

Columbia Containers Alternatives Assessment Report

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1.0 INTRODUCTION

Columbia Containers Ltd. has been successfully operating a grain transloading facility at 2775 Commissioner Street in Port Metro Vancouver's (PMV) South Shore Trade Area for more than 40 years. To remain competitive in the global market Columbia Containers is modernizing and rebuilding their facility (the Project).

The Project, which requires a permit from PMV, has four components:

- Decommission and remove the secondary system, stores facility and workshop.
- Build a modern, efficient and compact transloading facility to replace the aging grain elevator at a new location slightly north (toward the water) and west of the current grain elevator, excavate new loading pits, and replace previously removed grain storage silos and install one new silo.
- Move the retaining wall on the foreshore at the 'bight' approximately 20 feet to the north, accommodating PMV's realignment of Commissioner Street, part of the South Shore Corridor Project.
- Construct a new two-storey office building at the west end of the property (land lease held by Columbia Containers) to replace current office trailers.

Columbia Containers retained Hemmera Envirochem Inc. (Hemmera) to prepare this report as part of a broader role as environmental advisor for the Project. The purpose of the alternatives assessment is to:

- Document Columbia Containers' rationale for site selection and project configuration with respect to the constraints of the lands held by Columbia Containers;
- Summarise the alternative means for designing the project that were considered;
- To assist in the application for required permit; and,
- To support community information sharing and the consultation processes.

2.0 BACKGROUND

The Columbia Containers site is located within areas classified as green and yellow in the East Vancouver Port Lands (EVPL) Area Plan; requiring at a minimum conditional approval with consideration of mitigation to minimise effects (East Vancouver Port Lands Working Group 2007). The Columbia Containers site is zoned Port Terminal in the proposed Port Metro Vancouver (PMV) Land Use Plan.

In 2010 Port Metro Vancouver issued a request for expressions of interest to redevelop the Terminal Docks, the area containing Columbia Containers' operations at the time and properties to the west. Columbia Containers' submission to occupy and develop the site proposed a "full-service common terminal facility offering transloading, depoting, freight forwarding, logistics, and bulk loading services to meet anticipated market growth in board grains, pulses, seeds, and animal feed through the Asia-Pacific Gateway" (Columbia Containers 2010). The proposal was accepted by PMV, and a 30-year lease was granted.

Columbia Containers' modernisation and redevelopment plans outlined in the expression of interest include commitment to ensure uninterrupted service to customers, suppliers, and shipping lines by using existing legacy infrastructure throughout the construction process, and to minimize level-crossing congestion on Commissioner Street for the benefit of residents as well as other port users (Columbia Containers 2010).

As a first phase of modernisation and redevelopment, Columbia Containers re-grading the entire site, added new railway tracks and a redesigned rail and truck entrance in 2010.

In 2011 PMV announced plans for the South Shore Corridor Project, one of two high priority projects for the South Shore Trade Area, identified by Port Metro Vancouver, the City of Vancouver, and Transport Canada. A key goal for the SSCP is to "enhance port operations and provide for future rail capacity improvements as international trade continues to grow" (PMV 2014). The South Shore Corridor Project includes realigning Commissioner Street and will require some land currently occupied by Columbia Containers. The South Shore Corridor Project is also consistent with the EVPL Area Plan's Corridor Management Plan which outlines current strategies for management of road and rail improvements for Commissioner Street and recommended widening of Commissioner Street to improve traffic flow and reduce noise and air emissions (East Vancouver Port Lands Working Group 2007).

3.0 METHODS

This alternatives assessment report outlines Columbia Containers' decision-making process and presents the alternative design solutions considered for the Project with respect to Columbia Containers' commitments to PMV for redevelopment of the Terminal Docks site and PMV's South Shore Corridor Project.

To document the alternative and proposed Project configurations a number of methods were used:

- Review of the selection decision making process with respect to the EVPL Area Plan, site limitations and engineering constraints,, and
- Interviews with Columbia Containers managers, and the engineers for the proposed modernisation project including:
 - Columbia Containers' CEO, Stefan Ferrario – Columbia Containers perspective (Ferrario S., Columbia Containers 2014); and,
 - Nu-Westech Engineering Ltd. Process/Mechanical Lead, Rae Carroll – Project engineering (Carroll R., Nu Westech Ltd. 2014).

The preferred Project design was selected following a decision making process outlined in **Section 4.0 Results**.

4.0 RESULTS

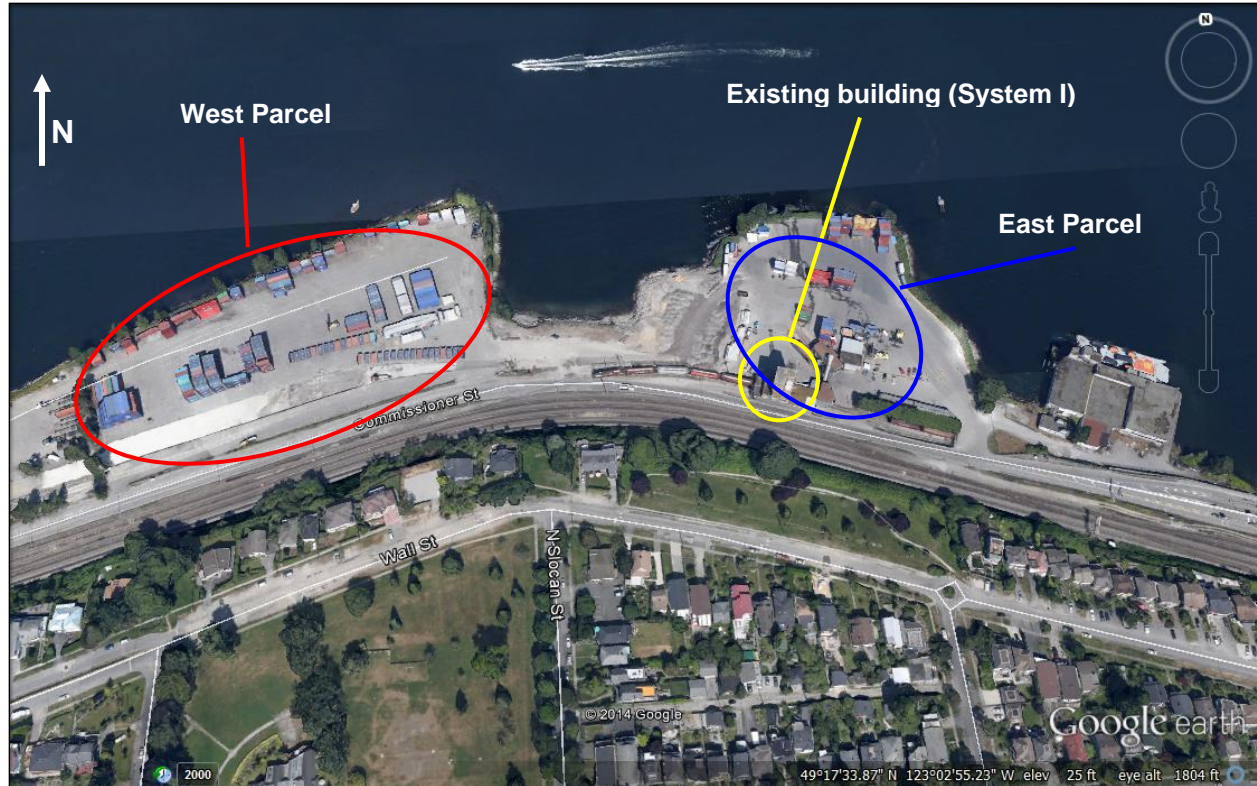
4.1 SITE LIMITATIONS

The land parcels and site layout (**Figure 1**) constrain and limit the options for the modernization, as follows:

Accessibility within the site – The Columbia Containers property is disjointed and narrow, with the east and west parcels separated by a marine area and connected only by a confined and narrow corridor. The narrow corridor was re-graded in 2011 to join the two portions of land. This portion of the property is further constrained by the design of the South Shore Corridor Project, which will expand Commissioner Street northward into land occupied by Columbia Containers current operations. Efficient truck movement within the site, to avoid the current use of Commissioner St and for reduced noise and air emissions, requires that space is provided for turning and two-way traffic. This requirement constrains the design and requires concessions to balance effects.

Rail and truck staging requirements – the east parcel (blue circle in **Figure 1**) does not have sufficient length to accommodate efficient staging of large trucks, rail cars and associated infrastructure, so these facilities must be provided on the west land parcel (red circle in **Figure 1**).

Vertical and horizontal footprint of the new grain elevator – When determining options for the locations of proposed grain elevator and silo infrastructure on the east parcel, Columbia Containers considered the EVPL Area Plan provisions, and prioritized configurations that would minimize the introduction of new visual impacts and to not increase the obstruction of view corridors compared with the existing structures. The location and orientation of infrastructure on the site affects viewsheds; infrastructure that is located farther from the escarpment (farther to the north) and is oriented east-west is more visible than infrastructure close to the escarpment and oriented north-south.



Source: Google Earth.

Figure 1 Existing site and infrastructure

4.2 PROJECT REQUIREMENTS AND ENGINEERING CONSTRAINTS

The Project includes decommissioning and removing the System II (secondary support system), storage facility and workshop; excavating new loading pits; constructing a replacement modern, efficient and compact elevator facility; reinstating grain storage silos and adding one new silo; and relocating the retaining wall on the foreshore and a two-story office building. **Figure 2** shows the proposed layout of the new elevator and storage facilities with alternate configurations for the proposed System I (rail car shed, truck shed and elevator) and silos.

For the infrastructure to meet the operating demands of the Project, multiple operational constraints needed to be considered:

- Continuous unidirectional traffic flow from west to east flow;
- Efficient truck and rail car staging; and
- Elevator conveyor and silo design considerations.

NOTE: Identifying circles in **Figure 2** are discussed in the pages that follow.

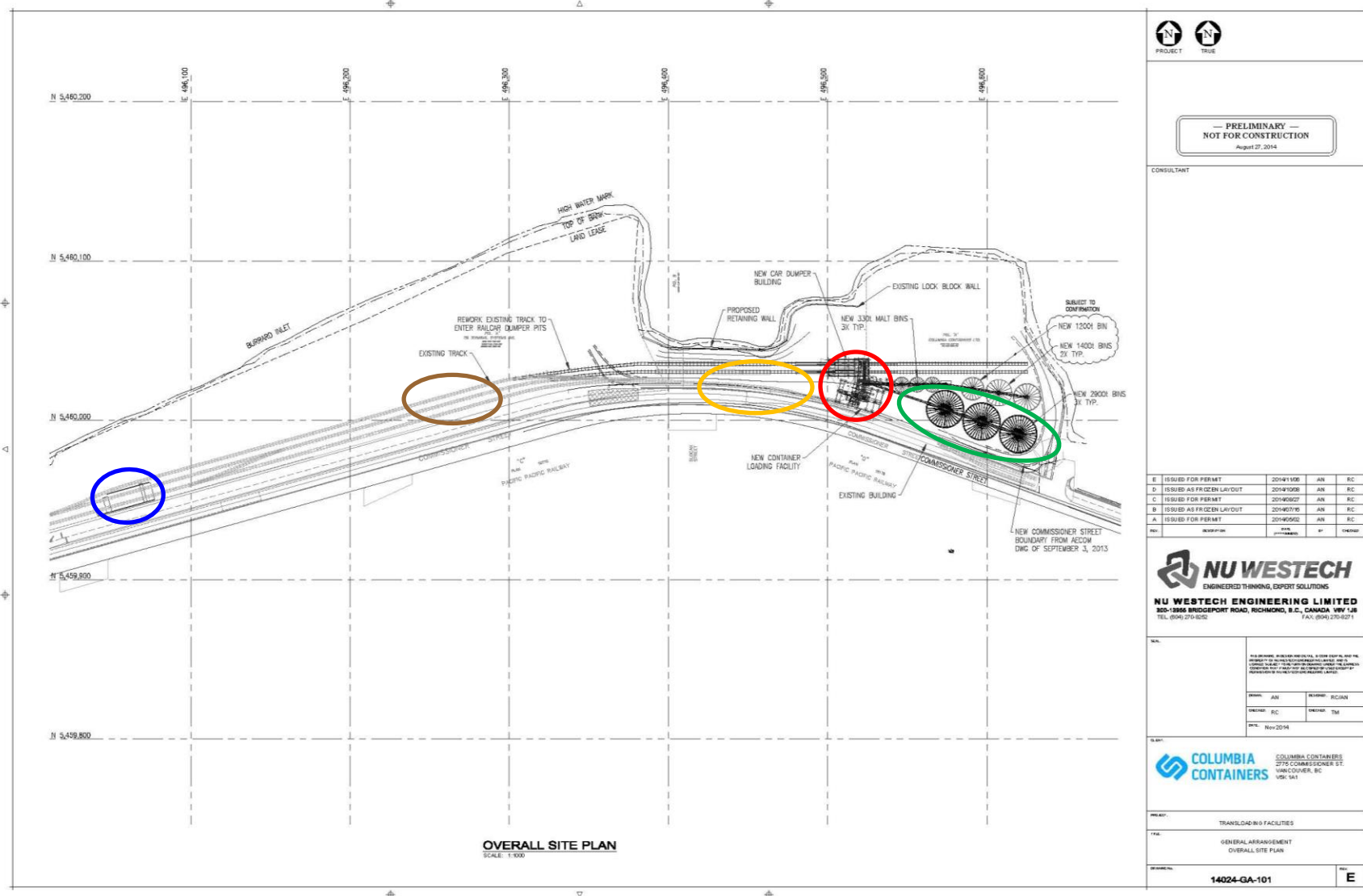


Figure 2 Proposed project layout and facilities locations with alternate configurations for the proposed system 1 and silos indicated (Nu Westech Engineering Ltd, 2014)

4.2.1 Continuous Unidirectional Traffic Flow

The Project design requires unidirectional flow of traffic to reduce congestion within the site, and at site access points. Countercurrent flow of traffic would require additional space within the Project site and would restrict access to vehicles coming to and leaving the site, potentially causing interactions with traffic on Commissioner Street. Countercurrent traffic flow also produces more truck movements, and by extension more noise and air emissions. Unidirectional flow reduces the space allotment required for roadways within the site and allows the Project to efficiently regulate access to the site.

One alternative configuration that was considered was to relocate the elevator to the center of the property (brown circle in **Figure 2**). However this layout does not allow for continuous unidirectional flow of traffic and reduces the ability of the site to be able to accommodate sufficient staging of transportation capacity of product in trucks and rail cars. This layout would require more switching inside Columbia Containers' property, which would create new noise impacts for the surrounding neighbourhood and significantly reduce the remaining area available for container storage. As a result, this layout was deemed inefficient and not carried forward. Similarly, orienting the silos north – south would take up too much room on the narrow site, and prevents continuous unidirectional traffic flow.

4.2.2 Efficient Truck and Rail Staging

Efficient staging of truck and rail cars is essential to effective operation of the facility. Staging of rail cars and trucks requires ample space to organize mobile infrastructure, and optimize space utilization and facilitate continuous flow of the trucks and rail car queues.

A second alternative configuration considered reusing the coastal loading pits location (blue circle in **Figure 2**) for the System I (track shed/elevator). However relocating the elevator to the coastal loading pits location created truck and rail car staging and flow restrictions, and required the realignment of significant lengths of rail infrastructure. This location would require significantly more rail switches each day within Columbia Containers' site, and would reduce the number of railcars that could be store on site, leading to more deliveries each day from CP, both of which would create new noise impacts. The alternate location would also result in new visual impacts to the Burrardview community, which is not consistent with EVPL Area Plan guidelines. As a result, this option was considered ineffective.

The preferred location of modernized elevator, (red circle in **Figure 2**), was shifted northwest of the existing elevator site in order to maximize efficiency of truck and rail car staging and the use of existing road and rail infrastructure. An independent view assessment confirms that this location does not impose a net increase in visual impacts.

4.2.3 Elevator Conveyor and Silo Design Considerations

Modern grain transloading facilities are built to maximize height, since grain handling uses the power of gravity for operational efficiency. There are several examples of this throughout Metro Vancouver, where the grain storage silos are in excess of 50 m in height and 150 m in length.

The design of the elevator initially proposed using a conveyor lift (i.e., a lower elevation, but long building such as used at other Burrard Inlet grain facilities) to accommodate a lower elevator height. However, based on the nature of the product, material grains require a slope of eight degrees before flow will occur. The resulting conveyor length required to reach the desired height exceeded the length that the site could accommodate. A bucket-lift elevator, with the consequent requirement for an elevator of similar height to the existing design, was selected as the option that best fit with site constraints and met Project performance objectives. An elevator of a similar height to the existing elevator has appropriate height to allow grain to flow into the government-certified scale and the waybins above and below the scale.

Given that Columbia Containers is situated in the EVPL Area, and recognizing its close proximity to residential areas, Columbia Containers opted for a constrained design, which would limit the height of the new grain elevator to no higher than the existing elevator. While minimizing view impacts, this design requires additional storage silos and rail handling equipment that affect the layout of the new facility.

In conjunction with the elevator, the Project design required storage for product. The product is to be transported to and from the grain storage silos via conveyors. Locations considered for the grain storage silos included:

- South of the existing elevator (green circle in **Figure 2**); and
- East side adjacent to northern boundary (orange circle in **Figure 2**).

The potential location on the south side of the existing elevator and proposed elevator was considered as an option to take advantage of the view angle and to provide an additional sound barrier between the grain elevator and the Burrardview community. However, in this configuration the conveyor interfered with truck traffic, resulting in inefficient truck operations that would negate any noise reduction benefits.

The location on the east side of the elevator proved optimal, as the silos would be located immediately adjacent to a stand of mature cedar trees. This location was ideal for the grain silos as it is isolated from other Project infrastructure and benefited from unobstructed conveyor access to the proposed elevator.

The silos consist of overhead conveyors, which feed the grain into the storage bins using trippers. The silos are then emptied from the bottom by a return conveyor. The silos require a certain height to ensure proper flow from the feed conveyor through the storage bins and onto the return conveyors. Columbia

Containers considered several options to reduce the height of the silos; however, further analysis showed these to be either impractical or as having the potential to create environmental issues. The options considered were:

- Below-grade (buried) return conveyors – impractical because the high water table at the site would require a sump and pump, and the moist environment would impede grain flow and possibly cause grain spoilage.
- Storage sheds (instead of silos) – rejected because it would require the use of front-end loaders, which would increase the noise (engine and back-up alarms) and air quality (exhaust) emissions associated with the facility.
- Shorter and wider silos – impractical because inadequate height will impede proper flow of the grain, and would drastically reduce the storage capacity of the silo.

4.3 ENVIRONMENTAL CONSIDERATIONS

As noted, the most limiting factor faced by Columbia Containers is space. Columbia Containers is also bound to respect the provisions of the EVPL Area Plan. Guidance in that document prescribes height thresholds, and noise, light and air quality goals. The design of the Project as presented addresses these goals. In particular, it avoids sites in the eastern portion of the property where the Wall Street embankment is lower, and the visual, light and noise impacts of the elevator and rail/track sheds would be much greater.

The previously noted design goals for continuous and unidirectional traffic flow, and efficient truck and rail staging reduce congestion within the site and on Commissioner Street, as a consequence air quality emissions and noise pollution is generally lower than they might be under the current, and other possible, configurations. It also reduces land requirements and is safer for Columbia Containers staff.

Columbia Containers considered filling the marine area between the east and west parcels to increase land space available to the Project (**Figure 1**). While technically feasible, this option would require a detailed environmental review and was considered non-viable within the timeframe required to construct prior to the Commissioner Street realignment work for the SSCP.

5.0 DISCUSSION

The Project seeks to modernize existing structures and replace previously removed structures. The proposed modernization is consistent with current and historical land uses, and with zoning for the land. Due to spatial constraints, and to achieve efficiency, safety and environmental goals for traffic flow, rail car and truck staging, storage volume and product transport, the Project configuration was limited. The most-viable options for the modernisation approximately use the existing locations of old infrastructure. Additional component locations were selected to optimize flow of traffic and product.

The objective of the EVPL Area Plan's Corridor Management Plan, and PMV's South Shore Corridor Project is to increase the efficiency of traffic flow along Commissioner Street and reduce noise and air emissions. To achieve this objective, Columbia Containers is proposing a site configuration designed to maximize flow of traffic continuously from the west parcel to the east parcel with no multi-directional flows.

By designing a similar configuration to the existing site, Columbia Containers is able to achieve the objective of modernizing the Project operations and comply with the EVPL Area Plan while avoiding new visual, noise and air quality impacts to the Burrardview community.

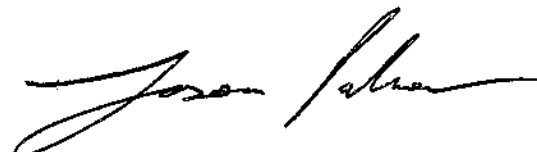
6.0 CONCLUSION

After careful consideration of Project configuration alternatives with respect to site limitations, Project requirements, and engineering constraints, the proposed configuration is the most effective at meeting Columbia Containers' objectives of site modernization while avoiding potential impacts to the Burrardview community.

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8.0 STATEMENT OF LIMITATIONS

This report was prepared by Hemmera Envirochem Inc. ("Hemmera"), based on interviews conducted by Hemmera, for the sole benefit and exclusive use of Columbia Containers Ltd. The material in it reflects Hemmera's best judgment 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. Hemmera 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.

Hemmera 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 environmental science profession practicing under similar conditions at the time the work was performed.

This Report represents a reasonable review of the information available to Hemmera 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, Hemmera 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. Hemmera accepts no responsibility for any deficiency, misstatement or inaccuracy in this Report resulting from the information provided by those individuals.

The liability of Hemmera to Columbia Containers Ltd. shall be limited to injury or loss caused by the negligent acts of Hemmera. The total aggregate liability of Hemmera related to this agreement shall not exceed the lesser of the actual damages incurred, or the total fee of Hemmera for services rendered on this project.