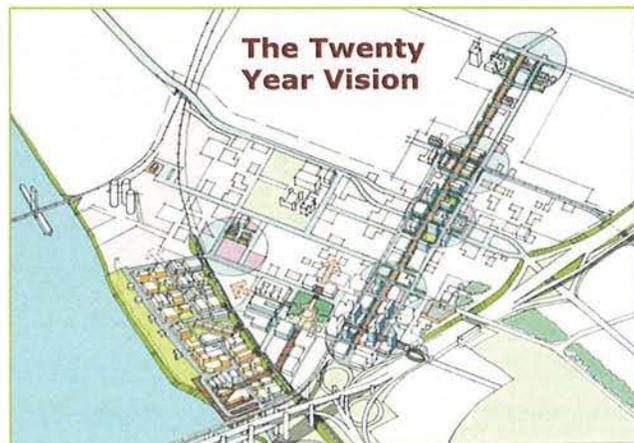


**FINAL SUPPLEMENTAL  
ENVIRONMENTAL IMPACT STATEMENT**

for the

**VANCOUVER CITY CENTER VISION SUBAREA PLAN**



November 2006



EX 0174-TSS

## CHAPTER 5: NOISE

### INTRODUCTION

There will be two potential noise issues for the Vancouver City Center Vision (VCCV) Subarea Plan. One issue is the potential noise increase that development of the area may cause. The other is the acceptability of the existing noise environment as a compatible location for the proposed development.

All noise measurements or standards used in this document are sound pressure levels stated in terms of decibels (dB) using an A-weighting (dBA). Noise levels stated in terms of dBA approximate the response of the human ear by filtering out some of the noise in the low and high frequency ranges that the ear does not detect well. The dBA weighting is used in most environmental ordinances and standards. The minimum change in sound level that can be detected by most people is about 3 dBA. An increase of 10 dBA is usually perceived as a doubling of loudness. Sound levels produced by common noises are listed in Table 5-1.

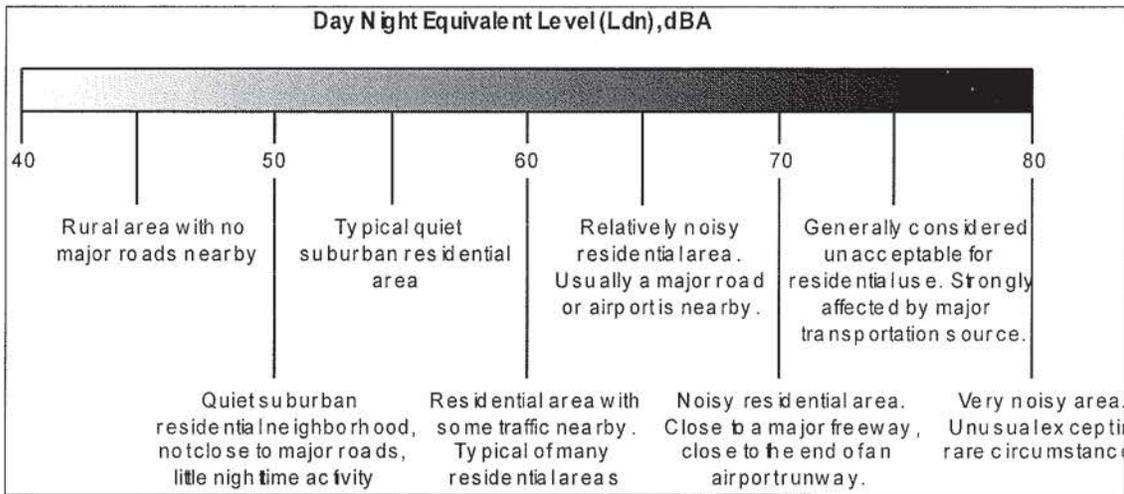
**Table 5-1. Sound Levels of Common Sources and Noise Environments\***

Thresholds/Noise Sources	Sound Level (dBA)	Subjective Evaluations	Possible Effects on Humans
Human threshold of pain	140	Deafening	Continuous exposure can cause hearing damage
Carrier jet takeoff (50 ft)			
Siren (100 ft)	130		
Jackhammer, power drill			
Loud rock band	120		
Auto horn (3 ft)		Very loud	
Busy video arcade	110		
Baby crying			
Lawn mower (3 ft)	100	Very loud	
Noisy motorcycle (50 ft)			
Heavy truck at 40 mph (50 ft)	90	Loud	Speech interference
Shouted conversation			
Kitchen garbage disposal (3 ft)	80		
Busy urban street, daytime		Moderate	
Normal automobile at 65 mph (25 ft)	70		
Vacuum cleaner (3 ft)		Moderate	
Large air conditioning unit (20 ft)	60		
Normal conversation (3 ft)			Sleep interference
Quiet residential area	50		
Light auto traffic (100 ft)		Faint	
Library	40		
Quiet home		Faint	
Soft whisper (15 ft)	30		
Broadcasting studio	20	Very faint	
Threshold of human hearing	0-10		

\* Note that both subjective evaluations and physiological responses are continuous without true threshold boundaries. Consequently, there are overlaps among categories of response that depend on the sensitivity of the noise receivers.

Sound levels vary over time. There are several methods used to describe noise characteristics over a given time period. Energy average sound levels ( $L_{eq}$ ) are commonly used on an hourly basis to show how levels vary with time.  $L_{eq}$  sound levels are also commonly averaged over longer time periods. Statistical descriptors indicate the percentage of time that a sound level is equaled or exceeded. For example, an  $L_{25}$  of 60 dBA means that the 60 dBA level is equaled or exceeded 25 percent of the time, or 15 minutes in any one hour.

Most environmental impact assessments in the United States use  $L_{dn}$  (also referred to as DNL) to describe the community noise environment.  $L_{dn}$  is a 24-hour  $L_{eq}$  with a 10-dB penalty added to noise events occurring at night (defined as 10:00 p.m. to 7:00 a.m.). The effect of this penalty is that any event during the nighttime hours is equivalent to ten events during the daytime hours. This strongly weights  $L_{dn}$  toward nighttime noise to reflect most people being more easily annoyed by noise during the nighttime hours when both background noise is lower and most people are sleeping. Figure 5-1 illustrates typical community noise levels in terms of  $L_{dn}$ .



**Figure 5-1. Day Night Equivalent Level ( $L_{dn}$ ), dBA**  
 Source: FTA 1995

**EXISTING CONDITIONS**

A review of previous studies and information relating to existing noise levels in the VCCV Subarea was conducted. Studies investigated were the Port of Portland’s ongoing community noise monitoring and the Portland International Airport (PDX) Noise Compatibility Study Part 150 update, the Port of Vancouver’s Columbia Gateway Environmental Impact Statement (EIS), and the Esther Short Subarea Redevelopment Plan. In addition, noise measurements were performed within the Subarea and in other locations with potential traffic noise impacts. Existing noise sources affecting downtown Vancouver and the Subarea are aircraft operating from

the Portland International Airport and Pearson Airpark, traffic on Interstate 5 (I-5) and the local street system, rail traffic on the Burlington Northern Santa Fe (BNSF) lines, industrial sources, and general urban noise sources such as building utilities and voices. Two of the major contributors to the VCCV existing noise environment - aircraft and train horns - are discussed here, as well as measured noise levels in the downtown area.

### **Aircraft Noise**

The project area is affected by both the Portland International Airport and Pearson Airpark. The Port of Portland maintains permanent community noise monitoring locations throughout the Portland/Vancouver metropolitan areas to monitor aircraft noise. Hough School, located on W 12<sup>th</sup> Street in the VCCV Subarea is one of the Port's permanent sites. Ambient noise data from the school showed a range of 64 to 70 DNL values for the site from 6/19/2002 to 7/9/2002.

For the Federal Aviation Regulation (FAR) Part 150 Noise Compatibility Study Update (June 2005), noise exposure maps were generated indicating the 55, 65, 70, and 75 DNL contours. The existing (2001) noise exposure map shows the 65 DNL contour touching the eastern edge of the VCCV Subarea at the Columbia River's edge. Part 150 document, which considers a short-term time frame (generally 5 years), does not show an expansion of the 65DNL contour in 2008. However, the Portland International Airport Future Year Noise Analysis<sup>1</sup> report shows that the 65 DNL contour for Alternative 3 does expand in approximately 2030 when compared to the 2008 noise contours in the Part 150 document. The 65 DNL contour in the future will expand in size to include the VCCV Subarea south of Esther Short Park. The contours, existing year and future were generated without implementing advancements in aircraft technology, navigation, and air traffic control that would likely reduce the noise impacts from aircraft. The future year contour assumed that there would be an additional taxiway and an extended runway.

Smaller, privately-owned aircraft, taking off and landing from Pearson Airpark, located in the Vancouver National Historic Reserve, also contribute to the high ambient noise levels found in the VCCV Subarea. The noise contours developed for the 2001 *Pearson Field Airport Master Plan*<sup>2</sup> show the 1999 65 DNL contour extending approximately 110 feet from the west end of the runway, which is well east of the Subarea boundary. For 2020, with a slight growth (9.1 percent) in aircraft operations, the Master Plan states that the difference in the size of the noise contour is predicted to be negligible. The 65 DNL boundary on the west side will remain the same in the future: approximately 110 feet from the runway. This will be outside the Subarea boundary. Although the 65 DNL noise contours for 1999 and 2020 are outside the VCCV Subarea, the proximity of the airfield to the Subarea means that smaller privately-owned aircraft would use the VCCV Subarea airspace for approaching and departing.

<sup>1</sup>BridgeNet International, November, 2005

<sup>2</sup>City of Vancouver, October 2001

## **Train Horns**

The Federal Railroad Administration (FRA) requires that trains blow their horn at all public crossings as well as at private crossings with vehicles present. Train horns are very loud and are sounded for an extended period of time (15 to 20 seconds). Train horn noise has a long history of generating complaints in the City of Vancouver and nation wide particularly in relation to residential land use.

The project area is affected by noise generated from the BNSF train lines, particularly at crossings. A May 2005 train horn study, Railroad Horn Quiet Zone Sound Study Benefit Zone, indicated that maximum noise levels from locomotive warning horns generally range from 104 to 108 dBA  $L_{max}$  at 100 feet. This report studied sound levels from train horns in the Evergreen corridor which runs parallel to SR-14, east of the VCCV. Monitoring data from the study indicates that the average sound levels from train horns ranged from 84 to 106 dBA measured from sites ranging from 95 to 740 feet from the rail tracks. We would expect to see similar sound levels from train horns in the VCCV Subarea. Monitoring performed for this study showed  $L_{dn}$  levels of 81 to 83 dBA at a location approximately 200 feet from the BNSF Crossing at 8<sup>th</sup> Street and Jefferson.

Downtown residents have made requests to the City of Vancouver to eliminate horn use for the W 8<sup>th</sup> Street, Jefferson and W 11<sup>th</sup> Street public railroad crossing. The complaints typically are related to disturbances to sleep and outdoor entertainment. Complaints related to train horns are likely to increase as the downtown resident population increases and as train traffic increases, as is projected.

The high noise levels in the VCCV Subarea can be attributed to aircraft noise generated from PDX and Pearson Airpark, along with noise from train horns and traffic. The locations that are impacted by these high noise levels helped define the boundaries of the City of Vancouver's noise impact overlay district (for discussion on the Noise Overlay District, see Summary of Federal, State, and Local Regulations section).

## **Measured Noise Levels**

Measurements of noise levels were performed as part of this study including four 24-hour (long-term) measurements and ten short-term measurements. The results of the field monitoring are summarized below.

## **Long-term Monitoring**

Areas where the proposed zoning will change to CX (City Center) were candidates for long-term monitoring, particularly those proposed CX areas that are close to the BNSF line. The purpose of the long-term monitoring was to evaluate the existing  $L_{dn}$  levels in the area for compatibility for development of noise sensitive uses. Figure 5-2 shows the long-term monitoring sites and Table 5-2 shows the results of the monitoring.

**Table 5-2. Long-Term Ambient Noise Monitoring Results**

Monitoring Site ID	Location	Date	$L_{dn}$
A	6th Street & Grant Street	1/23/06 - 1/24/06	68
B	Columbia River Bank (Boise)	1/24/06 - 1/25/06	68

	Cascade property - bottom of Jefferson Street)		
C	Jefferson Street & Evergreen Boulevard (Creative Tile)	2/7/06 - 2/8/06 7/25/06 - 7/26/06	81 83
D	6th Street and Esther Street (Columbian Newspaper Vacant Lot)	2/8/06 -2/9/06	69

*Data Source: TW Environmental, Inc. July 2006.*

The results of the measurements support the conclusion that overall noise levels in the area are uniformly high and are typical of urban commercial/industrial areas and urban residential areas near airports. All monitored sites have  $L_{dn}$  greater than 65 dBA, which is the abatement threshold for the Noise Impact Overlay District. In addition, except for one site strongly affected by train horn noise, measured levels were similar throughout the area and are representative of noise levels for areas proposed for rezoning to allow mixed use. Any residential units built in these areas would be subject to the requirements of the Chapter 20.520 of the City of Vancouver Development Code (see following section, Summary of Federal, State, and Local Regulations for discussion).

The  $L_{dn}$  of 81 and 83 dBA at Site C (Evergreen Boulevard and Jefferson Street) is higher than the other sites and these sound levels are not appropriate for the development of certain outdoor activities. In addition, these noise levels would need be unacceptable for residential development without mitigation. Train horns are the dominant contributor of high sound levels at this site. Site C is located approximately 200 feet from the at-grade rail crossing at 8<sup>th</sup> Street and Jefferson. During the 7/25/06 – 7/26/06 monitoring period, at least 12 trains passed through the crossing during the hours of 8 a.m. to 4 p.m. Measurements at this site are representative of levels that would be expected near the other at-grade rail crossings in downtown Vancouver and indicate that sound levels on portions of the riverfront area proposed for rezoning (Columbia West Renaissance District) may not be acceptable for residential development without mitigation.

### **Short-Term Noise Monitoring**

Short-term monitoring, primarily to evaluate traffic noise impacts in areas potentially affected by traffic volume changes resulting from the Proposed Alternative, was conducted in July, 2006. Ten sites where increases in traffic volumes were predicted to be greater than 50 percent from the No Action to the Proposed Alternative were selected for monitoring. Figure 5-2 shows the locations of the short-term monitoring sites.

As of 2005, truck traffic in the downtown area has been restricted to local deliveries only. Traffic counts and vehicle class breakouts were logged during short-term monitoring and used as inputs for noise prediction modeling for screening noise impacts from VCCV Subarea roadways. Table 5-3 shows the location and monitoring results for the 10 short-term monitoring sites.

**Table 5-3. Short-Term Ambient Noise Monitoring Results\***

Site ID	Location	Date	Duration	L <sub>eq</sub> (dBA)
1	Washington Street between 4th & 5th Streets	7/26/2006	15 Mins	66
2	5th Street between Washington Street & Columbia Street	7/26/2006	15 Mins	63
3	5th Street between Washington Street & Main Street	7/26/2006	15 Mins	67
4	Broadway Street Between 7th & 8th Streets	7/26/2006	15 Mins	64
5	Columbia Way, East of I-5 Bridge	7/26/2006	15 Mins	68
6	13th Street between C Street & D Street	7/27/2006	15 Mins	61
7	Broadway Between 13th & 14th Streets	7/27/2006	15 Mins	63
8	9th Street between Main Street & Broadway Street	7/27/2006	15 Mins	75**
9	Franklin Street between 11th & 12th Streets	7/27/2006	15 Mins	60
10	13th Street between Washington Street & Main Street	7/27/2006	15 Mins	63

\*Noise measurements were recorded at mid-block, at the back of the sidewalk.  
\*\*Military aircraft (6 fighter jets departing from PDX) were noted on field log.

Data Source: TW Environmental, Inc. July 2006.

Existing noise levels at most locations are below levels that would be considered noise impacted. Site 8 was dominated by the sound contribution from military aircraft during the monitoring interval. Sound measurements at Sites 3 and 5 were dominated by ramp and I-5 freeway noise.

## **SUMMARY OF FEDERAL, STATE, AND LOCAL REGULATIONS**

There are several sets of noise regulations and guidelines that will apply to various activities in the VCCV Subarea. Federal traffic noise impact guidelines apply to noise resulting from traffic. Washington has a state regulation governing maximum environmental noise levels that is incorporated into the City of Vancouver's municipal code. The City of Vancouver has a zoning ordinance that governs additional noise mitigation required for residential uses constructed in the Noise Impact Overlay District.

### **Traffic Noise**

Traffic noise impact guidelines used by the Federal Highway Administration (FHWA) to assess if traffic noise impacts are severe enough to warrant abatement are shown in Table 5-4. Impacts are considered to occur when the exterior noise level approaches or exceeds the abatement criteria. Washington State Department of

Transportation (WSDOT) considers a noise level 1 dBA below the FHWA abatement criteria to be the impact level. Noise studies and mitigation analysis are performed for new roads or significant modifications of existing roads.

**Table 5-4. Traffic Noise Impact Guidelines by Land Use (L<sub>eq</sub> - dBA)**

Land Use - Primary Activity	Abatement Criteria	Impact Criteria
Residential, Recreation, Churches, Schools	67	66
Commercial, Industrial	72	71

### **Stationary Source Noise**

Where local development and planning agencies in Washington have not established noise ordinances specifying noise standards for various land uses, WAC Chapter 173-60 governs noise regulation. WAC 173-60-030 defines allowable noise impacts by land use. The basic designations are:

- Class A properties – Residential
- Class B properties – Commercial
- Class C properties – Industrial

Table 5-5 is taken from WAC 173-60-040 and defines noise limits for sounds originating from and impacting different classes of property.

**Table 5-5. Acceptable Noise Limits from WAC 173-60 (dBA)**

Noise Source	Receiving Property		
	Class A	Class B	Class C
Class A	55	57	60
Class B	57	60	65
Class C	60	65	70

Between the hours of 10 p.m. and 7 a.m. the noise limitations of the table shall be reduced by 10 dBA for Class A receiving properties.  
 At any hour of the day or night the noise limits in the table or footnote 1 may be exceeded for any receiving property by no more than:  
 5 dBA for a total of 15 minutes in any 1-hour (L<sub>25</sub>)  
 10 dBA for a total of 5 minutes in any 1-hour (L<sub>8,3</sub>)  
 15 dBA for a total of 1.5 minutes in any 1-hour (L<sub>2,5</sub>)

The City of Vancouver has incorporated the Washington State Noise Regulations shown in Table 5-5 into the Vancouver Municipal Code (VMC), except the residential to residential maximum allowable sound level is omitted. In addition, the VMC includes prohibitions against off-site vibration impacts that are discernible without instruments at the property line and construction activity between 8 p.m. and 7 a.m. The regulations do not apply to public streets and sidewalks, rail maintenance yards, or essential public facilities such as the interstate highway system or intercity passenger rail (VMC 20.935.030).

The City of Vancouver has a Noise Impact Overlay District zoning ordinance. The purpose of the ordinance is to require noise to be considered in the development of residential properties within the area of the City where the combined effect of aircraft, railroad, and traffic noise levels exceed normally acceptable levels for residential uses. Some of the project area falls within the boundaries of the Noise Impact Overlay District. The Columbia West Renaissance District (Boise property),

which will be rezoned from heavy industrial (HI) to city center (CX) is not included within the boundary (see discussion under Mitigation).

Within the district, the City requires the submission of a Noise Impact Reduction Plan that documents the noise levels on the property, the methods proposed to reduce unacceptable sound levels, information on consultation with noise generating source owners, a schedule showing that noise impacts will be mitigated prior to residential occupancy, and a statement acknowledging the existence of the measured noise levels. Where exterior noise levels exceed  $L_{dn}$  of 65 dBA, mitigation of interior sound levels to 45 dBA  $L_{dn}$  or less is required (City of Vancouver Development Code, Chapter 20.520).

## POTENTIAL IMPACTS

Existing noise levels in the Subarea are high; and are dominated by aircraft, freeway, and railroad noise. A noise contour screening analysis was performed for traffic noise impacts caused by the proposed action using the 66 (residential) and 71 dBA (commercial) noise contours. The goal of the analysis was to identify areas where traffic increases associated with the proposed action would have the potential to affect noise levels.

Screening level estimates of sound levels resulting from increases in traffic were made using the FHWA Traffic Noise Model (TNM), a computer-based model used for predicting sound levels. Thirty-two roadways in the VCCV Subarea with predicted increases in traffic volumes of 50 percent or greater change from the No Action to the Proposed Alternative were selected for analysis. At a change less than 50 percent, the noise level difference would generally be inaudible. Medium and heavy truck percentages of the total traffic volumes were based on assumptions derived from traffic volume and vehicle class counts during the short-term noise monitoring. Distances from roadway centerlines to residential and commercial noise impact contours were estimated. For the No Action condition, the impact criteria contours for both the residential (66 dBA) and commercial impact criteria (71 dBA) were less than 30 feet from the roadway segment centerlines (this is generally within the roadway and sidewalk area) for all roads analyzed. For the Proposed Alternative, distances from the roadway centerlines to the 66 dBA and 71 dBA contours were all less than 30 feet with the exception of two segments of the 3<sup>rd</sup> Street/SR 14 Connector. Between 3<sup>rd</sup> Street and Main the 66 dBA contour is between 30 and 40 feet from the centerline in the road and from Main to SR14, the 66 dBA contour is approximately between 40 and 50 feet from the centerline of 3<sup>rd</sup> Street. In general, the proposed action is not expected to have a substantial affect on noise levels adjacent to roads in the VCCV Subarea except along a portion of the 3<sup>rd</sup> Street and SR14 Connector. Under either of the alternatives, zoning in the 3<sup>rd</sup> Street and SR-14 area will remain CX (City Center) which allows for a mix of retail, office and housing uses.

Overall traffic volumes within the VCCV Subarea (the Proposed Alternative) are not expected to increase substantially from those forecast in the No Action Alternative; however with some of the one-way roadways being modified to accommodate two-way traffic, the traffic patterns will change.

The more probable noise impact resulting from either the Proposed Alternative or the No Action Alternative will be the development of noise impacted land for noise

sensitive uses such as residential housing, recreation areas, hotels, professional offices, educational facilities, and cultural and civic institutions in downtown Vancouver. The long-term monitoring data indicate that the northwest portion of the Columbia West Renaissance District may have sound levels too high for residential development without mitigation. Prior to development of this area for residential uses, a thorough noise evaluation and mitigation plan should be developed.

### **Proposed Alternative**

The impact screening analysis performed for VCCV local roadways indicates that noise impacts from traffic will be located less than 30 feet from the centerline along most of the roads in the downtown area. In these cases impacts from traffic noise are not expected.

The Noise Impact Overlay District zoning ordinance, VMC 20.935.030, and the WAC Maximum Environmental Noise Regulations must be complied with in the VCCV Subarea and should prevent most incompatible land uses. However, noise compatible land use planning should be implemented to enhance the quality-of-life in the VCCV Subarea.

### **No Action Alternative**

The No Action Alternative does not include the active development and rezoning of the VCCV Subarea. Therefore, this alternative would reduce the possibility of the existing noise environment being incompatible with newly developed uses.

The Noise Impact Overlay District zoning ordinance and the WAC Maximum Environmental Noise Regulations must be complied with and should prevent most incompatible uses.

## **MITIGATION MEASURES**

### **Proposed Alternative**

No significant adverse noise impacts are expected to result from the Proposed Alternative. Development of the Proposed Alternative in the VCCV Subarea may result in noise sensitive uses being established in an incompatible noise environment. To mitigate for possible conflicts with the development of noise sensitive uses such as residential units in an area with high noise levels, it is recommended that effective planning be implemented to create more livable communities. For example, balconies and outdoor use areas should not be developed facing the railroad tracks or busy streets. Instead, noise sensitive uses should be developed in quieter areas of the Subarea or shielded by buildings to create quiet oases. Special construction standards that would mitigate interior sound levels to 45  $L_{dn}$  are required for all new, expanded, or reconstructed residential structures inside the Noise Impact Overlay District.<sup>1</sup>

### **Train Horns**

In the case of the area around the 8<sup>th</sup> Street/Jefferson rail crossing, some allowable uses in a CX zone would be incompatible with the high levels of ambient noise. It may be possible to close the at grade crossing at 8<sup>th</sup> Street and Jefferson once the

rail under crossing on 6<sup>th</sup> Street and Grant Street is reconstructed. If this crossing is closed sometime in the future, noise levels would be substantially reduced.

Another option would be to establish a train horn quiet zone for areas around rail crossings. A quiet zone can be established by installing supplemental safe improvements (quad-gates for example) that are as safe as or safer than rail/public crossings that rely on train horns.<sup>3</sup>

To mitigate the conflict between train horn noise and residential land use, a downtown train horn study should be prepared to narrow down the list of supplemental safety improvements that best meet the needs of the downtown, develop a cost for the downtown quiet zone and identify funding options.

Since rail access is a primary feature of the Port's operations, the Port shall be notified and involved with any future train horn quiet-zone study or proposed mitigation or improvements.

If train horn noise is not mitigated, portions of the Columbia West Renaissance District proposed for rezoning may not be acceptable for residential development.

### ***Expansion of the Noise Impact Overlay District***

With the zoning change proposed for the vacant Boise property on the river, the Noise Impact Overlay District boundaries would need to be expanded. The  $L_{dn}$  contour for PDX for the future year indicates that the 65 DNL contour will expand in size. The expansion of the PDX 65 DNL contour will include the southern portion of the VCCV Subarea, from Esther Short Park to the north and west to the rail line crossing the Columbia River. The City of Vancouver must plan for and examine long-term uses in the Subarea plan. Therefore, it is appropriate to anticipate the future boundary of the 65 DNL contour as presented in the *Portland International Airport Future year Noise Analysis*<sup>1</sup>.

Currently the Noise Impact Overlay District does not include the western lower portion of the VCCV Subarea (Columbia West Renaissance District). The current boundary is based on the 1988 65 DNL contour that was developed for the 1983 Portland International Airport Noise Abatement Plan.<sup>3</sup> Long-term monitoring performed for this project at Site B (the Boise location at the edge of the Columbia River), with an  $L_{dn}$  of 68, indicates that an expansion of the Noise Impact Overlay District is appropriate. The proposed new boundary for the overlay district, shown in Figure 7-14 (see Chapter 7, Land Use), would include most of the Columbia West Renaissance District. The expansion of the Noise Impact Overlay District boundaries will reduce the potential for inappropriate uses for this area which will be rezoned to CX from IH.

The mitigation measures listed are not exhaustive or preclusive of alternative mitigation strategies provided that they address the same issues and achieve the same end.

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<sup>1</sup> City of Vancouver Development Code, Chapter 25.520, Noise Impact Overlay District.

<sup>2</sup> 49 CFR Parts 222 and 229. Use of Locomotive Horns at Highway-Rail Grade Crossings; Final Rule.

**No Action Alternative**

No significant adverse noise impacts are expected as a result of the No Action Alternative and no mitigation is required.

**Unavoidable Significant Adverse Impacts****Action Alternative**

There are no unavoidable significant adverse noise impacts that will result from the Action Alternative.

**No Action Alternative**

There are no unavoidable significant adverse noise impacts that will result from the No Action Alternative.

<sup>1</sup>BridgeNet International, November, 2005



CHAPTER 5 FIGURES

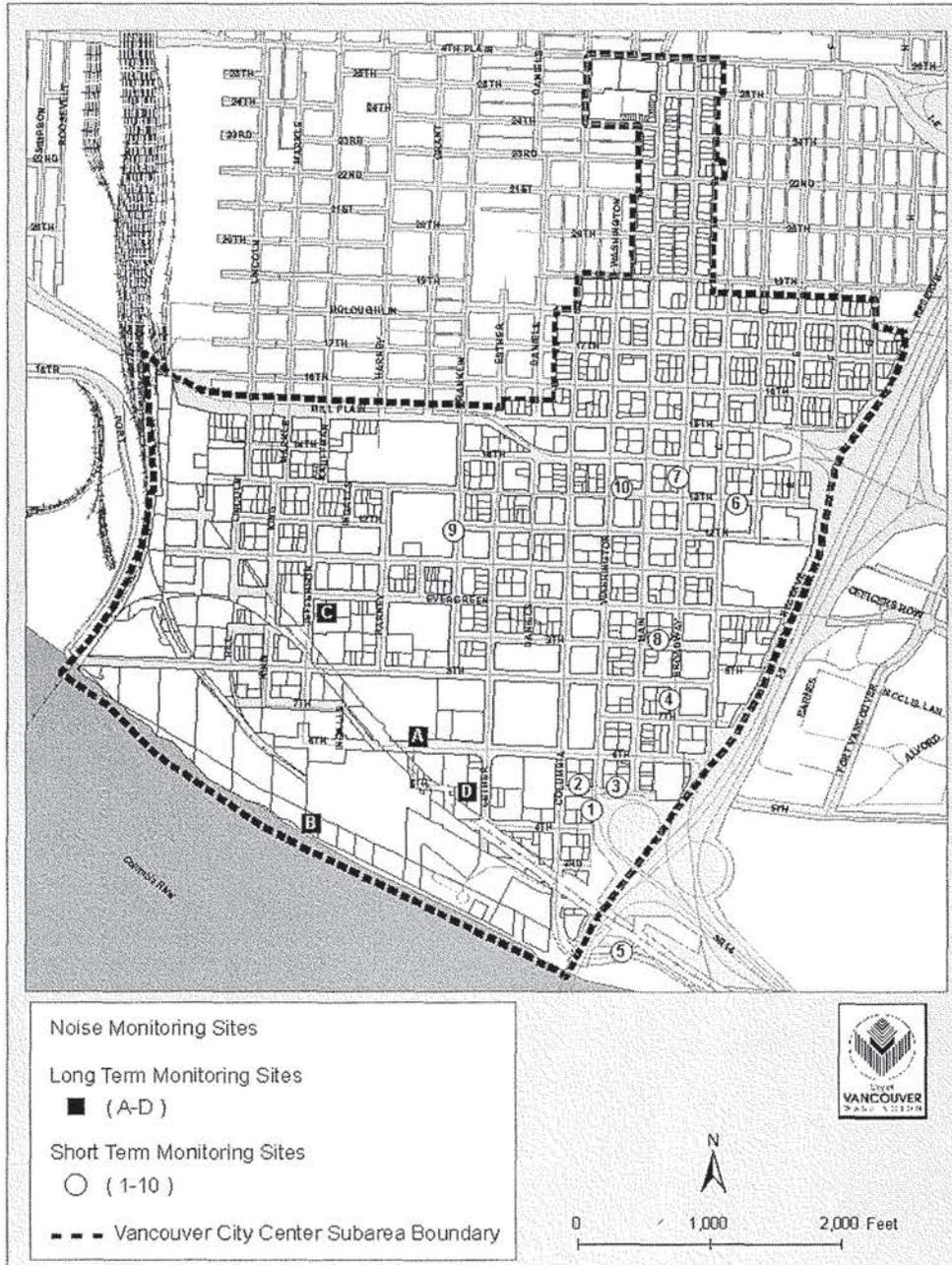


Figure 5-1. Noise Monitoring Sites



# ATTACHMENT O