

## 7.4 Visual Resources

### 7.4.1 Introduction

This section of the Environmental Assessment Certificate (EAC) Application/Environmental Impact Statement (EIS) (hereafter referred to as the EA) has been prepared by Golder Associates Ltd. (Golder). It addresses the effects of the Proposed BURNCO Aggregate Proposed Project (hereafter referred to as the 'Proposed Project') identified in the construction, operation, reclamation and closure phases on VCs related to Visual Resources. Consideration has been given to mitigation measures proposed to mitigate any identified effects to acceptable levels and any residual effects have been characterized. Additionally consideration has also been given to cumulative effects of other certain or reasonable foreseeable future projects in combination with the residual effects of the Proposed Project.

This section should be read in conjunction with the following technical report(s) provided in Volume 4, Part G - Section 22.0.

- Appendix 7.4-A – Visual Resources Baseline Inventory
- Appendix 7.4-B – Visual Resources Technical Assessment

### 7.4.2 Regulatory and Policy Setting

The assessment fulfills the requirements of the BC EAA and the former CEAA as laid out in the AIR/EIS Guidelines for the Proposed Project. A summary of the regulatory and policy setting of the Proposed Project as it relates to the management of visual aesthetics resources is provided below.

The air-shed is managed through the Sea-to-Sky air quality management plan (SSAQMP). Potential for visual degradation associated with the Proposed Project are discussed in Volume 2, Part B – Section 5.7.5.2.2.

#### 7.4.2.1 Policy relating to Forestry

There are no regulations in BC that manage the effects of aggregate mining development on visual quality. However, British Columbia provincial policy for the management of visual resources exists as per the *Forest and Range Practices Act* (2004) (FRPA) which identifies scenic landscapes as an integral component in natural resource development. The Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) uses the BC Visual Resource Management (VRM) system to manage visual resources and maintain timber supply. It maintains the British Columbia Visual Landscape Inventory (VLI) program, which is a register that identifies significant viewpoints and related visually sensitive areas throughout the province. It also defines parameters related to each visually sensitive area's scenic character and objectives for managing their visual quality.

Visual quality objectives (VQO) are designations defined for each visually sensitive area that reflect a desired level of visual quality to be maintained based on physical characteristics and social concern for the area. They are established by the Forest District's Manager under the Government Action Regulation Sect 7 (2) (*Forest Range and Practices Act*) or set through orders under the *Land Act* (2014). Consideration of VQO's, as defined under FRPA, is legally required for forestry applications, but is not a requirement for other resource development

planning. However, this framework is recognized as the provincial standard to manage visual resources, is commonly referenced in strategic land use planning (see Section 7.4.2.2) and encourages development design to minimise adverse visual effects.

#### **7.4.2.2 Policy relating to Land and Resource Planning**

Objectives and strategies for managing visual quality are often identified in strategic land and resource management plans and smaller related landscape unit plans. The Proposed Project is located in the Howe Landscape Unit of the Sunshine Coast District Sustainable Resource Management Plan (MFLNRO 2012a). The Proposed Project is also located within the boundaries of the Sunshine Coast Natural Resource District and related Sunshine Coast Timber Supply Area (TSA) administered by the MFLNRO.

#### **7.4.2.3 Policy relating to Mining**

The Ministry of Energy, Mines and Petroleum Resources (MEMPR) Guidelines for Mine Permit Applications for Aggregate Pits and Quarries in British Columbia (MEMPR 2010) addresses considerations for visual impacts related to mine permit applications for aggregate pits and quarries under the *Mines Act* (2014).

#### **7.4.2.4 Policy relating to Lighting**

There are no Provincial level regulations or policies in effect within BC regarding the limitations or management of lighting effects related to visual quality. In response to concern over obtrusive outdoor lighting effects related to the use of land, buildings and structures, the Sunshine Coast Regional District Outdoor Lighting Guidelines (SCRD 2008) were developed and are disseminated with all Building Permit applications, Development Permit applications involving form and character of commercial and multi-family development and rezoning applications involving new buildings and structures. These guidelines are intended to promote responsible lighting within the community and, with regards to visual quality, these guidelines suggest that outdoor lighting be installed in a manner that “minimizes glare, obtrusive light, and artificial sky glow by limiting outdoor lighting that is misdirected, excessive, or unnecessary and mitigates and prevents degradation of the natural nighttime environment and night sky” (SCRD 2008).

Guidance is available from the Commission Internationale de L'Éclairage (CIE); also known as the International Commission on Illumination; for evaluating and addressing adverse visual effects of lighting installations. The Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations (CIE 2003) provides standards for assessing the environmental impacts of outdoor lighting installations and provides recommended limits for relevant lighting parameters to minimize obtrusive effects of outdoor lighting. The Guidelines for Minimizing Sky Glow (CIE 1997) gives general guidance for lighting designers and policy makers on the reduction of diffused light effects.

### 7.4.3 Assessment Methodology

This section provides a description of the assessment methodology used in preparing the EA related to Visual Resources.

#### 7.4.3.1 Valued Component Selection and Rationale

This section describes the Valued Components (VCs) and measureable indicators identified for this assessment related to visual resources. The VCs identified reflect issues and guidelines, potential Aboriginal concerns, issues identified by BC EAO and CEA Agency, First Nations, other stakeholders, professional judgment and key sensitive resources, species or social and heritage values. The identified candidate visual resource VC was carried forward in the effects assessment (e.g. no visual resource VCs were excluded from the assessment). Additional details regarding the methods used to select VCs is provided in Part B, Volume 2 – Section 4.2.4.

There is the potential for adverse effects on visual resources in the Proposed Project Area and surrounding landscape since construction and operation of the Proposed Project components are likely to introduce anthropogenic disturbances that would alter the views of the existing landscape from viewpoints in and around Howe Sound. Aspects of the Proposed Project security lighting also have the potential for adverse effect on night-time visual aesthetics through the introduction of artificial light.

The visual aesthetics of this area are valued by local residents, recreational users and tourists and there is concern related to maintaining the quality of visual resources of the Proposed Project Area as it's visible from Gambier Island, the Sea to Sky Highway corridor (Highway 99) and McNab Estates residences (MFLNRO 2012a).

Given the potential for impact to visual resources and the recognized public value of those resources, Visual Quality is considered as a VC. Indicators of visibility and scenic character will be used for determining potential VC impacts.

Table 7.4-1 provides a summary of identified VCs, rationale for their inclusion in the assessment, and measurable indicators that will be considered.

**Table 7.4-1: Valued Components and Measurable Indicators: Visual Resources**

| Valued Component | Rationale   | Measurable Indicators   |
|------------------|---|---|
| Visual Quality   | Visual quality of the surrounding landscape could be adversely affected by the presence of an aggregate pit, processing infrastructure, marine barge loading and shipping activity. | <ul style="list-style-type: none"> <li>▪ Visibility of Proposed Project components from selected receptor sites.</li> <li>▪ Predicted scenic character of Proposed Project site and the existing landscape from selected receptor sites.</li> </ul> |

#### 7.4.3.2 Assessment Boundaries

##### 7.4.3.2.1 Spatial Boundaries

The spatial boundaries for the EA have been selected to take into account the physical extent of the Proposed Project, physical extent of Proposed Project-related effects and the physical extent of any key environmental systems. The specific study areas Visual Resources are provided in Table 7.4-2.

**Table 7.4-2: Spatial Boundaries: Visual Resources**

| Study Area                | Description  |
|---------------------------|--|
| Local Study Area (LSA)    | The LSA boundary includes viewing locations within 8 km of the Proposed Project Area to account for foreground and middle ground viewing distances.                        |
| Regional Study Area (RSA) | The RSA boundary is based on viewing locations beyond 8 km and a maximum viewing extent of 16 km from the Proposed Project Area and includes background viewing distances. |

The LSA includes the Proposed Project Area and both established and potentially sensitive viewing locations related to local communities, First Nations reserves, recreation sites and transportation routes that are within 8 km. It considers viewing distances that provide a discernible level of detail of the Proposed Project site. Foreground and middle-ground viewing distances allow for features and activities to be viewed in detail providing a higher sensitivity to visual effects (BC MoF 1997a).

The RSA was established to provide a regional landscape context for the assessment of Proposed Project effects and includes the LSA. The viewing distance beyond 8 km is the distance at which the detail of features and activities are no longer easily discernible and provides a lower sensitivity to visual effects (BC MoF 1997a). The outer extent of 16 km was determined in consideration of the overall scale of the Proposed Project and the presence of sensitive receptor on the eastern shoreline of Howe Sound. The RSA was also established to encompass the area within which the potential residual effects of the Proposed Project are likely to overlap with any residual effects of other certain or reasonably foreseeable projects and activities. As such, the RSA is the area within which the cumulative effects assessment has been conducted.

Figure 7.4-1 shows the extent of the LSA and RSA boundaries for Visual Resources.

#### **7.4.3.2.2 Temporal Boundaries**

Based on the Proposed Project schedule, the temporal boundaries for the effects assessment on Visual Resources are as follows:

- Project construction – up to 2 years;
- Project operations – 16 years; and
- Project reclamation and closure – on-going during and 1 year beyond operations.

#### **7.4.3.2.3 Administrative Boundaries**

There are no administrative boundaries for the assessment of Visual Resource VCs.

#### **7.4.3.2.4 Technical Boundaries**

The delineation of visually sensitive units (VSU) is consistent with those included in the VLI spatial database. VSU's are contiguous visible areas of the provincial landscape defined by common biophysical characteristics. Each VSU is characterised by visual quality class ratings that describe its visual condition, sensitivity to alteration and the establishment of a formal VQO rating. VSU's that intersect the Proposed Project Area provide information on existing viewing conditions and to inform the assessment of potential visual effects.

#### **7.4.3.3 Assessment Methods**

The following section describes the approach and methods applied to

- Compile information and characterize existing conditions for the Visual Quality VC;
- Identify interactions between the Proposed Project for the Visual Quality VC;
- Evaluate the residual effects of the Proposed Project following application of appropriate mitigation measures; and
- Determine the significance of potential residual adverse effects for the Visual Quality VC.

In general, assessing effects to visual quality is a process that employs systematic analysis of physical environments, the identification of potential viewers at key locations, and the evaluation of potential visual impacts determined by combining factors of sensitivity to visual change with a predicted degree of visual change. Determining the potential effects on visual quality for day-time and night-time viewing opportunities involved a combination of methods to address provincial visual resource management objectives and an assessment of visual impacts based on the potential for Proposed Project-related visual effects to change the visual character of a viewing opportunity.

An initial review of the current VLI spatial database indicated that a large portion of the Proposed Project is located within VSU's which do not include defined visual quality ratings or VQO's (Figure 7.4-2). As such, there is little visual inventory or management objective information available to support the assessment of visual effects. In order to address this information gap and to suitably assess the potential visual effects of the Proposed Project, an approach was applied that follows guidance from the BC VRM standards where applicable and adapts elements of the United States Department of the Interior (USDI) Bureau of Land Management's (BLM) visual resource management system to provide supplementary characterization of existing scenic value and potential visual contrast created by Proposed Project features. This system was adopted as it is an established and standardised tool for assessing the visual character of scenic landscapes and of Proposed Project-related visual impacts using identifiable qualities that can be consistently described and evaluated.

Further details of the existing conditions and effects assessment methods and results are offered below in Section 7.4.3.3.1 to 7.4.3.5. Technical descriptions and detailed results of the existing conditions assessment are presented in Volume 4, Part G – Section 22.0: Appendix 7.4-A. Technical descriptions and detailed results of the effects assessment are presented in Volume 4, Part G – Section 22.0: Appendix 7.4-B.

### **7.4.3.3.1 Existing Conditions**

The establishment of existing conditions for the visual effects assessment is conducted in order to identify, describe and classify the visual resources within the RSA landscape to facilitate further assessment of potential visual effects of the Proposed Project.

#### ***Literature Review***

A review of the Sunshine Coast District Sustainable Resource Management Plan (MFLNRO 2012a), the 2010 Sunshine Coast TSA Timber Supply Review (MFLNRO 2010), the Guidelines for Mine Permit Applications for Aggregate Pits and Quarries in British Columbia (MEMPR 2010), as well as the current Strategic Land and Resource Planning Legal and Non-Legal Planning Objectives (MFLNRO 2009a, 2009b) was conducted to determine existing land use management objectives related to visual resources.

An inventory of visual resources for the Proposed Project Area has been established and made available through the current approved VLI spatial and tabular data published in 2008 (BC Gov 2008) with ongoing amendments through the Sunshine Coast Natural Resource District Office.

The Visual Landscape Inventory: Procedures and Standards Manual (BC MoF 1997a), the Visual Impact Assessment Guidebook (BC MoF 2001), Protocol for Visual Quality Effectiveness Evaluations Procedures and Standards (BC MFR 2008), and amendments through the *Forest and Range Practices Act* (2004) were reviewed as they are recognized as key documents outlining British Columbia's visual resource management program and contain definitions of visual quality ratings and objectives. While this system provides a standardized approach to assessing visual conditions and visual impacts for land use planning in the Province, it is a system designed principally for forestry applications involving vegetation clearing and road construction and not all methods are suitable for assessing the effects of projects that consist of primarily built landforms and structures.

A review of the USDI BLM visual resource management systems key documents included the Visual Resource Inventory Bureau of Land Management Manual Handbook H-8410-1 (USDI 1986a) and the Visual Resource Inventory Bureau of Land Management Manual Handbook H-8431 (USDI 1986b). These describe methods and definitions for scenic values inventories and assessing visual effects of a variety of development applications.

#### ***Visual Inventory***

The RSA was mapped using a geographic information system (GIS) and spatial data describing the physical characteristics of the landscape. Base mapping data were collected from national and provincial government data sources and proprietary vendors. Data sources are presented in Volume 4, Part G – Section 22.0: Appendix 7.4-A.

Spatial data available from the VLI database were used to identify existing recreational viewpoints and to provide information for VSU's that establish the existing landscape character and management objectives through visual quality ratings (Figure 7.4-2). Two of the key visual quality ratings related to each VSU are Existing Visual Condition (EVC) and Visual Sensitivity Class (VSC).

EVC is a measure of the present level of landscape alteration caused by human activities and contributes to the baseline from which additional landscape alterations would be measured (BC MoF 1997a). EVC ratings are expressed by definitions summarized in Table 7.4-3 (BC MoF 1997a).

**Table 7.4-3: Existing Visual Condition Definitions**

| Existing Visual Condition Rating (EVC) | Definition  |
|--|---|
| Preserved (P)                          | The alteration is very small in scale, and not easily distinguishable from the pre-harvest landscape.   |
| Retained (R)                           | The alteration is difficult to see, is small in scale, and natural in appearance.   |
| Partially Retained (PR)                | The alteration is easy to see, is small to moderate in scale, and natural and not rectilinear or geometric in shape.  |
| Modified (M)                           | The alteration is very easy to see and is either large in scale and natural in its appearance, or small to medium in scale but with some angular characteristics. |
| Maximally Modified (MM)                | The alteration is very easy and is very large in scale and/or is rectilinear and geometric in shape.  |

The VSC rates the sensitivity of the landscape based on characteristics of the VSU's biophysical environment and viewing opportunities. VSC ratings are expressed by definitions summarized in Table 7.4-4 (BC MoF 1997a).

**Table 7.4-4: Visual Sensitivity Class Definitions**

| Visual Sensitivity Class Rating (VSC) | Definition   |
|---------------------------------------|--|
| Class 1                               | Very high sensitivity to human-made visual alteration. The area is extremely important to viewers. There is a very high probability that the public would be concerned if the area was visually altered in any way or to any scale |
| Class 2                               | High sensitivity to human-made visual alteration. The area is very important to viewers. There is a high probability that the public would be concerned if the area was visually altered.  |
| Class 3                               | Moderate sensitivity to human-made visual alteration. The area is important to viewers. There is a probability that the public would be concerned if the area was visually altered.  |
| Class 4                               | Low sensitivity to human-made visual alteration. The area is moderately important to viewers. There is a risk that the public would be concerned if the area was visually altered.   |
| Class 5                               | Very low sensitivity to human-made visual alteration. The area may be somewhat important to viewers. There is a small risk that the public would be concerned if the area was visually altered.                                    |

Established VQO's may also be related to a VSU. VQO's, as they are currently defined in FRPA are expressed in Table 7.4-5, indicate the level of alteration permitted for each classification:

**Table 7.4-5: Visual Quality Objective Definitions**

| Visual Quality Objective Rating (VQO) | Definition  |
|---------------------------------------|---|
| Preservation (P)                      | Alteration, when assessed from a significant public viewpoint, is:<br>(i) Very small in scale; and<br>(ii) Not easily distinguished from the pre-development conditions.  |
| Retention (R)                         | Alteration, when assessed from a significant public viewpoint is:<br>(i) Difficult to see;<br>(ii) Small in scale; and<br>(iii) Natural in appearance.  |
| Partially Retention (PR)              | Alteration, when assessed from a significant public viewpoint is:<br>(i) Easy to see;<br>(ii) Small to medium in scale; and<br>(iii) Natural and not rectilinear or geometric in shape.   |
| Modification (M)                      | Alteration, when assessed from a significant public viewpoint is:<br>(i) Very easy to see; and<br>(ii) Is either a) large in scale and natural in its appearance; or b) small to medium in scale but with some angular characteristics. |
| Maximally Modification (MM)           | Alteration, when assessed from a significant public viewpoint, (i) is:<br>(i) Very easy to see; and<br>(ii) Is either a) very large in scale, b) rectilinear and geometric in shape, or c) both.  |

### **Visibility Analysis**

Visibility modelling involves the use of spatial analysis to determine the potential extent of visible area across a landscape that can be seen from one or more observation points, often referred to as a viewshed. The analysis uses terrain data and viewpoint locations to calculate potential lines-of-sight between each point within the viewshed and the original viewpoint from which the viewshed was generated.

GIS-based viewshed analysis was conducted to determine potential viewing locations in the RSA that would have an unobstructed view towards the Proposed Project to conduct the preliminary photographic field survey. Survey viewpoints to represent potential public viewing opportunities were selected from established recreation viewpoints included in the VLI database as well as other identified locations consistent with established guidelines for viewpoint identification. Criteria for viewpoint selection include the following:

- Proximity to roads, recreation features, water and settlements;
- Use by recreational or local users;
- Accessibility to the public and ease of access; and
- The potential for least obstructed views of the Proposed Project (BC MoF 1997a).

The suitability of survey viewpoints was confirmed during the preliminary field survey and locations were adjusted based on ground-truthed assessment. Additional publicly accessible locations with a line-of-sight to the Proposed Project were identified during the field survey and were included in the survey viewpoint inventory. Representative locations were selected from the survey viewpoints to be used as receptor sites in further landscape analysis and reporting (see Figure 7.4-3 and Volume 4, Part G – Section 22.0: Appendix 7.4-A).



Viewing distance zones were calculated from the Proposed Project site to define the influence of viewing distance. Viewing distance affects the visible level of detail in the landscape where by visual elements of the landscape are naturally more discernible the closer they are to the observer (BC MoF 1997a). The defined zones include:

- **Foreground** – up to 1 km away where the maximum discernment of detail, texture and contrast of visible elements is available;
- **Middle-ground** – 1 to 8 km where the emergence of overall shapes and patterns, some texture and color are still evident; and
- **Background** - beyond 8 km where outlines of general shapes and patterns are visible with little discernible texture and color; a strong sense of overall perspective is available.

### ***Photographic Field Survey***

The purpose of the photographic field survey was to gain familiarity with the visible Proposed Project Area from an observer's perspective and to gather photographic imagery and geographic data. Current ground level site photography was necessary to benchmark the current viewing conditions of the Proposed Project site and adjacent landscapes. Photographic survey work was conducted according to guidelines presented in the British Columbia Visual Impact Assessment Guidebook (BC MoF 2001).

Field visits were undertaken by Golder staff on August 28<sup>th</sup> 2012, February 2<sup>nd</sup> 2013, and April 30<sup>th</sup> 2014. The initial survey on August 28<sup>th</sup> captured a mixture of land-based and marine-based viewing opportunities representative of residential, recreational and motorist receptors during the day-time. The field survey conducted on February 2<sup>nd</sup> focused on additional residential and recreational viewing opportunities located within and adjacent to the village of Lions Bay. The final survey conducted on April 30<sup>th</sup> captured a small subset of existing survey viewpoints representative of residential and recreational viewing opportunities at night.

Day-time photographs were taken from survey viewing locations with a Nikon D3000 digital camera using a focal length of approximately 50 to 55 millimetres to be consistent with the view perceived by the human eye (BC MFR 2008). Where potentially affected landforms were too large to fit into a single frame, multiple overlapping photos were taken towards the Proposed Project site and assembled into panoramic images. Night-time photos were taken from survey viewpoints with a Nikon D3200 digital camera using a focal length of approximately 18 millimetres to capture larger portions of the night sky related to the Proposed Project site. Geographic information was captured for each viewpoint using a GPS unit, as well as descriptions of viewing conditions.

See Volume 4, Part G – Section 22.0: Appendix 7.4-A for a presentation of baseline photographs of existing conditions.

### ***Landscape Inventory***

In order to address the lack of available VLI information describing the existing condition of visual resources surrounding the Proposed Project (see Section 7.4.3.3), a landscape assessment approach was applied that adapts elements of the USDI BLM visual resource inventory system to determine an ratings of the scenic value of

the existing landscape from key viewpoints. Nine (9) receptor sites were selected from the surveyed viewpoints that describe a range of representative viewing opportunities and geographic locations within the RSA. Site photography from these locations was assessed and rated based on dimensions of scenic quality and viewer sensitivity using criteria established in the USDI BLM visual resource management system (USDI 1986a). This rating also considered EVC and VSC ratings available in the VLI data for affected VSU's where appropriate. These factors and consideration of viewing distance were combined into a landscape rating that classifies the relative scenic value of the landscape visible from each location. Table 7.4-6 presents a matrix of how these factors are combined.

**Table 7.4-6: Landscape Rating**

| Scenic Quality | Viewer Sensitivity |          |          |     |      |
|----------------|--------------------|----------|----------|-----|------|
|                | High               |          | Medium   |     | Low  |
| High           | High               |          | High     |     | High |
| Medium         | High               | Moderate | Moderate | Low | Low  |
| Low            | Moderate           | Low      | Low      |     | Low  |
| Distance Zone  | FG/MG              | BG       | FG/MG    | BG  | All  |

Source: USDI 1986a

FG – foreground (within 1 km), MG – middle ground (1- 8 km), BG – background (beyond 8 km)

Landscape ratings can be characterized by the following definitions:

- **High** - indicates a landscape that holds major scenic value and/or vulnerability and is composed of contrasting variation in relief, landforms, water features and vegetation. Alterations could strongly impact the appearance of the landscape and/or be contentious with viewers.
- **Moderate** - indicates a landscape that has some distinct dimensions or character and is less sensitive to impact by alteration. The landscape may have evident variation in the composition of landscape features and allow for some absorption of alterations.
- **Low** – landscapes are of relatively low scenic merit and/or not very vulnerable to impact by alteration. The landscape may have minimal topographic relief, a uniform landscape character and be lacking in the presence of distinct elements. They may allow alterations to be absorbed and cause little concern with viewers.

Further definitions of scenic quality and viewer sensitivity, as well as the results from baseline data collection, photographic field inventories and landscape assessment are compiled in Volume 4, Part G – Section 22.0: Appendix 7.4-A to provide detailed information about the environmental setting and visual condition of the Proposed Project Area. The summary of assessment results describing the existing condition is presented in Section 7.4.3.3.1.

### **Lighting Condition**

Proper lighting of the Proposed Project is necessary to ensure a safe and secure facility during evening and night-time periods. However, the visual effects of obtrusive lighting are increasingly recognized as a social concern as

they adversely impact the ability to observe the night sky and provide annoyance or discomfort to viewers (SCRD 2008, CIE 1997). Artificial light in this study refers to man-made evening and night-time exterior lighting and consists of both direct sources; including light fixtures; and diffused sources related to illuminated surfaces which reflect light; including ground, walls, or trees. Assessment of the existing lighting condition was conducted on the Proposed Project site and the adjacent portion of the night sky.

Three (3) receptor sites were selected from the surveyed viewpoints that describe representative viewing opportunities and geographic locations within the RSA for uses that are considered sensitive to the effects of night-time light. This includes residential, transportation and recreation uses. Night-time site photography from these locations was evaluated for the quality of the night-time environment and the influence of existing visible lighting installations. The overall character was related to lighting condition classifications and definitions adapted from the CIE guidelines (CIE 1997, CIE 2003). Classifications can be described by the following definitions:

- **High** - areas of low brightness or intrinsic darkness with barely perceptible or no visible light attracting the attention of observers; including locations such as rural or natural areas, and parks or protected sites.
- **Medium** - areas of moderate brightness where direct light sources are noticeable and light pollution is evident; including locations such as suburban and industrial areas and roadways with functional levels of lighting.
- **Low** – areas of high brightness and strong, prominent light sources; including locations such as urban town and city centres, commercial areas and roadways with high levels of night time activity and related lighting.

The results from the night-time photo field surveys and landscape assessment are presented in Section 7.4.4.5 and in Volume 4, Part G – Section 22.0: Appendix 7.4-A.

#### **7.4.3.3.2 Identifying Project Interactions**

A preliminary evaluation of identified interactions between the various physical works and activities and the selected VCs across all spatial and temporal phases of the Proposed was undertaken to characterize interactions as:

- a) Positive, none or negligible, requiring no further consideration; or
- b) Potential effect requiring further consideration and possibly additional mitigation.

This evaluation is presented in Section 7.4.5.1. A rationale is provided for all determinations when there is no or negligible interaction and no further consideration is required. For those Proposed Project-VC interactions that may result in potential effects requiring further consideration, the nature of the effects arising from those interactions is described.

Potential interactions between the Proposed Project and the Visual Quality VC are generally associated with the potential to directly change or alter the visual character of an area. There are also potential indirect effects related to visual disturbances that can affect land and resource use activities. Identification of Proposed Project

interactions is based the Proposed Project description and technical knowledge and experience supported by existing information and data.

#### **7.4.3.3.3 Evaluating Residual Effects**

Potential Proposed Project-related residual effects were characterized as the basis for determining the significance of potential residual adverse effects for the Visual Quality VC. The characterization of effects was carried out for all potential residual and cumulative Proposed Project-related effects following application of appropriate mitigation measures.

Potential residual effects were characterized using the following standard residual effects criteria:

- **Context** – the current and future sensitivity and resilience of the VC to change caused by the Proposed Project;
- **Magnitude** – the expected size or severity of the residual effect;
- **Extent** – the spatial scale over which the residual effect is expected to occur;
- **Duration** – the length of time the residual effect persists;
- **Reversibility** - indicating whether the effect is *fully reversible*, *partially reversible*, or *irreversible*; and
- **Frequency** – how often the residual effect occurs.

See Table 7.4-8 for criteria used to characterize potential residual effects on the Visual Quality VC.

#### **7.4.3.3.3.1 Evaluating Visual Effects**

The following methods were used to evaluating visual effects of the Proposed Project.

##### ***Landscape Modelling***

A computer generated 3D landscape model was developed in Visual Nature Studio software (VNS 2012). This model was based on spatial data consistent with base mapping and included Proposed Project model of landscape and infrastructure features. The model was calibrated to the viewing conditions recorded in the photographic inventory. Simulation images were generated for each receptor site and combined with site photography, where required, to represent the Proposed Project's predicted visual effects.

## Landscape Unit Analysis

The simulated images of the Proposed Project were evaluated to determine an overall level of visual change. The assessment approach used elements of the USDI BLM contrast rating system to determine the visual contrast created between Proposed Project features and the existing landscape as well as a rating of the visual impact.

The USDI BLM contrast rating system is a standardized system for assessing components of a development project that create visual contrast with the existing landscape and affect the visual quality. Use of this system allowed for standardized assessment of the visual character of the Proposed Project effects. The degree of contrast for features can be characterized as one of the follows classes:

- **Negligible** – the level of contrast is barely perceivable or not visible;
- **Weak** – the level of contrast can be seen but does not attract attention;
- **Moderate** – the level of contrast begins to attract attention and to dominate the existing landscape; and
- **Strong** – the level of contrast demands attention and is dominant in the landscape (USDI 1986b).

For each receptor site, visible Proposed Project components were evaluated and an overall contrast rating was determined. The overall contrast rating was compared to the landscape rating designated to describe the existing condition, resulting in a visual impact rating of the Proposed Project on visual resources. The visual impact rating represents the level of visual change of the Proposed Project in relation to the existing landscape.

Table 7.4-7 presents a matrix of how these rankings are related.

**Table 7.4-7: Visual Impact Rating**

|                  |        | Overall Contrast Rating |          |          |           |
|------------------|--------|-------------------------|----------|----------|-----------|
|                  |        | Negligible              | Weak     | Moderate | Strong    |
| Landscape Rating | Low    | Negligible              | Low      | Low      | Moderate  |
|                  | Medium | Negligible              | Low      | Moderate | High      |
|                  | High   | Low                     | Moderate | High     | Very High |

Note: Based on the *Guidelines for Landscape and Visual Impact Assessment (LI/IEMA 2002)*.

Definitions for the visual impact rating classes are as follows:

- **Negligible** – very little or no alteration to elements/features of the existing landscape were predicted.
- **Low** - minor loss of or alteration to one or more key elements/features of the existing landscape and/or introduction of elements that may be uncharacteristic within the existing landscape.
- **Moderate** - partial loss or alteration to one or more key elements/features of the existing landscape and/or introduction of elements that may be prominent but not considered to be substantially uncharacteristic within the existing landscape.

- **High** - major alteration to key elements/features of the existing landscape and/or introduction of elements considered to be uncharacteristic within the existing landscape.
- **Very High** - a total loss of key elements/features of the existing landscape and/or dominance of elements considered to be totally uncharacteristic within the existing landscape.

The visual impact ratings assigned to each receptors site were considered in the determination of the Proposed Projects magnitude of residual effect characterisation detailed in Section 7.4.3.3.3.

### ***Light Analysis***

This portion of the visual assessment addresses visual effects of the Proposed Project related to artificial lighting. The study area and visual receptor sites are identical to the day-time visual assessment and the effects of artificial light are addressed in a similar manner.

Guidance provided by the International Commission on Illumination (CIE 1997, 2003) was used in order to provide assessment criteria to determine the potential visual effect of artificial exterior lighting. For each of the three (3) night-time receptor sites, the visual change resulting from the Proposed Project lighting design was characterized based on the results of landscape modelling and an evaluation the overall visual effect. A visual impact classification was determined relative to the existing lighting condition and the predicted change resulting from the Proposed Project lighting design at each of the night-time receptor sites. Definitions for the visual impact classes related to lighting effects are as follows:

- **Negligible** – no or barely perceptible change in the lighting condition is expected.
- **Low** - minor increase in the level of brightness or awareness of light sources for sensitive receptors that would result in a perceptible change in existing conditions.
- **Moderate** – increase in the level of brightness or awareness of light sources for sensitive receptors that would result in a noticeable effect on existing conditions.
- **High** - major increase in the level of brightness or awareness of light sources for sensitive receptors that would result in a major effect on existing conditions.

The visual effects classes assigned to each receptors site are considered in the determination of the Proposed Projects magnitude of residual effect characterisation detailed in Section 7.4.3.3.3.

The results from the landscape modeling and effects analysis are compiled in Volume 4, Part G – Section 22.0: Appendix 7.4-B to provide more detailed information about the predicted visual effects of the Proposed Project on the existing landscape.

The probability of potential residual effects occurring for the Visual Quality VC were determined with consideration of factors related to visual design and mitigation to characterise likelihood using the following scale:

- Low - likelihood of occurrence (0 to 40%) – Residual effect is possible but unlikely;
- Medium - likelihood of occurrence (41 to 80%) - Residual effect may occur, but is not certain to occur; and
- High - Likelihood of occurrence (81% to 100%) - Residual effect is likely to occur or is certain to occur.

#### **7.4.3.4 Evaluating Significance of Residual Effects**

The significance of potential residual adverse effects are determined for each VC based on the residual effects criteria and the likelihood of a potential residual effect occurring (Section 7.4.3.3.3) a review of background information and available field study results, consultation with government agencies and other experts, and professional judgement.

The rationale and determinations of the significance of potential residual effects on VCs are provided in Volume 2, Part B - Section 4.0: Assessment Methods. The rationale and determinations of the significance on the Visual Quality VC are provided in below.

#### **7.4.3.5 Level of Confidence**

The level of confidence for each predicted effect is discussed to characterize the level of uncertainty associated with both the likelihood and significance determinations. Level of confidence is typically based on professional judgement and is characterized as low:

- Low: Limited evidence is available, models and calculations are highly uncertain, and/or evidence about potential effects is contradictory.
- Moderate: Sufficient evidence is available and generally supports the prediction.
- High: Sufficient evidence is available and most or all available evidence supports the prediction.

International guidance on appropriate use of data and modelling conventions were referenced in the production landscape models and assessment. It is anticipated that there is a high level of understanding of the Proposed Project related impacts on the landscape.

Factors are well understood that contribute to visual quality and can be identified and described with reasonable accuracy (USDI 1986a, 1986b, BC MoF 1997a).

Reliability of landscape modelling to provide accurate and distinguishable representation of project effects is dependent on the availability of quality data and the appropriate use of that data. Current spatial data of a 1:50,000 resolution or better was sourced to support accurate landscape modelling.

**Table 7.4-8: Criteria for Characterizing Potential Residual Effects: Visual Resources VC – Visual Quality**

| VC             | Context  | Magnitude  | Extent  | Duration   | Reversibility   | Frequency  |
|----------------|--|--|---|--|---|--|
| Visual Quality | <p><b>Resilient:</b> Visual quality is a low valued component and sensitivity is low to adverse visual change;</p> <p><b>Moderately Resilient:</b> Visual quality is an moderately component and sensitivity is moderate to adverse visual change; or</p> <p><b>Sensitive:</b> Visual quality is a highly valued component and sensitivity is high to adverse visual change.</p> | <p><b>Negligible:</b> Very minor alteration to landscape that may not be uncharacteristic to existing character;</p> <p><b>Low:</b> Minor alteration to landscape that retains existing character;</p> <p><b>Medium:</b> Partial alteration to landscape that may be prominent but not substantially uncharacteristic to existing character; or</p> <p><b>High:</b> Major alteration or total loss to landscape considered to be totally uncharacteristic to existing character.</p> | <p><b>Local:</b> Effect restricted to LSA;</p> <p><b>Regional:</b> Effect extends beyond the LSA into the RSA; or</p> <p><b>Beyond Regional:</b> Effect extends beyond the RSA.</p> | <p><b>Short-term:</b> &lt;1 year;</p> <p><b>Medium-term:</b> 1 Year to life of Proposed Project; or</p> <p><b>Long-term:</b> &gt;life of Proposed Project.</p> | <p><b>Fully reversible:</b> Effect reversible with reclamation and/or over time;</p> <p><b>Partially Reversible:</b> Effect can be reversed partially; or</p> <p><b>Irreversible:</b> Effect irreversible and cannot be reversed with reclamation and/or over time.</p> | <p><b>Low:</b> Occurs rarely or during a specific period;</p> <p><b>Medium:</b> Occurs intermittently; or</p> <p><b>High:</b> Occurs continuously.</p> |



## **7.4.4 Baseline Conditions**

### **7.4.4.1 Characterization**

The regional setting of the Proposed Project is characterized by rugged coastal mountains, marine channels, and numerous islands within the Howe Sound area. Land cover generally consists of uniform, dense coastal forests dominated by coniferous species with some deciduous species along water courses. The level of existing anthropogenic disturbance reflects a landscape with multiple historical land uses including industrial development around Britannia Beach and Port Mellon, residential and recreational development on Gambier Island and along Highway 99 and forestry in several tenured locations throughout the RSA. Infrastructure features are also visible within the region including Highway 99 and numerous smaller access roads, concrete flumes located near Lions Bay and high tension transmission towers and right-of-ways on either side of Howe Sound.

The Proposed Project site is located at the mouth of the McNab Creek valley. Summits and ridges surround the valley with Mount Wrottesley (1442 m.) and Mount Varley (1639 m.) being most prominent to either side of McNab Creek. The topography of the Proposed Project site is relatively flat shaped by an alluvial formation. Portions of the property and adjacent slopes have been logged with riparian buffers maintained along McNab Creek and the marine foreshore of the site. This combination of topographic, vegetation and land use characteristics within the LSA provides a primarily natural landscape setting with a noticeable level of anthropogenic disturbance.

Public concern over the importance of the landscape character within the RSA has been expressed as it presents a distinct coastal vista visible along the Sea to Sky Highway route (Highway 99) and marine locations within Howe Sound. The Sea to Sky Highway travels along the eastern shore of Howe Sound and is considered a popular tourist route with many scenic viewpoints. The village of Lions Bay is located approximately 12 km north of Horseshoe Bay and has about 556 private dwellings (Statistic Canada 2011), many with views west overlooking Howe Sound. Approximately 15 recreational properties are located at the McNab Creek Estates site on the east side of McNab Creek. There are also a number of recreational properties across Thornbrough Channel on Gambier Island. Recreational activities that are popular in the area include kayaking, canoeing, sailing, camping, fishing, crabbing, shrimping, hiking, and wildlife watching. There are two yacht club outstations on Gambier Island that contribute to recreational boat traffic. Camp Latona (located on the north end of Gambier) and Camp Potlatch summer camps are key sites for recreational activities in the area.

### **7.4.4.2 Visual Resource Management**

There are no strategic level objectives related to scenic values for the Sunshine Coast Forest District as outlined in the Sunshine Coast District Sustainable Resource Management Plan (MFLNRO 2012a).

There are no specific requirements provided by the MEMPR related to management of visual resources through the *Mines Act* (2014). MEMPR does recognize the importance of building support for community values and minimizing conflict with neighbours of aggregate pits and quarries operations in the Guidelines for Mine Permit Applications for Aggregate Pits and Quarries in British Columbia (MEMPR 2010). It recommends to “minimize visual impacts to the landscape” as a consideration to develop positive community relationships.

The 2010 Sunshine Coast TSA Timber Supply Review (MFLNRO 2010) defines a general visual quality management direction that recognizes established Visual Quality Objectives in the Sunshine Coast District.

A review of this spatial and tabular VLI data indicates that while the Proposed Project Area intersects three (3) established visual sensitivity units; VSU #1652, VSU #1264 and VSU #2441. A total of 87% of the Proposed Project Area is located within VSU #1652, 10% is located within VSU #1264 and the remaining 3% is located within VSU #2441. A large portion of the Proposed Project is located within areas which do not include defined visual quality ratings or VQO's. VSU #1652 has a VSC rating of 'Unclassified' (UA) which indicates that a broad level survey was not carried out for this location as part of the current VLI and that the area was not considered visually sensitive (BC MoF 2001). VSU #2441 has a VSC rating of 'Water' (W). VSU #1264 is the only affected VSU that includes visual quality ratings. The foreshore area included within this VSU is classified as having a 'Retained' EVC rating indicating minor prominence of alterations on the landscape. It also has a VSC rating of Class '2' or high sensitivity to human-made alterations.

Table 7.4-9 provides a summary of the relevant VLI ratings for the VSUs intersected by the Proposed Project Area.

**Table 7.4-9: Summary Key Ratings for Intersected Visual Sensitivity Units**

| Visual Sensitivity Unit (VSU) | Existing Visual Condition (EVC) | Visual Sensitivity Class (VSC) | Visual Quality Objectives (VQO) |
|-------------------------------|---------------------------------|--------------------------------|---------------------------------|
| #1652                         | -                               | UA                             | -                               |
| #1264                         | R                               | 2                              | PR                              |
| #2441                         | -                               | W                              | -                               |

Notes:

VSC rating of UA - Unclassified

VSC rating of W - Water

VSC rating of 2 - High sensitivity to human-made visual alteration. The area is very important to viewers. There is a high probability that the public would be concerned if the Visual Sensitivity Unit was visually altered.

VQO rating of PR (Partial Retention) - Alteration, when assessed from a significant public viewpoint is easy to see; small to medium in scale; and natural and not rectilinear or geometric in shape.

Adjacent VSU polygons that characterize the broader visual setting within the LSA are located on either side of the McNab Creek valley and include VSU #1223 and #1236. Each of these areas have an EVC class rating of 'Partial Retention', indicating minor to moderate prominence of alteration on the landscape, and a VSC rating of Class '2' or high sensitivity to human-made alterations. Recent visible logging activity has occurred in March of 2014 (TSL A90229) within VSU #1236 and is not reflected in the areas existing VLI ratings for EVC. The VQO ratings from VSU #1223 and #1236 are both 'Partial Retention'.

### 7.4.4.3 *Visibility Modelling*

Initial GIS based visibility analysis was used to provide an estimate of the Proposed Project Area's visibility and determine potential receptors sites in the RSA that would have a line-of-sight to the Proposed Project. To provide an estimate of potential screening created by landforms and vegetation, the viewshed analysis included vegetation height information in addition to the topography of the RSA. This type of analysis typically overestimates the true visibility of the landscape, as it is influenced by the accuracy and resolution of the input data and GIS algorithms used, and does not accurately consider the effect of factors such as viewing distance or atmospheric conditions. In consideration of these limitations, visibility modelling was used to inform an estimate of the degree of visibility and to help define visually sensitive areas for additional analysis and description of the visible characteristics of the Proposed Project features.

The visibility of the Proposed Project was predicted to be limited primarily to the marine base infrastructure as indicated by the full visibility of the Proposed Project Area within VSU #2441. There is the potential for partial visibility of the processing area located in VSU #1264, and little to no visibility of the pit area located completely in VSU #1652. Table 7.4-10 provides a summary of visible Proposed Project Area for the VSU's intersected by the Proposed Project Area.

**Table 7.4-10: Summary of Visible Proposed Project Area by Visual Sensitivity Unit**

| Visual Sensitivity Unit (VSU) | Project Area within VSU [ha] | Visible Project Area [ha] | Percent of Total Project Footprint within VSU [%] |
|-------------------------------|------------------------------|---------------------------|---|
| # 1652                        | 52.11                        | 1.14                      | 2   |
| # 1264                        | 5.81                         | 3.66                      | 63  |
| # 2441                        | 1.93                         | 1.93                      | 100   |

Note:

Total Proposed Project footprint area is 59.84 ha.

Subsequent visibility modelling indicated the extent of visible area from receptor sites selected from surveyed viewpoints. Table 7.4-14 summarises results of subsequent visibility analysis from receptor sites and describes viewing distance and potential visibility of Proposed Project components.

### 7.4.4.4 *Landscape Assessment*

Photographic field survey images and observations were compiled, verified and assessed to serve as a baseline inventory of viewing conditions for use in further visual impact assessment. The baseline landscape images were rated based on dimensions of scenic quality (see Volume 4, Part G – Section 22.0: Appendix 7.4-A Tables A1-2 to A1-12) and viewer sensitivity to visual change (see Volume 4, Part G – Section 22.0: Appendix 7.4-A Tables A1-13 to A1-24). These factors were combined into an overall landscape rating of scenic value (Table A1-1 in Volume 4, Part G – Section 22.0: Appendix 7.4-A). The resulting ratings for each receptor site are summarized in Table 7.4-11.

**Table 7.4-11: Landscape Rating for Day-time Receptor Sites**

| Viewpoint   | Description  | Scenic Quality | Viewer Sensitivity | Distance Zone | Landscape Rating |
|-------------|--|----------------|--------------------|---------------|------------------|
| Viewpoint 1 | Marine-based viewing opportunity in Howe Sound                           | Medium         | Medium             | BG            | Low              |
| Viewpoint 2 | Marine-based viewing opportunity in Ramilles Channel                     | Medium         | Medium             | MG            | Moderate         |
| Viewpoint 3 | Marine-based viewing opportunity in Thornbrough Channel                  | Medium         | Medium             | MG            | Moderate         |
| Viewpoint 4 | Viewing opportunity near McNab Estates dock                              | Medium         | High               | FG            | High             |
| Viewpoint 5 | Viewing opportunity at Camp Latona                                       | Medium         | Medium             | MG            | Moderate         |
| Viewpoint 6 | Motorist viewing opportunity north of Lions Bay on Highway 99            | Medium         | Medium             | BG            | Low              |
| Viewpoint 7 | Motorist viewing opportunity at recreation pullout on Highway 99         | Medium         | Medium             | BG            | Low              |
| Viewpoint 8 | Lions Bay residential viewing opportunity (Panorama Rd. & Oceanview Rd.) | Medium         | High               | BG            | Moderate         |
| Viewpoint 9 | Recreational viewing opportunity at Lions Bay Beach Park.                | Medium         | High               | BG            | Moderate         |

Notes:

FG - foreground (0 – 1 km)

MG – middle ground (1 – 8 km)

BG – background (>8 km)

### 7.4.4.5 Lighting Assessment

The Proposed Project site does not currently contain functioning exterior lighting with the exception of potential lighting related to the existing maintenance shed facility. The closest light sources to the Proposed Project site are residential lights from the McNab Creek Strata, located approximately 700m northeast. It is assumed that exterior lights at these residents are related to security lighting. Approximately 4 km to the south of the site, lights from the residents on Gambier Island, Camp Latona and Thunderbird Yacht Club are discernable.

Regional sources consist of mostly direct lighting and ambient light noticeable in the direction of Port Mellon, as well as residents and communities along Highway 99. Noticeable along ridgelines surrounding the Proposed Project Area there were a small number of aviation warning lights on the various power stations and communications towers in the area.

Observed characteristics of existing lighting from baseline photographs have been considered together with viewing distances to characterize the existing baseline lighting condition and sensitivity for night-time receptor sites based on classifications provided by CIE guidelines (CIE 1997 and 2003). The description and resulting classification for each receptor site are summarized in Table 7.4-12. Volume 4, Part G – Section 22.0: Appendix 7.4-B Figures 12 to 14 shows the details of illuminance at each sensitive receptor location.

**Table 7.4-12: Night-time Receptor Site Sensitivity Rating**

| Viewpoint   | Description   | Lighting Condition |
|-------------|---|--------------------|
| Viewpoint 4 | Foreground viewing opportunity near McNab Estates dock; residential receptor located in dark setting with existing lighting visible from adjacent industrial land use   | High               |
| Viewpoint 5 | Middle ground viewing opportunity at Camp Latona; receptor located in dark setting with some discernible light from adjacent residential land use   | Medium             |
| Viewpoint 8 | Back ground residential viewing opportunity in Lions Bay (Panorama Rd. & Ocean view Rd.); residential and motorist receptor located in low brightness setting with ambient light from adjacent residential land use visible | Low                |

## 7.4.5 Effects Assessment

### 7.4.5.1 Proposed Project-VC Interactions

A preliminary evaluation of identified interactions between the various physical works and activities and the Visual Quality VC across all spatial and temporal phases of the Proposed is presented in Table 7.4-13. Rationale is provided for all determinations that there is no or negligible interaction and that no further consideration is required. For those Proposed Project-VC interactions that may result in a potential direct, indirect and induced effects requiring further consideration, the nature of the effects (both adverse and positive) arising from those interactions is described below.

**Table 7.4-13: Proposed Project-VC Interaction Table: Visual Resources VC – Visual Quality**

| Proposed Project Activities   | Description  | Visual Quality                    |  |
|---|--|-----------------------------------|--|
|   |  | Potential Interaction (See Notes) | Potential Effect / Rationale for Exclusion   |
| <b>Construction</b>   |  |                                   |  |
| 1. Crew and equipment transport   | <ul style="list-style-type: none"> <li>▪ Daily water taxi</li> <li>▪ Tug and barge transport of machinery/materials (est. 8 loads)</li> <li>▪ Barge household and industrial solid waste barged off-site</li> </ul>  | ○                                 | <ul style="list-style-type: none"> <li>▪ Temporary and intermittent visibility of Proposed Project activity will be introduced that are consistent in character relative to current level and type of vessel traffic in the RSA. The effect will not be considered further.</li> </ul> |
| 2. Site preparation, including and construction of berms and dyke                   | <ul style="list-style-type: none"> <li>▪ Logging, clearing and grubbing</li> <li>▪ Grading</li> <li>▪ Construction of the berms and dyke</li> <li>▪ Compaction and laying of gravel base</li> <li>▪ Limited improvements to existing on-site road infrastructure</li> </ul>  | ●                                 | <ul style="list-style-type: none"> <li>▪ Clearing of vegetation and potential visible screening. Effect will be assessed.</li> </ul>   |
| 3. Processing area installation, including conveyors and materials handling system) | <ul style="list-style-type: none"> <li>▪ Installation and use of portable concrete batch plant for construction</li> <li>▪ Installation of concrete foundations</li> <li>▪ Installation of screens, crushers, wash plant, conveyor system and automated materials-handling system (i.e., reclaim tunnels)</li> <li>▪ Installation of groundwater well as a source of make-up water for the wash plant</li> </ul> | ●                                 | <ul style="list-style-type: none"> <li>▪ Introduction of potentially visible Proposed Project feature(s). Effect will be assessed.</li> </ul>  |
| 4. Substation construction and connection   | <ul style="list-style-type: none"> <li>▪ Construct electrical substation adjacent to existing BC Hydro transmission line</li> <li>▪ Construct outdoor switchyard, electric building, and 100 m transmission line</li> </ul>  | ●                                 | <ul style="list-style-type: none"> <li>▪ Introduction of potentially visible Proposed Project feature(s). Effect will be assessed.</li> </ul>  |
| 5. Marine loading facility installation   | <ul style="list-style-type: none"> <li>▪ Remove existing mooring dolphins</li> <li>▪ Steel pile installation</li> <li>▪ Installation of conveyor, barge movement winch and mooring dolphins</li> </ul>   | ●                                 | <ul style="list-style-type: none"> <li>▪ Introduction of potentially visible Proposed Project feature(s). Effect will be assessed.</li> </ul>  |

| Proposed Project Activities                      | Description   | Visual Quality                    |  |
|--|---|-----------------------------------|--|
|  |   | Potential Interaction (See Notes) | Potential Effect / Rationale for Exclusion   |
| 6. Pit development                               | <ul style="list-style-type: none"> <li>▪ Dry excavation to remove overburden/topsoil</li> <li>▪ Installation of clamshell and floating conveyor</li> </ul>  | ●                                 | <ul style="list-style-type: none"> <li>▪ Introduction of potentially visible Proposed Project feature(s). Effect will be assessed.</li> </ul>  |
| 7. Other ancillary land-based construction works | <ul style="list-style-type: none"> <li>▪ Temporary construction infrastructure set up (trailers, temporary power, etc.)</li> <li>▪ Upgrades to the existing heavy equipment maintenance shop and warehouse</li> <li>▪ Upgrades to the existing fuelling facility for the storage of diesel and gasoline for on-site equipment</li> <li>▪ Construct site office, communications building, workers lunch/dry room, caretaker's cabin, first aid facility and helipad</li> <li>▪ Install contained washroom facilities</li> <li>▪ Construct pump room for well/stream intake water distribution and fire-fighting</li> </ul> | ●                                 | <ul style="list-style-type: none"> <li>▪ Introduction or modification of potentially visible Proposed Project feature(s). Effect will be assessed.</li> </ul>  |
| 8. Other ancillary marine construction works     | <ul style="list-style-type: none"> <li>▪ Removal of existing small craft dock; install temporary dock for worker access</li> <li>▪ Construct new floating small craft dock, the with tie-up area for a float plane, serviced with 30 amp (A) 125 volt (V) shore power</li> <li>▪ Barge household and industrial solid waste off-site</li> </ul>   | ●                                 | <ul style="list-style-type: none"> <li>▪ Introduction or modification of potentially visible Proposed Project feature(s). Effect will be assessed.</li> </ul>  |
| <b>Operations</b>                                |   |                                   |  |
| 9. Crew transport                                | <ul style="list-style-type: none"> <li>▪ Daily water taxi</li> </ul>  | ○                                 | <ul style="list-style-type: none"> <li>▪ Temporary and intermittent visibility of Proposed Project activity will be introduced that are consistent in character relative to current level and type of vessel traffic in the RSA. The effect will not be considered further.</li> </ul> |

| Proposed Project Activities                   | Description   | Visual Quality                    |  |
|---|---|-----------------------------------|--|
|   |   | Potential Interaction (See Notes) | Potential Effect / Rationale for Exclusion   |
| 10. Aggregate mining                          | <ul style="list-style-type: none"> <li>▪ Use of electric powered floating clamshell dredge</li> <li>▪ Primary screening and conveyance of extracted material to processing area</li> <li>▪ Install channel plug</li> </ul>  | ●                                 | <ul style="list-style-type: none"> <li>▪ Presence of a visible Proposed Project feature(s). Effect will be assessed.</li> </ul>  |
| 11. Processing (screening, crushing, washing) | <ul style="list-style-type: none"> <li>▪ Screening to separate aggregate sizes</li> <li>▪ Oversized gravels crushed</li> <li>▪ Operation of wash plant fed using recycled water from two large storage tanks, supplemented with make-up water by a groundwater well.</li> <li>▪ Drying and storage of fines and silt</li> </ul> | ○                                 | <ul style="list-style-type: none"> <li>▪ No visible effect of Proposed Project activity. The effect will not be considered further.</li> </ul>   |
| 12. Progressive reclamation                   | <ul style="list-style-type: none"> <li>▪ Ongoing earth works (including site clearing, surface material removal)</li> <li>▪ Fines and silt mixed with organic overburden material and used for infilling, re-vegetation and landscaping</li> </ul>  | ●                                 | <ul style="list-style-type: none"> <li>▪ Modification of visible landscape features. Effect will be assessed.</li> </ul>   |
| 13. Stockpile storage                         | <ul style="list-style-type: none"> <li>▪ Processed sand and gravel conveyed to stockpile area</li> <li>▪ Storage of processed materials in stockpiles</li> </ul>  | ●                                 | <ul style="list-style-type: none"> <li>▪ Presence of potentially visible Proposed Project feature(s). Effect will be assessed.</li> </ul>  |
| 14. Marine loading                            | <ul style="list-style-type: none"> <li>▪ Transfer of stored material using marine conveyor system</li> <li>▪ Barge loading</li> <li>▪ Site and navigational lighting</li> </ul>   | ●                                 | <ul style="list-style-type: none"> <li>▪ Presence of a visible Proposed Project feature(s). Effect will be assessed.</li> </ul>  |
| 15. Shipping                                  | <ul style="list-style-type: none"> <li>▪ Barge traffic (delivery/collection) in Howe Sound, Ramillies Channel, Thornbrough Channel, and Queen Charlotte Channel</li> <li>▪ Tug and barge transport of fuel and consumables</li> <li>▪ Navigational lighting</li> </ul>  | ○                                 | <ul style="list-style-type: none"> <li>▪ Temporary and intermittent visibility of Proposed Project activity will be introduced that are consistent in character relative to current level and type of vessel traffic in the RSA. The effect will not be considered further.</li> </ul> |
| 16. Refueling and maintenance                 | <ul style="list-style-type: none"> <li>▪ Refueling and maintenance of on-site equipment</li> </ul>  | ○                                 | <ul style="list-style-type: none"> <li>▪ No visible effect of Proposed Project activity(s). Activity will not be considered further.</li> </ul>  |



| Proposed Project Activities              | Description   | Visual Quality                    |  |
|--|---|-----------------------------------|--|
|  |   | Potential Interaction (See Notes) | Potential Effect / Rationale for Exclusion   |
| <b>Reclamation and Closure</b>           |   |                                   |  |
| 17. Crew and equipment transport         | <ul style="list-style-type: none"> <li>▪ Daily water taxi movements</li> <li>▪ Tug and barge transport of machinery/materials</li> <li>▪ Barge household and industrial solid waste barged off-site</li> </ul>  | ○                                 | <ul style="list-style-type: none"> <li>▪ Temporary and intermittent visibility of Proposed Project activity will be introduced that are consistent in character relative to current level and type of vessel traffic in the RSA. The effect will not be considered further.</li> </ul> |
| 18. Removal of land-based infrastructure | <ul style="list-style-type: none"> <li>▪ Remove surface facilities, including clamshell dredge, conveyor system, screens, crushers, wash plant, automated materials-handling system, heavy equipment maintenance shop and warehouse, fuelling facility, site office, communications building, workers lunch/dry room, caretaker's cabin, first aid facility, helipad and contained washroom facilities</li> </ul> | ●                                 | <ul style="list-style-type: none"> <li>▪ Change in visible Proposed Project and landscape feature(s). Effect will be assessed.</li> </ul>  |
| 19. Removal of marine infrastructure     | <ul style="list-style-type: none"> <li>▪ Remove marine facilities, in marine load out facility, jetty, conveyors and piles</li> </ul>   | ●                                 | <ul style="list-style-type: none"> <li>▪ Change in visible Proposed Project and landscape feature(s). Effect will be assessed.</li> </ul>  |
| 20. Site reclamation                     | <ul style="list-style-type: none"> <li>▪ Final completion of the pit lake, landscaping and re-vegetation to develop a functional ecosystem in the freshwater pit</li> <li>▪ Landscaping and re-vegetation of processing area, berms and dyke</li> </ul>   | ●                                 | <ul style="list-style-type: none"> <li>▪ Change in visible Proposed Project and landscape feature(s). Effect will be assessed.</li> </ul>  |

*Notes:*

○ = Potential effect of Proposed Project activity on VC is positive, none or negligible; no further consideration warranted.

● = Potential effect of Proposed Project activity on VC that may require mitigation/benefit enhancement; warrants further consideration

Project-VC interactions for Visual Quality identified include the following two (2) effects and their associated indirect effects.

**1. Introduction of visible Proposed Project features and/or modification of visible landscape features:**

- Changes in the visibility of visual disturbances resulting from the installation of Proposed Project features (e.g., site preparation, processing area and loading facility, ancillary works or facilities), and
- Changes in the visibility of visual disturbances resulting from Proposed Project operation activities (e.g., dredging and processing, storage, marine loading, security lighting).

**2. Change in scenic character of the Proposed Project site and landscape features:**

- Effects of visual contrast and changes in scenic character related to visible Proposed Project components and modification of landscape features, and
- Effects of visual contrast and changes in scenic character related to modifications from closure and site reclamation activities.

### 7.4.5.2 Potential Project-Related Effects

The following sections summarize the potential effects related to visibility and scenic character of the Proposed Project during the construction, operation, and remediation closure phases.

#### 7.4.5.2.1 Visual Quality

##### *Visibility*

Visibility analysis was conducted for the RSA from receptor sites and results were combined with foreground, middle ground and background viewing distance zones to present the potential visibility of the Proposed Project Area of the landscape. The visibility analysis results are summarized in Table 7.4-14.

**Table 7.4-14: Project Footprint Viewshed Summary**

| Viewpoint   | Visible Project Area [ha] | Percent of Total Project Footprint [%] | Distance Zone | Potential Project Visibility  |
|-------------|---------------------------|--|---------------|---|
| Viewpoint 1 | 0.07                      | 0.11                                   | BG            | Negligible – very small portions of Proposed Project Area within 16 km viewing distance; features are likely to be barely discernable.  |
| Viewpoint 2 | 3.93                      | 6.57                                   | MG            | Low – portions of marine and ancillary facilities within 8 km viewing distance; visible features are likely to be discernable.          |
| Viewpoint 3 | 4.83                      | 8.07                                   | MG            | Low – portions of marine and ancillary facilities within 8 km viewing distance; visible features are likely to be discernable.          |
| Viewpoint 4 | 2.38                      | 3.98                                   | FG            | Low – portions of marine facilities and ancillary facilities within 1 km viewing distance; visible features are likely to be prominent. |

| Viewpoint   | Visible Project Area [ha] | Percent of Total Project Footprint [%] | Distance Zone | Potential Project Visibility   |
|-------------|---------------------------|--|---------------|--|
| Viewpoint 5 | 5.60                      | 9.37                                   | MG            | Low – portions of marine and ancillary facilities within 8 km viewing distance; visible features are likely to be discernable.                           |
| Viewpoint 6 | 4.22                      | 7.05                                   | BG            | Negligible – portions of marine facilities and ancillary facilities within 16 km viewing distance; visible features are likely to be barely discernable. |
| Viewpoint 7 | 0.00                      | 0.00                                   | BG            | Not visible  |
| Viewpoint 8 | 4.42                      | 7.39                                   | BG            | Negligible – portions of marine facilities and ancillary facilities within 16 km viewing distance; visible features are likely to be barely discernable. |
| Viewpoint 9 | 0.00                      | 0.00                                   | BG            | Not visible  |

Notes:

Total Project footprint area is 59.84 ha.

FG - foreground (0 – 1 km)

MG – middle ground (1 – 8 km)

BG – background (>8 km)

Figure 7.4-3 presents the surveyed viewpoints, receptor sites and related visible area and distance zones.

### Scenic Character

Modelled images of each receptor site were evaluated for the visual contrast exhibited by the Proposed Project component within its landscape context. Disturbance types were separated into the categories of land/water, vegetation, and structures. The degree of contrast of each disturbance type was evaluated separately by the visual elements of form, line, colour, texture and scale. An overall contrast rating was assigned for each viewpoint as a measure of the visual impact severity between the Proposed Project's elements and the existing landscape. Visual contrast ratings for the receptors sites are provided in Table 7.4-15.

**Table 7.4-15: Receptor Site Contrast Ratings**

| Viewpoint   | Contrast Element | Land/Water    | Vegetation                       | Structures | Overall Contrast |
|-------------|------------------|---------------|----------------------------------|------------|------------------|
| Viewpoint 1 | Form             | None          | None                             | Weak       | Low              |
|             | Line             | None          | None                             | None       | None             |
|             | Colour           | None          | None                             | Weak       | Low              |
|             | Texture          | None          | None                             | None       | None             |
|             | Scale            | None          | None                             | None       | None             |
|             | Dominance        | Inconspicuous | Overall Contrast For Viewpoint 1 |            | Negligible       |

| Viewpoint   | Contrast Element | Land/Water    | Vegetation                              | Structures | Overall Contrast  |
|-------------|------------------|---------------|---|------------|-------------------|
| Viewpoint 2 | Form             | None          | None                                    | Weak       | Low               |
|             | Line             | None          | None                                    | Weak       | Low               |
|             | Colour           | None          | None                                    | Weak       | Low               |
|             | Texture          | None          | None                                    | Weak       | Low               |
|             | Scale            | None          | None                                    | Weak       | Low               |
|             | Dominance        | Inconspicuous | <b>Overall Contrast For Viewpoint 2</b> |            | <b>Weak</b>       |
| Viewpoint 3 | Form             | None          | Weak                                    | Weak       | Low               |
|             | Line             | None          | None                                    | Weak       | Low               |
|             | Colour           | None          | None                                    | Weak       | Low               |
|             | Texture          | None          | None                                    | Weak       | Low               |
|             | Scale            | None          | None                                    | Weak       | Low               |
|             | Dominance        | Subordinate   | <b>Overall Contrast For Viewpoint 3</b> |            | <b>Weak</b>       |
| Viewpoint 4 | Form             | None          | None                                    | Moderate   | Moderate          |
|             | Line             | None          | None                                    | Moderate   | Moderate          |
|             | Colour           | None          | None                                    | Moderate   | Moderate          |
|             | Texture          | None          | None                                    | Weak       | Low               |
|             | Scale            | None          | None                                    | Weak       | Low               |
|             | Dominance        | Subordinate   | <b>Overall Contrast For Viewpoint 4</b> |            | <b>Moderate</b>   |
| Viewpoint 5 | Form             | None          | Weak                                    | Weak       | Low               |
|             | Line             | None          | None                                    | Weak       |                   |
|             | Colour           | None          | None                                    | Weak       | Low               |
|             | Texture          | None          | None                                    | Weak       | Low               |
|             | Scale            | None          | None                                    | Weak       | Low               |
|             | Dominance        | Subordinate   | <b>Overall Contrast For Viewpoint 5</b> |            | <b>Weak</b>       |
| Viewpoint 6 | Form             | None          | None                                    | Weak       | Low               |
|             | Line             | None          | None                                    | None       | None              |
|             | Colour           | None          | None                                    | Weak       | Low               |
|             | Texture          | None          | None                                    | None       | None              |
|             | Scale            | None          | None                                    | None       | None              |
|             | Dominance        | Inconspicuous | <b>Overall Contrast For Viewpoint 6</b> |            | <b>Negligible</b> |
| Viewpoint 7 | Form             | None          | None                                    | None       | None              |
|             | Line             | None          | None                                    | None       | None              |
|             | Colour           | None          | None                                    | None       | None              |
|             | Texture          | None          | None                                    | None       | None              |
|             | Scale            | None          | None                                    | None       | None              |
|             | Dominance        | Inconspicuous | <b>Overall Contrast For Viewpoint 7</b> |            | <b>Negligible</b> |
| Viewpoint 8 | Form             | None          | None                                    | Weak       | Low               |
|             | Line             | None          | None                                    | None       | None              |
|             | Colour           | None          | None                                    | Weak       | Low               |
|             | Texture          | None          | None                                    | None       | None              |
|             | Scale            | None          | None                                    | None       | None              |
|             | Dominance        | Inconspicuous | <b>Overall Contrast For Viewpoint 8</b> |            | <b>Negligible</b> |

| Viewpoint   | Contrast Element | Land/Water    | Vegetation                              | Structures | Overall Contrast |
|-------------|------------------|---------------|---|------------|------------------|
| Viewpoint 9 | Form             | None          | None                                    | None       | None             |
|             | Line             | None          | None                                    | None       | None             |
|             | Colour           | None          | None                                    | None       | None             |
|             | Texture          | None          | None                                    | None       | None             |
|             | Scale            | None          | None                                    | None       | None             |
|             | Dominance        | Inconspicuous | <b>Overall Contrast For Viewpoint 9</b> |            |                  |

The overall contrast rating was compared to the initial landscape rating to determine the Proposed Project's level of visual impact on visual resources. Results for visual impact rating for each key receptor site are summarized below in Table 7.4-16.

**Table 7.4-16: Receptor Site Visual Impact Rating**

| Viewpoint   | Landscape Rating | Overall Contrast | Level of Visual Impact |
|-------------|------------------|------------------|------------------------|
| Viewpoint 1 | Low              | Negligible       | Negligible             |
| Viewpoint 2 | Moderate         | Weak             | Low                    |
| Viewpoint 3 | Moderate         | Weak             | Low                    |
| Viewpoint 4 | High             | Moderate         | Moderate               |
| Viewpoint 5 | Moderate         | Weak             | Low                    |
| Viewpoint 6 | Low              | Negligible       | Negligible             |
| Viewpoint 7 | Low              | Negligible       | Negligible             |
| Viewpoint 8 | Moderate         | Negligible       | Negligible             |
| Viewpoint 9 | Moderate         | Negligible       | Negligible             |

Technical descriptions and detailed results of the effects assessment are presented in Volume 4, Part G – Section 22.0: Appendix 7.4-B.

## Lighting

Guidance provided by CIE (CIE 1997, 2003) was used in order to provide assessment criteria to determine the potential visual effects of artificial exterior lighting. For each of the three (3) night-time receptor sites, the visual change resulting from the Proposed Project lighting design was characterized based on the results of landscape modelling and an evaluation the overall visual effect. A level of visual impact class was determined relative to the existing lighting condition and predicted visual effect at each location. In accordance with the CIE guidance, the following definitions are used in describing lighting effects visual impact:

- **Negligible** – no change or barely perceptible change in the baseline conditions.
- **Low** - minor increase in the level of brightness or awareness of light sources for sensitive receptors that would result in a perceptible change in baseline conditions.
- **Moderate** – increase in the level of brightness or awareness of light sources for sensitive receptors that would result in a noticeable effect on baseline conditions.

- **High** - major increase in the level of brightness or awareness of light sources for sensitive receptors that would result in a major effect on baseline conditions.

Table 7.4-17 summarises results of visual impact analysis for night-time receptor sites.

**Table 7.4-17: Visual Impact Rating for Night-time Receptor Sites**

| Viewpoint   | Lighting Condition | Lighting Effect | Level of Visual Impact |
|-------------|--------------------|-----------------|------------------------|
| Viewpoint 4 | High               | Moderate        | Moderate               |
| Viewpoint 5 | Medium             | Low             | Low                    |
| Viewpoint 8 | Low                | Negligible      | Negligible             |

#### **7.4.5.2.1.1 Construction**

##### **Visibility**

Negligible to Low levels of visibility are expected, limited mostly to portions of marine and ancillary works. The foreshore area contains effective natural vegetation screening of the processing area preparation, pit development and sub-station construction although some localized vegetation removal is expected during the installation of the conveyor. Upgrades and construction to ancillary land-based construction works will likely be evident as well.

##### **Scenic Character**

There is the potential for adverse effects on visual quality, since the construction of Proposed Project components including temporary construction infrastructure, installation of clamshell, piling and construction of jetty, installation of processing equipment, marine conveyor and barge winch, and other ancillary works will introduce new built features that will provide visual contrast with the existing landscape character. The removal during site preparation of existing landscape features that contributes to scenic character, such as existing vegetation and the initial year 1 to 3 area excavation have the potential to reduce the scenic value of the existing landscape prior to the implementation of progressive mitigation measures.

#### **7.4.5.2.1.2 Operations**

##### **Visibility**

Negligible to Low levels of visibility are expected, limited to mostly portions of marine and ancillary facilities and activities related to marine loading and lighting. The foreshore area includes effective natural vegetation screening of most of the activity occurring in the processing area and the pit as well as the stock pile storage.

##### **Scenic Character**

There is the potential for adverse effects on visual quality, since the visible Proposed Project components and activities related to operation, including the pit development and aggregate extraction, processing infrastructure,

storage piles, marine jetty and barges, and welfare and ancillary facilities will present anthropogenic features and provide visual contrast with the existing landscape character.

#### **7.4.5.2.1.3 Reclamation and Closure**

##### **Visibility**

Removal of marine infrastructure will reduce the visibility of the Proposed Project and re-vegetated areas will provide additional natural vegetation screening of the reclaimed processing area and pit.

##### **Scenic Character**

There is the potential for positive effects on visual quality, since the removal of visible Proposed Project components related to Proposed Project operation, including marine and land based site infrastructure, will eliminate anthropogenic features and reduce visual contrast with the existing landscape character. Landscape features will be designed and establishment through progressive and final remediation efforts. This will include infilling, re-vegetation and the completion of a lake created by the excavation extents. These remediation steps have the potential to contribute positively to the scenic character of the Proposed Project Area.

#### **7.4.5.3 Mitigation**

This section provides a description of the proposed mitigation measures specifically related to Proposed Project effects on the visual quality. Mitigation measures to reduce the visual impact of the Proposed Project have been developed from standard mitigations and best management practices (BMPs) considering their effectiveness for implementation and maintenance, and their appropriateness within the context of the existing landscape. These mitigation measures will address visibility of Project features from selected receptor sites as well as changes to scenic character.

The mitigation strategy outlined below forms the basis for the commitments that the Proposed Project is making with respect to visual resources. A detailed list of all commitments of the Proposed Project are provided in Volume 3, Part F – Section 19.

Measures proposed to mitigate potential Visual Resource effects are presented in Table 7.4-18.

##### **7.4.5.3.1 Construction**

##### **Visibility**

The effects on visual quality from the visibility of site preparation and processing area and marine loading facility installation, dust related to construction activities, and installation of ancillary land-based and marine-based construction works will be mitigated through best practice and Proposed Project design features. Proposed mitigation includes the following:

- A minimal amount of vegetation and topsoil should be removed to ensure that existing natural vegetation is retained wherever possible and incorporated into site design, especially in the foreshore and periphery areas of the Proposed Project site. This provides screening for construction activity and related effect such as dust, as well as ensuring blending with the existing land cover.
- Keep the scale and size of infrastructure components and processing area layout concentrated to avoid their visibility above existing vegetation screening.
- Additional vegetation screening of land-based structures may be possible around welfare and ancillary work not currently screened. Additional and/or maintenance planting should be considered as part of the Construction phase mitigation.
- Minimize lighting usage during construction and operations.

### ***Scenic Character***

The effects on visual quality from the contrast created by site preparation and processing area and marine loading facility installation, dust related to construction activities, and installation of ancillary land-based and marine-based construction works will be mitigated through best practice and Proposed Project design features. Proposed mitigation includes the following:

- A minimal amount of vegetation and topsoil should be removed to ensure that existing natural vegetation is retained wherever possible and incorporated into site design, especially in the foreshore and periphery areas of the Proposed Project site. This provides screening for construction activity and related effect such as dust, as well as ensuring blending with the existing land cover.
- Any desired planting programs for vegetative screening of land-based structures should be considered in the Construction phase as results will not be immediately effective and will take time to provide the desired effect for subsequent operation and closure and reclamation phases.
- Dust suppression techniques should be in place at all times during construction.
- Develop low level of contrast of infrastructure components, especially those in the foreshore, by finishing with low glare and natural colored surface treatment and maintaining external surfaces as required.

#### **7.4.5.3.2 Operations**

##### ***Visibility***

The effects on visual quality from visibility of pit development from clamshell dredging and processing, marine loading, stockpile storage, ancillary land-based infrastructure, and marine loading and security lighting will be mitigated through best practice and Proposed Project design features. Proposed mitigation and progressive reclamation efforts include the following:

- Maintain natural screening to decrease the visibility of extraction and processing activity by ensuring surface and root disturbance does not occur.



- Keep the height of stockpiles low to avoid their visibility above existing screening and the opportunity to be silhouetted against the sky.
- Adhere to design goals contained within the Sunshine Coast Regional District Outdoor Lighting Guidelines (SCRD 2008) to maintain the quality of the night-time lighting environment and avoid lighting impacts. This includes installing fixtures that reduce light spillage beyond the direct area of illumination and localizing lighting to areas of safety and security concern.
- Additional recommendations are available within the Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations (CIE 2003) to avoid lighting impacts.

### ***Scenic Character***

The effects on visual quality from the contrast created by pit development from clamshell dredging and processing, marine loading, stockpile storage, and marine loading and security lighting will be mitigated through best practice and Proposed Project design features. Proposed mitigation and progressive reclamation efforts include the following:

- Dust suppression techniques should be in place at all times during operation.
- Shape the aggregate pit where possible, so that the final profile of the opening emulates natural contours and form with the surrounding landscape to ensure more successful effect during the remediation phase.

#### **7.4.5.3.3 Reclamation and Closure**

##### ***Visibility***

The positive effects on visual quality from visibility of the removal of land-based and marine infrastructure and site reclamation will be facilitated through best practice and Proposed Project design features. Proposed mitigation integrated in the Proposed Project design includes the following:

- Removal of built components not required to the operation or maintenance of the site to remove visible Project elements.

### ***Scenic Character***

The positive effects on visual quality from visibility of the removal of land-based and marine infrastructure and site reclamation will be facilitated through best practice and Proposed Project design features. Proposed mitigation integrated in the Proposed Project design includes the following:

- Site planning and progressive reclamation plans throughout all phases of mine development (including landform design and temporary planting) and interim monitoring of ongoing reclamation activities.
- Final reclamation of disturbed areas with landscaping/landform design and revegetation with native species to develop a functional ecosystem.

- Implementation of Reclamation and Effective Closure Plan as per the reclamation standards outlined in the Health and Safety and Reclamation Code for Mines in BC. The Reclamation and Effective Closure Plan is provided in Volume 4, Part G – Section 22.0: Appendix 4.

### 7.4.5.3.4 Summary of Identified Mitigation Measures

**Table 7.4-18: Identified Mitigation Measures: Visual Resources**

| Potential Effect   | Mitigation   | Anticipated effectiveness  |
|--|--|--|
| <b>Construction</b>  |  |  |
| Site preparation, processing area and marine loading facility installation | <p>Minimize removal of vegetation and topsoil to ensure that existing natural vegetation is retained and incorporated into site design. This will be integrated into the Vegetation Management Plan (Volume 3, Part E - Section 16.0).</p> <p>Implementation of a Construction Environmental Management Plan (CEMP).</p>   | Mitigation measures will reduce potential residual effects by providing screening for construction activity and related effect, as well as ensuring blending with the existing land cover. |
| Dust related to construction activities                                    | <p>Dust suppression techniques should be in place at all times during construction.</p> <p>Implementation of an Air Quality and Dust Control Management Plan.</p> <p>Implementation of a Construction Environmental Management Plan (CEMP).</p>  | Mitigation measures will reduce potential residual effects by reducing visible Project effect.   |
| ancillary land-based and marine - based construction works                 | <p>Keep the scale and size of infrastructure components and layout concentrated.</p> <p>Any desired planting programs for vegetative screening of land-based structures should be considered as results will not be immediately effective.</p> <p>Preserve the level of structure contrast of infrastructure components by re-finishing and maintaining external surfaces as required.</p> <p>Additional screening of land-based structures may be possible around welfare and ancillary work not currently screened by existing vegetation.</p> <p>Implementation of a Construction Environmental Management Plan (CEMP).</p> | Mitigation measures will reduce potential residual effects to avoid visibility and reduce the level of visual contrast with the existing landscape.  |

| Potential Effect  | Mitigation  | Anticipated effectiveness   |
|---|---|---|
| <b>Operations</b>                                       |   |   |
| Pit development from clamshell dredging and processing; | <p>Maintain natural screening to decrease the visibility of extraction and processing activity. This will be integrated into the Vegetation Management Plan (Volume 3, Part E - Section 16.0).</p> <p>Dust suppression techniques should be in place at all times during operation.</p> <p>Implementation of an Air Quality and Dust Control Management Plan.</p> <p>Implementation of an Operational Environmental Management Plan (OEMP).</p> | Mitigation measures will reduce potential residual effects by providing screening for operation activity and related effect, as well as ensuring blending with the existing land cover. |
| Marine loading  | No mitigation measures proposed.  | Minor effects identified.   |
| Stockpile storage                                       | <p>Keep the height of stockpiles low to avoid their visibility above existing screening.</p> <p>Implementation of an Operational Environmental Management Plan (OEMP).</p>  | Mitigation measures will reduce potential residual effects to avoid visibility and reduce the level of visual contrast with the existing landscape.                                     |
| Security lighting                                       | <p>Negative lighting impacts can be mitigated by installing fixtures that reduce light 'spillage' beyond the direct area of illumination.</p> <p>Implementation of an Operational Environmental Management Plan (OEMP).</p>   | Mitigation measures will reduce potential residual effects to avoid visibility and reduce the level of visual contrast with the existing landscape.                                     |
| Progressive reclamation                                 | <p>Implementation of a Reclamation and Effective Closure Plan (Volume 4, Part G - Section 22.0: Appendix 4).</p> <p>Site planning and progressive reclamation plans throughout all phases of mine development including landform design and temporary planting.</p>   | Mitigation measures will reduce potential residual effects to avoid visibility and reduce the level of visual contrast with the existing landscape.                                     |
| <b>Reclamation and Closure</b>                          |   |   |
| Removal of land-based and marine infrastructure         | <p>Implementation of a Reclamation and Effective Closure Plan (Volume 4, Part G - Section 22.0: Appendix 4).</p> <p>Eliminate anthropogenic features through the removal of surface facilities and marine infrastructure not required to the operation or maintenance of the site.</p>  | Mitigation measures will reduce potential residual effects to avoid visibility and reduce the level of visual contrast with the existing landscape.                                     |
| Site Reclamation  | <p>Implementation of a Reclamation and Effective Closure Plan (Volume 4, Part G - Section 22.0: Appendix 4).</p> <p>Final reclamation of disturbed areas with landscaping/landform design and re-vegetation with native species.</p>  | Mitigation measures will reduce potential residual effects to avoid visibility and reduce the level of visual contrast with the existing landscape.                                     |

#### **7.4.5.4 Residual Effects Assessment**

Potential Proposed Project-related residual effects have been characterized using the criteria for each VC identified in Table 7.4-8. The characterization of potential residual effects (i.e., following application of appropriate mitigation measures) is described below and presented in Table 7.4-19. The likelihood of potential residual effects (after mitigation) occurring is described in Table 7.4-20.

##### **7.4.5.4.1 Construction**

The temporary introduction of construction infrastructure (e.g., machinery, trailers, facilities, etc.) and the installation of Proposed Project features effects may adversely affect visual quality during the Construction phase. Mitigation measures associated with screening and maintenance of existing land cover will limit the visibility of Proposed Project features and maintaining scenic character resulting in reduced visual impacts related to construction. The visibility of the Proposed Project Area and activities will be limited to views of the load out jetty and barges. Land-based and marine based infrastructure surfaces, including those that will be visible in areas disturbed from past activities, will be finished and maintained for low contrast which will limit the effect on scenic quality. The residual adverse effects caused by the visibility and scenic quality of the load out jetty, barges and ancillary infrastructure are likely to be of low magnitude, of local extent (restricted to the LSA), of short-term duration (most effects will remain during the life span of the Proposed Project, while some will be removed prior to operation), fully reversible (physical structure can be removed) and be high frequency.

##### **7.4.5.4.2 Operations**

Portions of Proposed Project features that are expected to remain visible where not effectively screened by vegetation may adversely affect visual quality during the operation phase. Mitigation measures associated with visibility and scenic quality will reduce potential residual effects on visual quality by ensuring vegetation screening is maintained and maximized, infrastructure component surfaces are maintained for low contrast, processing area layout and stock pile form are compact and obtrusive lighting is minimized. The residual adverse effects caused by the visibility and scenic character of the load out jetty and barges are likely to be of low magnitude, of local extent (restricted to the LSA), of medium-term duration (remaining during the 16 year life span of the Proposed Project but removed after), fully reversible (physical structure can be removed) and be high frequency (visible during day and night). The residual adverse effects caused by lighting will be of low magnitude and consistent with overall visual effects provided mitigation measures are implemented to utilize hooded fixtures and localize lighting. The effects may slightly higher for the McNab Estate Strata receptor site given its' close proximity to the Proposed Project site.

##### **7.4.5.4.3 Reclamation and Closure**

The removal of land-based and marine infrastructure and rehabilitation of disturbed areas is not expected to have an adverse effect. Removal of anthropogenic features and site reclamation will potentially provide positive social and recreational effects related an increase in the scenic character of the Proposed Project site.

**Table 7.4-19: Characterization of Potential Proposed Project-Related Residual Effects: Visual Resources VC - Visual Quality**

| Potential Residual Effects  | Residual Effect Assessment Criteria |           |        |          |               |           |
|---|-------------------------------------|-----------|--------|----------|---------------|-----------|
|   | Context                             | Magnitude | Extent | Duration | Reversibility | Frequency |
| <b>Construction</b>   |                                     |           |        |          |               |           |
| The temporary construction of infrastructure and the installation of land-based and marine-based infrastructure will introduce built structures to the existing landscape.    | S                                   | L         | L      | ST       | FR            | H         |
| <b>Operations</b>   |                                     |           |        |          |               |           |
| The operation of land-based and marine-based infrastructure and night-time security lighting will present built structures and lighting conditions to the existing landscape. | S                                   | L         | L      | MT       | FR            | H         |
| <b>Reclamation and Closure</b>  |                                     |           |        |          |               |           |
| None  |                                     |           |        |          |               |           |

**Assessment Criteria:**

Context: S- Sensitive; MR – Moderately Resilient; R-Resilient;

Magnitude: N – Negligible, L – Low, M – Medium, H – High;

Geographic Extent: L – Local, R – Regional, BR – Beyond Regional;

Duration: ST – Short-term, MT – Medium-term, LT – Long-term;

Reversibility: FR- Fully Reversible, PR - Partially Reversible, IR – Irreversible;

Frequency: L – Low, M – Medium, H – High

Significance: N – Negligible- Not Significance, NS – Not Significant, S – Significant

Likelihood: L- Low, M - Medium, H – High

Level of Confidence: L- Low, M - Moderate, H – High

**Table 7.4-20: Likelihood of Occurrence of Potential Residual Effects: Visual Resources**

| VC                             | Residual Effect  | Likelihood | Rationale   |
|--------------------------------|--|------------|---|
| <b>Construction</b>            |  |            |   |
| Visual Quality                 | The temporary construction of infrastructure and the installation of land-based and marine-based infrastructure will introduce built structures to the existing landscape context that are limited in visibility and have a low level of contrast with the existing scenic character.    | High       | Effect has a High likelihood of occurrence (81% -100%) as mitigation measures are limited related to the function and design of visible components. |
| <b>Operations</b>              |  |            |   |
| Visual Quality                 | The operation of land-based and marine-based infrastructure and night-time security lighting will present built structures and lighting conditions to the existing landscape context that are limited in visibility and have a low level of contrast with the existing scenic character. | High       | Effect has a High likelihood of occurrence (81% -100%) as mitigation measures are limited related to the function and design of visible components. |
| <b>Reclamation and Closure</b> |  |            |   |
| None                           |  |            |   |

### 7.4.5.5 Significance of Residual Effects

The significance of potential residual adverse effects will be determined for each VC based on the residual effects criteria and the likelihood of a potential residual effect occurring, a review of background information and available field study results, consultation with government agencies, First Nations, and other experts, and professional judgement. The rationale and determinations of the significance on the Visual Quality VC are provided in Table 7.4-21.

Several years of public perception research in BC confirms that public preferences for visual landscapes decrease as the level of visible landscape alterations increase (BC MFR 2006, 1989; BC MoF 2003, 1997b, 1998). The threshold for visual preference was determined at the 'Partially Retained' class which indicates human-caused alterations that are evident, but subordinate and do not dominate the landscape. This rating is consistent with the definition for moderate visual impacts (Section 7.4.3.3.3.1) and is considered to be an acceptable level of alteration to maintain the integrity of visual quality (BC MFML 2010). For the purposes of determining significance related to the Visual Quality VC, the level of residual effect has been rated as negligible-not significant, not significant, or significant, as follows:

- **Negligible-Not Significant:** Effects determined to be negligible are those that are generally not detectable. Negligible effects are not carried forward to the residual effects characterisation or significance section or the cumulative effects assessment;
- **Not significant:** An adverse effect that is greater than negligible and that does not meet the definition of significant. Not-significant effects are carried forward to the cumulative effects assessment; or
- **Significant:** An adverse effect of high magnitude that occurs over the long-term in a context that is moderately sensitive to visual change demonstrating an evident contrast with the current landscape character, and thus a noticeable decline in the visual quality from current conditions. Significant effects are carried forward to the cumulative effects assessment.

Detailed rationale for significance determinations is provided below.

#### **7.4.5.5.1 Construction**

The temporary introduction of construction infrastructure (e.g., machinery, trailers, facilities, etc.) and the installation of the load out jetty and ancillary land-based and marine-based infrastructure have the potential to adversely affect visual quality by removing some existing vegetation and introducing visible built structures to the Proposed Project site that will alter the existing scenic character. The potential residual effects related to construction infrastructure are short-term and considered to present a relatively small visual change with effects diminishing with increasing viewing distance. Residents of McNab Estates Strata and recreational marine users in Thornbrough Channel are likely to be most affected by the potential visual impacts due to their close proximity to the Proposed Project.

Considering the characterization of residual effects within a context that demonstrates visible disturbance from current and past activities and has a high sensitivity to adverse visual change, the low magnitude of residual visual effects, and the short-term duration, the significance of adverse residual effects to the Visual Quality VC for the Construction phase are considered to be not significant.

#### **7.4.5.5.2 Operations**

The operation of the load out jetty, barges, ancillary land-based and marine-based infrastructure and security lighting have the potential to adversely affect visual quality by presenting visible built structures to the Proposed Project site that will alter the existing scenic character. The potential residual effects related to operation are medium-term and considered to present a relatively small visual change with effects diminishing with increasing viewing distance. Residents of McNab Estates Strata and recreational marine users in Thornbrough Channel are likely to be most affected by the potential visual impacts due to their close proximity to the Proposed Project.

Considering the characterization of residual effects within a context that demonstrates visible disturbance from current and past activities and has a high sensitivity to adverse visual change, the low magnitude of residual visual effects, and the medium-term duration, the significance of adverse residual effects to the Visual Quality VC for the operations phase are considered to be not significant.

#### **7.4.5.5.3 Reclamation and Closure**

The proposed removal of land-based and marine-based infrastructure and reclamation activities have the potential to have a positive effect on visual quality of the Proposed Project site. Positive effects are not carried forward in the significance assessment.

A summary of significance determinations is presented in Table 7.4-21.

**Table 7.4-21: Significance of Potential Residual Effects: Visual Resources**

| VC                             | Residual Effect   | Significance    | Rationale  |
|--------------------------------|---|-----------------|--|
| <b>Construction</b>            |   |                 |  |
| Visual Quality                 | The temporary and intermittent visibility of construction infrastructure and the installation of land-based and marine based infrastructure will introduce built structures to the existing landscape context that are limited in visibility and have a low level of contrast with the existing scenic character. | Not Significant | Existing landscape context includes visible disturbance from current and past activities related to forestry operations, transmission and residential development. Visual impact of visible temporary construction infrastructure and Proposed Project features (load out jetty and ancillary land-based and marine based infrastructure) are expected to present a small visual change in scenic character with effects diminishing with increasing viewing distance. |
| <b>Operations</b>              |   |                 |  |
| Visual Quality                 | The operation of land-based and marine based infrastructure and night-time security lighting will present built structures and lighting conditions to the existing landscape context that are limited in visibility and have a low level of contrast with the existing scenic character.                          | Not Significant | Existing landscape context includes visible disturbance from current and past activities related to forestry operations, transmission and residential development. Visual impact of visible infrastructure and Proposed Project features (load out jetty and ancillary land-based and marine based infrastructure) are expected to present a small visual change in scenic character with effects diminishing with increasing viewing distance.                        |
| <b>Reclamation and Closure</b> |   |                 |  |
| None                           |   |                 |  |

### 7.4.5.6 Level of Confidence

The level of confidence of predicted residual effects is provided in Table 7.4-22. The prediction confidence of the assessment on each VC is based on scientific information and statistical analysis, professional judgement and effectiveness of mitigation (rated as High confidence, Moderate confidence, and Low confidence).

**Table 7.4-22: Level of Confidence in Potential Residual Effect Predictions: Visual Resources**

| Residual Effect     | Level of Confidence (LOC) in Residual Effect Prediction | LOC Rationale  |
|---------------------|---|--|
| <b>Construction</b> |   |  |
| Visual Quality      | Moderate  | Understanding based on description and schedule of activity, spatial analysis and professional knowledge.  |
| <b>Operations</b>   |   |  |
| Visual Quality      | High  | Understanding based on spatial analysis, detailed 3D engineering design and landscape modelling results and recognised standards to measure effects. |



| Residual Effect                | Level of Confidence (LOC) in Residual Effect Prediction | LOC Rationale   |
|--------------------------------|---|---|
| <b>Reclamation and Closure</b> |   |   |
| Visual Quality                 | Moderate  | Understanding based on description and schedule of progressive and final reclamation activities, spatial analysis and professional knowledge. |

### 7.4.5.7 Cumulative Effects Assessment

Cumulative effects result from interactions between Proposed Project-related residual effects and incremental effects of existing and certain or reasonably foreseeable projects and activities. Potential effects from past and present projects were assessed as part of the existing conditions. Cumulative effects assessment methodology is described in Volume 2, Part B - Section 4.6.

#### 7.4.5.7.1 Cumulative Effects Assessment Boundaries

As described in Section 7.4.3.2.1, the spatial boundary of the cumulative effects assessment for Visual Resources is defined as the area within 16 km of the Proposed Project Area to account for foreground, middle-ground and background viewing distances. The RSA is used in the cumulative effects assessment as it considers visibility of the overall scale of the Proposed Project within a regional context and the presence of sensitive receptor on the eastern shoreline of Howe Sound.

Projects that overlap with the cumulative effects assessment boundary are shown on Figure 4-6.

#### 7.4.5.7.2 Residual Effects Considered in Cumulative Effects Assessment

Proposed Project-related residual effects that were considered for the cumulative effects assessment are provided in Table 7.4-23. If residual effects were excluded from the cumulative effects assessment rationale is provided. Negligible residual effects were not carried through to the cumulative effects assessment as they are not considered measureable or are within a natural variability of the system and are therefore unlikely to interact cumulatively with other certain or reasonably foreseeable projects.

**Table 7.4-23: Residual Effects Considered in Cumulative Effects Assessment**

| VC             | Residual Effect          | Considered in Cumulative Effects Assessment | Rationale   |
|----------------|--------------------------|---|---|
| Visual Quality | Change in visual quality | Yes   | Potential for cumulative effect related to vegetation clearing and installation and operation of land-based and marine based infrastructure and night-time security lighting to the landscape visible from selected receptor sites. |

### **7.4.5.7.3 Effects of Other Projects and Activities**

Establishing a context for cumulative effects assessment involves an overview of other projects and activities. This includes an understanding of the visual effects of existing and past projects, captured in the description of existing conditions, and the potential effects of certain or reasonably foreseeable projects and activities.

The existing landscape includes a level of anthropogenic disturbance that reflects multiple historical land and marine uses throughout the RSA dating back to the early 1900s. This includes industrial development at Britannia Beach, Woodfibre and Port Mellon, residential and recreational development on Gambier Island and along Highway 99, and forestry in several tenured locations. The Britannia Mines site located in the unincorporated community of Britannia Beach was developed in the early 1900s with production ending in 1974 (Price et. al, 1995). The mine's Mill 3 ore processing facility is a prominent 26 storey tall structure built into the slope above the community. This exterior of this Howe Sound landmark was renovated in 2007 and is a historical mining museum and popular local attraction (Mitchell 2013). Howe Sound Pulp and Paper operates a mill near the community of Port Mellon. It is the site of BC's first wood-fibre based paper mill in 1909. Modernization occurred in the 1990s to expand the paper and kraft pulp operation, and shipping terminal (HSPP 2014). The large industrial facility is an evident feature within Thornbrough Channel both during the day and at night. The Woodfibre property is the former location of the Woodfibre Pulp and Paper Mill which began its' development in the early 1900s (Woodfibre LNG 2014). The brownfield site has been partially cleared of infrastructure and wood waste since its' closure in 2006 and, as of the writing of this study, is under review for re-development as an LNG production and marine storage facility. Forestry has historically been an important economic driver in Howe Sound with logging activity occurred since 1900. Visual evidence of logging operations in the McNab valley from the 1970s to more recently has resulted in a landcover pattern that includes several existing access roads and cut blocks in various stages of vegetation regeneration. Vegetation clearing and built infrastructure features including Highway 99 and smaller local and access roads, transmission towers and right-of-ways are visible on either side of Howe Sound. There are a number of residential and recreational property developments on the eastern shore of Howe Sound and Gambier Island. Approximately 15 recreational properties are located at the McNab Creek Estates site on the east side of McNab Creek. Recreational property development occurs primarily at two yacht club outstations on Gambier Island and at Camp Latona, Camp Potlatch, Daybreak Point Bible Camp and Camp Sunrise youth camps. Recreational and commercial boat traffic throughout the RSA are evident year-round.

A list of certain or reasonably foreseeable projects and activities with potential effects that could interact temporally and/or spatially with Proposed Project-related residual effect are provided in Table 4-5 in Volume 2, Part B - Section 4.5.5. Those that have potential to result in cumulative effects to Visual Resources are provided in Table 7.4-24. All other projects were not considered to interact with residual effects because they are outside of the Visual Resources RSA boundary.

**Table 7.4-24: Potential Incremental Effects of Other Project and Activities on Visual Quality**

| Project   | Timeline                | Phase of the project overlaps with the Proposed Project <sup>1</sup> | Project Description  | Rationale   |
|---|-------------------------|--|--|---|
| <b>Reasonably Foreseeable Future Projects</b>                       |                         |  |  |   |
| Box Canyon Hydro<br>(Box Canyon Hydro Corp.<br>(Sound Energy Inc.)) | Proposed start in 2017. | Construction and Operations  | <ul style="list-style-type: none"> <li>▪ Temporary Use Permit issued in February of 2014 to construct concrete batch plant relating to the construction project.</li> <li>▪ Planned future run-of-river hydroelectric project with a capacity of 15 MW and proposed start of 2017.</li> <li>▪ Total project footprint will be 64.5 ha</li> <li>▪ Electricity Purchase Agreement obtained from BC Hydro 2010 Clean Power Call</li> <li>▪ Multiple water intakes in three McNab drainages: Box Canyon, Marty, and Cascara creeks are planned with total penstock length of 7,847 m.</li> <li>▪ All intake water delivered to a powerhouse located on the Banks of McNab Creek ~1250 m upstream in existing cut block.</li> <li>▪ A 2.8 km 138 kV timber pole overhead line will connect powerhouse to BC Hydro 1L31 138 kV transmission line along the McNab Ck FSR.</li> <li>▪ Habitat compensation is planned for Box Canyon Creek (possibly Marty and Cascara) in the form of rearing habitat for juvenile Coho salmon and cutthroat trout</li> <li>▪ Website:<br/><a href="http://www.elementalenergy.ca/projects/">http://www.elementalenergy.ca/projects/</a></li> </ul> | <ul style="list-style-type: none"> <li>▪ Potential cumulative interaction identified. Project-related activities would involve potential changes to the visible landscape.</li> </ul> |

<sup>1</sup> When timelines are uncertain it was assumed that the Proposed Project would overlap with both construction and operations.

| Project                                    | Timeline   | Phase of the project overlaps with the Proposed Project <sup>1</sup> | Project Description  | Rationale   |
|--|--|--|--|---|
| Woodfibre LNG (Woodfibre Natural Gas Ltd.) | <p>Construction to start in 2015</p> <p>Operations in the second quarter of 2017</p> <p>Assumes permit issuance in 2015/early 2016</p> | Operations   | <ul style="list-style-type: none"> <li>▪ Development of the former Western Forest Products Woodfibre Mill; an LNG facility has been proposed.</li> <li>▪ Three to four times per month an LNG carrier will travel through well-established shipping lanes to the Woodfibre LNG terminal. Each carrier will travel at 8 to 10 knots in Howe Sound, be accompanied by at least three tugboats, at least one of which will be tethered to the carrier, and have two BC Coast Pilots on board, who are experts on BC's coast.</li> <li>▪ Website: <a href="http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_home_408.html">http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_home_408.html</a></li> </ul> | <ul style="list-style-type: none"> <li>▪ Potential cumulative interaction identified. Project-related activities would involve potential changes to the visible landscape.</li> </ul> |
| Woodfibre Substation (BC Hydro)            | <p>Selecting a preferred alternative in 2015. Have assumed same timeline as Woodfibre LNG Project.</p>                                 | Operations   | <ul style="list-style-type: none"> <li>▪ BC Hydro is constructing a new substation and connection to the 138 kilo volt (kV) transmission line. The purpose of the new substation would be to deliver electricity to the Woodfibre LNG Project.</li> <li>▪ Website: <a href="https://www.bchydro.com/energy-in-bc/projects/woodfibrelng/whats-being-done.html">https://www.bchydro.com/energy-in-bc/projects/woodfibrelng/whats-being-done.html</a></li> </ul>  | <ul style="list-style-type: none"> <li>▪ Potential cumulative interaction identified. Project-related activities would involve potential changes to the visible landscape.</li> </ul> |

| Project  | Timeline  | Phase of the project overlaps with the Proposed Project <sup>1</sup> | Project Description   | Rationale   |
|--|---|--|---|---|
| Porteau Cove Residential Development (Concord Pacific) | Unknown.  | Assumed Construction and Operations.                                 | <ul style="list-style-type: none"> <li>▪ Under a partnership between Squamish Nation and Concord Pacific, this residential development proposes 1,400 homes, lots, and commercial space, located on the east side of Howe Sound, 12.3km south of the Proposed Project.</li> <li>▪ This work includes 6 water reservoirs, water source development/treatment, sewage treatment plant, ocean discharge, stormwater systems and Best Management Practices.</li> <li>▪ The development includes 18km of roads including a new highway interchange.</li> <li>▪ Website: <a href="http://www.pwlpnership.com/our-portfolio/planning-urban-design/porteau-cove">http://www.pwlpnership.com/our-portfolio/planning-urban-design/porteau-cove</a></li> </ul> | <ul style="list-style-type: none"> <li>▪ Potential cumulative interaction identified. Project-related activities would involve potential changes to the visible landscape.</li> </ul> |
| Britannia Beach (MacDonald Development)                | Zoning is in place. No details on timeline available. | Unknown. Assume construction and operations.                         | <ul style="list-style-type: none"> <li>▪ Zoning is in place for a new commercial and retail development incorporating many renovated historic buildings. The development is located approximately 6 km southeast of the Project.</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Potential cumulative interaction identified. Project-related activities would involve potential changes to the visible landscape.</li> </ul> |
| South Britannia (Taicheng)                             | No details on timeline available.                     | Unknown. Assume construction and operations.                         | <ul style="list-style-type: none"> <li>▪ South Britannia is a 200-ha development located on the Makin lands at Britannia Beach proposing a mix of 3,000 residences, as well as retail and light industrial land uses. South Britannia is 6.5 km southeast of the Project on the east side of Howe Sound.</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Potential cumulative interaction identified. Project-related activities would involve potential changes to the visible landscape.</li> </ul> |

| Project                                     | Timeline  | Phase of the project overlaps with the Proposed Project <sup>1</sup> | Project Description  | Rationale   |
|---|---|--|--|---|
| Active and Pending Forest Tenures (Various) | Several. Exact timelines for tenures are unknown. | Construction and operations.   | <ul style="list-style-type: none"><li>▪ Crown component of Timber Harvesting Forestry Land Base in Howe LU is 11,285 of 52,209 total gross hectares.</li></ul> | <ul style="list-style-type: none"><li>▪ Potential cumulative interaction identified. Project-related activities would involve potential changes to the visible landscape.</li></ul> |

## 7.4.5.7.4 Potential Interactions with Other Projects

Proposed Project residual adverse effects have the potential to interact with potential adverse effects from certain or reasonably foreseeable project activities that could result in cumulative adverse effects to the Visual Quality VC. Potential interactions and effects are summarized in Table 7.4-25.

**Table 7.4-25 Activities Considered in the Cumulative Effects Assessment for Visual Quality**

| Activities  | Potential Effect  | Potential for Interaction of Effects | Rationale  |
|---|---|--------------------------------------|--|
| Box Canyon Hydro (Box Canyon Hydro Corp. (Sound Energy Inc.)) | Vegetation clearing and introduction of built structures to the visible landscape | Y                                    | Potential cumulative interaction identified. Development project-related activities may introduce vegetation clearing and structures to the visible landscape from receptor sites.   |
| Woodfibre LNG (Woodfibre Natural Gas Ltd.)                    | Vegetation clearing and introduction of built structures to the visible landscape | N                                    | Project-related activities may introduce visible clearing and residential structures to the landscape visible within the RSA, however, the footprint of this development is not likely visible from receptor sites and would have localised effect on the regional character visible from receptor sites from Porteau Cove to Squamish.  |
| Woodfibre Substation (BC Hydro)                               | Vegetation clearing and introduction of built structures to the visible landscape | N                                    | Project-related activities may introduce visible clearing and residential structures to the landscape visible within the RSA, however, the footprint of this development is not likely visible from receptor sites and would have localised effect on the regional character visible from receptor sites from Porteau Cove to Squamish.  |
| Porteau Cove Residential Development (Concord Pacific)        | Vegetation clearing and introduction of built structures to the visible landscape | N                                    | Project-related activities may introduce visible clearing and residential structures to the landscape visible within the RSA, however, the footprint of this development is not likely visible from receptor sites and would have localised effect on the regional character visible from receptor sites near Porteau Cove.  |
| Britannia Beach (MacDonald Development)                       | Vegetation clearing and introduction of built structures to the visible landscape | N                                    | Project-related activities may introduce visible clearing and residential structures to the landscape visible within the RSA, however, the footprint of this development is likely only visible from limited number or receptor sites and would have localised effect on the regional character visible from receptor sites near Britannia Beach, particularly with line-of-sight towards the development. |

| Activities                                  | Potential Effect  | Potential for Interaction of Effects | Rationale  |
|---|---|--------------------------------------|--|
| South Britannia (Taicheng)                  | Vegetation clearing and introduction of built structures to the visible landscape | N                                    | Project-related activities may introduce visible clearing and residential structures to the landscape visible within the RSA, however, the footprint of this development is likely only visible from limited number or receptor sites and would have localised effect on the regional character visible from receptor sites near Britannia Beach, particularly with line-of-sight towards the development. |
| Active and Pending Forest Tenures (Various) | Visual disturbance from timber harvesting and road construction activity          | Y                                    | Potential cumulative interaction identified. Development project-related activities may introduce vegetation clearing to the visible landscape from receptor sites.  |

No interaction or not likely to interact cumulatively (N), Yes, Potential cumulative effect (Y),

#### 7.4.5.7.5 Cumulative Effects Related to Risk to Change in Visual Quality

The Box Canyon Hydro run-of-river hydroelectric project will involve the construction and operation of a series of water intakes along the natural grade and flow of three tributaries of McNab Creek. A portion of the flow is diverted into penstocks which convey the water to a downstream powerhouse. Construction will involve vegetation clearing and construction of infrastructure related to the development of headponds, the footprint of the weirs and intake structures, penstock alignments, new access roads, borrow pits, laydown and assembly areas, powerhouse and transmission lines. Total project footprint will be 64.5 ha and the full temporal extent is not currently known. Mapping data delineating the projects layout footprint were obtained and used with an understanding of the project description and typical visual impacts or run-or-river projects to determine a potential cumulative effect on visual quality (SoundEnergy 2008).

The Box Canyon Hydro Project Construction Environmental Management Plan (CEMP) (FSCI Biological Consultants 2011) identifies environmental concerns and measures to address effects of vegetation clearing as well as closure and site restoration measure. These include:

- Minimizing areas are required for work preparation, material stockpiling, and construction management facilities.
- Project site restoration activities such as cleanup, grading, re-vegetation, and closure of the construction camps, access roads and work sites.

The development is located approximately 1200m northwest of the Proposed Project Area and may be visible from some receptor sites within Thornbrough and Ramilles Channel. The construction of project features would utilize existing disturbances to the extent possible for the powerhouse, transmission line and major access roads (i.e. McNab Ck FSR) and temporary clearing and infrastructure during construction is likely to provide minimal vegetation disturbance. Desktop analysis indicates that visibility of the projects'



footprint would be limited to lower portions near of Box Canyon Creek. Visible features are expected to be small in scale relative to the landscape due to potential viewing angles and distances and anticipated to last for the life of the proposed project (up to 40 years based on the power purchase agreement with BC Hydro) (FSCI Biological Consultants 2011) . Measures described for project decommission will likely address potential visual effects related to vegetation clearing with minor change to visual quality expected.

The western side of Howe Sound contains productive growing sites that are valuable as year-round opportunities for timber harvesting with recent timber harvest activity within the McNab Valley north of the Proposed Project (MFLNRO 2012b). In March 2013, BC Timber Sales (BCTS) accepted tenders from Black Mount Logging Ltd. to harvest approximately 118,532 m<sup>3</sup> of Forest Licence A90229 over a term of 32 months (BCTS 2013a). This harvesting has occurred in four separate areas to the west and north of the Proposed Project, the closest of which was completed approximately 550m to the west of the Proposed Project in March 2014. In December 2013, Forest License A79510 was sold to Brotherston Logging Co. Ltd. to harvest approximately 64,530 m<sup>3</sup> (BCTS 2013b). The tenure expires on October 29, 2016 (MFLNRO 2014, pers. comm.). Harvesting under this licence has occurred north of the Proposed Project further-up the McNab Valley. Box Canyon Hydro Corporation holds a licence to cut (L49769), located 0.9 km north of the Proposed Project footprint. A decked timber sale<sup>2</sup> from this licence occurred earlier in 2014 (MFLNRO 2014, pers. comm.). Along the north side of Gambier Island, and within view of several viewpoints, there are two new proposed woodlots<sup>3</sup> (W2068 and W2069) which are located behind Ekins Point and Douglas Bay. Woodlot W2069 is located closest to Ekins Point and Douglas Bay and covers 652.6 ha of Crown land, while woodlot W2068 is located further south and covers 672.9 ha of Crown land. The AAC for both woodlots is approximately 3,000 m<sup>3</sup> (Forest Service of British Columbia 2014a, b). The majority of log tenures are located between the west side of Gambier Island and the mainland south of Port Mellon. The only log dump tenure likely to be visible from representative viewpoints is owned by BURNCO (212251). It is anticipated that roads on the western side of McNab FSR will be activated in support of new logging activities (MFLNRO 2014, pers. comm.).

Spatial data delineating future forestry cut blocks, woodlots ,log tenures and road permits within in the RSA were obtained from provincial data sources and forestry operators where available and used with an understanding of current forestry operations and typical visual impacts to determine a potential cumulative effect on visual quality. The visual impacts of removing vegetated land cover related to the development of cut blocks and forestry roads would be likely and continuous throughout the cycles of forest management in the RSA. Visual effects related to forestry on Crown land are subject to meeting established VQOs as part of the provincially regulated forest development permitting process. The predominant VQO rating present within the RSA and along the western side of Howe Sound is for 'Partial Retention'. This indicates a level of alteration that is small to medium in 'scale and natural in shape, and natural and not rectilinear or geometric in shape' (*Forest and Range Practices Act*) (see Table 7.4-5). Future forestry activity on Crown land would be required to design alterations to maintain a level of compliance with established VQO's and limit visual effects to achieve this visual condition. Alterations that meet a Partial Retention VQO have the

<sup>2</sup> Operations such as clearing for roads, RoW or other operations on Crown land may result in timber being cut that must be disposed of by MFLNRO. These decks of timber are sold through a competitive tender sale.

<sup>3</sup> Woodlots are small area based tenures, which include Crown land and contributed private land.

potential to produce an evident level of visual impact (Table 7.4-8). Silviculture practices are applied in BC to facilitate successful reforestation of harvested areas and are typically effective in mitigating related visual disturbances over time. Effects would last until ‘visually effective green up’<sup>4</sup> has occurred (i.e., 15 to 30 years) reducing the visual impact of the disturbance area over time (BC MoF 1994). The visual effects of log tenures are expected to remain consistent with existing activity related to storage and boom logs and remain localized to the current tenure area 212251 located near the Proposed Project.

#### **7.4.5.7.6 Mitigation of Cumulative Effects**

Assessment of the Proposed Projects indicates a small amount of visual change is predicted within the context of the existing level of visible disturbance from current and past activities. Potential effects from other certain or reasonably foreseeable project activities have the potential to change the visual quality of the RSA and produce adverse residual effects by clearing vegetated land cover and introducing visible anthropogenic features. No additional mitigation measures; other than those already suggested for the Proposed Project; are suggested to assist in minimizing interactions between the Proposed Project visual effects and visual effects from other certain or reasonably foreseeable projects and activities.

#### **7.4.5.7.7 Residual Cumulative Effects and their Significance**

Potential residual cumulative effects and their significance were characterized using the same methods that were used to characterize residual effects (see Table 7.4-8). Residual effects of the Proposed Project are summarized in Table 7.4-19.

Cumulative effects of the Proposed Project and other certain and foreseeable developments have the potential to produce adverse residual effects on the Visual Quality VC related to vegetation clearing from timber harvest and road construction activity as well as the vegetation clearing and the introduction of visible anthropogenic features from the development of the Proposed Project and the Box Canyon Hydro run-of-river hydroelectric project.

The context within which the cumulative adverse effect is predicted to occur is considered high as visual quality is a highly valued component and, while the existing landscape includes a level of anthropogenic disturbance that reflects multiple historical land and marine uses throughout the RSA, sensitivity is high to adverse visual change. Forest management activity is likely to provide the largest level of visible disturbance within the RSA related to the residual effects of harvesting and road development activity. Compliance with established VQO's will limit visual effects to maintain the level of visual quality. The clearing and construction of infrastructure for the Box Canyon Hydro run-of-river hydroelectric project will likely result in visual disturbance with limited visibility of lower portions of the project area near Box Canyon Creek. The overall magnitude of residual effects will likely result in a medium severity where the visual disturbance may be prominent but not substantially uncharacteristic to the existing landscape character. The extent of active and pending forest tenures indicates the regional extent of effects which are likely to

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<sup>4</sup> The stage at which regeneration on a cut block is perceived, by the public, as being a newly established forest.

persist for a medium-term duration to achieve visually effective green up after re-planting. Effects of vegetation clearing and site development would be reversible with the plans for re-vegetation to cleared areas and the removal of built project features. The effect would be of medium frequency associated primarily with intermittent visual disturbance occurring at the time of harvest or clearing activity and/or construction of infrastructure components with effects diminishing with the regeneration of vegetation.

Likelihood is high in consideration that detailed forestry data indicates plans for harvesting and recent arrangements indicate the Box Canyon Hydro project is within the construction phase to fulfill its' pre-arranged purchase agreement with BC Hydro (CleanEnergy BC 2014). Confidence is moderate based on available information for reasonably foreseeable projects, the use of spatial data and desktop landscape analysis, primarily qualitative assessment of visual impacts and professional knowledge of visual impact assessment.

Residual cumulative effects characterizations for the RSA are outlined in Table 7.4-26.

**Table 7.4-26: Summary of Residual Cumulative Effects Characterization for Visual Quality**

| Project-Related Residual Effect   | Residual Cumulative Effect Assessment Criteria |           |        |          |               |           | Significance | Likelihood | Level of Confidence |
|---|--|-----------|--------|----------|---------------|-----------|--------------|------------|---------------------|
|   | Context  | Magnitude | Extent | Duration | Reversibility | Frequency |              |            |                     |
| <b>Construction</b>   |  |           |        |          |               |           |              |            |                     |
| Change in visual quality. Temporary construction infrastructure and the installation of land-based and marine-based infrastructure will introduce built structures to the existing landscape contributing to cumulative effects with other certain or foreseeable developments including forestry activity and development of a run-of-river hydroelectric project.           | S  | M         | R      | MT       | FR            | M         | NS           | H          | M                   |
| <b>Operations</b>   |  |           |        |          |               |           |              |            |                     |
| Change in visual quality. The operation of land-based and marine-based infrastructure and night-time security lighting will present built structures and lighting conditions to the existing landscape contributing to cumulative effects with other certain or foreseeable developments including forestry activity and development of a run-of-river hydroelectric project. | S  | M         | R      | MT       | FR            | M         | NS           | H          | M                   |
| <b>Reclamation and Closure</b>  |  |           |        |          |               |           |              |            |                     |
| None  |  |           |        |          |               |           |              |            |                     |

**Assessment Criteria:**

Context: S – Sensitive; MR – Moderately Resilient; R – Resilient;  
 Magnitude: N – Negligible, L – Low, M – Medium, H – High;  
 Geographic Extent: L – Local, R – Regional, BR – Beyond Regional;  
 Duration: ST – Short-term, MT – Medium-term, LT – Long-term;  
 Reversibility: FR – Fully Reversible, PR - Partially Reversible, IR - Irreversible;  
 Frequency: L – Low, M – Medium, H – High  
 Significance: N – Negligible- Not Significance, NS – Not Significant, S – Significant  
 Likelihood: L- Low, M - Medium, H – High  
 Level of Confidence: L- Low, M - Moderate, H – High

Considering the characterization of residual cumulative effects within a context that demonstrates visible disturbance from current and past activities and has a high sensitivity to adverse visual change, the moderate magnitude of residual visual effects, and the medium-term duration, the significance of adverse residual cumulative effects to the Visual Quality VC are considered to be not significant.

#### **7.4.6 Conclusions**

This section has identified and assessed the effects of the Proposed Project related to the construction, operation, Reclamation and Closure phases on VCs related to Visual Resources. The effects related to the visibility of Proposed Project landscape features and built infrastructure components, predicted change in the visibility and scenic character of the Proposed Project site in relationship to the existing landscape; and potential visual effect of installed artificial lighting on sensitive night-time receptors have been identified and assessed in relationship to the VC of Visual Quality.

The Proposed Project is located in a regional setting characterized by rugged coastal mountains, marine channels, and numerous islands within the Howe Sound area. The Proposed Project site is located at the mouth of the McNab Creek valley with distinct summits and ridges surround the valley. It is an area with a history of past and current industrial land use related to forestry operations, infrastructure and residential development, but that is regionally recognized for its scenic and related recreational value. The combination of biophysical, social and land use characteristics within the study area presents a primarily natural landscape setting with a noticeable level of anthropogenic disturbance and a high sensitivity to visual change.

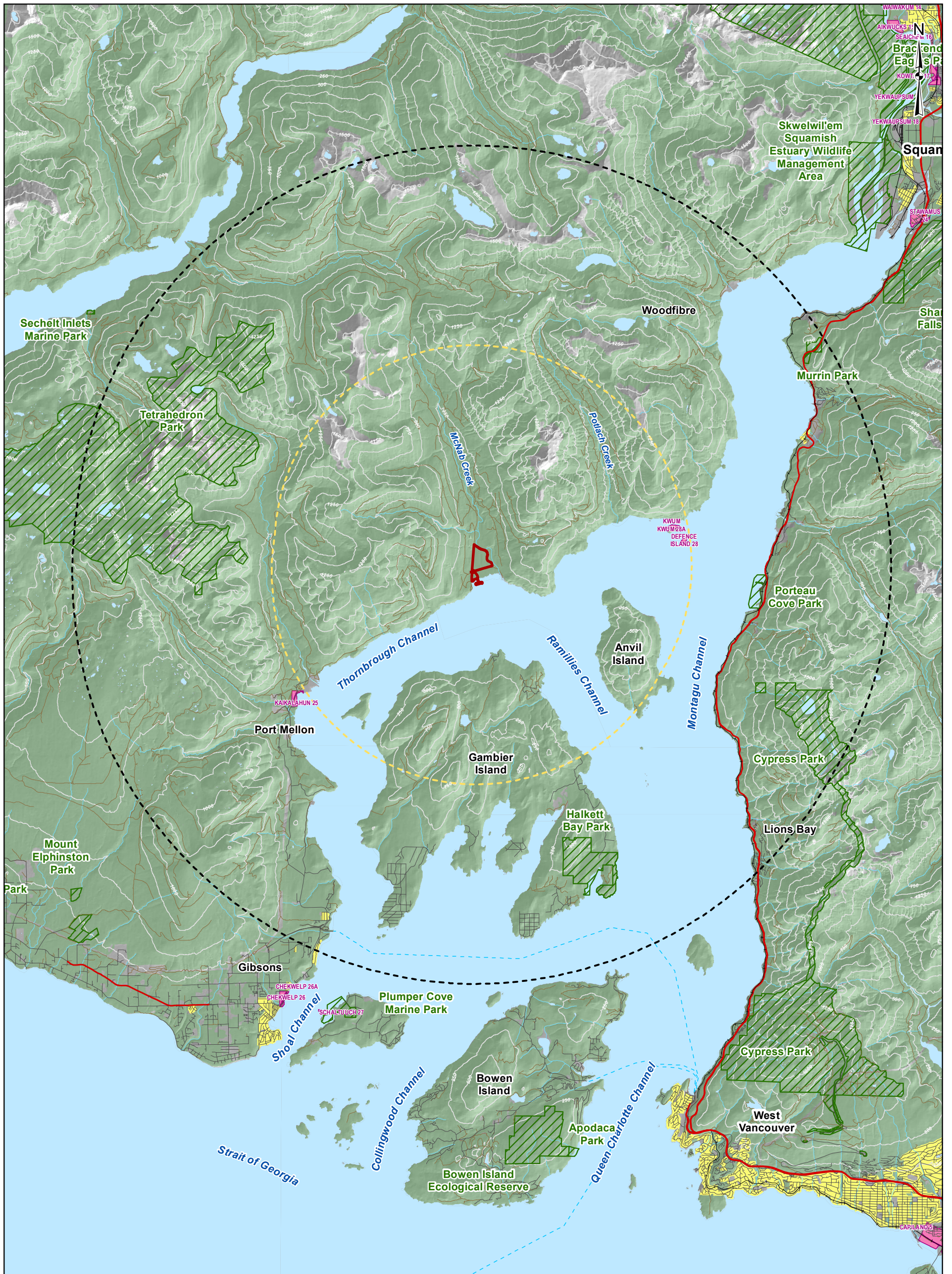
The Proposed Project is anticipated to be partially visible and with effects limited mostly to portions of marine and ancillary facilities and activities related to marine loading and lighting. There is the potential for adverse effects on visual quality since the Proposed Project components and activities related to construction and operation will present visible anthropogenic features to the existing landscape setting.

Following the application of proposed mitigation measures, the residual effects are predicted to present a localized, medium-term and relatively small level of visual change to the landscape with effects diminishing with increasing viewing distance from the Proposed Project site. Residents of McNab Estates Strata and recreational marine users in Thornbrough Channel are likely to be most affected by the potential visual impacts due to their close proximity to the Proposed Project. The removal of land-based and marine infrastructure and site reclamation during the reclamation and closure phase are expected to reduce residual visual effects related to construction and operation phases of the Proposed Project and will rehabilitate the existing exposed area of the site to a more natural visual condition. There is the potential to provide positive social and recreational effects related to an increase in scenic character of the Proposed Project site.

The residual cumulative effects are predicted to present a regional, medium-term and moderate level of visual change to the landscape related to the residual visual effects of the Proposed Project contributing to residual visual effects with other certain or foreseeable developments including forestry activity and development of a run-of-river hydroelectric project. No additional mitigation measures are suggested to

minimize interactions between the Proposed Project residual visual effects and visual effects from other certain or reasonably foreseeable projects and activities.

Within a context that demonstrates visible disturbance from past and current activities and has a high sensitivity to adverse visual change, the residual effects of the Proposed Project and the residual cumulative effects are not anticipated to demonstrate an evident contrast with the current landscape character or to produce a noticeable decline in the current level of visual quality and are therefore considered not significant.

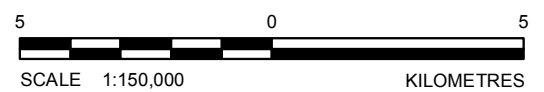


**LEGEND**

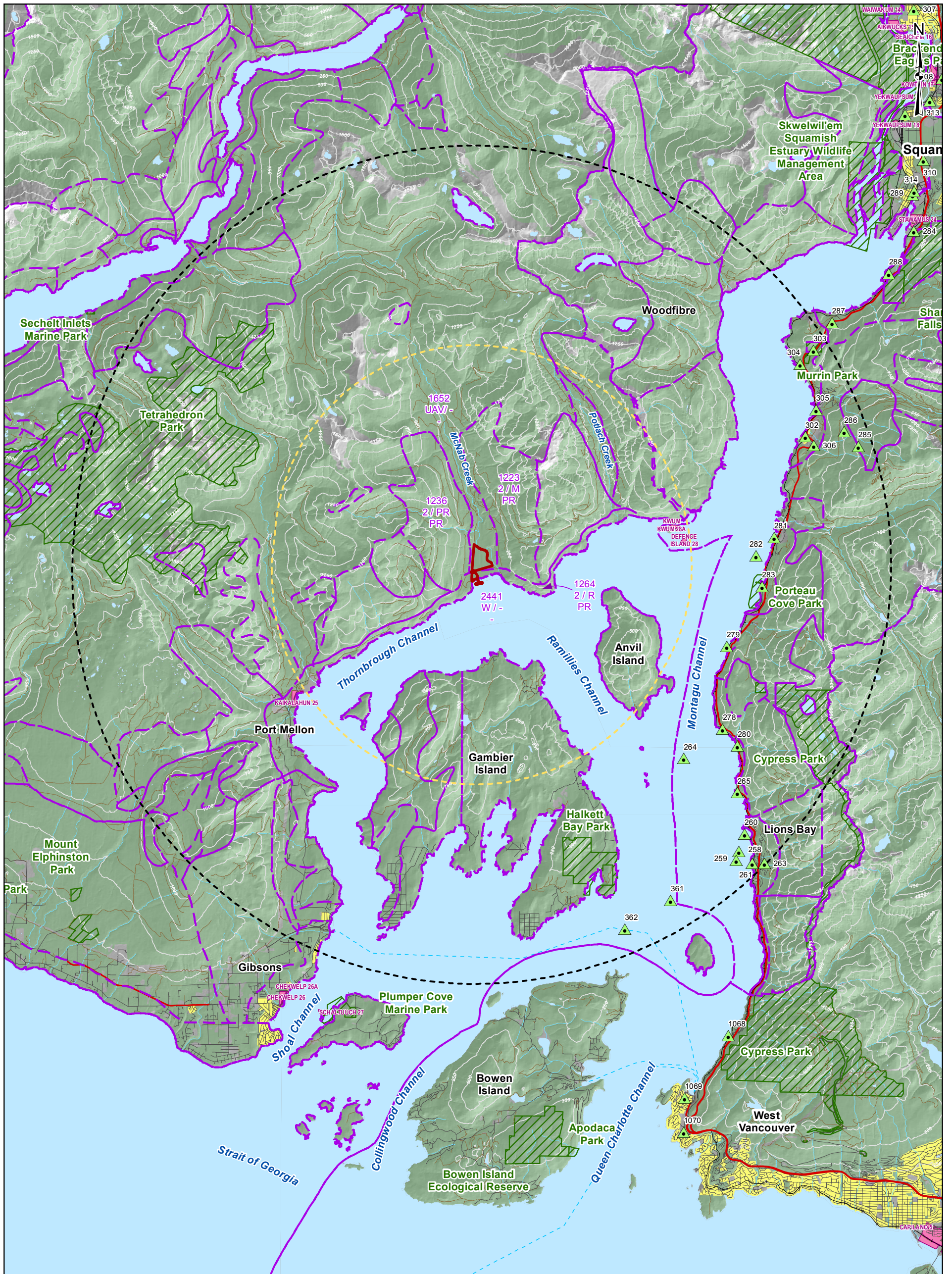
- Project Area
- Local Study Area
- Regional Study Area
- Park / Protected Area
- Vegetation
- Residential Area
- Indian Reserve
- Highway
- Road
- Resource Road
- Railway
- Ferry
- Contour (250m)

**REFERENCE**

Parks/protected areas obtained from the Province of British Columbia. All rights reserved. Elevation and indian reserves obtained from GeoBase®. Base data obtained from CanVec © Department of Natural Resources Canada. All rights reserved. Projection: UTM Zone 10 Datum: NAD 83



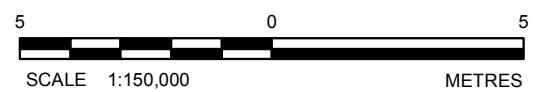
|         |                          |   |                |
|---------|--------------------------|---|----------------|
| PROJECT |                          | BURNCO ROCK PRODUCTS LTD.<br>BURNCO AGGREGATE PROJECT, HOWE SOUND, B.C. |                |
| TITLE   |                          | <b>VISUAL RESOURCES<br/>STUDY AREAS</b>                                 |                |
|         | PROJECT NO. 11-1422-0046 |   | PHASE No.      |
|         | DESIGN                   | DH 14 Aug. 2014   | SCALE AS SHOWN |
|         | GIS                      | AD 09 Mar. 2016   | REV. 1         |
|         | CHECK                    | DH 23 Oct. 2014   | FIGURE 7.4-1   |
| REVIEW  | GJ 03 Nov. 2014          |   |                |



**LEGEND**

- Project Area
- Local Study Area
- Regional Study Area
- Park / Protected Area
- Vegetation
- Residential Area
- Indian Reserve
- Highway
- Road
- Resource Road
- Railway
- Ferry
- Contour (250m)
- ▲ Recreation Viewpoint
- Visual Sensitivity Unit

**VSU KEY:**  
 VLI ID  
 VSC/EVC  
 VQO



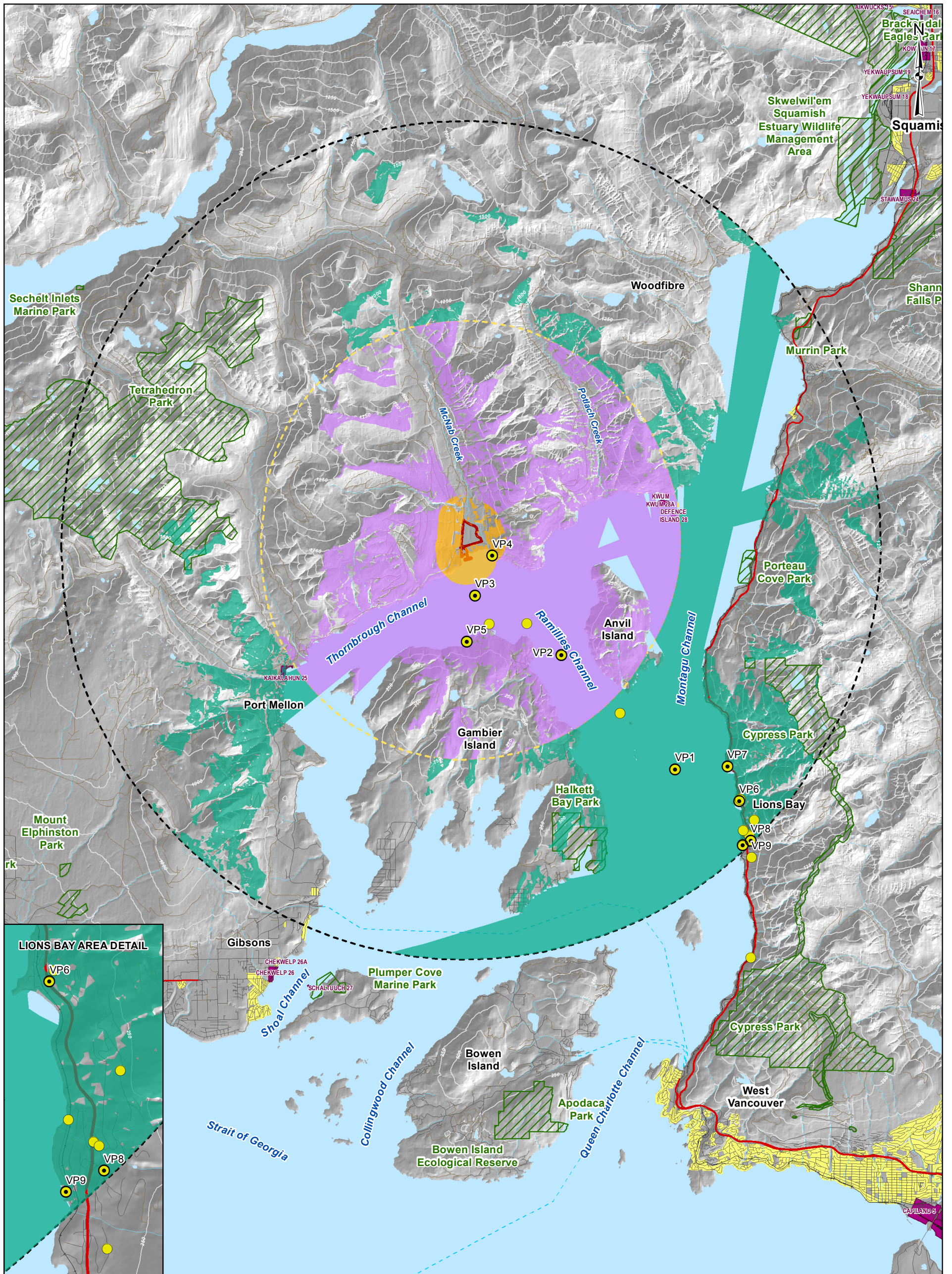
**REFERENCE**

Parks/protected and visual areas obtained from the Province of British Columbia. All rights reserved. Elevation and indian reserves obtained from GeoBase®. Base data obtained from CanVec © Department of Natural Resources Canada. All rights reserved. Projection: UTM Zone 10 Datum: NAD 83

|   |    |              |                     |
|---|----|--------------|---------------------|
| PROJECT   |    |              |                     |
| BURNCO ROCK PRODUCTS LTD.<br>BURNCO AGGREGATE PROJECT, HOWE SOUND, B.C. |    |              |                     |
| TITLE   |    |              |                     |
| <b>VISUAL INVENTORY</b>   |    |              |                     |
| PROJECT NO. 11-1422-0046  |    | PHASE No.    |                     |
| DESIGN  | DH | 14 Aug. 2014 | SCALE AS SHOWN      |
| GIS   | DL | 09 Mar. 2016 | REV. 1              |
| CHECK   | DH | 23 Oct. 2014 | <b>FIGURE 7.4-2</b> |
| REVIEW  | AD | 03 Nov. 2014 |                     |





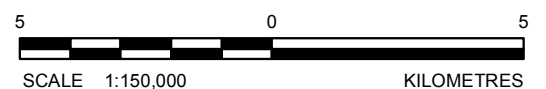


**LEGEND**

- |                                     |                       |                |
|-------------------------------------|-----------------------|----------------|
| <b>Visible Area from Viewpoints</b> | Project Area          | Highway        |
| 1km (foreground)                    | Local Study Area      | Road           |
| 8km (mid-ground)                    | Regional Study Area   | Resource Road  |
| >8km (background)                   | Park / Protected Area | Railway        |
| Survey Viewpoints                   | Indian Reserve        | Ferry          |
| Receptor Sites (ID#)                | Residential Area      | Contour (250m) |

**REFERENCE**

Parks/protected areas obtained from the Province of British Columbia. All rights reserved. Elevation and indian reserves obtained from GeoBase®. Base data obtained from CanVec © Department of Natural Resources Canada. All rights reserved. Projection: UTM Zone 10 Datum: NAD 83



|                          |                 |   |        |
|--------------------------|-----------------|---|--------|
| PROJECT                  |                 | BURNCO ROCK PRODUCTS LTD.<br>BURNCO AGGREGATE PROJECT, HOWE SOUND, B.C. |        |
| TITLE                    |                 | VISIBILITY AND VIEWING DISTANCE   |        |
| PROJECT NO. 11-1422-0046 |                 | PHASE No.   |        |
| DESIGN                   | DH 14 May. 2014 | SCALE AS SHOWN  | REV. 1 |
| GIS                      | DL 09 Mar. 2016 | <b>FIGURE 7.4-3</b>   |        |
| CHECK                    | DH 23 Oct. 2014 |   |        |
| REVIEW                   | GJ 03 Nov. 2014 |   |        |

