

# Association of Australasian Acoustical Consultants Guideline for Building Acoustic Scope of Work

Version 1.0



## TABLE OF CONTENTS

1.0	INTRODUCTION .....	4
1.1	PURPOSE.....	4
1.1.1.	HOW TO USE THIS DOCUMENT .....	4
1.1.2.	ARCHITECTS, LEAD CONSULTANTS AND CLIENTS .....	4
1.1.3.	ACOUSTIC CONSULTANTS.....	4
2.0	EXTENT OF SERVICES .....	5
2.1	ARCHITECTURAL ACOUSTICS .....	5
2.1.1.	SPACE ACOUSTICS.....	5
2.1.2.	SPEECH PRIVACY AND SOUND ISOLATION.....	5
2.1.3.	RAIN NOISE.....	6
2.2	BUILDING SERVICES ACOUSTICS.....	6
2.2.1.	MECHANICAL SERVICES .....	6
2.2.2.	ELECTRICAL SERVICES.....	7
2.2.3.	FIRE SERVICES .....	7
2.2.4.	HYDRAULIC SERVICES .....	7
2.2.5.	VERTICAL TRANSPORTATION SERVICES .....	7
2.3	ENVIRONMENTAL NOISE .....	7
2.3.1.	NOISE INTRUSION.....	7
2.3.2.	NOISE EMISSION .....	8
3.0	PROJECT DELIVERY.....	9
3.1	CONCEPT DESIGN .....	9
3.2	SCHEMATIC DESIGN .....	9
3.3	DESIGN DEVELOPMENT.....	10
3.4	CONTRACT DOCUMENTATION .....	11
3.5	TENDER AND PROCUREMENT .....	11
3.6	CONSTRUCTION .....	12
3.7	POST CONSTRUCTION .....	12
4.0	ADDITIONAL SERVICES .....	13
4.1	SITE ASSESSMENT – EXISTING CONDITIONS.....	13
4.2	VALUE MANAGEMENT.....	13
4.3	DEVELOPMENT APPLICATION / PLANNING PERMIT APPLICATION .	13
4.4	ENVIRONMENTAL NOISE MODELLING .....	14
4.5	ROOM ACOUSTIC MODELLING.....	14
4.6	DESIGN TO SUIT ALTERNATIVES (PRODUCT SUBSTITUTIONS).....	14
4.7	CONSTRUCTION NOISE AND VIBRATION MANAGEMENT PLAN .....	15
4.8	CONSTRUCTION NOISE AND VIBRATION MONITORING.....	15
4.9	PRODUCT PERFORMANCE REVIEW / ACOUSTIC TESTING .....	16
4.10	COMPLIANCE TESTING.....	16
4.11	CORRECTIVE ACTION.....	17
4.12	STRUCTURAL DYNAMICS.....	17

5.0 OTHER SCOPE ELEMENTS FOR CONSIDERATION ..... 18

5.1 MEETING ATTENDANCE ..... 18

5.2 EQUIPMENT COSTS AND DISBURSEMENTS ..... 18

5.3 EXCLUSIONS..... 18

## **1.0 INTRODUCTION**

### **1.1 Purpose**

This document has been prepared by the Association of Australasian Acoustical Consultants (AAAC) to support clients, architects and other professionals engaging acoustic consultants.

It outlines the range of building acoustic works typically undertaken by acoustic consultants and provides a base for communication between all parties involved in a project. The aim is to increase understanding of the work and possible roles of acoustic consultants and the benefits they may bring to a project.

A clearly articulated and understood scope is fundamental to the success of any project and forms the basis for the brief. This should identify project specific objectives and requirements, timeframes, milestones, expected outcomes and deliverables.

The project scope contained herein establishes an understanding of what work the acoustic consultant may undertake at different stages of the project and helps ensure expectations are clear and transparent. It should be written in clear language that can be understood by all parties.

It is noted that not all projects have the same needs, and not all clients have the same expectations. This document has primarily been written for the Australian industry, but may also be applied to projects throughout the Asia Pacific region with due care.

#### **1.1.1. How to use this document**

This document is a useful tool for the development of a clear agreement regarding the work to be performed, and what aspects are within or beyond the scope of a particular agreement.

#### **1.1.2. Architects, lead consultants and clients**

Architects and other professionals engaging acoustic consultants should use this to help identify the scope of works required and to help develop a brief for acoustic consultants.

A Request for Tender (RFT) and/or the acoustic brief should, as much as possible, clearly and unambiguously outline the scope of work. Where this is unknown or unclear, this document can form the basis of a conversation as the acoustics consultant prepares their scope document and/or return brief.

This document also provides a clear framework to assess the fee proposals from different acoustic consultants, along with their experience and expertise.

#### **1.1.3. Acoustic consultants**

Acoustic consultants should use this document to help articulate the range and scope of services they can provide to a lead consultant or client for a project. It can also be a useful document to educate clients about the range of work acoustic consultants may undertake.

## 2.0 EXTENT OF SERVICES

Establishing the scope of work for the acoustic consultant on the project should include an outline of the intent of the project and specific acoustic requirements, both functional and experiential. It should include a description of the work that will be undertaken to achieve this and the scope of recommendations and design advice that will result.

The project scope should also include a clear statement about additional certification and assessment requirements that need to be met, and the documentation required for these – for example, environmentally sustainable design requirements such as Green Building Council of Australia (GBCA) Green Star Design and As-Built certification.

This work falls under three main areas – architectural acoustics, building services acoustics, and environmental noise.

### 2.1 Architectural acoustics

#### 2.1.1. Space Acoustics

Identify the acoustic qualities required for interior spaces (or external as applicable) within the project and outline the desired acoustic experiences for users and inhabitants. Provide design advice to achieve these tasks could include:

- Establish the recommended reverberation times for different areas.

These will be based upon the recommendations contained within Australian Standard AS/NZS 2107:2016 “Acoustics – Recommended design sound levels for building interiors”.

- Review space acoustics for speech intelligibility in critical areas.
- Provide advice in relation to internal acoustic treatments that will satisfy the reverberation criteria.

#### 2.1.2. Speech privacy and sound isolation

Identify requirements and criteria in relation to acoustic privacy and isolation, and the relationship between different spaces. Provide design advice to achieve these. Tasks could include:

- Nominate requirements for acoustic separation of building areas. (For example, the separation of stairwells, corridors, or plant rooms from general office areas.).
- Outline recommended criteria for acoustic separation and communicate these effectively (for example, communicate recommended acoustic ratings on coloured markups).
- Examine proposed building layout and classify building areas in terms of the following:
  - acoustic separation requirements.
  - internal design noise levels from established project criteria.

- Provide acoustic design advice in relation to walls, floor, and ceiling constructions to satisfy the acoustic design criteria for sound insulation. Recommend typical constructions required to achieve the desired acoustic performance standards.
- Provide acoustic design advice in relation to suitable door constructions and acoustic seals.
- Limit both airborne and structure borne noise intrusion.

### 2.1.3. Rain noise

Identify the requirements and criteria in relation to rain noise. Outline particular considerations that result from the project location, for example, tropical intensity. Provide design advice to satisfy these criteria and mitigate noise intrusion.

Tasks could include:

- Nominate internal criteria for rain noise.
- Provide acoustic design advice in relation to roof and ceiling construction build-up to satisfy the acoustic rain noise design criteria.

## 2.2 Building services acoustics

Identify the noise controls required to mitigate the impact of services within the project.

Recommend criteria for internal noise from building services (mechanical, fire, and hydraulic services) within various spaces of the building. Provide acoustic design advice to meet these requirements.

### 2.2.1. Mechanical services

Provide acoustic design advice in relation to mechanical services – for example, fan noise, airflow induced noise, duct attenuation and duct noise breakout, and plant rooms.

Tasks could include:

- Predict the mechanical services noise levels within various spaces of the building.
- Acoustically design elements to control noise in duct systems.
- Acoustically design building elements such as walls, ceilings, floors, facades, and louvres to control noise transmission between spaces.
- Acoustically design treatments to mechanical plant such as:
  - Fans.
  - VAV boxes.
  - Air Handling Units.
  - intake and exhaust shafts.

### 2.2.2. Electrical services

Provide acoustic design advice in relation to electrical services.

Tasks could include:

- Liaise with electrical services consultant and review standard acoustic treatment details where required. Noise generating plant such as electrical generating sets may require treatment or acoustic enclosures. Treatment of electrical cable penetrations through building separating elements may also be considered.

### 2.2.3. Fire services

Provide acoustic design advice in relation to fire services.

Tasks could include:

- Liaise with fire services consultant and review acoustic treatments where required. Specific considerations include noise control for fire pumps and associated generator sets, treatment of pipe and cable penetrations.

### 2.2.4. Hydraulic services

Provide acoustic design advice in relation to hydraulic services.

Tasks could include:

- Liaise with hydraulic services consultant and review treatments where required. Specific considerations include waste pipe noise control, stormwater pipe noise control, noise control for pumps and other hydraulic plant.

### 2.2.5. Vertical transportation services

Provide acoustic design advice in relation to vertical transportation services.

Tasks could include:

- Assessment of noise from lifts, escalators, pneumatic tubes, including associated ventilation plant.

## 2.3 Environmental Noise

### 2.3.1. Noise intrusion

Provide recommendations and design advice for noise intrusion from existing environmental sources – for example, road, rail, aircraft, industrial sites or commercial developments.

Tasks could include:

- Determine appropriate internal noise criteria for the project, in accordance with relevant policies, regulations and guidelines.
- Assess the existing acoustic environment at the site and the nature of the noise sources impacting onto the development. This can often require fieldwork and noise measurements.

- Predict potential noise impacts onto the development.
- Provide advice on controlling external noise ingress through building elements, such as facade and ventilation paths.

### **2.3.2. Noise emission**

Provide recommendations and design advice for noise created by the project and its impact on the surrounding environment.

Tasks could include:

- Determine appropriate environmental noise criteria (limits) for the development, in accordance with relevant policies, regulations and guidelines. Assess the existing acoustic environment at the site to derive noise criteria.
- Assess the predicted noise levels against the environmental noise criteria.
- Provide advice on plant room placement and treatments to comply with relevant criteria and minimise impact on outdoor areas.
- Provide advice on controlling external noise ingress, as required through building elements, especially facade and ventilation paths.
- Review noise sources and recommend treatments to control noise emission into adjacent sensitive sites. This might include car park exhaust fans and plant noise from roof mounted plant equipment. Design noise controls to limit noise emission to the appropriate criteria.



### 3.0 PROJECT DELIVERY

This section outlines the process of designing and delivering the project, along with the tasks and deliverables that may be undertaken by the acoustic consultant for each stage.

The work outlined below is standard for most projects. The project delivery stages described are generic but may vary in detail between jurisdictions and according to procurement models.

Refer to Section 4 Additional Scope for further work that may be relevant and appropriate to specific projects and contexts.

#### 3.1 Concept design

At the concept design stage, the acoustic consultant role includes understanding the general site conditions and expectations of the project, establishing base requirement and contributing to the general overview of the project approach.

It is essential to identify and understand acoustic factors at this stage, to ensure that they are engaged with in an integrated manner throughout the design process.

Tasks could include:

- Review previous noise surveys where available.
- Establish relevant noise limits as applicable.
- Assess the potential adverse noise impacts required to be addressed by the development conditions.
- Establish internal noise and reverberation criteria based on all relevant standards and guidelines.
- Establish acoustic separation criteria for walls, floors/ceilings and building services separation based on all relevant standards and guidelines, and experience on similar projects.

Deliverable:

- Concept stage acoustic report.

#### 3.2 Schematic design

At the schematic design, the acoustic consultant role includes identifying particular issues arising as the design progresses and providing criteria and requirements

Tasks could include:

- Provide advice flagging any key issues based on the information available, such as:
  - facade constructions.
  - junction detailing.

- external glazing.
- internal separating partitions.
- flanking paths.
- doors and seals.
- Provide details of all nominated criteria and the preliminary construction requirements in the form of an acoustic report.

Deliverable:

- Acoustic Schematic Design Report.

### 3.3 Design development

This stage involves providing ongoing advice in relation, construction methods and details, building services systems, surface finishes, and reviewing project documentation.

Tasks could include:

- Refine the acoustic criteria based on discussions with the project team and client expectations.
- Develop facade construction requirements to achieve compliance with the established internal noise and sound insulation criteria.
- Develop advice on internal building fabric to meet the sound insulation targets between spaces. Typical constructions capable of achieving the established criteria will be provided for:
  - Wall and floors, including those to plant rooms and separating tenancies.
  - Internal sound insulating ceilings.
  - Ceiling void protection (including slab-to-slab walls or in-ceiling treatments).
  - Junction detailing.
  - noise flanking paths.
  - Doors and seals.
  - Internal glazing constructions.
  - Plant room / enclosure design.
  - Vibration isolation of mechanical plant.
- Work closely with the architects to consider suitable acoustic finishes to control reverberation to design criteria.
- Review any base-building services documentation and predict external and internal noise levels from these. Provide advice on noise mitigation for building services.

- Review documentation as it progresses and provide input as required.

Deliverables:

- Design Development Stage acoustic report summarising the project criteria, required construction details and noise control recommendations
- Miscellaneous project communication. (i.e. response to requests for information).

### 3.4 Contract Documentation

The contract documentation stage sees the acoustic consultant assist the team with the refinement and completeness of the documentation for tender.

Tasks could include:

- Further develop acoustic design standards and criteria for all acoustic issues.
- Design noise and vibration construction requirements for incorporation into documentation to be prepared by others.
- Refine acoustic designs to ensure that a balance is achieved between acoustic performance and risk associated with construction.
- Liaise with building services sub-consultants to provide acoustic input for selections of plant and equipment in their areas.
- Provide alternative construction details to align with the contractor approach or on-site conditions.

Deliverables:

- Design reports including performance specifications.
- Miscellaneous project communication (emails, memos etc).

### 3.5 Tender and Procurement

The acoustic consultant supports the tendering and procurement phase by responding to queries and reasonable requests for additional documentation and assisting with assessment of tenders.

Tasks could include:

- Respond to technical queries as necessary.
- Provide supplementary documentation as required to assist in the procurement process.
- Assist in the evaluation of tenders for procurement packages as required.

### 3.6 Construction

The acoustic consultant supports the construction stage through inspections, answering reasonable requests for information and advice, and ensuring compliance with the design intent and documentation.

Tasks could include:

- Provide advice as requested in response to requests for information, to address acoustic matters arising during construction.
- Review supplied acoustic data for alternative products or constructions offered by the contractors. Advise on compliance for these elements.
- Undertake inspections and attend meetings and provide inspection reports to ensure design compliance, identify and investigate potential acoustic issues, and comment on the quality of workmanship.
- Assist the project team with checking of shop drawings, especially where associated with noise and vibration control. Review technical submissions to ensure compliance with design criteria and design intent.
- Note: Construction stage assistance does not include detailed supervision of day-to-day construction work.

Deliverables:

- Site inspection reports.
- Responses to requests for information.
- Miscellaneous project communication (emails, memos etc).

### 3.7 Post construction

After the completion of the construction stage, the acoustic consultant conducts a final inspection. Acoustic testing may be conducted as required, especially if rating systems depend on such tests (Green Star, WELL, LEED etc.).

Deliverable:

- Final signoff report.

## 4.0 ADDITIONAL SERVICES

Acoustic consultants can provide a broad range of additional services, which may be necessary on different sites and project types.

### 4.1 Site assessment – existing conditions

For sites in challenging acoustic environments, or for projects with particularly sensitive acoustic requirements, a site assessment will determine baseline noise and vibration (as applicable) levels on site. This would nominally be undertaken at the Concept and Schematic Design stages.

Tasks could include:

- Assess any significant existing noise and vibration sources that may impact upon the proposed development, such as transportation noise (i.e. road traffic, trains and/or aircraft) or noise from nearby mechanical plant.
- Identify the locations on site most affected by external noise and vibration sources.
- Noise logging - continuous measurements over several days to characterise the ambient and background noise levels. Logging should generally be conducted for at least 7 days and be representative of noise levels at the Project site.
- Vibration logging – often short-term operator attended measurements of external sources such as heavy and or light rail.

Deliverable:

- Report on the results of measurements.

### 4.2 Value management

Where a design is subject to value management processes, the acoustic consultant should be contracted to participate to ensure that acoustic outcomes are not inadvertently compromised.

Tasks could include:

- Provide value management suggestions to the project manager.
- Attend value management workshop.
- Rework design solutions as appropriate.

### 4.3 Development Application / Planning Permit Application

Acoustic consultants can provide assessments to support Development Application (DA) process and/or the process of gaining development approval.

Tasks could include:

- Assessment of environmental noise and vibration (as applicable) both onto and from the development in accordance with the applicable local Council noise policy and relevant State legislation.

Deliverable:

- Acoustic Assessment report suitable for submission to the relevant authority body.

#### 4.4 Environmental noise modelling

An environmental noise model predicts noise from the project to nearby sensitive receivers. Additionally, environmental noise modelling can predict noise levels to the Project from other noise sources including road traffic, rail traffic, industrial noise etc. Modelling accounts for many factors including the 3D geometry, and acoustic shielding provided built structures.

Tasks could include:

- Prepare an environmental noise model of the site.
- Compare modelled levels with measurements on site (model validation).
- Compare predicted levels with the appropriate acoustic criteria.
- Where required, provide advice suitable noise mitigation options.

Deliverable:

- Acoustic report including model inputs and assumptions.
- Model files (for review by other AAAC consultant/s).

#### 4.5 Room acoustic modelling

A room acoustic model helps predict the acoustic performance of interior spaces and can assist with selection and location of materials. Acoustic parameters such as reverberation time are often the key design drivers. Modelling would typically be done at the design development stage but may be further refined at further stages.

Tasks could include:

- Conduct room acoustic modelling using industry accepted modelling package such as EASE, Odeon, Bose Modelling.
- Compare the model results to measured acoustic parameters (model validation).
- Predict the effect of changes to the room design, including surface finishes.

Deliverable:

- Provide design recommendations in an acoustic report.

#### 4.6 Design to suit alternatives (product substitutions)

Where material or system substitutions are proposed after the issue of Contract Documents, the acoustic consultant should be engaged to review these to ensure that the proposed substitutions satisfy the acoustic criteria and/or design intent.

Tasks could include:

- Review alternative material or system substitutions and provide comment.
- Witness material testing (on site or laboratory testing).

Deliverable:

- Design note or memo as appropriate.

#### **4.7 Construction noise and vibration management plan**

A Construction Noise and Vibration Management Plan (CNVMP) is a tool for managing the impact of potentially disruptive works on the surrounding environment. It may be required as part of an approval process by the regulatory authority.

Tasks could include:

- Communicate with the relevant members of the project team to discuss the specific requirements, objectives and deliverables for the completion of the assessment.
- Obtain a detailed description of proposed demolition, excavation and construction activities, including probable equipment to be used. If no specific equipment data is available, reasonable assumptions are often made by the acoustic consultant. In order to assess only the most critical activities, a limited number of scenarios may be modelled.
- Assess the impact of noise and vibration for the various construction scenarios and/or associated construction activities which will entail:
  - Computer noise modelling, i.e. SoundPLAN or CadnaA
  - Predict construction noise and vibration levels for the established scenarios at each of the nearby sensitive receptors.
  - Assess the predicted levels in accordance with the project requirements or other relevant guideline.
  - Where required, recommend appropriate construction noise and vibration mitigation measures.
- Prepare and deliver a noise and vibration impact assessment report including associated noise and vibration management measures.

Deliverables:

- Construction Noise and vibration impact assessment report.
- Construction noise and vibration management plan.

#### **4.8 Construction noise and vibration monitoring**

Monitoring of construction noise and vibration may be required on sensitive projects.

Tasks could include:

- Establish appropriate noise and vibration criteria for the identified sensitive receptors.
- Prepare a test plan, including proposed monitoring equipment, locations and methodology.
- Discuss the test plan and proposed measurement locations with the relevant stakeholders.
- Install vibration monitors for unattended ground vibration. Where appropriate vibration monitors may include visual alerts adjacent to the monitor, audible alarms, or emails/text messages to site managers.
- Install noise monitors at the site boundary or at the sensitive receptors. Where appropriate, the noise monitors may include alerts via email or text.
- Live noise/vibration monitoring results may be published on a website for the purposes of community consultation or stakeholder engagement.
- Conduct regular visits to download data, replace batteries, calibrate the systems or relocate monitors based on changes in site activity or as nominated by the construction team.
- Prepare a summary of the results as measured, and a comparison against project criteria as appropriate.

Deliverable:

- Construction noise and vibration monitoring report.

#### **4.9 Product performance review / acoustic testing**

Acoustic consultants can review the acoustic performance from data provided by suppliers to ensure the product performs as specified. This can relate to various building elements including, partitioning systems, absorptive finishes, bulk insulation, vibration isolation systems, waste pipes and/or wrapping, glazing systems. Technical attributes such as material density may be reviewed from product data sheets. Acoustic performance attributes such as transmission loss, or absorption coefficient may be quantified through on-site or laboratory testing.

Tasks could include:

- Review of supplier performance data, commentary as required.
- Comparison against similar products

Deliverable:

- Memo or report providing the basis of a review of technical specification and the outcome of that review.

#### **4.10 Compliance testing**

Compliance/verification testing is in-situ testing to verify compliance with acoustic criteria.

Tasks could include:



- In situ testing of the following:
  - environmental noise levels.
  - mechanical services noise levels.
  - sound transmission.
  - impact isolation tests.
  - internal noise levels from external sources.
  - internal noise levels from mechanical plant.
- Testing may be conducted for all locations/elements or for a representative sample of locations/elements.

Deliverable:

- Test certificates and/or report detailing measurements undertaken and findings.

#### **4.11 Corrective Action**

Where the project as built does not meet the acoustic criteria, corrective action may be required.

Tasks could include:

- Investigate non-conformance and conduct additional measurements to determine likely cause.
- Discuss available remedial actions with project team. Consider suitability of options considered.
- Make recommendations for appropriate remedial acoustic control measures.

Deliverable:

- Acoustic report detailing the issue with recommendations for remedial action.

#### **4.12 Structural Dynamics**

Some projects may require advanced numerical modelling, predictions or on-site measurement of vibration and the related building response. Tasks could include:

- In-situ Measurements such as strain gauge, validation of site suitability (e.g. bridge structures, slabs for vibration sensitive equipment)
- Vibration Assessments (e.g. fatigue, structural damage, human comfort, sensitive equipment).
- Vibration Suppression, Mitigation and Control.
- Ground-borne and Structure-borne Vibration (e.g. road, rail, construction, pools, gyms, helipads etc).

## **5.0 OTHER SCOPE ELEMENTS FOR CONSIDERATION**

Other items to consider when establishing the scope of work include the following:

### **5.1 Meeting attendance**

The number of meetings required may be qualified by the client or consultant.

### **5.2 Equipment costs and disbursements**

Whether equipment charges are included in the lump sum or are additional (such as on a schedule of rates).

### **5.3 Exclusions**

Scope of work should specify exclusions.

For more information and other published AAAC Guidelines, go to:

[www.aaac.org.au](http://www.aaac.org.au)

[www.aaac.org.nz](http://www.aaac.org.nz)

Member Firms:

To contact an AAAC member, select a region from the link below:

<http://www.aaac.org.au/act>

<http://www.aaac.org.au/nsw>

<http://www.aaac.org.au/qld>

<http://www.aaac.org.au/sa>

<http://www.aaac.org.au/vic>

<http://www.aaac.org.au/wa>

<http://www.aaac.org.au/tas>

<http://www.aaac.org.nz>

Version	Date
1.0	6 August 2021