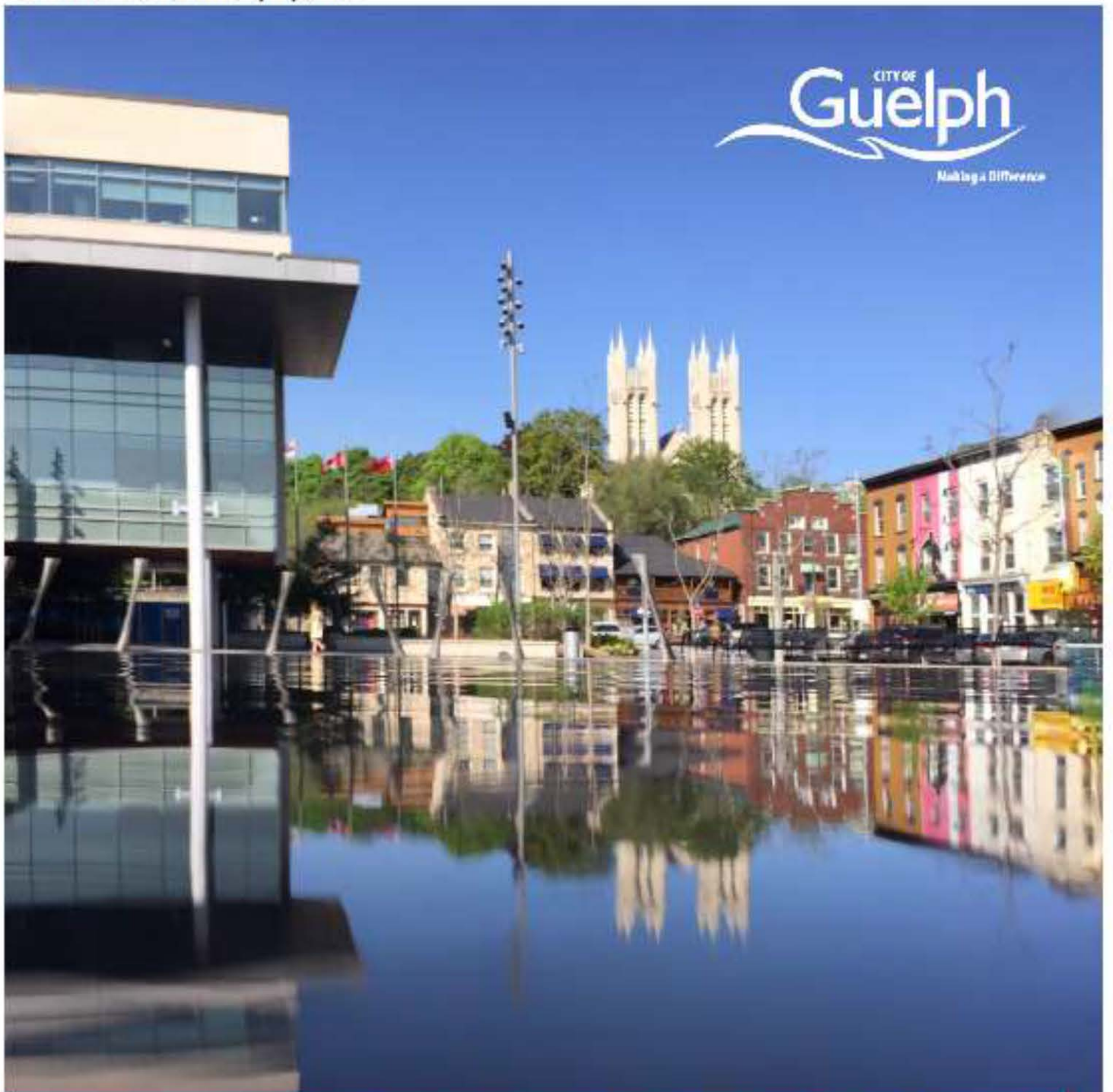


In effect as of January 1, 2019



GUELPH NOISE CONTROL GUIDELINES
VERSION 1.0
NOVEMBER 2018

City of Guelph Engineering and Transportation Services

Guelph Noise Control Guidelines

City of Guelph

Engineering and Transportation Services

Version 1.0

November 2018 - In effect as of January 1, 2019

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Transition Period

Previous to January 1, 2019

City of Guelph Official Plan Section 4.4.5 applies

Planning staff are to determine if a noise study is required, and have the submitted study peer-reviewed against MECP NPC-300

After January 1, 2019

General

- City of Guelph Official Plan Section 4.4.5 applies
- Any existing application with an existing noise study already submitted and under review will continue to be reviewed and approved by Planning staff as before.

Subdivision Applications

- Guelph Noise Control Guidelines will apply to all new applications.
- Applications that have been submitted for, but not yet obtained, Draft Plan Approval shall be reviewed case-by-case for applicability for noise studies if a noise study has not yet been requested by Planning staff.
- Noise studies are not required for applications that are Draft Approved and that do not have draft conditions requiring detailed noise studies.

All Other Application Types

- Guelph Noise Control Guidelines will apply to all new applications.
- Noise study is not required if the pre-application consultation meeting was completed prior to January 1, 2019, and the requirement for a noise study was not identified.

Existing Communities

- All communities that were approved for construction prior to these guidelines coming into effect are not subject to these guidelines (unless further development applications are made).
- Existing communities that might otherwise require noise mitigation under the new guidelines are not subject to the new Guelph Noise Control Guidelines mitigation requirements but may be subject to mitigation requirements from a previous Noise Study that was approved by Planning staff.

Introduction, Purpose & Organization of this Guideline Document

The City of Guelph (City) Noise Control Guideline document was prepared to provide guidance for development applications as it relates to the compatibility of land uses and noise generating sources such as roads and industry. With its goal of building a distinct and a livable city, the City recognizes that noise is a matter of quality of life as well as public health.

Some publications, including those produced by the Ontario Ministry of Environment, Conservation and Parks (MECP), **use the term “environmental noise”**: this term is used to distinguish unwanted sound transmitted through the outdoor environment as opposed to noise generated and contained within buildings. **In the context of this document, the terms “noise” and “environmental noise” may be used interchangeably and pertain to transportation and stationary sources of noise.**

Much of what can be accomplished to address noise can be done with good planning and urban design. This guideline and the Official Plan takes the approach that noise is a matter for study early in the development process. Early consideration of noise, such as part of a complete planning application, ensures that noise can be considered as part of initial urban design. Thus land use decisions can be better informed which should result in reduced need to retrofit buildings and neighbourhoods with noise attenuation measures in the future.

This document is divided into sections focusing on development applications (privately initiated land development) and includes a section on technical requirements for noise studies.

Harmonization with Other Policies and Regulations

These guidelines are intended to work in concert with the City of Guelph Official Plan, including **Section 4.4.5 “Noise and Vibration”, the City’s noise control Bylaw Number (2000)-16366**, and the Environmental Protection Act to comprehensively provide and protect livable and healthy public and private spaces in the City.

The Noise Control Guidelines are to be read in conjunction with the MECP publication “Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning” Publication NPC-300, August 2013 (hereinafter referred to as NPC-300). Unless otherwise indicated in this document, the principles and policies of NPC-300 must be followed for all noise studies submitted.

Throughout this document the guidelines are to be considered minimum required measures. The Noise Control Guidelines are intended to be interpreted in the context of the Official Plan and Zoning By-law. This guideline is also intended to be used in the context of applicable Federal and Provincial legislation, guidelines and regulations. This includes the Provincial Policy Statement (Ontario Ministry of Municipal Affairs and Housing 2014) issued under the Planning Act as well as the D series guidelines issued under the Provincial Environmental Protection Act (for example, D-6 Guidelines: Compatibility between Industrial Facilities and Sensitive Land Uses, Ontario Ministry of Environment 1995) and any successors thereof.

Unless otherwise indicated in this document, if there is a discrepancy between the Federal and Provincial guidelines and this document the more conservative standards (greater limiting of noise) should be used.

Definitions

Except where identified below, please refer to the Definitions found within NPC-300. The following definitions apply to this guideline:

"Annual Average Daily Traffic" or "AADT"

AADT is the average twenty-four hour, two-way traffic for the period January 1st to December 31st.

"Acoustic Shadow Zone" and "Acoustic Bright Zone"

Acoustic "Shadow Zone" is the area behind a sound barrier with no direct line-of-sight from the receptor to the source where the sound wave may diffract (bend) around the barrier. The Acoustic "Bright Zone" is an area behind a sound barrier with direct line-of-sight from the receptor to the source.

"Acoustic Insulation Factor" or "AIF"

Is a technical descriptor developed by the National Research Council of Canada (NRC) to signify the ability of a structure or an assembly to reduce the noise from the outside to the inside of a building based on specified indoor design conditions.

"Class 4 area"

Means an area or specific site that would otherwise be defined as Class 1 or 2 and which:

- is an area intended for development with new noise sensitive land use(s) that are not yet built; and
- is in proximity to existing stationary source(s); and
- has formal confirmation from the land use planning authority of the Class 4 area classification as determined during the land use planning process

Reclassification from a Class 1 or 2 area to a Class 4 area is typically initiated by the owner(s) of a noise sensitive land use(s), and is not a form of mitigation for noise generating sources. Additionally, areas with existing noise sensitive land use(s) cannot be classified as Class 4 areas.

For more information on Class area types and their applicability, please see MECP publications NPC-300 (all Class Areas), NPC-205 (Class 1 and 2 areas) and NPC-323 (Class 3 area).

"Mature State of Development"

The future build-out of development to the ultimate population and traffic capacity forecasts corresponding to the Official Plan of the City.

“Outdoor Living Area” or “OLA” or “Outdoor Amenity Area”

Means that part of a noise sensitive land use that is intended and designed for the quiet enjoyment of the outdoor environment and is readily accessible from the building.

The OLA includes, but is not limited to, the following:

- Backyard and side yard areas of single family, semi-detached and townhouse dwellings;
- Gardens, terraces and patios;
- Balconies and elevated terraces (e.g. rooftops) that are not enclosed, with a minimum depth of 4 metres;
- Common outdoor areas associated with high-rise and other multi-unit buildings, including designated outdoor amenity areas required under Zoning provisions;
- Passive recreational areas such as parks if identified by the City.

The OLA does not include the front yard areas of single family, semi-detached and townhouse dwellings.

For the purposes of noise impact assessment in an OLA, the point of assessment is typically:

- For rectangular and regularly shaped OLAs: 3 metres from the building façade, 1.5 metres above grade or floor level and aligned with the midpoint of the subject façade;
- For unusually shaped OLAs: a reasonably central location, biased toward a conservative assessment of the noise source, (e.g. at the area centroid);
- For elevated OLAs, the point of assessment is typically the middle of the OLA however more conservative locations may be necessary.

The noise impact assessment at an OLA excludes the effect of sound reflection from the façade. In general, the point of assessment in the OLA is a point used for prediction (including extrapolation), rather than measurement, of sound levels.

“Sound Transmission Class” or “STC”

Is a single-number rating of the capacity of a structure to prevent sound from reaching a receiving location. It is calculated in accordance with ASTM classification e413 using values of sound-transmission loss measured in accordance with ASTM test method e90. It provides an estimate of the performance of a partition in dealing with certain common sound insulation problems.

For Development Applications

When is a noise study required?

A noise study will be required for any development of noise sensitive land uses (as defined by the City of Guelph Official Plan and the Ontario Ministry of Environment, Conservation and Parks document NPC-300) that are within proximity to rail corridors, provincial highways or the Guelph Air Park Airport, or adjacent to collector or arterial roads. In addition, noise studies will be required for new or redeveloped noise sensitive land uses abutting existing commercial, employment, industrial, and institutional uses, or for new or redeveloped commercial, employment, industrial, or institutional uses abutting existing or approved noise sensitive land uses. There are two types of noise studies for development applications: Feasibility Noise Study and Detailed Noise Study. See **the "Technical Requirements for Noise Studies" section of this guideline** for details on each study type. **The City of Guelph Official Plan, Section 4.4.5 "Noise and Vibration"**, also outlines noise and vibration study requirements. When reviewing the Official Plan together with this document, the Feasibility Noise Study shall be considered the same as the Noise Impact Study identified in the Official Plan, and the Detailed Noise Study shall be considered the same as the detailed Acoustical Design Study identified in the Official Plan.

Actual noise study requirements may differ from site to site, and should be discussed with City staff (for example, during pre-application consultation meetings). Unless otherwise indicated, and in addition to any requirements outlined in the Official Plan, the below requirements for noise study submission and general intent will apply when the criteria above is met for the following application types:

The following application types will require noise studies as indicated:

Official Plan Amendment

Feasibility Noise Study to confirm change in land designation is compatible; submission and approval prior to approval of official plan amendment.

Zoning By-Law Amendment

Feasibility Noise Study to confirm land use compatibility; submission and approval prior to approval of zoning by-law amendment.

Plan of Subdivision

Feasibility Noise Study to identify potential noise impacts and extent of potential mitigation; submission and approval prior to Draft Plan of Subdivision approval.

Detailed Noise Study to identify specific mitigation requirements and warning clauses; submission and review with detailed engineering submission, approval prior to Subdivision Agreement approval.

Site Plan

Detailed Noise Study to identify specific mitigation requirements and warning clauses; submission as part of the formal engineering submission, and approval prior to final Site Plan approval.

At the discretion of the City and/or the Developer, a Feasibility Noise Study may be required/desired during early design stages of large/complex sites.

Plan of Condominium

(Includes standard, common elements, vacant land, and condominium conversion)

Detailed Noise Study to identify specific mitigation requirements and warning clauses; submission and approval prior to Plan of Condominium approval.

Where a Detailed Noise Study was completed for a previous application which is subsequently applying for a Draft Plan of Condominium, the scope of the additional study required at the time of condominium application may be reduced to warning clause identification.

Committee of Adjustment

Feasibility and/or Detailed Noise Study to confirm land use compatibility and identify specific mitigation requirements and warning clauses if necessary; submission and approval of a Feasibility Noise Study prior to obtaining staff support for an application, submission and approval of a Detailed Noise Study, when conditioned on the Notice of Decision.

What noise criteria must be followed?

Except where noted in this document or otherwise determined by the City, all new development seeking approval under the Planning Act must comply with the principles outlined in NPC-300.

What noise control measures are to be used?

The choice of appropriate noise control measures for a specific development application depends on factors such as the stage of the planning approval desired, significance of the sound level relative to the sound level criteria, size of the parcel of land, nature of the source(s) of noise, existing, proposed and future land use context, zoning considerations or restrictions, type of development, and urban design considerations.

The most effective and preferred form of mitigation is to use distance to separate sensitive land use from the source of the noise; this method provides more effective long term mitigation. If distance separation is proven to not be feasible there are additional forms of noise mitigation (or combinations of mitigation) an applicant can propose for City consideration.

For all development applications, the following noise control measures are recommended by the City, in order of preference:

Protection of Outdoor Living Areas:

- Distance setback with soft intervening ground
- Insertion of noise insensitive land uses between the source and sensitive receptor
- Orientation of the site and buildings to provide sheltered zones for rear yards
- Earth berms
- Acoustic barriers

Protection of Indoor Living Areas:

- Distance setback with soft intervening ground
- Insertion of noise insensitive land uses between the source and sensitive receptor
- Orientation of the site and buildings to orient sensitive uses away from sources
- Enhanced construction techniques and quality (brick veneers, multi-pane windows, etc.)

- In the case of protection of indoor spaces due to stationary noise in a Class 4 area, please refer to NPC-300

Stationary noise should be addressed at its source, which may include selection of equipment, installation of equipment sound barriers and equipment sound attenuation, relocation of equipment within a facility, or a combination thereof. If additional mitigation is required, the City will consider change in processes and timing of equipment use, hours of facility operation, or other administrative controls over how the facility operates, however as these can be more difficult to monitor and maintain over time, special attention will be paid to the implementation of these options.

Noise originating from aircraft operations is particularly difficult to mitigate, and additional emphasis must be placed on the use of distance separation as the primary control measure. Additionally, the City of Guelph may implement zoning restrictions for lands in the airport vicinity, at its discretion.

How are noise study results and recommendations implemented?

Where noise is a concern that warrants recognition or mitigation, the specific noise attenuation measures and warning clauses may need to be included in a development agreement. The following sections outline some of the components that may need to be included, depending on the site context.

Noise-sensitive development

Provision for Maintenance, replacement and repair

Noise control mitigation measures may require maintenance from time to time. Where necessary, the development agreement should contain provisions to require the owner to maintain the range of noise control measures as approved by the City in a good and safe condition to the satisfaction of the City. The agreement may also include the necessary procedures for repairs and remedies at the **owner's expense in accordance with the City's property standards practices.**

Financial Securities

To secure the fulfillment of the required noise control measures, the City may require Letters of Credit to cover the actual implementation of the necessary work. The proponent may be required, prior to receipt of final approval, to enter into a Financial Agreement with the City and to deposit the necessary

Letters of Credit. The principal sum of the Letter of Credit required will be in an amount equal to One Hundred Percent (100%) of the total estimated cost **of the noise control measures as certified by the proponent's Consulting Engineer(s)** and to the satisfaction of the City.

The conditions for the Letter of Credit release will be directly connected with the **engineer's certification process for exterior and interior noise mitigation** features.

Confirmation of Final Construction and Release of Funds

Upon completion of the project, the **developer's** acoustical engineering consultant will visit and assess the site to complete their certification letter, including inspection of the installed noise control measures to confirm that the recommendations as approved through the noise study have been implemented. The acoustical engineer should not complete or submit the certification letter until confirming that the development is in compliance with all requirements in the approved noise study and the applicable conditions in the development agreement. The letter must also provide all relevant information such as the project name, lot numbers, building identification, drawing numbers, noise study report number, dates of relevant documents and in particular reference to the documents used for building permits and site grading applications. The letter(s) must be signed and bear the **Professional Engineer's stamp**.

Release of funds held (Letter of Credit, security, etc.) shall follow the process outlined within the Specifications for Noise Barriers found in Appendix B.

Noise-generating development

Provision for Maintenance, replacement and repair

The development agreement will contain provisions to require the owner to maintain the range of noise control measures, as approved by the City in a good and safe condition to the satisfaction of the City. The agreement should also include the necessary procedures for repairs and remedies at the **owner's expense in accordance with the City's property standards practices** and the MECP Environmental Compliance Approval (Noise) process.

Confirmation of Final Construction

Upon completion of the project, the acoustical engineer will visit the site, inspect the installed noise control measures and be satisfied that the installed work conforms to the noise study recommendations as approved earlier by

the City and/or the approval agencies and authorities (MECP). The engineer should then prepare a certification letter confirming acoustical compliance with all requirements in the approved noise study, the applicable conditions in the development agreement, and the applicable requirements and conditions of the MECP Environmental Compliance Approval (ECA) (if applicable).

The letter must also reference all relevant information such as the project name, lot numbers, building identification, drawing numbers, noise study report number, dates of relevant documents and in particular reference to the documents used for building permits and site grading applications. The letter **must bear the Professional Engineer's signature.**

The certification letter shall then be submitted to the City with a request to release the relevant parts of the Letter of Credit. The amount of the Letter of Credit may be reduced or completely released by the City subject to their satisfaction of the submission, based on the following:

- actual site visits, inspection, testing, including actual sound level readings at the receptors;
- reference to previously approved Detailed Noise Control Studies, Site Plan and the relevant approved ECA;
- non-conditional final approval for release for occupancy

Class 4 Land Areas

A developer may request to have lands classified as Class 4 land areas through a formal Development Application under the Planning Act. Applications for Class 4 must be accompanied by a Detailed Noise Study. Details of the reclassification and appropriate warning clauses shall be registered on title, and copies of the final noise study and development agreement shall be distributed to the stationary noise source land owner for their information.

The City of Guelph may identify lands suitable for Class 4 designation through other planning or engineering projects, policies or studies, at their discretion.

For more information on Class area types and their applicability, please see MECP publication NPC-300 (all Class Areas).

Technical Requirements for Noise Studies

General Report Requirements

All noise studies must be prepared consistent with the methods described in this document and where applicable those described in NPC-300. Where there are other relevant documents, methods or criteria these should be referenced in the noise study. The noise study report must note any variations or exceptions to Provincial or City criteria or methods.

Noise studies should be prepared as early as possible in the application process, in most cases as part of a complete application under the Planning Act. The reason that the study is required so early in the process is because the outcome of the study is intended to contribute directly to site design and consequent decisions of committee, council and/or staff on the planning application.

Noise studies are to be prepared by qualified individuals with experience in environmental acoustics, and be certified by Professional Engineers licenced in the Province of Ontario in good standing, with qualifications stipulated by the Association of Professional Engineers of Ontario in their guideline document titled **“Professional Engineers Providing Acoustical Engineering Services in Land-Use Planning”**, revised June 24, 1998. All studies and certificates need to be certified by a Professional Engineer (stamped, signed and dated).

Types of Studies

Feasibility Noise Study

The objective of a Feasibility Noise Study is to identify if noise will be an issue for the proposed development and to explore possible alternatives if noise levels are expected to be near or exceed Provincial or Municipal guidelines. The level of detail in a feasibility study may vary depending on the complexity of the project and is largely dependent on the outcome of the pre-consultation meeting with the City and the results of initial observations and analysis by the engineer. Note that a Feasibility Noise Study is the same as the Noise Impact Study identified in the City of Guelph Official Plan.

Feasibility Noise Studies should include the following items, where applicable:

Scale Plan(s) identifying:

- Locations of noise sources;
- Receptor locations;

- Distance and angles between sources and receptors;
- Existing grade elevations used;
- Noise contour map (optional).

Assessment of the site layout including:

- Noise sources in relation to building orientations;
- Outdoor amenity areas;
- Indoor environment;
- Potential locations for source and/or receptor noise mitigation;
- Identification of potential land use conflicts.

Evaluation of:

- Noise control model results;
- Alternative site designs;
- Alternative methods of noise mitigation.

Recommendations:

- For preferred noise control measures or strategies;
- For site plan design adjustments to improve the feasibility of noise mitigation;
- For the content of the Detailed Noise Study including further data requirements, analysis and implementation of proposed noise control measures.

Following the completion of a Feasibility Noise Study the City and development team should have sufficient information to determine the acoustic environment of the proposed development. If the development is determined not to require noise control measures then a Detailed Noise Study may **not be necessary, at the City's** discretion. If noise control measures or additional design considerations are found to be necessary to meet Provincial or Municipal guidelines then a Detailed Noise Study will be required as a condition of planning approval.

Detailed Noise Study

The objective of a Detailed Noise Study is to assess and recommend the impact and mitigation of environmental noise sources. In most cases a noise feasibility study will have been prepared for the development as part of the initial application. The Detailed Noise Study includes substantively more information on the noise sources and mitigation than that contained in a Noise Feasibility Study. Note that a Detailed Noise Study is the same as the detailed Acoustical Design Study identified in the City of Guelph Official Plan.

The typical requirements of a Detailed Noise Study are listed below:

Scale Plan(s) identifying:

- Locations of noise sources
- Receptor locations
- Distance and angles between sources and receptors
- Existing and/or proposed grade elevations used
- Noise contour map (optional)
- A copy of the previously approved draft plan, site plan, etc.
- A copy of the proposed grading plan showing proposed mitigation

Assessment of the site layout including:

- Noise sources in relation to building orientations
- Outdoor amenity areas
- Indoor environment
- Locations of proposed source and/or receptor noise mitigation
- Identification of potential land use conflicts
- Traffic data and volumes based on City (or responsible agency) approved corridor and traffic data, attach details to the study

Evaluation and Discussion of:

- Noise control model results
- Site design and alternative methods of noise mitigation based on existing, proposed and future land use context
- Proposed mitigation measures and justification for the preferred noise mitigation alternatives (if any); demonstration that proposed mitigation will achieve City and Provincial guidelines

Additional Requirements:

- Recommendations for preferred noise control mitigation
- Specific recommendations for each lot, block, unit, etc. documented in clear and concise summary form to aid implementation purposes
- Building component acoustic specifications based on the best available project drawings
- All lots, blocks, units, locations requiring noise control measures named and referenced in the study
- Warning clauses using City standard wording
- Clearly written recommendations and implementation procedures
- Costs for mitigation measures for financial securities (sound barriers, special provisions for building components, air conditioning, etc.); the

engineer may rely on the expertise of other specialist consultants for determining reasonable cost estimates for the various specified mitigation measures

It is essential that the detailed noise control study identify the details of preferred noise control measures, and not list alternative solutions. All noise control measures are subject to mutual approval by the proponent and the City.

Sound measurement procedures should be conducted in accordance with the technical procedures and practices developed by the MECP. The details for using actual field measurements, including the procedures, instrumentation, results and analysis should be documented in the applicable detailed noise study report.

If acoustic barriers or berms are recommended, then appropriate cross sections shall be provided in the detailed noise study to clearly illustrate the proposed berm and/or wall configuration in relation to existing and future grades as indicated by the proposed civil Grading Plan. Cross sections and/or the data in the report must include all information required to calculate the expected sound levels (such as the location and elevation of the noise source(s), receiver(s), building(s), acoustic barrier(s), berm(s), berm slopes, sidewalks, ditches, roadway and/or railway elevations and centerlines and property lines).

Assessment of Noise

All completed noise studies must be consistent with the methods and requirements outlined in this document and those outlined in NPC-300. Where other relevant documents, methods, or criteria are used, these must be referenced in the noise study. The noise study must note any variations or exceptions to Provincial or City criteria or methods. The following outlines some of the study assessment requirements, but is not an exhaustive list; additional requirements may be outlined in NPC-300 and/or requested by City staff based on site-specific circumstances.

Transportation Sources

Noise Criteria:

Applicable noise criteria as outlined in this document and in NPC-300.

Traffic Data:

Road traffic data (AADT traffic volumes) must be requested from City staff for each project.

Rail traffic data must be requested from the rail line owner(s) and/or operator(s), and must include worst-case forecasted volumes and train configurations to at least 10 years beyond the anticipated construction completion date. In the absence of information from the railway companies on the future rail traffic volume, the existing data should be increased at annual rate of 2.5% for a minimum of 10 years after the expected construction completion date.

Road and Rail Traffic Noise Predictions:

There is no minimum number for residences that define a noise sensitive area. Therefore, all noise sensitive land uses, regardless of size or location, are to be assessed for potential application of noise control measures.

ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation), and STEAM (Sound from Trains Environment Analysis Method) are the required prediction methodologies to be used for all noise studies in the City of Guelph. Computerized calculations of these methods are to use the STAMSON 5.04 software as provided by the MECP.

Input data and model assumptions when using STAMSON must correlate to those outlined in ORNAMENT and STEAM, and any variations or exceptions must be identified in the report.

In certain situations, the preferred approach may include a combination of actual field sound measurements supplemented by calculations and prediction procedures. Examples of special cases requiring the use of supplementary noise measurements include difficult site and/or topographic conditions, the presence of numerous acoustical obstructions/barriers, unusual vehicular traffic conditions and presence of other extraneous sources of noise that cannot be predicted. When field measurements are required, MECP procedures must be followed and documented in the study, as per documents NPC-101, NPC-102, NPC-103 and NPC-104, and other references as appropriate.

Noise shall be assessed separately for outdoor and indoor points of reception.

Impact assessment and mitigation design for outdoor areas is to include the combined effect from all surface transportation sources. Indoor noise impact shall be assessed separately for road and rail sources; indoor noise control measures shall be designed based on the combined effect of all noise sources.

Noise sensitive receiver locations and heights are to be based on City and Provincial guidelines, and on actual site design, as appropriate. Generally, outdoor receivers are located as described in the Definitions section above. Indoor receivers are analyzed at a standing height in the interior space under assessment, and/or at the outside Plane of Window [POW] at a height equal to the centroid of the top one third of the proposed window based on the building design. When the building design is unknown, typically a height of 1.5m above grade is used for 1st storey windows and 4.5m above grade is used for 2nd storey windows. When POW is analyzed for multi-storey, multi-family buildings (such as stacked townhouses or apartment buildings), actual window locations and heights must be assessed.

The number and type of assessed receivers or points of reception will be determined based on site specific conditions.

For improved accuracy, curved road or rail sections, roads with varying grade elevations, 4 and more lane roadways and surface transportation corridors with sound barriers might benefit from being assessed using multiple segments.

Where sound barriers are involved in the analysis and especially where the existing and/or proposed grade elevations change considerably, sound level calculations should be performed at more frequent locations. Every effort should be made to secure reliable grade elevations at the receptors, barrier base and source and to be included in the study. For Noise Feasibility Studies, it is important to establish the viability of noise control measures, where required, based on the existing grade elevations for relatively flat conditions. For sites involving difficult topographies (source, barrier or receptor locations), preliminary grade elevations must be used. It is only in the final stages of the planning approval process that noise assessments be updated to a greater detail based on reasonably accurate proposed grade elevations.

The receptors, where segments of sound barriers are involved, should be in the acoustic "shadow zone", being that area behind the barrier where there is no line of sight exposure to the traffic noise (see the ORNAMENT model documentation, as prepared by the MECP, for details).

Where receptors are found to have existing sound barrier(s), the study should address the sound levels with such barrier(s) in place. The general condition of the barrier(s) and their acoustic performance should be included in the noise study together with appropriate conclusions and recommendations.

For road traffic, the "posted speed" limit should be used in calculation of the sound levels. Where it can be demonstrated by any of the concerned parties that the actual operating speed is significantly different than the posted speed limit (i.e. by over 5 km/hour for the 85% percentile speed), additional analysis may be included in the study to deal with this change. For rail, the system speeds shall be obtained from the transit authority.

All receptors (residential and non-residential) that may have an outdoor noise sensitive land use component are to be identified and addressed in the study. The impacts on noise-sensitive non-residential buildings that do not include central air conditioning are also to be addressed in the noise assessment.

Where noise barriers are proposed on Condominium lands they are to be placed within the common elements, and additional site plan and plan of condominium approval conditions will be required to ensure noise barriers are maintained by the condominium board.

Optional Noise Contour Mapping

An emerging technology in acoustical engineering is the preparation of noise contour maps. A noise contour map is a thematic representation of predicted noise levels based on a model of the terrain, structures and noise sources. The model and the maps have great potential to visualize the effect of urban design alternatives to decision makers and the community.

The City supports the preparation of noise contour mapping in noise feasibility and/or detailed noise studies in order to convey the effect of various urban design and mitigation alternatives and to help substantiate recommendations made in the reports. Because this is an emerging technology the City does not require noise contour maps but encourages their use when appropriate.

Noise contour maps do not negate the requirement for the use of STAMSON for prediction of noise levels at receiver points, but they may be used to corroborate conclusions of the STAMSON model. Where a noise contour map is submitted the modelling parameters such as assessment grid, height, model algorithm, etc., must be outlined in the report. When feasible, the United States Federal Highway Administration Traffic Noise Model (TNM 2.5 or later) algorithm should be used.

Where a noise-sensitive development for which noise control measures will be required precedes the construction of a potential/future surface transportation corridor, the City may require as a condition of approval that:

- a) A noise barrier is constructed within the development to mitigate noise originating from the proposed surface transportation corridor. Traffic and **corridor data used for noise prediction shall be in accordance with the City's Environmental Noise Control Guideline.**
- b) In all cases the proponent of the new development is responsible for the implementation of all other noise control measures within the noise sensitive buildings including building acoustical requirements, notice(s) on title and the use of air conditioning.
- c) All technical details related to criteria, predictions and implementation apply to those stated throughout this document.

Stationary Sources

Noise Criteria:

Applicable noise criteria as outlined in this document.

Stationary Noise Data:

Noise data for stationary sources can be based on field-measurements or relevant, cited literature. In all cases, stationary noise source assumptions must be clearly stated in the report and supported by included data and references.

Background ambient noise may also be based on field-measurements or predicted based on the quietest hour traffic volume, based on recent observations, for each relevant time period under assessment.

In all cases where field measurement of noise is desired, the measurement procedures and reporting details identified in the MECP procedures must be followed and documented in the report, as per documents NPC-101, NPC-102, NPC-103 and NPC-104, and other references as appropriate.

ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation) is the required prediction methodology to be used when predicting background ambient noise based on the quietest hour traffic volume. Computerized calculations are to use STAMSON 5.04 software.

Prediction of stationary noise levels and impacts to points of reception may be determined using alternate computerized software including 3D noise mapping software. In all cases the report must outline all model assumptions used, and contain sufficient input and output data including a complete sample calculation. In addition, a copy of the model file(s) may also be included digitally with the submission. When feasible, the United

States Federal Highway Administration Traffic Noise Model (TMN 2.5 or later) algorithm should be used.

Noise Contour Mapping

Where available (software dependant), include noise contour maps within the report. These should be suitably captioned, labeled and annotated. Where a noise contour map is submitted the modelling parameters such as assessment grid, height, model algorithm, etc., must be outlined in the report.

Mitigation of Noise

As mentioned above (pages 9 & 10) the most effective and preferred form of mitigation is to use distance to separate sensitive land use from the source of noise. Distance setback options may assist with meeting both indoor and outdoor noise criteria, and may improve site stormwater management.

If distance separation is proven to not be feasible, additional mitigation options are available for consideration and they must be appropriately chosen to provide for the health and safety of the occupants of the noise sensitive land use and:

- Keep existing, proposed and future land use context in mind
- Meet land use planning and urban design objectives
- Must not interfere with servicing the site

Where noise barriers are chosen the noise study must include adequate justification for their use and must include the location and elevation specifications for the proposed barriers including the required top of barrier elevation, and the barriers must be located and constructed as per the Specifications for Noise Barriers found in Appendix B.

Where it is determined that noise mitigation is required to protect indoor spaces, acoustical objectives need to be translated into actual building components, physical measurements, dimensions, and specific materials through an acoustic building component review, included as part of the detailed noise study.

- This section of the study shall outline the required building components including exterior wall sections and window selections and other best management practices required to mitigate noise to the interior spaces under assessment.

- Approved acoustic parameters, building/unit design and layout/floorplan details, window and wall design and material selection, and similar information must be compiled by the acoustic engineer(s) and included as part of the building component design.
- The use of acoustic terminology such as sound levels, decibels, STC, etc. is not acceptable. Instead reference to specific building components and equipment specifications is required, such as thickness of glazing, material specifications, details of walls and doors, maximum size of equipment, equipment make and model, and location of equipment, among others.
- **Please note that generic “worst-case” calculations** for building component-driven noise mitigation may not be accepted and each unit should have building components designed according to the individual floor plans intended for construction.

Appendix A - Warning Clauses and Standard Conditions

The following warning clauses and standard conditions are to be considered when finalizing a noise study, and for inclusion in a Development Agreement, registered on title and be included in Offers of Purchase and Sale for designated residential lots, blocks or units. Only those appropriate for the development shall be chosen from the below list, and some minor adjustment of wording or inclusion of additional clauses and conditions may be necessary for site-specific applications.

Warning Clauses

This clause shall be included in all cases:

“The Transferee covenants with the Transferor that the below clause, verbatim, will be included in all subsequent Agreements of Purchase of sale or lease and Sale and Deeds conveying the lands described herein, which covenant shall run with the said lands and is for the benefit of the subsequent owners and renters of the said lands and the owner of the adjacent road.”

Select from the following clauses, as is appropriate for the site:

A.

“The Transferee of [insert lots/blocks/units], for himself, his heirs, executors, administrators, successors and assigns acknowledge being advised that despite the inclusion of noise control features in the development and/or within the building unit sound levels due to increasing road traffic may occasionally interfere with some indoor and/or outdoor activities of the dwelling occupants as the sound levels may at times exceed the sound level limits of the municipal and provincial noise criteria.”

“This development includes a number of measures to help reduce noise impacts, listed below. To ensure that provincial and municipal sound level limits are not exceeded and/or to keep sound levels as low as possible it is important to maintain the sound attenuation features provided.”

“This development includes building and street orientation to help increase setback distances to major noise sources and shield some rear yards from excessive noise levels.”

B.

"This development includes an acoustic barrier to help reduce the sound levels within the rear yard of this and other nearby units."

C.

"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the municipal and provincial sound level limits."

"The building components of this dwelling unit (walls, windows and exterior doors) have been designed to provide acoustic insulation so that, when windows and exterior doors are closed, the indoor sound levels are within the municipal and provincial sound level limits. The details of this building component design are available by contacting the builder of this unit."

D.

"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the municipal and provincial sound level limits."

"The building components of this dwelling unit (walls, windows and exterior doors) have been designed to provide acoustic insulation so that, when windows and exterior doors are closed, the indoor sound levels are within the municipal and provincial sound level limits. The details of this building component design are available by contacting the builder of this unit."

E.

"The Transferee, for himself, his heirs, executors, administrators, successors and assigns acknowledge being additionally advised that due to the proximity of the **adjacent school, sound levels from the school may at times be audible"**

F.

"The Transferee, for himself, his heirs, executors, administrators, successors and assigns acknowledge being additionally advised that the installed acoustic barrier is on private property and must be maintained and kept in good repair by the property owner. Any maintenance, repair or replacement is the responsibility of the

property owner and shall be the same material or to the same standards, having **the same colour, appearance and function of the original.**"

G.

"Warning: Canadian National Railway Company or its assigns or successors in interest has or have a right-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the rail facilities on such right-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). CN will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid right-of-way."

H.

"Purchasers/tenants are advised that due to the proximity of the adjacent industry (facility) (utility), noise from the industry (facility) (utility) may at times interfere with outdoor activities."

"To address potential impacts of noise from the adjacent industry (facility) (utility) this development has been designed to provide for specific outdoor amenity areas **and a quieter indoor environment.**"

"Purchasers/tenants are further advised that sound levels due to the adjacent industry (facility) (utility) are required to comply with sound level limits that are protective of indoor areas and are based on the assumption that windows and exterior doors are closed. This dwelling unit has been supplied with a ventilation/air conditioning system which will allow windows and exterior doors to remain closed."

I.

"Purchasers/tenants are advised that due to the proximity of the Guelph Airpark, noise from the airport and individual aircraft may at times interfere with outdoor or indoor activities. Guelph Airpark and the City of Guelph are not responsible if the purchaser/occupant of this dwelling finds that the noise levels due to aircraft operations continue to be of concern or are offensive."

Standard Conditions

1. The Owner/Developer acknowledges and agrees to comply with the most current **version of the City's** Specifications for Noise Barriers.
2. The Owner/Developer acknowledges and agrees that the noise attenuation barriers are to be constructed 150 millimetres inside the property line on private property in a location and to the height (minimum top of noise barrier elevation) identified in the approved noise study. Fences shall be constructed as per municipal and provincial standards for noise barriers.
3. The Owner/Developer acknowledges and agrees to install noise barrier footings to a minimum depth of 2 metres depending on soil conditions when temperatures are above 5 degrees Celsius and when frost is not in the ground, whenever possible. The Owner/Developer agrees to install the footings in accordance with cold weather concrete provisions as per OPSS 904.07.03.08, if required.
4. The Owner/Developer acknowledges and agrees to ensure that all surface drainage channels such as grassed swales and ditches shall be located on private property and shall not cross the proposed noise barrier but shall be self-contained and in keeping with the approved stormwater management design for the site. This will ensure the mitigation effect of the noise barrier base by eliminating holes and gaps.
5. The Owner/Developer acknowledges and agrees that, if stepping of the noise barrier is required, the interval height per panel section of the required noise fence will be no greater than 101.6 millimetres (4 inches).
6. The Owner/Developer acknowledges and agrees that where a noise barrier is installed by the Owner/Developer as a condition of development, the Owner/Developer agrees that all purchase and sale agreements for the whole or any part of a lot/block that shall receive a noise barrier shall provide notification to the purchaser that they are responsible to maintain the noise barrier in a good and sound condition at their own expense including if necessary, the replacement or reconstruction of the barrier.
7. The Owner/Developer acknowledges and agrees that prior to construction of the noise barrier, their professional engineering consultant must file a certificate with the City certifying the acoustical and structural integrity of the design. The design drawings accompanying the certification are to include details such as, but not limited to, the location, grading, barrier details, elevations, lots affected, and are to be stamped and signed by a Professional Engineer.

8. The Owner/Developer acknowledges and agrees, after construction, to provide a certificate from their professional **engineering consultant together with an "as-built" drawing of the noise barrier confirming** details such as, but not limited to, the location, elevations and grades, and a statement certifying that the structure installed is a noise barrier that will mitigate traffic noise to the levels required in the approved study.
9. The Owner/Developer acknowledges and agrees that, where central air conditioners, heat pumps or other similar devices are required to be installed, the final installation shall comply with the provincial criteria "Residential Air Conditioning Devices, Publication NPC-216, 1993", or any subsequent revisions.
10. The Owner/Developer acknowledges and agrees to construct multi-unit buildings to provide at least a noise rating of STC 50 between adjoining units, or greater if required by the Ontario Building Code.
11. The Owner/Developer acknowledges and agrees that, prior to occupancy and/or final building inspection, their professional engineering consultant shall inspect the site and certify in a letter that the recommended interior/exterior noise control measures comply with the measures in the approved study; such certificate shall be provided to the City.

Appendix B - Specifications for Noise Barriers

Noise Barrier System Requirements

The details presented below refer to noise barriers as a system of various components including the base berm, the wall, and all other associated components.

Noise Barrier Systems can be designed using barrier walls or fences, earth berms, or a combination thereof. Any combination of wall and/or berm, constructed to mitigate noise, is considered a noise barrier system and can also be referred to more simply as a noise barrier.

Design Requirements:

- Where a barrier is required, the receptors must be located within its acoustical shadow zone.
- Noise barrier wall/fence heights for new development shall be 1.8m. If a higher barrier system is required to mitigation noise, other mitigation measures should be considered instead of, or in combination with, the noise barrier wall. Noise barrier wall heights above 1.8m will be reviewed on a case-by-case basis, and justification must be included in the report.
- The noise barrier should be continuous and turned through appropriate angles and lengths away from the source at both ends to protect the receivers from the flanking sides.
- In cases where the barrier system is interrupted, barrier returns or parallel screens may be required and the detailed design and calculations of the treatment in such cases will have to be incorporated into the noise report. The report and the grading plan must include a detailed plan and appropriate cross sections of such cases.
- The City may approve the use of an acoustic gate where the installation of the gate is advantageous in order to allow for access to a rear yard amenity area while shortening the overall length of the noise barrier. Note that gates must be placed so as to limit fugitive noise when open.
- Where possible proposed barrier systems should be complimentary with nearby existing barrier systems, and must not negatively impact existing receivers (acoustically).

Material:

Noise barriers should have the following general characteristics:

- Have no holes or gaps
- Be non-combustible
- Be resistant to graffiti or include a graffiti resistive coating conforming to relevant ASTM standards (fences)
- Be vermin and fungus resistant (fences)
- Have a minimum predicted maintenance free lifespan of 20 years
- Final barrier material/manufacturer shall be approved by the City

The noise barrier shall be designed to withstand all possible forces and loads encountered during the design life of the barrier and remain serviceable. The design shall be site specific with reference to the wind pressure, earthquake load, freezing depth and soil conditions.

All components of noise barrier systems, including their performance, such as corrosion and weathering, to be in accordance with the applicable CSA, ASTM, CAN/L1LC, ULC, CSA/CAN and ANSI standards.

Acoustic Characteristics:

Sound Transmission Class

Noise barriers must provide the desired minimum sound level reduction and protect all receiver locations subject to the guidelines. All barriers must have one or more of the following acoustic characteristics:

- The Sound Transmission Class (STC) of the panel material to be 20, or greater, when tested in accordance with ASTM-E90 (a test report to be submitted for approval)
- The Sound Transmission Class (STC) of the panel material has historically been demonstrated to be 30 or greater (include references)
- Surface mass density not less than 20 kg/sq.m (4 lbs/sq-ft)

Sound Absorption

Noise barrier systems should be noise absorptive on both sides. Barrier panels should be tested to determine the Noise Reduction Coefficient (NRC) in accordance with ASTM-C423. An assembly of panels should be tested, as required, in accordance with the ASTM Procedures for free-standing screens. The average Noise Reduction Coefficient (NRC) shall be not less than 0.70 (70%).

Construction:

Height and Alignment

The noise barrier is to be constructed to the height and alignment as specified by the acoustical consultant. The minimum specified top of barrier elevation shall be maintained at all times.

Site Grading and Preparation

All barriers must be installed based on the required top of barrier elevation outlined in the approved study. Changes in alignment and/or height shall occur at the posts, by suitable means, to avoid acoustical degradation.

To prevent openings from occurring under the barrier an additional timber, not less than 5mm x 20mm in section, shall be securely fastened horizontally to the bottom of the barrier, and shall extend the full width of each barrier panel between adjacent vertical posts. This additional timber shall be buried to a depth equal to one-half its width during the final grading operation. Earth and pavement grading shall be sloped at a minimum of 2% and a maximum of 33% away from the barrier.

Document Submission Requirements

The following items shall be submitted to the City for approval for each noise barrier system project as part of a detailed noise study:

- Shop drawings, signed and sealed by a qualified Professional Engineer licensed by the Professional Engineers of Ontario, showing the details of noise barrier system components, including material specifications.
- Structural drawing(s), signed and sealed by a qualified Professional Engineer licensed by the Professional Engineers of Ontario, showing foundation details and specifying design criteria, climatic design loads, as well as applicable geotechnical data used in the design.
- Layout plan complete with proposed grade and top of barrier elevations.
- Typical and specific (as necessary) cross sections of barrier system.
- A covering letter stating deviations or exceptions to the City requirements and the reasons/justification for the deviations.
- The manufacturer's name and address and trade name of the product.
- A general statement as to the composition of the materials.
- Barrier section/elevation drawings showing proposed materials, colours and patterns.
- An estimate of life cycle cost over the period of installation, maintenance and repair through replacement in 20 or more years.