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28 January 2024

Ref. RB/11-291.R23

Peet Caboolture Syndicate Ltd
Level 3, 167 Eagle Street
Brisbane Q 4000

Attn: Ms Allie Sharp, Development Manager

Dear Ms Sharp,

**Re. Peet Riverbank Stages 22A and 22B, Caboolture South
Assessment and Control of Rail Noise Intrusion
Guidance for Purchasers of Lots 1505-1566
re Acoustical Design Requirements of QDC MP 4.4**

Further to your request, we have undertaken an assessment of the extent of rail noise intrusion onto Stages 22A and 22B of Peet Riverbank estate.

Thereafter, we have prepared this letter of guidance to provide assistances to purchasers of Lots 1505-1566 within Stages 22A and 22B with respect to the acoustical design process to be adopted to adequately control rail noise intrusion into their particular residence.

1.0 Background

Queensland Development Code Mandatory Part 4.4 (QDC MP 4.4) *Buildings in a Transport Noise Corridor* was introduced on 1 September 2010. The current version of [QDC MP 4.4](#) commenced on 17 August 2015, replacing the version introduced in 2010. The stated purpose of QDC MP 4.4 is “to ensure habitable rooms of Class 1, 2, 3 and 4 buildings located in a Transport Noise Corridor (TNC) are designed and constructed to reduce transport noise”.

On 29 January 2020, under the provisions of Section 246Z and Section 246ZA of *Building Act 1975*, the State Government gazetted new TNC’s for the Rail Network of Queensland. This includes North Coast Rail Line (NCRL), ie the section of the Rail Network of Queensland located immediately to the west of the Riverbank estate.

By reference to [Queensland Government Gazette - Extraordinary No 21 of Vol 383](#), it is noted that the new mapping presented on the Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) State Planning Policy (SPP) Interactive Mapping System (IMS) supersedes all previous mapping.

Having regard to the mapping presented on the DSDMIP SPP IMS [website](#), it is evident that, from 29 January 2020 onwards, land within 250m of NCRL has been designated as lying within the TNC associated with NCRL.

In general, all residential allotments located within a TNC will need to be acoustically designed in accordance with the requirements of QDC MP 4.4 having regard to the relevant noise categories. The QDC MP 4.4 Noise Categories can be determined by reference to the DSDMIP SPP IMS website or in accordance with the alternative site-specific noise level assessment method¹.

An overview of QDC MP 4.4 is presented in Attachment A together with the degree of control that may be achieved in respect of the noise intrusion from diesel passbys.

2.0 Determination of Acoustical Upgrade Requirements to Control Rail Noise Intrusion

In July 2020, a detailed site-specific noise level assessment of the extent of rail noise intrusion onto the site was undertaken. From results of this examination, it was determined that, after construction of a rail noise barrier along the western boundary of Stages 22A and 22B together with returns along the side boundaries of specific lots, the actual level of rail noise intrusion onto Lots 1505-1566 of Stages 22A and 22B will be substantially less than that currently shown on the DSDMIP SPP IMS website. Details of the assessment process and results were presented in Report No 11-291.R21.Rev1, dated 10 October 2022.

Subsequently, in December 2023 and January 2024, the Project Civil Engineer, Egis, updated the set of barrier design drawings to take account of specific changes to finished ground levels, retaining wall heights and the horizontal alignment of the barrier. The resultant barrier design is shown in Egis Drawing No 21-000058.3 1400 Rev3 dated 21 November 2023 and Drawing No 21-000058.3 1401 Rev4 dated 20 December 2023 (issued on 15 January 2024). The noise model that was prepared at the time of preparation of Report No 11-291.R21.Rev1 was updated accordingly. With the updated barrier design in place, the resultant extent of noise intrusion was determined.

The actual QDC MP 4.4 Noise Categories for rail noise intrusion that will apply to Lots 1505-1528 of Stage 22A and Lots 1529-1566 of Stage 22B are presented in Tables 1 and 2 following.

Lot No	QDC MP 4.4 Noise Category by Floor Level		Lot No	QDC MP 4.4 Noise Category by Floor Level		Lot No	QDC MP 4.4 Noise Category by Floor Level	
	Ground	First		Ground	First		Ground	First
1505	1	2	1513	2	4	1521	2	2
1506	2	2	1514	2	4	1522	2	2
1507	2	2	1515	2	4	1523	2	2
1508	2	4	1516	2	4	1524	2	2
1509	2	4	1517	2	4	1525	2	2
1510	2	4	1518	2	4	1526	2	2
1511	2	4	1519	1	1	1527	2	2
1512	2	4	1520	1	1	1528	2	2

Table 1 – QDC MP 4.4 Rail Noise Categories for Stage 22A (Lots 1505-1528) With Barrier Arrangement as Shown in Egis Drawing Nos 21-000058.3 1400 Rev3 and 1401 Rev4

¹ On advice from DTMR (and as noted in DTMR’s Transport Noise Management Code of Practice, November 2013) as well as per Schedule 3 of QDC MP 4.4, building upgrade requirements may be determined either (i) by application of noise categories determined from the DSDMIP SPP IMS website, or (ii) from the results of the alternative site-specific noise assessment.



Lot No	QDC MP 4.4 Noise Category by Floor Level		Lot No	QDC MP 4.4 Noise Category by Floor Level		Lot No	QDC MP 4.4 Noise Category by Floor Level	
	Ground	First		Ground	First		Ground	First
1529	2	2	1542	2	2	1555	2	4
1530	2	2	1543	2	2	1556	2	4
1531	2	2	1544	2	2	1557	2	4
1532	2	2	1545	2	2	1558	1	4
1533	2	2	1546	2	2	1559	1	4
1534	2	2	1547	2	4	1560	1	4
1535	2	2	1548	2	4	1561	1	4
1536	2	2	1549	2	4	1562	1	4
1537	2	2	1550	2	4	1563	1	3
1538	1	1	1551	2	4	1564	2	3
1539	1	1	1552	2	4	1565	2	3
1540	1	2	1553	2	4	1566	2	4
1541	2	2	1554	2	4			

**Table 5 – QDC MP 4.4 Rail Noise Categories for Stage 22B Lots 1529-1566
With Barrier Arrangement as Shown in Egis Drawing Nos 21-000058.3 1400 Rev3 and 1401 Rev4**

3.0 Guidance Re Acoustical Design and Certification Process

3.1 Rail Noise – Determination of QDC MP 4.4 Noise Categories for a Specific Residence

Having determined the QDC MP 4.4 Noise Categories for each lot from the information presented in Tables 1 and 2 above, the extent of building upgrade that will be required to be implemented into a specific residence can be determined by one of two methods as discussed below:-

- Simple Method:** Having regard to Matters 1-3 of Attachment A, simply adopt the applicable QDC MP 4.4 Noise Categories above in Table 1 at Section 2.2. Thereafter, design the residence in accordance with Schedule 1 and Schedule 2 of QDC MP 4.4. Refer also discussion at Attachment A (notably, pages 7 and 8) following.
- Refined Method:** Having regard to Matters 1-4 of Attachment A, update the existing noise model or prepare a site-specific noise model for the lot and residence.
Then, by having regard to the beneficial shielding provided by (i) other already-constructed "approved" residences on intervening lots (if any) and (ii) the residence to be constructed on the particular lot itself, plot rail noise contours at fine gradation around the external facades of each habitable space within the residence being assessed.
Thereafter for each habitable space, design the residence in accordance with the procedures of QDC MP 4.4 and Schedule 1 and Schedule 2 of QDC MP 4.4 to determine the level of building upgrade (ie the R_w rating of each upgraded building element, or the building construction details for each specific building element to be upgraded) that will be required to be implemented into the design of the dwelling. Refer also discussion at Attachment A (notably, pages 7 and 8) following.



Note:

For residences located within QDC MP 4.4 Noise Category 1, the deemed-to-comply constructions are generally sufficiently benign that any savings in building costs that may accrue by carrying out a site-specific assessment in accordance with the Refined Method may be commensurate with the cost of conducting the site-specific assessment itself. The Refined Method is usually best suited to residences located in QDC MP 4.4 Noise Categories 2-4.

3.2 Building Design Upgrade Procedure Requirements

Once the QDC MP 4.4 Noise Category/ies for a specific residence have been determined by the Simple Method or the Refined Method, as applicable, and having regard to the provisions of QDC MP 4.4, the extent of building upgrade deemed to be required to be applied to each habitable space of a residence may be determined by reference to Schedules 1 and 2 of QDC MP 4.4 as follows below:-

1. Schedule 1 of QDC MP 4.4 provides the R_w performance requirements (ie the acoustical ratings) for each facade element for each specific QDC MP 4.4 Noise Category, and
2. Schedule 2 of QDC MP 4.4 provides the deemed-to-comply building constructions, ie the "acceptable forms of construction", that are deemed to match the R_w performance requirements. As permitted under Acceptable Solution A1(b) of QDC MP 4.4, however, building constructions other than the deemed-to-comply constructions of Schedule 2 may be incorporated into the building design provided that, in each case, the building construction "achieves the minimum R_w value for the relevant building component and applicable noise category"².

Schedules 1 and 2 of QDC MP 4.4 are reproduced in Appendix C.

Thereafter, to ensure that the residence is constructed in accordance with the required building upgrades, the building design drawings should be annotated to include the following:-

- (i) Reference to the R_w ratings for specific building facade elements (eg windows) which are then to be used as a specification for supply of these facade elements, and
- (ii) The specific deemed-to-comply constructions presented in Schedule 2 for the particular building facade element (eg external walls), or
- (iii) In the case of other building elements where none of the specific deemed-to-comply constructions is to be incorporated into the building design (eg in the case of lightweight external wall constructions), an alternative building construction that "achieves the minimum R_w value for the relevant building component and applicable noise category".

In instances where one facade of a particular habitable space is exposed to a noise category which differs from the noise category to which another facade of the same habitable space is exposed, it would be prudent to adopt the higher of the two noise categories when carrying out the acoustical assessment of the space. In any event, it would also be appropriate to adopt the higher of the two noise categories for the determination of the minimum R_w performance requirement to be achieved by the roof/ceiling construction for that space.

3.3 Documentation for Building Acoustical Design Certification

Certification of the adequacy of the acoustical design of the residence is a matter for sole determination by the Building Certifier.

To assist the Building Certifier in making this determination, it is to be expected that various documents will need to be supplied to the building certifier. The documentary requirements of the Building Certifier should be determined by making a request of the Building Certifier directly.

² In instances where alternative building constructions are proposed, it would be prudent to ensure that confirmation is provided that the specific construction achieves the required minimum R_w rating required. This confirmation may be provided either by the supplier of the building element or by an RPEQ-registered acoustical engineer experienced in acoustical design.



While the requirements of individual Building Certifiers will vary from one to another, it is likely that the following information will need to be provided in any event:-

- **Simple Method:**
 - (i) A copy of this letter of guidance
 - (ii) Building design drawings annotated to include:
 - a. the actual QDC MP 4.4 Noise Category applying to each level of the dwelling (extracted from Table 1), and
 - b. reference to the R_w ratings, specific deemed-to-comply constructions, and
 - c. where necessary, alternative building construction/s (plus supporting confirmation that the alternative construction/s comply with the R_w rating required) as discussed above at Section 3.2.

- **Refined Method:**
 - (i) A copy of this letter of guidance
 - (ii) A site-specific acoustical design review report for the specific residence listing:
 - a. the R_w ratings for each upgraded building element, and/or
 - b. the building construction details for each specific building element.
 - (iii) A completed Form 15 *Compliance Certificate for Building Design or Specification* to accompany the acoustic design review report.
 - (iv) Building design drawings annotated to include:
 - a. R_w ratings for each upgraded building element, and/or
 - b. the building construction details for each specific building element to be upgraded as discussed above at Section 3.2.

We trust that this information is adequate for your purposes at this stage, but should you require any further information, please do not hesitate to contact us.

Regards,
Acoustics RB Pty Ltd



Russell Brown,
Director
RPEQ 2799



Attachment A

Overview of QDC MP 4.4 and Advice from DTMR

Under the provisions of Section 246Z and Section 246ZA of *Building Act 1975*, a Transport Noise Corridor (TNC) applies along both sides of North Coast Rail Line (NCRL).

In general, all residential allotments located within a TNC will need to be acoustically designed in accordance with the requirements of QDC MP 4.4 having regard to the relevant noise categories. The QDC MP 4.4 Noise Categories can be determined at BA by reference to the DSDMIP SPP IMS [website](#) or in accordance with the alternative site-specific noise level assessment method.

On advice from DTMR and as noted in DTMR's *Transport Noise Management Code of Practice*, November 2013, building upgrade requirements can be determined at BA either (i) by application of QDC MP 4.4 Noise Categories determined from the DSDMIP SPP IMS website, or (ii) from the results of the alternative site-specific noise assessment.

The alternative site-specific noise assessment allows the actual building upgrades that need to be incorporated into the design of the dwelling to be optimised. In most commonly encountered situations, and especially for residences located in QDC MP 4.4 Noise Categories 2, 3 and 4, the optimisation of building upgrades results in lower overall building costs relative to those that would be incurred using the deemed-to-comply constructions of QDC MP 4.4.

When applying the alternative site-specific noise assessment method to the determination of either the QDC MP 4.4 Noise Categories or the building upgrade requirements that apply to any specific residence located within a TNC, due consideration may be given to the following five (5) matters:-

1. Site topography.
2. Beneficial shielding provided by any barriers – either existing or required to be constructed as a condition of the approval of the Development Application over the subject site.
3. Acoustical shielding provided by existing and approved buildings, where “approved buildings” refers to (i) buildings for which formal building approval has been granted, or (ii) in the case of the specific building/s being assessed, where building approval is being sought.
4. Determination of the relevant QDC MP 4.4 Noise Categories may be made on a facade-specific basis, but where the total area of the facade of a habitable space is exposed to two or more QDC MP 4.4 Noise Categories, the higher QDC MP 4.4 Noise Category would apply to the whole facade of the particular habitable space.



In addition, and as a result of advice provided by DTMR, the following refinements to the site-specific noise assessment may also be applicable (refer also constraint detailed following):-

5. In April 2012, updated advice from DTMR resulted in further refinement of the acoustical design procedures. This updated advice contends that in situations where noise contours can be plotted at fine gradation around the external facades of the building being assessed, such that noise levels can be determined with precision at individual building facade elements, the calculation procedures of AS3671 - 1989 *Acoustics - Road Traffic Noise Intrusion - Building Siting and Construction* may be adopted in lieu of the QDC MP 4.4 Noise Categories and the minimum R_w values presented in Schedule 1 of QDC MP 4.4 to determine the precise level of building upgrade required to be implemented to achieve compliance with the internal sound level of AS/NZS 2107:2016 *Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors*³ that is applicable to the specific space.

Notes:

Each of these items of advice has been endorsed in DTMR's *Transport Noise Management Code of Practice*, November 2013.

AS3671 – 1989, as its name suggests, provides guidance on dealing with road traffic noise intrusion. There is currently no equivalent standard to deal adequately with rail noise intrusion. Notwithstanding, even though AS3671 – 1989 is not directly applicable to the control of rail noise intrusion, it can be demonstrated that it is a relatively simple matter to apply standard acoustical theory and calculation techniques to the processes of AS3671 to yield validated outcomes.

It has been well-established that when considering the degree of noise intrusion from electric train passbys, the application of the calculation procedures of AS3671 – 1989 (after validation) would result in the same internal noise levels (ie generally within ± 1 dB(A)) as would be obtained by application of the applicable deemed-to-comply constructions set by QDC MP 4.4 and, correspondingly, would result in compliance with the 45-50dB(A) target range set by QDC MP 4.4.

By contrast, when considering the degree of noise intrusion from diesel passbys, the direct application of AS3671 – 1989 results in internal noise levels which are significantly higher than those which result from a direct application of applicable deemed-to-comply constructions set by QDC MP 4.4 for the same external noise level⁴. This results in noise levels which very frequently may be above the 45-50dB(A) target range set by QDC MP 4.4. Exceedances of 5-8dB(A) may be encountered.

³ The minimum R_w values presented in Schedule 1 of QDC MP 4.4 were determined for a generic building design by applying the calculation techniques of AS3671 – 1989 to achieve compliance with the satisfactory internal sound levels of AS/NZS 2107:2016. Refer tabulation of Referenced Documents of QDC MP 4.4. Because it was necessary to cover a moderately wide range of functional variances for each particular space (ie number of exposed facades, floor areas, areas of glazing, ceiling height, presence of roof/ceiling construction, presence of entry door, etc) in doing so, as well as deal with (i) a 5dB(A) spread of noise levels within each noise category and (ii) generalised (and usually conservative) offsets between (a) $L_{10(18\text{hour})}$ and $L_{Aeq,1\text{hrnight}}$ values and (b) $L_{10(18\text{hour})}$ and $L_{Aeq,1\text{hrday}}$ values, a significant degree of conservatism was built into the minimum R_w values of Schedule 1.

In addition, the minimum R_w values of Schedule 1 have been determined on the basis that equal levels of acoustic energy are transmitted via each of the specific building elements. In practice, the acoustical performance of wall and roof/ceiling constructions, even under "standard construction" conditions, often exceeds the minimum R_w values of Schedule 1. As a result of this, a re-balancing of the R_w performance requirement for glazing can be undertaken without increasing the level of noise intrusion and without jeopardising compliance with the relevant internal sound levels of AS/NZS 2107:2016.

When due consideration is also given to the actual level of noise exposure at the facade, rather than adoption of the applicable 5dB(A) noise category band, a further refinement of the R_w performance requirement for glazing can be conducted, again without jeopardising compliance with the relevant internal sound level requirement. As a result, when these refinements are adopted, it has been determined that, in almost all instances, the glazing to habitable spaces will not need to be upgraded to the degree stated in Schedule 1.

⁴ This outcome is a direct result of there being a higher level of low frequency sound energy within the noise levels generated by diesel passbys compared to that generated by electric passbys. The acoustical performance of all building elements is frequency-dependent. This is exemplified by the fact that as the sound frequency increases, so does the performance of the building element. As a result, any particular building element (eg a window) will better control noise intrusion from electric passbys than it will for diesel passbys. Correspondingly, to achieve the same internal noise levels from diesel passbys electric passbys, higher R_w rated building elements will be required for diesel passbys than will be required for electric passbys, or for that matter, required by the deemed-to-comply constructions under QDC MP 4.4.



When this situation has arisen previously on other occasions, the advice from the relevant Building Certifier/s has been that the assessment of the extent of building upgrade is to be conducted by reference to the deemed-to-apply acoustical performance ratings set by Schedule 1 of QDC MP 4.4, rather than by application of the validated calculation procedures of AS3671 – 1989.

This is notwithstanding the fact that by application of the deemed-to-apply ratings set by QDC MP 4.4, the level of noise transmitted by diesel passbys into habitable spaces will generally be above than the upper end of the 45-50dBA target range set by QDC MP 4.4 and sometimes substantially above.

Rather, the advice is based on (i) an acceptance that the deemed-to-apply ratings set by QDC MP 4.4 provide an acceptable level of control of rail noise intrusion from both trains drawn by diesel locomotives and electric trains and (ii) the acknowledgement that the determination of the specific deemed-to-comply constructions can be best made by reference to the actual site-specific QDC MP 4.4 Noise Categories applicable to the particular residence which are determined by reference to Matters 1-4.

Consequently, given that the North Coast Rail Line is regularly trafficked by trains drawn by diesel locomotives, the objective of any site-specific acoustical design assessment should be to determine the deemed-to-apply minimum R_w ratings for each component of the external envelope of the particular residence by reference directly to (i) the results presented in Tables 1 and 2 and (ii) the details in Schedule 1 of QDC MP 4.4 notwithstanding the fact that noise levels exceeding the upper end of the 45-50dBA target range set by QDC MP 4.4 will result from diesel train passbys.



Attachment B

Refinement of QDC MP 4.4 Noise Categories

Table 1 of QDC MP 4.4 sets Noise Categories depending upon the external noise level to which the dwellings subjected when measured 1m from the facade of the proposed or existing building⁵. The QDC MP 4.4 Noise Category levels of Table I are reproduced in Table B1 below.

Noise Category	State-Controlled Roads and Designated Local Government Roads, $L_{10(18\text{hour})}$ (dBA)	Railway Land Single Event Maximum Noise Level, $L_{A\text{max passby}}$ (dBA)
Category 4	≥ 73 dBA	≥ 85 dBA
Category 3	68 - 72 dBA	80 - 84 dBA
Category 2	63 - 67 dBA	75 - 79 dBA
Category 1	58 - 62 dBA	70 - 74 dBA
Category 0	≤ 57 dBA	≤ 69 dBA

Table B1 – Noise Category Levels Reproduced from QDC MP 4.4

Note: Recognising the discontinuities and resultant practical uncertainties evident in the noise level class intervals ascribed by Table B1⁶, DTMR has issued a directive requiring that, in the case of State-controlled roads, the class intervals be adjusted. The new class intervals for road traffic noise are presented in Table B2 below together with, for consistency, the class intervals for rail noise reconciled in the same manner.

These adjustments are also reconciled in the mapping presented on the DSDMIP SPP IMS [website](#).

The Single Event Maximum Noise Levels presented in Table B2 for each Noise Category have been adopted and applied accordingly.

Noise Category	State-Controlled Roads and Designated Local Government Roads, $L_{10(18\text{hour})}$ (dBA)	Railway Land Single Event Maximum Noise Level, $L_{A\text{max passby}}$ (dBA)
Category 4	≥ 73 dBA	≥ 85 dBA
Category 3	68 dBA \leq noise level $<$ 73 dBA	80 dBA \leq noise level $<$ 85 dBA
Category 2	63 dBA \leq noise level $<$ 68 dBA	75 dBA \leq noise level $<$ 80 dBA
Category 1	58 dBA \leq noise level $<$ 63 dBA	70 dBA \leq noise level $<$ 75 dBA
Category 0	$<$ 58 dBA	$<$ 70 dBA

Table B2 – Corrected Noise Category - QDC MP 4.4

⁵ In contrast to other Codes and Guidelines, QDC MP 4.4 permits assessment of extent of road and rail noise intrusion onto the site to take account of shielding provided by existing and approved buildings, only where “approved buildings” refers to (i) existing residences, (ii) buildings for which formal building approval has been granted, or (iii) in the case of the specific building being assessed, where building approval is being sought. It does not allow the shielding of other future residences to be taken into account when determining the extent of noise intrusion to lots located one or two rows of lots distant from transport noise source.

⁶ The discontinuities are the gaps between the upper bound of one Noise Category and the lower bound of the next higher Noise Category. Discontinuities give rise to resultant practical uncertainties. For example, should the residence subjected to an external noise level of 62.5dBA $L_{10(18\text{hour})}$ be ascribed a Noise Category 1 designation or a Noise Category 2 designation? To resolve this uncertainty, the upper bound of one Noise Category must be equivalent to the lower bound of the next higher Noise Category. The corrected Noise Categories are presented in Table B2.



Attachment C

Performance Requirements, Acceptable Solutions and Schedules 1 and 2 from QDC MP 4.4

Note: Refer to full text of QDC MP 4.4 for complete details.

<https://www.business.qld.gov.au/industries/building-property-development/building-construction/laws-codes-standards/queensland-development-code/building-transport-noise>



**PERFORMANCE
REQUIREMENTS**

ACCEPTABLE SOLUTIONS

***Relevant residential
buildings***

P1

Habitable rooms in a relevant residential building are adequately protected from transport noise to safeguard occupants' health and amenity.

A1

The *external envelope* of each *habitable room* in a *relevant residential building* must comply with the minimum R_w for each building component specified in Schedule 1 to achieve a minimum *transport noise reduction* level for the relevant *noise category* by:

- (a) using materials specified in Schedule 2; or
- (b) using materials with *manufacturer's specifications* that, in combination, achieve the minimum R_w value for the relevant building component and applicable *noise category*.

Schedule 1

<i>Noise category</i>	<i>Minimum transport noise reduction (dB (A)) required for habitable rooms</i>	<i>Component of building's external envelope</i>	<i>Minimum R_w required for each component</i>
Category 4	40	Glazing	43
		External walls	52
		Roof	45
		Floors	51
		Entry doors	35
Category 3	35	Glazing	38 (where total area of glazing for a <i>habitable room</i> is greater than 1.8m ²)
			35 (where total area of glazing for a <i>habitable room</i> is less than or equal to 1.8m ²)
		External walls	47
		Roof	41
		Floors	45
		Entry doors	33

<i>Noise category</i>	<i>Minimum transport noise reduction (dB (A)) required for habitable rooms</i>	<i>Component of building's external envelope</i>	<i>Minimum R_w required for each component</i>
Category 2	30	Glazing	35 (where total area of glazing for a <i>habitable room</i> is greater than 1.8m ²)
			32 (where total area of glazing for a <i>habitable room</i> is less than or equal to 1.8m ²)
		External walls	41
		Roof	38
		Floors	45
		Entry doors	33
Category 1	25	Glazing	27 (where total area of glazing for a <i>habitable room</i> is greater than 1.8m ²)
			24 (where total area of glazing for a <i>habitable room</i> is less than or equal to 1.8m ²)
		External walls	35
		Roof	35
Entry Doors	28		
Category 0	No additional acoustic treatment required – standard building assessment provisions apply.		

Schedule 2

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
Glazing	43	Double glazing consisting of two panes of minimum 5mm thick glass with at least 100mm air gap and full perimeter <i>acoustically rated seals</i> .
	38	Minimum 14.38mm thick laminated glass, with full perimeter <i>acoustically rated seals</i> ; OR Double glazing consisting of one pane of minimum 5mm thick glass and one pane of minimum 6mm thick glass with at least 44mm air gap, and full perimeter <i>acoustically rated seals</i>
	35	Minimum 10.38mm thick laminated glass, with full perimeter <i>acoustically rated seals</i> .
	32	Minimum 6.38mm thick laminated glass with full perimeter <i>acoustically rated seals</i> .
	27	Minimum 4mm thick glass with full perimeter <i>acoustically rated seals</i>
	24	Minimum 4mm thick glass with standard weather seals

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
External walls	52	Two leaves of clay brick masonry, at least 270mm in total, with subfloor vents fitted with noise attenuators.
	47	<p>Two leaves of clay brick masonry at least 110mm thick with:</p> <ul style="list-style-type: none"> (i) cavity not less than 50mm between leaves; and (ii) 50mm thick mineral insulation or 50mm thick glass wool insulation with a density of 11kg/m³ or 50mm thick polyester insulation with a density of 20kg/m³ in the cavity. <p>OR</p> <p>Two leaves of clay brick masonry at least 110mm thick with:</p> <ul style="list-style-type: none"> (i) cavity not less than 50mm between leaves; and (ii) at least 13mm thick cement render on each face <p>OR</p> <p>Single leaf of clay brick masonry at least 110mm thick with:</p> <ul style="list-style-type: none"> (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) Mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m³ positioned between studs; and (iii) One layer of plasterboard at least 13mm thick fixed to outside face of studs. <p>OR</p> <p>Single leaf of minimum 150mm thick masonry of hollow, dense concrete blocks, with mortar joints laid to prevent moisture bridging.</p>

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
	41	<p>Two leaves of clay brick masonry at least 110mm thick with cavity not less than 50mm between leaves</p> <p>OR</p> <p>Single leaf of clay brick masonry at least 110mm thick with:</p> <ul style="list-style-type: none"> (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m³ positioned between studs; and (iii) One layer of plasterboard at least 10mm thick fixed to outside face of studs <p>OR</p> <p>Single leaf of brick masonry at least 110mm thick with at least 13mm thick render on each face</p> <p>OR</p> <p>Concrete brickwork at least 110mm thick</p> <p>OR</p> <p>In-situ concrete at least 100mm thick</p> <p>OR</p> <p>Precast concrete at least 100mm thick and without joints.</p>

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
	35	Single leaf of clay brick masonry at least 110mm thick with: <ul style="list-style-type: none"> (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) One layer of plasterboard at least 10mm thick fixed to outside face of studs OR Minimum 6mm thick fibre cement sheeting or weatherboards or plank cladding externally, minimum 90mm deep timber stud or 92mm metal stud, standard plasterboard at least 13mm thick internally.
Roof	45	Concrete or terracotta tile or sheet metal roof with sarking, <i>acoustically rated plasterboard</i> ceiling at least 13mm thick fixed to ceiling joists, cellulose fibre insulation at least 100mm thick with a density of at least 45kg/m ³ in the cavity. OR Concrete or terracotta tile or sheet metal roof with sarking, 2 layers of <i>acoustically rated plasterboard</i> at least 16mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m ³ or polyester insulation at least 50mm thick with a density of at least 20kg/m ³ in the cavity.
	41	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m ³ or polyester insulation at least 50mm thick with a density of at least 20kg/m ³ in the cavity. OR Concrete suspended slab at least 100mm thick.
	38	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling cavity, mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m ³ .

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
	35	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling cavity.
Floors	51	Concrete slab at least 150mm thick.
	45	Concrete slab at least 100mm thick OR Tongued and grooved boards at least 19mm thick with: (i) timber joists not less than 175mm x 50mm; and (ii) mineral insulation or glass wool insulation at least 75mm thick with a density of at least 11kg/m ³ positioned between joists and laid on plasterboard at least 10mm thick fixed to underside of joists; and (iii) mineral insulation or glass wool insulation at least 25mm thick with a density of at least 11kg/m ³ laid over entire floor, including tops of joists before flooring is laid; and (iv) secured to battens at least 75mm x 50mm; and (v) the assembled flooring laid over the joists, but not fixed to them, with battens lying between the joists.
Entry Doors	35	Solid core timber not less than 45mm thick, fixed so as to overlap the frame or rebate of the frame by not less than 10mm, with full perimeter <i>acoustically rated seals</i> .
	33	Fixed so as to overlap the frame or rebate of the frame by not less than 10mm, fitted with full perimeter <i>acoustically rated seals</i> and constructed of - (i) solid core, wood, particleboard or blockboard not less than 45mm thick; and/or (ii) acoustically laminated glass not less than 10.38mm thick.

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
	28	Fixed so as to overlap the frame or rebate of the frame, constructed of - <ul style="list-style-type: none"> (i) Wood, particleboard or blockboard not less than 33mm thick; or (ii) Compressed fibre reinforced sheeting not less than 9mm thick; or (iii) Other suitable material with a mass per unit area not less than 24.4kg/m²; or (iv) Solid core timber door not less than 35mm thick fitted with full perimeter <i>acoustically rated seals</i>.