Residential Noise Insulation Scheme

Condition 7

North Runway, daa

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CONTENTS

1.0 INTRODUCTION

daa is progressing with the construction of the North Runway at Dublin Airport. To comply with planning conditions attached to the development, it is necessary to agree a voluntary noise insulation scheme for dwellings located within the future 63 dB LAeq,16hr noise contour with Fingal County Council. As the daa submission to Fingal County Council with regard to compliance with Condition No. 7, this document has been prepared to provide background information and a technical summary of the proposed noise insulation scheme to be offered to eligible dwellings near Dublin Airport.

It explains:

- who is eligible,
- the type of noise insulation works that are on offer and
- how each dwelling will be assessed for those works
- how the scheme will be implemented
- measures for Quality Control and Effectiveness

This document has been prepared by BDP with AWN Acoustic Consultants and daa whom form part of the project team addressing planning conditions 7 & 8 relating to acoustic issues connected with the operation of North Runway.

1.1 PROPOSED METHODOLOGY

Following a review of relevant guidance documents and other noise insulation schemes operated at a number of other major airports in various jurisdictions, the following methodology has been proposed for implementing the noise insulation scheme and discharging Condition No7:

1. Identify eligible properties within the future predicted 63 dB LAeq,16hr noise contour for the opening year of the runway;
2. Visit each eligible property to carry out a visual inspection of the building to gather information required to conduct the acoustic assessment specific to that building;
3. Determine the future external noise level at each eligible property using the noise model prepared by BAP on behalf of daa;
4. Calculate the acoustic performance of the existing building façade using information gathered during the survey and following the methodology outlined in British Standard BS8233;
5. Assess the anticipated future internal noise level within each room in the building using the future external noise level and the existing building façade performance;
6. Based on the anticipated future internal noise level the required level of sound insulation improvement will be determined for each property, noting an objective of achieving an improvement in sound insulation in the range of 5 to 10dB has been specified;

7. Upgrade measures will be specified to achieve the required improvement in sound insulation;
8. A Statement of Need will be produced for each eligible property specifying the upgrade works and the expected acoustic environment internally in the future, following the implementation of the works, and;
9. Site inspections and acoustic surveys in a representative sample (20%) of properties will be conducted as part of the quality control measures during the construction phase.
10. Follow up and Feedback (post upgrade works)

Improvements in sound insulation do not equate to sound proofing the dwelling. Aircraft noise will still be audible inside the dwelling in the future and the overall reduction will be dependent on the condition of the building. Where buildings are already well-insulated against sound, the improvement will be lower.

The expected internal noise level within each dwelling will be a function of the improved sound insulation performance and the future aircraft noise levels.

The roles and responsibilities and communication plan associated with this section can be found in Appendices D and E.

2.0 PLANNING BACKGROUND

The An Bord Pleanála Decision to Grant the planning application PL06F.217429 for permission to construct the North Runway was conditioned by certain measures to be agreed with Fingal County Council prior to commencement of development.

This report pertains to the following conditions 7, 8 & 10.

Condition 7

"Prior to commencement of development, a scheme for the voluntary noise insulation of existing dwellings shall be submitted to and agreed in writing by the planning authority. The scheme shall include all dwellings predicated to fall within the contour of 63 dB LAeq 16 hours within 12 months of the planned opening of the runway for use. The scheme shall include for a review every two years of the dwelling eligible for insulation.

Reason: In the interest of residential amenity"

Condition 8

"The runway hereby permitted shall not be brought into use until noise insulation approved under conditions numbers 6 and 7 above has been installed in all cases where a voluntary offer has been accepted within the time limit of the scheme.

Reason: In the interest of the amenities of residences and schools in the area."

Condition 10

"Noise and flight track monitoring shall be operated at all times as detailed in the Environmental Impact Statement Addendum received by the planning authority on the 9th day of August, 2005 and in accordance with the recommendations of ECAC.CEAC.Doc 29. An annual report on noise contours shall be submitted to the planning authority. A noise and flight track monitoring report shall be submitted to the planning authority on a quarterly basis and shall be made available for public inspection. The results of the noise and flight track monitoring shall be used to re-evaluate noise impacts and the application of mitigation measures, including (a) the noise insulation scheme (including residences and schools) and (b) the property buy-out scheme, biannually.

Reason: To protect the amenities of the area and to ensure ongoing monitoring and verification of the proposed noise mitigation measures.

3.0 ELIGIBILITY

An Bord Pleanála has determined the eligibility criteria for this scheme as part of the grant of permission. The scheme is available to those dwellings within the prescribed Noise Contour.

Noise exposure contours are a common method of portraying aircraft noise. Noise exposure contours show a set of closed curves on a map. Each contour shows places where people get the same amounts of noise from the aircraft. They are analogous to the contours on an ordinary map showing places at the same height.

To produce noise exposure contours we use the following information:

Runway location(s): the arrival and departure routes, the aircraft movements (number by aircraft type), the split of the movement amongst the runway(s) and routes and airport procedures.

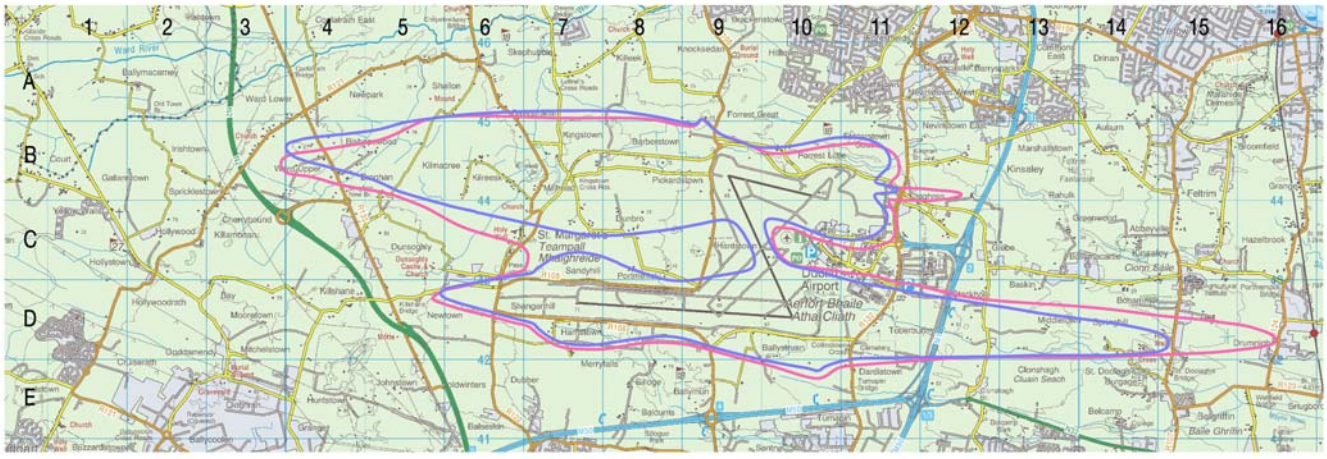
A computer model is then used to predict noise at locations within a defined area. Contour lines are drawn for locations that experience the same noise. The contour closest to the noise source will have the highest number and further from the noise the contour number reduces.

Noise exposure contours can be produced for different noise metrics, the metric used in the grant of planning was

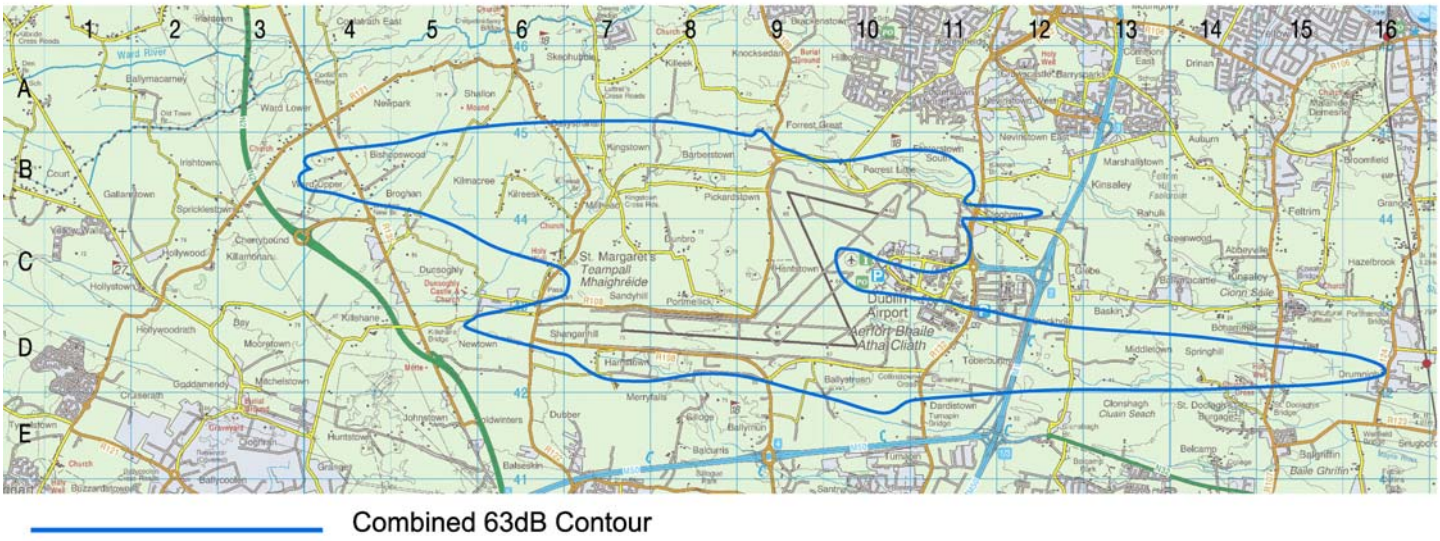
LAeq, 16h which gives the 'average' level during the day (07:00 – 23:00). The day in this case is representative of typical busy day (summer period)

63 dB is commonly used as a threshold for noise mitigation to dwellings and this was also applied as part of the eligibility criteria during the planning process.

The original 63dB contour published as part of the EIS in 2007 was based on a future year of 2025. The current updated 63dB contour was produced based on 2022 forecast for the opening year of the runway in accordance with Condition 7. Both 63dB contours are illustrated in the following figure which shows there are differences between the two.



The union of the 2007 63dB contour and the current forecast 63dB contour, will be used to determine eligibility for the scheme. This contour will be known as the combined 63dB contour. The combined contour is shown in the following figure.



As a result of taking this approach the daa has taken into consideration its most immediate neighbours as the combined contour ensures that c. 40% more dwellings will be eligible to benefit from the insulation scheme.

Also, dwellings within the 63dB contour that had insulation works undertaken as part of the previous insulation scheme offered when the southern runway was built are eligible to opt to have the performance of previously installed materials reviewed.

daa will ensure that Fingal County Council are provided with access to review the database for eligible dwelling owners before the implementation of the scheme.

Please note that this scheme is voluntary and places no obligation whatsoever on any resident to apply.

The roles and responsibilities and communication plan associated with this section can be found in Appendices D and E.

For further details pertaining to the noise contours refer to Appendix B.

3.1. ON-GOING MONITORING FOR ELIGIBILITY

In accordance with Condition 10 the first bi-annual review will take place 24 months from the date the runway becomes operational. As part of this review the combined contour will be updated to determine if any additional dwellings become eligible to avail of the scheme. Any additional dwellings that become eligible will be identified as part of the monitoring bi-annual report issued to Fingal County Council to comply with Condition 10. An offer to opt into the scheme will be open to eligible dwelling owners for up to 6 months following agreement of the biannual report with Fingal County Council.

As part of the ongoing monitoring process actual noise levels will be monitored from the operational movements of the airport once the north

runway is open. The measured noise levels will be used, if necessary to correct any uncertainty in the current assessment which is based on calculations. Where necessary any additional dwellings that become eligible for the noise insulation scheme as defined in Condition 7 will be invited to opt into the scheme.

It is the role of the daa to carry out ongoing monitoring, verification and re-evaluation of the noise impacts. It will be the role of Fingal County Council to review the reports submitted by the daa and acknowledge any changes to the existing scheme for example additional dwelling becoming eligible. Following agreement with Fingal County Council the scheme will be extended to all additional eligible dwellings.

4.0 NOISE INSULATION SCHEME

4.1 OBJECTIVE

The purpose of the proposed scheme is to improve the sound insulation performance of eligible dwellings. An objective of achieving an improvement in sound insulation in the range of 5 to 10dB has been specified. In addition, where possible the guidelines recommended in BS8233 and by the WHO for internal ambient noise levels will be targeted.

However, if the 5 dB target is achieved by the application of one of the measures outlined in the scheme, the other measures will also be applied to strive to get closer to the 10 dB reduction – except in circumstances where the WHO guidelines have already been achieved by a reduction of less than 10 dB.

daa's scheme is designed to be particularly effective in this regard as rather than simply offering a grant towards the cost of upgrades (which may have little regard to the actual cost of mitigation efforts), as happens in other jurisdictions. daa will take responsibility and ownership of mitigation measures to make sure they are completed to a high standard.

In the Environmental Impact Statement (EIS), submitted to Fingal County Council as part of the planning application, daa undertook to implement a Voluntary Residential Noise Insulation Scheme.

To achieve this target upgrade measures will be specified for each eligible property. The following upgrade measures will be considered:

- Acoustic vents will be offered to ensure adequate background ventilation is provided while also ensuring a good degree of noise insulation.
- Acoustic windows will be offered to replace existing windows or secondary glazing will be provided where the existing windows are not providing adequate sound insulation.
- Chimney caps and dampers will be offered where necessary;
- Additional attic and roof insulation will be offered where necessary. Typically, this will involve the addition of insulation in the cavity and/or the additional of extra mass layers into the overall construction.

daa will offer dwelling owners a choice of product appearance that meets the acoustic specification, within the product range offered.

4.2 REVIEW OF RELEVANT GUIDANCE

There are no Irish guidelines that specify acoustic standards to be achieved within dwellings. In the absence of local guidance, the scheme has reviewed several guidance documents and British Standards that are relevant to this scheme. This section will give a brief overview of the most relevant documents and their recommendations. A review of other noise insulation schemes in operation at major airports has been undertaken for comparison against the proposed scheme for further detail refer to Appendix A Section 2.0.

Please note that only daytime noise criteria are discussed here as the operating restrictions placed on the grant of permission for the Northern Runway are such that night-time activity will be less than existing operations at Dublin Airport.

The following points summarise the relevant guidance:

- An internal ambient noise level of 35 to 40dB LAeq,16hr during daytime hours is recommended by both the WHO and BS8233;
- All insulation schemes operated by airports internationally provide upgraded windows, vents and attic insulation to improve the sound insulation of existing buildings. Note that this is in line with the proposed methods of insulation outlined in the EIS prepared for the North Runway;
- All insulation schemes aim to improve the sound insulation performance of existing buildings;
- Some insulation schemes aim to achieve an internal noise level post-insulation with the targets most commonly adopted in line with those recommended by the WHO and BS8233;
- A minimum improvement of 5dB in the sound insulation performance of buildings is necessary to ensure a subjectively noticeable change;
- An improvement of 10dB is considered to be a significant change;
- BS8233 provides a standardised method of calculation to determine the sound insulation performance of a building through an elemental analysis, and;
- Physical noise surveys are generally used as a quality control tool to ensure that the desktop assessments are accurate and that construction work is achieving the required standard of workmanship.

Taking all of the above into consideration the purpose of the proposed scheme is to improve the sound insulation performance of habitable rooms, including bathrooms, within eligible dwellings. For the purposes of this Scheme habitable rooms include: Bedroom, Bathrooms, Study rooms, Living room,,Lounge room, Dining room, Kitchen, Play room, WC. Other ancillary rooms are not covered by the scheme unless windows in such rooms comprise part of an elevation whose character would be adversely impacted upon The homeowner shall also be given the opportunity to request rooms (including mixed-use rooms) which they inhabit be included in the scheme which are not featured in the description above.

An objective of achieving an improvement in sound insulation in the range of 5 to 10dB has been specified. In addition, where possible the guidelines recommended in BS8233 and by the WHO for internal ambient noise levels will be targeted.

Note that a minimum improvement of 5dB will be targeted where possible

for all properties. However, in some instances where the elemental analysis demonstrates very high level of noise insulation is already being provided by the existing dwelling construction this improvement may not be possible.

The statement of need prepared for each dwelling will include an analysis of the expected improvements that can be achieved from the three types of upgrade measures offered, being Attic insulation, Vents / Chimneys and Windows / Doors. This analysis will demonstrate which of these measures will achieve the targeted improvement. In some instances a single upgrade measure will be adequate to achieve the targeted improvement, whereas three upgrade measures may be required elsewhere. Appendix A contains a sample Statement of Need for further detail.

4.3 NOISE INSULATION SCHEME APPROACH

In summary, a homeowner decides to opt in to the scheme and before any works occur a survey will be undertaken, an offer of acoustic treatment will then be made and the homeowner has a 6-week period to opt out of the scheme or accept the offer before the proposed upgrade works are procured by daa. This is described in more detail below.

Because each dwelling is different each solution will be different. If an eligible dwelling owner Opts In, a surveyor will come to the dwelling at a time agreed with the dwelling owner.

The results of the building survey in combination with the future noise levels from the runway will be used to determine the noise insulation upgrades for each individual property. The information will be contained within a Statement of Need report that will be provided to each dwelling owner. The Statement of Need is a tailored solution for each property.

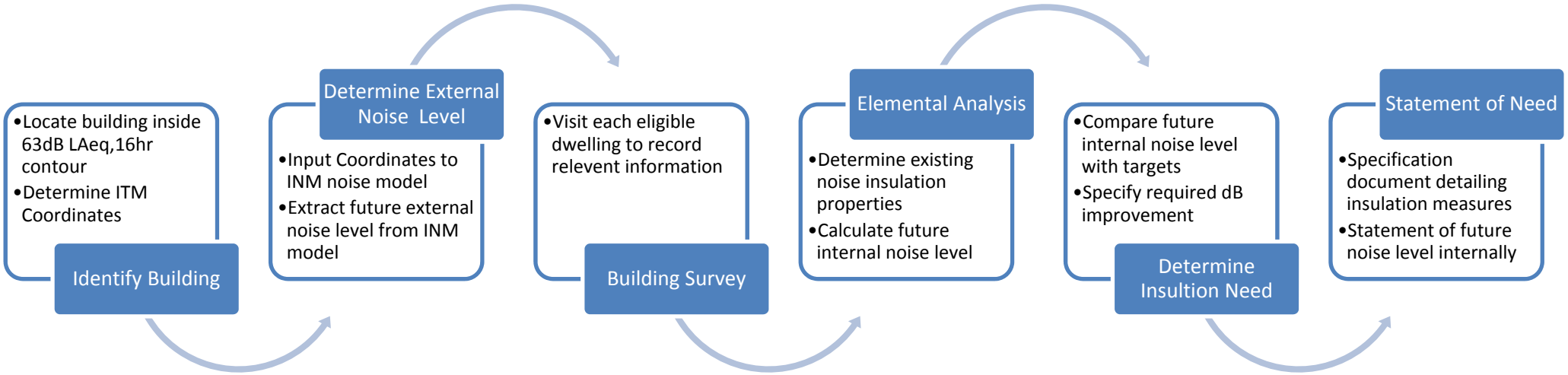
daa will be available to explain the Statement of Need to each dwelling owner prior to Acceptance of the offer and formal acceptance to allow the works to start. As the scheme is voluntary, the dwelling owners will have the opportunity to opt out of the Scheme at this point.

To enable the works to proceed in a timely manner and for the dwelling owner to review the Statement of Need, there will be a six week period from when the Statement if Need is presented to when the dwelling owner must Accept the offer.

Where the Statement of Need states that the minimum target of 5 dB cannot be achieved then the owner will have access to a third party review by a qualified acoustician paid for by daa. The acoustics report will be taken into account in refining the Statement of Need for that individual dwelling.

The roles and responsibilities and communication plan associated with this section can be found in Appendices D and E.

The following graphic illustrates the proposed noise insulation scheme approach.



4.3.1. Building Identification

Using the Combined 63dB Noise Contour1, each eligible dwelling will be identified using a combination of Ordinance Survey mapping, Geodirectory and land registry database lookup and further information provided at the public consultation to daa. Once a dwelling is identified as being eligible for the scheme the exact map co-ordinates are determined for the dwelling. This will allow each eligible dwelling to be represented by a point receiver within the aircraft noise model produced by Bickerdike Allen Partners (BAP) on behalf of daa. A list of the dwellings which is considered within the Combined 63dB Noise Contour and eligible for an offer of noise insulation has been provided to Fingal County Council.

4.3.2. External Noise Level

The 2022 forecast noise model produced by BAP uses the Integrated Noise Model (INM) calculation method to determine the future aircraft noise level across a large geographic area for a given set of inputs related to aircraft types, volume of traffic, flight paths etc. The 2022 forecast noise model allows the future noise level at each building to be calculated for the future year of opening for the runway. This is in accordance with the specific requirements of Condition No. 7 which requires that the scheme is based on the noise levels in the 12 months after the opening of the northern parallel runway.

The 2022 forecast model will then be interrogated to output the future noise level at each eligible dwelling based on the ITM grid coordinates of the property. The future noise level at each property will be used to calculate the expected internal noise level at each eligible dwelling before and after the implementation of the noise insulation measures. This calculation will be carried out in accordance with the methodology outlined in BS 8233 and is discussed further in Section 4.4 of this report.

The Statement of Need report prepared for each dwelling will outline all external future noise levels and calculations carried out.

In accordance with Condition 10 any additional eligible dwellings identified as part of the bi-annual review will be assessed based on future external noise levels using the most up to date forecast available at the time.

In summary the external noise level will be used to calculate the anticipated internal future noise level within each eligible dwelling.

4.3.3. Building Survey

An important step in the assessment of each building is the physical survey of each property. Given the variation in building types, building age, building condition and construction types it is not possible to use a generic building description in this analysis. Furthermore, an individual assessment of each property is considered to provide a more robust assessment allowing any unusual aspects to be surveyed and recorded.

The survey will be conducted by a competent surveyor appointed on behalf of daa. It is not to measure noise levels but instead is to determine details of each eligible dwelling that will influence the level of noise

[1] Refer to Appendix B - Noise Contour Report

insulation required. The survey will record the following information about each property:

- Room types – all rooms will be identified throughout the dwelling;
- Number of rooms – each room will be given a unique reference;
- External wall construction – where possible the construction type of the external walls will be recorded for example wall composition including inner leaf, cavity, and external leaf dimensions including all associated building materials;
- Window type – for example frame material, single glazing, double glazing, including key dimensions and overall window condition;
- Roof construction – where possible roof construction type, for example flat, dormer, pitched, roof composition, materials and all associated attic insulation and ventilation;
- Details of chimneys, fireplaces and stoves – open fireplaces, blocked up fireplaces, capped chimneys, flues and the rooms they serve;
- Ventilation paths – existing wall and floor vent types, quantities and dimensions;
- Details of any noise insulation measures previously installed – the dwelling owner will be requested to provide this detail if available;
- Dimensions of all rooms including window, roof and wall dimensions;
- Drawings - the dwelling owner will be requested to provide this detail if available;
- Outline floor plans will be produced where drawings are not available;
- Photographic records of the building.

The final composition of the survey report will be based on industry best practice, for example home survey reports from the Royal Institute of Chartered Surveyors (RICS). Competent surveyors will be asked to submit their report format as part of the competitive procurement procedure prior to the implementation phase.

Where the scheme applies to an historic structure of architectural interest or a protected structure, the surveyor will be accompanied by a suitably accredited conservation specialist to provide advice on the suitability or otherwise of proposed measures in respect of potential adverse impact on the cultural heritage value of the structure.

As requested by Fingal County Council and subject to the agreement of the dwelling owner, Fingal County Council representatives may witness a number of building surveys. The scheme shall provide Fingal County Council with full access to the survey reports upon request..

In summary the building survey will be used to determine the existing noise insulation properties of each eligible dwelling.

4.3.4. Elemental Analysis

The elemental analysis is where the technical assessment of noise insulation for each eligible dwelling will be conducted. The following assessment process will be adopted:

1. Determine the existing noise insulation properties of each habitable room in the dwelling;

2. Assess the anticipated future internal noise level within the habitable rooms by using the future external noise level discussed in Section 3.2, presented in octave bands scaled from measurements taken around Dublin Airport, and the existing noise insulation performance of the building from step 1 above;
3. Compare the anticipated future internal noise level to the WHO and BS8233 targets for internal ambient noise;
4. Assess the required improvement in the noise insulation performance of the building, note that an improvement in the range of 5 to 10dB will be targeted for all eligible properties. As demonstrated in the case studies presented in Appendix A - Section 5.0 of the Technical Report, dwellings exposed to the highest noise level or dwelling with lower levels of existing external envelope performance will be provided with the maximum insulations levels. This is inherent in the scheme methodology;
5. Determine through an elemental analysis what upgrade measures will be required to increase the noise insulation performance, and;
6. Determine the future internal noise level following the implementation of the upgrade measures for comparison to the WHO and BS8233 targets.

The elemental analysis discussed above will be carried out in accordance with the standardised calculation method described in Annex G of BS8233. This method takes as inputs the area of each element of the building envelope (i.e. windows, wall, roof etc.), the sound insulation performance of each element, the room dimensions and the external noise level. The output of the analysis is the composite sound insulation performance of the building façade and the resultant internal noise level for a given external noise level.

The elemental analysis assesses the building sound insulation performance for each octave band over a specified frequency range. In practice, the most important elements will be those which offer the lowest sound insulation performance. This will be windows and vents for the majority of cases and for that reason these elements will be provided with the highest performance upgrades.

In summary the elemental analysis will provide:

- *The existing sound insulation performance of the dwelling;*
- *The anticipated future internal noise level within the dwelling based on the future external noise level previously discussed in Section 3.3.2;*
- *The level of noise insulation upgrade required;*
- *The anticipated future internal noise level within the dwelling with the noise insulation measures provided.*

For further information on the elemental analysis please refer to Appendix A Section 4.4.

4.3.5. Upgrade Measures

Attic Insulation

Windows and Doors

Vents and Chimneys

The dominant transfer paths will be those elements with the lowest elemental sound insulation performance. In practice this will be windows, doors, ventilation openings, chimneys and small gaps and cracks. Walls and roofs are secondary in importance given their relatively massive construction. Taking the above into consideration, treating windows, doors and vents will deal with the major source of noise break-in into most homes.

The following sections discuss the upgrade measures that will be used to improve the sound insulation performance of eligible dwellings.

Windows

As is the case in most buildings, the glazed elements of the building envelope are typically the weakest element from a sound insulation perspective. The following options are available to increase the sound insulation performance of windows:

- Replace existing window units with new windows using acoustically insulated frames and acoustic glass combinations. Typically, it is expected that an acoustic performance of up to 43dB Rw will be required. This level of performance can be achieved using a double glazed system with acoustic glass. Note that triple glazing does not automatically infer higher acoustic performance and the acoustic performance required in this instance can be achieved using double glazed systems.
- Install secondary glazing internally while maintaining existing windows. This solution is often used in historic buildings/protected structures where changes to the existing windows are not possible. The secondary glazing element is installed in conjunction with acoustically absorbent material to at least two of the window reveals.

Window upgrades will be subject to designer's recommendations. The decision to select windows for upgrades will be subject to design factors such as exiting fabric conditions and proximity to noise sources. If the upgrade design suggests that windows are required for upgrade works, daa shall replace all the windows associated with the particular elevation in question.

Doors

External doors that open onto habitable rooms will be upgraded to be provided with acoustic seals around the perimeter. Glazed doors may need to be replaced in line with the recommendations discussed earlier for windows.

Any existing openings through the door, e.g. letterbox, cat flap etc., must

be closed and sealed to ensure the acoustic performance is achieved.

Vents

The ventilation strategy for each building will be determined in accordance with Part F of the Building Regulations and will be finalised for each property during the assessment. Options which will be considered in order to achieve compliance with background ventilation requirements and acoustic insulation requirements will be passive or active mechanical ventilators.

Note that an active mechanical ventilator in this context is a ventilator unit consisting of a controlled variable-speed inlet fan with sound attenuating duct and cover that is capable of supplying fresh air to the room directly from outside by means of the supply duct and cowl (or grille). Air conditioning, whole building ventilation or heat recovery ventilation is not being considered as part of this scheme.

Holes and Gaps

Holes and gaps found in the external envelope that are not required for ventilation will be sealed airtight using a non-setting acoustic mastic. Good sealing is essential around all window and door openings to achieve good sound insulation. Any perimeter leakage will degrade the performance by 2 to 4dB and may become the limiting factor in the overall sound insulation performance that can be achieved.

Chimneys

Unused chimneys will be capped to stop noise transfer to the rooms inside. Where chimneys remain in use a damper will be fitted to allow the chimney to be closed off when not being used. This will effectively limit the noise transfer to the rooms at all times except when the fire is lit.

Roof

In some instances, it will be necessary to provide additional noise insulation to roofs and attic spaces. This will be provided as follows:

- Where no loft insulation is present 200mm of fibrous acoustic insulation will be placed between ceiling joists, the insulation is to have a minimum density of 80kg/m3. Where insulation is already present but found to be unsatisfactory additional layers of insulation will be added to increase the total thickness to 200mm.
- Where additional insulation is required ceiling overboarding or decking will be provided using a continuous layer of mass to provide at least 12kg/m2 added above joists in attic, for example 22mm plywood (or similar approved). If due to inaccessibility or other practical reasons, loft Insulation or loft Boards cannot be installed, ceiling overboarding will be offered using dense plasterboard with a total minimum surface mass of 12 kg/m2, i.e. 15mm SoundBloc (or similar approved).

Walls

In general, all wall constructions, i.e. blockwork, concrete or timber frame with brick facing, offer a high degree of sound insulation, much greater than that offered by other elements of the building envelope. Therefore, noise intrusion via the wall construction will be minimal. It should be noted that the addition of thermal insulation, either through the provision of pumped insulation or external wall insulation, is not an indicator of good sound insulation. These materials do not add any significant mass

to the wall construction which would be necessary to increase the sound insulation performance. In summary external wall upgrades are not part of this scheme.

4.3.6. Statement of Need

The Statement of Need will define for each dwelling owner the noise insulation upgrade measures required and how this will improve the noise environment in their dwelling. The Statement of Need is a bespoke document tailored to each individual dwelling.

It is expected that the following information will be contained within each Statement of Need:

1. A description of the existing building sound insulation performance

   Following the approach summarised in Section 4.3.4 of this document an elemental analysis of each eligible dwelling will be carried out. This will enable the existing sound insulation performance of the dwelling to be described including those existing building elements that are weakest in terms of their sound insulation performance.

2. An opinion of future noise level external to the property

   The building location will be identified on a map which also shows the combined 63dB contour discussed in Section 3.0. The anticipated external noise level at the property will be determined by interrogating the INM noise model as discussed in Section 4.3.2 and this noise level will be stated.

3. An opinion of the required improvement in sound insulation;

   The external noise level and the existing building sound insulation performance will be used to determine the anticipated future internal noise level within the dwelling with the North Runway in operation but before any noise insulation is offered. This noise level will then be compared against the BS and WHO guidelines to determine the improvement in sound insulation to be targeted. This will ensure that those properties that are exposed to the highest noise levels are provided with the highest levels of sound insulation. Note that a minimum improvement of 5dB will be targeted where possible for all properties. However, in some instances where the elemental analysis demonstrates very high level of noise insulation is already being provided by the existing dwelling construction this improvement may not be possible.

4. A schedule of the required works on a room by room basis;

   A schedule of the noise insulation upgrade measures required to achieve the targeted noise insulation improvement will be provided on a room by room basis.

5. An opinion of the anticipated future noise level internally following implementation of the noise insulation works.

   To advise the dwelling owner, the Statement of Need will also present the anticipated future internal noise with the noise upgrade measures installed.

For sample case studies refer to Appendix A – Section 5.0 which demonstrates the methodology above

4.4 PUBLIC CONSULTATION

As part of the scheme development a series of information meetings were held to consult with eligible residents. As part of this consultation there were some common queries related to the implementation of the scheme. This section addresses each point separately and comments on how the scheme has been modified in response where necessary. Further information on the public consultation meetings can be found in Appendix C.

4.4.1 Triple Glazing

Queries were raised at the public consultation meetings regarding the use of triple glazing as an acoustic measure, however, it is not envisaged that triple glazing will be used for acoustic purposes. High levels of acoustic performance will be achieved using double glazed units with acoustic laminated panes of glass. While triple glazing is superior thermally, it is not a good acoustic insulator and double glazed units of equivalent overall thickness can offer higher levels of sound insulation performance than triple glazed units. Please note that triple glazing in this context refers to three panes of glass in a single frame. Secondary glazing which is a form of triple glazing will be considered as part of the scheme as appropriate.

4.4.2 Acoustic Vent Performance

Acoustic passive vents will be provided to ensure adequate background ventilation is provided while also ensuring a good degree of noise insulation. Vents provided under this scheme will be high performing products and will be required to have test certificates guaranteeing their acoustic performance as tested in a suitably accredited laboratory. The use of high quality fully certified vents addresses queries from the public consultation meetings regarding the quality of the vents being installed. Appendix A Section 5.0 presents some case studies which discusses the range of acoustic performance for vents that is anticipated as part of the scheme.

4.4.3 Include Bathrooms as Habitable Rooms

During the public consultation stage it was requested several times that bathrooms be included in the scheme as habitable rooms. This suggestion has been adopted and the scheme will include bathrooms as habitable rooms ensuring that noise insulation measures will be specified for these rooms as required.

4.4.4 External Wall Insulation

During the public consultation it has been requested that external wall insulation be considered as a mitigation measure for noise insulation. In general, all wall constructions, i.e. blockwork, concrete or timber frame

with brick facing, offer a high degree of sound insulation, much greater than that offered by other elements of the building envelope. Therefore, the addition of thermal insulation, either through the provision of pumped insulation or external wall insulation is not a suitable method to increase noise insulation.

4.4.5 Air Conditioning or Mechanical Ventilation

During the public consultation stage it was requested that air conditioning and or heat exchange ventilation systems be considered. These systems will not be considered as part of the scheme as they are predominantly used as part of thermal or energy efficiency measures and not noise insulation. Acoustic vents will be provided as required to ensure adequate background ventilation is achieved in accordance with Part F of the building regulations while also ensuring a good degree of noise insulation.

4.4.6 Listed Buildings and Buildings of Historic Interest

Where listed buildings or other buildings of potential historic interest are eligible for the scheme it will be necessary to develop noise insulation measures that are appropriate to these buildings. Each eligible dwelling, whether occupied or not, will receive an individual report. This report will clearly state if the property is listed protected structure, occupied or unoccupied. A separate category for protected structures will be incorporated into the survey report. Eligibility is not subject to habitation; however derelict buildings that are not fit for their intended purpose have not been included as eligible buildings under this scheme.

Where the scheme applies to an historic structure of architectural interest or a protected structure, it is proposed that an accredited conservation specialist will be appointed to advise on the suitability or otherwise of proposed measures in respect of potential adverse impact on the cultural heritage value of the structure.

5.0 IMPLEMENTATION PHASE

5.1 FINGAL COUNTY COUNCIL SIGN OFF

The formal agreement of the scheme with Fingal County Council is a key milestone in developing the implementation phase of the scheme. Before the dwelling surveys and designers desktop analysis can commence the overall approach for the scheme shall be agreed in writing with Fingal County Council. This is reflected in the revised Project Execution Plan in Section 6.0

5.2 DWELLING OWNER OPT IN

To avail of the noise insulation scheme eligible home owners must opt into the scheme no later than the 1st December 2017.

If home owners do not accept the offer by the Cut-off date they cannot avail of the insulation scheme in this round.

In accordance with planning condition 10, the first biannual review will take place 24 months from the date the runway becomes operational. Home owners who did not opt in for the preliminary scheme can avail of the scheme on the biannual review.

If the home owner decides to opt into the scheme they will be presented with a letter outlining the details pertaining to the following steps:

- Surveys
- Design Analysis
- Statement of Need
- Contract Works Procurement
- Quality Control
- Terms and conditions

The Terms and Conditions included within the opt in process will form the basis of an agreement with the dwelling owner to allow daa to facilitate the survey works and contract works to be carried out. daa envisage certain consents will be required from the home owner.

This may include the following but not limited to (for example):

- Consent for the surveyor to undertake the building survey.
- Agreeing to grant access to the property,
- Make reasonable preparations to ensure the house is safe to undertake work
- To inform the contractor and daa of any known risks or hazards.
- Consent for the results of the survey to be made available to FCC as requested by FCC.
- Consent to grant FCC access to oversee the survey works under FCC request.
- The purpose of the noise insulation scheme is to improve the noise insulation performance of the eligible dwelling. Other improvements, e.g. thermal insulation, fixing pre-existing building defects etc. will not form part of the works;

- Only vetted contractors appointed by the daa can carry out the works;
- Improvements in sound insulation do not equate to sound proofing the dwelling. Aircraft noise will still be audible inside the dwelling in the future and the overall reduction will be dependent on the condition of the building. Where buildings are already well-insulated against sound, the improvement will be lower;
- The specification of products and materials to be used as part of the works will be determined by daa;
- Dwelling owners are not permitted to retain the contractor performing sound insulation work to do additional work while they are participating in the program;
- Dwelling owner to comply with the Contractors requirements with respect to the Requirements of the Safety, Health and Welfare at Work (Construction) Regulations;
- Dwelling owners that opt into the scheme shall agree that works required to comply with the Building Regulations & statutory compliance will form part of the scheme;
- At the end of the project it is likely that a Safety File will be completed and the home owner will need to consent to be given this safety file and acknowledge that if future work is done on the house the builder of future work will ask to see the Safety File;
- The anticipated future noise levels and sound insulation performance are calculated values based on best available information using industry standard methodologies. Because this is an estimated value it may differ from the actual value when the runway is operational.

Because the Terms and Conditions will need to relate to the procurement contract, i.e. the contract between daa and the builder, the finalisation of the Terms and Conditions is planned to be undertaken during the Implementation phase of the project, following agreement of the Scheme with Fingal County Council which in turn will inform the procurement methodology.

5.3 SURVEYS AND STATEMENT OF NEED

5.3.1 Building Survey

If the home owner is eligible and has decided to opt in to the scheme in accordance with the cut-off date, a daa appointed building surveyor and a suitably accredited conservation specialist where relevant will visit each dwelling and inspect the building and provide data that will inform the designers recommendations for the upgrades measures that will reduce the noise inside.

The date and time of the survey will be agreed with the home owner in advance and the home owner must be present for the duration of the survey. The survey is expected to take place over a 1-3 hours period, depending on the dwelling type and size. Refer to section 4.0 for details on the building surveys.

Following the survey an acoustic assessment of the building envelope will be undertaken on each property to determine the required noise insulation upgrade measures. As previously defined the objective of the scheme is to improve the sound insulation of the building and to achieve the BS and WHO guideline values internally where possible. Refer to section 4.0 for details on acoustic assessment.

5.3.2 Statement of Need

Each dwelling owner will be provided with a tailored Statement of Need document that will present to them the required upgrade measures for their dwelling. This document will provide on a room by room basis the measures being provided and will also present to the dwelling owners the expected improvement in sound insulation performance as a result of the measures. Refer to section 4.3.5 and 4.3.6 for further details on upgrade measures and the Statement of Need.

5.4 THE WORKS

In all cases, 100% of the costs associated with the upgrade measures will be met by the daa.

The nature of construction work is that it is often noisy and can be disruptive. For noise upgrades of the type being offered, the work might require minor demolition, plastering, painting and installing acoustic products.

In cases where historic structure of architectural interest or protected structures are involved, the advice of a conservation specialist will be sought. Where, in the opinion of the conservation specialist, the proposed works would materially affect the historic value of the structure, it may be necessary to either seek planning permission or an exemption from the need to obtain planning permission from the planning authority. Each case will be dealt with on its own merits and as Fingal County Council is the Competent Authority daa cannot guarantee in advance that all noise insulation proposals will meet with the approval of the planning authority.

5.4.1 Contract Works

Vetted Contractors will carry out the work according to the specifications provided by daa. All Contractors will be required to agree to a Code of Practice and Workmanship so that the work is of acceptable standards and comply with Building Regulations.

The properties are likely to be occupied during the time of the insulation works therefore, the contractor must take all precautions regarding safety and to minimise inconvenience to all occupiers living within or visiting the property.

The contractor must protect landscaping and gardened areas and all other property. The contractor should take all necessary precautions to protect the existing structures, finishes, fittings and all other property from weather and any other damage caused by or during the works. The Contractor will be instructed to photograph the properties before and after insulation for record purposes.

daa clarify that where works are carried out, the interior and exterior decoration of the dwelling will be restored to its previous condition. For example, if plastering is required, daa will cover the costs of redecorating.

In cases where historic structures of architectural interest or protected structures are involved, the works will be monitored by a conservation specialist and specialist conservation survey and recording may be required.

Although it is acknowledged that scheme participants would like to use contractors with whom they have an existing relationship or level of trust, owners are not allowed to select the contractor that will perform work on their dwelling. As a daa funded scheme, contractors will be selected based on a competitive bid process. For contractors to be eligible to work in the program, they must meet very extensive insurance and bonding requirements, and may also be asked to provide evidence of

their ability to perform the work as required by the specifications.

Interior doors and windows and rooms that serve a commercial purpose including offices and workshops are excluded, as are ancillary buildings and spaces such as car garages, sheds, gazebos and conservatories.

Dwelling owners are not permitted to retain the contractor performing sound insulation work to do additional work while they are participating in the program as this could prevent the contractor from adhering to the construction schedule or result in potential modifications to sound insulation work that can render the work or products less effective against noise.

5.4.2 Warranties and Certification

The products used in the scheme must meet required performance specifications. Many products used (in particular, the windows, vents and doors) must be tested against cited standards and must also come with warranties that meet project requirements. As a daa funded project, dwelling owners are not permitted to select product manufacturers.

Instead, daa are obligated to allow the contractor to select the manufacturers and their products to use, provided that the products selected meet the required performance specifications.

The contractor shall be subject to a 12 month defect liability period following completion of the upgrade works.

Contractors will be required to offer dwelling owners a selection of product types (for example a limited choice of colour or materials) from which to choose from.

Warranties will be required from product suppliers for products selected for upgrade works such as windows and vents. At this point in time daa have not agreed the details relating to warranty periods, once the contracts are in place with contractors and associated suppliers daa can secure the product warranties including the manufactures associated terms and conditions

For sign off on the completed works the following information will be provided:

- Safety File including product Warranties which will vary according to the products selected; for example daa expect windows to have a min 5 year product warranty
- Certificate of completion under the building regulations
- Opinion of compliance with the Project Specification
- Heritage compliance for protected structures

5.4.3 Quality Control and Effectiveness

Once a property owner decides to opt into the scheme the specification for the works that are contained within the Statement of Need for that property will be implemented by an appointed contractor. As part of the quality control proposals for the scheme, inspections will be conducted during the course of construction by competent persons appointed by daa to ensure that the contractor is implementing the specification correctly onsite.

It is also proposed that as part of the quality control measures a representative sample of properties will be acoustically surveyed before and after the works to confirm that the noise reduction targets have been

achieved. A representative sample is defined as 20% of the eligible properties and the properties will be chosen at random to ensure an even distribution of properties. These samples will be chosen so as to give as wide as possible a range of existing dwelling types and proposed upgrade measures to ensure that they are reflective of the entire scheme. Those dwellings proposed for selection as sample dwellings shall be selected by daa and shall be forwarded to the planning authority for written approval prior to installation works commencing.

These sample dwellings will be targeted for completion first so that learnings from these can be incorporated into schemes for dwellings not completed. If these sample dwellings, when tested, show that further upgrades are required or that individual elements are failing to meet the target reductions, these elements shall be upgraded/replaced in all instances where they have already been installed across the entire scheme. Defined obligations will be included in the contacts to ensure that the contractors have responsibility to deliver the approved test standards in all subsequent installations.

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The acoustic survey will be conducted in general accordance with the methodology outlined in the British Standard BS EN ISO 16283-3:2016 Acoustics – Field measurement of sound insulation in buildings and of building elements. Part 3 – Façade sound insulation. Further information on this testing methodology is outlined in Appendix A Section 4.7.

The results of the surveys will be used by the daa to monitor the effectiveness of the scheme as it is currently designed. In addition, it is proposed to repeat the acoustic survey on the same 20% sample of properties on a bi-annual basis to continue to monitor the effectiveness of the scheme. The results of these ongoing surveys will be submitted to Fingal County Council as part of the ongoing reporting required under Condition 10. In relation to the above it will be the role of the daa to conduct the surveys and prepare the reports monitoring the ongoing effeteness for submission to Fingal County Council. It will be the role of Fingal County Council to review these reports and make the information available to the public if deemed necessary.

With reference to implementation meetings - terms of reference and agreed reporting will be agreed with FCC.

5.5 ROLES & RESPONSIBILITIES

The roles and responsibilities and communication plan associated with this section can be found in Appendices D and E.

5.5.1 Example Scope of Works

For each Type of work there will be an Objective, Target Performance, Suite of Measures and Builders work associated as follows:

Type of Work	Objective	Target Performance		Suite of Measures	Builders work
Attic Insulation 	Introduce acoustic insulation to attic spaces above occupied rooms to reduce the noise transfer from outside to inside via the roof space.	200mm thick insulation layer with a minimum density of 80kg/m3.	Loft Insulation	Where no loft insulation is present 200mm of fibrous acoustic insulation will be placed between ceiling joists. The insulation is to have a minimum density of 80kg/ m3 Where insulation is already present but found to be unsatisfactory additional layers of insulation will be added to increase the total thickness to 200mm.	Subject to site conditions, protecting existing plumbing and electrical services, such as wiring and lights.
			Loft Boards	Continuous layer of mass to provide at least 12kg/m2 added above joists in attic, for example 22mm plywood (or similar approved).	Subject to site conditions, protect existing plumbing and electrical services, such as wiring and lights.
			Ceiling over-boarding	Acoustic testing is required to determine if Ceiling Overboarding instead of Loft Insulation or Loft Boards is required. If due to inaccessibility or other practical reasons, Loft Insulation or Loft Boards cannot be installed, Ceiling Overboarding will be offered. Ceiling Overboarding using dense plasterboard with a total minimum surface mass of 12 kg/m2, i.e.. 15mm Soundbloc (or similar approved).	Provide new ceiling cornice, painting and plastering.
Windows and Doors 	Upgrade acoustic performance of external windows and doors	The existing window shall be either retained or replaced by a new double glazed window, if appropriate. Windows will have a target performance of up to 43dB R_w depending on the building type and the external noise levels. Doors will be weather sealed to ensure all gaps are acoustically treated.	Double Glazing	Double glazed window system with varying glass types to ensure acoustic performance to be up to 43dB R_w. This performance value is applicable to the window system as a whole, including frames, mullions and panels. The windows must have been tested in a European accredited laboratory to the standard ISO 10140:2010 “Laboratory measurement of airborne sound insulation of building elements” and rated in accordance with ISO 717-1:2013 “Acoustics- Rating of sound insulation in buildings and of building elements Part 1. Airborne sound insulation.”. The contractor must ensure that the glazing build-up meets both the above acoustic performance standard and current Building Regulations non-acoustic requirements (e.g. U values for work on existing buildings). Replacement windows must only be installed with sufficient sound attenuated ventilation as specified below to meet the requirements of Technical Guidance Document F to the Building Regulations current at the time of installation.	The older window frame and glass shall be removed from site for appropriate licensed disposal. The existing window shall be removed by the installer of a new double glazed unit to be installed. The existing building and decorations shall be made good where they have been affected by the installation of the windows, including plastering and painting around the window as required. Digital photographs could be taken before and after the works have been completed.

Type of Work	Objective	Target Performance		Suite of Measures	Builders work
Windows and Doors continued 			Secondary Glazing	The inner window may be framed in wood, metal or plastic or a combination of these materials. At least two reveals of the window opening between the outer and inner window shall be lined with sound absorbent material, if secondary glazing is installed. Both the outer and inner windows shall be adequately openable for direct ventilation and the component lights of the inner window must be fully openable or removable for cleaning purposes and where it is necessary to remove them they shall be of a reasonable weight and size. All opening lights of the inner window shall be well sealed around the edges either by a compressible resilient strip or equally effective alternative means. Where existing outer windows open sufficiently to permit egress in case of fire then this facility should be maintained when fitting secondary glazing. If the window is a bay or bow window the inner window shall follow the shape of the outer window unless specific instructions are given to the contrary by daa. Any necessary horizontal and vertical members of the inner glazing shall be aligned with the existing horizontal and vertical members, making due allowance for the weight and size of the moveable parts. The inner window may only be planted onto the wall face around the reveal where the reveal is too achieve a minimum cavity width as determined from the survey. Where the existing window is not openable and it is impracticable to provide an openable inner window of the same size and unacceptable to provide smaller inner windows then subject to the approval of the occupier and the daa, the inner window may be fixed by means of galvanized bolted connections or the approved means, such that the windows may be removed when necessary for cleaning. Where it is necessary to frame out at floor level to fit secondary windows and/or doors any carpet or lose laid floor covering shall be lifted and the sub-frame fitted directly onto the structural floor.	Before work is commenced the curtain, curtain rails, pelmets and other fittings should be removed and the curtains should be handed to the occupier. On completion of the glazing work the curtain rails, pelmets and other fittings should be re-instated where possible. Any gaps in the outer window shall be effectively sealed if possible by compressible resilient strip or by other means
			Acoustic perimeter seals to doors.	Doors will be weather sealed to ensure all gaps are acoustically treated.	

Vents and Chimneys 	Add acoustic attenuation to vents and chimneys to reduce sound transfer	Acoustic vents to have a target performance of up to 55dB $D_{ne,w}$.	Acoustic Vents	The ventilator selected can be a passive or active mechanical ventilator. The unit shall comply with current Technical Guidance Document F of the Building Regulations and evidence of the acoustic attenuation performance and noise generated by the vents must be supplied. External cowls/grilles shall be manufactured from fibreglass, reinforced plastic or equal and approved material, which shall not rust or degrade without maintenance. These shall be coloured to blend with the external fabric of the wall and shall be so constructed that when installed to a cavity wall the weather resistance of the cavity if retained. The external cowl/grille shall prevent the passage of snow, rain, vermin and birds. The gap between the ventilator unit and the inside face of the wall shall be fully sealed by a compressible strip and sealant or other approved means.	Making good of internal and external finishes, such as paint and plaster if required. Sealing of openings with flexible sealant. Temporary scaffolding or roof access as required.
		Operational chimneys to have damper added to allow chimney to be closed when not in use	Chimney cap or Damper	Unused chimneys to be capped. Operational chimneys to have proprietary chimney damper.	

6.0 PROJECT EXECUTION PLAN

Notify eligible dwelling owners of voluntary acoustic upgrade scheme.

Organise and engage in stakeholder meetings to outline proposals and intentions of voluntary acoustic upgrade scheme.

Prior to commencement of the development, a scheme for the voluntary noise insulation of existing dwellings shall be submitted to Fingal County Council.

Obtain agreement in writing from Fingal County Council to confirm acceptance of the scheme.

Carry out building surveys

In cases where historic structure of architectural interest or protected structures are involved, the services of a conservation specialist will be employed to assist with the survey.

Opt in by eligible owners

Issue of confirmation letter outlining the following:

Survey Methodology

Design Analysis

Statement of Need

Contract Works Procurement

Quality Control

Terms and conditions

Proposed schedule of appropriate acoustic upgrades

Organise and engage in Stakeholder meetings

Agree schedule of appropriate acoustic insulation measures

Define scope of works

Implement each application based on survey findings and agreed schedule of appropriate acoustic upgrades.

Tender Works

Construction Works

Certification of Works

Sign off completed works

Record and document