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BURNCO AGGREGATE PROJECT

Visual Resources Technical Assessment

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REPORT

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1.0 INTRODUCTION

This report includes definitions, visual simulations (Figures 1 to 12), and effects assessment (Tables 1 to 12) for all receptor sites to provide detailed information about the potential visual effects of the Proposed Project area.

2.0 VISUAL EFFECTS ASSESSMENT APPROACH

The predicted effects of the Proposed Project on visual resources in the Regional Study Area (RSA) were evaluated in accordance with recognized standards and guidelines for visual impact assessment. This includes consideration of guidelines and ratings from the British Columbia visual resource management program where available and applicable, the United States Department of the Interior Bureau of Land Management's (USDI BLM) contrast rating system and the Landscape Institute and Institute of Environmental Management & Assessment's (LI/IEMA) Guidelines for Landscape and Visual Impact Assessment to determine overall level of visual change. This assessment also includes guidance from the Commission Internationale de L'Éclairage (CIE), also known as the International Commission on Illumination, for evaluating and addressing visual effects of outdoor lighting installations. Elements of these systems that are applied to this assessment as described below.

2.1 Contrast Rating

The contrast rating system is a systematic process used by the Bureau of Land Management (BLM) to analyze potential visual impact of proposed projects and activities (USDI 1986). The premise of the system is that the degree to which a project activity affects the visual quality of a landscape depends on the visual contrast created between a project features and the existing landscape. The contrast can be measured by comparing the project features with observation of the existing landscape. Basic design elements are used to make this comparison and to describe the visual contrast created by the project. This assessment process also provides a means to identifying key contributing elements to visual impacts that helps to identify appropriate mitigation measures. The degree of contrast for any component can be characterized using the following criteria (USDI 1986):

- **None** – the element contrast is not visible or perceived**.**
- **Weak** – the element contrast can be seen but does not attract attention.
- **Moderate** – the element contrast begins to attract attention and begins to dominate the characteristic landscape.
- **Strong** – the element contrast demands attention, will not be overlooked, and is dominant in the landscape.

2.2 Dominance Rating

Scale dominance is related to the relative size of the modification and its activities within the landscape. This is an important element contributing to visual impact and is characterized using the following definitions (based on USDI 1986):

- **Dominant** – the modification is the major object or area in a confined setting and occupies a large part of the setting.
- **Co-dominant** – the modification is one of the major objects or areas in the confined setting and its features are of equal visual importance
- **Subordinate** – the modification is significant in size but occupies a minor part of the setting.
- **Inconspicuous** – the modification is a small object and occupies a very small area of the setting.

2.3 Light Effects Rating

Guidance provided by CIE was used in order to provide assessment criteria to determine the potential visual effects of artificial exterior lighting. The CIE guidelines establish Environmental Zones as a foundation for evaluating and guiding exterior lighting regulation. For each of the three 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 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 (CIE 1997, 2003):

- **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 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.

3.0 LANDSCAPE MODELLING SIMULATIONS

To assess the visual effects of the Proposed Project, modelled simulation images of the operation phase were rendered from receptor site locations in a computer-based landscape model of the RSA using Visual Nature Studio (VNS) software (VNS 2009). This landscape model was developed based on spatial data consistent with Proposed Project related geographic information and project features were incorporated based on current site plans. Figures 1 to 9 demonstrate the Proposed Project effects during summer conditions for the nine baseline receptor sites. Figures 10 to 12 demonstrate the Proposed Project lighting effects during night-time conditions from three baseline receptor sites. Each of these images includes related contrast rating values and rationale based on analysis of the simulated images and knowledge of the existing landscape.

Figure 1: Receptor Viewpoint 1 – Marine-based viewing opportunity in Howe Sound

Table 1: Receptor Viewpoint 1 – Contrast Rating Evaluation

Project	Land/Water	Vegetation	Structures
Form	none visible	none visible	forms of barges
Line	none visible	none visible	none visible
Colour	none visible	none visible	distinct colour of barges (colour may vary)
Texture	none visible	none visible	none visible
Scale	none visible	none visible	very small relative to landscape features

Degree of Contrast		**Features**											
		Land/Water				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	**Form**				**0**				**0**			**2**	
	Line				**0**				**0**			**0**	
	Colour				**0**				**0**			**2**	
	Texture				**0**				**0**			**0**	
	Scale				**0**				**0**			**0**	

Scale Dominance	Dominant	Co-dominant	Subordinate	Inconspicuous
Very small visible project features relative to landscape features				**0**
Overall Contrast Rating	Negligible			

Figure 2: Receptor Viewpoint 2 – Marine-based viewing opportunity in Ramilles Channel

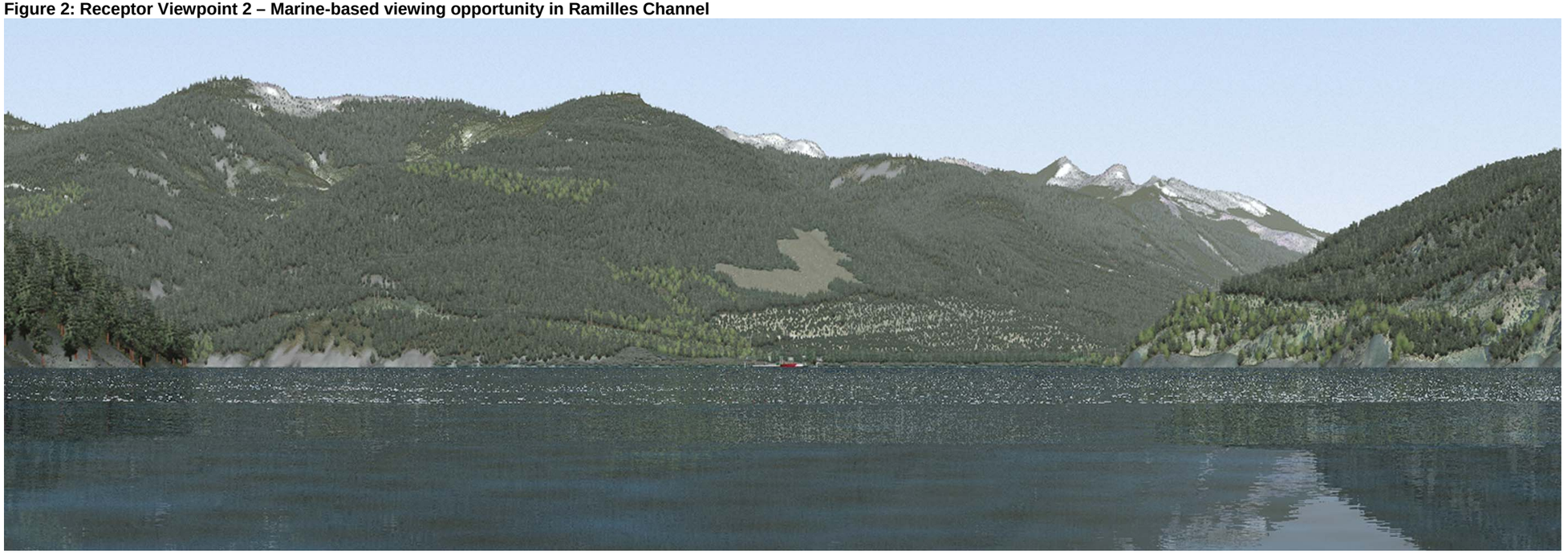

Table 2: Receptor Viewpoint 2 – Contrast Rating Evaluation

Project	Land/Water	Vegetation	Structures
Form	none visible	small clearing for marine conveyor	solid, geometric forms of barges and warehouse
Line	none visible	none visible	horizontal orientation of barges, short vertical of marine conveyor
Colour	none visible	none visible	distinct colour of barges and marine conveyor (colours may vary)
Texture	none visible	none visible	smooth surfaces of barges
Scale	none visible	very small relative to landscape features	small relative to landscape features

Degree of Contrast		**Features**											
		Land/Water				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	**Form**				**0**				**0**			**2**	
	Line				**0**				**0**			**1.5**	
	Colour				**0**				**0**			**2**	
	Texture				**0**				**0**			**1**	
	Scale				**0**				**0**			**1.5**	

Scale Dominance	Dominant	Co-dominant	Subordinate	Inconspicuous
Small visible project features in larger setting				**0**
Overall Contrast Rating	Low			

Figure 3: Receptor Viewpoint 3 – Marine-based viewing opportunity in Thornbrough Channel

Table 3: Receptor Viewpoint 3 – Contrast Rating Evaluation

Project	Land/Water	Vegetation	Structures
Form	none visible	small clearing for marine conveyor	solid, geometric forms of barges, and warehouse
Line	none visible	none visible	horizontal and vertical lines of marine conveyor and barges
Colour	none visible	none visible	distinct colour of barges, loading structure and warehouse (colours may vary)
Texture	none visible	none visible	smooth surfaces of structures; fine grain texture of aggregate load on barges
Scale	none visible	none visible	small relative to landscape features

Degree of Contrast		**Features**											
		Land/Water				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	**Form**				**0**			**2**				**2**	
	Line				**0**				**0**			**3**	
	Colour				**0**				**0**		**4**		
	Texture				**0**				**0**			**1**	
	Scale				**0**				**0**			**1.5**	

Scale Dominance	Dominant	Co-dominant	Subordinate	Inconspicuous
Small visible project features in larger setting				**0**
Overall Contrast Rating	Low			

Figure 4: Receptor Viewpoint 4 – Viewing opportunity near McNab Estates dock

Table 4: Receptor Viewpoint 4 - Contrast Rating Evaluation

Project	Land/Water	Vegetation	Structures
Form	none visible	none visible	solid, geometric forms of barges, top of processing enclosure
Line	none visible	none visible	horizontal and vertical lines of marine conveyor and barges
Colour	none visible	none visible	distinct colour of barges, marine conveyor and enclosures (colours may vary)
Texture	none visible	none visible	smooth surfaces of structures; fine grain texture of aggregate load on barges
Scale	none visible	none visible	small relative to landscape features

Degree of Contrast		**Features**											
		Land/Water				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	**Form**				**0**				**0**		**6**		
	Line				**0**				**0**		**4.5**		
	Colour				**0**				**0**		**6**		
	Texture				**0**				**0**			**2**	
	Scale				**0**				**0**			**3**	

Scale Dominance	Dominant	Co-dominant	Subordinate	Inconspicuous
Small visible project features in larger setting				**0**
Overall Contrast Rating	Moderate			

Figure 5: Receptor Viewpoint 5 – Viewing opportunity at Camp Latona

Table 5: Receptor Viewpoint 5 - Contrast Rating Evaluation

Project	Land/Water	Vegetation	Structures
Form	none visible	small clearing for marine conveyor	solid, geometric forms of barges, and warehouse
Line	none visible	none visible	horizontal and vertical lines of marine conveyor and barges
Colour	none visible	none visible	distinct colour of barges, loading structure and warehouse (colours may vary)
Texture	none visible	none visible	smooth surfaces of structures; fine grain texture of aggregate load on barges
Scale	none visible	none visible	small relative to landscape features

Degree of Contrast		**Features**											
		Land/Water				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	**Form**				**0**			**2**				**2**	
	Line				**0**				**0**			**3**	
	Colour				**0**				**0**		**4**		
	Texture				**0**				**0**			**1**	
	Scale				**0**				**0**			**1.5**	

Scale Dominance	Dominant	Co-dominant	Subordinate	Inconspicuous
Small visible project features in larger setting				**0**
Overall Contrast Rating	Low			

Figure 6: Receptor Viewpoint 6 – Motorist viewing opportunity north of Lions Bay on Highway 99

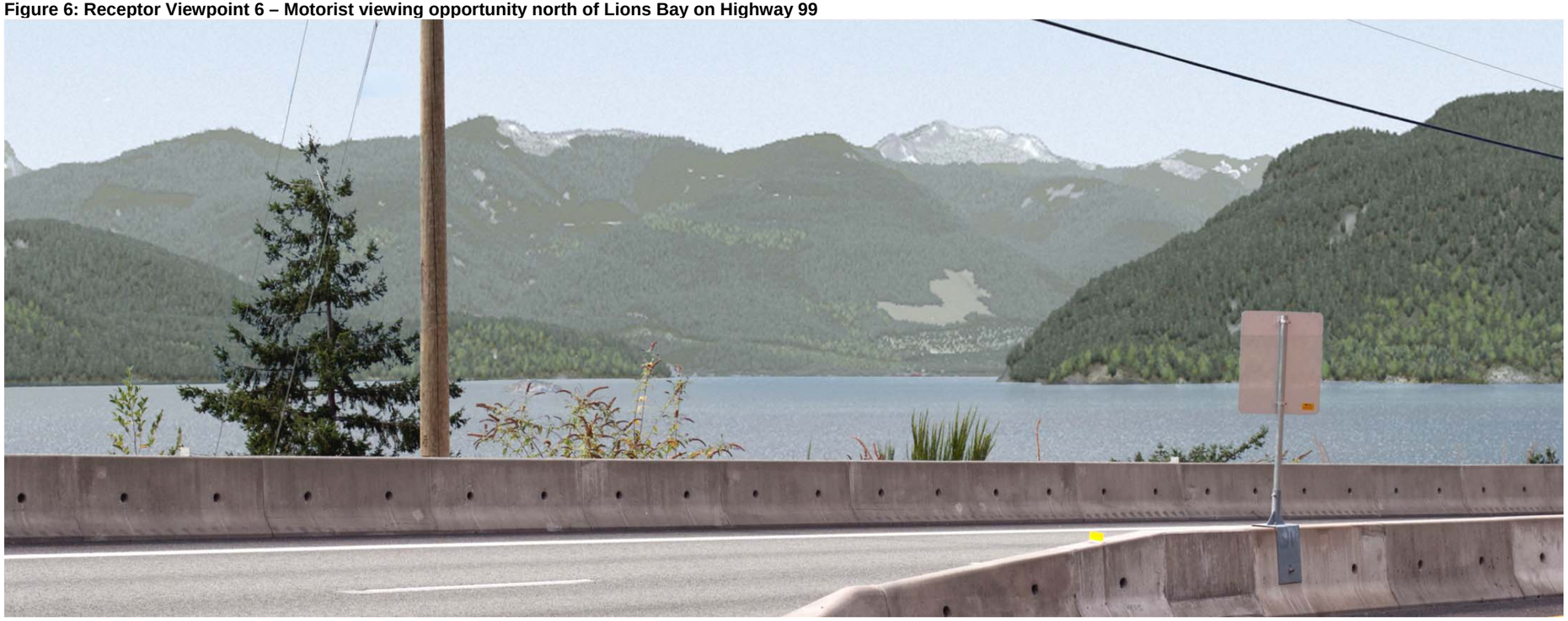

Table 6: Receptor Viewpoint 6 - Contrast Rating Evaluation

Project	Land/Water	Vegetation	Structures
Form	none visible	none visible	geometric forms of barges
Line	none visible	none visible	none visible
Colour	none visible	none visible	distinct colour of barges (colour may vary)
Texture	none visible	none visible	none visible
Scale	none visible	none visible	very small relative to landscape features

Degree of Contrast		**Features**											
		Land/Water				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	**Form**				**0**				**0**			2	
	Line				**0**				**0**			0	
	Colour				**0**				**0**			2	
	Texture				**0**				**0**			0	
	Scale				**0**				**0**			0	

Scale Dominance	Dominant	Co-dominant	Subordinate	Inconspicuous
Very small visible project features relative to landscape features				**0**
Overall Contrast Rating	Negligible			

Figure 7: Receptor Viewpoint 7– Motorist viewing opportunity at recreation pullout on Highway 99

Table 7: Receptor Viewpoint 7 - Contrast Rating Evaluation

Project	Land/Water	Vegetation	Structures
Form	none visible	none visible	none visible
Line	none visible	none visible	none visible
Colour	none visible	none visible	none visible
Texture	none visible	none visible	none visible
Scale	none visible	none visible	none visible

Degree of Contrast		**Features**											
		Land/Water				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	**Form**				**0**				**0**			0	
	Line				**0**				**0**			0	
	Colour				**0**				**0**			0	
	Texture				**0**				**0**			0	
	Scale				**0**				**0**			0	

Scale Dominance	Dominant	Co-dominant	Subordinate	Inconspicuous
Very small visible project features relative to landscape features				**0**
Overall Contrast Rating	Negligible (Not Discernible)			

Figure 8: Receptor Viewpoint 8– Lions Bay residential viewing opportunity (Panorama Rd. and Ocean View Rd.)

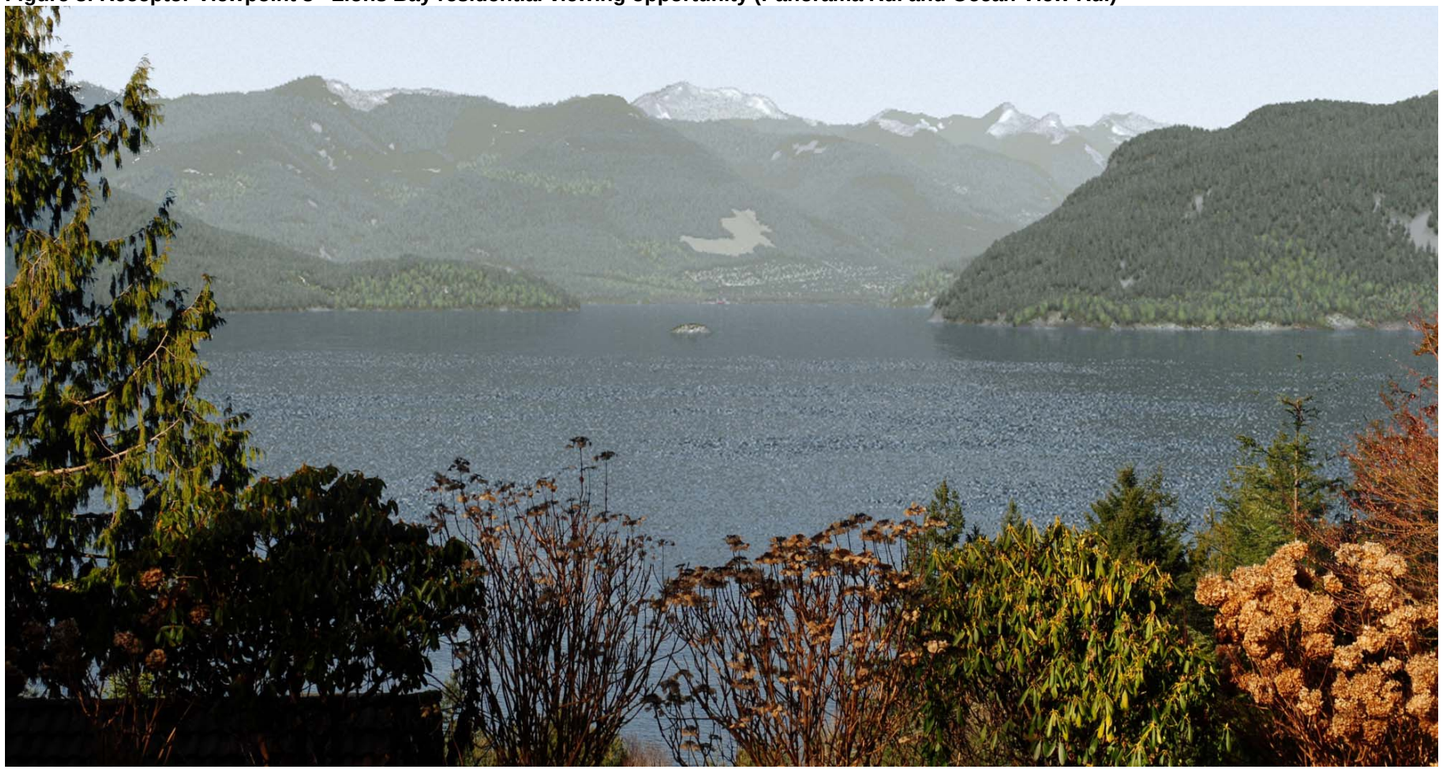

Table 8: Receptor Viewpoint 8 - Contrast Rating Evaluation

Project	Land/Water	Vegetation	Structures
Form	none visible	none visible	geometric forms of barges
Line	none visible	none visible	none visible
Colour	none visible	none visible	distinct colour of barges (colour may vary)
Texture	none visible	none visible	none visible
Scale	none visible	none visible	very small relative to landscape features

Degree of Contrast		**Features**											
		Land/Water				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	**Form**				**0**				**0**			**2**	
	Line				**0**				**0**			**0**	
	Colour				**0**				**0**			**2**	
	Texture				**0**				**0**			**0**	
	Scale				**0**				**0**			**0**	

Scale Dominance	Dominant	Co-dominant	Subordinate	Inconspicuous
Very small visible project features relative to landscape features				**0**
Overall Contrast Rating	Negligible			

Figure 9: Receptor Viewpoint 9 – Recreational viewing opportunity at Lions Bay Beach Park

Table 9: Receptor Viewpoint 9 – Contrast Rating Evaluation

Project	Land/Water	Vegetation	Structures
Form	none visible	none visible	none visible
Line	none visible	none visible	none visible
Colour	none visible	none visible	none visible
Texture	none visible	none visible	none visible
Scale	none visible	none visible	none visible

Degree of Contrast		**Features**											
		Land/Water				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	**Form**				**0**				**0**			**0**	
	Line				**0**				**0**			**0**	
	Colour				**0**				**0**			**0**	
	Texture				**0**				**0**			**0**	
	Scale				**0**				**0**			**0**	

Scale Dominance	Dominant	Co-dominant	Subordinate	Inconspicuous
Very small visible project features relative to landscape features				**0**
Overall Contrast Rating	Negligible (Not Discernible)			

Figure 10: Receptor Viewpoint 4 – Night-Time Viewing opportunity near McNab Estates dock

Table 10: Receptor Viewpoint 4 – Lighting Effects Evaluation

Lighting Effect	Installed security lighting for load out jetty and land-based infrastructure will be evident and provides additional light sources to the baseline condition. Project marine-based infrastructure and barges will be partially illuminated and be discernible. Providing mitigation measures are implemented, direct lighting and ambient effects are expected to be minimal.
Overall Rating	**Moderate**

Figure 11: Receptor Viewpoint 5 – Night-Time viewing opportunity at Camp Latona

Table 11: Receptor Viewpoint 5 – Lighting Effects Evaluation

Lighting Effect	Installed security lighting for load out jetty and land-based infrastructure will be perceivable and provide additional light sources to the baseline condition. Viewing distance will minimize the direct lighting and ambient effects effect.
Overall Rating	**Low**

Figure 12: Receptor Viewpoint 8 – Night-Time Lions Bay residential viewing opportunity (Panorama Rd. & Ocean View Rd.)

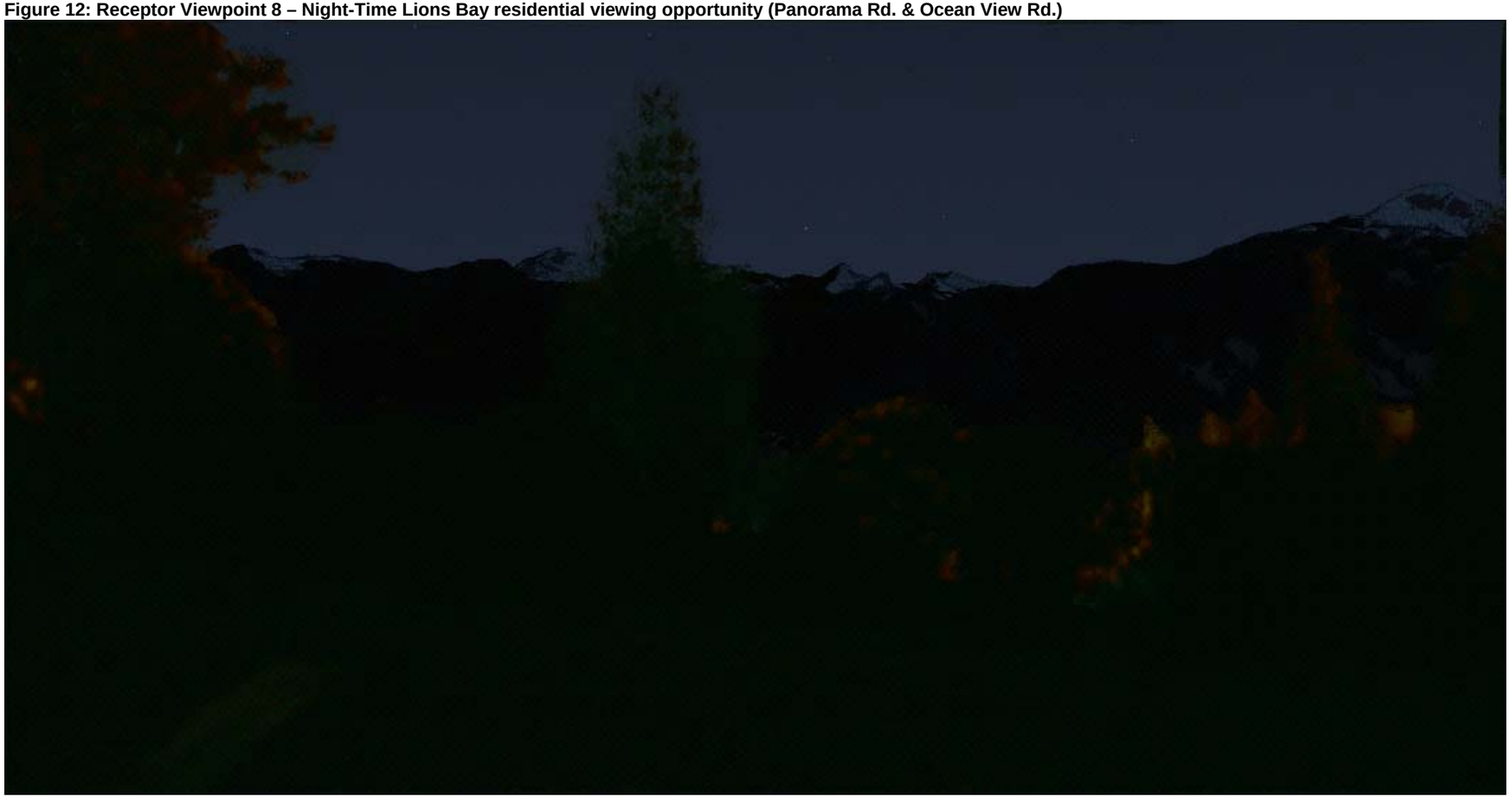

Table 12: Receptor Viewpoint 8 – Light Effects Evaluation

Lighting Effect	Installed security lighting for load out jetty and land-based infrastructure will not be visible and not provide additional light sources to the baseline condition. Viewing distance will mitigate the direct lighting and ambient effects effect.
Overall Rating	**Negligible**

4.0 CLOSING

We trust that the information contained in this report meets your current requirements. Please contact us if you require any further information.

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REFERENCES

CIE (Internationale de l'Eclairage). 1997. Guideline for minimizing sky glow, Vienna: CIE; 1997. CIE publication 126.

CIE. 2003. Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations, Vienna: CIE; 2003. CIE publication 150.

LI/IEMA (Landscape Institute and Institute of Environmental Management and Assessment). 2002. Guidelines for Landscape and Visual Impact Assessment (Second Edition). New York, NY:Spon. Press

MFLNRO (British Columbia Ministry of Forests, Land and Natural Resource Operations). 1997. Visual Landscape Inventory: Procedures and Standards Manual. Forest Practices Branch for the Culture Task Force, Resource Inventory Committee. Victoria, BC.

MFLNRO. 2004a. Forest and Range Practices Act, SBC 2002, c69. Available at: http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_02069_01. Accessed June 2013.

MFLNRO. 2004b. Forest and Range Practices Act Forest Planning and Practices Regulation – BC Reg. 580/2004, s.2. Available at: http://www.bclaws.ca/Recon/document/ID/freeside/14_2004. Accessed June 2013.

USDI (United States Department of the Interior, Bureau of Land Management). 1986. Visual Resource Contrast Rating. Bureau of Land Management Manual Handbook H-8431-1, Rel. 8-30. Washington, DC, USA.

VNS (Visual Nature Studio). 2009. Version 3.03. 3-D Nature LLC. 13195 West Chenango Ave. Morrison, CO, 80465, USA.

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