverable.

Path B: Alternative Compliance

Not applicable for this PPO.

Pursuing Certification

Additional credits may be considered in line with the intent of the Prevent Pollutants from Contaminating Surface Water & Ground Water PPO. These credits represent opportunities available under the Envision rating system and additional points available for project teams pursuing certification:

NW 2.2 Manage Stormwater

The purpose of this credit is to manage stormwater such that stormwater quality is maintained while stormwater quantity is controlled. This is measured through stormwater quality and quantity at varying degrees of 24-hour events.

NW 2.3 Reduce Pesticide & Fertilizer Impacts

The intent of this credit is to reduce negative impacts resulting from pesticide and fertilize use. This may include negative impacts relating to toxicity, bioavailability, persistence, etc.

Additional Resources

Metro Vancouver – Stormwater Management Resources

Metro Vancouver – Stormwater Source Control Design Guidelines

Metro Vancouver – Best Management Practices Guide for Stormwater

Erosion & Sediment Control Association of British Columbia (ESCA BC) – ESC Best Management Practices

International Living Future Institute (ILFI) – Living Building Challenge: Water Petal Intent

City of Vancouver – Citywide Integrated Stormwater Management Plan

City of Vancouver – Integrated Stormwater Management Vision, Principles & Actions

City of Vancouver – Integrated Stormwater Management Best Practice Toolkit

Fraser Basin Council – Salmon Safe Certification

Considering future climate. Climate projections for Metro Vancouver are showing a likely increase in overall precipitation in the fall, winter and spring, as well as an increase in storm events. To mitigate the impacts of these changes, design teams should consider how pollution risks and impacts (e.g. from road runoff or contaminated sites) may be exacerbated due to increased precipitation and storm events, as well as the impact on the selection of strategies to mitigate and manage water runoff.

Useful resources to consider include:

Metro Vancouver – Climate Projections for Metro Vancouver

Metro Vancouver – Template for Integrated Stormwater Management Planning

Province of BC – Stormwater Planning Guidebook

6.15 Reduce Air Pollutant Sources During Construction

Metro Vancouver is responsible for managing and regulating air contaminants throughout the region, and has set ambitious clean air targets for 2030:

- Ambient air quality in the region meets or is better than health-based ambient air quality objectives and standards set by Metro Vancouver, the BC Government and Government of Canada.
- Increase the amount of time that visual air quality is classified as excellent.

Construction projects are a major contributor of air pollutants, primarily fine and coarse particulate matter (e.g. dust) and volatile organic compounds from construction materials (e.g. adhesives, sealants). The intent of this PPO is to guide projects that control construction activity pollution and limit the use of emitting materials. Reducing the level of these air contaminants can also help to improve visual air quality and reduce unpleasant odours for residents and businesses.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that include construction activities are expected to comply with the requirements of **Path A**.	There is no **Path B** for this PPO.
EXEMPTIONS	
Projects where there are no construction activities are exempt from any requirements for this PPO.	

Path A: Performance Requirements

The strategies below references QL 1.6 Minimize Construction Impacts at an Enhanced level of achievement (2 points).

All projects following Path A must meet the following requirements:

01	**Develop a Construction Management Plan to address construction impacts.** The Plan must address air pollution as well as at least two of the following impacts:

- noise
- safety
- wayfinding
- access/mobility
- lighting

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	No action required		
Design	Design Team	Require contractor to submit Construction Waste Management Plan, detailing mitigation measures	Technical Specifications
Construction	Contractor	Develop a Construction Management Plan to identify mitigation measures for minimizing impacts on site.	Construction Management Plan and Standard Operating Procedures
		Carry out mitigation measures per the Construction Management Plan	No deliverable
Closeout	No action required		

Path B: Alternative Compliance

Not applicable for this PPO.

Pursuing Certification

Additional credits may be considered in line with the intent of the Reduce Air Pollutant Source During Construction PPO. These credits represent opportunities available under the Envision rating system and additional points available for project teams pursuing certification:

CR1.3 Reduce Air Pollutant Emissions

The purpose of this credit is to manage, control, and reduce air pollutant emissions. This is measured through the extent to which air quality emissions are modelled, eliminated, or improved.

Additional Resources

Metro Vancouver – Air Quality Regulatory Program

Metro Vancouver – Emissions Inventories & Forecasts

Metro Vancouver – Sustainability Innovation Program

International Standards Organization (ISO) – ISO/TC 146: Air Quality

International Standards Organization (ISO) – ISO 3740: Acoustics

South Coast Air Quality Management District (SCAQMD) – Materials Emissions Rules

WorkSafeBC – OHS Regulation Part 4: General Conditions

WorkSafeBC – OHS Regulation Part 7: Noise, Vibration, Radiation and Temperature

Considering future climate. Regional air quality may be exacerbated in the coming decades as the magnitude and frequency of wildfire events increases. Dangerous indoor air quality from wildfire smoke events can compound existing sources of contamination (e.g. ground-level ozone, pollution from traffic and industry), making this a significant health risk for certain populations. Reducing this risk requires thoughtful ventilation and filtration design, and minimizing sources of pollutants wherever possible. Design teams should consider how air pollution may be exacerbated due to increased wildfire smoke and ozone depletion, and the impact on the need to mitigate and manage air pollution.

Key reference materials include:

BC Energy Step Code Design Guide Supplement on Overheating & Air Quality

BC Centre for Disease Control (BCCDC) – Wildfire Smoke

US Environmental Protection Agency (EPA) – Wildfires & Indoor Air Quality

7.

Performance Requirements for Buildings

The following sections provide guidance for building projects only (i.e. projects that are comprised of one or more Dwelling Spaces or Habitable Spaces as per Section 3.1).

- **Dwelling Space**
- **Habitable Space**

Note that these performance requirements have been developed to align with the Priority Performance Objectives of Metro Vancouver's *Sustainable Infrastructure and Buildings Policy.*

7.1 Reduce Operational Energy Consumption

The energy used to condition and run buildings and infrastructure accounts for a substantial portion of GHG emissions in Metro Vancouver. Emissions are mostly sourced from mechanical systems that burn fossil fuels (e.g. natural gas, fuel oil), and are typically higher in older buildings and those with low-performance envelopes (e.g. minimal insulation, leaky windows).

Metro Vancouver has adopted a minimum energy performance requirement of Step 3 of the BC Energy Step Code; however, local municipalities may have set requirements for the achievement of higher steps. The intent of this PPO is to reduce energy consumption from buildings and support compliance of Step 3 of the BC Energy Step Code, which in turn both reduces GHG emissions from buildings and helps manage escalating operating costs.

A key piece of reducing operational energy consumption in buildings is to ensure that systems are fine tuned and optimized to operate as designed, or commissioning (Cx). The commissioning process is increasingly important in higher performance projects, as newer systems and technologies can require additional care to ensure their proper function. After initial commissioning, recommissioning (RCx) and ongoing commissioning can both help to ensure that energy efficiency and other benefits are maintained over time. This ongoing maintenance can help to identify low- or no-cost operational improvements and is one of the most economical ways to reduce a project's operational energy consumption.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects where energy is consumed during the project lifetime are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • The project scope does not involve the renovation or upgrading of the following systems considered to be 'key' to the efficiency of the building: - Building Envelope - Building Glazing - Mechanical Ventilation, heating, cooling and Domestic Hot Water systems - Electrical lighting systems
EXEMPTIONS	
Projects that do not consume energy over the project lifetime or where there is no demonstrated opportunity to save energy are exempt from any requirements for this PPO	

Path A: Performance Requirements

All projects must meet Step 3 of the BC Energy Step Code or the step set by the local municipality, whichever is greater.

All projects following Path A must also follow the Metro Vancouver's Energy & Greenhouse Gas Emissions Management Design Memo Requirements in undertaking the following steps:

01 **Develop a baseline energy model** that captures the energy performance consumption for the entire scope of the project. Baseline energy performance will be used to demonstrate a percentage reduction in operational energy. The intent of the baseline is to represent a standard approach to construction under typical/current conditions and using standard industry practice.

Given the different energy modelling standards between the LEED rating system and BC Energy Step Code, it is generally advisable that projects generate two separate models following both modelling guidelines. Energy models should be developed according to the following guidelines:

Habitable Spaces Offices, Administrative Spaces, Facilitation Spaces, Recreation Centres.	**BC Energy Step Code:** City of Vancouver Energy Modelling Guidelines V2 AND **LEED Minimal and Optimize Energy Performance:** ANSI/ASHRAE/IESNA Standard 90.1–2010, Appendix G or National Energy Code for Buildings (NECB) 2011 and LEED Version 4 reference guide – *Minimal Energy Performance and Optimize Energy Performance* credits.
High Density Dwelling Spaces (Part 3) Residential building types greater than three stories in height	**BC Energy Step Code:** City of Vancouver Energy Modelling Guidelines V2 AND **LEED Minimal and Optimize Energy Performance:** ANSI/ASHRAE/IESNA Standard 90.1–2010, Appendix G or National Energy Code for Buildings (NECB) 2011 and LEED Version 4 reference guide – *Minimal Energy Performance and Optimize Energy Performance* credits.
Low Density Dwelling Spaces (Part 9) Residential building types less than three stories in height	**BC Energy Step Code:** Hot 2000 Energy Modelling Guidelines AND **LEED Minimal and Optimize Energy Performance:** ANSI/ASHRAE/IESNA Standard 90.1–2010, Appendix G or National Energy Code for Buildings (NECB) 2011 and LEED Version 4 reference guide – *Minimal Energy Performance and Optimize Energy Performance* credits

02 **Identify options** available for the project which improves on the project's baseline performance. The baseline will be compared to the identified options.

- Identify options that meet and improve upon the project requirements.
- Detail design and construction implications as well as performance impacts.

03 **Undertake a financial analysis to evaluate options:**

- Using the Metro Vancouver Business Case Standard Economic Assumptions Unit Conversions and Energy Prices, develop a life cycle net present value analysis for the options.
- The financial analysis should identify and include available financial incentives. Per the Metro Vancouver Carbon Price Policy, the financial analysis shall rely on the Metro Vancouver carbon price.

04 **Undertake an annual energy consumption analysis over the life of the project to demonstrate 30% reduction:**

- Options should be evaluated and selected to ultimately result in a project with a reduction of 30%, compared to the baseline operational energy consumption.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	Project Lead	Engage Energy Modeller	Scope outline and identification of project scope and applicable Municipal and BC Energy Step Code requirements
Design	Design Team	Identify major building systems and available Energy Conservation Measures (ECMs) under each system	Preliminary Design Report detailing building mechanical, electrical and architectural systems and available ECMs
	Energy Modelling Consultant	Develop preliminary energy model and ECM performance	Brief report detailing proposed ECMs and energy and carbon savings elements
		Confirm preliminary compliance with applicable code, Step Code and LEED requirements	Brief report detailing project compliance
Construction	Energy Modelling Consultant	Confirm final compliance with applicable code, Step Code and LEED requirements	Brief report detailing project compliance
Closeout	No action required		

Path B: Alternative Compliance

All projects must meet Step 3 of the BC Energy Step Code or the step set by the local municipality, whichever is greater.

All projects following Path B must meet the following requirements:

01	**Fulfill the requirements of Metro Vancouver's Energy & Greenhouse Gas Emissions Management Design Memo Requirements.** To demonstrate continuous improvement in energy and GHG emissions management, the Energy and GHG Emissions Management Design Memo should summarize the processes followed through the project design phases and the resulting design decisions. Provide one memo for each of the two design phases: Preliminary and Detailed Design. Design teams are encouraged to identify and document opportunities that go beyond these minimum requirements to meet the intent of Metro Vancouver's energy and GHG emissions management objectives.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	Project Lead	Engage with Metro Vancouver Project and Energy Management Staff	Include as discussion point in kick-off meeting
Design	Design Team	Estimate operational energy	Metro Vancouver Energy & Greenhouse Gas Emissions Management Design Memo (Part 1)
	Design Team / Mechanical designer	Refine operational energy model	Metro Vancouver Energy & Greenhouse Gas Emissions Management Design Memo (Part 2)
		Make final design selections Calculate and report the operational energy consumption of the project	Design drawings and technical specifications
Construction	No action required		
Closeout	No action required		

Pursuing Certification

Additional credits may be considered in line with the intent of the Reduce Operational Energy Consumption PPO. These credits represent opportunities available under the LEED v4 rating system and additional points available for project teams pursuing certification:

Minimum and Optimized and Energy Performance (prerequisite; 4-18 points)

Analyze efficiency measures during the design process and account for the results in design decision making.

Integrated Design Process (1 point)

Beginning in pre-design and continuing throughout the design phases, identify and use opportunities to achieve synergies across disciplines and building systems.

Fundamental Commissioning and Verification (prerequisite)

Complete the following commissioning (Cx) process activities for mechanical, electrical, plumbing, and renewable energy systems and assemblies, in accordance with ASHRAE Guideline 0-2005 and ASHRAE Guideline 1.1–2007 for HVAC&R Systems, as they relate to energy, water, indoor environmental quality, and durability.

Enhanced Commissioning (2-6 points)

Enhance the fundamental commissioning and verification process by engaging commissioning authorities sooner and refocusing commissioning during and beyond project handover.

Additional Resources

Metro Vancouver – Energy and Greenhouse Gas Emissions Management Requirements

Metro Vancouver – Business Case Standard Economic Assumptions, Unit Conversions and Energy Pricing Memorandum

BC Housing – BC Energy Step Code Builder Guide

BC Housing – Building Envelope Thermal Bridging Guide

BC Housing – Guide to Low Thermal Energy Demand for Large Buildings

BC Housing – Illustrated Guide: Achieving Airtight Buildings

Considering future climate. Finding opportunities for reducing energy consumption can help improve resilience to climate change in a few ways. Reduced thermal energy demand can translate into improved thermal resilience, or the ability of a space to maintain comfortable indoor temperatures under a power outage. Well-designed spaces that make use of passive design strategies (e.g. natural ventilation, well-designed envelopes) are less dependent on mechanical systems to provide indoor comfort. Reducing operational energy consumption also reduces reliance on the grid, which in turn improves regional and energy system resilience.

Project teams should make use of future climate projections in energy modelling and if feasible, undertake a sensitivity analysis to understand the impact of future load projections.

Key resources on this topic include:

Metro Vancouver – Climate Projections for Metro Vancouver

Environment & Climate Change Canada – Climate Data Canada

Prairie Climate Centre – Climate Atlas of Canada

BC Energy Step Code Design Guide and *Design Guide Supplement on Overheating & Air Quality*

7.2 Reduce Embodied Energy of Priority Construction Materials

While our understanding of how to reduce operational energy has improved in recent years, 'embodied energy' (and its contribution to climate change) often goes unaccounted for. Embodied energy refers to the energy consumed over the life of a construction material from its 'cradle to grave' (i.e. extraction through to disposal), and is best understood through a life-cycle assessment (LCA). Though embodied energy currently represents a relatively low proportion of an average project's total carbon footprint, it will move to the forefront as operational emissions and energy efficiency continue to improve. The intent of this PPO is to recognize the importance of embodied energy and reduce the environmental impacts of new construction materials used in Metro Vancouver projects.

There are many existing tools and environmental product declarations (EPDs) available from construction material manufacturers to support the assessment and improvement of embodied impacts in projects. Significant efforts are also underway by organizations including the World Green Building Council and Natural Resources Canada to standardize processes and centralize information regarding embodied energy.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that make use or consume materials during construction and operation are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects with a limited number of components or building systems that have fewer materials to source with reduced environmental impact, making it difficult to find materials which meet all technical requirements and required embodied energy reductions
EXEMPTIONS	
Projects making substantial reuse (i.e. >50%) of existing building structure, envelope areas, floors, and roof areas have demonstrated substantial embodied energy reductions and are exempt of any requirements for this PPO	

Path A: Performance Requirements

All projects following Path A must meet the following requirements:

01 **Establish an embodied carbon baseline** that will be used to demonstrate a percentage reduction in total embodied carbon. The intent of the baseline is to represent a standard approach to construction under typical/current conditions and using standard industry practice.

The baseline should be set using any one or more of the following:

- Evaluation of existing conditions
- Comparison of viable alternatives
- Standard practice
- A comparable existing project (e.g. of similar size, type)

A Whole-Building Lifecycle Impact Assessment (LCA) should be used in developing the project embodied carbon baseline early in the project design to estimate the project's impact across the following environmental impact categories:

- Global warming potential (greenhouse gases), in CO_2e
- Depletion of the stratospheric ozone layer, in kg CFC-11
- Acidification of land and water sources, in moles H+ or kg SO_2
- Eutrophication, in kg nitrogen or kg phosphate
- Formation of tropospheric ozone, in kg NOx, kg O_3, or kg ethene
- Depletion of non-renewable energy resources, in MJ

02 **Identify options** available for the project which improves on the project's baseline performance. The baseline will be compared to the identified options.

- Identify options that meet and improve upon the project requirements.
- Detail design and construction implications as well as performance impacts.

03 **Undertake a financial analysis to evaluate options:**

- Using the Metro Vancouver Business Case Standard Economic Assumptions Unit Conversions and Energy Prices, develop a life cycle net present value analysis for the options.
- Per the Metro Vancouver Carbon Price Policy, the financial analysis shall rely on the Metro Vancouver carbon price.
- The financial analysis should identify and include available financial incentives.

04 **Demonstrate a 10% reduction in embodied emissions** through the selection materials or modification of design that contribute a minimum of 10% reduction across three of the impact categories above in line with *LEED Building Design and Construction Rating system* Version 4 – *Whole-Building Lifecycle Assessment.*

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	Project Lead	Engage a dedicated LCA modeller	Outline scope of project and anticipates materiality for development of an RFP
Design	LCA Consultant	Develop baseline LCA to identify major embodied emissions impact categories Detail 2-3 core actions that support reduced embodied emission	Detailed LCA modelling report including: Overall project impact across 6 impact categories Details of 'key impact areas' where impact is greatest Sensitivity analysis suggesting the impact available for selecting alternate 'low impact' materials in 'key impact areas'
	Structural Engineer	Coordinate with the design team to outline alternate materials or structural response	Detail alternate materials or products available that satisfy structural requirements of the project
		Specify environmental product disclosures in core structural materials	Specification section detailing major structural materials and trade requirements to ensure Environmental Product Declarations (EDPs) are provided with materials
	Architect	Coordinate with the design team to outline alternate architectural finishes and assembly materials	Detail alternate materials and assemblies available which satisfy architectural requirements of the project
		Specify environmental product disclosures in architectural assemblies	Specification section detailing major materials and trade requirements to ensure Environmental Product Declarations (EDPs) are provided with materials
	LCA Consultant	Update baseline LCA model to identify improvements in embodied emissions impacts and alignment with credit requirements	Updated LCA modelling report including: Overall project impact across 6 impact categories Identification of key material assumptions carried in updated model
Construction	Contractor	Collect and share EPDs information with LCA Consultant	Product submittals with material EPDs
	LCA Consultant	Compile LCA report and materials information	Finalized LCA report with appended materials EPDs where applicable
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Develop a materials inventory.** Outline the project scope and key materials. Scope of materials should include the following:

- Structural
- Building envelope and finish materials:
  - Framing
  - Drywall
  - Insulations
  - Cladding
- Interior finishes

02	**Identify opportunities for material reuse.** Identify any materials available from any on-site or available project sites for integration into the project design. Identifying materials early makes including them easier as the form and layout of the project can be better configured to use available materials rather than attempting to find materials that fit a specific application once the project is more detailed in design.

03	**Identify large volume materials** that may constitute major portions of the project. Examples of such materials include structural materials, envelope/ enclosure materials, and interior/ finish materials. For these large volume materials, identify an available alternative that supports comparable function but with a reduction in overall environmental impact.

03	**Select products**. Review and identify available suppliers with proven disclosure of the environmental impacts of their materials. Environmental Product Declarations (EPDs) can be used to equitably evaluate materials and select the least impactful materials for the project.

Path B: Demonstrating Compliance

Project Phase	Actor	Action	Documentation/Deliverable
Definition	No action required		
Design	Design Team	Develop materials inventory	Detail the scope of the project and major materials
	Design Team	Review market for opportunities for materials reuse	Adapt project design to support integration of reused materials where viable
		Detail major materials	Develop list of top three materials by volume
Construction	Contractor	Source and construct with reusable materials	Detail locations and implementation reused materials
		Provide 'low carbon' alternatives for top three materials	Provide supplier information outlining environmental benefits for alternate materials
	Project Lead	Select low impact materials where viable	Select and approve of materials identified with lower environmental impact where viable
Closeout	No action required		

Pursuing Certification

Additional credits may be considered in line with the intent of the Reduce Embodied Energy of Priority Construction Materials PPO. These credits represent opportunities available under the LEED v4 rating system and additional points available for project teams pursuing certification:

Integrated Design Process Credit (1 point)

The intent of this credit to identify and evaluate the performance objectives of the project early in the design to explore the most feasible options for increased energy, water, and embodied energy savings.

Building Life-Cycle Impact Reduction (3 points)

The intent of this credit is to undertake a process to identify and select materials with reduced lifecycle impacts.

Building Product Disclosure and Optimization (1 point)

The intent of this credit is to identify and selection products and materials where the environmental impacts associated with its production is disclosed by the manufacturer (i.e. environmental product declarations or EPD). This information can be used in the production of the LCA and used to demonstrate savings.

Building Product Disclosure and Optimization (Sourcing of Raw Materials) (1 point)

The intent of this credit is to use the EPD of materials to seek products with greater quantities of recycled content, reginal sourcing, and overall lifecycle impact. Guidance for this credit could help in the sourcing and selection of recycled materials with reduced embodied energy.

Additional Resources

ASTM International – ASTM E2921-16a, Standard Practice for Minimum Criteria for Comparing Whole Building Life Cycle Assessments for Use with Building Codes, Standards, and Rating Systems

Athena Sustainable Materials Institute – Athena Impact Estimator (free LCA software)

BC Ministry of the Environment and Climate Change Strategy – LEED v4 and Low Carbon Building Materials

Canada Green Building Council (CaGBC) – Zero Carbon Building Standard

Carbon Leadership Forum – EC3 Tool

Green Building Certification Inc. (GBCI) – Whole Building Life Cycle Assessment Through LEED v4

International Standards Organization (ISO) – ISO 14044:2006 (Environmental Management – Life Cycle Assessment – Requirements & Guidelines)

International Standards Organization (ISO) – ISO 14064 Part 2: Specification with Guidance at the Project Level for Quantification, Monitoring, and Reporting of Greenhouse Gas Emission Reductions or Removal Enhancements

7.3 Reduce Lifecycle GHG Emissions

The comprehensive lifecycle GHG emissions of a project, or its 'embodied carbon footprint', is a product of the emissions associated with and energy used during all phases of its life. This includes extraction, transportation, refinement and processing of raw materials, as well as installation, ongoing operations, decommissioning, and eventual disposal. The intent of this PPO is to build on and strengthen measures to reduce operational energy consumption (as described in *Section 7.1*. Reduce Operational Energy Consumption) and measures to reduce embodied energy of priority construction materials (as described in *Section 7.2*). This section will utilize many of the same exercises, but will focus specifically on the metrics necessary to evaluate options based on lifecycle carbon emissions.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that consume energy and produce GHG emissions during the lifetime of the project are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects that do not involve the renovation or upgrading of the following systems considered to be 'key' to the efficiency of the building: - Building Envelope - Building Glazing - Mechanical Ventilation, heating, cooling and Domestic Hot Water systems - Electrical lighting systems • Projects that do not involve the replacement or addition of substantial quantities of materials, or that primarily feature elements that cannot easily be replaced with lower carbon alternative products
EXEMPTIONS	
Projects that do not consume energy or produce GHG emissions or include new materials in the construction or operation of the project are exempt of any requirements for this PPO	

Path A: Performance Requirements

All projects following Path A must also follow the Metro Vancouver's Energy & Greenhouse Gas Emissions Management Design Memo Requirements in undertaking the following steps:

01 **Develop a baseline carbon model.**

Using the energy modelling results developed through the energy model exercise required in *Section 7.1* **Path A**, capture the operational carbon emissions for the entire scope of the project. Operational carbon profiles should be closely linked to the modeled energy consumption and fuel types identified for the project. Typical Emissions Factors for fuel type are outlined under the *City of Vancouver Energy Modelling Guidelines* and below:

- Natural Gas – 0.185 $kgCO_2e/kWh$
- Electricity – 0.011 $kgCO_2e/kWh$

Baseline carbon emissions will be used to demonstrate a percentage reduction in lifecycle carbon emissions. The intent of the baseline is to represent a standard approach to construction under typical/current conditions and using standard industry practice.

02 **Aggregate preliminary Whole-Building Lifecycle Impact Assessment (LCA).** Using the results developed through the LCA exercise required in *Section 7.2* **Path A**, aggregate estimated embodied carbon emissions over the projects functional life. Project teams should use a preliminary functional life of 60 years to determine the project's embodied emissions intensity as $kgCO_2e/m2/yr$.

03 **Identify options** available for the project which improves on the project's baseline carbon performance. The baseline will be compared to the identified options.

- Identify options that meet and improve upon the project requirements.
- Detail design and construction implications as well as performance impacts.

04 **Undertake a financial analysis to evaluate options:**

- Using the Metro Vancouver Business Case Standard Economic Assumptions Unit Conversions and Energy Prices, develop a life cycle net present value analysis for the options.
- The financial analysis should identify and include available financial incentives. Per the Metro Vancouver Carbon Price Policy, the financial analysis shall rely on the Metro Vancouver carbon price.

05 **Demonstrate a minimum 50% reduction in annual greenhouse gas emissions** by submitting calculations for the following:

- Calculations of the percentage reduction compared to the baseline used over the same period.
- Demonstration of a minimum 50% reduction in greenhouse gas emissions over the baseline.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	Project Lead	Engage Energy Modeller	Scope outline and identification of project scope and applicable Municipal and BC Energy Step Code requirements
		Engage a dedicated LCA modeller	Outline scope of project and anticipates materiality for development of an RFP
Design	Design Team	Identify major building systems and available Carbon Conservation Measures (CCMs) under each system	Preliminary Design Report detailing building mechanical, electrical and architectural systems and available CCMs
	LCA Consultant	Develop baseline LCA to identify major embodied emissions impact categories Detail 2-3 core actions that support reduced embodied emission	Detailed LCA modelling report including: Overall project impact across 6 impact categories Details of 'key impact areas' where impact is greatest Sensitivity analysis suggesting the impact available for selecting alternate 'low impact' materials in 'key impact areas'
	Energy Modelling Consultant	Develop preliminary energy model and CCM performance	Brief report detailing proposed CCMs and energy and carbon savings elements
		Confirm preliminary compliance with applicable code, Step Code and LEED requirements	Brief report detailing project compliance
	Structural Engineer	Coordinate with the design team to outline alternate materials or structural response	Detail alternate materials or products available which satisfy structural requirements of the project
		Specify environmental product disclosures in core structural materials	Specification section detailing major structural materials and trade requirements to ensure Environmental Product Declarations (EDPs) are provided with materials
	Architect	Coordinate with the design team to outline alternate architectural finishes and assembly materials	Detail alternate materials and assemblies available which satisfy architectural requirements of the project
		Specify environmental product disclosures in architectural assemblies	Specification section detailing major materials and trade requirements to ensure Environmental Product Declarations (EPDs) are provided with materials
	LCA Consultant	Update Baseline LCA model to identify improvements in embodied emissions impacts and alignment with credit requirements	Updated LCA modelling report including the following; Overall project impact across 6 impact categories Identification of key material assumptions carried in updated model
Construction	Energy Modelling Consultant	Confirm final compliance with applicable code, Step Code and LEED requirements	Brief report detailing project compliance
	Contractor	Collect and share EPDs information with LCA Consultant	Product submittals with material EPDs
	LCA Consultant	Compiled LCA report and materials information	Finalized LCA report with appended materials EPDs where applicable
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Integrate GHG reduction strategy into requirements of Metro Vancouver's Energy & Greenhouse Gas Emissions Management Design Memo Requirements.** Using the results developed through the Metro Vancouver Energy & Greenhouse Gas Emissions Management Design Memo exercise required in *Section 7.1 Path B*, focus specifically on implementing carbon conservation measures which off little to no financial or coordination barrier.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	Project Lead	Engage with Metro Vancouver Project and Energy Management Staff	Include as discussion point in kick-off meeting
Design	Design Team	Estimate operational energy	Metro Vancouver Energy & Greenhouse Gas Emissions Management Design Memo (Part 1)
	Design Team / Mechanical designer	Refine operational energy model	Metro Vancouver Energy & Greenhouse Gas Emissions Management Design Memo (Part 2)
		Make final design selections Calculate and report the operational energy consumption of the project	Design drawings and technical specifications
Construction	No action required		
Closeout	No Action Required		

Pursuing Certification

Additional credits may be considered in line with the intent of the Reduce Lifecycle GHG Emissions PPO. These credits represent opportunities available under the LEED v4 rating system and the points available for project teams pursuing certification:

Minimum and Optimized and Energy Performance (Prerequisite; 4-18 points)

Analyze efficiency measures during the design process and account for the results in design decision making.

Integrated Design Process (1 point)

Beginning in pre-design and continuing throughout the design phases, identify and use opportunities to achieve synergies across disciplines and building systems.

Fundamental Commissioning and Verification (prerequisite)

Complete the following commissioning (Cx) process activities for mechanical, electrical, plumbing, and renewable energy systems and assemblies, in accordance with ASHRAE Guideline 0-2005 and ASHRAE Guideline 1.1–2007 for HVAC&R Systems, as they relate to energy, water, indoor environmental quality, and durability.

Enhanced Commissioning (2-6 points)

Enhance the fundamental commissioning and verification process by engaging commissioning authorities sooner and refocusing commissioning during and beyond project handover.

Additional Resources

Metro Vancouver – Energy and Greenhouse Gas Emissions Management Requirements

Metro Vancouver – Business Case Standard Economic Assumptions, Unit Conversions and Energy Pricing Memorandum

Athena Sustainable Materials Institute – Athena Impact Estimator (free LCA software)

BC Housing – BC Energy Step Code Builder Guide

BC Housing – Building Envelope Thermal Bridging Guide

BC Housing – Guide to Low Thermal Energy Demand for Large Buildings

BC Housing – Illustrated Guide: Achieving Airtight Buildings

City of Vancouver – Energy Modelling Guidelines

International Standards Organization (ISO) – ISO 14044:2006 (Environmental Management – Life Cycle Assessment – Requirements & Guidelines)

International Standards Organization (ISO) – ISO 14064 Part 2: Specification with Guidance at the Project Level for Quantification, Monitoring, and Reporting of Greenhouse Gas Emission Reductions or Removal Enhancements

7.4 Generate or Recover Renewable Energy On Site

Achieving the GHG emissions reductions that we need will require switching from fossil fuels to clean, renewable energy that is replenished over days or years instead of lifetimes. Both new and existing projects can incorporate a variety of renewable energy sources on site to meet their energy needs, including solar photovoltaic, solar hot water, small-scale wind turbines, waste-to-energy and biomass combustion, among others. In addition to driving down emissions, these alternative power sources can also serve to protect the project from energy price volatility and reliance on the power grid, while reducing the energy that is wasted in transmission.

The intent of this PPO is to encourage and guide on-site energy generation that suits Metro Vancouver's variety of projects. Some factors that influence the viability of on-site renewables are project location, size, and structure, along with daily and seasonal load variations.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that consume energy during the lifetime of the project are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following conditions are present: • Projects that do not include significant adjustments of the existing mechanical and electrical systems that may limit the capacity for renewable energy generation or recovery. • Projects that do not include substantial modification to structure, roof, or surrounding areas that may support the generation of renewable energy
EXEMPTIONS	
Projects that do not consume energy through the lifetime of the project are exempt from any requirements for this PPO	

Path A: Performance Requirements

All projects following Path A must also follow the Metro Vancouver's Energy & Greenhouse Gas Emissions Management Design Memo Requirements in undertaking the following steps:

01	**Develop a baseline model.** Using the energy modelling results developed through the energy model exercise required in *Section 7.1 Path A*, capture the estimated energy consumption for the entire scope of the project. Preliminary energy consumption profiles should identify patterns and trends representing opportunities for energy recovery and renewable energy integration. Baseline energy consumption will be used to demonstrate a percentage of renewable energy generated for the project. The intent of the baseline is to represent a standard approach to construction under typical/current conditions and using standard industry practice.

02	**Evaluate options for energy recovery.** Undertake a survey of the surrounding area and within the building for opportunities to recovery energy. Document life-cycle net present value analysis for each energy recovery option using Metro Vancouver Business Case Standard Economic Assumptions Unit Conversions and Energy Prices. Include all available financial incentives (government, utility, etc.) and the Metro Vancouver carbon price – per the Metro Vancouver Carbon Price Policy – in all life-cycle analyses.

03	**Evaluate options for renewable energy.**

Perform a site evaluation to identify opportunities for renewable energy generation onsite. Using available energy modelling results, size renewable energy systems to meet a portion of the building's energy use. Renewable energy sources may include the following:

- Photovoltaic
- Solar thermal
- Wind
- Biofuel (in some cases)
- Low-impact hydroelectricity
- Wave and tidal energy
- Geothermal energy (in some cases)

Strategies such as architectural features, passive solar, and daylighting, reduce energy consumption but are not eligible renewable energy systems. Geothermal energy used in conjunction with vapor compression cycles, as in a ground-source heat pump, is not considered a renewable energy. Biofuels considered for heating or cogeneration applications should consider the sourcing of the fuel to ensure it does not include municipal waste, forest biomass (other than mill residue), contaminated woods (painted or treated).

04	**Undertake a financial analysis to evaluate options:**

- Using the Metro Vancouver Business Case Standard Economic Assumptions Unit Conversions and Energy Prices, develop a life cycle net present value analysis for the options.
- Per the Metro Vancouver Carbon Price Policy, the financial analysis shall rely on the Metro Vancouver carbon price.
- The financial analysis should identify and include available financial incentives.

05	**Demonstrate 5% of the project energy needs are provided from renewable sources.** Submit calculations for the following:

- The project's estimate annual energy consumption.
- Calculations of the percentage consumed by the project from renewable energy sources.
- The project's estimated annual renewable energy production.
- Demonstration of a minimum 5% consumption of renewable energy to meet the annual energy requirements for the project.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	No action required		
Design	Mechanical Designer	Review site and surrounding areas for high quality sources of recoverable energy	Brief energy recovery report
		Review site and surrounding area for renewable energy production areas	Brief renewable energy production report
	Electrical Designer	Review site and surrounding area for renewable energy production areas	Brief renewable energy production report
	Project Lead	Engage Renewable Energy Consultant (if deemed feasible by mechanical and electrical consultants)	Scope outline and identification of project scope (If deemed feasible by mechanical and electrical consultants)
	Mechanical Designer	Evaluate energy recovery profile (if applicable)	Brief energy recovery profile report detailing energy recovery profile and alignment with project energy demand
	Renewable Energy Consultant	Design preliminary renewable energy system	Comprehensive renewable energy report detailing system layouts and technical assumptions.
	Project Lead	Review financial case for renewable energies with Metro Vancouver Finance/ Procurement	Brief memo
Construction	No action required		
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Size renewable energy systems.** Develop an estimate of the size and technical requirements of a renewable energy system sized to meet 5% of the building energy demand. The exercise should use modeled building performance to illustrate the annual generation demands, potential cost, and physical scale of renewable energy system to meet the targeted 5% of building energy use.

02	**Develop a simple financial model.** Document life-cycle net present value analysis for the renewable energy option using Metro Vancouver Business Case Standard Economic Assumptions Unit Conversions and Energy Prices. Include all available financial incentives (government, utility, etc.) and the Metro Vancouver carbon price – per the Metro Vancouver Carbon Price Policy – in all life-cycle analyses.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	No action required		
Design	Renewable Energy Consultant	Design preliminary renewable energy system	Comprehensive renewable energy report detailing system layouts and technical assumptions.
	Project Lead	Review financial case for renewable energies with Metro Vancouver Finance/ Procurement	Specification of signage for dedicated EV charging parking spaces (If applicable)
Construction	No action required		
Closeout	No action required		

Pursuing Certification

Additional credits may be considered in line with the intent of the Generate or Recover Renewable Energy On Site PPO. These credits represent opportunities available under the LEED v4 rating system and the points available for project teams pursuing certification:

Renewable Energy Production (1-3 points)

Use renewable energy systems to offset building energy costs.

Minimum and Optimized and Energy Performance (Prerequisite; 4-18 points)

Analyze efficiency measures during the design process and account for the results in design decision making.

Integrated Design Process (1 point)

Beginning in pre-design and continuing throughout the design phases, identify and use opportunities to achieve synergies across disciplines and building systems.

Additional Resources

Metro Vancouver – Energy and Greenhouse Gas Emissions Management Requirements

Metro Vancouver – Business Case Standard Economic Assumptions, Unit Conversions and Energy Pricing Memorandum

British Columbia Sustainable Energy Association (BCSEA) – Renewable Energy in British Columbia

Clean Energy BC – Solar Photovoltaic Power

Natural Resources Canada (NRCan) – Photovoltaic Potential and Solar Resource Map

Natural Resources Canada (NRCan) – RETScreen

PVSyst – PVsyst Photovoltaic Software

Considering future climate. Generating on-site renewable energy helps improve project resilience by reducing reliance on the power grid. Power disruptions due to overloaded grids in the summer, storm events in the winter, and flooding year-round is projected to increase in frequency and severity, making an independent source of energy an advantage. Project teams should also explore low-carbon back-up power solutions to help improve resilience while keeping emissions low.

Helpful guidance on this topic can be found at the following links:

National Renewable Energy Laboratory – Distributed Energy Planning for Climate Resilience

US Climate Resilience Toolkit – Energy

Resilient Design Institute – Passive Survivability

Climate Central – Battery Energy Storage

7.5 Install Advanced Energy Metering

Energy metering is based on the fundamental principle that order to effectively manage building energy consumption, it must first be measured and understood. Comprehensive energy metering allows building operators to track energy consumption over time, identify variations between uses, and precisely calibrate operational parameters in response. This process can show gaps between projected and actual efficiency performance, a vital component of energy management, and can highlight opportunities to remedy poorly performing buildings, reduce wasted energy, and decrease costs. The intent of this PPO is to ensure that adequate metering and measurement systems are in place to facilitate ongoing tracking of energy usage.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects where energy is consumed during the project lifetime are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects that do not involve the renovation or upgrading of more that three of following systems considered to be 'key' to the installation of advanced energy metering of the building: - Mechanical Ventilation, heating, cooling and Domestic Hot Water systems - Electrical lighting systems - Electrical plug loads
EXEMPTIONS	
Projects that only have a single energy end use (i.e. lighting only) are exempt from any requirements for this PPO	

Path A: Performance Requirements

All projects following Path A must meet the following requirements:

01	**Provide building level metering for primary energy sources (i.e. electricity, natural gas, and water).** Project teams may do so by following the LEED Building Design and Construction Rating system Version 4 – *Building-Level Energy Metering* prerequisite. Independent organizations and tenants should be individually metered.

02	**Develop an energy metering scheme.** which captures the energy consumption for any energy use which represents more than 10% of the project's total energy use. The energy metering scheme should be developed according to the following guidelines.

03	**Identify energy consumption and generation sources.** Using preliminary energy modelling results from PPO 1A Reduce Operational Energy Consumption, develop an understanding of the project's energy consumption and what the primary uses of energy are. Identify any building energy consumption which makes-up at least 10% of the total energy use consumption. In typical buildings, the following end-uses may be good places to start:

- Ventilation
- Common Area Lighting
- Domestic Hot Water
- Exterior Lighting
- Space Heating
- Receptacle Equipment
- Space Cooling
- Heat Rejection
- Fans
- Pumps

04	**Consider meter management and energy monitoring software.** Outline the proposed characteristics of the metering scheme. Metering characteristics should consider the following:

- Meter recording and transmission intervals (ideally less than an hour).
- Metering Networks, and connectivity to the Building Automation Systems and accessibility.
- Scope of meter readings (should be both demand and consumption).
- Long term data storage.

05	**Develop a Commissioning and Operations Plan.**

Outline a strategy for reviewing and verifying the performance of the project's different metering systems.
This strategy should include the commissioning of the meters and outline the transition of systems to Metro Vancouver operations teams.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	No action required		
Design	Electrical Designer	Identify whole project energy metering scheme (electricity)	Report results as a Design Memo, to be appended to Preliminary Design Report
	Mechanical Designer	Identify whole project energy metering scheme (district heating, cooling or natural gas)	Report results as a Design Memo, to be appended to Preliminary Design Report
	Mechanical and Electrical Designer	Review preliminary energy model and identify energy end-uses	Brief report detailing modelled energy end-uses over 10% of total energy consumption.
	Project Lead	Review metering plan with Metro Vancouver Operations	Brief report to Mechanical and Electrical designer sharing Metro Vancouver metering scheme feedback
Construction	Commissioning Authority	Commissioning metering	Brief report detailing confirming commissioning of meters
		Outline Operations and Maintenance strategy for Metro Vancouver Operations team	Detailed design report outlining operations and maintenance plan
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Provide building level metering for primary energy sources (i.e. electricity, natural gas, and water).** Provide building level metering for primary energy sources (i.e. electricity, natural gas, and water). Project teams may do so by following the LEED Building Design and Construction Rating system Version 4 – *Building-Level Energy Metering* prerequisite.

02	**Develop a fundamental energy metering scheme** which captures the energy consumption for the three largest energy users for the project. The energy metering scheme should be developed according to the following guidelines.

03	**Evaluate energy consumption.** Using preliminary energy modelling results, develop an understanding of the project's energy consumption and what the primary uses of energy are. Identify the three highest energy using equipment in the building. In typical buildings, the following end-uses may be good places to start:

- Ventilation
- Common Area Lighting
- Domestic Hot Water
- Space Heating
- Space Cooling

04	**Outline a commissioning strategy** for reviewing and verifying the performance of the project's different metering systems. This strategy should include the commissioning of the meters and outline the transition of systems to Metro Vancouver operations teams. During commissioning, confirm that assets perform as per design across the expected operating range of the equipment. Document test results so that they can be used in the future as baseline conditions for ongoing Metro Vancouver performance monitoring and predictive maintenance. Outline operations and Maintenance documentation to provide information and guidance for Metro Vancouver to operate and maintain the systems at peak efficiency.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	No action required		
Design	Electrical Designer	Identify whole project energy metering scheme (electricity)	Report results as a Design Memo, to be appended to Preliminary Design Report
	Mechanical Designer	Identify whole project energy metering scheme (district heating, cooling or natural gas)	Report results as a Design Memo, to be appended to Preliminary Design Report
	Mechanical and Electrical Designer	Review preliminary energy model and identify energy end-uses	Brief report detailing modelled energy end-uses over 10% of total energy consumption
		Review schematic design for metering locations	Brief report detailing preliminary metering plan
	Project Lead	Review metering plan with Metro Vancouver Operations	Brief report to Mechanical and Electrical designer sharing Metro Vancouver metering scheme feedback
Construction	Commissioning Authority	Commissioning metering	Brief report detailing confirming commissioning of meters
		Outline Operations and Maintenance strategy for Metro Vancouver Operations team	Detailed design report outlining operations and maintenance plan
Closeout	No action required		

Pursuing Certification

Additional credits may be considered in line with the intent of the Install Advanced Energy Metering PPO. These credits represent opportunities available under the LEED v4 rating system and the points available for project teams pursuing certification:

Integrated Design Process (1 points)

The intent of this credit to identify and evaluate the performance objectives of the project early in the design to explore the most feasible options for increased energy, water, and embodied energy savings.

Enhanced Commissioning (Path 2 – Enhanced and Monitoring-Based Commissioning) (4 points)

The intent of this credit is to ensure that monitoring systems and procedures are in place to allow for measurement and evaluation of energy- and water-consuming systems.

Enhanced Commissioning (3-4 points)

The intent of this credit is to ensure the design, construction and operation of a project that meets the owner's project requirements for energy, water and embodied energy savings.

Additional Resources

Metro Vancouver – Energy and Greenhouse Gas Emissions Management Requirements

Metro Vancouver – Business Case Standard Economic Assumptions, Unit Conversions and Energy Pricing Memorandum

BC Housing – BC Energy Step Code Builder Guide

FortisBC – Building Metering Design Guide

Efficiency Valuation Organization (EVO) – International Performance Measurement and Verification Protocol (IPMVP)

Ministry of Energy, Northern Development and Mines – Ontario Energy and Water Reporting and Benchmarking Requirements

OPEN Technologies – Building Benchmark BC

US Environmental Protection Agency (EPA) – ENERGY STAR Portfolio Manager Technical Reference Manual

7.6 Facilitate Access to Low-Carbon & Active Transportation

Metro Vancouver's transportation system serves the many needs of the region, but also contributes almost 45% of regional GHG emissions. Of this, the majority come from single-occupancy vehicles powered by fossil fuels. The intent of this PPO is to reduce the environmental impact associated with the transportation of staff and visitors to a completed project by encouraging the uptake of non-combustion vehicles (i.e. electric- or hydrogen-powered vehicles), active transportation (e.g. bicycles, scooters, wheelchairs) and higher density modes of transportation (i.e. carpooling and mass transit).

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects with a minimum of 1 full-time equivalent occupant commuting to the project site are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following conditions are present: • Projects located on an existing site with limited connectivity to existing transit or cycling infrastructure • Projects that do not include significant additions or alterations to existing parking
EXEMPTIONS	
Projects that do not have full-time equivalent occupancies (i.e. at least 1 full time staff member or resident using the site) are exempt from any requirements for this PPO	

Path A: Performance Requirements

All projects following Path A must meet the following requirements:

01	**Survey transit connectivity.** All projects must conduct a review of available transit connections within 400m of the project's primary entrances. Where possible, locate the project where it is closer to transit stops with a service offering over 72 trips per day (weekday).

02	**Provide electric vehicle infrastructure.** All projects must provide infrastructure (i.e. panel space and conduit to the parking spots) for EV charging spaces in 100% of parking spaces.

03	**Conduct a low-carbon mobility survey.** All projects must perform a site evaluation and staff survey to determine demand for cycling amenities, carpooling, car-shares, and EV charging spaces.

- **Non-residential:** Where over 30% of surveyed staff support a given measure (i.e. carpooling, EV Charging, End-of-Trip cycling amenities), the following actions should be taken:
  - **Carpooling –** Meet the requirements of the LEED Building Design and Construction Rating system Version 4 – *Reduced Parking Footprint* credit including the following: Designate a minimum of 5% of parking for carpooling/car-sharing spaces
  - **EV Charging –** Meet the requirements of the LEED Building Design and Construction Rating system Version 4 – *Green Vehicles* credit including the following: Provide preferred HEV parking for 5% of parking and install Level 2 EV charging for 2% of parking
  - **End-of-Trip –** Meet the requirements of the LEED Building Design and Construction Rating system Version 4 – *Bicycle Facilities Case 1* requirements including the following: Provide bike parking for 2.5% of peak visitors and 5% of regular occupants and Provide end-of-trip changeroom, shower, and secure storage facilities for cyclists

Residential: Follow the local bylaw for residential parking requirements OR meet LEED Building Design and Construction Rating system Version 4 – *Bicycle Facilities Case 2* requirements provide, whichever is higher.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	No action required		
Design	Project Lead	Develop and administer parking survey	Scope outline and identification of parking
		Determine staff demand for cycling amenities	Draft survey and survey feedback
	Electrical Designer	Design EV charging infrastructure for applicable parking	Design and tender specification outlining required infrastructure
	Architect	Design and specify end-of-trip facilities for cyclists	Design and tender documentation for shower and changerooms
		Identify parking spaces available for EV charging designation	Specification of signage for dedicated EV charging parking spaces
		Identify parking spaces available for carpooling designation	Specification of signage for dedicated carpooling parking spaces
Construction	Contractor	Construct and install facilities and signage as outlined in the design and specifications	Field reports and on-site documentation
Closeout	Facility Operator	Manage and monitor use of facilities designated parking spaces	Management plans detailing the ongoing monitoring and supervision of bicycle facilities, EV charging spaces and Carpooling

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Non-residential:** Project teams must follow Step 2 outlined under Path A above for the purposes of identifying and meeting the demand for cycling amenities.
	• Where one or two individuals express interest in end of trip facilities, none need be provided • Where more than three individuals express interest in end-of trip facilities, one washroom should be made a shower and change room
02	**Residential:** Follow the local bylaw for residential parking requirements OR meet LEED Building Design and Construction Rating system Version 4 – *Bicycle Facilities Case 2* requirements provide, whichever is higher.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	No action required		
Design	Project Lead	Determine staff demand for cycling amenities	Draft survey and survey feedback
	Architect	Design and specify end-of trip facilities for cyclists (if applicable)	Design and tender documentation for shower and changerooms (if applicable)
Construction	Contractor	Construct and install facilities as outlined in the design and specifications	Field reports and on-site documentation
Closeout	Facility Operator	Manage and monitor use of facilities	Management plans detailing the ongoing monitoring and supervision of bicycle facilities

Pursuing Certification

Additional credits may be considered in line with the intent of the Facilitate Access to Low Carbon and Active Transportation PPO. These credits represent opportunities available under the LEED v4 rating system and the points available for project teams pursuing certification:

Bicycle Facilities (1 point)

The intent of this credit is to provide infrastructure to support cyclists and improve the viability of cycling to work rather than driving.

Access to Quality Transit (1-6 points for commercial, 1-5 points for residential)

The intent of this credit is to promotion selection of locations with good connectivity to existing transit routes and networks.

Reduced Parking Footprint (1 point)

The intent of this credit is to reduce the number of vehicle parking spaces provided for the project to reduce the availability and thus incentive for single occupant vehicle use.

Green Vehicles (1 point)

The intent of this credit is to provide infrastructure for high efficiency and electric vehicles in the form of premium parking spaces for high efficiency electric vehicles.

Additional Resources

Local transportation plan (as applicable)

TransLink– Trip Planner & Schedule Database

TransLink – Metro Vancouver Cycling Maps

City of Vancouver – Bicycle Parking Strategy

HUB Cycling – Not Just Bike Racks - Informing Design for End of Trip Cycling Amenities in Vancouver Real Estate

City of Toronto – Electric Vehicles

City of Vancouver – Electric Vehicles

Considering future climate. Low-carbon and active transportation opportunities can be made more resilient by ensuring sufficient safeguard measures against extreme weather events are in place. Project teams should provide adequate shading and drinking water infrastructure at transit stops for summer months, as well as appropriate measures to protect access to transit during heavy rainfall/snowfall events. Electric vehicle infrastructure can also be designed to allow bi-directional charging, allowing electric vehicles to be used as batteries for key services under power outages.

Useful resources to consider include:

BC Healthy Communities Society – Active Transportation

GreenCare – Active & Clean Transportation

Rand Corporation – Incorporating Resilience into Transportation Planning & Assessment

US Federal Transit Administration (FTA) – Bus Exportable Power Supply (BEPS) System Use Strategy

7.7 Use Reclaimed or Recycled Materials in Construction

New construction materials, especially those that are unable to be recycled, can consume large amounts of natural resources throughout their lifespan. Their production and distribution are responsible for both resource depletion and environmental impacts, while their eventual disposal after demolishment create significant quantities of waste. The intent of this PPO is to reduce the environmental impact of construction projects by encouraging the use of reclaimed materials (e.g. historical façades, timber from existing structures) and those with recycled content (e.g. concrete that incorporates crushed glass or wood chips).

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that make use or consume materials during construction are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following conditions are present: • Projects with simple assemblies that can only be sourced from a handful of suppliers
EXEMPTIONS	
Projects making substantial reuse (i.e. >50%) of existing building structure, envelope areas, floors, and roof areas have demonstrated substantial embodied energy reductions and are exempt of any requirements for this PPO	

Path A: Performance Requirements

All projects following Path A must meet the following requirements:

01	**Develop a materials Inventory.** The materials inventory should include estimated quantities of materials and approximate budgets for each material. Materials inventory should be address as many materials as possible with the exception of materials under CSI MasterFormat divisions 11, 21-28 (mechanical, plumbing, and electrical divisions).
02	**Identify reusable materials.** Using the material costs and quantities identified in the materials inventory, identify opportunities for the reuse of materials to equal 25% of the project's materials budget.
03	**Select and use reusable materials.** Tender and use identified recycled or reused materials which equal 25% of the project's total materials budget. Materials should be selected and included to satisfy LEED Version 4 – *Building Product Disclosure and Optimization – Sourcing of Raw Materials – Option 2 Leadership Extraction Practices.*

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	No action required		
Design	Project Lead	Lead project materials inventory	Brief Report outlining building materials, estimated quantities and budgets
	Design Team	Review and identify opportunities for reused materials	Report opportunities as a Design Memo, to be appended to Design Development Report (e.g. design basis)
		Coordinate and integrate reused materials into project design	Design drawings and technical specifications
Construction	Contractor	Tender and source reused materials	Reused materials shop drawings and submittals
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Develop a materials inventory.** Materials Inventory should be address as many materials as possible with the exception of materials under CSI MasterFormat divisions 11, 21-28 (mechanical, plumbing, and electrical divisions). Outline the project scope and key materials. Scope of materials should include the following:

- Structural
- Building envelope and finish materials:
  - Framing
  - Drywall
  - Insulations
  - Cladding
- Interior finishes
- Exterior finishes

02	**Identify reusable materials.** Using the material costs and quantities identified in the materials inventory, identify opportunities for the reuse of materials to equal 25% of the project's materials budget.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	No action required		
Design	Project Lead	Lead project materials inventory	Brief Report outlining building materials, estimated quantities and budgets
	Design Team	Review and identify opportunities for reused materials	Report opportunities as a Design Memo, to be appended to Design Development Report (e.g. design basis)
		Coordinate and integrate reused materials into project design	Design drawings and technical specifications
Construction	No action required		
Closeout	No action required		

Pursuing Certification

Additional credits may be considered in line with the intent of the Use Reclaimed or Recycled Materials in Construction PPO. These credits represent opportunities available under the LEED v4 rating system and the points available for project teams pursuing certification:

Integrated Design Process Credit (1 point)

The intent of this credit to identify and evaluate the performance objectives of the project early in the design to explore the most feasible options for increased energy, water, and embodied energy savings.

Building Product Disclosure and Optimization – Environmental Product Declaration (1 point)

The intent of this credit is to identify and selection products and materials where the environmental impacts associated with its production is disclosed by the manufacturer. This information can be used in the production of the LCA and used to demonstrate savings.

Building Product Disclosure (EPD) and Optimization – Souring of Raw Materials (1 point)

The intent of this credit is to use the EPD of materials to seek products with greater quantities of recycled content, reginal sourcing, and overall lifecycle impact. Guidance for this credit could help in the sourcing and selection of recycled materials with reduced embodied energy.

Additional Resources

British Columbia Ministry of Environment and Climate Change Strategy – LEED v4 and Low Carbon Building Materials: A Comprehensive Guide

International Living Future Institute (ILFI) – Declare Product Database

International Living Future Institute (ILFI) – Living Building Challenge: Materials Petal Intent

International Standards Organization (ISO) – ISO 14021: Environmental Labels & Declarations

Mindful MATERIALS – Mindful MATERIALS Library

UL Environment – SPOT

Vertima – Certified Products Directory

7.8 Divert Construction & Demolition Waste from Landfills

Construction and demolition waste represent a significant portion of the waste produced in Metro Vancouver, with much of it (e.g. wood, glass, plastics, and metals) being recyclable. The intent of this PPO is to ensure that that these products are managed properly instead of being sent to the landfill or incinerator, reducing the project's embodied emissions and overall impact on the environment.

A well-designed and well-executed construction waste management plan is essential to ensure that materials are handled correctly. Planning for construction waste management early in the process can make it easier to coordinate with local handlers for different material streams, and can highlight opportunities to lessen tipping fees and generate income by selling valuable scrap materials. Properly applied, these steps will help the region to transition to a more circular economy, where valuable materials are kept in active use over time.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects are expected to generate waste during the construction of the project are expected to comply **Path A**.	There is no **Path B** for this PPO.
EXEMPTIONS	
Projects where no construction waste is expected to be generated are exempt from any requirements for this PPO	

Path A: Performance Requirements

All projects following Path A must meet the following requirements:

01	**Develop a Construction Waste Management Plan.** Develop a plan and inventory to divert waste from construction activities from disposal at landfills.

- The Waste Management Plan must *include*:
  - Major demolition waste materials;
  - Major construction waste materials;
  - Reusable or recyclable materials on site;
  - Key contractors and responsible parties:
  - High-risk materials and specialty materials with unique disposal requirements.

- The Waste Management Plan should *consider* the following:
  - Waste diversion strategies;
  - Waste reduction;
  - Materials sent to recycling or reclamation facilities;
  - Materials composted on site or sent to a composting facility;
  - The use of material, if appropriate, as infill

02	**Undertake waste tracking throughout construction to demonstrate a 75% diversion rate**. During construction, continually track demolition and construction waste quantities by weight. Tracking should ideally be assembled in a uniform tracking sheet capable of cataloguing each source of waste exiting the site, the receiving facility, and the quantity diverted form the landfill. Tracking should target and demonstrate a 75% diversion (by weight) in all waste existing the site in line with the credit requirements of LEED Version 4 – *Construction and Demolition Waste Management – Path 2*. Construction waste tracking should be documented in such a way where information is available to validate claimed waste diversion by way of a weigh bill audit.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	No action required		
Design	Contractor	Develop preliminary Waste Management Plan	Brief Construction Waste Management Report
		Flag potentially challenging materials for diversion from landfill	Report results to be appended to Brief Construction Waste Management Report
Construction	Contractor	Finalize preliminary Construction Waste Management Plan	Comprehensive Construction Waste Management Report
		Track construction waste throughout construction	Consolidated construction waste diversion tracker
Closeout	No action required		

Path B: Alternative Compliance

Not applicable for this PPO.

Pursuing Certification

Additional credits may be considered in line with the intent of the Divert Construction and Demolition Waste from Landfills PPO. These credits represent opportunities available under the LEED v4 rating system and the points available for project teams pursuing certification:

Construction and Demolition Was Management Planning (prerequisite)

The intent of this prerequisite is to ensure the minimum level of waste management planning and diversion.

Building Product Disclosure (EPD) and Optimization – Souring of Raw Materials path 2 (1 point)

The intent of this credit path is to source materials with greater quantities of recycled content and reused materials. Guidance for this credit could help developing pathways for demolition and construction waste.

Construction and Demolition Waste Management (1-2 points)

The intent of this credit is to develop a strategy for targeting and achieving a waste diversion.

Additional Resources

Metro Vancouver – Integrated Solid Waste and Resource Management

International Living Future Institute (ILFI) – Living Building Challenge - Materials Petal Intent

Province of Manitoba – Construction, Renovation and Demolition Waste Management Guideline

Recycling Certification Institute (RCI) – Certification of Sustainable Recyclers

City of Toronto – Long Term Waste Management Strategy

7.9 Reduce Potable Water Use & Overall Water Use

Metro Vancouver provides clean, safe drinking water through its member municipalities for 2.6 million residents across the region. Ensuring this service involves a complex network of watersheds, dams, treatment facilities, reservoirs, pump stations and water mains, along with rigorous treatment and testing. Though we have relatively abundant water supplies, these are facing mounting pressure – we are witnessing continued drawdown of aquifers and lowered reservoir levels, issues that will only be exacerbated by climate change and steady population growth. The intent of this PPO is to limit the use of potable water for purposes other than drinking, and to promote more sustainable water use patterns overall.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects where water is consumed during the project lifetime are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects that do not involve the renovation or upgrading of water management or consuming systems: - Indoor Plumbing Fixtures - Irrigation - Evaporative Cooling Towers - Rainwater Management Systems
EXEMPTIONS	
Projects that do not include any water-using elements are exempt from any requirements for this PPO	

Path A: Performance Requirements

All projects following Path A must meet the following requirements:

01	**Design for basic water metering infrastructure.** All projects must provide infrastructure (i.e. whole building water meter) to capture water consumption for the project.

02	**Develop a water baseline.** All projects must perform a project evaluation to identify and estimate potable water consumption. Opportunities for alternative sources of water should also be explored to offset potable water consumption.

- **Indoor water use:** Review the existing and proposed plumbing fixtures to determine the proposed consumption rating of each fixture. Fixtures to be reviewed should include the following:
  - Water closets
  - Urinal (if applicable)
  - Lavatories
  - Kitchen Faucets
  - Shower heads

  Filling implements like tub-fillers, janitorial faucets are should not be considered.
- **Outdoor water use:** Review the existing and proposed irrigation systems to determine the proposed irrigation demand consumption. Irrigation demand should consider planting selection, irrigation system type, and controller technology.
- **Evaporative Cooling Systems:** Review the proposed evaporative cooling system to estimate the demand for potable water makeup. The evaluation should aim to determine the number of cooling cycles available before additional potable water is required to maintain cooling system integrity.

Project teams should consider the LEED Version 4 reference guide for development of an appropriate baseline.

03	**Establish opportunities for non-potable water use.** Identify any potable uses which could use non-potable water in lieu of potable water. Opportunities may include:

- Toilet Flushing
- Cooling tower make-up
- Irrigation (in non-spray applications)

Review opportunities to capture rainwater or greywater (washer machine water, dishwasher water, etc.) and treat it for reuse within the building in the applications considered above.

04	**Develop a water target.** All projects must demonstrate a reduction in potable water use according to the following:

- ***Indoor water use:*** Demonstrate a minimum of ***35% reduction*** in potable water relative to the LEED Version 4 – *Indoor Water Use Reduction* prerequisite and credit.
- ***Outdoor water use:*** Demonstrate a minimum of ***50% reduction*** in potable water relative to the LEED Version 4 – *Outdoor Water Use Reduction* prerequisite and credit.
- ***Evaporative Cooling Systems:*** Achieve a ***minimum of 10 cycles*** before the need for potable water make-up following the requirements of LEED Version 4 – *Cooling Tower Water Use* credit.

Path A: Demonstrating Compliance

Project Phase	Actor	Action	Documentation/ Deliverable
Definition	No action required		
Design	Mechanical Designer	Develop water baseline	Brief water use report detailing water consumption
		Identify preliminary non-potable water sources	Brief non-potable water report detailing water opportunities
		Establish preliminary water target and reduction strategies	Brief non-potable water report detailing water opportunities
		Design project water meter	Drawings and Technical Specification
		Coordinate water savings measures	Drawings and Technical Specification detailing water saving equipment selections
Construction	No action required		
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Provide basic water metering infrastructure** (i.e. whole building water metering) to capture water consumption for the project.
02	**Adopt measures in line with the 'We Love Water' campaign.**
03	**Specify water efficient equipment.** For indoor water fixtures and irrigation components, specify fixtures which are WaterSense certified.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	No action required		
Design	Mechanical Designer	Design project water meter	Drawings and Technical Specification detailing water meter selection and location
		Coordinate water savings measures (i.e. 'We Love Water' measures and WaterSense fixtures)	Drawings and Technical Specification confirming the selection of WaterSense fixtures
Construction	No action required		
Maintain and Operate Closeout	No action required		

Pursuing Certification

Additional credits may be considered in line with the intent of the Reduce Potable Water Use and Overall Water Use PPO. These credits represent opportunities available under the LEED v4 rating system and the points available for project teams pursuing certification:

Integrated Design Process (1 point)

The intent of this credit to identify and evaluate the performance objectives of the project early in the design to explore the most feasible options for increased energy, water, and embodied energy savings.

Building-Level Water Metering (prerequisite)

The intent of this credit is to ensure a fundamental tracking and accountability of potable water.

Outdoor Water Use (prerequisite; 1-2 points)

The intent of this credit is to reduce the quantity of potable water used for maintenance of outdoor landscaping.

Indoor Water Use (prerequisite; 1-6 points)

The intent of this credit is to reduce the quantity of potable water used for indoor functions like waste conveyance (flushing), cooking, and bathing.

Cooling Tower Water Use (prerequisite; 1-2 points)

The intent of this credit is to promote the use of non-potable water for makeup water and to verify makeup water quantities used from non-potable sources.

Advanced Water Metering (1 point)

The intent of this credit is to track water consumption, which can support water management and help identify opportunities for additional water savings.

Additional Resources

Metro Vancouver – Drinking Water Management Plan

Metro Vancouver – We Love Water Campaign

International Living Future Institute (ILFI) – Living Building Challenge: Water Petal Intent

City of Toronto – Water Efficient Landscaping

City of Vancouver – Becoming a Water Wise City

City of Vancouver – Rainwater Management Bulletin

US Environmental Protection Agency (EPA) – WaterSense Calculator

Considering future climate. Reduced water supply as a result of reduced snowpack and hotter, drier summers strain supplies during times of year when demand is the greatest. Project teams should make use of future climate projections as a way of understanding future potential drought risk to building water supply and landscaping needs, and identify suitable design strategies to ensure water conservation both now and in the future.

Key resources include:

Metro Vancouver – Drinking Water Management Plan

Metro Vancouver – Drinking Water Conservation Plan

Province of BC – Drought Response Plan

Province of BC – Drought Information Portal

7.10 Minimize the Impact on Stormwater Runoff Quantity, Rate & Quality

There is a growing need to consider the impact that building and infrastructure projects can have on the hydrological cycle, especially stormwater runoff. Metro Vancouver's population is growing, hard surface areas are increasing, and climate change is increasing the frequency and severity of extreme precipitation events. If not properly managed, stormwater can lead to serious environmental impacts including erosion, downstream flooding, and the introduction of harmful sediments and pollutants into sensitive ecosystems. Scaling up grey infrastructure to meet these challenges is a time-intensive and costly endeavour and there may be opportunities on-site to leverage natural assets such as creeks, wetlands, and greenspace to enhance site drainage. The intent of this PPO is to guide the development of an on-site stormwater management plan that emphasizes green infrastructure and low-impact development strategies, while also creating more natural areas, reducing the heat island effect, and providing opportunities for cost savings.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that are expected to impact stormwater runoff are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects that do not involve the alteration to key site characteristics as part of the main scope of work, including - Site hardscapes (Parking, roadways, sidewalks, etc.) - Landscaping - Rooftop drainage systems
EXEMPTIONS	
Projects that do not have any scope of work outside the building are exempt from any requirements for this PPO	

Path A: Performance Requirements

All projects following Path A must meet the following requirements:

01	**Develop a Stormwater Management Strategy** that recognizes the following attributes:

- Pre-development runoff rates and quality
- Preliminary estimates on post-development run-off rates
- Landscape and native soils locations for infiltration
- Locations and opportunities for stormwater management infrastructure.

The Stormwater Management strategy must satisfy the following:

- Replicate natural site hydrology processes, manage on site the runoff from the developed site for the 95th percentile of regional or local rainfall events in line with LEED Version 4 – *Rainwater Management* credit – Option 1, Path 1.
- Identify and remove and average of 80% of Total Suspended Soils (TSS) from a minimum of 90% of total rainwater runoff from the site in line with LEED version 2009 *Stormwater Design: Quality Control* credit.
- Ensure peak flow rate discharged to the sewer under post-development conditions is not greater than the peak pre-development flow rate for the return period specified by the authority having jurisdiction. Metro Vancouver IDF curves (using rain relevant rain gauges or the relevant rainfall study and climate projections), together with municipality-specific IDF curves (the latter which may be more stringent) shall be utilized for design flow calculations.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	Project Lead	Engage Civil Consultant to develop stormwater strategy	Scope and RFP document to communicate stormwater management performance requirements to Civil consultants
Design	Site Civil Engineer	Develop stormwater management strategy	Comprehensive report detailing, pre and post development runoff rates, infiltration opportunities, and locations for stormwater management infrastructure
		Coordinate stormwater management strategy	Design drawings and technical specifications to support stormwater management scheme
		Final stormwater management calculations affirming compliance with required stormwater management	Updated comprehensive report stormwater management scheme and compliance with management practices
Construction	No action required		
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Ensure Compliance with stormwater management policy.** Following the guidance of item A1, all projects must meet applicable municipal requirements around stormwater management.

02	**Develop a Stormwater Strategy.** Develop a preliminary study that recognizes the following attributes:
	• Landscape and native soils locations for infiltration. • Locations and opportunities for stormwater management infrastructure.

03	**Identify and implement any available measures:** which reduces peak post-development stormwater runoff quantities. Detail specific barriers to further developing stormwater infrastructure.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	No action required		
Design	Project Lead / Landscape Architect	Develop stormwater strategy	Preliminary report detailing locations for stormwater management infrastructure
		Develop stormwater management strategy	Comprehensive report detailing, pre and post development runoff rates, infiltration opportunities, and locations for rainwater management infrastructure
		Coordinate stormwater management strategy	Design drawings and technical specifications to support stormwater management scheme
	Project Lead	Detail limitation to stormwater management	Brief report identifying stormwater management limitations
Construction	No action required		
Closeout	No action required		

Pursuing Certification

Additional credits may be considered in line with the intent of the Minimize the Impact on Stormwater Runoff Quantity, Rate and Quality PPO. These credits represent opportunities available under the LEED v4 rating system and the points available for project teams pursuing certification:

SSp1 – Construction Activity Pollution Prevention (prerequisite)

The intent of this prerequisite is to reduce pollution from construction activities by controlling soil erosion, waterway sedimentation, and airborne dust.

SSc1 – Site Selection (1 point)

The intent of this credit is to avoid development of inappropriate sites and reduce the environmental impact from the siting of a project.

SSc2 – Protect and Restore Habitat and Open Space (2 points)

The intent of this credit is to conserve existing natural areas and undertake remediation of existing areas that have been damaged.

SSc4 – Rainwater Management (2 points)

The intent is to reduce runoff volume and improve water quality by replicating the natural hydrology and water balance of the site.

Additional Resources

Erosion & Sediment Control Association of British Columbia (ESCA BC) – ESC Best Management Practices

International Living Future Institute (ILFI) – Living Building Challenge: Water Petal Intent

City of Vancouver – Citywide Integrated Stormwater Management Plan

City of Vancouver – Integrated Stormwater Management Vision, Principles & Actions

City of Vancouver – Integrated Stormwater Management Best Practice Toolkit

Considering future climate. Metro Vancouver already uses IDF curves to assess the impact of future runoff events. However, there are also opportunities to address the impact of storm and flood events on building sites and infrastructure themselves. While urban flooding from periods of extreme rainfall can cause immediate and long-term damage, these impacts can be addressed using careful site selection, structural and site drainage design decisions, prioritizing green infrastructure, the strategic location of key mechanical systems above grade, and careful materials selection.

Key resources include:

Metro Vancouver – Climate Projections for Metro Vancouver

Metro Vancouver – Template for Integrated Stormwater Management Planning

Province of BC – Stormwater Planning Guidebook

7.11 Select Site to Protect Sensitive Ecosystems & Preserve/Enhance Habitat Function

The region's rich and varied natural spaces perform critical functions called ecosystem services that capture and store carbon, clean the air and water, cool our city streets, and protect us from hazards, among others. However, pressure from human development is causing many of these areas to be lost or to change in function, which will have resounding impacts on the health and resilience of our communities. Metro Vancouver monitors and reports on the status of sensitive ecosystems through a number of plans, including *Metro 2040*, the *Ecological Health Framework*, and the *Natural Resource Management Framework*. In alignment with these initiatives, the intent of this PPO is guide projects that carefully consider sensitive ecosystems on site include measures to preserve and enhance the natural functions of these areas.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that are sited on new and/or undeveloped areas are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects with limited control of siting or landscaping areas, and where preserving or adding greenspace will be difficult • Projects where additional greenspace will compromise the ability to meet the project requirements or objectives (e.g. parking lots, works yards, etc.)
EXEMPTIONS	
Projects which include programming which cannot support existing or additional greenspace are exempt from any requirements of this PPO	

Path A: Performance Requirements

All projects following Path A must meet the following requirements:

01	**Identify areas of ecological value.** Develop a site map which identifies and inventory's existing ecological areas. Places of high ecological value should be protected from all forms of development and construction activity. If applicable, a minimum of 40% of the site should be preserved in line with the requirements of LEED Version 4 – *Site Development – Protect and Restore Habitat* credit.

02	**Develop a vegetation strategy.** Create a site plan highlighting both existing vegetated areas and opportunities for the addition of greenspace throughout the project. The vegetation strategy should consider the following:

- Locations and areas of greenspace.
- Identified roof-level areas within the project boundary which could accommodate greenspace.
- Existing sensitive ecological spaces.
- Identified ground-level areas within the project boundary which could accommodate greenspace.

Vegetation strategy must establish a means of vegetating a minimum of 30% of the project site in line with the requirements of LEED Version 4 – *Site Development – Protect and Restore Habitat* credit.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	No action required		
Design	Landscape Architect	Identify areas of ecological value	Brief areas of ecological value report
		Design the project to preserve ecological spaces	Preliminary design report detailing preserved ecological spaces and design responses
		Design the project to increase vegetated areas in the project	Preliminary design report detailing added vegetated spaces
	Architect	Support the addition of vegetated spaces to project buildings	Preliminary design report detailing added vegetated spaces on the building
Construction	Contractor	Implement measures to protect / avoid areas of high ecological value	Construction Management Plan and Standard Operating Procedures
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Identify areas of ecological value.** Develop a site map which identifies and inventory's existing ecological areas. Places of high ecological value should be protected from all forms of development and construction activity.

02	**Implement mitigation measures.** Provide rationale for why avoidance of siting project in area of high ecological value is not possible. Identify and stipulate mitigation measures or strategies to be implemented.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	No action required		
Design	Landscape Architect	Identify areas of ecological value	Brief areas of ecological value report
		Design the project to preserve ecological spaces	Preliminary design report detailing preserved ecological spaces and design responses
Construction	Contractor	Implement measures to protect / avoid areas of high ecological value	Construction Management Plan and Standard Operating Procedures
Closeout	No action required		

Pursuing Certification

Additional credits may be considered in line with the intent of the Select Site to Protect Sensitive Ecosystems and Preserve/Enhance Habitat Function PPO. These credits represent opportunities available under the LEED v4 rating system and the points available for project teams pursuing certification:

Site Selection (1 point)

The intent of this credit is to avoid development of inappropriate sites and reduce the environmental impact from the siting of a project.

Protect and Restore Habitat and Open Space (2 points)

The intent of this credit is to conserve existing natural areas and undertake remediation of existing areas that have been damaged.

Rainwater Management (2 points)

The intent is to reduce runoff volume and improve water quality by replicating the natural hydrology and water balance of the site.

Additional Resources

The Sustainable Sites Initiative (SITES)

US Environmental Protection Agency (EPA) – Ecoregions

Fraser Basin Council – Salmon Safe Certification

Considering future climate. Changes in climate will bring with them changes to ecosystem makeup and distribution as well. In evaluating options to preserve or enhance sensitive ecosystems, project teams should consider how any potential harmful impacts to local ecosystems may increase as a result of climate change, potentially increasing its overall sensitivity. Where selecting plant species for the site, consider how a warmer climate might impact their overall suitability into the future. Project teams may also wish to consider how natural assets such as mature trees, creeks, and wetlands can be retained, restored, and enhanced to provide ecosystem services.

Metro Vancouver offers several useful tools on this topic:

Metro Vancouver – Urban Forest Climate Adaptation Initiative

Metro Vancouver – Tree Species Selection Database

Metro Vancouver – Urban Tree List for Metro Vancouver in a Changing Climate

7.12 Develop & Implement an Invasive Species Management Plan

Invasive species are non-native plants and animals that cause environmental harm in areas where they are introduced. Without natural checks in place, they can quickly dominate a new region by outcompeting existing species for nutrients, light, physical space, water or food. Invasive species can have far reaching environmental, economic and social impacts, such as reducing soil productivity, causing crop losses, and causing the loss of traditional food and medicinal plants. Invasive species are introduced and spread in a number of ways, many of them unintentional, and major construction projects are a primary culprit. Metro Vancouver, in collaboration with the Invasive Species Council of Metro Vancouver and member jurisdictions, as been working to develop and implement best practise for managing existing invasive species and preventing future occurrences. In support of this work, the intent of this PPO is to guide projects that protect and enhance the natural environmental through invasive species management.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that are sited on areas containing invasive species, or that involves landscaping are expected to comply with the requirements of **Path A**.	There is no **Path B** for this PPO.
EXEMPTIONS	
Projects where there is no landscaping scope or that are not located in areas containing invasive species are exempt from any requirements for this PPO	

Path A: Performance Requirements

All projects following Path A must meet the following requirements:

01	**Reduce invasive species spread.** Develop an inventory of existing invasive species existing on-site. A site assessment should be developed which should include the following: • Identification of existing species. • Invasive species management techniques. • Locations and extents of invasive species. • Review of proposed landscape design and proposed species to affirm no addition of invasive species. **Any identified invasive species must be eliminated.** To support this, a construction management plan must be developed to ensure the following: • Existing invasive species are removed in an appropriate manner as to ensure they do not spread further. • New species added to the project are not on any existing invasive species list.
02	**Maintain invasive species management.** After construction continue to review the site to identify and eliminate any identified invasive species. The developed Construction management Plan should act as a solid base for ongoing invasive species management.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	No action required		
Design	Environmental Scientist / Landscape Architect	Develop an inventory of existing invasive species	Brief inventory of existing invasive species
	Landscape Architect	Landscape design ensure the use of non-invasive species	Tender design and construction documents
	Environmental Scientist / Landscape Architect	Develop preliminary construction management plan	Comprehensive report identifying invasive species and appropriate management techniques
Construction	Contractor	Implement construction management plan	Brief report detailing ongoing invasive species management
		Select non-invasive species	Tender documents/ drawings detailing selected non-invasive species
Closeout	Operator	Maintain invasive species management	Operational Management Plan for invasive species based on construction management plan

Path B: Alternative Compliance

Not applicable for this PPO.

Pursuing Certification

Additional credits may be considered in line with the intent of the Develop and Implement an Invasive Species Management Plan PPO. These credits represent opportunities available under the LEED v4 rating system and the points available for project teams pursuing certification:

Site Selection (1 point)

The intent of this credit is to avoid development of inappropriate sites and reduce the environmental impact from the siting of a project.

Protect and Restore Habitat and Open Space (2 points)

The intent of this credit is to conserve existing natural areas and undertake remediation of existing areas that have been damaged.

Innovation in Design (1 point)

An opportunity may exist to adopt landscape and species management best practice from alternate rating systems like SITES.

Additional Resources

Metro Vancouver – Invasive Species Management Plan

Province of BC – Priority Invasive Species in BC

Province of BC – Status of Invasive Species in BC

Invasive Species Council of BC

Invasive Species Council of Metro Vancouver

Considering future climate. As ecosystems change, so too does the range and risk of invasive species. Project teams should consider how an invasive species management plan may need to address the introduction or dominance of invasive species within the project lifetime as a result of the changing climate.

Key resources to consider include:

Metro Vancouver – Invasive Species Management Plan

Province of BC – Climate Change Vulnerability of BC's Fish & Wildlife

Invasive Species Centre – Invasive Species in a Changing Climate

7.13 Preserve Soils & Restore Disturbed Areas with Appropriate Soil to Support Healthy Vegetation

The rich soils found across Metro Vancouver serve a multitude of functions – they store and regulate water and nutrients, support food security, and help to absorb carbon. Metro Vancouver has estimated that Delta's agricultural soils and vegetation alone store almost one million tonnes of carbon. However, construction activities can disturb soil health and disrupt these functions. Redistributed soil is less capable of absorbing stormwater and supporting vegetation, while compaction caused by construction equipment can kill surrounding plants and trees, and prevent future plant growth. The intent of this PPO is to ensure that disturbed soils are properly restored to be healthy and productive.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that impact or disturb soil during construction are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects with limited control of siting or landscaping areas, where preserving greenspace or adding greenspace will be difficult • Projects where additional greenspace will compromise the ability to meet the project requirements or objectives (i.e. parking lots, works yards, etc.)
EXEMPTIONS	
Projects where there is no disturbance of the existing site or soils are exempt from any requirements for this PPO	

Path A: Performance Requirements

All projects following Path A must meet the following requirements:

01	**Identify areas of with high-value soils.** Develop a site map that identifies and inventories existing ecological areas and quality soils. Soils should be identified in line with the Government of Canada National Soil Database (NSDB). Places with high soil suitability should be protected from all forms of development and construction activity. If applicable, a minimum of 40% of the site should be preserved in line with the requirements of LEED version 4 *Site Development – Protect and Restore Habitat* credit.

02	**Develop a soil management strategy.** Create a site plan highlighting both existing soils and proposed excavation as well as and opportunities for the restoration of soils throughout the project. The soil management strategy should consider the following:

- Locations and quantities of soils.
- Proposed scope of construction including soil removal and backfill activities.
- Any contaminated soils in need of remediation (both by contamination, disturbance, or compaction).
- Opportunities for relocation or restabilising of existing high suitability soils.

The Soil Management strategy must be implemented and tracked through construction. Any soils identified as in need of remediation must be removed or remediated.

- **Imported soils:** Soils brought onto site must meet the following conditions:
  - Soils (imported and in situ) must be reused for functions comparable to their original function.
  - Soils from other greenfield sites, unless those soils are a by product of a construction process.
  - Soils defined regionally by the Government of Canada National Soil Database as prime farmland, unique farmland, or farmland of provincial or local importance.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	No action required		
Design	Landscape Architect/ Geotechnical consultant	Identify areas of ecological value	Brief areas of ecological value report highlighting part of the site or exiting landscapes meriting additional protection
		Identified any contaminated soils	Brief contaminated soils report outlining location and extent of exiting contamination
	Landscape Architect	Design the project to preserve soils	Preliminary design report detailing preserved ecological spaces and design responses
		Where the addition of soils is required specify soils in line with conditions above	Preliminary design report detailing added soils and potential sources
Construction	Contractor	Remediate contaminated soils	Compliance report confirming soil remediation
		Implement measures to protect / avoid excavation of high-grade soils value	Construction Management Plan and Standard Operating Procedures
		Source soils which meet the three criteria for imported soils	Construction documentation confirming the selection of soils
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Identify contaminated soils** using local provincial or federal registries of contaminated sites and local site survey and testing where applicable.

02	**Restore contaminated soils.** If soil contamination is identified, remediate or remove contaminated soils. Contaminated soils should be managed in accordance with authority having jurisdiction.

- *Imported soils:* Soils being brought onto site must meet the following conditions:
  - Soils (imported and in situ) must be reused for functions comparable to their original function.
  - Soils defined regionally by the Government of Canada National Soil Database as prime farmland, unique farmland, or farmland of provincial or local importance; or
  - Soils from other greenfield sites, unless those soils are a by product of a construction process.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/Deliverable
Definition	No action required		
Design	Landscape Architect/ Geotechnical consultant	Identified any contaminated soils	Brief contaminated soils report outlining location and extent of exiting contamination
	Landscape Architect	Where the addition of soils is required specify soils in line with conditions above	Preliminary design report detailing added soils and potential sources
Construction	Contractor	Remediate contaminated soils	Compliance report confirming soil remediation
		Source soils which meet the three criteria for imported soils	Construction documentation confirming the selection of soils
Closeout	No action required		

Pursuing Certification

Additional credits may be considered in line with the intent of the Preserve Soils and Restore Disturbed Areas with Appropriate Soil to Support Healthy Vegetation PPO. These credits represent opportunities available under the LEED v4 rating system and the points available for project teams pursuing certification:

Site Selection (1 point)

- The intent of this credit is to avoid development of inappropriate sites and reduce the environmental impact from the siting of a project.

High-Priority Site Option 3 – Brownfield Remediation (2 points for residential; 3 points commercial)

- The intent of this credit it to identify and remediate contaminated sites in line with the appropriate procedure.

Protect and Restore Habitat and Open Space (2 points)

- The intent of this credit is to conserve existing natural areas and undertake remediation of existing areas that have been damaged.

Additional Resources

Government of Canada – Soil Database & Maps

Province of BC – Contaminated Sites Registry

Province of BC – Soil Information Finder

Considering future climate. While not immediately apparent, a changing climate may also impact on overall soil health. Project teams should consider how climate hazards such as sea level rise, acidification, and salination may impact the ability to restore soil to support healthy vegetation.

Helpful resources on this topic include:

Province of BC – Sea Level Rise Adaptation Primer

Province of BC – Best Practices for Prevention of Saltwater Intrusion

7.14 Prevent Pollutants from Contaminating Surface Water & Ground Water

Construction projects often lead to erosion, sedimentation, and pollution that add to the challenge of keeping Metro Vancouver's water supplies clean. This can also lead to increased flooding potential, disruption of natural stream habitats, and altered water flow. Controlling these contaminants at the source is the most effective way to protect the viability of our water resources, rather than trying to clean up after pollution has already occurred. The intent of this PPO is to mitigate water contamination by capturing and treating water runoff before it enters the Metro Vancouver system or sensitive natural areas.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that are expected to impact stormwater runoff are expected to comply with the requirements of **Path A**.	There is no **Path B** for this PPO.
EXEMPTIONS	
Projects that do not have any scope of work outside the building are exempt from any requirements for this PPO	

Path A: Performance Requirements

All projects following Path A must meet the following requirements:

01	**Develop a Rainwater Quality Strategy** that recognizes the following attributes: • Identifies and remove and average of 80% of Total Suspended Soils (TSS) from a minimum of 90% of total stormwater runoff from the site in line with LEED version 2009 *Stormwater Design: Quality Control* credit.
02	**Develop a Construction Activity Pollution Prevention plan.** Complete an erosion, sedimentation, and pollutant control plan in line with LEED Version 4 – *Construction Activity Pollution Prevention* prerequisite.

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	Project Lead	Engage Civil Consultant to develop stormwater quality strategy	Scope and RFP document to communicate stormwater quality performance requirements to Civil consultants
Design	Site Civil Engineer	Develop stormwater quality management strategy	Brief report detailing key locations and opportunities to improve stormwater quality
		Coordinate stormwater quality management strategy	Design drawings and technical specifications to support stormwater quality management scheme
Construction	Contractor	Develop Construction Activity Pollution Prevention plan	Construction Activity Pollution Prevention plan
		Document Construction Activity Pollution Prevention plan	Field reports and photo documentation to prove implementation of Construction Activity Pollution Prevention measures
Closeout	No action required		

Path B: Alternative Compliance

Not applicable for this PPO.

Pursuing Certification

Additional credits may be considered in line with the intent of the Prevent Pollutants from Contaminating Surface Water and Ground Water PPO. These credits represent opportunities available under the LEED v4 rating system and the points available for project teams pursuing certification:

Construction Activity Pollution Prevention (prerequisite)

The intent of this prerequisite is to reduce pollution from construction activities by controlling soil erosion, waterway sedimentation, and airborne dust.

Stormwater Quality Management (1 credit)

The intent of this prerequisite is to the quantity of Total Suspended Solids (TSS) in site rainwater runoff.

Additional Resources

Metro Vancouver – Stormwater Management Resources

Metro Vancouver – Stormwater Source Control Design Guidelines

Metro Vancouver – Best Management Practices Guide for Stormwater

Erosion & Sediment Control Association of British Columbia (ESCA BC) – ESC Best Management Practices

International Living Future Institute (ILFI) – Living Building Challenge: Water Petal Intent

City of Vancouver – Citywide Integrated Stormwater Management Plan

City of Vancouver – Integrated Stormwater Management Vision, Principles & Actions

City of Vancouver – Integrated Stormwater Management Best Practice Toolkit

Fraser Basin Council – Salmon Safe Certification

Considering future climate. Climate projections for Metro Vancouver are showing a likely increase in overall precipitation in the fall, winter and spring, as well as an increase in storm events. To mitigate the impacts of these changes, design teams should consider how pollution risks and impacts (e.g. from road runoff or contaminated sites) may be exacerbated due to increased precipitation and storm events, as well as the impact on the selection of strategies to mitigate and manage water runoff.

Useful resources to consider include:

Metro Vancouver – Climate Projections for Metro Vancouver

Metro Vancouver – Template for Integrated Stormwater Management Planning

Province of BC – Stormwater Planning Guidebook

7.15 Reduce Air Pollutant Sources During Construction

Metro Vancouver is responsible for managing and regulating air contaminants throughout the region, and has set ambitious clean air targets for 2030:

- Ambient air quality in the region meets or is better than health-based ambient air quality objectives and standards set by Metro Vancouver, the BC Government and Government of Canada.
- Increase the amount of time that visual air quality is classified as excellent.

Construction projects are a major contributor of air pollutants, primarily fine and coarse particulate matter (e.g. dust) and volatile organic compounds from construction materials (e.g. adhesives, sealants). The intent of this PPO is to guide projects that control construction activity pollution and limit the use of emitting materials. Reducing the level of these air contaminants can also help to improve visual air quality and reduce unpleasant odours for residents and businesses.

Applicability

Path A **Performance Requirements**	**Path B** **Alternative Compliance Pathway**
All projects that include construction activities are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Project scope of work does not include any interior works or finishes
EXEMPTIONS	
Projects where there are no construction activities are exempt from any requirements for this PPO	

Path A: Performance Requirements

All projects following Path A must meet the following requirements:

01	**Complete a Construction Indoor Air Quality Management Plan** in line with LEED Version 4 – *Construction Indoor Air Quality Management* credit. The plan should identify and establish a response to the indoor air quality risks brought about through construction according to the following criteria:

- ***HVAC protection.*** Keep contaminants out of the HVAC system. Do not run permanently installed equipment if possible or maintain proper filtration if it is used.
- ***Housekeeping.*** Maintaining a clean job site results in fewer IAQ contaminants to manage.
- ***Source control.*** Keep sources of contaminants out of the building and have a plan to eliminate any that are introduced.
- ***Scheduling.*** Sequence construction activities to reduce air quality problems in new construction projects. For major renovations, coordinate construction activities to minimize or eliminate disruption of operations in occupied areas.
- ***Pathway interruption.*** Prevent circulation of contaminated air when cutting concrete or wood, sanding drywall, installing VOC-emitting materials, or performing other activities that affect indoor air quality (IAQ) in other workspaces.

The Construction IAQ Management Plan should be implemented and closely monitored and documented as soon as the building is enclosed.

02	**Use low-emission materials.** Project teams must identify and install interior finishes and materials with emission intensities within a level identified to be non-impactful to human health. Project teams should follow and satisfy the LEED Version 4 – *Low-Emitting Materials*, specifically the following material categories:

- Interior Paints and Coatings
- Adhesives and Sealants
- Flooring
- Composite Woods
- Ceilings, walls, thermal, and acoustic Insultations

Path A: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	No action required		
Design	Architect, Electrical, Mechanical Design Consultants	Specifications identifying emissions limits for material categories	Specifications detailing materials and emissions limits as well as procedures for collection and sharing materials emissions
Construction	Contractor	Develop Construction Activity Pollution Prevention and Indoor Air Quality Management plan	Construction Activity Pollution Prevention and Indoor Air Quality Management plan
		Document Construction Activity Pollution Prevention and Indoor Air Quality Management plan	Field reports and photo documentation to prove implementation of Construction Activity Pollution Prevention and Indoor Air Quality Management measures
		Provide and vet materials for emission limit compliance	Shop drawings or materials submittals detailing materials emissions and confirmation they are below applicable thresholds
Closeout	No action required		

Path B: Alternative Compliance

All projects following Path B must meet the following requirements:

01	**Complete a Construction Indoor Air Quality Management Plan** in line with LEED Version 4 – *Construction Indoor Air Quality Management* credit. The plan should identify and establish a response to the indoor air quality risks brought about through construction according to the following criteria:

- ***HVAC protection.*** Keep contaminants out of the HVAC system. Do not run permanently installed equipment if possible or maintain proper filtration if it is used.
- ***Source control.*** Keep sources of contaminants out of the building and have a plan to eliminate any that are introduced.
- ***Pathway interruption.*** Prevent circulation of contaminated air when cutting concrete or wood, sanding drywall, installing VOC-emitting materials, or performing other activities that affect indoor air quality (IAQ) in other workspaces.
- ***Housekeeping.*** Maintaining a clean job site results in fewer IAQ contaminants to manage.
- ***Scheduling.*** Sequence construction activities to reduce air quality problems in new construction projects. For major renovations, coordinate construction activities to minimize or eliminate disruption of operations in occupied areas.

The Construction IAQ Management Plan should be implemented and closely monitored and documented as soon as the building is enclosed.

Path B: Demonstrating Compliance

Phase	Actor	Action	Documentation/ Deliverable
Definition	No action required		
Design	Architect, Electrical, Mechanical Design Consultants	Specifications identifying emissions limits for material categories	Specifications detailing materials and emissions limits as well as procedures for collection and sharing materials emissions
Construction	Contractor	Develop Construction Activity Pollution Prevention and Indoor Air Quality Management plan	Construction Activity Pollution Prevention and Indoor Air Quality Management plan
		Document Construction Activity Pollution Prevention and Indoor Air Quality Management plan	Field reports and photo documentation to prove implementation of Construction Activity Pollution Prevention and Indoor Air Quality Management measures
Closeout	No action required		

Additional credits may be considered in line with the intent of the Reduce Air Pollutant Sources During Construction PPO. These credits represent opportunities available under the LEED v4 rating system and the points available for project teams pursuing certification:

Construction Activity Pollution Prevention (prerequisite)

The intent of this prerequisite is to reduce pollution from construction activities by controlling soil erosion, waterway sedimentation, and airborne dust.

Low-Emitting Materials (3 points)

The intent of this credit is to support the identification of potentially harmful materials emissions and intervene to ensure concentrations stay within acceptable levels.

Construction Indoor Air Quality Management Plan (1 point)

The intent of this credit is to reduce pollution from indoor construction activities.

Additional Resources

Metro Vancouver – Air Quality Regulatory Program

Metro Vancouver – Emissions Inventories & Forecasts

Metro Vancouver – Sustainability Innovation Program

International Standards Organization (ISO) – ISO/TC 146: Air Quality

International Standards Organization (ISO) – ISO 3740: Acoustics

Sheet Metal & Air-Conditioning National Contractors Association (SMACNA) – Indoor Air Quality Guidelines for Occupied Buildings Under Construction

South Coast Air Quality Management District (SCAQMD) – Materials Emissions Rules

WorkSafeBC – OHS Regulation Part 4: General Conditions

WorkSafeBC – OHS Regulation Part 7: Noise, Vibration, Radiation and Temperature

Considering future climate. Regional air quality may be exacerbated in the coming decades as the magnitude and frequency of wildfire events increases. Dangerous indoor air quality from wildfire smoke events can compound existing sources of contamination (e.g. ground-level ozone, pollution from traffic and industry), making this a significant health risk for certain populations. Reducing this risk requires thoughtful ventilation and filtration design, and minimizing sources of pollutants wherever possible. Design teams should consider how air pollution may be exacerbated due to increased wildfire smoke and ozone depletion, and the impact on the need to mitigate and manage air pollution.

Key reference materials include:

BC Energy Step Code Design Guide Supplement on Overheating & Air Quality

BC Centre for Disease Control (BCCDC) – Wildfire Smoke

US Environmental Protection Agency (EPA) – Wildfires & Indoor Air Quality

Appendix A: Project Types & Components

The following infrastructure and building project types, and the various components that make up these projects, were used in the development of the Sustainable Infrastructure and Buildings Design Guide.

Dwelling Spaces

Spaces used primarily for housing

- Low-rise MURBs (low density)
- High-rise MURBs (High density)
- Townhomes
- Single-room occupancies (SROs)
- Hospices
- Heritage buildings

Habitable Spaces

Professional and/or specialized space used for continual human occupancy and conditioned primarily to the needs of people.

- Offices
- Administrative spaces
- Facilitation spaces (private)
- Workshops / maintenance rooms
- Laboratories
- Kitchens / lunchrooms
- Washrooms (public and staff)
- Change rooms
- First aid rooms
- Nature centre
- Research centre
- Assembly Space
- Exercise rooms / gyms
- Public kitchens (commercial)
- Plant control rooms
- Transfer station buildings / scale houses
- Concession stands

Indoor Storage / Workshops

Enclosed or mostly enclosed space used to store equipment, parts, process consumables and other items, and conditioned as necessary primarily to support these purposes. Enclosed or mostly enclosed workshop space, conditioned as necessary primarily to support this use.

- Workshops
- Parts and equipment storage rooms
- Parking / vehicle storage rooms
- Storage rooms

Outdoor Storage / Shops

Outdoor or mostly outdoor space used to store equipment, parts, process consumables and other

- Chemical / fuel storage (specific/ bulk) outdoor – wet/dry/gas
- Coating and lining
- Equipment storage
- Covered work areas

Tankage / Reservoirs

Infrastructure used to store liquid or gas.

- Pressurized tanks (e.g. CO_2, biogas)
- Liquid tanks and closed reservoirs: primary clarifiers
- Liquid tanks and closed reservoirs: bioreactors & aeration
- Liquid tanks and closed reservoirs: secondary clarifiers
- Liquid tanks and closed reservoirs: sludge thickening tanks
- Liquid tanks and closed reservoirs: aerobic & anaerobic digesters
- Liquid tanks and closed reservoirs: equalization tank
- Liquid tanks and closed reservoirs: pre-treatment
- Liquid tanks and closed reservoirs: coagulation & flocculation
- Liquid tanks and closed reservoirs: filtration
- Liquid tanks and closed reservoirs: clearwell / wetwell

Indoor Equipment / Process

Enclosed or mostly enclosed space used to accommodate process and process-related equipment, and conditioned as necessary primarily to support these purposes.

- Control rooms
- Pump rooms
- Blower rooms
- Foul air treatment rooms
- Receiving station: trucked liquid waste rooms
- Screenings / grit rooms
- Receiving station: septage rooms
- Dewatering rooms
- Disinfection / dechlorination rooms
- Filtration rooms
- Electrical rooms / computer rooms
- Boiler and heat exchanger rooms
- HVAC rooms
- Intakes

Public Parks and Open Space

Community oriented outdoor amenities.

- Campgrounds
- Playgrounds
- Park spaces

Outdoor Equipment / Process

Outdoor or mostly outdoor space used to accommodate process and process-related equipment.

- Lagoons and swales
- Methane flares
- Biosolids storage
- Truck loading / bagging: biosolids
- Truck loading: solid waste
- Soil storage / production
- Solid waste storage / landfills
- Diffusers
- Electrical substation
- Weigh scales

Parking / Roads / Site Scaping

Outdoor space surrounding process / equipment infrastructure that provides access, parking, visual aesthetics, etc.

- Parking
- Park spaces
- Green spaces
- Trails non-public
- Trails public Roadways
- Recreational spaces / playgrounds
- Docks
- Shelters / picnic shelters
- Outdoor pools
- Community gardens

Underground Linear Infrastructure (Excluding Pipelines)

Infrastructure associated with buried forcemains and gravity mains, but excluding the pipeline itself.

- Force mains
- Gravity mains
- Intakes
- Twin tunnels
- Outfalls
- Valve chambers
- Tunnels

Dams

Space and infrastructure associated with dams.

- Dams

Appendix B: Alterations & Exemptions Forms

Performance Requirements for Infrastructure (Envision) Alterations or Exemptions Form for Baseline Pathway A

Date		**Orbit No.**	

Project Name	
Baseline Pathway	PATH A - PERFORMANCE REQUIREMENTS

PROJECT LEAD			
Name			
Title		**Email**	

REVIEWER (METRO VANCOUVER)			
Name			
Title		**Email**	

Project leads are required to determine whether any exemptions or alterations to the overall pathway for their project selected can or should be made. While overall project value determines the broad pathway a project should follow (Path A vs. Path B), there are project-specific conditions and characteristics that may render the achievement of a specific Priority Performance Objective's (PPO) requirements unachievable. Deviations from the baseline pathway must be identified and requested on a PPO by PPO basis, including the rationale for why an alteration or exemption is warranted. **All requests for alterations or exemptions from the primary pathway must be approved by a senior staff member.**

Review the applicability criteria for each of the following 15 Priority Performance Objectives (PPOs) against your project and identify permissable alterations *(Path B - alternate compliance)* or exemptions. Please indicate in the space provided a clear rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.

6.1 REDUCE OPERATIONAL ENERGY CONSUMPTION

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects where energy is consumed during the project lifetime are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following conditions are present: • Projects with a limited number of primary components where opportunities for energy savings are also limited.	Projects that do not consume energy over the project lifetime or where there is no demonstrated opportunity to save energy are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.1 ☐	**Request to follow alternate compliance PATH B for PPO 6.1 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 6.1 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

Orbit No.	

6.2 REDUCE EMBODIED ENERGY OF PRIORITY CONSTRUCTION MATERIALS

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects that make use or consume materials during construction and operation are expected to comply with the requirements of **Path A**.	Projects are permitted to follow Path B if the following conditions are present: • The availability of low carbon alternatives is limited in supply such that competitive bids are not possible • Projects with simple assemblies that can only be sourced from a handful of suppliers	Projects where the consideration of embodied carbon is demonstrably unfeasible (e.g. major equipment design supply and install package where the material used is fixed for performance and durability requirements) are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.2	**Request to follow alternate compliance PATH B for PPO 6.2 (please provide rationale below)**	**Requesting EXEMPTION for PPO 6.2 (please provide rationale below)**
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED		

6.3 REDUCE LIFECYCLE GHG EMISSIONS

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects that consume energy and produce GHG emissions during the lifetime of the project are expected to comply with the requirements of **Path A.**	Projects are permitted to follow Path B if the following conditions are present: • The project scope has a limited number of primary components that limit the ability to reduce GHG emissions	Projects that do not consume energy and produce GHG emissions through the operations are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.3	**Request to follow alternate compliance PATH B for PPO 6.3 (please provide rationale below)**	**Requesting EXEMPTION for PPO 6.3 (please provide rationale below)**
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED		

Orbit No.	

6.4 GENERATE OR RECOVER RENEWABLE ENERGY ON SITE

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects that consume energy during the lifetime of the project are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following conditions are present: • The project scope has a limited number of primary components or process systems, which limits the opportunities to generate or recover renewable energy on-site. • The project scope does not include modifications to the electrical systems, which limits the ability to connect and utilize renewable energy on-site.	Projects that do not consume energy through the lifetime of the project are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.4 ☐	**Request to follow alternate compliance PATH B for PPO 6.4 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 6.4 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

6.5 INSTALL ADVANCED ENERGY METERING

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects where energy is consumed during the project lifetime are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** the following conditions are present: • Projects with a limited instrumentation and controls scope, which limits the ability to install monitoring equipment on-site.	Projects that do not consume energy over the project lifetime are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.5 ☐	**Request to follow alternate compliance PATH B for PPO 6.5 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 6.5 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

Orbit No.	

6.6 FACILITATE ACCESS TO LOW-CARBON & ACTIVE TRANSPORTATION

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects that impact access and mobility as part of the project scope are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following conditions are present: • Projects with an existing site or limited new location options. • Projects with limited public access to site • Projects where use of the facility does not lend itself to active or public transit	Projects that do not have the opportunity to either select sites with good active, shared, or mass transit connectivity, or to carry out public consultation and community engagement are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.6 ☐	**Request to follow alternate compliance PATH B for PPO 6.6 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 6.6 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

6.7 USE RECLAIMED OR RECYCLED MATERIALS IN CONSTRUCTION

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects that make use or consume materials during construction are expected to comply with the requirements of **Path A.**	Projects are permitted to follow **Path B** if the following conditions are present: • Projects with simple assemblies that can only be sourced from a handful of suppliers.	Projects in which materials are not consumed or used during construction (e.g. planning studies) are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.7 ☐	**Request to follow alternate compliance PATH B for PPO 6.7 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 6.7 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

Orbit No.	

6.8 DIVERT CONSTRUCTION & DEMOLITION WASTE FROM LANDFILLS

PATH A - PERFORMANCE REQUIREMENTS	PATH B - NOT APPLICABLE	EXEMPTIONS
All projects are expected to comply with the requirements of **Path A**.		Projects for which there is no construction phase are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.8 ☐		**Requesting EXEMPTION for PPO 6.8 (please provide rationale below)** ☐

RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION	
If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.	

REVIEWER COMMENTS	
APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

6.9 REDUCE POTABLE WATER USE & OVERALL WATER USE

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects where water is consumed during the project lifetime are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** the following conditions are present: • Limited irrigation or indoor plumbing fixtures that limit opportunities for water use reductions	Projects that do not consume water over the project lifetime are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.9 ☐	**Request to follow alternate compliance PATH B for PPO 6.9 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 6.9 (please provide rationale below)** ☐

RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION	
If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.	

REVIEWER COMMENTS	
APPROVED ☐	**SIGNATURE**
ALTERATION OR EXEMPTION REQUEST DENIED ☐	

Orbit No.	

6.10 MINIMIZE THE IMPACT ON STORMWATER RUNOFF QUANTITY, RATE & QUALITY

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects that are expected to impact stormwater runoff are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects with a limited control of site landscaping and 'green infrastructure' where the opportunity for reducing stormwater runoff is limited.	Projects that are completely indoors and do not impact stormwater are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.10 ☐	**Request to follow alternate compliance PATH B for PPO 6.10 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 6.10 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

6.11 SELECT SITE TO PROTECT SENSITIVE ECOSYSTEMS & PRESERVE / ENHANCE HABITAT FUNCTION

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects that are sited on new and/or undeveloped areas are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects with limited control of siting or landscaping areas, and where preserving or adding greenspace will be difficult • Projects where additional greenspace will compromise the ability to meet the project requirements or objectives (e.g. parking lots, works yards, etc.)	Projects where the location is pre-determined and cannot be modified are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.11 ☐	**Request to follow alternate compliance PATH B for PPO 6.11 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 6.11 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

Orbit No.	

6.12 DEVELOP & IMPLEMENT AN INVASIVE SPECIES MANAGEMENT PLAN

PATH A - PERFORMANCE REQUIREMENTS	PATH B - NOT APPLICABLE	EXEMPTIONS
All projects that are sited on areas containing invasive species, or that involves landscaping are expected to comply with the requirements of **Path A**.		Projects where there is no landscaping scope or that are not located in areas containing invasive species are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.12 ☐		**Requesting EXEMPTION for PPO 6.12 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
EXEMPTION REQUEST DENIED ☐		

6.13 PRESERVE SOILS & RESTORE DISTURBED AREAS WITH APPROPRIATE SOIL TO SUPPORT HEALTHY VEGETATION

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects that impact or disturb soil during construction are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects with limited control of siting or landscaping areas, where preserving greenspace or adding greenspace will be difficult • Projects where additional greenspace will compromise the ability to meet the project requirements or objectives (i.e. parking lots, works yards, etc.)	Projects where the location is pre-determined and cannot be modified are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.13 ☐	**Request to follow alternate compliance PATH B for PPO 6.13 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 6.13 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

Orbit No.	

6.14 PREVENT POLLUTANTS FROM CONTAMINATING SURFACE WATER & GROUND WATER

PATH A - PERFORMANCE REQUIREMENTS	PATH B - NOT APPLICABLE	EXEMPTIONS
All projects that include the use of material that has the potential of polluting or contaminating water (e.g. industrial runoff, chemical discharge) are expected to comply with the requirements of **Path A**.		Projects where there is no use of a hazardous (or potentially hazardous) material that may result in water contamination are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.14 ☐		**Requesting EXEMPTION for PPO 6.14 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
EXEMPTION REQUEST DENIED ☐		

6.15 REDUCE AIR POLLUTANT SOURCES DURING CONSTRUCTION

PATH A - PERFORMANCE REQUIREMENTS	PATH B - NOT APPLICABLE	EXEMPTIONS
All projects that include construction activities are expected to comply with the requirements of **Path A**.		Projects where there are no construction activities are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.15 ☐		**Requesting EXEMPTION for PPO 6.15 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
EXEMPTION REQUEST DENIED ☐		

Date		Signature	
Signed by			

Performance Requirements for Infrastructure (Envision) Exemptions Form for Baseline Pathway B

Date		**Orbit No.**	

Project Name	
Baseline Pathway	PATH B - ALTERNATE COMPLIANCE

PROJECT LEAD			
Name			
Title		**Email**	

REVIEWER (METRO VANCOUVER)			
Name			
Title		**Email**	

Project leads are required to determine whether any exemptions to the overall pathway for their project selected can or should be made. While overall project value determines the broad pathway a project should follow (Path A vs. Path B), there are project-specific conditions and characteristics that may render the achievement of a specific Priority Performance Objective's (PPO) requirements unachievable. Deviations from the baseline pathway must be identified and requested on a PPO by PPO basis, including the rationale for why an exemption is warranted. **All requests for exemptions from the primary pathway must be approved by a senior staff member.**

Review the applicability criteria for each of the following 15 Priority Performance Objectives (PPOs) against your project and identify permissable exemptions. Please indicate in the space provided a clear rationale for why the option to be exempt from the PPO has been requested.

6.1 REDUCE OPERATIONAL ENERGY CONSUMPTION

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following conditions are present: • Projects with a limited number of primary components where opportunities for energy savings are also limited.	Projects that do not consume energy over the project lifetime or where there is no demonstrated opportunity to save energy are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 6.1 ☐	**Requesting EXEMPTION for PPO 6.1 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST	
If the selection above indicates a request for exemption, please provide a detailed rationale to support your request.	

REVIEWER COMMENTS

APPROVED ☐	SIGNATURE
EXEMPTION REQUEST DENIED ☐	

Orbit No.	

6.2 REDUCE EMBODIED ENERGY OF PRIORITY CONSTRUCTION MATERIALS

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following conditions are present: • The availability of low carbon alternatives is limited in supply such that competitive bids are not possible • Projects with simple assemblies that can only be sourced from a handful of suppliers	Projects where the consideration of embodied carbon is demonstrably unfeasible (e.g. major equipment design supply and install package where the material used is fixed for performance and durability requirements) are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 6.2 ☐	**Requesting EXEMPTION for PPO 6.2 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, please provide a detailed rationale to support your request.	
REVIEWER COMMENTS	
APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

6.3 REDUCE LIFECYCLE GHG EMISSIONS

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following conditions are present: • The project scope has a limited number of primary components that limit the ability to reduce GHG emissions	Projects that do not consume energy and produce GHG emissions through the operations are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 6.3 ☐	**Requesting EXEMPTION for PPO 6.3 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, please provide a detailed rationale to support your request.	
REVIEWER COMMENTS	
APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

Orbit No.	

6.4 GENERATE OR RECOVER RENEWABLE ENERGY ON SITE

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following conditions are present: • The project scope has a limited number of primary components or process systems, which limits the opportunities to generate or recover renewable energy on-site. • The project scope does not include modifications to the electrical systems, which limits the ability to connect and utilize renewable energy on-site.	Projects that do not consume energy through the lifetime of the project are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 6.4 ☐	**Requesting EXEMPTION for PPO 6.4 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, please provide a detailed rationale to support your request.	
REVIEWER COMMENTS	
APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

6.5 INSTALL ADVANCED ENERGY METERING

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** the following conditions are present: • Projects with a limited instrumentation and controls scope, which limits the ability to install monitoring equipment on-site.	Projects that do not consume energy over the project lifetime are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 6.5 ☐	**Requesting EXEMPTION for PPO 6.5 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, please provide a detailed rationale to support your request.	
REVIEWER COMMENTS	
APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

Orbit No.	

6.6 FACILITATE ACCESS TO LOW-CARBON & ACTIVE TRANSPORTATION

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following conditions are present: • Projects with an existing site or limited new location options. • Projects with limited public access to site • Projects where use of the facility does not lend itself to active or public transit	Projects that do not have the opportunity to either select sites with good active, shared, or mass transit connectivity, or to carry out public consultation and community engagement are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 6.6 ☐	**Requesting EXEMPTION for PPO 6.6 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, please provide a detailed rationale to support your request.	
REVIEWER COMMENTS	
APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

6.7 USE RECLAIMED OR RECYCLED MATERIALS IN CONSTRUCTION

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following conditions are present: • Projects with simple assemblies that can only be sourced from a handful of suppliers.	Projects in which materials are not consumed or used during construction (e.g. planning studies) are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 6.7 ☐	**Requesting EXEMPTION for PPO 6.7 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, please provide a detailed rationale to support your request.	
REVIEWER COMMENTS	
APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

Orbit No.	

6.8 DIVERT CONSTRUCTION & DEMOLITION WASTE FROM LANDFILLS

PATH A - PERFORMANCE REQUIREMENTS	PATH B - NOT APPLICABLE	EXEMPTIONS
All projects are expected to comply with the requirements of **Path A**.		Projects for which there is no construction phase are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.8 ☐		**Requesting EXEMPTION for PPO 6.8 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST	
If the selection above indicates a request for exemption, please provide a detailed rationale to support your request.	

REVIEWER COMMENTS	

APPROVED ☐	SIGNATURE
EXEMPTION REQUEST DENIED ☐	

6.9 REDUCE POTABLE WATER USE & OVERALL WATER USE

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** the following conditions are present: • Limited irrigation or indoor plumbing fixtures that limit opportunities for water use reductions	Projects that do not consume water over the project lifetime are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 6.9 ☐	**Requesting EXEMPTION for PPO 6.9 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST	
If the selection above indicates a request for exemption, please provide a detailed rationale to support your request.	

REVIEWER COMMENTS	

APPROVED ☐	SIGNATURE
EXEMPTION REQUEST DENIED ☐	

Orbit No.	

6.10 MINIMIZE THE IMPACT ON STORMWATER RUNOFF QUANTITY, RATE & QUALITY

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following condition is present: • Projects with a limited control of site landscaping and 'green infrastructure' where the opportunity for reducing stormwater runoff is limited.	Projects that are completely indoors and do not impact stormwater are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 6.10 ☐	**Requesting EXEMPTION for PPO 6.10 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, please provide a detailed rationale to support your request.	
REVIEWER COMMENTS	
APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

6.11 SELECT SITE TO PROTECT SENSITIVE ECOSYSTEMS & PRESERVE/ENHANCE HABITAT FUNCTION

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following condition is present: • Projects with limited control of siting or landscaping areas, and where preserving or adding greenspace will be difficult • Projects where additional greenspace will compromise the ability to meet the project requirements or objectives (e.g. parking lots, works yards, etc.)	Projects where the location is pre-determined and cannot be modified are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 6.11 ☐	**Requesting EXEMPTION for PPO 6.11 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, please provide a detailed rationale to support your request.	
REVIEWER COMMENTS	
APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

Orbit No.	

6.12 DEVELOP & IMPLEMENT AN INVASIVE SPECIES MANAGEMENT PLAN

PATH A - PERFORMANCE REQUIREMENTS	PATH B - NOT APPLICABLE	EXEMPTIONS
All projects that are sited on areas containing invasive species, or that involves landscaping are expected to comply with the requirements of **Path A**.		Projects where there is no landscaping scope or that are not located in areas containing invasive species are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.12 ☐		**Requesting EXEMPTION for PPO 6.12 (please provide rationale below)** ☐
RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, please provide a detailed rationale to support your request.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
EXEMPTION REQUEST DENIED ☐		

6.13 PRESERVE SOILS & RESTORE DISTURBED AREAS WITH APPROPRIATE SOIL TO SUPPORT HEALTHY VEGETATION

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following condition is present: • Projects with limited control of siting or landscaping areas, where preserving greenspace or adding greenspace will be difficult • Projects where additional greenspace will compromise the ability to meet the project requirements or objectives (i.e. parking lots, works yards, etc.)	Projects where the location is pre-determined and cannot be modified are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 6.13 ☐	**Requesting EXEMPTION for PPO 6.13 (please provide rationale below)** ☐
RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, please provide a detailed rationale to support your request.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
EXEMPTION REQUEST DENIED ☐		

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Orbit No.	

6.14 PREVENT POLLUTANTS FROM CONTAMINATING SURFACE WATER & GROUND WATER

PATH A - PERFORMANCE REQUIREMENTS	PATH B - NOT APPLICABLE	EXEMPTIONS
All projects that include the use of material that has the potential of polluting or contaminating water (e.g. industrial runoff, chemical discharge) are expected to comply with the requirements of **Path A**.		Projects where there is no use of a hazardous (or potentially hazardous) material that may result in water contamination are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.14 ☐		**Requesting EXEMPTION for PPO 6.14 (please provide rationale below)** ☐
RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, please provide a detailed rationale to support your request.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
EXEMPTION REQUEST DENIED ☐		

6.15 REDUCE AIR POLLUTANT SOURCES DURING CONSTRUCTION

PATH A - PERFORMANCE REQUIREMENTS	PATH B - NOT APPLICABLE	EXEMPTIONS
All projects that include construction activities are expected to comply with the requirements of **Path A**.		Projects where there are no construction activities are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 6.15 ☐		**Requesting EXEMPTION for PPO 6.15 (please provide rationale below)** ☐
RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, please provide a detailed rationale to support your request.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
EXEMPTION REQUEST DENIED ☐		

Date			Signature	
Signed by				

Performance Requirements for Buildings (LEED) Alterations or Exemptions Form for Baseline Pathway A

Date		**Orbit No.**	

Project Name	
Baseline Pathway	PATH A - PERFORMANCE REQUIREMENTS

PROJECT LEAD			
Name			
Title		**Email**	

REVIEWER (METRO VANCOUVER)			
Name			
Title		**Email**	

Project leads are required to determine whether any exemptions or alterations to the overall pathway for their project selected can or should be made. While overall project value determines the broad pathway a project should follow (Path A vs. Path B), there are project-specific conditions and characteristics that may render the achievement of a specific Priority Performance Objective's (PPO) requirements unachievable. Deviations from the baseline pathway must be identified and requested on a PPO by PPO basis, including the rationale for why an alteration or exemption is warranted. **All requests for alterations or exemptions from the primary pathway must be approved by a senior staff member.**

Review the applicability criteria for each of the following 15 Priority Performance Objectives (PPOs) against your project and identify permissable alterations *(Path B - alternate compliance)* or exemptions. Please indicate in the space provided a clear rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.

7.1 REDUCE OPERATIONAL ENERGY CONSUMPTION

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects where energy is consumed during the project lifetime are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • The project scope does not involve the renovation or upgrading of the following systems considered to be 'key' to the efficiency of the building: - Building Envelope - Building Glazing - Mechanical Ventilation, heating, cooling and Domestic Hot Water systems - Electrical lighting systems	Projects that do not consume energy over the project lifetime or where there is no demonstrated opportunity to save energy are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.1 ☐	**Request to follow alternate compliance PATH B for PPO 7.1 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 7.1 (please provide rationale below)** ☐

RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.	
REVIEWER COMMENTS	
APPROVED ☐	**SIGNATURE**
ALTERATION OR EXEMPTION REQUEST DENIED ☐	

Orbit No.	

7.2 REDUCE EMBODIED ENERGY OF PRIORITY CONSTRUCTION MATERIALS

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects that make use or consume materials during construction and operation are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects with a limited number of components or building systems that have fewer materials to source with reduced environmental impact, making it difficult to find materials which meet all technical requirements and required embodied energy reductions	Projects making substantial reuse (i.e. >50%) of existing building structure, envelope areas, floors, and roof areas have demonstrated substantial embodied energy reductions and are exempt of any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.2 ☐	**Request to follow alternate compliance PATH B for PPO 7.2 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 7.2 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

7.3 REDUCE LIFECYCLE GHG EMISSIONS

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects that consume energy and produce GHG emissions during the lifetime of the project are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects that do not involve the renovation or upgrading of the following systems considered to be 'key' to the efficiency of the building: - Building Envelope - Building Glazing - Mechanical Ventilation, heating, cooling and Domestic Hot Water systems - Electrical lighting systems • Projects that do not involve the replacement or addition of substantial quantities of materials, or that primarily feature elements that cannot easily be replaced with lower carbon alternative products	Projects that do not consume energy or produce GHG emissions or include new materials in the construction or operation of the project are exempt of any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.3 ☐	**Request to follow alternate compliance PATH B for PPO 7.3 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 7.3 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

Orbit No.	

7.4 GENERATE OR RECOVER RENEWABLE ENERGY ON SITE

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects that consume energy during the lifetime of the project are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following conditions are present: • Projects that do not include significant adjustments of the existing mechanical and electrical systems that may limit the capacity for renewable energy generation or recovery. • Projects that do not include substantial modification to structure, roof, or surrounding areas that may support the generation of renewable energy	Projects that do not consume energy through the lifetime of the project are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.4 ☐	**Request to follow alternate compliance PATH B for PPO 7.4 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 7.4 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

7.5 INSTALL ADVANCED ENERGY METERING

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects where energy is consumed during the project lifetime are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects that do not involve the renovation or upgrading of more that three of following systems considered to be 'key' to the installation of advanced energy metering of the building: - Mechanical Ventilation, heating, cooling and Domestic Hot Water systems - Electrical lighting systems - Electrical plug loads	Projects that only have a single energy end use (i.e. lighting only) are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.5 ☐	**Request to follow alternate compliance PATH B for PPO 7.5 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 7.5 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

Orbit No.	

7.6 FACILITATE ACCESS TO LOW-CARBON & ACTIVE TRANSPORTATION

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects with a minimum of 1 full-time equivalent occupant commuting to the project site are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following conditions are present: • Projects located on an existing site with limited connectivity to existing transit or cycling infrastructure • Projects that do not include significant additions or alterations to existing parking	Projects that do not have full-time equivalent occupancies (i.e. at least 1 full time staff member or resident using the site) are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.6 ☐	**Request to follow alternate compliance PATH B for PPO 7.6 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 7.6 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

7.7 USE RECLAIMED OR RECYCLED MATERIALS IN CONSTRUCTION

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects that make use or consume materials during construction are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following conditions are present: • Projects with simple assemblies that can only be sourced from a handful of suppliers	Projects making substantial reuse (i.e. >50%) of existing building structure, envelope areas, floors, and roof areas have demonstrated substantial embodied energy reductions and are exempt of any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.7 ☐	**Request to follow alternate compliance PATH B for PPO 7.7 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 7.7 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

TOC

Orbit No.	

7.8 DIVERT CONSTRUCTION & DEMOLITION WASTE FROM LANDFILLS

PATH A - PERFORMANCE REQUIREMENTS	PATH B - NOT APPLICABLE	EXEMPTIONS
All projects are expected to generate waste during the construction of the project are expected to comply **Path A**.		Projects where no construction waste is expected to be generated are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.8 ☐		**Requesting EXEMPTION for PPO 7.8 (please provide rationale below)** ☐

RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION	
If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.	

REVIEWER COMMENTS

APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

7.9 REDUCE POTABLE WATER USE & OVERALL WATER USE

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects where water is consumed during the project lifetime are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects that do not involve the renovation or upgrading of water management or consuming systems: - Indoor Plumbing Fixtures - Irrigation - Evaporative Cooling Towers - Rainwater Management Systems	Projects that do not include any water-using elements are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.9 ☐	**Request to follow alternate compliance PATH B for PPO 7.9 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 7.9 (please provide rationale below)** ☐

RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION	
If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.	

REVIEWER COMMENTS

APPROVED ☐	**SIGNATURE**
ALTERATION OR EXEMPTION REQUEST DENIED ☐	

Orbit No.	

7.10 MINIMIZE THE IMPACT ON STORMWATER RUNOFF QUANTITY, RATE & QUALITY

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects that are expected to impact stormwater runoff are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects that do not involve the alteration to key site characteristics as part of the main scope of work, including - Site hardscapes (Parking, roadways, sidewalks, etc.) - Landscaping - Rooftop drainage systems	Projects that do not have any scope of work outside the building are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.10 ☐	**Request to follow alternate compliance PATH B for PPO 7.10 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 7.10 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

7.11 SELECT SITE TO PROTECT SENSITIVE ECOSYSTEMS & PRESERVE / ENHANCE HABITAT FUNCTION

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects that are sited on new and/or undeveloped areas are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects with limited control of siting or landscaping areas, and where preserving or adding greenspace will be difficult • Projects where additional greenspace will compromise the ability to meet the project requirements or objectives (e.g. parking lots, works yards, etc.)	Projects which include programming which cannot support existing or additional greenspace are exempt from any requirements of this PPO
Project meets the PATH A applicability criteria for PPO 7.11 ☐	**Request to follow alternate compliance PATH B for PPO 7.11 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 7.11 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

Orbit No.	

7.12 DEVELOP & IMPLEMENT AN INVASIVE SPECIES MANAGEMENT PLAN

PATH A - PERFORMANCE REQUIREMENTS	PATH B - NOT APPLICABLE	EXEMPTIONS
All projects that are sited on areas containing invasive species, or that involves landscaping are expected to comply with the requirements of **Path A**.		Projects where there is no landscaping scope or that are not located in areas containing invasive species are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.12 ☐		**Requesting EXEMPTION for PPO 7.12 (please provide rationale below)** ☐

RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION	
If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.	

REVIEWER COMMENTS

APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

7.13 PRESERVE SOILS & RESTORE DISTURBED AREAS WITH APPROPRIATE SOIL TO SUPPORT HEALTHY VEGETATION

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects that impact or disturb soil during construction are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Projects with limited control of siting or landscaping areas, where preserving greenspace or adding greenspace will be difficult • Projects where additional greenspace will compromise the ability to meet the project requirements or objectives (i.e. parking lots, works yards, etc.)	Projects where there is no disturbance of the existing site or soils are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.13 ☐	**Request to follow alternate compliance PATH B for PPO 7.13 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 7.13 (please provide rationale below)** ☐

RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION	
If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.	

REVIEWER COMMENTS

APPROVED ☐	**SIGNATURE**
ALTERATION OR EXEMPTION REQUEST DENIED ☐	

Orbit No.	

7.14 PREVENT POLLUTANTS FROM CONTAMINATING SURFACE WATER & GROUND WATER

PATH A - PERFORMANCE REQUIREMENTS	PATH B - NOT APPLICABLE	EXEMPTIONS
All projects that are expected to impact stormwater runoff are expected to comply with the requirements of **Path A**.		Projects that do not have any scope of work outside the building are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.14 ☐		**Requesting EXEMPTION for PPO 7.14 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
EXEMPTION REQUEST DENIED ☐		

7.15 REDUCE AIR POLLUTANT SOURCES DURING CONSTRUCTION

PATH A - PERFORMANCE REQUIREMENTS	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
All projects that include construction activities are expected to comply with the requirements of **Path A**.	Projects are permitted to follow **Path B** if the following condition is present: • Project scope of work does not include any interior works or finishes	Projects where there are no construction activities are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.15 ☐	**Request to follow alternate compliance PATH B for PPO 7.15 (please provide rationale below)** ☐	**Requesting EXEMPTION for PPO 7.15 (please provide rationale below)** ☐
RATIONALE FOR REQUEST OF ALTERATION OR EXEMPTION If the selection above indicates a request to deviate from **baseline Path A**, please provide a detailed rationale for why the option to either follow Path B or to be exempt from the PPO has been requested.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
ALTERATION OR EXEMPTION REQUEST DENIED ☐		

Date		Signature	
Signed by			

Performance Requirements for Buildings (LEED) Exemptions Form for Baseline Pathway B

Date		**Orbit No.**	

Project Name	
Baseline Pathway	PATH B - ALTERNATE COMPLIANCE

PROJECT LEAD			
Name			
Title		**Email**	

REVIEWER (METRO VANCOUVER)			
Name			
Title		**Email**	

Project leads are required to determine whether any exemptions to the overall pathway for their project selected can or should be made. While overall project value determines the broad pathway a project should follow (Path A vs. Path B), there are project-specific conditions and characteristics that may render the achievement of a specific Priority Performance Objective's (PPO) requirements unachievable. Deviations from the baseline pathway must be identified and requested on a PPO by PPO basis, including the rationale for why an exemption is warranted. **All requests for exemptions from the primary pathway must be approved by a senior staff member.**

Review the applicability criteria for each of the following 15 Priority Performance Objectives (PPOs) against your project and identify permissable exemptions. Please indicate in the space provided a clear rationale for why the option to be exempt from the PPO has been requested.

7.1 REDUCE OPERATIONAL ENERGY CONSUMPTION

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following condition is present: • The project scope does not involve the renovation or upgrading of the following systems considered to be 'key' to the efficiency of the building: - Building Envelope - Building Glazing - Mechanical Ventilation, heating, cooling and Domestic Hot Water systems - Electrical lighting systems	Projects that do not consume energy over the project lifetime or where there is no demonstrated opportunity to save energy are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 7.1 ☐	**Requesting EXEMPTION for PPO 7.1 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST	
If the selection above indicates a request for exemption, p**lease provide a** detailed rationale to support your request.	

REVIEWER COMMENTS	
APPROVED ☐	SIGNATURE
EXEMPTION REQUEST DENIED ☐	

Orbit No.	

7.2 REDUCE EMBODIED ENERGY OF PRIORITY CONSTRUCTION MATERIALS

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following condition is present: • Projects with a limited number of components or building systems that have fewer materials to source with reduced environmental impact, making it difficult to find materials which meet all technical requirements and required embodied energy reductions	Projects making substantial reuse (i.e. >50%) of existing building structure, envelope areas, floors, and roof areas have demonstrated substantial embodied energy reductions and are exempt of any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 7.2 ☐	**Requesting EXEMPTION for PPO 7.2 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, **please provide a** detailed rationale to support your request.	
REVIEWER COMMENTS	
APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

7.3 REDUCE LIFECYCLE GHG EMISSIONS

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following condition is present: • Projects that do not involve the renovation or upgrading of the following systems considered to be 'key' to the efficiency of the building: - Building Envelope - Building Glazing - Mechanical Ventilation, heating, cooling and Domestic Hot Water systems - Electrical lighting systems • Projects that do not involve the replacement or addition of substantial quantities of materials, or that primarily feature elements that cannot easily be replaced with lower carbon alternative products	Projects that do not consume energy or produce GHG emissions or include new materials in the construction or operation of the project are exempt of any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 7.3 ☐	**Requesting EXEMPTION for PPO 7.3 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, **please provide a** detailed rationale to support your request.	
REVIEWER COMMENTS	
APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

Orbit No.	

7.4 GENERATE OR RECOVER RENEWABLE ENERGY ON SITE

PATH A - NOT APPLICABLE

PATH B - ALTERNATE COMPLIANCE

Projects are permitted to follow **Path B** if the following conditions are present:

- Projects that do not include significant adjustments of the existing mechanical and electrical systems that may limit the capacity for renewable energy generation or recovery.
- Projects that do not include substantial modification to structure, roof, or surrounding areas that may support the generation of renewable energy

EXEMPTIONS

Projects that do not consume energy through the lifetime of the project are exempt from any requirements for this PPO.

Project meets PATH B Alternate Compliance for PPO 7.4 ☐	**Requesting EXEMPTION for PPO 7.4 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST

If the selection above indicates a request for exemption, p**lease provide a** detailed rationale to support your request.

REVIEWER COMMENTS

APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

7.5 INSTALL ADVANCED ENERGY METERING

PATH A - NOT APPLICABLE

PATH B - ALTERNATE COMPLIANCE

Projects are permitted to follow **Path B** if the following condition is present:

- Projects that do not involve the renovation or upgrading of more that three of following systems considered to be 'key' to the installation of advanced energy metering of the building:
  - Mechanical Ventilation, heating, cooling and Domestic Hot Water systems
  - Electrical lighting systems
  - Electrical plug loads

EXEMPTIONS

Projects that only have a single energy end use (i.e. lighting only) are exempt from any requirements for this PPO.

Project meets PATH B Alternate Compliance for PPO 7.5 ☐	**Requesting EXEMPTION for PPO 7.5 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST

If the selection above indicates a request for exemption, p**lease provide a** detailed rationale to support your request.

REVIEWER COMMENTS

APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

Orbit No.	

7.6 FACILITATE ACCESS TO LOW-CARBON & ACTIVE TRANSPORTATION

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following conditions are present: • Projects located on an existing site with limited connectivity to existing transit or cycling infrastructure • Projects that do not include significant additions or alterations to existing parking	Projects that do not have full-time equivalent occupancies (i.e. at least 1 full time staff member or resident using the site) are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 7.6 ☐	**Requesting EXEMPTION for PPO 7.6 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, **please provide a** detailed rationale to support your request.	
REVIEWER COMMENTS	
APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

7.7 USE RECLAIMED OR RECYCLED MATERIALS IN CONSTRUCTION

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following conditions are present: • Projects with simple assemblies that can only be sourced from a handful of suppliers	Projects making substantial reuse (i.e. >50%) of existing building structure, envelope areas, floors, and roof areas have demonstrated substantial embodied energy reductions and are exempt of any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 7.7 ☐	**Requesting EXEMPTION for PPO 7.7 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, **please provide a** detailed rationale to support your request.	
REVIEWER COMMENTS	
APPROVED ☐	**SIGNATURE**
EXEMPTION REQUEST DENIED ☐	

TOC

Orbit No.	

7.8 DIVERT CONSTRUCTION & DEMOLITION WASTE FROM LANDFILLS

PATH A - PERFORMANCE REQUIREMENTS	PATH B - NOT APPLICABLE	EXEMPTIONS
All projects are expected to generate waste during the construction of the project are expected to comply **Path A**.		Projects where no construction waste is expected to be generated are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.8 ☐		**Requesting EXEMPTION for PPO 7.8 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST	
If the selection above indicates a request for exemption, p**lease provide a** detailed rationale to support your request.	

REVIEWER COMMENTS	

APPROVED ☐	SIGNATURE
EXEMPTION REQUEST DENIED ☐	

7.9 REDUCE POTABLE WATER USE & OVERALL WATER USE

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following condition is present: • Projects that do not involve the renovation or upgrading of water management or consuming systems: - Indoor Plumbing Fixtures - Irrigation - Evaporative Cooling Towers - Rainwater Management Systems	Projects that do not include any water-using elements are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 7.9 ☐	**Requesting EXEMPTION for PPO 7.9 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST	
If the selection above indicates a request for exemption, p**lease provide a** detailed rationale to support your request.	

REVIEWER COMMENTS	

APPROVED ☐	SIGNATURE
EXEMPTION REQUEST DENIED ☐	

Orbit No.	

7.10 MINIMIZE THE IMPACT ON STORMWATER RUNOFF QUANTITY, RATE & QUALITY

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following condition is present: • Projects that do not involve the alteration to key site characteristics as part of the main scope of work, including - Site hardscapes (Parking, roadways, sidewalks, etc.) - Landscaping - Rooftop drainage systems	Projects that do not have any scope of work outside the building are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 7.10 ☐	**Requesting EXEMPTION for PPO 7.10 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST	
If the selection above indicates a request for exemption, p**lease provide a** detailed rationale to support your request.	

REVIEWER COMMENTS	

APPROVED ☐	SIGNATURE
EXEMPTION REQUEST DENIED ☐	

7.11 SELECT SITE TO PROTECT SENSITIVE ECOSYSTEMS & PRESERVE / ENHANCE HABITAT FUNCTION

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following condition is present: • Projects with limited control of siting or landscaping areas, and where preserving or adding greenspace will be difficult • Projects where additional greenspace will compromise the ability to meet the project requirements or objectives (e.g. parking lots, works yards, etc.)	Projects which include programming which cannot support existing or additional greenspace are exempt from any requirements of this PPO
	Project meets PATH B Alternate Compliance for PPO 7.11 ☐	**Requesting EXEMPTION for PPO 7.11 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST	
If the selection above indicates a request for exemption, p**lease provide a** detailed rationale to support your request.	

REVIEWER COMMENTS	

APPROVED ☐	SIGNATURE
EXEMPTION REQUEST DENIED ☐	

Orbit No.	

7.12 DEVELOP & IMPLEMENT AN INVASIVE SPECIES MANAGEMENT PLAN

PATH A - PERFORMANCE REQUIREMENTS	PATH B - NOT APPLICABLE	EXEMPTIONS
All projects that are sited on areas containing invasive species, or that involves landscaping are expected to comply with the requirements of **Path A**.		Projects where there is no landscaping scope or that are not located in areas containing invasive species are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.12 ☐		**Requesting EXEMPTION for PPO 7.12 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST	
If the selection above indicates a request for exemption, p**lease provide a** detailed rationale to support your request.	

REVIEWER COMMENTS

APPROVED ☐	SIGNATURE
EXEMPTION REQUEST DENIED ☐	

7.13 PRESERVE SOILS & RESTORE DISTURBED AREAS WITH APPROPRIATE SOIL TO SUPPORT HEALTHY VEGETATION

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following condition is present: • Projects with limited control of siting or landscaping areas, where preserving greenspace or adding greenspace will be difficult • Projects where additional greenspace will compromise the ability to meet the project requirements or objectives (i.e. parking lots, works yards, etc.)	Projects where there is no disturbance of the existing site or soils are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 7.13 ☐	**Requesting EXEMPTION for PPO 7.13 (please provide rationale below)** ☐

RATIONALE FOR EXEMPTION REQUEST	
If the selection above indicates a request for exemption, p**lease provide a** detailed rationale to support your request.	

REVIEWER COMMENTS

APPROVED ☐	SIGNATURE
EXEMPTION REQUEST DENIED ☐	

TOC

Orbit No.	

7.14 PREVENT POLLUTANTS FROM CONTAMINATING SURFACE WATER & GROUND WATER

PATH A - PERFORMANCE REQUIREMENTS	PATH B - NOT APPLICABLE	EXEMPTIONS
All projects that are expected to impact stormwater runoff are expected to comply with the requirements of **Path A**.		Projects that do not have any scope of work outside the building are exempt from any requirements for this PPO.
Project meets the PATH A applicability criteria for PPO 7.14 ☐		**Requesting EXEMPTION for PPO 7.14 (please provide rationale below)** ☐
RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, p**lease provide a** detailed rationale to support your request.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
EXEMPTION REQUEST DENIED ☐		

7.15 REDUCE AIR POLLUTANT SOURCES DURING CONSTRUCTION

PATH A - NOT APPLICABLE	PATH B - ALTERNATE COMPLIANCE	EXEMPTIONS
	Projects are permitted to follow **Path B** if the following condition is present: • Project scope of work does not include any interior works or finishes	Projects where there are no construction activities are exempt from any requirements for this PPO.
	Project meets PATH B Alternate Compliance for PPO 7.15 ☐	**Requesting EXEMPTION for PPO 7.15 (please provide rationale below)** ☐
RATIONALE FOR EXEMPTION REQUEST If the selection above indicates a request for exemption, p**lease provide a** detailed rationale to support your request.		
REVIEWER COMMENTS		
APPROVED ☐	**SIGNATURE**	
EXEMPTION REQUEST DENIED ☐		

Date		Signature	
Signed by			

Appendix C: Energy & GHG Emissions Management Design Memo

The following text has been taken from the Metro Vancouver Forms and Template document and should be used as a reference when following Path B of select PPOs that address energy and/or emissions.

1.4. Energy and Greenhouse Gas Emissions Management Design Memos

Energy use represents one of Metro Vancouver's largest operating costs and is a dominant source of corporate greenhouse gas (GHG) emissions. Metro Vancouver's Corporate Energy Management Policy commits the organization to continuously improving the efficiency with which it produces and uses energy. As a signatory to the BC Climate Action Charter, Metro Vancouver has an on-going commitment to pursue carbon neutrality in its operations. Meeting this goal will require continuous improvement in energy performance and the identification of opportunities to transition to less carbon-intensive energy sources, including the recovery and/or generation of energy from various waste streams and utility operations. The Carbon Price Policy requires that Metro Vancouver's carbon price be included in all life-cycle cost analyses to provide a mechanism to transition to lower-carbon energy sources and to reduce financial risk of increased operating costs associated with rising external carbon taxes over the lifetime of assets. Beyond its commitment to manage corporate GHG emissions, Metro Vancouver wishes to identify and evaluate opportunities where the organization can contribute to reducing the GHG emissions of municipalities, businesses, and residents by providing lower-carbon energy sources to the region (e.g. supplying renewable natural gas to the energy grid).

To demonstrate continuous improvement in energy and GHG emissions management, the Energy and GHG Emissions Management Design Memos summarize the processes followed through the project design phases and the resulting design decisions. Provide one memo for each of the two design phases: Preliminary and Detailed Design. As a minimum, include the following sections in each of the memos. Design teams are encouraged to identify and document opportunities that go beyond these minimum requirements to meet the intent of Metro Vancouver's energy and GHG emissions management objectives.

1.4.1 Engagement with Metro Vancouver Project and Energy Management staff and/or consultant

Dialogue with staff at the outset of each design phase to discuss and document the scope of the Energy and GHG Emissions Management Design Memo for that design phase.

1.4.2 Baseline Design

Define life-cycle energy and GHG emissions performance for a baseline design against which alternative design options will be evaluated to demonstrate continuous improvement.

1.4.3 Options Identification

The design team is encouraged to employ creativity and innovation in working with Metro Vancouver staff and industry to identify a Long List of options to meet the project requirements at the beginning of each design phase. Document the process for narrowing the Long List to a Short List of options that proceed to Life-Cycle Options Analysis.

1.4.4 Life-Cycle Net Present Value Options Analysis

Document life-cycle net present value analysis for each Short-Listed option using Metro Vancouver Business Case Standard Economic Assumptions Unit Conversions and Energy Prices. Include all available financial incentives (government, utility, etc.) and the Metro Vancouver carbon price – per the Carbon Price Policy – in all life-cycle analyses. Compare each option against the Baseline Design to evaluate the life-cycle financial viability and GHG emissions impact associated with the incremental investment in energy-efficient design.

1.4.5 Passive Design

Describe how passive design opportunities were identified and evaluated with respect to the design of building systems (space heating, space cooling, how water heating, ventilation, and lighting) and process design.

1.4.6 Renewable Energy

Describe how opportunities to transition to renewable sources of energy – both inside the facility and for the region in general – were identified and evaluated.

1.4.7 Energy Recovery

Describe how opportunities to recover energy for use inside the facility (by Metro Vancouver) and/or outside the facility (by others) were identified and evaluated.

1.4.8 Equipment Efficiency

Document how equipment efficiency was evaluated to enable specifying the most energy- and GHG emissions-efficient equipment showing a positive life-cycle net present value while considering the Metro Vancouver carbon price and all available financial incentives.

1.4.9 Operational Flexibility

Describe how consideration was given to meeting the functional needs of the facility while optimizing the flexibility with which it can be operated so that equipment can run as close as possible to its best efficiency point the majority of time.

1.4.10 Instrumentation and Controls

Summarize the instrumentation and control strategy that will enable ongoing process monitoring and control to allow Metro Vancouver to demonstrate efficient operation and predictive maintenance of energy-intensive assets.

1.4.11 Procurement Strategy

Describe how life-cycle energy and GHG emissions performance metrics will be incorporated into the procurement process for energy-intensive assets. Life-cycle performance-based procurement is encouraged.

1.4.12 Factory Acceptance Testing

When factory acceptance testing is to be undertaken, describe how energy and GHG emissions performance testing will be incorporated into Factory Acceptance Testing. Confirm that asset performs as predicted through procurement process and in accordance with the requirements of the performance-based procurement contract where applicable.

1.4.13 Commissioning Plan

Describe how energy and GHG emissions performance testing will be incorporated into the commissioning of all energy-intensive assets. During commissioning, confirm that assets perform as per design across the expected operating range of the equipment. Document test results so that they can be used in the future as baseline conditions for ongoing performance monitoring and predictive maintenance.

1.4.14 O&M Documentation

Describe how energy and GHG emissions performance considerations were incorporated into O&M documentation to provide information and guidance for Metro Vancouver to operate and maintain the systems at peak efficiency.

1.4.15 O&M Training

Define O&M training that is required for Metro Vancouver to operate and maintain the systems at peak efficiency.