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Environmental Assessment and Approvals Branch

November 14, 2006

Hayley Berlin  
Project Officer, EA Project Coordination Section  
EAAB,MOE

RE: NOISE AND VIBRATION COMMENTS CONCERNING;

GO TRANSIT GEORGETOWN SOUTH CORRIDOR SERVICE EXPANSION  
& AIRPORT TRANSPORTATION LINK BETWEEN LESTER B. PEARSON  
AIRPORT AND UNION STATION,  
ENVIRONMENTAL ASSESSMENT TERMS OF REFERENCE,  
OCTOBER 2006

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This office was requested by Hayley Berlin, Project Officer, Environmental Assessment Project Coordination Section, Environmental Assessment and Approvals Branch, MOE to review the noise aspects of the document "GO Transit Georgetown South Corridor Service Expansion & Airport Transportation Link between Lester B. Pearson Airport and Union Station, Environmental Assessment Terms of Reference, October 2006" ("the ToR"). Also provided for review was the document "GO Transit Georgetown South Corridor Service Expansion & Airport Transportation Link between Lester B. Pearson Airport and Union Station, Environmental Assessment Terms of Reference Consultation Record, October 2006" ("the Consultation Record").

The proposed project involves two main aspects, one being the expansion of existing GO Transit service in the GO Georgetown South Corridor, the other being the provision of dedicated frequent passenger rail service, sharing parts of that corridor, connecting Union Station in downtown Toronto with the Lester B. Pearson Airport.

The following comments arose from that review.

## **1.0 SOCIO-ECONOMIC (OR SOCIAL) ENVIRONMENT CRITERIA**

The ToR refers to noise and vibration as criteria for assessment of the Social (Section 6.2.1) or the Socio-Economic (Table 6.1) Environment, which are considered by this review to be among a number of appropriate categories under which noise and vibration might be included

## **2.0 NOISE AND VIBRATION GUIDELINES**

The ToR does not indicate specific guidelines under which noise and vibration would be assessed.

The accompanying Consultation Record indicates that to members of some citizen groups, particularly in the Weston area of Toronto in which there are a number of older homes adjoining the rail line which would be the subject of the EA, noise and vibration are very important concerns.

There would appear to be an underlying assumption expressed in various places in the Consultation Record that MOE will address noise and vibration in the future EA in terms of existing general MOE guidelines. The only existing MOE general guideline that addresses operating rail noise (as opposed to construction noise) is Publication LU-131, Noise Assessment Guidelines in Land Use Planning (October 1997), which is a land use guideline, and thus not applicable to this project. In MOE parlance, land use guidelines for noise are used when proposed housing or other sensitive receptors are to be built near existing noise sources, not when transportation noise sources are to be built or expanded near existing housing (or other sensitive receptors).

In the end, the MOE requires guidelines by which to determine the approvability of the Environmental Assessment. In the past, MOE has negotiated project-specific guidelines for operational noise and vibration of new or expanded transportation facilities with the proponents of those facilities, such as GO Transit and the TTC. The previously-negotiated guideline which comes closest to addressing the current subject proposal is "MOEE/ GO Transit Draft Protocol for Noise and Vibration Assessment", January 1995 (Draft #9). Although the Airport link element of the proposal might differ in equipment, scheduling and frequency from conventional GO Transit operations, and will probably be operated by a body other than GO, the Protocol nevertheless appears to this reviewer as an excellent technical starting point for a noise guideline for the combined rail sounds on the Georgetown South Corridor resulting from this project.

It is suggested here that there are several obvious benefits, particularly in terms of perceived fairness, to having established the assessment guidelines for noise and vibration prior to the use of those guidelines for comparing alternatives in the EA itself. Thus it is recommended here that a commitment should be made in the ToR to establishing project-specific noise and vibration guidelines, acceptable to both the proponent and to MOE, before the EA is conducted. As the creation of the Protocols in the 1990s involved up to two years of negotiation, this process should be initiated in the near future.

It is further recommended that the noise and vibration emissions of any competing transportation technologies, particularly for the Airport Link, be quantified in the Environmental Assessments, in order that potential noise and vibration impact may be used as criteria for selection of the desired technology.

### **3.0 NOISE SENSITIVE POINTS OF RECEPTION**

The locations at which the noise and vibration guidelines are to be assessed are known as "*Points of Reception*", which are another area which should be predefined by negotiation between the proponents of the project and MOE. In one current MOE definition, "Point of Reception" means any point on a premises where sound or vibration originating from other than those premises is received. The point of reception may be located on any of the following existing or zoned for future use premises: permanent or seasonal residences, hotels/motels, nursing/retirement homes,

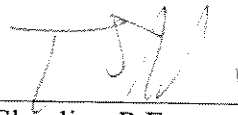
rental residences, hospitals, camp grounds, and noise sensitive buildings such as schools and places of worship.

Other factors incorporated in definitions used by past Protocols include commercial/industrial operations that are exceptionally sensitive to noise or vibration, approved site plans, approved condominium plans or draft approved plans of subdivision.

#### **4.0 CONSTRUCTION EQUIPMENT**

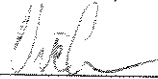
The EA document should also note that noise emissions from construction equipment are subject to the limits set out in Ministry Publication NPC-115.

Should you have any questions, please contact the undersigned.



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T. Shevlin, P.Eng.



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V. Low, P.Eng.

Supervisor, Air and Noise Unit

# 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.