



**PARRISH & HEIMBECKER**  
PROPOSED FRASER GRAIN TERMINAL EXPORT FACILITY

**VIEWSCAPE & SHADE STUDY**

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# 1. Introduction

## 1.1 Project Background

Parrish & Heimbecker Ltd (P&H) is proposing to build a new state-of-the-art Fraser Grain Terminal Export Facility (the "Project") at 11041 Elevator Road, Surrey. The site is bounded by Fraser Surrey Docks to the Northwest and South, and a lumber facility (Western Cleanwood / Surewood Forest Products) to the East. This land is owned by Port Metro Vancouver (PMV) and was formerly leased by Bekaert Canada Ltd. (Bekaert). The new grain facility will serve as a trans-shipment storage location for bulk grain products, and will include loading and unloading infrastructure, storage silos, a transfer tower and gallery, and ancillary works.

The Project, which comprises 1 permit application, will be equipped with:

- rail car unloading system;
- storage silos;
- vessel bulk grain loading terminal for overseas shipment;
- rail car and truck loading installations for feedmills; and,
- container loading system for overseas shipments.

## 1.2 Objectives

In accordance to the PMV Project and Environmental Review Guidelines - View and Shade Impact July 2015 (PERG VS 2015), the Project requires analysis of the effects of the proposed siting, massing and height to public and private views of the visual landscape to the surrounding community and skyline. The guidelines also require study into the potential shade impacts on the surrounding areas from the proposed Project. Photographs and visual renderings have been provided of existing and proposed developments according to PERG VS 2015 guidelines, and potential mitigation strategies for view and shade effects have been discussed in this report as well.

The Project is zoned Port Terminal in the PMV Land Use Plan (October 29 2014). Consistent with PMV's approvals process, a visual impact assessment has been conducted for the proposed new grain facility. The purpose of this assessment is to:

- Demonstrate that P&H has considered the provisions and requirements of the PERG VS 2015;
- To guide the application of visual mitigation measures;
- To support community information sharing and the consultation process.

Enns | Gauthier Landscape Architects has been tasked with performing the Views and Shade study. Together in collaboration with other environmental and engineering firms, the Project Team will deliver all necessary reports to PMV for permit approval.

## 1.3 About Enns | Gauthier Landscape Architects

Enns | Gauthier Landscape Architects (ELG) was formed in 2014 with an eye towards bringing greater creativity, adaptability and collaboration to the practice of landscape architecture. ELG is

built upon the collective experiences of over 20 years spent planning, designing and managing landscape projects for some of Greater Vancouver's premier urban development brands, municipalities and institutions. Based in Vancouver, BC, EIG has worked on similar projects involving regenerative design, large-scale master planning and analysis, visual resource management, graphic renderings and manipulation, and site reconnaissance, documentation and field review. As landscape architects experienced working in collaborative environments, EIG will work closely with the Project Team to deliver a high quality and comprehensive Report for the Client.

## **2. View Study: Approach and Methodology**

This view study and impact assessment will focus on how the proposed Project infrastructure, siting, layout, massing, materials and height impact the surrounding community and views from public areas. The following outlines our approach and methodology.

### **2.1 Base Information, Review and Coordination**

Base information was acquired from Hemmera Envirochem (Hemmera), CMC Engineering (CMC), vegetation specialists, surveyors and civil engineers. This information included:

- Site existing ground contours;
- Site aerial photos, at-grade site photos;
- CAD drawings of existing and proposed facilities;
- Rendering perspective of proposed facilities;
- Plans for new equipment, structures, and buildings,
- Elevation drawings of Main Plant area;
- Sections of proposed structures, orthophotos / satellite images in plan view of the site;
- Mapping of existing vegetation on site to be preserved and protected.

Information from these documents was gathered and overlaid to form an accurate and informative assessment of the site's conditions.

### **2.2 Desktop Study**

A literature review of local and regional land use policies, environmental guidelines, PMV standards and BC visual Quality Objective Guidelines was conducted. As the site is within PMV's jurisdiction and its land use is designated Port Terminal, the Project must adhere to the PERG VS 2015 document. As-built drawings of the proposed new infrastructure provided by CMC were reviewed and assessed. Aerial photos, satellite images, and at-grade photos were used to conduct an initial study of the immediate and surrounding areas. City topographic maps were

also consulted to get a better understanding of elevation changes surrounding the project site.

### 2.3 Site Visits and Viewpoint Selection

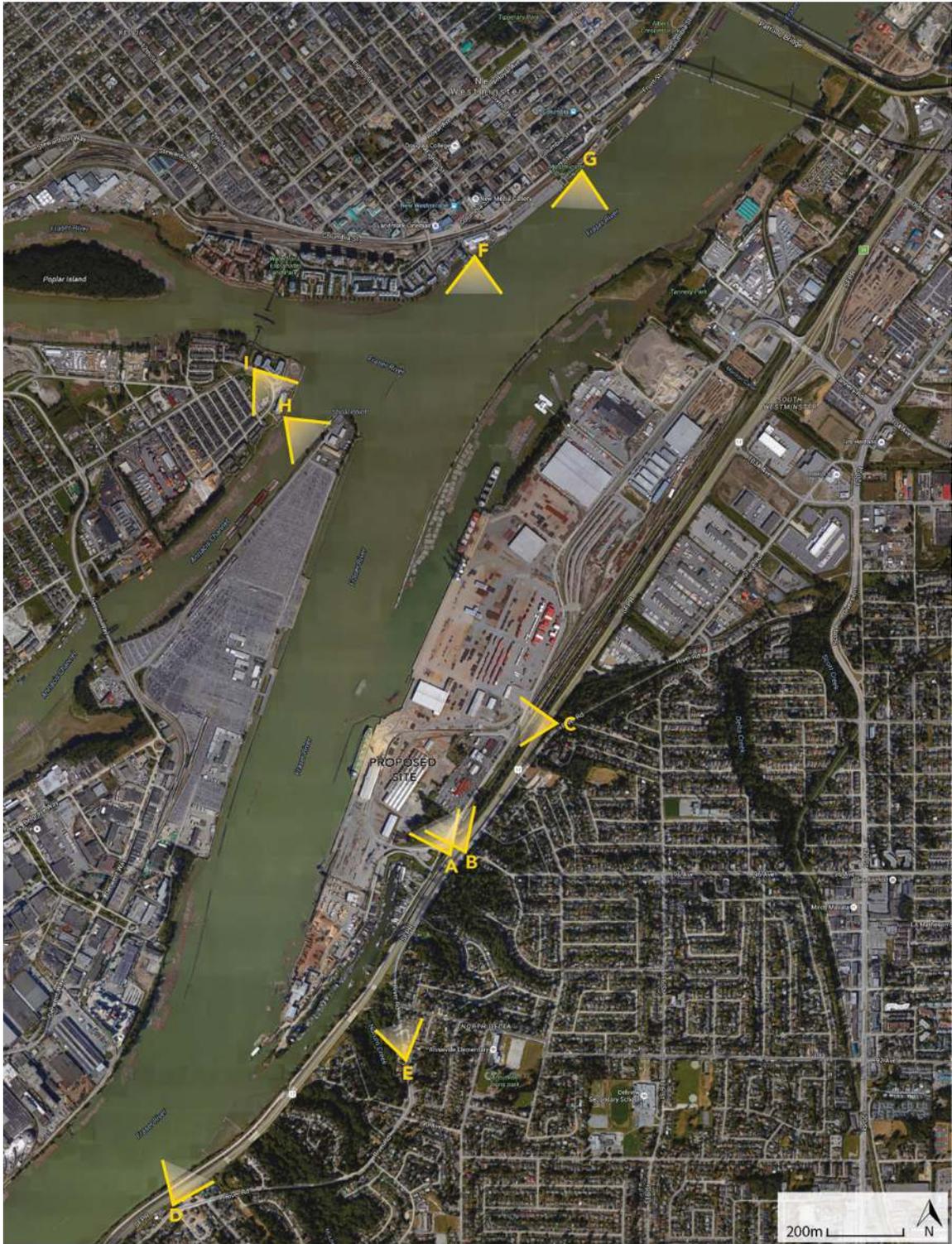
Site reconnaissance is an important part of information gathering and 'ground truthing' to assess the the accuracy of the base information and back ground studies. Site visits of the site, adjacent properties and the surrounding area occurred on October 27, 2015 and July 27, 2016. The purpose of the first site visit was to review existing site conditions and identify potential locations for the view study graphics within the site as well as additional locations in the neighbouring vicinity. Viewpoint selection criteria were established prior to site reconnaissance to help determine possible view points, as follows:

- high-use public spaces with views to the site
- viewpoints at elevations with potential view windows over existing trees
- main roadways in the vicinity of the site with high traffic volumes
- residential roadways within the vicinity of the site whose view quality and neighbourhood 'character' may be affected by the new facilities
- institutions and community buildings with potential views to the project site
- tourist destinations
- recreational trails and public parks

An additional site visit was conducted on July 26, 2016 after feedback was gathered from PMV, Hemmera and CMC to obtain information from a greater variety of viewpoints from the residential community and public vantage points. This site visit also provided a better understanding of the potential viewpoints in summer conditions, when all trees are leafing out. This information helped to refine the viewpoint selection process even further, as many of the deciduous trees were bare at the time of the initial site visit.

As a result of the 2 site visits and correspondence with the Project Team, 9 locations (**A to I, see Figure 1**) were chosen as viewpoints for this study. The viewpoints chosen offered formed an accurate representation of the view impacts of the new facility on the surrounding communities: the South Fraser Perimeter Road; River Road; on the North side of the Fraser River from Queensborough; Westminster Quay; and Pier Park in New Westminster. The views from these areas are significant due to their location established in residential neighbourhoods, civic gathering places, parks, trails and tourism destinations within the surrounding community. Each viewpoint, its orientation, description of location, elevation and distance from the site are summarized in **Table 1**.

FIGURE 1 - Aerial View and Location of Viewpoints



**TABLE 1 - Camera Viewpoint Locations**

<b>Viewpoint</b>	<b>Description</b>	<b>Direction</b>	<b>Elevation / Distance from Site</b>
A	Along South Fraser Perimeter Road near Elevator Road	Looking Northwest	+1m / 200m from site
B	Along River Road near Regal Drive	Looking Northwest	+10m / 15m above site
C	Along River Road above Western Cleanwood Preservers Ltd.	Looking West	+13 / 400m above site
D	Along River Road near Stegavik Court in Delta	Looking Northeast	+25 / 1500m from site
E	Along River Road near Trinity Lutheran Church	Looking Northwest	+48 / 500m from site
F	From North Bank of Fraser River at Westminster Quay near River Market	Looking South	+0m / 1500m from site
G	From North bank of Fraser River at Westminster Pier Park	Looking Southwest	+3m / 1800m from site
H	Along Port Royal River Trail in Queensborough, New Westminster	Looking Southeast	+0m / 1000m from site
I	At Port Royal Park in Queensborough, New Westminster	Looking Southeast	+6m / 900m from site

Viewpoints A, B, and C were chosen because of their location on the South Fraser Perimeter Road and River Road, which are key vehicular roads for both commuting and local traffic, respectively. Viewpoints A and B are also in close proximity to the Project with direct views to the project. Viewpoint C is further away, and is located on the North shoulder of River Road, with a clear view to the project site. Viewpoints D to I were located in various publicly accessible, high use and/or tourist destinations. Viewpoint D is located on a public lot in a residential neighbourhood with views of the Fraser River and the Project from above. Viewpoint E looks out from a section of River Road near the Trinity Lutheran Church, an important civic gathering place. Viewpoint F is located on the boardwalk of the Westminster Quay outside River Market in New Westminster, a popular tourist destination. Viewpoint G is further East at a newly installed

popular park and civic space named Westminster Pier Park. Viewpoints H and I are located on popular riverfront trails and parks with views to the Project on Queensborough Island.

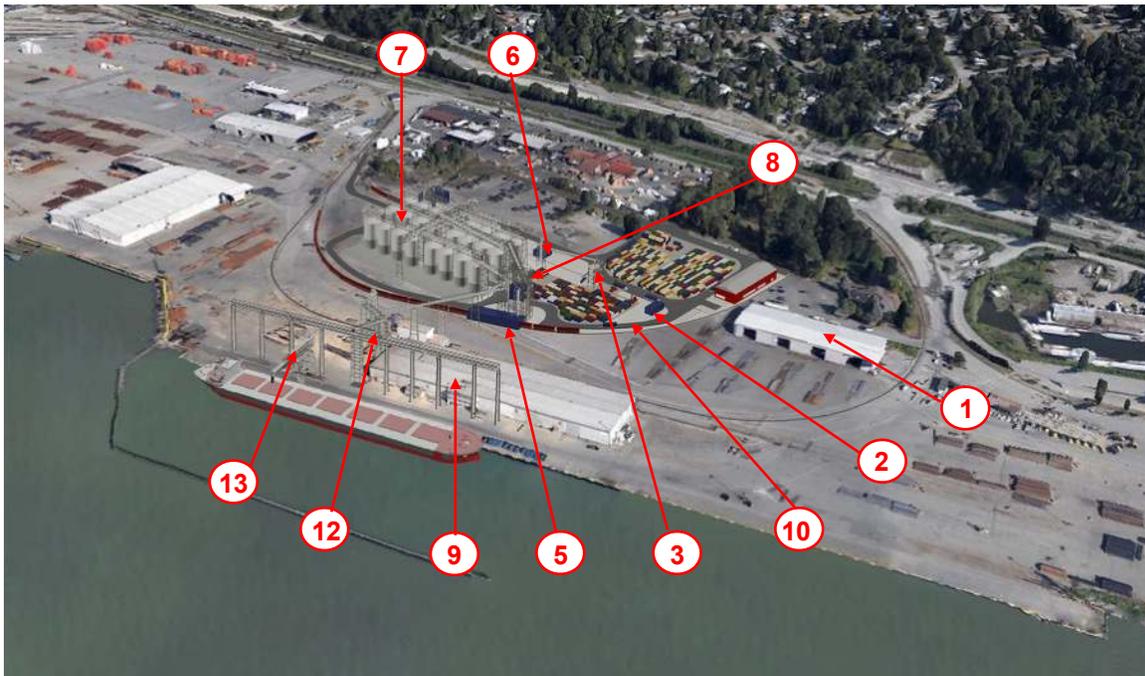
Once viewpoints were documented and approved, graphic work began to create realistic photo-simulations of the proposed infrastructure from each view point location.

## **2.4 Preparation of Photo Simulations**

Renderings of the future view of the Project buildings and structures were prepared for each of the viewpoints (Figures 4-b to 12-b). The methodology to create the photo simulations is as follows:

1. Original viewpoint photos for foreground details / existing landscape features (by EG);
2. Survey data (height contours) of the surrounding landscape (City of Surrey);
3. Technical drawings of the proposed site plans / building dimensions (provided by CMC, 2016)
4. CAD base plans of the proposed facility were confirmed (provided by CMC);
5. Overlay the base plans with computer-generated 3D models of the proposed infrastructure (provided by CMC), **(see Figures 2 + 3)**;
6. Confirm the heights and dimensions of the Project's infrastructure (by CMC), **(see Table 2)**;
7. Confirm building facade and infrastructure materials (by CMC), **(see Table 2)**;
8. Generate "snapshots" with 3D model corresponding with approved viewpoints;
9. Import 3D snapshot "frames" to photo manipulation software (Photoshop) and produce realistically rendered buildings, structures, and surfaces and vegetation;

FIGURE 2 - View of Site and Proposed Buildings (3D Model) Looking Southeast



#	Description	#	Description
1	Administration Building	8	Main Transfer Tower
2	Maintenance Building	9	Existing JV Shed
3	Container Loading Building	10	FT Semi-loop Track
4	Railcar and Truck Loading Building	11	New Access Road
5	Railcar Unloading Building	12	Overhead Gallery with Conveyor (typical)
6	Main Electrical Room (existing)	13	Shiploader
7	Storage Silos		

FIGURE 3 - View of Site and Proposed Buildings (3D Model) Looking West



#	Description	#	Description
1	Administration Building	8	Main Transfer Tower
2	Maintenance Building	9	Existing JV Shed
3	Container Loading Building	10	FT Semi-loop Track
4	Railcar and Truck Loading Building	11	New Access Road
5	Railcar Unloading Building	12	Overhead Gallery with Conveyor (typical)
6	Main Electrical Room (existing)	13	Shiploader
7	Storage Silos		

TABLE 2 - Building Heights and Dimensions for Proposed Facilities  
(as per CMC, 2016 data)

Structure of Element	Height (m)	Facade Materials / Finish
<b>Rail Unloading Building</b>	13.25	Heron Blue
<b>Overhead Galleries</b>	42.46	Galvanized
<b>Transfer Tower</b>	49.11	Galvanized
<b>Container Loading Tower</b>	26.15	Galvanized
<b>Administration Building</b>	5.82	<ul style="list-style-type: none"> <li>• Select Cedarmill in Countrylane red</li> <li>• Galvalume</li> </ul>
<b>Maintenance Building</b>	6.92	Heron Blue
<b>Electrical Room #1 (Existing)</b>	4	Painted Grey
<b>Silos (Big)</b>	33.96	Galvanized
<b>Silos (Small)</b>	25.79	Galvanized
<b>Rail and Truck Loading Building</b>	13.64	Heron Blue

### 3. Visual Impact Photo Simulations

After the computer-generated model “snapshots” were superimposed on the current viewpoints they were further manipulated to remove site features that will no longer be present (ie. removed vegetation) and to add proposed infrastructure. In the following section, a photograph of existing conditions from the selected viewpoint is shown beside a computer rendered image to illustrate the potential impacts of the proposed Project from that vantage point. Existing and rendered graphics are shown in the subsequent Figures 4-12 along with a description of the viewpoint, rationale for site selection, and preliminary assessment of visual impacts.

VIEWPOINT A: Along South Fraser Perimeter Road near Elevator Road (Looking Northwest)

FIGURE 4A - Existing Conditions



FIGURE 4A - Photo-simulation



**VIEWPOINT B:** Along South Fraser Perimeter Road near Elevator Road (Looking Northwest)

**FIGURE 5A - Existing Conditions**



**FIGURE 5B - Photo-simulation**



VIEWPOINT C: Along River Road near Western Cleanwood Preservers Ltd. (Looking West)

FIGURE 6A - Existing Conditions



FIGURE 6B - Photo-simulation



**VIEWPOINT D:** Along River Road near Stegavik Court (Looking Northeast)

**FIGURE 7A - Existing Conditions**



**FIGURE 7B - Photo-simulation**



**VIEWPOINT E:** Along River Road near Trinity Lutheran Church (Looking Northwest)

**FIGURE 8A - Existing Conditions**



**FIGURE 8B - Photo-simulation**



**VIEWPOINT F:** At Westminster Quay near River Market (Looking South)

**FIGURE 9A - Existing Conditions**



**FIGURE 9B - Photo-simulation**



**VIEWPOINT G:** At Westminster Pier Park (Looking Southwest)

**FIGURE 10A - Existing Conditions**



**FIGURE 10B - Photo-simulation**



**VIEWPOINT H:** At Port Royal River Trail in Queensborough (Looking Southeast)

**FIGURE 11A - Existing Conditions**



**FIGURE 11B - Photo-simulation**



**VIEWPOINT I:** At Port Royal Park in Queensborough (Looking Southeast)

**FIGURE 12A - Existing Conditions**



**FIGURE 12B - Photo-simulation**



#### **4. View Study Impact Assessment and Recommendations**

The proposed Project lies in land managed by Port Metro Vancouver and thus must adhere to the PMV Project and Environmental Review Guidelines for View and Shade Impact 2015. The lands border the City of Surrey, near populated neighbourhoods and major thoroughfares and must take into account the potential view impacts on these areas. The site is also located on the Fraser River, across from industrial and residential areas of Queensborough. As such, a thorough review of the photo-simulations and subsequent visual impact assessment of the proposed facilities on the selected view points will form the basis of our recommendations for mitigation techniques where appropriate.

In general, the potential view impacts of the proposed Project to the surrounding communities, roadways, park lands and public spaces with views to the site are minimal, as per the following summary assessment:

- Much of the site is surrounded by tall, dense vegetation to the south and south-west. These trees will shield most of the new infrastructure from the residential slopes south of the site as well as the main roadways south of the site;
- There is an abundance of tall, mature deciduous and coniferous trees throughout the residential areas, parks and neighbourhood roadways on the slopes south of the site, minimizing any significant views onto the project site;
- Distance across the Fraser River is a mitigating factor to reduce visual impact as well. The Project is located sufficiently far away from public view points of the surrounding communities, residential areas, pathways, tourist destinations and public parks in New Westminster. In addition, mature trees along River Road will also minimize the impacts to views caused by proposed Project structures.
- Select views from across the Fraser River from residential areas and public parks in Queensborough may be impacted significantly by proposed facilities. Existing industrial land uses mean that the proposed project causes minimal impact to the skyline. The proposed structures are also obscured by Annacis Island and ship activity in the Fraser River.
- The Project site is within an Industrial zoned land-use area, thus minimizing the impact on the local skyline, architectural language and materials, as the new facilities will effectively blend in with adjacent industries and infrastructure.

However, for viewpoints that reveal a negative impact as a result of the proposed facilities, we recommend the following mitigation techniques be considered on a site-by-site basis:

- Install fast growing and robust trees (deciduous and conifers) in areas that do not conflict with facility operations that will screen the facilities relatively quickly while considering height restrictions to preserve views;
- Consider native plant species common along the Fraser River to encourage habitat for insects, animals and native plants;
- Consider vertical architectural screens or elements against the infrastructure to improve aesthetics and reduce sun glare and visible weathering of materials;
- Consider installing vertical vegetative elements (ie. green screens) against building

facades and expansive walls that encourage vertical plant growth and help reduce sun glare and heat island effect;

- In some cases, consider exploring opportunities to educate the public about the Fraser River's industrial heritage in unique, creative and interactive ways through signage, education, child play and public art.

**Table 3** on the following pages outlines the viewpoint selection rationale, the visual impact assessment for each viewpoint location, and recommended measures to take for each location to mitigate the visual impacts on the surrounding community if applicable.

**TABLE 3 - Summary of Viewpoint Selection Rationale, Visual Impact Assessment, and Recommended Mitigation Techniques**

Viewpoint	Viewpoint Selection Rationale	Assessment	Recommendations
A	<ul style="list-style-type: none"> <li>• At South Fraser Perimeter Road (SFPR), a main vehicular highway;</li> <li>• Approximately 200m from the proposed site and relatively accessible to the general public.</li> </ul>	<ul style="list-style-type: none"> <li>• New access road on Robson Rd and new rail on Southwest will be visible from this location;</li> <li>• Most of the proposed facilities will be screened by the cottonwoods on the Southwest;</li> <li>• Some trees to be removed to accommodate new road and rail line.</li> </ul>	<ul style="list-style-type: none"> <li>• Retain trees as much as possible to ensure year-round screening of proposed facilities;</li> <li>• Consider planting coniferous trees to provide year-round screening;</li> <li>• Plant native tree and shrub species adjacent to new road and rail line to minimize colonization of invasive plant species common in disturbed areas.</li> </ul>
B	<ul style="list-style-type: none"> <li>• On North shoulder of River Road (11208 River Road, Surrey), directly above the SFPR;</li> <li>• Approximately 15m above proposed site.</li> </ul>	<ul style="list-style-type: none"> <li>• Existing trees effectively screen the proposed site in the spring, summer and fall;</li> <li>• Proposed facilities possibly partially seen in winter.</li> </ul>	<ul style="list-style-type: none"> <li>• Retain trees as much as possible to ensure year-round screening of proposed facilities;</li> <li>• Consider planting coniferous trees to provide year-round screening;</li> <li>• Plant native tree and plant species to fill in “gaps” of the existing tree groupings.</li> </ul>
C	<ul style="list-style-type: none"> <li>• On North shoulder of River Road (11334 River Road, Surrey), directly above SFPR.</li> <li>• Approximately 400m from the proposed site.</li> </ul>	<ul style="list-style-type: none"> <li>• Existing mature trees along SFPR and fence along River Road partially screen proposed site and facilities.</li> <li>• Existing industrial activity (Western Cleanwood Preservers Ltd.) partially blocks proposed site and facilities.</li> </ul>	<ul style="list-style-type: none"> <li>• Protect existing trees north of SFPR as much as possible;</li> <li>• Plant new trees and native shrubs along north side of River Road and north side of SFPR, considering tree heights to preserve views;</li> </ul>
D	<ul style="list-style-type: none"> <li>• Viewpoint from publicly accessible green space on 10637 River Road, Delta in residential area;</li> <li>• Approximately 1500m from the proposed site.</li> </ul>	<ul style="list-style-type: none"> <li>• Proposed shipload, shiploader tower, shipping conveyor, shipping conveyor gallery will be visible;</li> <li>• Trees along Fraser River partially screen other proposed facilities;</li> <li>• Distance is a mitigating factor.</li> </ul>	<ul style="list-style-type: none"> <li>• Use building materials that reduce sun-glare.</li> </ul>

Viewpoint	Viewpoint Selection Rationale	Assessment	Recommendations
E	<ul style="list-style-type: none"> <li>Viewpoint near civic gathering space (Trinity Lutheran Church, Delta).</li> <li>Approximately 500m from the proposed site.</li> </ul>	<ul style="list-style-type: none"> <li>Part of the proposed shiploader, shiploader tower and shipping conveyor gallery will be visible;</li> <li>Other facilities will be screened by the trees on the east side of River Road and SFPR;</li> <li>Distance is a mitigating factor.</li> </ul>	<ul style="list-style-type: none"> <li>Retain trees along roadway;</li> <li>Use building materials that reduce sun-glare.</li> </ul>
F	<ul style="list-style-type: none"> <li>Near Westminster Quay, a popular public place and tourist destination New Westminster.</li> <li>Approximately 1500m from the proposed site.</li> </ul>	<ul style="list-style-type: none"> <li>Loading ships, other nearby industrial facilities, and riparian vegetation partially block view of proposed facilities;</li> <li>However, tall structures will be visible;</li> <li>Distance is a mitigating factor.</li> </ul>	<ul style="list-style-type: none"> <li>Plant riparian trees and shrubs in select areas to create a more variation in the view area;</li> <li>Use building materials that reduce sun-glare.</li> <li>Explore opportunities to educate the public about the Fraser River's industrial heritage in unique, creative and interactive ways.</li> </ul>
G	<ul style="list-style-type: none"> <li>On riverfront walkway in Westminster Pier Park, a public place and tourist destination in New Westminster.</li> <li>Approximately 1800m from the proposed site.</li> </ul>	<ul style="list-style-type: none"> <li>Loading ships, other nearby industrial facilities, and riparian vegetation partially block view of proposed facilities;</li> <li>However, tall structures will be visible;</li> <li>Distance is a mitigating factor.</li> </ul>	<ul style="list-style-type: none"> <li>Plant riparian trees and shrubs in select areas to create a more variation in edge conditions along public walkways in the view area;</li> <li>Use building materials that reduce sun-glare;</li> <li>Explore opportunities to educate the public about the Fraser River's industrial heritage in unique, creative and interactive ways.</li> </ul>

Viewpoint	Viewpoint Selection Rationale	Assessment	Recommendations
H	<ul style="list-style-type: none"> <li>• Along Port Royal River Trail, a public riverfront trail.</li> <li>• Approximately 900m from the proposed site.</li> </ul>	<ul style="list-style-type: none"> <li>• Queensborough industrial parks partially blocks view of proposed facilities, however, proposed tall structures will be clearly visible;</li> <li>• Existing facilities already currently visible;</li> <li>• Nearby existing industrial activity are mitigating factors.</li> </ul>	<ul style="list-style-type: none"> <li>• Plant riparian trees and shrubs in select areas to create a more variation in edge conditions along public walkways in the view area;</li> <li>• Use building materials that reduce sun-glare;</li> <li>• Explore opportunities to educate the public about the Fraser River's industrial heritage in unique, creative and interactive ways (ie. signage, child play, public art etc.).</li> </ul>
I	<ul style="list-style-type: none"> <li>• From top of hill at Port Royal Park, park in residential neighbourhood in New Westminster.</li> <li>• Approximately 900m from the proposed site.</li> </ul>	<ul style="list-style-type: none"> <li>• Annacis Island partially blocks view of proposed facilities, however, tall structures will be visible.</li> </ul>	<ul style="list-style-type: none"> <li>• Plant park trees at southern end of park to screen views to proposed facility and 'internalize' the park experience;</li> <li>• Use building materials that reduce sun-glare;</li> <li>• Explore opportunities to educate the public about the Fraser River's industrial heritage in unique, creative and interactive ways (ie. signage, child play, public art etc.).</li> </ul>

## **5. Shade Study: Approach and Methodology**

The Shade Study report will focus on how shade generated by the proposed Project siting, layout, massing, and height may have impacts on the surrounding community and public areas during different times of the day and year. The following outlines our approach and methodology.

### **5.1 Base Information, Review and Coordination**

Base information was acquired from Hemmera Envirochem (Hemmera), CMC Engineering (CMC), vegetation specialists, surveyors and civil engineers. Information from these documents was gathered and overlaid to form an accurate and informative picture of the site's conditions and adjacent land uses, infrastructure, and potential public areas could receive an increase in shade. This information included:

- Site existing ground contours;
- Site aerial photos, at-grade site photos showing current adjacent land use and zoning;
- CAD drawings of existing and proposed facilities;
- Rendering perspective of proposed facilities;
- Plans for new equipment, structures, and buildings,
- Elevation drawings of Main Plant area;
- Sections of proposed structures, orthophotos / satellite images in plan view of the site.

It was noted during this process that all adjacent buildings to the project site are zoned industrial, limiting any shade affects on public spaces, roads, residential lots or parks. Similarly, the adjacent industrial buildings are a sufficient distance away from the proposed new infrastructure, resulting in an expected low shade impact and minimal (if any) reduction in direct sunlight received at these adjacent buildings.

### **5.2 Desktop Study**

A literature review of local and regional land use policies, environmental guidelines, PMV standards and BC visual Quality Objective Guidelines was conducted. As-built drawings of the proposed new infrastructure provided by CMC were reviewed. Aerial photos, orthophotos and Google Maps were used to study the immediate and surrounding areas, buildings, uses and vegetation that might be affected by the proposed infrastructure.

### **5.3 Site Reconnaissance**

Visits of the site, adjacent properties and the surrounding area served to review existing conditions and helped to confirm and identify adjacent land-uses and properties, potential

locations for public gatherings, community gardens playgrounds or other uses that may be negatively affected by shade. Site reconnaissance is an important part of information gathering and 'ground truthing' to assess the the accuracy of the base information and desktop studies. Site visits of the site, adjacent properties and the surrounding area occurred on October 27, 2015 and July 27, 2016. The purpose of these visits was to review existing site conditions, confirm adjacent land-uses, identify potential buildings or infrastructure close enough to the Project site that may be affected by increased shade. Existing vegetation adjacent to the Project site was also inspected (from the Project Site) for potential reduced direct sunlight due to shade thrown from the proposed new facilities.

It was confirmed during both site visits that the surrounding land use is exclusively industrial, with no public roads, parks, paths, community assets, public gathering spaces or residential areas close enough to be affected. It was also confirmed that due to the nature of industrial sites, there were no concerns of impacted vegetation (through loss of direct sunlight) in areas adjacent to the site due to the proposed facilities.

#### **5.4 Preparation of Shade Study Graphics: 3D Shadow Modelling**

A 3D model (provided by CMC) was imported into CAD based drawings (Vectorworks). Shadow settings were then applied to the model on the dates required of the PMV PERG during 3 time periods at 9am, 12pm, and 3pm:

- Spring Equinox (March 21)
- Summer Solstice (June 21)
- Fall Equinox (September 21)
- Winter Solstice (December 21)

The shade study graphics were completed through the following process:

1. Exported 3-dimensional design model from AutoCAD into CAD-based software (Vectorworks);
2. Simplified the model to remove unnecessary elements (i.e. interior and underground features);
3. Exported an initial base image of the model without shadows;
4. Applied shadow settings on the location of the site according to the requested dates and times in the PMV PERG (July 2015).
5. Overlay the model and various shadow settings onto the base orthophoto, to scale.
6. For clarity, enhanced contrast of shadows and proposed infrastructure in Photoshop.

## **6. Shade Impact Study - 3D Shadow Modelling**

Shade impact renderings indicate where shadows footprints by the proposed Project during four time periods of the year: the summer solstice (June 21), winter solstice (December 21), spring equinox (March 21) and fall equinox (September 21) as shown in Figures 13-16. During solstice the sun reaches its highest or lowest point in the sky and during equinox the sun is aligned with the equator. Different shadows are created as a result of the sun's position relative to the equator and the study covers the range of sun's movements during the year. Note that the height of the sun is the same during the spring and fall equinox, so they are combined in one shade rendering (Figure 16).

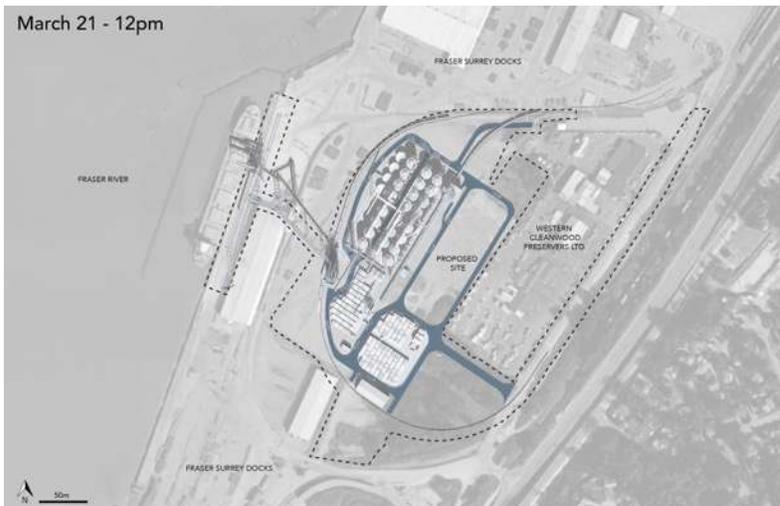
Shade studies were also created to show how shadows are created as the sun rises and sets throughout the day at 9am, 12pm, and 3pm to show the resulting shadow that would be cast from the structures onto the site and surrounding area. These are shown as Figure A, B, and C respectively for each time period of the year.

See **Figures 13-16** for accurate representations of the shadows cast by the proposed facilities onto the site and surrounding areas.

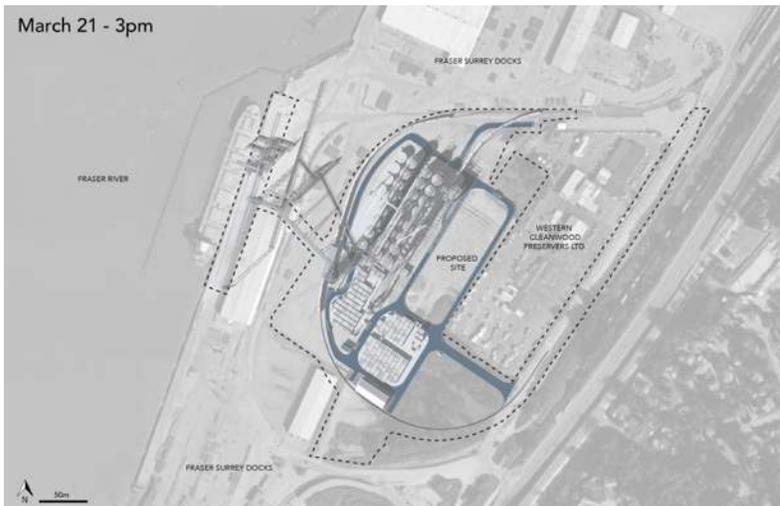
**FIGURE 13A - MARCH 21, 9AM**



**FIGURE 13B - MARCH 21, 12PM**



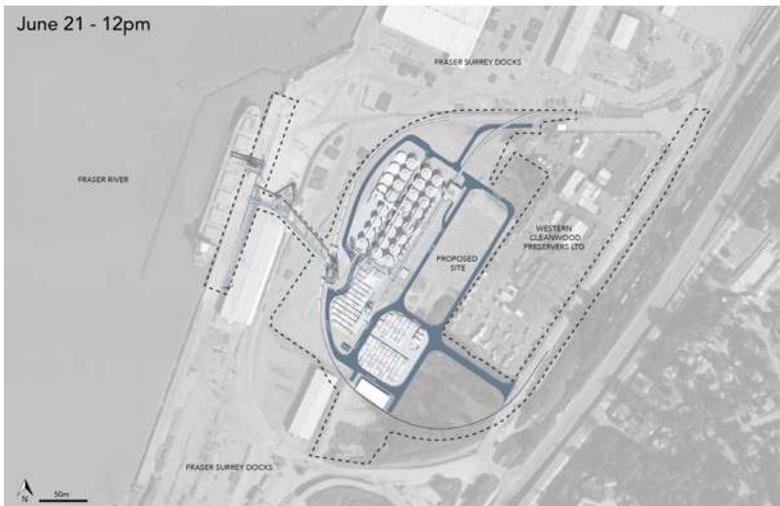
**FIGURE 13C - MARCH 21, 3PM**



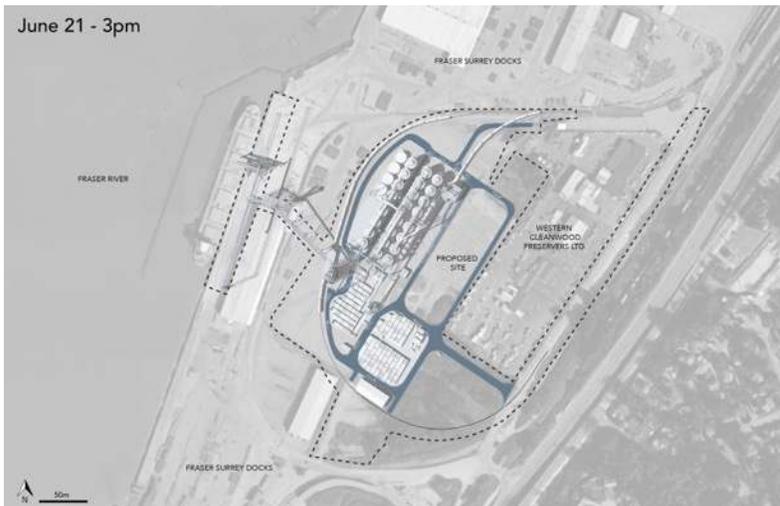
**FIGURE 14A - JUNE 21, 9AM**



**FIGURE 14B - JUNE 21, 12PM**



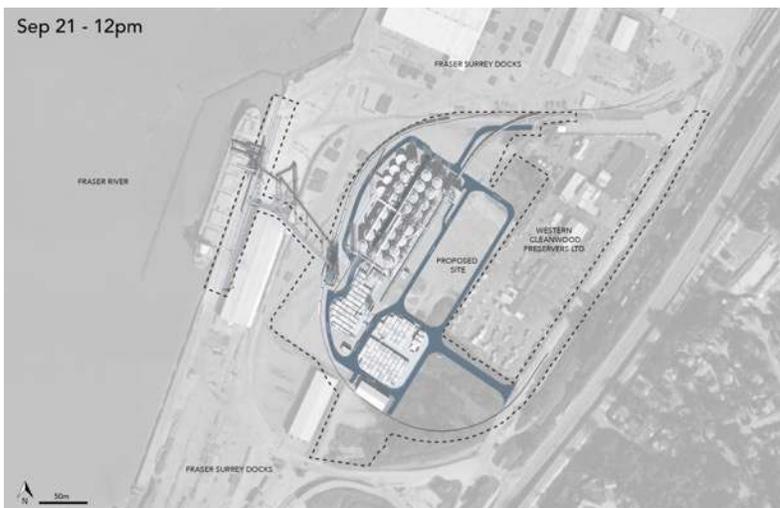
**FIGURE 14C - JUNE 21, 3PM**



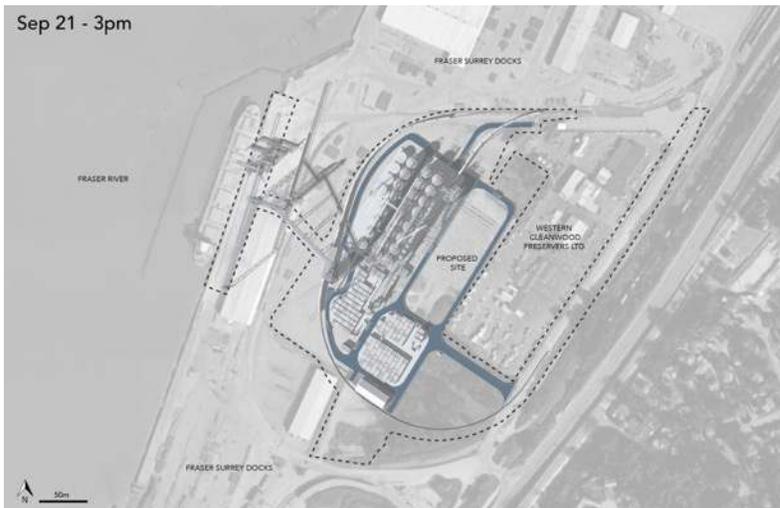
**FIGURE 15A - SEPTEMBER 21, 9AM**



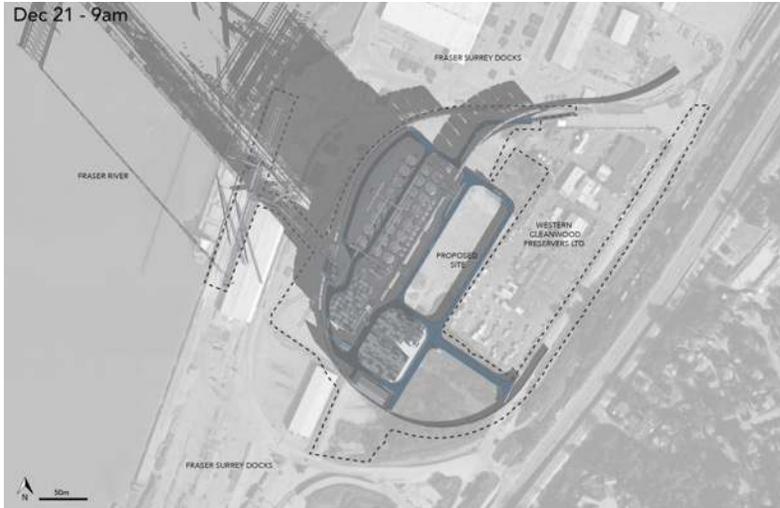
**FIGURE 15B - SEPTEMBER 21, 12PM**



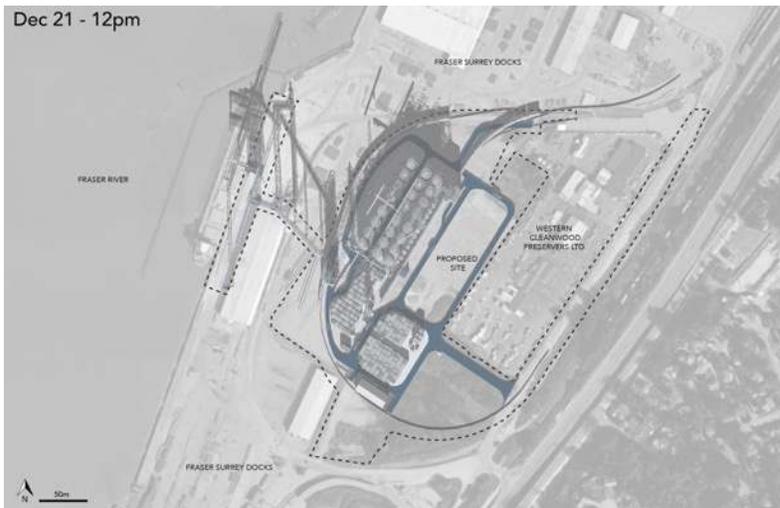
**FIGURE 15C - SEPTEMBER 21, 3PM**



**FIGURE 16A - DECEMBER 21, 9AM**



**FIGURE 16B - DECEMBER 21, 12PM**



**FIGURE 16C - DECEMBER 21, 3PM**



## **7. Shade Study Impact Assessment and Recommendations**

In summary, the shade impact renderings and 3D shadow models indicate that the proposed Project is sufficiently far from the surrounding residential communities and the road such that there is little to no impact caused by shadows to the public. The renderings also shows that the adjacent industrial site to the northeast is generally unaffected by shade early Spring to late Fall; however, this site is somewhat affected by the shade caused by the new silos around the time of the winter solstice (December 21), particularly in the late afternoon and evening as the sun migrates to the west, as seen in Figures 14a and 14c. However, these effects, given the nature of the industrial zone in this area, are considered minimal, and do not require mitigation against potential shade impacts.

## **8. Conclusion**

Based on the graphic renderings and simulations contained herein, the proposed new Fraser Grain Terminal Export Facility adheres to the guidelines set out in PERG VS 2015. The Project is consistent with existing land uses and increases efficiencies and productivity of PMV industrial land.

In general, the proposed new Fraser Grain Terminal Export Facility will have minimal impact on views from the surrounding communities. To the south and west of the site, existing mature tree stands form a natural vegetative screen to the proposed facilities. To the east, the views are more open to the project site; however, the existing industrial use and infrastructure predominates in this area, and is similar to the proposed infrastructure in terms of skyline, massing and building materials. As such, the views to the project site would not be adversely affected. The most affected views to the site are from the north, along the New Westminster and Queensborough water fronts facing south and south west. Recommendations on techniques to mitigate adverse visual impacts have been discussed in this report for key public, tourist and residential locations in this area. In certain areas where these mitigation techniques are not applicable or desired, an alternative approach is to celebrate the rich industrial heritage of the Fraser River through education, child play, interpretive signage and public art.

Likewise, the shade impact on the site and surrounding areas would be minimal, given the current industrial land-use zone surrounding the site, as well as the large distances from the site to any public place, roadway, pathway, gathering space or residence. It is important to note that the materials and sizes of the proposed elevators, storage structures, and rail ramps are consistent with prior use on the site and surrounding industrial and port activity, and are not viewed as a negative effect on the Project.

Study findings produced and analyzed in this View and Shade Study Report will be submitted to Port Metro Vancouver for approval. Subsequently, a public consultation component may follow where information is shared with the public. Input may be sought from the public with regard to further mitigation strategies and techniques.

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## **9. Statement of Limitations**

This report has been prepared by Enns I Gauthier Landscape Architects (EIG), based on fieldwork conducted and renderings produced by EIG, for the sole benefit and exclusive use of Parrish & Heimbecker (P&H) Fraser Grain Terminal Export Facility and Hemmera Envirochem Ltd. (Hemmera) The material in it reflects EIG's best judgement in light of the information available to it at the time of preparing this Report. Any use that a third party makes of this Report, or any reliance on or decision made based on it, is the responsibility of such third parties. EIG accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this Report.

EIG has performed the work as described above and made the findings and conclusions set out in this Report in a manner consistent with the level of care and skill normally exercised by members of the landscape architecture and planning profession practicing under similar conditions at the time the work was performed.

This Report represents a reasonable review of the information available to EIG within the established Scope, work schedule and budgetary constraints. The conclusions and recommendations contained in this Report are based upon applicable legislation existing at the time the Report was drafted. Any changes in the legislation may alter the conclusions and /or recommendations contained in the Report. Regulatory implications discussed in this Report were based on the applicable legislation existing at the time this Report was written.

In preparing this Report, EIG has relied in good faith on information provided by others as noted in this Report, and has assumed that the information provided by those individuals is both factual and accurate. EIG accepts no responsibility for any deficiency, misstatement or inaccuracy in this Report resulting from the information provide by those individuals.

The liability of EIG to P&H and Hemmera shall be limited to injury or loss caused by the negligent acts of EIG. The total aggregate liability of EIG related to this agreement shall not exceed the lesser of the actual damages incurred, or the total fee of EIG for services rendered for this project.