APPENDIX G

Highway 17 Corridor Improvement Project – Results of Pre and Post Project Noise Monitoring
Attn: Norm D’Andrea, P. Eng.

Dear Mr. D’Andrea,

Regarding: **Highway 17 Corridor Improvements Project – Results of Pre- and Post-Project Noise Monitoring**

Further to our proposal of March 7th, 2008, I provide herein the results of noise monitoring performed in regards to the Highway 17 Corridor Improvements Project. The Vancouver Port Authority (VPA), in cooperation with the BC Ministry of Transportation (MoT), is proposing road improvements on Highway 17 and the Ladner Interchange to mitigate the impacts of increased vehicle traffic associated with Deltaport Third Berth Project. There are two main elements to the proposed physical works: (1) extending the Highway 17 HOV lane in the vicinity of the Ladner Trunk intersection; and (2) modifications to the eastbound on-ramp to Highway 99 at the Ladner Interchange.

The noise monitoring was carried out over two separate periods, one in May 2008 (pre-project) and the other in Dec 2008 (post-project), at several locations near the intersection of Highway 17 and Ladner Trunk Rd. The purpose of the monitoring was to determine what, if any, effects the project has had on daily average community noise levels. This report describes the methodology employed during the noise monitoring, presents the measured pre- and post-project noise levels and discusses the outcomes.
NOISE MONITORING METHODOLOGY

Equipment

The continuous sound monitoring was conducted using four Larson-Davis Model 820 and 812 Community Noise Analyzers. These digital instruments comply with ANSI S1.4 [1983] standards for Type 1 Sound Level Meters and are capable of sampling the ambient sound level many times per second and storing the resulting sound level data for subsequent analysis and display.

Dates of Monitoring

From May 14 to 16, 2008 the pre-project noise monitoring was conducted at six residential locations near the intersection of Highway 17 and Ladner Trunk Rd for periods of one to forty-eight hours. From December 2 to 3, 2008 the post-project noise monitoring was conducted at five of the same six residential locations for periods of one to twenty-four hours. During the post-project monitoring it was not possible to measure for longer than twenty-four hours due to poor weather conditions (i.e. wet roads).

Monitoring Locations

Figures 1 and 2 in Appendix B show the approximate locations of the six monitoring sites numbered from north to south.

Description of Noise Monitoring Sites

The six noise monitoring sites were located at residences to the northwest and southeast of the intersection of Highway 17 and Ladner Trunk Rd. The sound level meter (SLM) microphones were mounted on tripods at a height of approximately 1.7 m above ground in the back or front yards of the residences. It should be noted that Sites 1 and 2 are currently shielded from some Highway 17 traffic noise by a concrete noise wall mounted on an earth berm. The berm/wall begins at the intersection of Highway 17 and Ladner Trunk Rd and extends northward along Highway 17 for approximately 200 m at which point it diminishes and eventually terminates. The noise wall, however, extends for approximately an additional 450 m to the north. Site 6 is also somewhat shielded from Highway 17 traffic by an earth berm that extends from the north end to the south end of Hawthorne Pl.

Table 1 (over page) provides site addresses, setback distances from either Highway 17 or Ladner Trunk Rd or, setback distances from the intersection of Highway 17 and Ladner Trunk Rd and indicates whether or not the site is shielded from traffic noise by a wall and/or earth berm.

1 Site 4 was located in Association Park, adjacent to the residence at 4729 60B St.
Table 1; Highway 17 Corridor Improvements Project - Noise Monitoring Sites

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Site Address</th>
<th>Approx. Setback from Highway 17 or Ladner Trunk Rd (m)</th>
<th>Approx. Setback from Intersection of Highway 17 and Ladner Trunk Rd (m)</th>
<th>Noise Wall and/or Berm?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5983 49 Ave</td>
<td>45 (Hwy 17)</td>
<td>200</td>
<td>noise wall on berm</td>
</tr>
<tr>
<td>2</td>
<td>4852 59A Ave</td>
<td>45 (Hwy 17)</td>
<td>130</td>
<td>noise wall on berm</td>
</tr>
<tr>
<td>3</td>
<td>5926 48A Ave</td>
<td>30 (Ladner Trunk Rd)</td>
<td>160</td>
<td>diminishing berm</td>
</tr>
<tr>
<td>4</td>
<td>4729 60B St¹</td>
<td>70 (Hwy 17)</td>
<td>180</td>
<td>no</td>
</tr>
<tr>
<td>5</td>
<td>4690 60B St</td>
<td>135 (Hwy 17)</td>
<td>260</td>
<td>no</td>
</tr>
<tr>
<td>6</td>
<td>4572 Hawthorne Pl</td>
<td>50 (Hwy 17)</td>
<td>470</td>
<td>berm</td>
</tr>
</tbody>
</table>
RESULTS OF NOISE MONITORING

The results of the pre- and post-project noise monitoring are presented in Table 2. This table provides the address/location, dates and durations of each monitoring session and the daily average noise exposures obtained at each site, expressed in terms of $L_{eq}(24)$ (see Appendix A for a definition of the term $L_{eq}(24)$. Also, see Appendix C for graphical level histories at Sites 1, 2, 3, and 6 that compare pre- and post-project noise histories).

Table 2; Highway 17 Corridor Improvements Project - Results of Pre- and Post-Project Noise Monitoring

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Site Address / Location</th>
<th>$L_{eq}(24)$ (dBA)</th>
<th>Pre-project (2008)</th>
<th>Post-project (2008)</th>
<th>Duration (hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5983 49 Ave</td>
<td>-</td>
<td>56.6</td>
<td>55.7</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4852 59A Ave</td>
<td>56.7</td>
<td>-</td>
<td>56.8</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>5926 48A Ave</td>
<td>58.1</td>
<td>59.1</td>
<td>57.9</td>
<td>48</td>
</tr>
<tr>
<td>4</td>
<td>4729 60B St(^1)</td>
<td>-</td>
<td>59.8(^2)</td>
<td>59.2(^2)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4690 60B St</td>
<td>57.5</td>
<td>57.9</td>
<td>-</td>
<td>48</td>
</tr>
<tr>
<td>6</td>
<td>4572 Hawthorne Pl</td>
<td>56.6</td>
<td>57.0</td>
<td>56.5</td>
<td>48</td>
</tr>
</tbody>
</table>

1. The Sound Level Meter (SLM) mic was located in Association Park, just to the south of the residence located at 4729 60B St.
2. The $L_{eq}(24)$’s were estimated from one-hour measurements through comparison with the noise histories measured at Sites 5 and 6. The resulting $L_{eq}(24)$ was then further adjusted for the difference in setback distances from the highway of the SLM mic and the residence at 4729 60B St.
DISCUSSION OF RESULTS AND CONCLUSIONS

From Table 2, it can be seen that pre-project noise levels, or $L_{eq}(24)$’s, at the six monitoring sites varied from 56.6 to 59.8 dBA. At the three sites where forty-eight hour measurements were performed from May 14 to 16th (Sites 3, 5 and 6) it can be seen that the day-to-day variations in $L_{eq}(24)$ were between 0.4 and 1.0 dBA. Such variations are typical for residences located adjacent to highways and are consistent with measurements performed by Wakefield Acoustics Ltd. at residences adjacent to other British Columbia highways and freeways.

Post-project $L_{eq}(24)$’s are seen to have been much the same as the pre-project $L_{eq}(24)$’s, varying from 56.5 to 59.2 dBA. In fact, it can be seen that the differences between the May 14-15 (pre-project) and Dec 2-3 (post-project) $L_{eq}(24)$’s at the same site are between 0.1 and 0.2 dBA; less than the measured pre-project day-to-day variations of the May 14-15 and May 15-16 $L_{eq}(24)$’s.

Although there may be some differences in traffic volumes between May and December, it would take a difference of over 25% to change traffic noise levels by more than 1 dBA and thereby exceed typical day-to-day variations. Therefore, the results of the pre- and post-project noise monitoring indicate that the Highway 17 Corridor Improvements Project has not resulted in a measurable change in community noise levels at residences in the vicinity of the intersection of Ladner Trunk Rd and Highway 17.

I trust this has provided all the information you require at this time. Please call me at 370-9302 if you should have any questions regarding this report or the findings herein.

Yours truly,

Wakefield Acoustics Ltd.

Andrew Williamson, E.I.T.  C. W. Wakefield, P.Eng., President
Appendix A
Definitions of Noise Metrics
\( L_{eq}(24) \)
- the steady sound level that, over a specified period of time (often 24-hrs), would produce that same sound energy exposure as would the actual fluctuating sound level

\( L_{dn} \)
- A variant of the \( L_{eq}(24) \) is the Day-Night Average Noise Level, or \( L_{dn} \). Like the \( L_{eq}(24) \), the \( L_{dn} \) is an energy-averaged descriptor of daily noise exposure and is expressed in dBA. However, in computing \( L_{dn} \), all noise levels occurring between 22:00 and 07:00 hours are increased by 10 dBA to reflect the greater sensitivity of residential communities to noise at night.

\( L_d \)
- The Day Average Noise Level, or \( L_d \), is the steady sound level that, over the specified day-time period (7:00 - 22:00), would produce that same sound energy exposure as would the actual fluctuating sound level

\( L_n \)
- The Night Average Noise Level, or \( L_n \), is steady sound level that, over the specified night-time period (22:00 - 7:00), would produce that same sound energy exposure as would the actual fluctuating sound level

\( L_{MAX} \)
- the maximum instantaneous sound level recorded over a specified period of time.

\( L_1 \)
- the sound level that is exceeded for 1% of a specified period of time

\( L_{10} \)
- the sound level that is exceeded for 10% of a specified period of time

\( L_{50} \)
- the sound level that is exceeded for 50% of a specified period of time

\( L_{90} \)
- the sound level that is exceeded for 90% of a specified period of time
Appendix B
Site Maps
Figure 1; Approximate Locations of Noise Monitoring Sites (northwest quadrant)
Figure 2; Approximate Locations of Noise Monitoring Sites (southeast quadrant)
Appendix C
Noise Level Histories
Hwy 17 Corridor Improvements Project
Pre- and Post-Project Noise Monitoring

Site 1; 5983 49 Ave, May and December, 2008
(noise levels in 15 minute intervals)

May 15-16, Leq(24) = 56.6 dBA
Dec 2-3, Leq(24) = 55.7 dBA
May 14-15, Leq(24) = 56.7 dBA
Dec 2-3, Leq(24) = 56.8 dBA
Results of Pre- and Post-Project Noise Monitoring

Site 3; 5926 48A Ave, May and December, 2008
(noise levels in 15 minute intervals)

May 14-15, Leq(24) = 58.1 dBA
May 15-16, Leq(24) = 59.1 dBA
Dec 2-3, Leq(24) = 57.9 dBA
Results of Pre- and Post-Project Noise Monitoring

Wakefield Acoustics Ltd.
Appendix C