BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE

POLICY FOR ASSESSING AND MITIGATING NOISE IMPACTS FROM NEW AND UPGRADED NUMBERED HIGHWAYS

April, 2014
(Revised Oct 27 2016)

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INTRODUCTION

This policy replaces the 1993 version of the B.C. Ministry of Transportation and Infrastructure (MoTI) Noise Policy. It provides a procedure to determine if the anticipated community noise impacts associated with the upgrading of existing numbered highways or the construction of new numbered highways, as planned by the MoTI, warrant noise mitigation consideration.

SCOPE OF NOISE POLICY

The 2016 MoTI noise policy addresses highway traffic-related noise impacts and the potential need for mitigation measures in relation to the following types of projects:

- Construction of new numbered highways,
- Upgrading of existing numbered highways.

For a planned highway improvement to be considered a "project" in the context of the MoTI noise policy, that is, to have sufficient physical scope to potentially create noise impacts warranting mitigation consideration (and therefore a noise impact assessment), it must feature at least one of the following elements:

- Significant change in horizontal alignment – the alignment must be shifted laterally (towards noise-sensitive land uses) by at least one lane width;
- Significant change in vertical alignment – highway elevation must increase by 1 m or more, and/or there must be a loss of noise shielding elements (topography or structures);
- Addition of one or more through lanes – including HOV, bus or truck climbing lanes;
- Addition of an auxiliary lanes – other than a turning lane;
- Addition or relocation of interchange lanes or ramps – must occur within a interchange quadrant containing noise-sensitive receivers within approximately 100 m; and
- Restriping of existing pavement – for purposes of adding a through or auxiliary lane.

Highway improvement projects that include none of the above elements will require no further consideration under the policy. Projects may also avoid a full noise assessment if it can be demonstrated that all existing noise-sensitive receptors lie outside the maximal noise impact zone. The noise impact zone is determined by examining factors such as projected traffic volumes, vehicle type and mix, posted speed, highway gradient, and the nature of intervening ground.

The Project Manager is responsible for the final determination of the assessment process and resulting mitigation requirements. Mitigation will be considered justifiable if it effectively reduces noise exposure with a reasonable expenditure of public funds and resources, and with acceptable impacts on the community and the environment. The Project Manager will document any final decisions.

TYPES OF NOISE-SENSITIVE LAND USES

This policy addresses noise impacts at the following types of noise-sensitive land uses:

- Residential (all types of permanent residences),
- Educational Facilities,
- Hospitals,
- Libraries, Places of Worship and Museums,
- Passive Parks and other land uses where quiet and tranquillity are important attributes.

ELIGIBILITY OF LAND USES FOR MITIGATION

To be eligible for mitigation consideration, noise-sensitive land uses or developments must predate the highway project at hand. Developments must receive planning approval from the appropriate local authority prior to the first public announcement of the highway project or the designation (through gazetting) of the affected lands as potential future highway right-of-way.

NOISE METRIC FOR ASSESSING NOISE IMPACT AT RESIDENCES

The noise metric used to quantify the highway noise environment at residential land uses shall be the Day-Night Average Sound Level, or L_{dn}. The L_{dn} is an energy-based daily average sound level similar to the 24-hour Equivalent Sound Level, or $L_{eq}(24)$, employed in earlier versions of the MoTI noise policy. Both the L_{dn} and the $L_{eq}(24)$ are expressed in units of A-weighted decibels, or dBA. However, in computing the L_{dn}, a 10 dBA penalty is applied (added) to all noise levels measured, or predicted to occur, during the night-time hours, that is between 22:00 and 07:00 hours. This penalty reflects the greater sensitive of communities to noise at night.

NOISE IMPACT THRESHOLDS FOR RESIDENTIAL LAND USES

Communities can be impacted by noise in two ways: firstly by exposure to excessive absolute levels of noise (i.e., absolute noise impacts) which can interfere with sleep, speech and the use and enjoyment of property; secondly, by exposure to excessive project-related "increases" in noise (i.e., relative noise impacts) that tend to increase expressed levels of human annoyance and which may be considered environmental degradation.

The policy takes a "dual-threshold" approach in identifying noise impacts that warrant mitigation consideration so as to better address the range of possible impacts associated with highway projects and to provide greater flexibility in selecting mitigation measures consistent with the projected degree of impact. These thresholds are shown in two forms in Figures 1 and 2.

In Figure 1, baseline, or pre-project, noise levels (L_{dn}) are plotted on the horizontal axis while total, post-project (10 years after project completion) noise levels are plotted on the vertical axis. Mitigation consideration shall be warranted for noise impact situations falling within the Moderate and Severe impact zones. Note that mitigation will only be carried out where total post-project noise levels are clearly dominated by highway traffic. In Figure 2, pre-project noise levels are shown on the horizontal axis while the project-related increases in total noise exposure required to warrant mitigation consideration are plotted on the vertical axis. The Moderate and Severe noise impact threshold values are presented in tabular form in Table 1.

NOISE IMPACT THRESHOLDS FOR NON-RESIDENTIAL LAND USES

Hospitals

While hospitals may not provide truly on-going, or long-term, residency situations for many of their patients, it is recognized that adequate rest is critical to patient recovery. Therefore noise impact mitigation for hospitals will be considered on a case-by-case basis using the same procedure employed for permanent residences.

Educational Facilities

Potential noise mitigation requirements for educational facilities will be investigated where the during the noisiest hour of the school day, post-project traffic noise levels, ten years after project completion, are projected to reach L_{eq}(max-hr) 60 dBA or more at the facility exterior façade.

Libraries, Places of Worship, Museums

Places of worship, libraries, and museums are, like educational facilities, sensitive to the intrusion of noise that can interfere with speech communications and concentration. Therefore, unless unique circumstances exist at a particular facility, the noise impact assessment threshold for these types of public buildings will be the same as specified above for educational facilities.

Passive Parks and other land uses where quiet and tranquillity are important attributes

Passive parks and other land uses (cemeteries, formal memorials, outdoor performance spaces, special natural features, and sites of religious or spiritual significance) for which quiet and tranquillity are important, if not essential attributes, will be considered for mitigation on a case-by-case basis.

MITIGATION OBJECTIVES

To be considered sufficiently effective, mitigation measures must be able to reduce total noise exposures (from highway and non-highway sources) at fronting residences, educational facilities etc., by at least 5 dBA. Larger noise reductions should be sought where feasible and cost-effective, particularly where project-related noise impacts at residences are predicted to be "Severe".

MITIGATION MEASURES

Cost-benefit Considerations

The costs and benefits of mitigation measures must be weighed by MoTI Project Managers based on the particular conditions and considerations of each project. Benchmark mitigation cost guidelines have been established on a per-benefiting household basis. These are $25,000 per directly-benefiting residential unit in Moderate noise impact situations, and $40,000 per directly-benefiting residential unit in Severe noise impact situations.

Noise Barriers

Noise barriers may be located either inside or, subject to arrangements being made with landowners, outside the MoTI right-of-way. Barriers may be made of a wide variety of materials (pre-cast concrete, concrete block, steel, timber, plastic and other recycled materials, as well as earth berms). They may be sound reflective or sound absorptive. The height of vertical noise barriers (walls) is limited to 5 m. Earth berms or berm-wall combinations may be of any height.

Low-Noise Pavements

Some relatively porous pavement designs can reduce tire noise and hence, overall highway traffic noise levels, by 4 to 7 dBA when new. However, this noise reduction tends to diminish over time. To be considered effective, low-noise pavements should be capable of providing an average noise reduction effect of at least 3 dBA over a ten-year period.

Noise Control at the Receiver

Where receivers of noise overlook, or will overlook, a highway, it may not be possible to achieve effective noise shielding even from a 5 m high roadside barrier or a berm/wall of practical total height. Where residences are isolated or widely spaced, barriers may not be cost-effective because of the substantial lengths required per residence. In such cases, consideration may be given to upgrading the sound insulation capacity of building facades or taking other measures to reduce highway noise exposures in and around residences. Mitigation of this type may also be considered for use at educational facilities and other noise-sensitive public buildings.

Noise Impact Avoidance

Decisions made during the planning, design or construction phases of a highway project that result in reduced noise exposures at adjacent sensitive land uses (and possibly the prevention of exceedance of either Moderate or Severe Impact thresholds), but do not involve actual mitigation works, may be considered "noise impact avoidance". Examples include selection of the least impactful route option, or the one best utilizing natural or man-made noise screening features. Other potential impact avoidance approaches are speed control and the use of low-noise pavement.

POST- PROJECT COMPLETION NOISE MONITORING

Once a highway project incorporating noise mitigation structures and/or low-noise pavement is completed and traffic patterns have stabilized (no more than a year after completion), 24-hour noise monitoring will be carried out at selected, representative noise receiver locations. Such monitoring will serve to both confirm noise predictions and to assess the effectiveness of mitigation measures. If the mitigation does not meet the predicted minimum mitigation objectives of the project then further work must be undertaken by the project to rectify any deficiencies.

Figure 1; Project-Related Traffic Noise Impact Thresholds

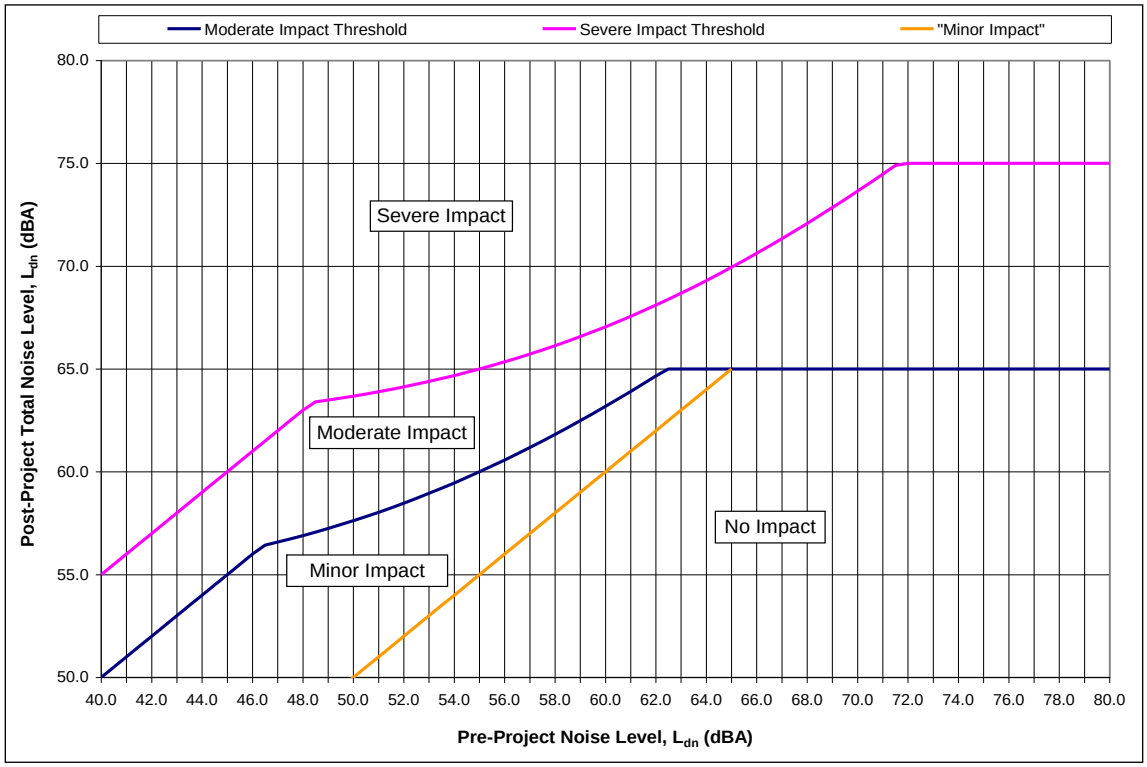

Figure 2; Increases in Total Noise Levels Permitted by Impact Thresholds of Figure 1.

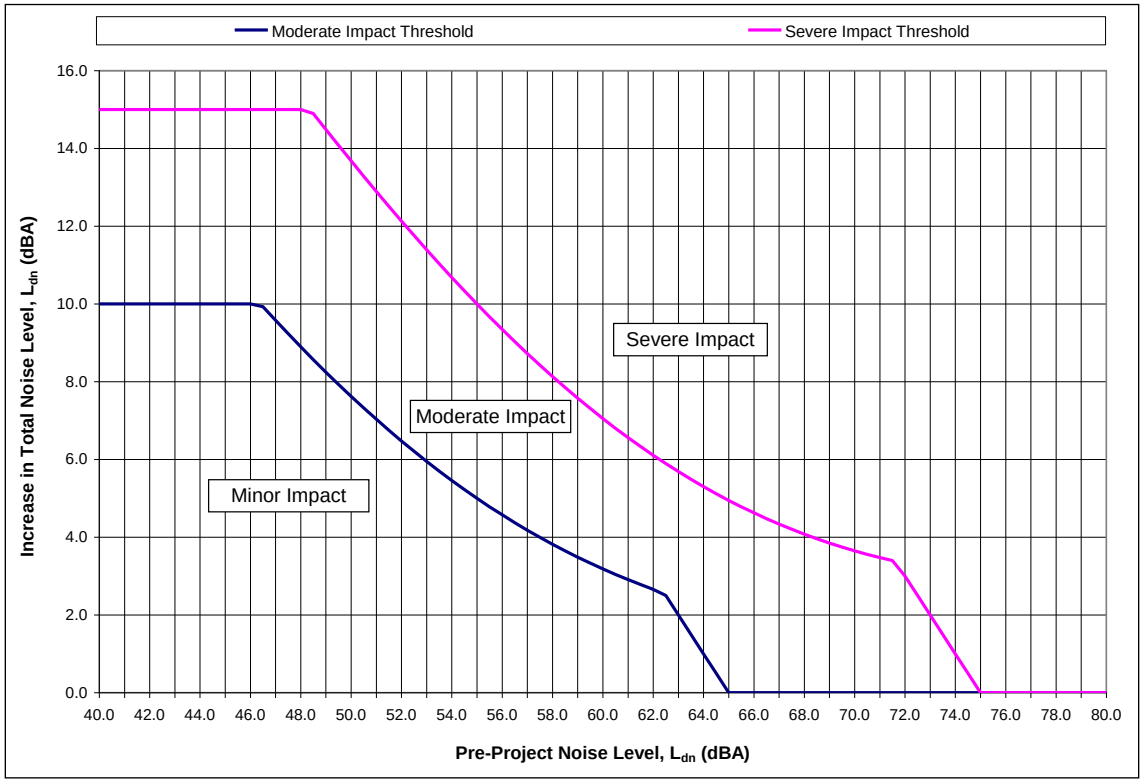

Table 1; Post-Project Total L_{dn} Values and Increases in Total L_{dn} Corresponding to Noise Impact Thresholds of Figures 1 and 2 Respectively.

Pre-Project L_{dn} (dBA)	Post-Project Total L_{dn} (dBA) (Figure 1)			Increase in Total L_{dn} (dBA) (Figure 2)		
	Minor Impact	Moderate Impact	Severe Impact	Minor Impact	Moderate Impact	Severe Impact
40.0	40.0	50.0	55.0	0.0	10.0	15.0
41.0	41.0	51.0	56.0	0.0	10.0	15.0
42.0	42.0	52.0	57.0	0.0	10.0	15.0
43.0	43.0	53.0	58.0	0.0	10.0	15.0
44.0	44.0	54.0	59.0	0.0	10.0	15.0
45.0	45.0	55.0	60.0	0.0	10.0	15.0
46.0	46.0	56.0	61.0	0.0	10.0	15.0
47.0	47.0	56.6	62.0	0.0	9.6	15.0
48.0	48.0	56.9	63.0	0.0	8.9	15.0
49.0	49.0	57.2	63.5	0.0	8.2	14.5
50.0	50.0	57.6	63.7	0.0	7.6	13.7
51.0	51.0	58.0	63.9	0.0	7.0	12.9
52.0	52.0	58.5	64.1	0.0	6.5	12.1
53.0	53.0	59.0	64.4	0.0	6.0	11.4
54.0	54.0	59.5	64.7	0.0	5.5	10.7
55.0	55.0	60.0	65.0	0.0	5.0	10.0
56.0	56.0	60.6	65.3	0.0	4.6	9.3
57.0	57.0	61.2	65.7	0.0	4.2	8.7
58.0	58.0	61.8	66.1	0.0	3.8	8.1
59.0	59.0	62.5	66.6	0.0	3.5	7.6
60.0	60.0	63.2	67.1	0.0	3.2	7.1
61.0	61.0	63.9	67.6	0.0	2.9	6.6
62.0	62.0	64.7	68.1	0.0	2.7	6.1
63.0	63.0	65.0	68.7	0.0	2.0	5.7
64.0	64.0	65.0	69.3	0.0	1.0	5.3
65.0	-	65.0	69.9	-	0.0	4.9
66.0	-	65.0	70.6	-	0.0	4.6
67.0	-	65.0	71.3	-	0.0	4.3
68.0	-	65.0	72.1	-	0.0	4.1
69.0	-	65.0	72.8	-	0.0	3.8
70.0	-	65.0	73.6	-	0.0	3.6
71.0	-	65.0	74.5	-	0.0	3.5
72.0	-	65.0	75.0	-	0.0	3.0
73.0	-	65.0	75.0	-	0.0	2.0
74.0	-	65.0	75.0	-	0.0	1.0
75.0	-	65.0	75.0	-	-	0.0
76.0	-	65.0	75.0	-	-	0.0
77.0	-	65.0	75.0	-	-	0.0
78.0	-	65.0	75.0	-	-	0.0
79.0	-	65.0	75.0	-	-	0.0
80.0	-	65.0	75.0	-	-	0.0