Section
8

MINISTRY OF TRANSPORTATION

# Noise

Environmental Standards and Practices User Guide

***Version: December 2006***

## MINISTRY OF TRANSPORTATION

# Environmental Standards and Practices User Guide

# SECTION 8

# Noise

## Part of the Environmental Standards and Practices

ISSUED BY:

PROVINCIAL AND ENVIRONMENTAL PLANNING OFFICE
MINISTRY OF TRANSPORTATION
301 ST. PAUL STREET
ST. CATHARINES, ONTARIO
L2R 7R4

### Citation

Environmental Standards and Practices User Guide, Section 8: Noise, December 2006. Ministry of Transportation Ontario.

### Acknowledgements

This document was prepared for the Ministry of Transportation (MTO) by Ecoplans Limited. Lead authors were Clark Gunter and Ewa Bednarczuk (Ecoplans) and Greg Moore (McCormick Rankin Corporation).

This document was developed under the direction of the Environmental Standards Project (ESP) team comprised of MTO staff in the Provincial and Environmental Planning Office (Jamie Dougall – Project Director and Brenda Carruthers – Project Manager) and the lead consultant firm of Ecoplans Limited (Bob Hodgins - Project Director and Clark Gunter – Project Manager).

The ESP team would like to acknowledge the numerous contributors and reviewers for this document from MTO's Working Group, other reviewers from MTO's head and regional offices, and the Regulatory Liaison Committee that includes representatives from: Canadian Environmental Assessment Agency, Environment Canada, Fisheries and Oceans Canada, Health Canada, Ministry of Agriculture, Food and Rural Affairs, Ministry of Culture, Ministry of The Environment, Ministry of Municipal Affairs and Housing, and Ministry of Natural Resources.

### Comments and Suggestions

The Ministry of Transportation welcomes comments and suggestions on ways to improve the document with the objective of providing a practical and pragmatic approach to environmental management in the Province of Ontario. MTO anticipates that changes will be warranted to clarify, improve and incorporate new information. The format of the document is designed to accommodate such changes. Such revisions and amendments will be incorporated in later editions of this document. MTO will not formally respond to unsolicited comments submitted in response to the document.

# VERSION HISTORY

| VERSION # | DATE | DESCRIPTION OF MAJOR CHANGE |
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| | | |
| | | |
| | | |

# TABLE OF CONTENTS



## LIST OF TABLES



## LIST OF FIGURES



## APPENDICES

# 1 INTRODUCTION

MTO's Environmental Standards and Practices User Guide (the User Guide) provides guidance to design teams and information to stakeholders on how the ministry approaches typical environmental impact issues in order to meet its Environmental Protection Requirements through the Environmental Assessment (EA) Process.

This section covers the typical environmental impact issues faced in transportation project design with respect to noise. It is not the intent of the section to provide possible solutions to every potential impact or to cover every regional, local or project-specific nuance that design teams and stakeholders may face. Site-specific issues may dictate site-specific responses.

## 1.1 Using this Technical Section of the User Guide

If this is the first time you are reading any section of the User Guide, then it is recommended that you review Section 1 – Introduction. It describes, among other things:

- the role of other documents in relation to the User Guide;
- general information about the types of environmental impacts associated with the design and construction of transportation projects; and
- guiding principles to addressing environmental impacts.

This Section is laid out as in the following Sub-sections:

Sub-Section 2 - presents some useful concepts regarding noise.

Sub-Section 3 - presents the transportation project design and construction process and how noise assessment and mitigation is incorporated.

Sub-Section 4 - presents the main requirements and goals based on the Environmental Protection Requirements.

Sub-Section 6 - presents typical noise impacts associated with transportation project design and construction; and sub-section 5.1 discusses impacts in detail.

Sub-Section 7 - presents a checklist for ensuring that noise issues are adequately addressed.

# 2 NOISE CONCEPTS

The following are key concepts for noise related issues. For more details about nor and noise analysis see MTO's *Environmental Guide to Noise*.

- **Ambient Noise Level:** means the total sound which is associated with and representative of a given environment and includes all natural and man-made sound from many sources (i.e. existing transportation projects and roadways, industries, etc.) both near and far. It is the noise level prior to construction of an undertaking.

- **Decibel Scale (dBA):** means a linear numbering scale used to define a logarithmic amplitude scale, thereby compressing a wide range of amplitude values to a small set of numbers. This system is used to compress sound pressure levels. The scale is adjusted using the "A" weighting frequency adjustments because it most closely approximates the frequency response of the average human ear.

- **Mitigation Measures:** means measures that are designed to result in reduced noise levels in Noise Sensitive Areas (NSAs). These measures include walls, berms, adjustment to horizontal and vertical alignments and pavement types, which are designed to result in reduced noise levels in NSA's.

- **Noise Sensitive Areas (NSAs):** means the following land uses, with an Outdoor Living Area (OLA) associated with them, would qualify as NSA's. NSA's must have an outdoor living area (OLA) associated with the residential unit:
  - Private homes such as single family residences (owned or rental)
  - Townhouses (owned or rental);
  - Multiple unit buildings, such as apartments with OLA's for use by all occupants;
  - Hospitals, nursing homes for the aged, where there are OLA's for the patients;
  - Educational facilities and day care centres, where there are OLA's for students;
  - Campgrounds that provide overnight accommodation; and
  - Hotels / motels where there are OLA's (i.e. swimming pool area, etc.) for visitors.

  There is no minimum number of land uses that defines a NSA. Therefore, all noise sensitive land uses, regardless of size or location (urban or rural), will be assessed for application of noise control measures.

In order to determine a noise impact, a comparison is made for future noise levels with and without the proposed transportation project for NSA's. Where increases in noise levels are predicted at an NSA, mitigation is investigation under the following criteria:

- the transportation project is expected to increase future noise levels by 5 dBA or more above the ambient at that time[1], or
- the transportation project is expected to increase future noise levels to 65 dBA or more.

For more information about the criteria see sub-section 4 and the Environmental Protection Requirements in Appendix 8.A.

**Assessing Noise**

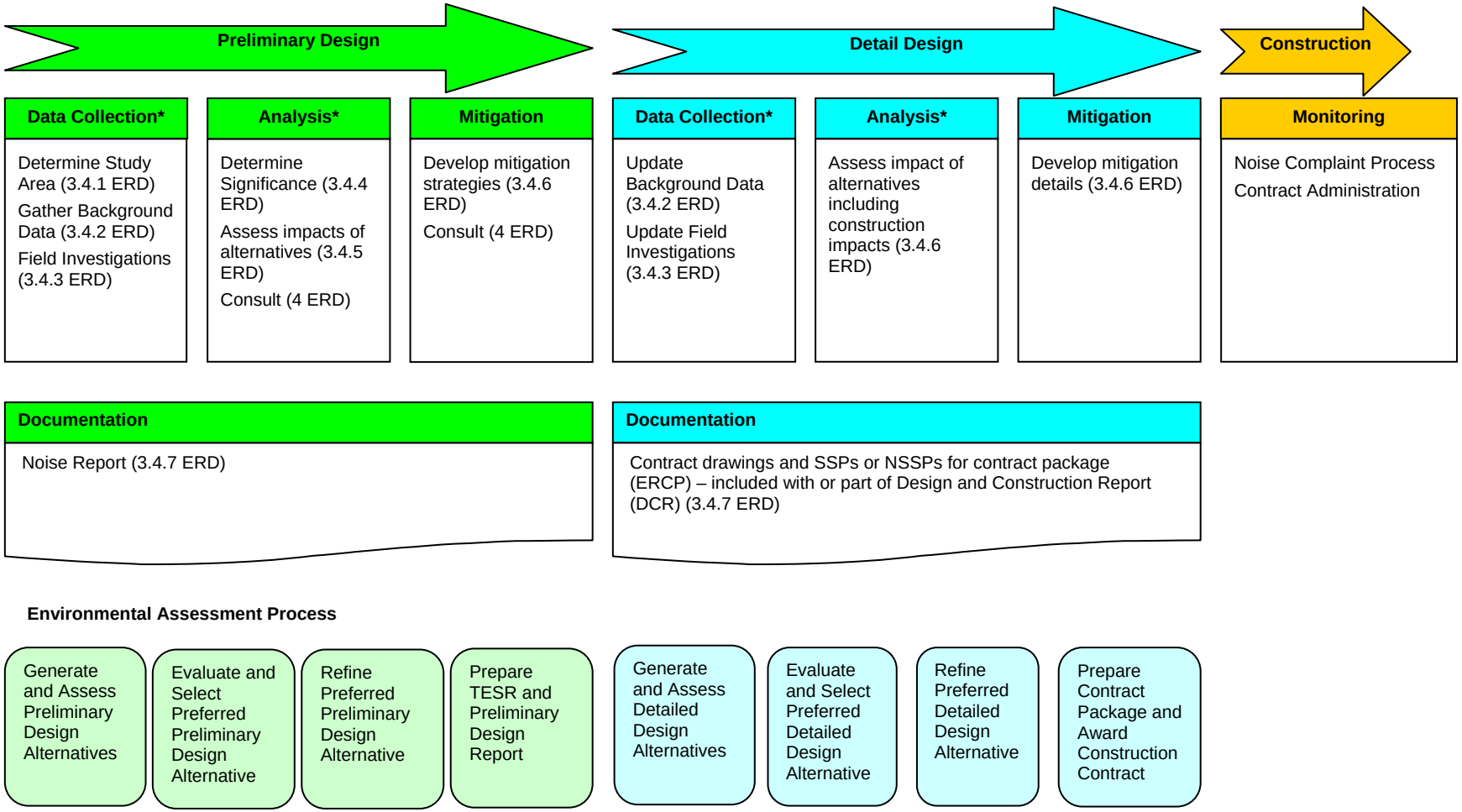
Section 3.6 of MTO's *Environmental Reference for Highway Design* details MTO expectations for undertaking noise assessments.

[1] "Ambient at that time" is the noise level in the future that would occur without the transportation project.

# 3 INCORPORATING NOISE ASSESSMENT AND MITIGATION INTO THE TRANSPORTATION PROJECT DESIGN AND CONSTRUCTION PROCESS

The following figure illustrates how noise assessment and mitigation may be integrated into the transportation project design and construction process.

## Figure 3.1 An Example of How the Assessment and Mitigation of Noise is Integrated into the Transportation Project Design and Construction Process




ERD refers to MTO's Environmental Reference for Highway Design.
*denotes that activities undertaken in the various steps can differ depending on the project. See MTO's ERD section 2 for details on various options.

# 4 MAIN REQUIREMENTS AND GOALS

To clarify its environmental requirements, MTO synthesized the over 60 environmental statutes and the supporting regulations and formal government policies that apply to transportation projects and facilities. In cooperation with Regulatory Agencies, MTO interpreted how each is applied to transportation planning and highway design, construction, and operation and maintenance activities and developed Environmental Protection Requirements (EPR's).

The checklist in Appendix 8.A summarizes the EPR's that typically are applicable to noise impacts for:

- all transportation projects; and
- transportation projects on Federal lands and/or with Federal involvement

For requirements for transportation projects within Designated Areas, see Section 14 of this User Guide.

For a complete list and wording of the EPR's, see MTO's *Environmental Protection Requirements for Transportation Planning and Highway Design, Construction, and Operation and Maintenance.*

# 5 IMPACTS AND ENVIRONMENTAL MANAGEMENT OPTIONS

For purposes of this document, transportation project-related impacts due to noise are considered where a transportation project is proposed through or adjacent to a Noise Sensitive Area (NSA) as defined in the MTO's *Environmental Guide for Noise* and there is the potential for a noise level increase above the criteria in the EPR's (See Appendix 8.1).

Sub-section 5.1 discusses the impact of a noise level increase above the in a NSA in detail. For this impact, the following is described:

- the cause;
- the potential effect; and
- the environmental options to manage the impacts.

Table 5.1 presents the specific design and construction activities that can have a noise impact and identifies the relevant sub-sections dealing with these impacts.

**Table 5.1 Potential Environmental Impacts from Noise by Design Activity**

| IMPACT | *DESIGN ACTIVITY* | | | | | | | | | | | Sub-section *No* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inter-changes | Vertical Alignment | Horizontal alignment | Grade | Drainage Design | Temporary / Access Roads | Bridges, culverts and channels | Traffic and noise barriers | Illumination | Utility relocation | Construction | |
| Noise level increase | **X** | **X** | **X** | **X** | | **X** | **X** | **X** | | | **X** | *5.1* |

*Legend: An "X" in a box indicates that the "Design Activity" listed at the top could have the impact listed on the left of the Table. The sub-section identified in the last column provides a detailed discussion of the potential impacts and the possible strategies for addressing the impacts. For example: A rise in noise levels over 5dBA next to a Noise Sensitive Area due to a new transportation project facility. The user should refer to the applicable sub-section (e.g. 5.1) to learn about the nature of the potential impacts (Section 5.1.1) and what can be done to address the impacts (Table 5.1.1).*

## 5.1 Noise Level Increases in Noise Sensitive Areas

### 5.1.1 *Cause*

The operation and construction of transportation facilities such as inter-changes, lanes, temporary/access roads, bridges and culverts, can cause significant noise impacts at adjacent Noise Sensitive Areas (NSAs).

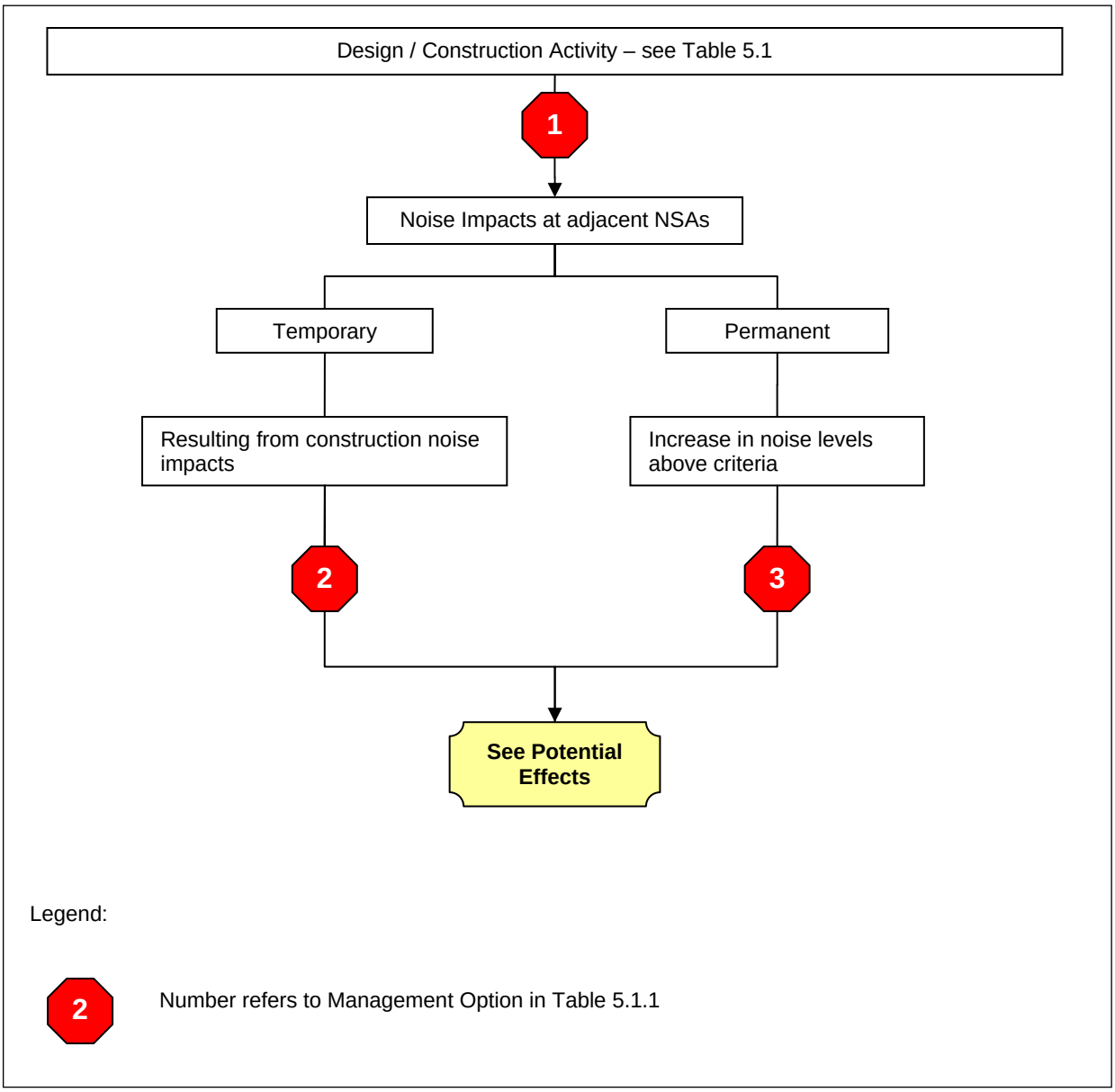
### 5.1.2 *Potential Effect*

Transportation projects generate noise that can disrupt the quality of life in Noise Sensitive Areas (NSAs).

### 5.1.3 *Environmental Management Options*

Figure 5.1.1 depicts the environmental concerns and the potential intervention by management options shown as numbered stop sign symbols. Table 5.1.1 provides details regarding each management option number referenced in the figure. The strategies and practices can be considered either alone, in concert or as part of an iterative process.

**Figure 5.1.1 Noise Level Increases: Opportunities for Intervention by Management Options**



## Table 5.1.1 Environmental Management Options for Noise Level Increases

| | Possible Management Options | References | Considerations |
|---|---|---|---|
| **Avoidance / Prevention** | | | |
| 1 | Locate facilities to avoid or maximize the separation from existing Noise Sensitive Areas (NSAs) or lands that are zoned as future NSAs. | **MTO**<br>• Environmental Guide for Noise<br><br>Primary references for design considerations in modifying size and/or location include:<br>• Geometric Design Standards for Ontario Highways<br>• Roadside Safety Manual | Limited ability to relocate some elements (like alignment) in the design stage. |
| **Control / Mitigation** | | | |
| 2 | Ensure all construction noise and vibrations adhere to MOE and MTO Special Standard Provisions pertaining to noise.<br><br>Investigate any noise complaints and advise contractor of the appropriate action, if applicable. | **MTO**<br>• Environmental Guide for Noise<br>• Environmental Reference for Contract Preparation Section 7 - Noise | |
| 3 | Provide noise mitigation measures where warranted. These measures include walls, berms, adjustment to horizontal and vertical alignments and pavement types, which are designed to reduce noise levels in NSA's. | **MTO**<br>• Environmental Guide for Noise | |

# 6 CHECKLIST

Appendix 4.A contains a checklist to help project participants (MTO staff, consultants, Regulatory Agencies and the public) review environmental assessment process documentation of a transportation project to ensure that all potential impacts have been identified and adequately addressed. The checklist includes sections on both general project activities and compliance with Environmental Protection Requirements.

# APPENDIX 8.A: Checklist for Noise

See Separate File.