

# MOEE / GO TRANSIT DRAFT PROTOCOL FOR NOISE AND VIBRATION ASSESSMENT

## 1.0 PURPOSE

GO Transit and the Ministry of Environment and Energy (MOEE) recognize that commuter rail transit facilities produce noise and vibration which may affect neighbouring properties. This document identifies the framework within which criteria will be used to assess noise and vibration from proposed GO Transit rail projects. The framework in this document is to be applied for planning purposes in order to address the requirements of the Environmental Assessment Act and is to be utilized during implementation of the project.

The purpose of this document can be summarized by the following:

- assist GO Transit in the preparation of Environmental Assessments;
- streamline the MOEE's noise impact review of Environmental Assessments; and
- make available to the public a consistent approach for Environmental Assessments.

This Protocol does not apply to existing GO Transit operations, nor does it apply to projects undertaken by other non-GO Transit rail operators.

## 2.0 SCOPE

- Establish noise and vibration objectives for GO Transit rail projects.
- Establish methods of assessment - measurement and prediction.
- Enable the comparison of alternatives.
- Establish the framework for the assessment of mitigation where impacts are identified.

## 3.0 DEFINITIONS

Adjusted Noise Impact:

Noise impact is the incremental increase in the pre-project equivalent sound level resulting from the introduction of a GO Transit project. The Adjusted

Noise Impact is calculated by adjusting the value of the noise impact to indicate greater impact at higher pre-project sound levels.

**Ambient Noise (Ambient Sound Level):**

The ambient noise (ambient sound level) is the sound existing at a point of reception in the absence of all noise from the GO Transit rail project. In this Protocol, the ambient is taken to be the noise from road traffic and existing industry. The ambient specifically excludes transient noise from aircraft and railways.

**Day-time Equivalent Sound Level:**

$L_{eq,16}$  is the day-time equivalent sound level. The definition of equivalent sound level is given in Reference 2. The applicable time period is from 07:00 to 23:00 hours.

**GO Transit Rail Project:**

GO Transit rail project means a project to add or expand rail service and/or a layover site that requires approval under the Environmental Assessment Act be obtained by carrying out an environmental assessment.

**Layover Site:**

Layover site means a GO Transit facility dedicated to overnight storage of GO trains.

**Night-time Equivalent Sound Level:**

$L_{eq,8}$  is the night-time equivalent sound level. The definition of equivalent sound level is given in Reference 2. The applicable time period is from 23:00 to 07:00 hours.

**Point of Reception:**

Day-time: 07:00 to 23:00 hours

Day-time point of reception is any outdoor location on the property of a sensitive land use where sound originating from the Project is received and which is no less than 15m from the nearest track's centre line. For at-grade sensitive land uses, e.g., low density residential development, this point is normally 3m from the unit in the front or back yard whichever is most exposed to the noise source at a height of 1.5m. For

residential uses such as apartment units, this is normally the plane of the apartment bedroom or living room window.

Nighttime: 23:00 to 07:00 hours

Night-time point of reception is the plane of a bedroom window where sound originating from the Project is received and which is no less than 15m from the nearest track's centre line. At the planning stage, this is usually assessed at the nearest facade.

Point of Vibration Assessment:

Point of Vibration Assessment is the location 5m to 10m away from the building foundation in a direction parallel to the tracks or adjusted as required to accommodate site conditions.

Rail Service:

Rail Service means the operation of GO trains along transit corridors (including GO Transit commuter stations) and access routes between GO facilities and these corridors. Layover sites are not part of the Rail Service and are therefore assessed separately.

Sensitive Land Use:

Sensitive land use means a residential dwelling or place where people ordinarily sleep or a commercial/industrial operation that is exceptionally sensitive to noise or vibration. Noise and vibration impacts will be assessed for lands which have been committed for sensitive land uses. Committed uses include uses such as: existing development, approved site plans, approved condominium plans or draft approved plans of subdivision.

Vibration Velocity:

Vibration shall be assessed using the running average RMS (Root-Mean-Square) vibration velocity (mm/sec).

## 4.0 NOISE

### 4.1 Rail Service

For the purposes of assessment, rail service is considered to include the operation of trains on the rail line and the operation of trains inside

commuter stations. Idling of trains inside commuter stations is considered part of the operation. Noise produced by layover sites is not considered part of the rail service and is assessed separately, see Section 4.2.

#### 4.1.1 Objective

The desirable objective is that the day-time (16 hour)  $L_{eq}$  produced by the rail service operation of the GO Transit project does not exceed the higher of the ambient sound level, combined with the sound level from existing rail activity, or 55 dB  $L_{eq}$ . Furthermore, that the night-time (8 hour)  $L_{eq}$  produced by the rail service operation of the GO Transit project does not exceed the higher of the ambient sound level, combined with the sound level from existing rail service, or 50 dB  $L_{eq}$ .

#### 4.1.2 Impact Assessment Method

The noise impact of GO Transit rail projects shall be assessed using prediction methods acceptable to the MOEE (see Reference 1). The noise impact from rail service shall be assessed on a 16 hour (day-time) basis using  $L_{eq,16}$ , and 8 hour (night-time) basis using  $L_{eq,8}$ . The impact assessment method should base its assessment on future GO Transit train volume projections, from the commencement of operations to a maximum of twenty years (typical GO Transit planning horizon).

#### 4.1.3 Impact Assessment Criteria

The impact at a point of reception shall be expressed in terms of the Adjusted Noise Impact. The Adjusted Noise Impact shall be based on the difference between:

- pre-project noise, which is the combination of the ambient noise and the rail noise; and
- post-project noise, which is the combination of the ambient noise and the post-project rail noise.

Where the pre-project noise is less than 55 dB  $L_{eq}$  during the daytime or 50 dB  $L_{eq}$  during the nighttime, the pre-project noise shall be taken as 55 dB  $L_{eq}$  daytime or 50 dB  $L_{eq}$  nighttime.

The impact shall be rated with respect to the objectives as follows:

Adjusted Impact Level	Impact Rating
0-2.99 dB	Insignificant
3-4.99 dB	Noticeable
5-9.99 dB	Significant
10 +dB	Very Significant

Where a GO Transit rail project may produce road traffic noise impact, these noise impacts shall be assessed in accordance with the methods approved for the Environmental Assessment of roadway projects, e.g., Class EA.

#### 4.1.4 Mitigation

When a 'significant or greater' impact is predicted, the potential to mitigate will be evaluated based on administrative, operational, economic and technical feasibility. If deemed feasible, the mitigation measures shall ensure that the predicted sound level from the GO Transit rail project is as close to, or lower than, the rail service objective.

## 4.2 Layover Sites

For the purposes of assessment, a layover is considered to include the idling of trains in an area off the mainline track that is designated for such use. Due to operational constraints, GO Transit will usually generate layover alternatives that closely parallel mainline tracks.

### 4.2.1 Objective

The desirable objective is that the  $L_{eq}$  in any hour produced by the operation of the layover site does not exceed the higher of the ambient sound level, including the sound level from existing industry, or 55 dB  $L_{eq}$ .

### 4.2.2 Impact Assessment Method

The noise impact of GO Transit layover sites should be evaluated on a case-by-case basis, by predicting the one hour  $L_{eq}$  at a point of reception, using prediction methods acceptable to the MOEE. The noise impact assessment should incorporate all noise sources associated with the layover operation.

#### 4.2.3 Impact Assessment Criteria

For the purposes of site selection, the noise impact shall be assessed utilizing the rating method of Section 4.1.3, with the exception that the minimum pre-project  $L_{eq}$  shall be 45 dB  $L_{eq}$ .

#### 4.2.4 Mitigation

When a 'noticeable or greater' impact is predicted, the potential to mitigate will initially be evaluated based on administrative, operational, economic and technical feasibility. In addition, the feasibility shall consider the effectiveness of mitigation with respect to site specific conditions and other sources of noise not included in the original impact assessment. If deemed feasible, the mitigation measures shall ensure that the predicted sound level from the GO Transit rail project is as close to, or lower than, the layover objective.

### 4.3 Construction

Noise and vibration impacts from the construction of a project shall be examined. For the purposes of impact assessment and identifying the need for mitigation, the guidelines in Reference 5 apply.

## 5.0 VIBRATION

The assessment of ground-borne vibration shall be confined to that produced by the operation on the line and shall exclude vibration due to maintenance and/or construction activities.

### 5.1 Objective

The desirable objective is that the vibration velocity produced by the GO Transit project does not exceed 0.14 mm/s at a point of vibration assessment. Where the vibration from existing operation exceeds 0.14 mm/s, the desirable objective is to not exceed the existing vibration level.

### 5.2 Assessment Method

The vibration impact of a GO Transit rail project shall be assessed using field measurements of vibration velocities. Where applicable, the assessment shall include vibration generated by non-GO Transit rail traffic.

### 5.3 Impact Assessment Criteria

The impact at a point of vibration assessment will fall into one of the following categories:

- existing and future vibration velocity remains less than 0.14 mm/s ;
- existing vibration velocity is less than 0.14 mm/s, future vibration is expected to exceed 0.14 mm/s;
- existing vibration velocity is greater than 0.14 mm/s, future vibration is not expected to exceed this value; and
- existing vibration is greater than 0.14 mm/sec, future vibration is expected to exceed this figure.

GO Transit will not increase vibration velocity to a level that will cause structural damage.

### 5.4 Mitigation

When the vibration velocity at a point of vibration assessment exceeds the objective by 25%, the requirement to mitigate will be evaluated based on administrative, operational, economic and technical feasibility.

## 6.0 REFERENCES

- [1] STEAM, Sound from Trains Environmental Analysis Method, Ontario Ministry of the Environment, ISBN 0-7729-6376-2 (1990).
- [2] NPC-101 - Technical Definitions, part of Reference 5.
- [3] NPC-102 - Instrumentation, part of Reference 5.
- [4] NPC-103 - Procedures, part of Reference 5.
- [5] Model Municipal Noise Control By-law, Final Report, August 1978, Ontario Ministry of the Environment.
- [6] Noise Control Guideline for Class Environmental Undertakings, February 1980, Ontario Ministry of the Environment.