WESTRIDGE MARINE TERMINAL VISUAL AND SHADE IMPACT ANALYSIS

WESTRIDGE MARINE TERMINAL UPGRADE AND EXPANSION PROJECT APPLICATION TO VANCOUVER FRASER PORT AUTHORITY

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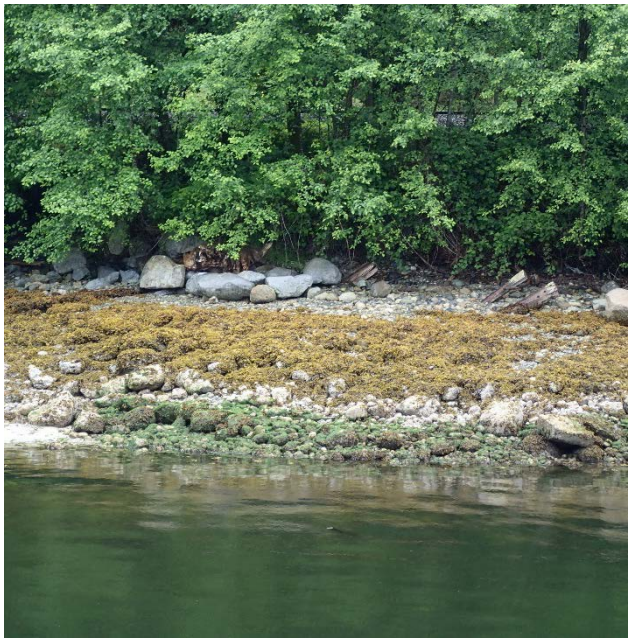

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Executive Summary

Trans Mountain Pipeline ULC (Trans Mountain) submitted a Facilities Application (the Application) to the National Energy Board (NEB) in December 2013 for the proposed Trans Mountain Expansion Project ("the Project" or "TMEP"). On November 29, 2016 the Government of Canada concluded the Project was in the public interest of Canada. A Certificate of Public Convenience and Necessity (CPCN) allowing the Project to proceed, subject to 157 conditions, was issued on December 1, 2016.

As part of the Project, the Westridge Marine Terminal will require expansion, including construction of three new loading berths within an expanded water lot and infilling along the existing shoreline to accommodate new onshore infrastructure.

Trans Mountain is working with the Vancouver Fraser Port Authority (VFPA) to obtain the necessary approvals to construct and operate the expanded Westridge Marine Terminal in Burrard Inlet. This report assesses the visual and shade impacts of the proposed expansion of the Westridge Marine Terminal on the skyline and surrounding communities, as required by the VFPA's Project and Environmental Review View and Shade Impact Guidelines.

This report provides visual simulations of both viewshed and shade impacts, and discusses the extent to which the Westridge Marine Terminal expansion will have view and shade impacts on surrounding residential properties and public areas. It will assist in determining whether further mitigation is required to minimize visual and shade impacts associated with the proposed terminal expansion.

Visual modelling was conducted of the revised terminal design at three locations: from Cates Park in the District of North Vancouver located approximately 1.3 km north of the terminal across Burrard Inlet; from Capitol Hill in the City of Burnaby approximately 1.9 km west of the terminal; and from Belcarra Picnic Area in the Village of Belcarra located approximately 3.2 km northeast of the terminal across Burrard Inlet. These observation viewpoints were chosen based on desktop visual analysis, field visits and a selection of criteria, and are consistent with the viewpoints modelled in the 2013 NEB Application so as to reflect terminal design updates.

Post-construction simulations indicate that the viewsheds have been altered from the existing viewshed by the presence of the new scraper facilities, tanks, dock and berths, as well as the moored vessels. However, the low height of the proposed structures and moored tankers result in no impacts on the skyline given the topography of the area; all proposed structures including berthed tankers stay below the skyline at all these vantage points. The overall effect is also lessened due to the current industrial nature of the site and presence of the existing Westridge Marine Terminal and storage tanks, which the expansion design has been integrated with.

The assessment of potential shade impacts of the expanded Westridge Marine Terminal and the surrounding community was conducted to reflect four time periods throughout the year: Spring Equinox (March 21); Summer Solstice (June 21); Fall Equinox (September 21); and Winter Solstice (December 21). The analysis also then presents impacts for each season at 9 a.m., 12 p.m. and 3 p.m.. Given the low-level of the proposed structures and site context, the shading cast by the new site structures at no time extends beyond the site property and does not extend into any nearby communities.

Overall, no additional visual or shade related mitigation has been identified as warranted as a result of this analysis.

Contents

Section Page

Executive Summary ..... **III**

Acronyms and Abbreviations ..... **vii**

Introduction **1-1**
1.1 Objectives 1-1
1.2 Project Overview 1-1
1.3 Regulatory Standards 1-1
1.4 Visual Landscape Context 1-2

View Impact Analysis **2-1**
2.1 Methods 2-1
2.1.1 Selection of Observer Viewpoints 2-1
2.1.2 Visualization Modelling 2-3
2.1.3 Data Sources and Limitations 2-3
2.2 Observer Viewpoints – Existing Context 2-4
2.2.1 Observer Viewpoint 1, Cates Park (North Vancouver) 2-7
2.2.2 Observer Viewpoint 2, Capitol Hill (Burnaby) 2-7
2.2.3 Observer Viewpoint 3, Belcarra Picnic Area (Belcarra) 2-7
2.3 Results 2-8
2.3.1 Observation Viewpoint 1, Cates Park 2-8
2.3.2 Observation Viewpoint 2, Capitol Hill 2-8
2.3.3 Observation Viewpoint 3, Belcarra Picnic Area 2-8
2.4 Observations 2-8

Shade Impact Analysis **3-1**
3.1 Method 3-1
3.2 Results 3-1
3.2.1 Spring Equinox 3-1
3.2.2 Summer Solstice 3-1
3.2.3 Fall Equinox 3-1
3.2.4 Winter Solstice 3-1

Conclusions **4-1**

References **5-1**

Figures

Figure 1 – Existing Westridge Marine Terminal 1-3
Figure 2 - Artist Rendering of Expanded Westridge Marine Terminal (Aerial View) 1-4
Figure 3 - Features of the Expanded Westridge Marine Terminal 1-5
Figure 4 - Westridge Marine Terminal - Observation Locations 2-5
Figure 5 - Distance of Observer Viewpoints from Expanded Dock 2-6
Figure 6 - Observation Viewpoint 1, Cates Park (Original Photo) 2-9
Figure 7 - Observation Viewpoint 1, Cates Park (After - With Tankers Present) 2-10
Figure 8 - Observation Viewpoint 1, Cates Park (After - No Tankers Present) 2-11

Section Page

Figure 9 - Observation Viewpoint 2, Capitol Hill (Original Photo) 2-12
Figure 10 - Observation Viewpoint 2, Capitol Hill (After - With Tanker Present) 2-13
Figure 11 - Observation Viewpoint 2, Capitol Hill (After - No Tankers Present).....2-14
Figure 12 - Observation Viewpoint 3, Belcarra Picnic Area (Original Photo).....2-15
Figure 13 - Observation Viewpoint 3, Belcarra Picnic Area (After - With Tankers Present).....2-16
Figure 14 - Observation Viewpoint 3, Belcarra Picnic Area (After - No Tankers Present) 2-17
Figure 15 – Expanded Westridge Marine Terminal Shade Impact – Spring Equinox 9 a.m.....3-3
Figure 16 - Expanded Westridge Marine Terminal Shade Impact – Spring Equinox 12 p.m. 3-4
Figure 17 - Expanded Westridge Marine Terminal Shade Impact – Spring Equinox 3 p.m. 3-5
Figure 18 - Expanded Westridge Marine Terminal Shade Impact – Summer Solstice 9 a.m. 3-6
Figure 19 - Expanded Westridge Marine Terminal Shade Impact – Summer Solstice 12 p.m. 3-7
Figure 20 - Expanded Westridge Marine Terminal Shade Impact – Summer Solstice 3 p.m. 3-8
Figure 21 - Expanded Westridge Marine Terminal Shade Impact – Fall Equinox 9 a.m. 3-9
Figure 22 - Expanded Westridge Marine Terminal Shade Impact – Fall Equinox 12 p.m. 3-10
Figure 23 - Expanded Westridge Marine Terminal Shade Impact – Fall Equinox 3 p.m. 3-11
Figure 24 - Expanded Westridge Marine Terminal Shade Impact – Winter Solstice 9 a.m. 3-12
Figure 25 - Expanded Westridge Marine Terminal Shade Impact – Winter Solstice 12 p.m. 3-13
Figure 26 - Expanded Westridge Marine Terminal Shade Impact – Winter Solstice 3 p.m. 3-14

Tables

Table 1 - Site Descriptions of Observation Viewpoints.....2-4

Acronyms and Abbreviations

bbl/d	barrels per day
BC MFLNRO	BC Ministry of Forests, Lands and Natural Resource Operations
BC	British Columbia
CDED	Canadian Digital Elevation Data
DEM	Digital Elevation Model
ESRI	Environmental Systems Research Institute
KMC	Kinder Morgan Canada
NEB	National Energy Board
OV	Observation Viewpoint
the Project	Trans Mountain Expansion Project
TMEP	Trans Mountain Expansion Project
Trans Mountain	Trans Mountain Pipeline ULC
VFPA	Vancouver Fraser Port Authority
VSIA	Visual and Shade Impact Analysis

SECTION 1

Introduction

1.1 Objectives

This report assesses the visual and shade impacts of the proposed expansion of the Westridge Marine Terminal on the skyline and surrounding communities.

This report provides visual simulations of both viewshed and shade impacts, and discusses the extent to which the Westridge Marine Terminal expansion will have on view and shade impacts on surrounding residential properties and public areas. It will assist in determining whether further mitigation is required to minimize visual and shade impacts associated with the proposed terminal expansion.

The visual simulations in this report update the viewshed modelling conducted of the Westridge Marine Terminal in the National Energy Board (NEB) Facilities Application for the Trans Mountain Expansion Project (TMEP or the Project), which was submitted in December 2013, based on terminal design updates since that time.

1.2 Project Overview

Trans Mountain Pipeline ULC (Trans Mountain) submitted a Facilities Application to the NEB in December 2013 for the Project. On November 29, 2016 the Government of Canada concluded the Project was in the public interest of Canada. A Certificate of Public Convenience and Necessity (CPCN) allowing the Project to proceed, subject to 157 conditions, was issued on December 1, 2016. As part of the Project, the Westridge Marine Terminal will require expansion, including construction of three new loading berths within an expanded water lot and infilling along the existing shoreline to accommodate new onshore infrastructure.

From a sight and shade perspective, new structures that are part of the proposed terminal expansion of the Westridge Marine Terminal that were assessed include three new berths for Aframax tankers, a small utility dock, an expanded foreshore area, and a new electrical substation.

An aerial view of the existing Westridge Marine Terminal is shown in Figure 1. Artist renderings of the new dock complex are presented in Figure 2 and Figure 3.

1.3 Regulatory Standards

This Visual and Shade Impact Analysis (VSIA) has been prepared in accordance with the Vancouver Fraser Port Authority's (VFPA's) Project and Environmental Review View and Shade Impact Guidelines (the guidelines). The guidelines were developed to assist proponents, whose projects are located on land or water managed by the VFPA, when considering view and shade impacts relating to new buildings or structures on surrounding communities (Port Metro Vancouver 2015). During the Preliminary Review phase of the Project, the VFPA determined that, given the location of the proposed development near and in view of various residential and recreational areas, a VSIA will be required.

As per the guidelines, the VSIA includes:

a) An assessment of potential view impacts of the proposed development on the skyline and surrounding community.

b) An assessment of potential shade impacts of the proposed development on the skyline and surrounding community during four time periods throughout the year:

a. spring equinox, summer solstice, fall equinox and winter solstice

b. at 9 a.m., 12 p.m. and 3 p.m.

c) Illustrations or photographs of existing views overlaid with computer rendered images of the proposed development and proposed mitigation strategies.

d) Illustrations or photographs taken from representative public viewpoints from the surrounding community (e.g., street ends, public parks and other public areas as deemed appropriate).

1.4 Visual Landscape Context

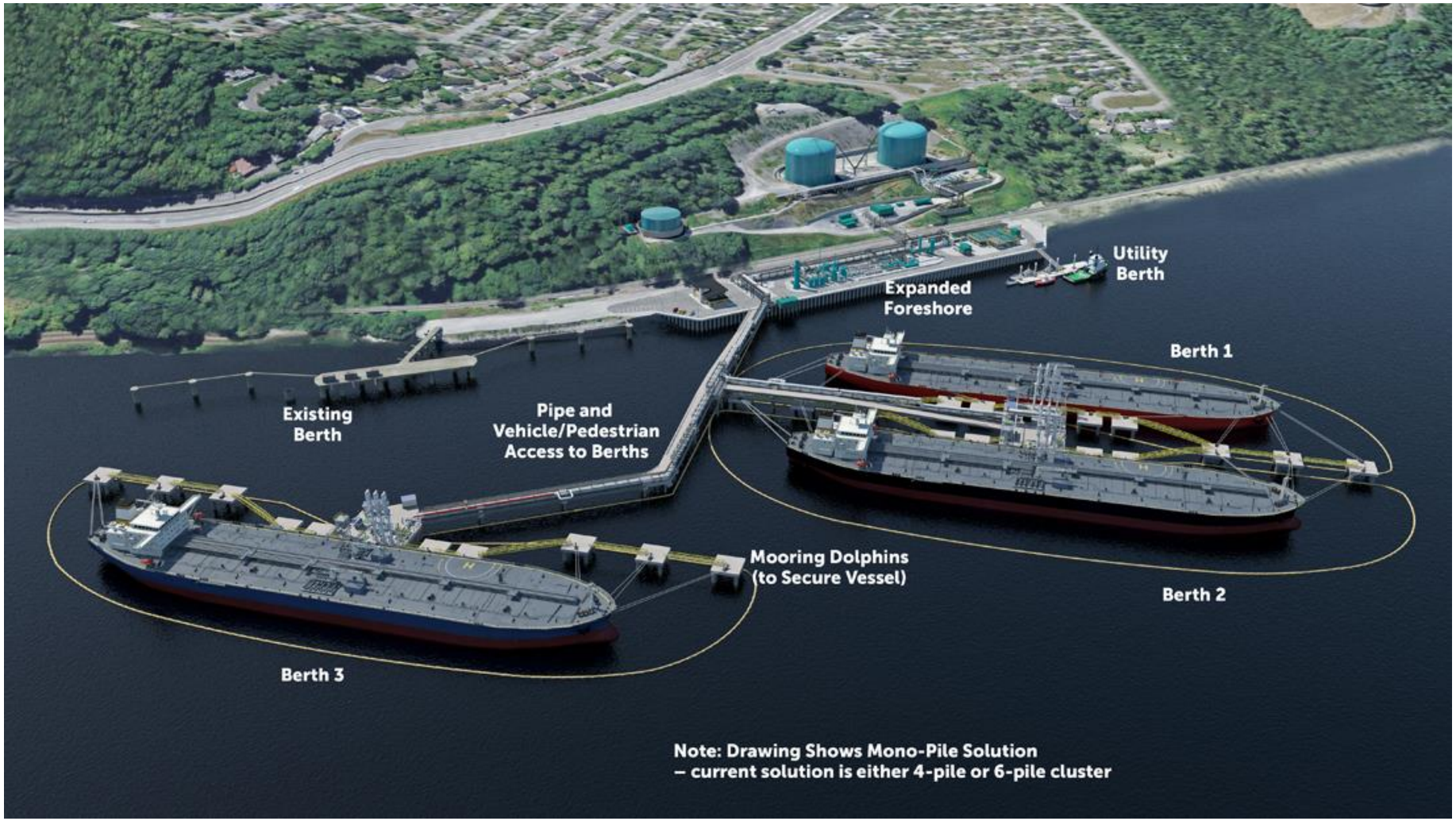
The Westridge Marine Terminal is located within the City of Burnaby, close to Inlet Drive on the south shore of Burrard Inlet. The Westridge Marine Terminal is located on industrial land; however, adjacent lands include parks and residential areas (City of Burnaby 1998). The Westridge residential area is located directly south of the terminal, while the Burrard Inlet Conservation Area is west along the shoreline and the Barnet Marine Park is east of the terminal along the shoreline. Barnet Marine Park has a picnic site and a beach, which is popular for swimming, canoeing and kayaking (City of Burnaby 2016). There are numerous walking trails, one of which goes along the shoreline towards the terminal (City of Burnaby 1998). The Westridge Marine Terminal is not situated in an area with a Visual Quality Objective designation, as defined by the BC Ministry of Forests, Lands and Natural Resource Operations (BC MFLNRO), who have developed a system to identify and categorize visually sensitive areas (BC MFLNRO, Forest Practices Branch 2001).

Approximately 1.5 km north across the Burrard Inlet is the District of North Vancouver, which has lands with direct sight of the Westridge Marine Terminal. These lands include residential and commercial areas, parks, open spaces and natural areas as well as the Tsleil-Waututh First Nation of the Burrard Inlet Indian Reserve 3 (District of North Vancouver 2011). The areas zoned as parks, open spaces and natural areas include Roche Point Park and Cates Park. Roche Point Park is mainly forested while Cates Park contains a playground, a picnic site, a beach and a year-round boat launch (Deep Cove BC 2016). Further northeast on the Burrard Inlet, approximately 2 to 3 km away from the Westridge Marine Terminal, are the City of Port Moody and the Village of Belcarra. The Village of Belcarra has residential areas along the water that face towards the Westridge Marine Terminal (Village of Belcarra 2011). The Belcarra Regional Park, which also faces towards the terminal, is popular for activities such as hiking, bicycling, horseback riding, fishing, paddling, and swimming, and also includes picnic sites, a campground and a beach (Metro Vancouver 2016).

Figure 1 – Existing Westridge Marine Terminal

Figure 2 - Artist Rendering of Expanded Westridge Marine Terminal (Aerial View)

Figure 3 - Features of the Expanded Westridge Marine Terminal



SECTION 2

View Impact Analysis

2.1 Methods

Potential impacts to views were analyzed by modelling the proposed facilities onto photographs of the landscape to determine what the expanded dock complex would look like from various viewpoints.

2.1.1 Selection of Observer Viewpoints

To ensure consistency, the expanded dock complex has been re-modelled from the Observer Viewpoints (OVs) that were modelled in the NEB Application. OVs were selected as representative areas with high public use or aesthetic value (such as residential areas or scenic viewpoints) from which the Westridge Marine Terminal could be seen. Photographs were taken from each OV towards the proposed terminal, and the terminal model was digitally combined with the photographs to create a simulation of the changed viewshed from that particular point.

Although there are an infinite number of possible OVs, OVs were selected based on several criteria. The OVs were selected as sites that have potentially clear views of the facility as well as one or more of the following:

- readily accessible by the general public (e.g., highways, trails, recreational areas, residential area, roadside turnouts, etc.);
- frequent public use (i.e., popular destinations);
- aesthetic or historic importance; and/or
- other areas of community interest identified through stakeholder consultation.

As noted in the Facilities Application, OV site selection was determined by a three-step process (i.e., desktop viewshed analysis, site visits, and final selection) which is discussed further below.

Desktop Viewshed Analysis

Viewsheds are defined as the areas within the key location study area that could be viewed from one or more observation locations. The key location study area is a 2 km buffer around the ground disturbance extent of the identified sites of proposed infrastructure. Conversely, the viewshed from a particular facility site (the areas that can be viewed) are also the areas from which the facility site can be seen.

Desktop viewshed analysis was conducted using the Environmental Systems Research Institute (ESRI) ArcGIS Spatial Analyst Viewshed Analysis tool (ESRI 2013). This tool uses elevation modelling with estimated facility height to determine if facilities may be visible from a variety of viewpoints. A 20 m resolution Digital Elevation Model (DEM) (Canadian Digital Elevation Data [CDED]) was used as the basis of the analysis (Natural Resources Canada 2008). The dataset was converted to a raster (i.e., grid) dataset using ESRI ArcGIS version 10.1. In general, a raster dataset is a grid of locations that contains information about each point (or cell). The DEM then served as the elevation input into the Viewshed Analysis tool. Facility height locations were processed at an estimated height of 8 m. This height was assigned to point locations at all polygon corners and centres for each identified facility site. The Viewshed Analysis tool incorporated both the combined DEM (i.e., vegetation and bare earth elevations) and facility height as inputs.

The viewshed (i.e., the area from which the facility is visible) is defined by identifying the locations in an input raster (i.e., grid) that can be seen from one or more observation locations. Each cell location in the output raster receives a value that indicates whether the observer point can be seen from that location.

Each cell from which an OV is visible is given a value of 1. All cells from which the OV is not visible are given a value of 0.

Viewshed analysis was conducted using ESRI ArcGIS (Version 10.1) software using both the Spatial and 3D Analyst extensions. The input surface for 2 km around each facility site was the DEM. The elevation value for each cell in the final grid represents the topographical location of the cell in the study area as well as the potential screening effect of the vegetation present at that cell.

When conducting the viewshed analysis, the outputs were grids for each facility location with each output cell defined as 20 m x 20 m. Therefore, each cell has a planimetric surface area of 400 m^2. Using this value, the area of the viewshed can be calculated (e.g., the maximum viewshed of any 2 km facility buffer area is 21,701 cells or 8,680,400 m^2, which is 868 ha).

The grid of locations from which the facility may be visible was used to select preliminary potential OVs. The OV locations were refined by identifying areas accessible to the general public and those that could potentially be affected by a modification to the viewshed (e.g., highways, roadside turnouts or trails). A vertical offset of 1.6 m was applied to each OV to compensate for the normal driving or standing observers' perspective being elevated above ground level.

Canopy height data was not available at the Westridge location. Therefore, the viewshed analysis at these facility sites was completed without the Vegetation Resource Index input to refine the potential OV locations.

The DEM alone did not produce constructive results for determining viewpoint locations. Based on available aerial imagery and Project team knowledge of the facility locations, it was evident that there were many areas that were modelled within the viewshed that would actually be hidden from view (*e.g.*, by mature trees near Burnaby Terminal). Potential OV locations were further refined using aerial imagery, stakeholder input, input from Trans Mountain and the professional judgement of the Project team.

Site Visit Preliminary Assessment

Field work to the Westridge Marine Terminal area was conducted in May 2013 as part of the NEB Application process. Potential OV areas identified through desktop analysis were visited to determine locations where the proposed infrastructure would potentially be visible.

When it was determined that the terminal might be visible from a potential OV, the locations were recorded on a GPS, digital Gigapan photographs were acquired, and a site description recorded. The digital Gigapan camera records multiple photographs in quick succession such that they can be stitched together in an automated repeatable fashion to form one high resolution image.

For expediency, redundant sites were not recorded individually where an OV had been recorded that adequately characterized the potential visual effect of the proposed facility. All information collected during the field portion of this work was collated, checked for errors and labeled upon return from the field.

The field assessment also narrowed the number of OVs chosen for further assessment, since visibility of the terminals was not as high at some locations as was initially assumed. Visibility was frequently obstructed by vegetation and/or infrastructure.

Final Selection of Observation Viewpoints

Several locations on public lands were identified for the acquisition of OV images near the terminal, from which the terminal is highly visible. Three OVs, two located across the Burrard Inlet and one on Capitol Hill in Burnaby, were chosen for the Westridge Marine Terminal (see Figure 4). Figure 4 also shows modelling locations that were considered from the desktop work, but which were then ruled out after the site visit due to lack of visibility.

2.1.2 Visualization Modelling

The process of creating the visual models (or photo simulations) first involved creating a three dimensional (3D) environment of the proposed project, as well as collecting pertinent existing information. Terrain data, existing structures, proposed structure footprints, and landscaping information, were gathered as CAD data. Layouts/models were developed, which were imported into 3DSMax, a 3D modeling software.

The site photos were obtained from the previous visual modelling exercise, along with information about site locations, time, weather, camera type, camera lens and GPS. A virtual camera was created in the 3D software which camera matches to the site photos. Camera matching is a technique to create a virtual camera within a virtual 3D model that simulates the real camera that took the existing conditions photograph.

The site photo was then added as a background bitmap in the software. A combination of both automated tools and hand adjustments were used to finalize the camera-match. Both the existing conditions photograph and the virtual 3D model contained reference points of known geographic location and dimensions to perform the camera match. For this analysis, the existing jet fuel tanks on the upland area were used as well as the existing topography.

Once the model was aligned in the same view as the photo it was rendered out and post production Photoshop was used to finalize the photo simulations.

2.1.3 Data Sources and Limitations

Several datasets were required to perform visibility analysis, including a DEM and spatial locations of the OVs. All data were projected in NAD83 and UTM Zone 10. Each type of data and its limitations is discussed below.

Digital Elevation Model

The best available DEM data were used for the visibility analysis, which is the 1:50,000 CDED freely available online from Natural Resources Canada (www.geobase.ca) (Natural Resources Canada 2008). The CDED consists of an ordered array of ground elevations at regularly spaced intervals, approximately 23 m in the study area, and are based on the 1:50,000 National Topographic Data Base digital files. Each CDED file consists of elevation data recorded in metres relative to mean sea level based on the NAD83 horizontal reference datum and the Canadian Vertical Geodetic datum (Natural Resources Canada 2008). While the data are the best currently available, they contain both horizontal and vertical errors that may affect the viewshed analysis and the interpretation of those results. These errors combined with the horizontal resolution of the CDED data can introduce errors into the visibility analysis, particularly when examining subtle changes in foreground viewsheds.

Observer Viewpoints

OVs were spatially captured as waypoints during field work using a Garmin 62s, Wide Area Acquiring Search-enabled, differential ready 12 channel GPS receiver with a positional accuracy of ±6 m. Upon return to the office, the waypoints were downloaded using Map Source (version 3.16.3) and converted to ESRI point shapefiles for export in GIS software. The OV shapefiles were then checked for positional errors against the 2008 to 2011 0.5 m orthophotography of the study area.

Seasonal Changes

Field work for this assessment occurred during the month of May, under full foliage conditions. Seasonal changes in vegetation could affect the visual quality of the OV viewsheds, since, in some cases, vegetation screens facilities.

2.2 Observer Viewpoints – Existing Context

The three OVs selected for visual modelling of Westridge Marine Terminal are shown in the regional context in Figure 4. Figure 4 also shows potential OVs that were considered, but then ruled out during field visits due to lack of visibility. The site location of each OV is also described in Table 1.

Table 1 - Site Descriptions of Observation Viewpoints

Viewpoint Number	Easting	Northing	UTM Zone	Orientation (Direction)	Elevation asl (m)	Location
OV1	5460929	503072	10N	South	7	Cates Park, District of North Vancouver
OV2	5459367	501307	10N	East	184	Capitol Hill, City of Burnaby
OV3	5462255	505353	10N	Southwest	19	Belcarra Picnic Area, Village of Belcarra

Figure 4 - Westridge Marine Terminal - Observation Locations

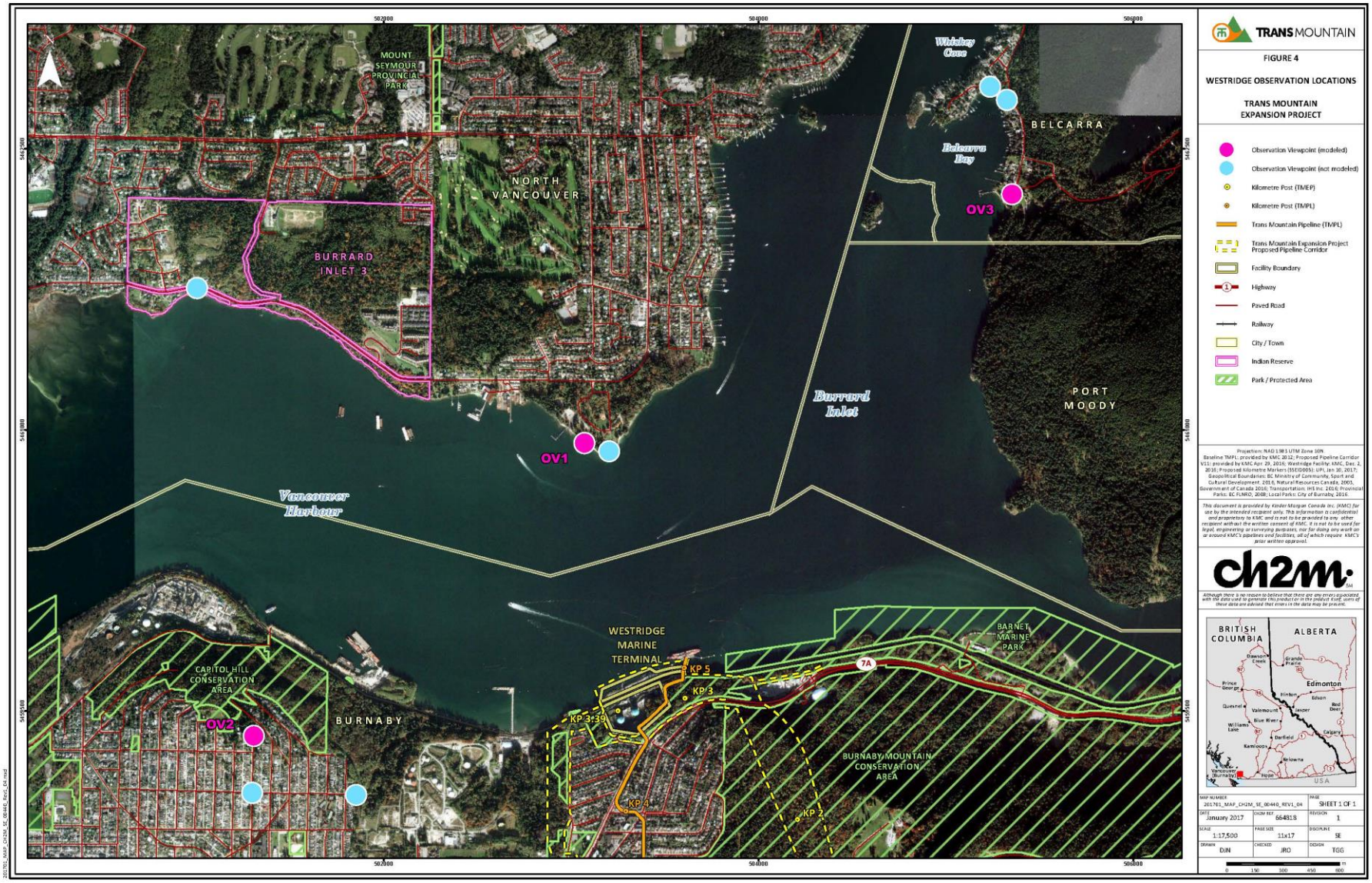


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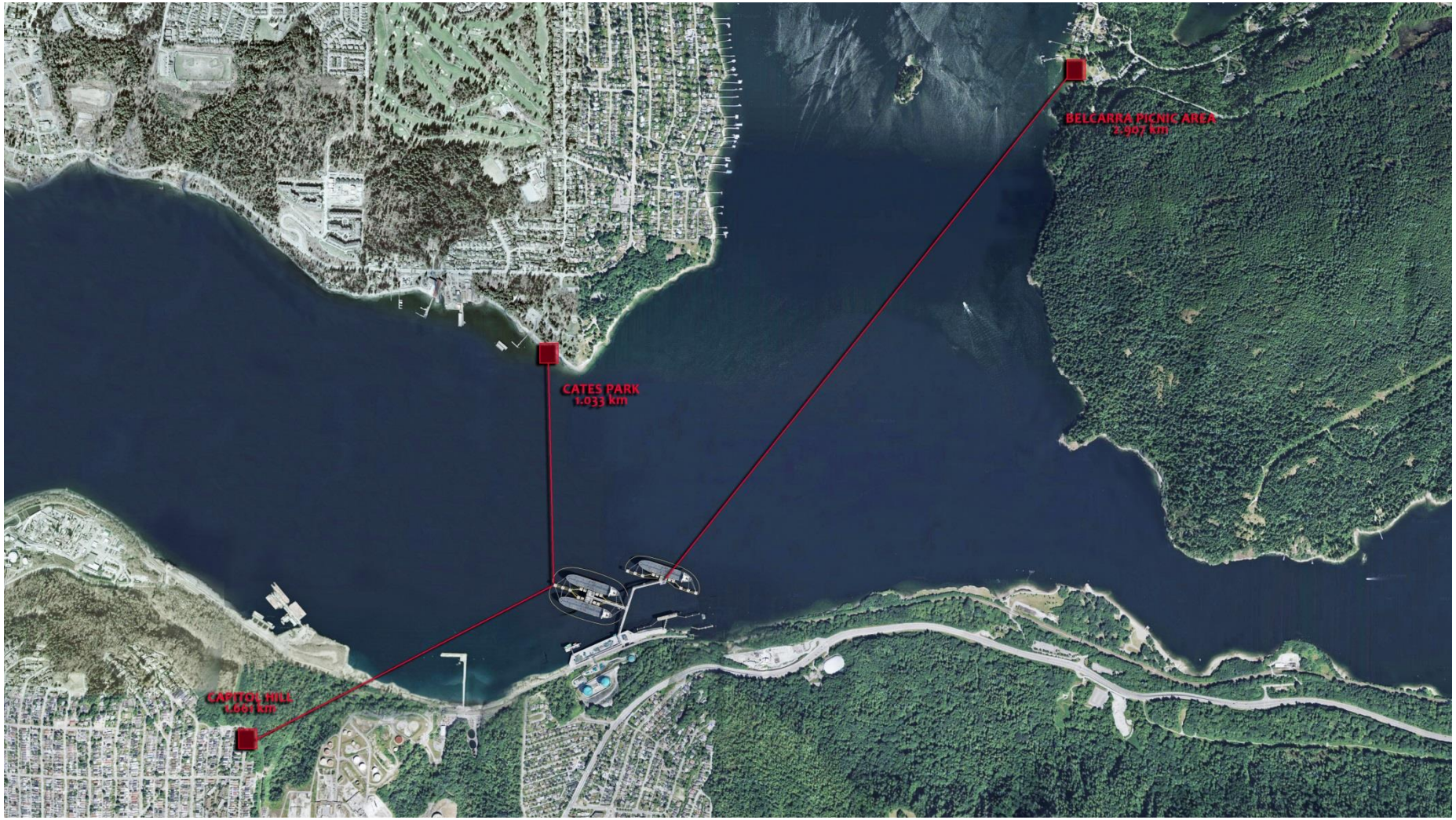
Figure 5 - Distance of Observer Viewpoints from Expanded Dock



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2.2.1 Observer Viewpoint 1, Cates Park (North Vancouver)

OV1 is located across the Burrard Inlet in Cates Park, approximately 1.3 km north of the Westridge Marine Terminal. Cates Park is in the District of North Vancouver and is largely forested but also has some grassy areas for picnic sites. OV1 is located in the beach/swimming area of Cates Park on the Burrard Inlet, approximately 100 m southeast of the boat launch and has a view of the Westridge Marine Terminal over the water. The Westridge Marine Terminal faces north towards Cates Park on the south side of the Burrard Inlet. The terminal is located on land that is zoned for industrial uses, but is surrounded by parks and residential areas. This site was chosen since the park faces directly towards the Westridge Marine Terminal; and given its beach and boat launch, it is popular for boating and other water activities. The new berths will be visible to those engaging in various activities in Cates Park.

From OV1, foreground consists only of a sandy and rocky area that is the shore of the northern bank of Burrard Inlet. The shore, which is approximately 30 m wide from this viewpoint, very gradually slopes into the water. Burrard Inlet makes up the middle ground and is approximately 1.3 km wide. The background is the southern bank of Burrard Inlet and a part of the City of Burnaby. The western part of the bank is relatively flat and the eastern part is dominated by Burnaby Mountain, which is largely forested. In the centre of the background is a large cleared area with two blue tanks, which is the existing Westridge Marine Terminal. There is some anthropogenic disturbance, most of which is associated with residential areas and the existing Westridge Marine Terminal.

2.2.2 Observer Viewpoint 2, Capitol Hill (Burnaby)

OV2 is located on North Ellesmere Avenue in the neighbourhood of Capitol Hill in the City of Burnaby, which is approximately 1.9 km west of the Westridge Marine Terminal. Capitol Hill is a residential area of single and two family homes (City of Burnaby 1998). Harbour View Park is located approximately 100 m northwest of OV2 and Stratford Park lies approximately 200 m northeast. OV2 is located on the east side of the hill, which allows views of the Westridge Marine Terminal and Burrard Inlet. This site was chosen for modelling since the new additions to the facility could impact views of the Burrard Inlet for the Capitol Hill residents.

OV2 faces east down onto Burrard Inlet. The foreground consists mainly of vegetation and a house. Due to Capitol Hill's steep decline, the viewshed from this site is primarily background. The background is comprised of Burrard Inlet and its northern and southern banks. In the centre of the background is the southern bank of Burrard Inlet, where there is some anthropogenic disturbance. This disturbance includes residential areas as well as the existing Westridge Marine Terminal. There are also some structures that extend onto the water both adjacent to and in front of the terminal.

2.2.3 Observer Viewpoint 3, Belcarra Picnic Area (Belcarra)

OV3 is located across Burrard Inlet in the Belcarra Picnic Area and is approximately 3.2 km northeast of the Westridge Marine Terminal. OV3 is situated in an open area with a few trees and has a beach and pier for boating and water activities. Belcarra Picnic Area sits on the mouth of Indian Arm and faces directly west to the District of North Vancouver; however, the Westridge Marine Terminal can also be viewed to the southwest. Due to Belcarra's popularity as a recreational area, this site was chosen for visual modelling.

OV3 faces southwest over Burrard Inlet. At this site, the foreground consists of a large flat grassy area with some trees and park benches. The middle ground is the large expanse of water of Burrard Inlet. Burrard Inlet is approximately 3 km wide from this site to the southern bank, where the Westridge Marine Terminal is located. The background consists of this southern shore, where some anthropogenic disturbance is visible. This disturbance is both residential development and the existing Westridge Marine Terminal.

2.3 Results

2.3.1 Observation Viewpoint 1, Cates Park

Figure 6 shows the existing view from OV1 in Cates Park in the District of North Vancouver.

Figure 7 provides a comparative post-construction view from OV1, with the new docks and berths as well as tankers present.

Figure 8 provides a comparative post-construction view from OV1, with no tankers present at the docks.

The distance from OV1 to the outer edge of the expanded dock is approximately 1.03 km (Figure 5).

2.3.2 Observation Viewpoint 2, Capitol Hill

Figure 9 shows the existing view from OV2 in Capitol Hill in the City of Burnaby.

Figure 10 provides a comparative post-construction view from OV2, with the new docks and berths as well as tankers present.

Figure 11 provides a comparative post-construction view from OV2, with no tankers present at the docks.

The distance from OV2 to the outer edge of the expanded dock is approximately 1.66 km (Figure 5).

2.3.3 Observation Viewpoint 3, Belcarra Picnic Area

Figure 11 shows the existing view from OV3 in Belcarra Picnic Areas in the Village of Belcarra.

Figure 13 provides a comparative post-construction view from OV3, with the new docks and berths as well as tankers present.

Figure 14 provides a comparative post-construction view from OV3, with no tankers present at the docks.

The distance from OV3 to the outer edge of the expanded dock is approximately 2.91 km (Figure 5)

2.4 Observations

The expanded Westridge Marine Terminal will be visible from certain locations in the District of North Vancouver, the Village of Belcarra and the City of Burnaby as evidenced from the locations and vantage points used in this assessment.

Post-construction simulations indicate that the viewsheds have been altered from the existing viewshed by the presence of the new scraper facilities, tanks, dock and berths, as well as the moored vessels. However, the low height of the proposed structures and moored tankers result in no impacts on the skyline given the topography of the area; all proposed structures, including berthed tankers, stay below the skyline at all these vantage points.

The overall effect is also lessened due to the current industrial nature of the site and presence of the existing Westridge Marine Terminal and storage tanks, which the design has been integrated with. The use of green colour for certain structures further reduces view impacts as the buildings blend into the natural/built environment.

There are additional mitigations identified to reduce the visual and skyline effects of these additions. However, it should be noted that the tankers will not always be moored at the terminal and, therefore, will detract less from the visual experience when they are absent.

Figure 6 - Observation Viewpoint 1, Cates Park (Original Photo)

Figure 7 - Observation Viewpoint 1, Cates Park (After - With Tankers Present)

Figure 8 - Observation Viewpoint 1, Cates Park (After - No Tankers Present)

Figure 9 - Observation Viewpoint 2, Capitol Hill (Original Photo)

Figure 10 - Observation Viewpoint 2, Capitol Hill (After - With Tanker Present)

Figure 11 - Observation Viewpoint 2, Capitol Hill (After - No Tankers Present)

Figure 12 - Observation Viewpoint 3, Belcarra Picnic Area (Original Photo)

Figure 13 - Observation Viewpoint 3, Belcarra Picnic Area (After - With Tankers Present)

Figure 14 - Observation Viewpoint 3, Belcarra Picnic Area (After - No Tankers Present)

SECTION 3

Shade Impact Analysis

The assessment of potential shade impacts of the expanded Westridge Marine Terminal and the surrounding community has been prepared during four time periods throughout the year: Spring Equinox (March 21); Summer Solstice (June 21); Fall Equinox (September 21); and Winter Solstice (December 21). Further the review considers impacts for each at 9 a.m., 12 p.m. and 3 p.m. These dates and times for modelling are specified in the VFPA Visual and Shade Impact Guidelines.

3.1 Method

For the shade modelling, a 3D modeling, animation, and rendering software with daylight system capability (3DS Max) was used. Within this software, specific locations, dates and times can be isolated. Once the location, date and time are specified, the program adjusts the "sun" to mimic conditions. For this particular analysis, the following time periods were set as per the VFPA Visual and Shade Impact Guidelines -- spring equinox, summer solstice, fall equinox and winter solstice, each at 9 a.m., 12 p.m. and 3 p.m. Each of these times was rendered out and post production was used to finalize each image.

3.2 Results

3.2.1 Spring Equinox

Figure 15 presents the results of the shade impact modelling for Spring Equinox at 9 a.m. Figure 16 presents the shading results for Spring Equinox at 12 p.m. Figure 17 presents the shading results for Spring Equinox at 3 p.m. Given the low-level of the proposed structures and site context, the shading cast by the site structures at no time extends beyond the site property and does not extend into any nearby communities.

3.2.2 Summer Solstice

Figure 18 presents the results of the shade impact modelling for Summer Solstice at 9 a.m. Figure 19 presents the shading results for Summer Solstice at 12 p.m. Figure 20 presents the shading results for Summer Solstice at 3 p.m. Given the low-level of the proposed structures and site context, the shading cast by the site structures at no time extends beyond the site property and does not extend into any nearby communities.

3.2.3 Fall Equinox

Figure 21 presents the results of the shade impact modelling for Fall Equinox at 9 a.m. Figure 22 presents the shading results for Fall Equinox at 12 p.m. Figure 23 presents the shading results for Fall Equinox at 3 p.m. Given the low-level of the proposed structures and site context, the shading cast by the site structures at no time extends beyond the site property and does not extend into any nearby communities.

3.2.4 Winter Solstice

Figure 24 presents the results of the shade impact modelling for Winter Solstice at 9 a.m. Figure 25 presents the shading results for Winter Solstice at 12 p.m. Figure 26 presents the shading results for Winter Solstice at 3 p.m. Given the low-level of the proposed structures and site context, the shading

cast by the site structures at no time extends beyond the site property and does not extend into any nearby communities.

Figure 15 – Expanded Westridge Marine Terminal Shade Impact – Spring Equinox 9 a.m.

Figure 16 - Expanded Westridge Marine Terminal Shade Impact – Spring Equinox 12 p.m.

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Figure 17 - Expanded Westridge Marine Terminal Shade Impact – Spring Equinox 3 p.m.

Figure 18 - Expanded Westridge Marine Terminal Shade Impact – Summer Solstice 9 a.m.

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Figure 19 - Expanded Westridge Marine Terminal Shade Impact – Summer Solstice 12 p.m.

Figure 20 - Expanded Westridge Marine Terminal Shade Impact – Summer Solstice 3 p.m.

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Figure 21 - Expanded Westridge Marine Terminal Shade Impact – Fall Equinox 9 a.m.

Figure 22 - Expanded Westridge Marine Terminal Shade Impact – Fall Equinox 12 p.m.

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Figure 23 - Expanded Westridge Marine Terminal Shade Impact – Fall Equinox 3 p.m.

Figure 24 - Expanded Westridge Marine Terminal Shade Impact – Winter Solstice 9 a.m.

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Figure 25 - Expanded Westridge Marine Terminal Shade Impact – Winter Solstice 12 p.m.

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Figure 26 - Expanded Westridge Marine Terminal Shade Impact – Winter Solstice 3 p.m.

SECTION 4

Conclusions

Post-construction visual simulations indicate that the viewsheds have been altered from the existing viewshed by the presence of the new scraper facilities, tanks, dock and berths, as well as the moored vessels. However, the low height of the proposed structures and moored tankers result in no impacts on the skyline given the topography of the area; all proposed structures, including berthed tankers, stay below the skyline at all these vantage points. The overall effect is also lessened due to the current industrial nature of the site and presence of the existing Westridge Marine Terminal and storage tanks, which the expansion design has been integrated with.

Given the low-level of the proposed structures and site context, the shading cast by the new site structures at no time extends beyond the site property and does not extend into any nearby communities.

Overall, no additional visual or shade related mitigation has been identified as warranted as a result of this analysis.

SECTION 5

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