global environmental solutions

Proposed Residential Aged Care Facility

Paling Court, Grasmere

Aircraft and Road Traffic Noise Assessment

Report Number 610.07939.06075

22 June 2012

Carrington Centennial Care
90 Werombi Road
GRASMERE NSW

Version: Revision 0

Proposed Residential Aged Care Facility

Paling Court, Grasmere

Aircraft and Road Traffic Noise Assessment

PREPARED BY:

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
2 Lincoln Street Lane Cove NSW 2066 Australia

(PO Box 176 Lane Cove NSW 1595 Australia)
T: 61 2 9428 8100 F: 61 2 9427 8200
E: sydney@slrconsulting.com www.slrconsulting.com

DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
610.07939.06075	Revision 0	22 June 2012	Monica Saralertsophon	Robert Trieu	Robert Trieu

Table of Contents

Table of Contents

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR Consulting) has been engaged by Michael Brown Planning Strategies to undertake an acoustical assessment of the proposed Residential Aged Care Facility (RACF) to be located on a parcel of land within Paling Court, east of Werombi Road, Grasmere (near Camden) NSW. The assessment forms part of a Development Application to Camden Council.

This report identifies the potential noise impacts associated with aircraft and road traffic noise intrusion from the Camden Airport and Werombi Road into the proposed RACF.

The purpose of this acoustic assessment report is to demonstrate whether the site is suitable for residential development with reference to applicable regulatory standards and codes.

2 SITE LOCATION

The proposed three-story RACF is located within Paling Court, east of Werombi Road, Grasmere (near Camden) NSW.

The location of the proposed RACF is shown in **Figure 1**.

Figure 1 Site Location

The proposed RACF is located approximately 145 m east of Werombi Road and 1.45 km away from the glider runways 10/24 and 06/24 and approximately 1.9 km away from the powered fixed wing aircraft runways 10/28 and 06/24 (main runway (sealed)) of Camden airport.

The location of the proposed RACF in relation to its surroundings is shown in **Figure 2**.

Figure 2 Site Location in relation to its surroundings

Existing single residential dwellings and residential complexes are located in the vicinity of the proposed RACF. The site is best described as suburban with a likely potential for further residential development in the future.

2.1 Aircraft Noise

Sydney Metro Airport Camden (Camden Airport) is a General Aviation airport, hosting small aircraft operations in the commercial, private, sports and recreational aviation areas served by four runways, two for powered fixed wing aircraft (Runways 06/24(Sealed) and 10/28) and two for gliders (Runways 10/24 and 06/24).

Camden Airport is located approximately 1.6 km away (based on the nearest site boundaries) from the proposed development site and has the potential to impact on the future residences and therefore require assessment.

2.2 Road Traffic Noise

The proposed RACF is located approximately 145 m east of Werombi Road. Werombi Road is classified as a collector road according to the RTA. Werombi Road has the potential to impact on the proposed development and therefore require assessment.

3 CRITERIA/GUIDELINES AND PROJECT SPECIFIC NOISE LEVELS

3.1 Aircraft Noise Assessment Criteria

Section 5.2.1 Airport *(Camden) Noise effect on Developments* of the Camden Council's Environmental Noise Policy provides controls for development near Camden Airport. The Noise Policy prescribes that the assessment of building site acceptability must be determined based on the Australian Noise Exposure Forecast (ANEF) systems. The aircraft noise intrusion assessment of the development is to be carried out in accordance with the methodologies provided in AS 2107-2000 and Camden Council's Environmental Noise Policy Part C – Section 5.3.

The General Aviation (GA) airport, such as Camden Airport, facilitates light aircraft such as:

- Low performance single engine aircraft (GASEPF) such as a Cessna 172.
- High performance single engine piston aircraft (GASEPV) such as a Beech Bonanza.
- Conventional twin engine aircraft (BEC58P) such as a Piper Seneca.
- Conventional single engine turbine helicopters (EC130) such as the Eurocopter EC130 Ecureuil.

Aircraft Noise Exposure Forecasts (ANEFs) play a major role in land use planning in communities surrounding airports. The role of noise modelling in land use planning is described in *Australian Standard AS 2021-2000: Acoustics - Aircraft noise intrusion - Building siting and construction* which advises on the acceptability of building types for various uses based on ANEF zones. The key elements of AS 2021-2000 are set out in **Table 1**.

Table 1 Building Type Acceptability Based on ANEF Zones

Building Type	Acceptable	Conditional	Unacceptable
House, home unit, flat, caravan park	Less than 20 ANEF	20 to 25 ANEF	Greater than 25 ANEF
Hotel, motel, hostel	Less than 25 ANEF	25 to 30 ANEF	Greater than 30 ANEF
School, university	Less than 20 ANEF	20 to 25 ANEF	Greater than 25 ANEF
Hospital, nursing home	Less than 20 ANEF	20 to 25 ANEF	Greater than 25 ANEF
Public building	Less than 20 ANEF	20 to 30 ANEF	Greater than 30 ANEF
Commercial building	Less than 25 ANEF	25 to 35 ANEF	Greater than 35 ANEF
Light industrial	Less than 30 ANEF	30 to 40 ANEF	Greater than 40 ANEF
Other industrial	Acceptable in all ANEF zones		

Maximum Internal Noise Levels due to Aircraft Noise Intrusion

Recommended indoor design sound levels (effective maximum levels) for various areas of occupancy are provided in Section 3 of AS 2021-2000. The relevant Indoor Design Sound Levels for this assessment are presented in **Table 2.**

Table 2 Indoor Design Sound Levels - Residential Building

Area of Occupancy	Indoor Design Sound Level (L_{ASmax})
Sleeping Areas[1]	50 dBA
Other Habitable Areas	55 dBA
Bathrooms, Toilets, etc	60 dBA

Note 1 Criteria interpreted to apply during the night-time period, (i.e.: 10:00 pm until 7:00 am). This reverts to the "Other Habitable Areas" criterion at all other times.

3.2 Road Traffic Noise Assessment Criteria

3.2.1 Camden Council Development Control Plan (Camden Council DCP)

Section B1.16 (Acoustic Amenity) of the *Camden Council DCP 2011* provides controls for residential apartment developments. Item 7 in the *Controls* section prescribes that internal noise goals in AS 2107 and methodologies provided in AS 3671 are to be used when considering road traffic noise intrusion into such developments.

3.2.2 AS/NZS 2107:2000

Australian/New Zealand Standard AS/NZS 2107:2000 - *Acoustics - Recommended design sound levels and reverberation times for building interiors* is primarily concerned with establishing internal noise levels for relatively steady noise sources, such as air conditioning plant and continuous road traffic noise.

Table 3 provides an extract of the recommended internal noise levels for residential premises near "minor roads" as given in AS/NZS 2107:2000 and relevant to this assessment. The guideline lower and upper range of the noise levels are described as "satisfactory" and "maximum" respectively.

Table 3 AS/NZS 2107:2000 Recommended Design Sound Levels

Type of Occupancy/Activity	Recommended Design Sound Level L_{Aeq} dBA re 20 µPa	
	Satisfactory	Maximum
Houses and apartments near minor roads		
Living areas	30 dBA	40 dBA
Sleeping areas	30 dBA	35 dBA

In order to provide further clarity on the assessment periods, reference has been made to The Department of Planning, *Development near Rail Corridors and Busy Roads – Interim Guideline* which states that a $L_{Aeq(15\ hour)}$ descriptor be used for the daytime (living areas) and a $L_{Aeq(9\ hour)}$ descriptor for the night-time (sleeping areas) with daytime corresponding to the period from 7 am to 10 pm and night-time corresponding to the period 10 pm to 7 am.

3.2.3 AS 3671-1989

Australian Standard 3671-1989 *Acoustics - Road Traffic Noise Intrusion – Building Siting & Construction* provides guidance on the location and construction of buildings in the areas near roadways carrying more than 2000 vehicles per day. The recommended internal noise levels presented in AS/NZS 2107:2000 form the basis for the determination of adequate external envelope construction.

4 AIRCRAFT NOISE ASSESSMENT

Modelling of the noise impact of aircraft operations has been undertaken as part of the Camden Airport Master Plan 2010. Such modelling is undertaken for three primary reasons:

- ANEFs are a required part of an Airport Master Plan under the Airports Act 1996.
- To assist the community to understand the noise impacts associated with the 20 year aircraft movement traffic forecast included in the Master Plan.
- To assist in land use planning.

ANEF charts typically consist of exposure contours with single number indexes of 20, 25, 30, 35 and 40. These contours indicate land areas around aerodromes which are forecast to be exposed to aircraft noise of certain levels as defined by a computation based upon:

- Measurements of aircraft noise (expressed in Effective Perceived Noise Decibels, EPNdB), which take account of the spectral, temporal and spatial aspects of the noise.
- Estimates and generalisations of aircraft type groups and mix, number of operations, runway utilisation, flight paths and operational procedures.
- Time of day, whether daytime (0700 hours to 1900 hours) or evening/night-time (1900 hours to 0700 hours).

4.1 Procedure

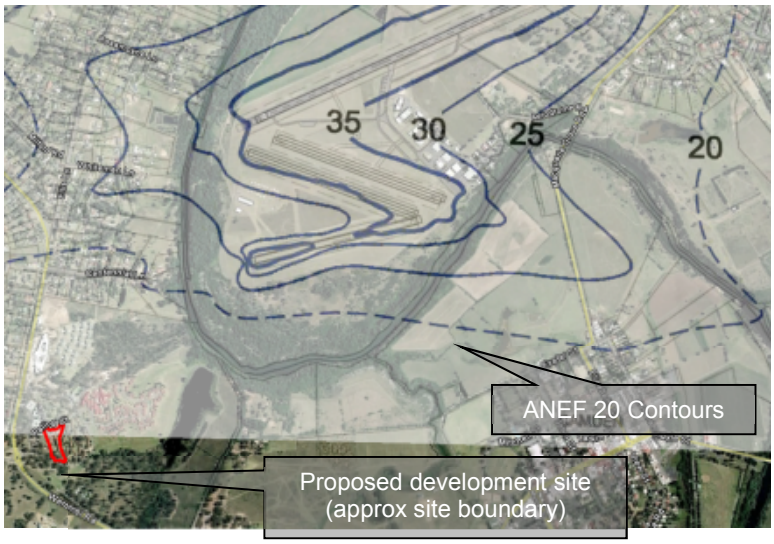
AS 2021:2000 contains a detailed procedure for assessing maximum levels of aircraft noise intrusion based on the location of a building with respect to ANEF contours. The suitability of the site for a given building type is then ranked as either “Unacceptable”, “Conditionally Acceptable” or “Acceptable”. Based on the acceptability of the site for the proposed building use, there are further detailed procedures to determine the noise reduction required of the building construction to control maximum internal noise levels due to aircraft flyovers.

4.2 Site Location

Figure 3 shows the outline location of the proposed development site in reference to the Camden Airport 2029/30 ANEF contours. The proposed development site has been identified as located outside the ANEF 20 contours. However, the Aircraft Noise Intrusion assessment for the subject site is undertaken under specific request by the Camden Council.

A review of Table 2.1 in AS 2021-2000 reveals that the site is classified as "Acceptable" for residential land use.

Figure 3 Camden Airport ANEF 2029 Chart and Proposed Site Location



In accordance with the methods provided in AS 2021-2000, distance coordinates for the site relative to the runways have been determined. Given the site location, noise from aircraft movements associated with the main glider areas are most likely to impact on the proposed development. The distance coordinates for this development with reference to all operating runways at Camden Airport are presented in **Table 4** below.

Table 4 Distance Coordinates Based on the Nearest Site Boundary

Distance Coordinate	Distance from Runways			
	Powered Fixed Wing Aircraft Runways		Gliders Runways	
	06/24 (Main)	10/28	06/24	10/24
DL[1]	800, 742, 684 [4]	0, 0, 0 [4]	489, 431, 373 [4]	0, 0, 0 [4]
DT[2]	2611, 2577, 2543 [4]	955, 921, 887 [4]	1461, 1427, 1393 [4]	863, 829, 795 [4]
DS[3]	920	1552	563	1460

Note 1: DL - Parallel distance to the runway, from the site to the closer end of the runway

Note 2: DT - Parallel distance to the runway, from the site to the far end of the runway

Note 3: DS - Perpendicular distance from the site to the side of the extended runway centre line

Note 4: Corrections to DL and DT were included to account for the difference in elevation between the proposed RACF site and Camden airport. (Lower Ground, Upper Ground, 1st Floor)

4.3 Aircraft Noise Source Levels

Typical maximum noise levels predicted at the proposed RACF from each runway due to light general aviation aircraft activities are presented in **Table 5**.

Table 5 Typical Maximum Noise Levels Predicted at the Proposed RACF

Aircraft Activities	Typical maximum noise levels predicted at the proposed RACF			
	Powered Fixed Wing Aircraft Runways		Gliders Runways	
	06/24 (Main)	10/28	06/24	10/24
Take off	65 dBA	54 dBA	70 dBA	55 dBA
Arrivals	49 dBA	40 dBA	56 dBA	40 dBA

Note 1: Typical Maximum Noise Levels were predicted to be similar for each floors of the proposed RACF building.

A review of **Table 5** indicates that the highest typical maximum noise level predicted at the proposed RACF due to aircraft activities at Camden Airport is **70 dBA**.

4.4 Aircraft Noise Reduction

In order to establish the minimum building construction requirement at the proposed RACF, the Aircraft Noise Reduction (ANR) has been established based on the typical maximum noise levels predicted at the proposed RACF. The AS 2021-2000 recommended maximum internal noise levels assume windows and external entry doors closed.

The calculated ANR are shown in **Table 6**.

Table 6 Aircraft Noise Reduction (ANR)

Area of Occupancy	Aircraft Noise Reduction
Sleeping Areas	20 dBA
Other Habitable Areas	15 dBA
Bathrooms, Toilets etc.	10 dBA

A 10 dB ANR can typically be achieved by a facade with an opened window to floor area ratio satisfactory with the fresh air requirements of the Building Code of Australia. Notwithstanding, 20 dB ANR is the highest ANR requirement and thus mechanical/alternative ventilation may be required in order to keep windows and doors closed.

An inclusion of the ventilation system may require review from an acoustic consultant such that the design does not compromise the acoustic integrity of the building envelope construction recommended in this report.

Ventilation systems shall meet relevant criteria for environmental noise emissions as stipulated within Camden Council's Environmental Noise Policy. It is likely that the criteria will be met through the use of conventional noise control methods (eg judicious positioning of equipment, selection on the basis of quiet operation and, where necessary, providing enclosures or localised barriers). **Table 7** presents the recommended minimum weighted noise reduction (Rw) for each external building element in order to achieve the ANR.

Table 7 Minimum Acoustic Rating (Rw) Required for Each External Building Element

Area of Occupancy	Rw of Building Element		
	External Wall	Glazing	Roof/Ceiling
Bedrooms	29	26	30
Other Habitable Areas	24	21	25
Bathrooms, Toilets, Non-Habitable Areas	21	13	20

An extract of Appendix C of the DoP's *Development near Rail Corridors and Busy Roads - Interim Guideline* showing the indicative performance of building elements and their construction is presented in **Appendix A** and is considered relevant for this assessment.

Standard wall and roof constructions shown in **Appendix A** will surpass the R_w ratings stipulated in **Table 7**. A minimum of 6 mm glazing with acoustic seals will be required for bedroom windows as per Category 2 recommendations of **Appendix A**.

5 ROAD TRAFFIC NOISE ASSESSMENT

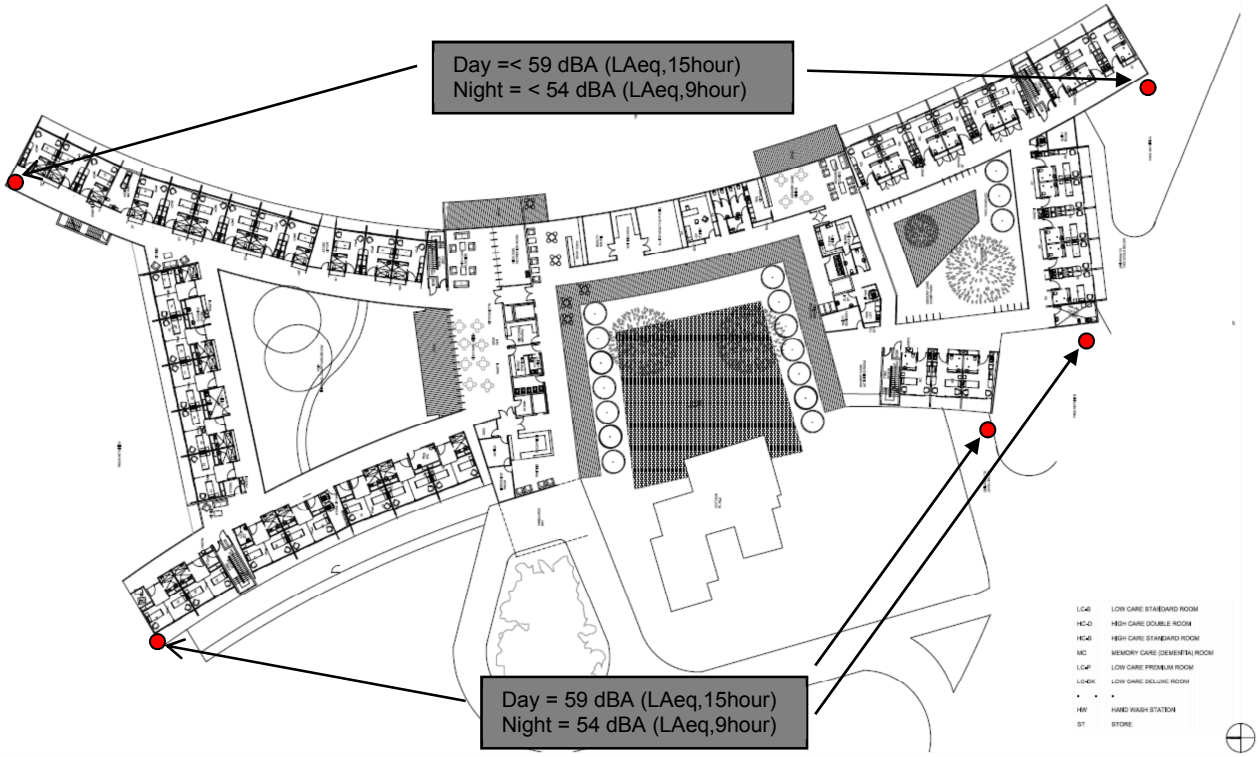
5.1 Predicted External Noise Levels

Calculations of the level of road traffic noise likely to be experienced at the proposed RACF were carried out using the Calculation of Road Traffic Noise (CoRTN 1988) prediction method and existing traffic volume data provided for a traffic assessment report prepared for a site located adjacent to the proposed RACF (refer to *Transport and Urban Planning report reference 11131r*). The report stated an average daily traffic flow of 6000 vehicles on Werombi Road in November 2011.

Future development in the Wollondilly Shire LGA is likely to induce traffic volumes increase on Werombi Road which will lead to a gradual increase in road traffic noise levels over time. For this to be significant in the short term, traffic numbers would have to increase by 60% before a discernible increase (approximately 2 dBA) in noise level occurred. Such an increase in the short term however is considered unlikely and therefore assessment using current traffic figures is considered most applicable.

The predicted noise levels (including +2.5 dBA facade correction) generally impinging on the facades of the proposed apartment blocks are shown on **Figure 4**.

Figure 4 Plan Showing General Noise Exposure of Future Facades



Drawing courtesy of Jackson Teece Architecture

5.2 Noise Intrusion to Residential Dwellings

Standard window glazing of a building will typically attenuate noise ingress by 20 dBA with windows and doors closed and 10 dBA with windows and door open (allowing for natural ventilation).

The predicted internal LAeq noise levels for standard facade glazing are presented in **Table 8** for the windows opened and windows closed scenarios.

Table 8 Predicted Internal Road Traffic LAeq (dBA) Noise Levels - Standard Glazing

Room Type	Internal Noise Level[1] (dBA) - Week days		Internal Noise Criteria (dBA)	
	Windows Open	Windows Closed	Satisfactory	Maximum
Living Areas (daytime)	49	39	30	40
Sleeping Areas (night-time)	44	34	30	35

Note 1: Predicted LAeq Noise Levels include a 2.5 dBA facade correction.

A review of **Table 8** indicates that with windows and doors closed, the maximum internal noise criteria will be achieved in living and sleeping areas with respect to road traffic noise intrusion.

On the basis of the calculated LAeq noise levels in **Table 8**, it is anticipated that the design of the proposed residential development will not need to incorporate specific noise control treatments with respect to road traffic noise intrusion. However, fresh air ventilation systems will be required to allow windows and doors to be closed if desired by the occupant and achieve the minimum Building Code of Australia airflow requirement.

For building constructions which differ significantly from typical composition, eg for those including oversize windows or larger areas of glazed doors, further consideration should be given at the detailed design stage to specify adequate acoustic properties of the specific building element assemblies.

6 CONCLUSION

SLR Consulting has conducted an acoustical assessment of a proposed RACF located within Paling Court, Grasmere near Camden NSW. The assessment examined aircraft and road traffic noise intrusion to residential spaces.

The assessment of aircraft noise intrusion was carried out in accordance with AS 2021-2000 at the proposed development within proximity of Camden Airport.

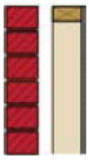
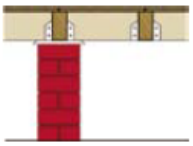
Calculation of road traffic noise levels using CoRTN algorithms has been used to predict road traffic noise levels incident upon the development.

Based upon the findings of this assessment, the development as proposed appears satisfactory in terms of its general planning arrangement. Acceptable internal noise levels can be achieved within residential apartments with the incorporation of recommended controls, ie standard wall and roof construction, category 2 glazing for bedrooms and mechanical/alternative ventilation.

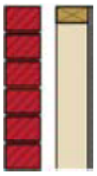
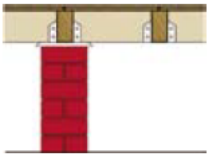
EXTRACT OF APPENDIX C OF THE DOP'S "DEVELOPMENT NEAR RAIL CORRIDORS AND BUSY ROADS – INTERIM GUIDELINE - INDICATIVE ACOUSTIC TREATMENTS

Category of Noise Control Treatment	R_w of Building Elements (minimum assumed)				
	Windows/Sliding Doors	Frontage Facade	Roof	Entry Door	Floor
Category 1	24	38	40	28	29
Category 2	27	45	43	30	29
Category 3	32	52	48	33	50
Category 4	35	55	52	33	50
Category 5	43	55	55	40	50

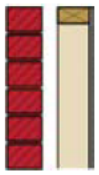
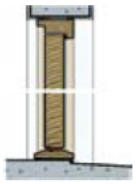
EXTRACT OF APPENDIX C OF THE DOP'S "DEVELOPMENT NEAR RAIL CORRIDORS AND BUSY ROADS – INTERIM GUIDELINE - INDICATIVE ACOUSTIC TREATMENTS

Category No.	Building Element	Standard Constructions	sample
1	**Windows/Sliding Doors**	Openable with minimum 4mm monolithic glass and standard weather seals	
	Frontage Facade	**Timber Frame or Cladding:** 6mm fibre cement sheeting or weatherboards or plank cladding externally, 90mm deep timber stud or 92mm metal stud, 13mm standard plasterboard internally	
		Brick Veneer: 110mm brick, 90mm timber stud or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, 10mm standard plasterboard internally	
		Double Brick Cavity: 2 leaves of 110mm brickwork separated by 50mm gap	
	Roof	Pitched concrete or terracotta tile or metal sheet roof with sarking, 10mm plasterboard ceiling fixed to ceiling joists, R1.5 insulation batts in roof cavity.	
	Entry Door	35mm solid core timber door fitted with full perimeter acoustic seals	
	Floor	1 layer of 19mm structural floor boards, timber joist on piers	
		Concrete slab floor on ground	

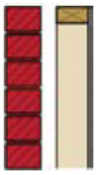
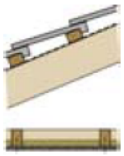
EXTRACT OF APPENDIX C OF THE DOP'S "DEVELOPMENT NEAR RAIL CORRIDORS AND BUSY ROADS – INTERIM GUIDELINE - INDICATIVE ACOUSTIC TREATMENTS

Category No.	Building Element	Standard Constructions	sample
2	**Windows/Sliding Doors**	Openable with minimum 6mm monolithic glass and full perimeter acoustic seals	
	Frontage Facade	**Timber Frame or Cladding Construction:** 6mm fibre cement sheeting or weatherboards or plank cladding externally, 90mm deep timber stud or 92mm metal stud, 13mm standard plasterboard internally with R2 insulation in wall cavity.	
		Brick Veneer Construction: 110mm brick, 90mm timber stud frame or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, 10mm standard plasterboard internally.	
		Double Brick Cavity Construction: 2 leaves of 110mm brickwork separated by 50mm gap	
	Roof	Pitched concrete or terracotta tile or metal sheet roof with sarking, 10mm plasterboard ceiling fixed to ceiling joists, R2 insulation batts in roof cavity.	
	Entry Door	40mm solid core timber door fitted with full perimeter acoustic seals	
	Floor	1 layer of 19mm structural floor boards, timber joist on piers	
		Concrete slab floor on ground	

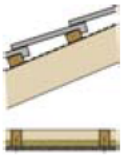
EXTRACT OF APPENDIX C OF THE DOP'S "DEVELOPMENT NEAR RAIL CORRIDORS AND BUSY ROADS – INTERIM GUIDELINE - INDICATIVE ACOUSTIC TREATMENTS

Category No.	Building Element	Standard Constructions	sample
3	**Windows/Sliding Doors**	Openable with minimum 6.38mm laminated glass and full perimeter acoustic seals	
	Frontage Facade	**Brick Veneer Construction:** 110mm brick, 90mm timber stud or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, 10mm standard plasterboard internally.	
		Double Brick Cavity Construction: 2 leaves of 110mm brickwork separated by 50mm gap	
	Roof	Pitched concrete or terracotta tile or sheet metal roof with sarking, 1 layer of 13mm sound-rated plasterboard fixed to ceiling joists, R2 insulation batts in roof cavity.	
	Entry Door	45mm solid core timber door fitted with full perimeter acoustic seals	
	Floor	Concrete slab floor on ground	

EXTRACT OF APPENDIX C OF THE DOP'S "DEVELOPMENT NEAR RAIL CORRIDORS AND BUSY ROADS – INTERIM GUIDELINE - INDICATIVE ACOUSTIC TREATMENTS

Category No.	Building Element	Standard Constructions	sample
4	**Windows/Sliding Doors**	Openable with minimum 10.38mm laminated glass and full perimeter acoustic seals	
	Frontage Facade	**Brick Veneer Construction:** 110mm brick, 90mm timber stud or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, R2 insulation batts in wall cavity, 10mm standard plasterboard internally.	
		Double Brick Cavity Construction: 2 leaves of 110mm brickwork separated by 50mm gap	
	Roof	Pitched concrete or terracotta tile or sheet metal roof with sarking, 2 layers of 10mm sound-rated plasterboard fixed to ceiling joists, R2 insulation batts in roof cavity.	
	Entry Door	45mm solid core timber door fitted with full perimeter acoustic seals	
	Floor	Concrete slab floor on ground	

EXTRACT OF APPENDIX C OF THE DOP'S "DEVELOPMENT NEAR RAIL CORRIDORS AND BUSY ROADS – INTERIM GUIDELINE - INDICATIVE ACOUSTIC TREATMENTS

Category No.	Building Element	Standard Constructions	sample
5	**Windows/Sliding Doors**	Openable Double Glazing with separate panes: 5mm monolithic glass, 100mm air gap, 5mm monolithic glass with full perimeter acoustic seals.	
	Frontage Facade	**Double Brick Cavity Construction:** 2 leaves of 110mm brickwork separated by 50mm gap with cement render to the external face of the wall and cement render or 13mm plasterboard direct fixed to internal faces of the wall.	
	Roof	Pitched concrete or terracotta tile or sheet metal roof with sarking, 2 layers of 10mm sound-rated plasterboard fixed to ceiling joist using resilient mounts, R2 insulation batts in roof cavity	
	Entry Door	Special high performance acoustic door required - Consult an Acoustic Engineer	*Door to acoustic consultant's specifications*
	Floor	Concrete slab floor on ground	
6	**All**	Consult an Acoustic Engineer	