



Acoustics RB Pty Ltd

Report No. 21-1284.R01

**Proposed Residential Development
254 Barrams Road, White Rock
Ripley Valley PDA**

**Amended Road Traffic
Noise Impact Assessment**

December 2021

DOCUMENT CONTROL PAGE

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Montview
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Noise Impact Assessment

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Status: Final
Date of Issue: 10 December 2021

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History of Revisions

Date	Revision No	Changes / Page Reference
26 November 2021	Draft	NA
09 December 2021	Draft	NA
10 December 2021	Final	Editorial

Record of Distribution

Document Type	Revision No.	Destination
electronic	Final	APD Projects

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SUMMARY

APD Projects has acquired land 254 Barrams Road, White Rock. The land has the benefit of a development approval issued by Ipswich City Council as the MEDQ Delegate (refer Decision Notice ref. 6226/2018/PDA:MB, dated 22 March 2021).

The site is located within the Ripley Valley Priority Development Area (PDA) which is administered by Ipswich City Council.

Two conditions of the development approval have direct relevance to the control of road traffic noise intrusion onto the site.

Attachment B (RoL) Condition 28 Acoustical Design Management for Road Traffic Noise imposes a requirement that, prior to the issue of pre-construction certification for the first stage of the development, an amended Noise Impact Assessment (NIA) be submitted to MEDQ for compliance assessment.

Attachment C (MCU-PoD) Condition 5 Acoustic Design Management of the Decision Notice imposes specific requirements with regard to (i) the provision of an amended Plan of Development that “provides any Acoustical Design Management requirements for future dwellings in accordance with the amended Noise Impact Assessment (NIA) required by Attachment B, Condition 28” and “the need for the submission of certification from an appropriately qualified professional demonstrating the design of all impacted dwellings incorporate relevant noise reduction design features.”

Acoustics RB Pty Ltd has been engaged by APD Projects to prepare the amended NIA as required by Condition 28 and to provide advice regarding the method of fulfilment of the requirements of Condition 5.

From the results of the assessment presented above, the following conclusions can be drawn.

An acoustic barrier limited to a height of 1.5m will be ineffective in controlling road traffic noise intrusion onto the site.

Further, for a number of reasons relating to cost and the requirement for direct street access to be maintained for a large number of lots at the southern extent of the development, there is no prospect of erecting barriers to protect all lots in any event, irrespective of the height. The utility of barriers as a form of control of road traffic noise intrusion is very severely compromised as a result. Rather, it was determined that the more prudent form of noise control (in fact the only feasible method of noise control) was to place reliance solely on building upgrades to achieve the required acoustical outcomes.

In these circumstances, ie in the absence of the construction of any acoustic barriers, the requirements of Condition 28 can be satisfied by:-

1. Identifying (i) the lots which are adversely affected by road traffic noise intrusion, (ii) the degree of noise intrusion, and (iii) the appropriate method of addressing any adverse impact.
2. Providing to all prospective purchasers of the lots identified as being adversely impacted, a copy this amended Noise Impact Assessment Report.

Thereafter, and also in the absence of the construction of any acoustic barriers, the requirements of Condition 5 (a) can be satisfied by the preparation of an amended Plan of Development (POD) that presents details of the acoustic design requirements for future dwellings in accordance with this amended Noise Impact Assessment Report.

Finally, for each adversely affected lot, the acoustical design requirements of Condition 5 (b) can be addressed by undertaking a site-specific acoustical design review for the particular residence to be constructed on the lot and preparing a design review report for the residence accordingly.



Each site-specific report would provide details of the degree of acoustical upgrade (if any) required together with a schedule of specific acoustical upgrades to be incorporated by the building designer and/or builder into the design of the particular dwelling subsequently.

With respect to the certification requirements of Condition 5 (b), it is noted that such certification can only be provided at the BA stage. In these circumstances, the responsibility for verification of the acoustical design is a matter for the building certifier.

From the results of the noise impact assessment it has been determined that in the absence of any acoustic barriers erected along the Barrams Road boundary of the subject site, the AS3671-1989 Construction Categories applying the new lots will be as shown in Tables 1 and 2 of this report.

Consequently, it is recommended that the future dwellings be acoustically designed in accordance with the calculation procedures of AS3671-1989 *Acoustics - Road Traffic Noise Intrusion - Building Siting and Construction* to achieve compliance with the internal sound level of AS/NZS 2107:2016 *Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors* applicable to each specific habitable space.

Determination of the construction category/s applying to each lot should be made by reference to Tables 1 and 2 of this report.

Construction Category 1 means that the relevant floor level of the dwelling (ie ground floor or first floor) is subjected to noise levels that do not exceed 48dBA $L_{A10(18\text{hour})}$ facade-corrected. For any dwellings subject to Construction Category 1, there will be no requirement to apply any specific acoustical upgrades to the design of the relevant floor level of the dwelling.

Construction Category 2 means that the relevant floor level of the dwelling (ie ground floor or first floor) is subjected to noise levels in the range 48dBA to 63dBA $L_{A10(18\text{hour})}$ facade-corrected. By reference to AS3671-1989 *Acoustics - Road Traffic Noise Intrusion - Building Siting and Construction*, “standard construction (ie brick veneer), except for the lightweight elements such as fibre cement or metal cladding or all-glass facades” is deemed to be adequate to control noise intrusion for dwellings within the Construction Category 2 band, provided all windows and external doors to the dwelling are closed.

Construction Category 3 means that the relevant floor level of the dwelling (ie ground floor or first floor) is subjected to noise levels in the range 63dBA to 73dBA $L_{A10(18\text{hour})}$ facade-corrected.

Similarly, Construction Category 4 means that the relevant floor level of the dwelling (ie ground floor or first floor) is subjected to noise levels exceeding 73dBA $L_{A10(18\text{hour})}$ facade-corrected.

For both of these higher construction categories, ie Construction Category 3 and Construction Category 4, the design of the dwelling will need to be reviewed acoustically to ensure that the level of road traffic noise intrusion is adequately controlled.



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1.0 Introduction

APD Projects has acquired land 254 Barrams Road, White Rock. The land has the benefit of a development approval issued by Ipswich City Council as the MEDQ Delegate (refer Decision Notice ref. 6226/2018/PDA:MB, dated 22 March 2021).

The site is located within the Ripley Valley Priority Development Area (PDA) which is administered by Ipswich City Council.

Two conditions of the development approval have direct relevance to the control of road traffic noise intrusion onto the site.

Attachment B (RoL) Condition 28 *Acoustical Design Management for Road Traffic Noise* imposes a requirement that, prior to the issue of pre-construction certification for the first stage of the development, an amended Noise Impact Assessment (NIA) be submitted to MEDQ for compliance assessment.

Attachment C (MCU-PoD) Condition 5 *Acoustic Design Management* of the Decision Notice imposes specific requirements with regard to (i) the provision of an amended Plan of Development that “provides any Acoustical Design Management requirements for future dwellings in accordance with the amended Noise Impact Assessment (NIA) required by Attachment B, Condition 28” and “the need for the submission of certification from an appropriately qualified professional demonstrating the design of all impacted dwellings incorporate relevant noise reduction design features.”

Acoustics RB Pty Ltd has been engaged by APD Projects to prepare the amended NIA as required by Condition 28 and to provide advice with respect to the method of fulfilment of the requirements of Condition 5.

This report has been prepared accordingly.

2.0 Existing Situation and Proposed Development

2.1 Existing Situation

The location of the subject site is shown in Figure 1.

The real property descriptions of the site are Lot 108 on M3174 and Lot 8 on RP218512.

The local authority is Ipswich City Council.

The site is currently occupied by a single dwelling and a small number of outbuildings.

2.2 Proposed Development

The approved development over the site is presented in Figure 2. As can be seen in this figure, the development of the site will generate a total of 220 lots across seven stages of development.

The site is not located within a Transport Noise Corridor (TNC) as defined under Sections 246X and 246Y of *Building Act 1975*. Consequently, the provisions of *Queensland Development Code MP 4.4 Buildings in a transport noise corridor* (QDC MP 4.4) are not triggered. Refer further discussion in Appendix A of this report.



3.0 Relevant Conditions of Approval

3.1 Attachment B Condition 28 and Attachment C Condition 5 as Imposed by Council

In approving the development application over 254 Barrams Road, White Rock, Council as the MEDQ Delegate has issued a Decision Notice with multiple attachments of conditions (refer Attachments A-C of Decision Notice ref. 6226/2018/PDA:MB, dated 22 March 2021).

Two of the three attachments to the Decision Notice contain conditions relating to noise impacts. These are:

- Attachment B (RoL): Condition 28 *Acoustic Design Management for Road Traffic Noise*
- Attachment C (MCU - PoD): Condition 5 *Acoustic Design Management*

Condition 28 is re-produced below.

28.	Acoustic Design Management for Road Traffic Noise	
	<p>Submit to the MEDQ for compliance assessment an amended Noise Impact Assessment (NIA) generally in accordance with the <i>Noise Impact Assessment prepared by Palmer Acoustics</i>. The NIA must:</p> <ul style="list-style-type: none"> (i) be prepared by a suitably qualified acoustic consultant. (ii) demonstrate how the development can be designed and managed to maintain an acceptable level of acoustic amenity for existing and/or proposed future sensitive receivers. (iii) demonstrate how the proposed Lots will achieve compliance with the Environmental Protection (Noise) Policy 2019 Acoustic Quality Objectives and in accordance with the Ripley Road Design Guideline, as relevant to the type of sensitive receiver. (iv) Identify which Lots are affected by Noise constraints and the level and type of mitigation required. (v) Provide a detailed design for all acoustic barriers required. The design must ensure that any acoustic barriers are minimised wherever possible and if required, are attractive, articulated and if greater than 1.5m in height incorporate visual permeability while balancing privacy and causal surveillance of the public realm. All acoustic barriers must be within private lots. 	<p>Prior to the issue of preconstruction certification for the first stage of the development.</p>
(b)	<p>The developer must construct any mitigation barriers in accordance with the Noise Impact Assessment Report required by Condition (a).</p>	<p>Prior to the MEDQ Delegate signing the relevant subdivision plan.</p>
(c)	<p>The developer must provide all prospective purchasers of the lots identified in the report required by Condition (a) with a copy of the Noise Impact Assessment Report outlined in Part 4 of the Development Approval.</p>	<p>In conjunction with the signing of a contract of sale.</p>

Condition 5 is re-produced below.

5.	Acoustic Design Management	
(a)	The applicant must submit to the MEDQ Delegate for written approval an amended Plan of Development (POD) that provides any Acoustic Design Management requirements for future dwellings in accordance with the amended Noise Impact Assessment (NIA) required by Attachment B, Condition 28 above. These design requirements are to include but not be limited to built-form requirements but also the provision of articulated, visually permeable and minimised acoustic barriers within private lots (if required) including the requirement to maintain in accordance with the design requirements in perpetuity. The POD requirements should also include the need for the submission of certification from an appropriately qualified professional demonstrating that the design of all impacted dwellings incorporate relevant noise reduction design features to achieve compliance with the NIA approved in accordance with Attachment B, Condition 28.	Prior to the issue of preconstruction certification for first stage of the development as approved in Attachment B above.
(b)	The developer or future owner must submit to the MEDQ Delegate certification from an appropriately qualified professional demonstrating that the design of dwellings on the Lots identified in the amended Noise Impact Assessment (NIA) required by Attachment B, Condition 28 incorporate relevant noise reduction design features to achieve compliance with the NIA approved in accordance with Attachment B, Condition 28.	Prior to the commencement of the use or in conjunction with the Form 21.

3.2 Analysis of Conditions 28 and 5

3.2.1 Condition 28 Acoustic Design Management for Road Traffic Noise

Condition 28 is comprised of three parts, ie (a), (b) and (c). Part (a) is broken into five sub-parts, ie (i)-(v). Each is discussed below.

Condition 28 (a) (i) requires that prior to the issue of pre-construction certification for the first stage of the development, an amended Noise Impact Assessment (NIA) be submitted to MEDQ for compliance assessment. The amended NIA is to be generally in accordance with the NIA prepared by Palmer Acoustics¹.

Condition 28 (a) (ii) imposes an additional requirement that it be demonstrated how an acceptable level of acoustical amenity be achieved. Notwithstanding, Condition 28 (a) (iii) takes this requirement further by specifying the reference documents, ie Environmental Protection (Noise) Policy 2019 (EPP-N 2019) and Ripley Road Design Guide.

While the intent of making reference to these two documents is clear and understood, neither document is directly applicable given (i) that EPP-N 2019 does not apply to the noise source of interest, ie road traffic noise, and (ii) the fact that the site does not adjoin Ripley Road. (Ripley Road is more than 2km distant.)

¹ It is noted that the most recent NIA prepared by Palmer Acoustics Australia is not listed among the approved plans or specifications/ drawings even though it was subsequently reviewed and assessed by Council. In addition, the Palmer Acoustics report dealt with land outside the subject site and, in doing so, introduced other noise sources and triggers for assessment which are not applicable to the approved development subject to Condition 28.



In these circumstances, having regard to the EDQ *Environmental Values and Sustainable Resource Use Guideline* (ie PDA Guideline No 14, dated May 2015) and EDQ *Engineering Standards Guideline* (ie PDA Guideline No 13, dated September 2017), the appropriate course of action is to instead refer to DTMR's *Transport Noise Management Code of Practice*, November 2013.

Condition 28 (a) (iv) requires that the type and extent of noise control measures be identified across the site (ie acoustic barriers, if appropriate) and on a lot-specific basis (ie requirement for building upgrade).

Condition 28 (a) (v) requires provision of the details of the design of acoustic barriers, if any are proposed to be constructed. This sub-part also places several restrictions on the horizontal and vertical alignment of any acoustic barriers.

In addition, given Ipswich City Council does not have a default specification and/or standard drawing for acoustic barriers, and by reference to the EDQ guidelines above, it would be not inappropriate to ensure that the design and construction of any acoustic barriers comply with DTMR MRTS 15.

Part (b) of Condition 28 requires that, if acoustic barriers are recommended by the NIA report, that these barriers be constructed prior to the MEDQ Delegate signing the relevant subdivision plan.

Further, Part (c) of Condition 28 requires that the developer must provide a copy of the noise report to each prospective purchaser of any of the lots identified in the amended NIA. Council requires that the report be provided in conjunction with the signing of the contract of sale.

3.2.2 Condition 5 Acoustic Design Management

Condition 5 is comprised of two parts, ie (a) and (b).

In essence, the first part, ie Condition 5 (a), requires that the Plan of Development (PoD) be updated to reflect the recommendations of the amended NIA.

Specifically, prior to the issuance of a pre-construction certification for the first stage of the development (as approved in Attachment B), Council requires that the PoD be amended:

- (i) to show the locations of the acoustic barrier (if any proposed required) within private lots,
- (ii) with a note stating that the acoustic barrier is to be maintained in perpetuity, and
- (iii) with a note stating the need to submit certification from appropriately qualified professional that confirms the acoustical design of the residence on each residually noise affected lot is satisfactory.

Condition 5 (b) requires that the developer or future property owner must submit to the MEDQ Delegate certification of the acoustical design of each residually noise-affected residence. This condition is to be complied with prior to the commencement of the use or in conjunction with the Form 21 *Final Inspection Certificate*.

In August 2020, ICC officer, Simone Orscheg (Senior Planner (Environment), Planning and Regulatory Services Department) provided advice with respect to another development project within the Ripley Valley PDA. (Ref. Application No: 8736/2017/MAPDA/A.) The conditions of approval issued for that development contained similar requirements to those issued for this site.

Specifically, Council advised that an appropriate mechanism should be developed for determining the degree of upgrade, if any, that is required to be incorporated into the design of the affected residences. Council concurred that it was not appropriate to use the methodologies of QDC MP 4.4 *Buildings in a Transport Noise Corridor* for this purpose.



Council's reason for coming to this conclusion was congruent with ours: that QDC MP 4.4 can only be applied only when there is a trigger for it to be adopted, ie when the affected lot/s is/are located within a Transport Noise Corridor (TNC)².

Further, given the inappropriateness of QDC MP 4.4, it was agreed with Council that residences to be constructed on the lots identified as being residually noise-affected should be designed using the methodology of the calculation methods of AS3671-1989 *Acoustics – Road traffic noise intrusion - Building siting and construction* to achieve compliance with the recommended internal sound levels of AS/NZS 2107:2016 *Acoustics – Recommended design sound levels and reverberation times for building interiors*.

Further background and explanation to this approach to the acoustical design of noise-affected residences is presented in Appendix A.

Accordingly, it is considered appropriate to adopt this methodology again to determine the necessary degree of upgrade required to be incorporated into any particular residence identified as being residually noise-affected.

More specifically, to satisfy the acoustical design requirements of Condition 5 (b), it will be necessary to undertake a site-specific acoustical design review for each particular residence and prepare a design review report for the residence accordingly. Each report would provide details of the degree of acoustical upgrade (if any) required together with a schedule of specific acoustical upgrades to be incorporated by the building designer and/or builder into the design of dwelling subsequently.

With respect to the certification requirements of Condition 5 (b), it is noted that such certification can only be provided at the BA stage. In these circumstances, requiring the developer or the relevant future owner to submit certification of the acoustical design of each residence to the MEDQ Delegate may prove to be problematic. Rather, it is considered more appropriate to place the responsibility for verification of the acoustical design on the building certifier.

Adopting this more commonplace and more robust approach, the site-specific acoustical design review report and the accompanying Form 15 that will be prepared for each noise-affected lot can be used by the building certifier to verify that the residence has been acoustically designed appropriately.

In this way, for land only sales, the certification of the design of the residence can be conducted at the appropriate point (ie at BA) using established procedures coupled with the appropriate professional advice without reference to or involvement by the developer directly.

² It is noted that the same assessment methodology has been applied to many approved developments within the bounds of Moreton Regional Council LGA.



4.0 Applicability of Construction Categories of AS3671-1989

A discussion of AS3671-1989 together with the appropriate method of applying the calculation procedures of the Standard is presented below.

Important Note

It should be noted that Construction Categories as defined by AS3671 – 1989 are not the same as Noise Categories as defined by QDC MP 4.4 *Buildings in a Transport Noise Corridor*. They are materially different and cannot be used interchangeably.

AS3671-1989 sets Construction Categories by reference to $L_{Aeq,T}$ noise levels, notably $L_{Aeq,1hr\ night}$ ³ and $L_{Aeq,1hr\ day}$ ⁴. Noise level prediction programs determine road traffic noise levels in terms of the $L_{A10(18hour)}$ ⁵ noise level parameter. The offsets between $L_{A10(18hour)}$ and the day and night $L_{Aeq,T}$ values are site-specific and depend upon the hourly distribution of traffic.

To establish offsets which can be used satisfactorily in most commonly encountered situations, it is appropriate to refer to standard offset values derived from an extensive study of a large number of comparable sites in SE Queensland located adjacent to major roads⁶. When this is done, the relevant Construction Categories can be determined in terms of the predicted $L_{A10(18hour)}$ value directly.

The derivation of the bounds of the Construction Categories is presented in Appendix B.

From the results presented in Appendix B, it can be seen that Construction Category 1 means that the relevant floor level of the dwelling (ie ground floor or first floor) is subjected to noise levels that do not exceed 48dBA $L_{A10(18hour)}$ facade-corrected. For any dwellings subject to Construction Category 1, there will be no requirement to apply any specific acoustical upgrades to the design of the relevant floor level of the dwelling.

Construction Category 2 means that the relevant floor level of the dwelling (ie ground floor or first floor) is subjected to noise levels in the range 48dBA to 63dBA $L_{A10(18hour)}$ facade-corrected. By reference to AS3671-1989 *Acoustics - Road Traffic Noise Intrusion - Building Siting and Construction*, “standard construction (ie brick veneer), except for the lightweight elements such as fibre cement or metal cladding or all-glass facades” is deemed to be adequate to control noise intrusion for dwellings within the Construction Category 2 band, provided all windows and external doors to the dwelling are closed.

Construction Category 3 means that the relevant floor level of the dwelling (ie ground floor or first floor) is subjected to noise levels in the range 63dBA⁷ to 73dBA $L_{A10(18hour)}$ facade-corrected.

Similarly, Construction Category 4 means that the relevant floor level of the dwelling (ie ground floor or first floor) is subjected to noise levels exceeding 73dBA $L_{A10(18hour)}$ facade-corrected.

³ $L_{Aeq,1hr\ night}$ is defined as the maximum rolling average $L_{Aeq,1hr}$ value from 10:00pm to 6:00am, where the integrating time for $L_{Aeq,T}$ (ie equal energy) values used to determine the $L_{Aeq,1hr}$ value is typically 10minutes or 15 minutes.

⁴ $L_{Aeq,1hr\ day}$ is defined as the maximum rolling average $L_{Aeq,1hr}$ value from 6:00am to 10:00pm, where the integrating time for $L_{Aeq,T}$ (ie equal energy) values used to determine the $L_{Aeq,1hr}$ value is typically 10minutes or 15 minutes.

⁵ $L_{A10(18hour)}$ is defined by DTMR in their *Road Traffic Noise Management: Code of Practice* and by UK DoE in their *Calculation of Road Traffic*, as the arithmetic mean of each of the eighteen hourly $L_{A10,1hr}$ levels between 6:00am and 12:00 midnight on an average weekday where $L_{A10,1hr}$ is the noise level measured in dBA that is exceeded for 10% of the specific one hour period. It is noted that this terminology is not in strict accordance with the recommendations of Standards Australia because it does not identify the A-weighting requirement. Recognising this departure, DTMR has adopted the term $L_{A10(18hour)}$ in their *Code of Practice*. $L_{A10(18hour)}$ has been used throughout this report as a result.

⁶ Brown, AR & Brown, HD *A Re-Examination of the Relationship Between the $L_{10(18hour)}$ Noise Level Parameter and Other Road Traffic Noise Level Parameters*, proc. Joint Conference of Australian and New Zealand Acoustical Societies, Brisbane, 2016.

⁷ DTMR and several local authorities in SE Queensland apply this limit of 63dBA $L_{A10(18hour)}$ facade-corrected as the basis of setting limits for acceptable levels of road traffic noise intrusion onto residential allotments situated adjacent to major roads.



For both of these higher construction categories, ie Construction Category 3 and Construction Category 4, the design of the dwelling will need to be reviewed acoustically to ensure that the level of road traffic noise intrusion is adequately controlled.

Note:

For purposes of initial guidance only, standard brick veneer or blockwork wall construction would normally be satisfactory in most instances to deal with external noise levels up to 63dBA $L_{A10(18\text{hour})}$ facade-corrected, ie for Construction Category 2 dwellings.

For Construction Category 3 and 4 dwellings, however, it will be necessary to (i) upgrade the acoustical performance of windows and external sliding glass doors beyond standard STC/ R_w 23 performance and (ii) close windows and external doors. Further guidance is provided in AS3671-1989 *Acoustics - Road Traffic Noise Intrusion - Building Siting and Construction*.

5.0 Road Traffic Noise Model

5.1 Preparation of Road Traffic Noise Model

To determine the extent of road traffic noise intrusion onto the site, a SoundPLAN⁸ road traffic noise level prediction model was prepared. The noise model included the future alignment of Barrams Road and the future plan of development and topography across the site as supplied by Arcadis on 13 October 2021⁹. Refer also attached.

The traffic data for Barrams Road under design conditions (ie 10 year planning horizon, Yr 2032) was derived from data presented in each of the extracts supplied by APD Projects¹⁰ on 11 November 2021 of the daily two way traffic volumes for the Ripley Valley PDA Trunk Road Network prepared by Jacobs. In addition, the future posted speed limit on Barrams Road was supplied by Arcadis on 16 November 2021¹¹.

A summary of the road traffic parameters used in the noise model is presented below:

Barrams Road at Site

- Traffic Volume: 14620 AADT at Yr 2032
- Percentage Heavy Vehicles: 4%
- Traffic Speed: 70 km/h

The determination of the extent of road traffic noise intrusion onto the site was conducted using the CRTN '88¹² algorithms as applied by SoundPLAN.

The noise level prediction calculations also took account of the various site-specific variables and parameter settings which influence the level of road traffic noise emission onto the site.

⁸ SoundPLAN is an integrated software package for noise and air pollution evaluation developed in Germany by Braunstein + Berndt GmbH. It has been configured to predict the extent of (i) road traffic noise intrusion by application of the CRTN '88 algorithms and (ii) industrial noise emission using the CONCAWE algorithms. It is in use in more than 48 countries and has had widespread application throughout Australia. It is endorsed by DTMR, Ipswich City Council, Brisbane City Council, MBRC, RCC, LCC, GCCC, SCRC, DEHP and most other State environmental authorities.

⁹ Refer .dwg files attached to email from Christo Louw titled *RE: 1284_RE: 254 Barrams Rd - Layout for Acoustic Consultant*.

¹⁰ Refer .pdf files attached to email from Jennifer McCormick titled *RE: 1284_RE: 254 Barrams Rd - Layout for Acoustic Consultant*.

¹¹ Refer to email from Christo Louw titled *Barrams Road Design/Posted Speed*.

¹² "Calculation of Road Traffic Noise", UK DoE, HMSO, 1988. This is the method endorsed by DTMR, ICC, BCC, GCCC, SCRC, LCC, MBRC, Queensland DES and most other State environmental authorities.



These included:

- Site topography
- Distance from road
- Road gradients and road surfaces
- Vertical alignment of road
- Angle of view to road
- Acoustic barriers (none)
- Receptor height¹³

5.2 Road Traffic Noise Prediction Scenarios

To determine the extent of road traffic noise intrusion onto the site at the ten year planning horizon (2302), two assessment scenarios have been modelled. The details of each are presented below.

Scenario 1: Receiver height set at 1.8m agl (ie ground floor level facades), Barrams Road at 2032 traffic volume, no acoustic barrier to Barrams Road boundary. Refer Figure 3.

Scenario 2: Receiver height set at 4.6m agl (ie first floor level facades), Barrams Road at 2032 traffic volume, no acoustic barrier to Barrams Road boundary. Refer Figure 4.

Thereafter, the assessment of the acoustical effectiveness of barriers of various heights and extent was undertaken.

6.0 Discussion of Results

6.1 Extent of Road Traffic Noise Intrusion

In Figure 3 (ie ground floor level facades, no barrier to Barrams Road boundary), it can be seen that the Construction Category 3 band will intrude onto the site for a distance of approximately 40m. This will compass the first row N-S lots as well as the first two or three rows of E-W lots. Almost all of the remaining lots will be located in the Construction Category 2 band.

By reference to Figure 4 (ie first floor level facades, no barrier to Barrams Road boundary), it can be seen that the Construction Category 3 band will intrude slightly further onto the site. This will result in noise intrusion onto the southern extent of some of the second row N-S lots as well as a few more of the E-W lots. All of the remaining lots will be located within the Construction Category 2 band.

As noted above, an assessment of the effectiveness of barriers of various heights and extent in attenuating the degree of noise intrusion onto the site was undertaken. In carrying out this assessment, it was necessary to take account of the provisions of Condition HB 28 (a) (v), specifically the requirement that:

The design must ensure that any acoustic barriers are minimised where possible and if required, are attractive, articulated and if greater than 1.5m in height incorporate visual permeability while balancing privacy and casual surveillance of the public realm. All acoustical barriers must be within private lots.

It is also noted pathway access is required to be maintained through the southern boundaries of Lots 110-121.

¹³ Noise levels at ground floor level facades are determined at a receptor height of 1.8m above ground level. For first floor level facades, the receptor height is 4.6m.



From the results of this assessment, it was determined that if the height of the barrier was set at 1.5m (max), there would be little to no acoustical benefit to be derived, even for the ground floor level facades of future residences.

This is an unsurprising and fully expected outcome given that the receiver height for ground floor level facades was set at mid window level, ie 1.8m, which is substantially above the height of the barrier.

In fact, it was determined that to achieve any significant reduction in the degree of noise intrusion onto the site, it would be necessary to increase the height of the barrier to 3.5m-4.0m.

Even if a barrier of this height were to be acceptable, the requirement that is imposed at Condition 28 (a) (v) to include visual permeability (ie inclusion of laminated glass view panels) would add greatly to the cost of the barriers, while the requirement to articulate the barriers would result in a loss – albeit minor – in the area of the relevant lots.

Finally, because the Lots 1-3 and 53-58 which are all N-S lots have direct driveway access through the southern boundaries and pathway access is required to be maintained through the southern boundaries of Lots 110-121, the access requirements would preclude the construction of an acoustically effective barrier on these lots in any event.

Taken together, the ineffectiveness of a solid 1.5m high barrier, the cost of a higher visually permeable barrier coupled with the absence of there being any prospect of building barriers to protect all lots as well as Council's desire for the extent of any barriers to be minimised in any event, the utility of barriers as a form of control of road traffic noise intrusion has not been explored further.

Rather, it was determined that the more prudent form of noise control – in fact the only feasible method of noise control – was to place reliance solely on building upgrades to achieve the required acoustical outcomes.

6.2 Resultant AS3671-1989 Construction Categories

The construction categories applying to the proposed new lots can be determined directly from Figures 3 and 4.

A summary of the results for the ground floor level of each lot is presented in Table 1 overpage.

Similarly, construction categories applying to the first floor level of each lot are presented in Table 2.

In each case, the results have been colour-coordinated with the bands shown in the corresponding figure.

Important Note

It should be noted that Construction Categories as defined by AS3671 – 1989 are not the same as Noise Categories as defined by QDC MP 4.4 *Buildings in a Transport Noise Corridor*. They are materially different and cannot be used interchangeably.



Lot No	Construction Category	Lot No	Construction Category	Lot No	Construction Category	Lot No	Construction Category
1	3	56	3	111	3	166	2
2	3	57	3	112	3	167	2
3	3	58	3	113	3	168	2
4	2	59	3	114	3	169	2
5	2	60	3	115	3	170	2
6	2	61	3	116	3	171	2
7	2	62	2	117	3	172	2
8	2	63	2	118	3	173	2
9	2	64	2	119	3	174	2
10	2	65	2	120	3	175	2
11	2	66	2	121	3	176	2
12	2	67	2	122	2	177	2
13	2	68	2	123	2	178	2
14	2	69	2	124	2	179	2
15	2	70	2	125	2	180	2
16	2	71	2	126	2	181	2
17	2	72	2	127	2	182	1
18	2	73	2	128	2	183	1
19	2	74	2	129	2	184	1
20	2	75	2	130	2	185	2
21	2	76	2	131	2	186	2
22	2	77	2	132	2	187	2
23	2	78	2	133	2	188	2
24	2	79	2	134	2	189	2
25	3	80	2	135	2	190	2
26	3	81	2	136	2	191	2
27	2	82	2	137	2	192	2
28	2	83	2	138	2	193	2
29	2	84	2	139	2	194	2
30	2	85	2	140	2	195	2
31	2	86	2	141	2	196	2
32	2	87	2	142	2	197	2
33	2	88	2	143	2	198	2
34	2	89	2	144	2	199	2
35	2	90	2	145	2	200	2
36	2	91	2	146	2	201	2
37	2	92	2	147	2	202	2
38	2	93	2	148	2	203	2
39	2	94	2	149	2	204	2
40	2	95	2	150	2	205	2
41	2	96	2	151	2	206	1
42	2	97	2	152	2	207	2
43	2	98	2	153	2	208	2
44	2	99	2	154	2	209	1
45	2	100	2	155	2	210	1
46	2	101	2	156	2	211	1
47	2	102	2	157	2	212	2
48	2	103	2	158	2	213	2
49	2	104	2	159	2	214	2
50	3	105	2	160	2	215	2
51	3	106	2	161	2	216	2
52	3	107	2	162	2	217	2
53	3	108	2	163	2	218	2
54	3	109	2	164	2	219	2
55	3	110	3	165	2		

Table 1 – AS3671-1989 Construction Categories at Ground Floor Level (not QDC MP 4.4 Noise Categories)



Lot No	Construction Category	Lot No	Construction Category	Lot No	Construction Category	Lot No	Construction Category
1	3	56	3	111	3	166	2
2	3	57	3	112	3	167	2
3	3	58	3	113	3	168	2
4	3	59	3	114	3	169	2
5	3	60	3	115	3	170	2
6	2	61	3	116	3	171	2
7	2	62	3	117	3	172	2
8	2	63	2	118	3	173	2
9	2	64	3	119	3	174	2
10	2	65	3	120	3	175	2
11	2	66	3	121	3	176	2
12	3	67	3	122	3	177	2
13	2	68	3	123	3	178	2
14	2	69	3	124	3	179	2
15	2	70	2	125	3	180	2
16	2	71	2	126	3	181	2
17	2	72	2	127	3	182	2
18	2	73	2	128	3	183	2
19	2	74	2	129	3	184	2
20	2	75	2	130	2	185	2
21	2	76	2	131	2	186	2
22	2	77	2	132	2	187	2
23	2	78	2	133	2	188	2
24	2	79	2	134	2	189	2
25	3	80	2	135	2	190	2
26	3	81	2	136	2	191	2
27	3	82	2	137	2	192	2
28	2	83	3	138	2	193	2
29	2	84	2	139	2	194	2
30	2	85	2	140	2	195	2
31	2	86	2	141	2	196	2
32	2	87	2	142	2	197	2
33	2	88	2	143	2	198	2
34	2	89	2	144	2	199	2
35	2	90	2	145	2	200	2
36	2	91	2	146	2	201	2
37	2	92	2	147	2	202	2
38	2	93	2	148	2	203	2
39	2	94	2	149	2	204	2
40	2	95	2	150	2	205	2
41	2	96	2	151	2	206	2
42	2	97	2	152	2	207	2
43	2	98	2	153	2	208	2
44	2	99	2	154	2	209	2
45	2	100	2	155	2	210	2
46	2	101	2	156	2	211	2
47	2	102	2	157	2	212	2
48	2	103	2	158	2	213	2
49	3	104	2	159	2	214	2
50	3	105	2	160	2	215	2
51	3	106	2	161	2	216	2
52	3	107	2	162	2	217	2
53	3	108	2	163	2	218	2
54	3	109	3	164	2	219	2
55	3	110	3	165	2		

Table 2 – AS3671-1989 Construction Categories at First Floor Level (not QDC MP 4.4 Noise Categories)



Floor Level	Total Number of Lots Located in Construction Category			
	1	2	3	4
Ground Floor	7	183	29	0
First Floor	0	168	51	0

Table 3 – Summary of Number of Lots in each AS3671-1989 Construction Category for each Floor Level

(AS3671-1989 Construction Categories are **not** the same as QDC MP 4.4 Noise Categories)

As can be seen from Table 1, the ground floor level of:

- (i) Lots 182-184, 206 and 209-211 would lie within Construction Category 1;
- (ii) Lots 4-24, 27-49, 62-109, 122-181, 185-205, 207, 208 and 212-219 would lie within Construction Category 2;
- (iii) Lots 1-3, 25, 26, 50-61 and 110-121 would lie within Construction Category 3; and
- (iv) none of the lots would lie within Construction Category 4.

Similarly, as can be seen from Table 2, the first floor level of:

- (i) none of the lots would lie within Construction Category 1;
- (ii) Lots 6-11, 13-24, 28-48, 63, 70-82, 84-108 and 130-219 would lie within Construction Category 2;
- (iii) Lots 1-5, 12, 25-27, 49-62, 64-69, 83 and 109-129 would lie within Construction Category 3; and
- (iv) none of the lots would lie within Construction Category 4.

7.0 Conclusions

7.1 In Respect of Conditions 28 and 5

From the results of the assessment presented above, the following conclusions can be drawn.

An acoustic barrier limited a height of 1.5m will be ineffective in controlling road traffic noise intrusion onto the site.

Further, for a number of reasons relating to cost and the requirement for direct street access to be maintained from a large number of lots at the southern extent of the development, there is no prospect of erecting barriers to protect all lots in any event, irrespective of the height. The utility of barriers as a form of control of road traffic noise intrusion is very severely compromised as a result.

Rather, it was determined that the more prudent form of noise control – in fact the only feasible method of noise control – was to place reliance solely on building upgrades to achieve the required acoustical outcomes.

In these circumstances, ie in the absence of the construction of any acoustic barriers, the requirements of Condition 28 can be satisfied by:-

1. Identifying (i) the lots which are adversely affected by road traffic noise intrusion, (ii) the degree of noise intrusion, and (iii) the appropriate method of addressing any adverse impact.
2. Providing to all prospective purchasers of the lots identified as being adversely impacted, a copy this amended Noise Impact Assessment report.



Thereafter, and also in the absence of the construction of any acoustic barriers, the requirements of Condition 5 (a) can be satisfied by the preparation of an amended Plan of Development (POD) that presents details of the acoustic design requirements for future dwellings in accordance with this amended Noise Impact Assessment report.

Finally, for each adversely affected lot, the acoustical design requirements of Condition 5 (b) can be addressed by undertaking a site-specific acoustical design review for the particular residence to be constructed on the lot and preparing a design review report for the residence accordingly. Each report would provide details of the degree of acoustical upgrade (if any) required together with a schedule of specific acoustical upgrades to be incorporated by the building designer and/or builder into the design of dwelling subsequently.

With respect to the certification requirements of Condition 5 (b), it is noted that such certification can only be provided at the BA stage. In these circumstances, the responsibility for verification of the acoustical design is a matter for the building certifier.

7.2 In Respect of Building Design

From the results of the noise impact assessment it has been determined that in the absence of any barriers erected along the Barrams Road boundary of the subject site, the AS3671-1989 Construction Categories applying the new lots will be as shown in Tables 1 and 2 of this report.

As can be seen from Table 1, the ground floor level of:

- (i) Lots 182-184, 206 and 209-211 would lie within Construction Category 1;
- (ii) Lots 4-24, 27-49, 62-109, 122-181, 185-205, 207, 208 and 212-219 would lie within Construction Category 2;
- (iii) Lots 1-3, 25, 26, 50-61 and 110-121 would lie within Construction Category 3; and
- (iv) none of the lots would lie within Construction Category 4.

Similarly, as can be seen from Table 2, the first floor level of:

- (i) none of the lots would lie within Construction Category 1;
- (ii) Lots 6-11, 13-24, 28-48, 63, 70-82, 84-108 and 130-219 would lie within Construction Category 2;
- (iii) Lots 1-5, 12, 25-27, 49-62, 64-69, 83 and 109-129 would lie within Construction Category 3; and
- (iv) none of the lots would lie within Construction Category 4.

Important Note

It should be noted that Construction Categories as defined by AS3671 – 1989 are not the same as Noise Categories as defined by QDC MP 4.4 *Buildings in a Transport Noise Corridor*. They are materially different and cannot be used interchangeably.

Construction Category 1 means that the relevant floor level of the dwelling (ie ground floor or first floor) is subjected to noise levels that do not exceed 48dBA $L_{A10(18\text{hour})}$ facade-corrected. For any dwellings subject to Construction Category 1, there will be no requirement to apply any specific acoustical upgrades to the design of the relevant floor level of the dwelling.

Construction Category 2 means that the relevant floor level of the dwelling (ie ground floor or first floor) is subjected to noise levels in the range 48dBA to 63dBA $L_{A10(18\text{hour})}$ facade-corrected. Some acoustical upgrades may be required depending on the building materials used.



Specifically, by reference to AS3671-1989 *Acoustics - Road Traffic Noise Intrusion - Building Siting and Construction*, “standard construction (ie brick veneer), except for the lightweight elements such as fibre cement or metal cladding or all-glass facades” is deemed to be adequate to control noise intrusion for dwellings within the Construction Category 2 band, provided all windows and external doors to the dwelling are closed.

Construction Category 3 means that the relevant floor level of the dwelling (ie ground floor or first floor) is subjected to noise levels in the range 63dBA to 73dBA $L_{A10(18\text{hour})}$ facade-corrected.

Similarly, Construction Category 4 means that the relevant floor level of the dwelling (ie ground floor or first floor) is subjected to noise levels exceeding 73dBA $L_{A10(18\text{hour})}$ facade-corrected.

For both of these higher construction categories, ie Construction Category 3 and Construction Category 4, the design of the dwelling will need to be reviewed acoustically to ensure that the level of road traffic noise intrusion is adequately controlled.

Note:

For purposes of initial guidance only, standard brick veneer or blockwork wall construction would normally be satisfactory in most instances to deal with external noise levels up to 63dBA $L_{A10(18\text{hour})}$ facade-corrected, ie for Construction Category 2 dwellings.

For Construction Category 3 and 4 dwellings, however, it will be necessary to (i) upgrade the acoustical performance of windows and external sliding glass doors beyond standard STC/ R_w 23 performance and (ii) close windows and external doors. Further guidance is provided in AS3671-1989 *Acoustics - Road Traffic Noise Intrusion - Building Siting and Construction*.



8.0 Recommendations

Because it is not feasible to erect noise barriers or reduce or control the level of road traffic noise intrusion onto the new lots, it was determined that the more prudent form of noise control (in fact the only feasible method of noise control) was to place reliance solely on building upgrades to achieve the required acoustical outcomes.

Consequently, to achieve adequate control of road traffic noise intrusion from Barrams Road in the habitable spaces of residences to be constructed on the subject site, it is recommended that future dwellings be acoustically designed in accordance with the calculation procedures of AS3671–1989 *Acoustics - Road Traffic Noise Intrusion - Building Siting and Construction* to achieve compliance with the internal sound level of AS/NZS 2107:2016 *Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors* applicable to each specific habitable space.

Determination of the construction category/s applying to each lot should be made by reference to Tables 1 and 2 of this report.

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Reviewed and approved by:



Russell Brown,
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RPEQ 2799

Appendix A

Constraint on Adoption of QDC MP 4.4

When making a determination of the applicability of *Queensland Development Code MP 4.4 Buildings in a Transport Noise Corridor* (QDC MP 4.4) to the site, it is relevant to have regard to Sections 1, 2, 6 and 8 of QDC MP 4.4 and Chapter 8B (especially s.246X and s.246Y) of *Building Act 1975*.

The relevant extracts from QDC MP 4.4 follow below.

1 Purpose

To ensure *habitable rooms* of particular residential buildings located in *transport noise corridors* are designed and constructed to reduce the extent to which transport noise intrudes into those rooms.

3 Application

This QDC part applies to building work for a *relevant residential building* if the work is the subject of a building development application made on or after 17 August 2015.

6 What is a *relevant residential building*

A building is a *relevant residential building* if:

- (a) a building development application for the construction of the building is made after 31 August 2010; and
- (b) the building:
 - (i) is a class 1, 2, 3 or 4 building; and
 - (ii) is located in a *transport noise corridor*; and
 - (iii) is not a *relocated building*; and
- (c) the building development approval for the construction of the building was not given under the building assessment provisions in force immediately before 1 September 2010, under section 37 of the *Building Act 1975*.

At Section 8 *Definitions* of QDC MP 4.4, “transport noise corridor” is defined as follows:-

Transport noise corridor means land designated under Chapter 8B of the *Building Act 1975* as a *transport noise corridor*.

Note: This is identified in State and Local Government records as described in a gazettal notice following designation of the transport noise corridor.

As noted above, the purpose of QDC MP 4.4 is to ensure control of transport noise intrusion into particular residential buildings, specifically “relevant residential buildings”, where as noted in the definition above, a relevant residential building must be located within a Transport Noise Corridor (TNC) as defined at Chapter 8B of *Building Act 1975* and, more particularly, at s.246X of the Act.



Section 246X of *Building Act 1975* states:

246X Designation of transport noise corridor—local governments

- (1) *A local government may, by gazette notice, designate land as a transport noise corridor.*
- (2) ...
- (3) ...
- (4) *The notice must—*
 - (a) *Identify the land that is proposed to be designated; and*
 - (b) *include information reasonably required by the chief executive about the likely levels of noise within the proposed transport noise corridor caused by traffic on the road for which the designation is proposed; and*
 - (c) *state the proposed gazettal day for the designation.*
- (5) *The information mentioned in subsection (4)(b) must be given in the form required by the chief executive.*
- (6) *If the local government designates land under this section, the land must be—*
 - (a) *identified specifically in the gazette notice; or*
 - (b) *identified generally in the gazette notice, and identified specifically in documents described in the gazette notice and available for inspection at an office of the local government mentioned in the gazette notice.*
- (7) ...

Ipswich City Council has not yet gazetted any Transport Noise Corridors (TNCs). Consequently, the subject site is not located in a TNC. Therefore, the provisions of QDC MP 4.4 are not triggered.

Whether it is possible to extend the application of QDC MP 4.4 beyond its purpose is a town planning/legal question.

In the absence of an answer to that question and to avoid any inadvertent conflict by attempting to invoke QDC MP 4.4 where it cannot be properly applied, the appropriate means of controlling of road traffic noise intrusion is to apply the more robust methodology of the calculation methods of AS3671-1989 *Acoustics – Road traffic noise intrusion - Building siting and construction* to the design of noise affected residences, with the goal being to achieve compliance with the recommended internal sound levels of AS/NZS 2107:2016 *Acoustics – Recommended design sound levels and reverberation times for building interiors*.

This more robust methodology routinely results in lower overall build cost for home owners/builder compared to simple application of Schedule 1 of QDC MP 4.4.



Appendix B

Derivation of Upper and Lower Bounds of Construction Categories

The upper and lower bounds of the Construction Categories can be derived in the following manner.

Internal noise level limits set by AS/NZS 2107:2016:-

- Bedrooms and sleeping areas: 35dBA ($L_{Aeq,1hr\ night}$)
- Living and work areas: 40dBA ($L_{Aeq,1hr\ day}$)

Reduction external to internal, glazing open
(includes conversion from free field to facade-corrected): 10dBA

External noise limits (facade-corrected):-

- Night: 45dBA ($L_{Aeq,1hr\ night}$)
- Day: 50dBA ($L_{Aeq,1\ hr\ day}$)

Offsets: +3.3dBA (night)
-0.6dBA (day)

Resultant Facade-Corrected External $L_{A10(18hour)}$ Limit:

- Based on internal limits during night: 48.3dBA (48dBA rounded)
- Based on internal limits during day: 49.4dBA (49dBA rounded)

On the basis of these results, the noise level external to the most exposed facade of any residence should not exceed a facade-corrected noise level of **48dBA** $L_{A10(18hour)}$ if the internal noise level limits of AS/NZS 2107:2016 are to be met when windows and external doors are **open**. This is the upper bound Construction Category 1 and the lower bound of Construction Category 2.

Internal noise level limits set by AS/NZS 2107:2016:-

- Bedrooms and sleeping areas: 35dBA ($L_{Aeq,1hr\ night}$)
- Living and work areas: 40dBA ($L_{Aeq,1hr\ day}$)

Reduction external to internal, glazing open
(includes conversion from free field to facade-corrected): 25dBA

External noise limits (facade-corrected):

- Night: 60dBA ($L_{Aeq,1hr\ night}$)
- Day: 65dBA ($L_{Aeq,1\ hr\ day}$)

Offsets: +3.3dBA (night)
-0.6dBA (day)

Resultant Facade-Corrected External $L_{A10(18hour)}$ Limit:

- Based on internal limits during night: 63.3dBA (63dBA rounded)
- Based on internal limits during day: 64.4dBA (64dBA rounded)

On the basis of these results, the noise level external to the most exposed facade of any residence should not exceed a facade-corrected noise level of **63dBA** $L_{A10(18hour)}$ if the internal noise level limits of AS/NZS 2107:2016 are to be met when standard construction windows and external doors are **closed**. This is the upper bound Construction Category 2 and the lower bound of Construction Category 3.



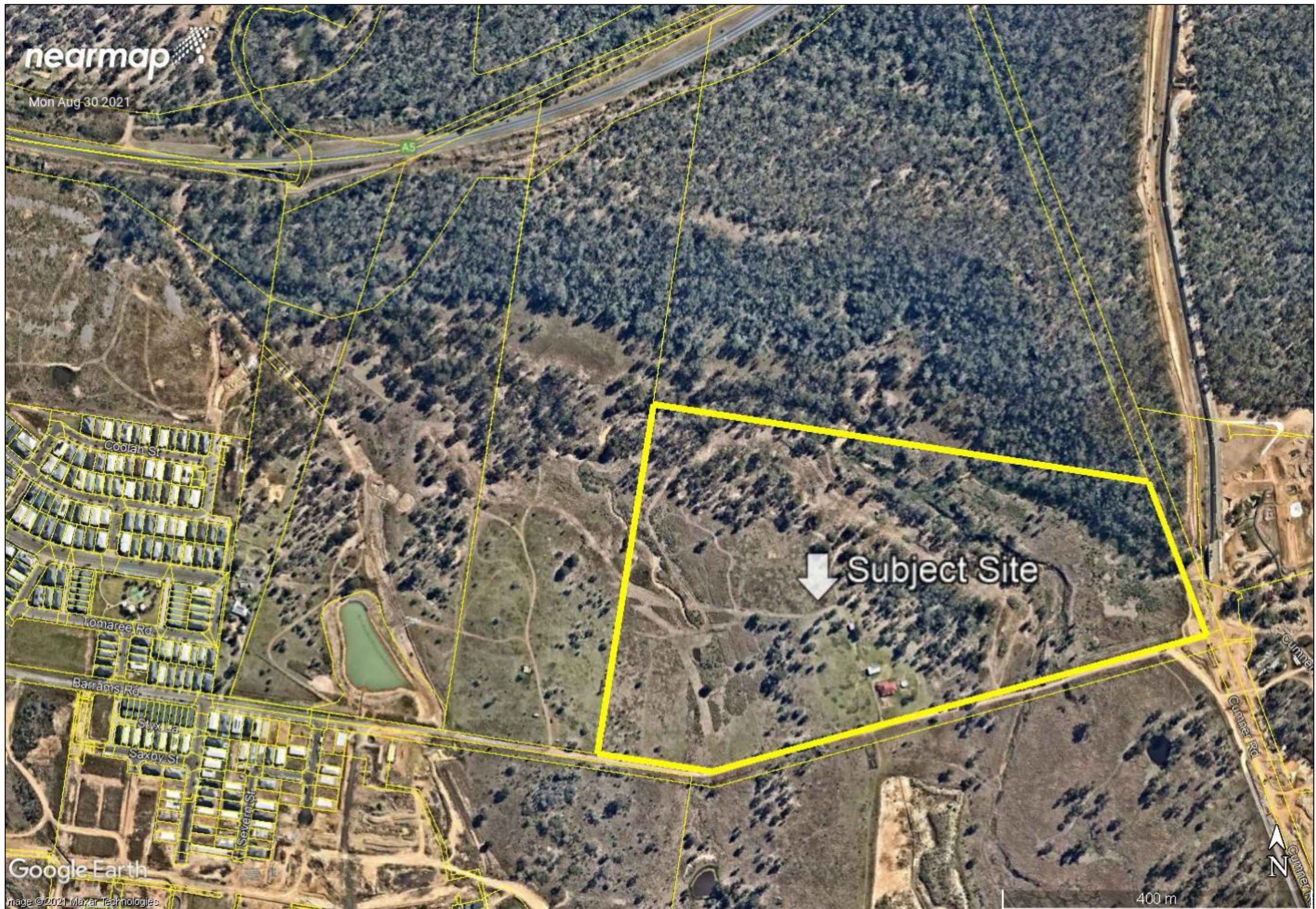


Figure 1 – Location of Subject Site

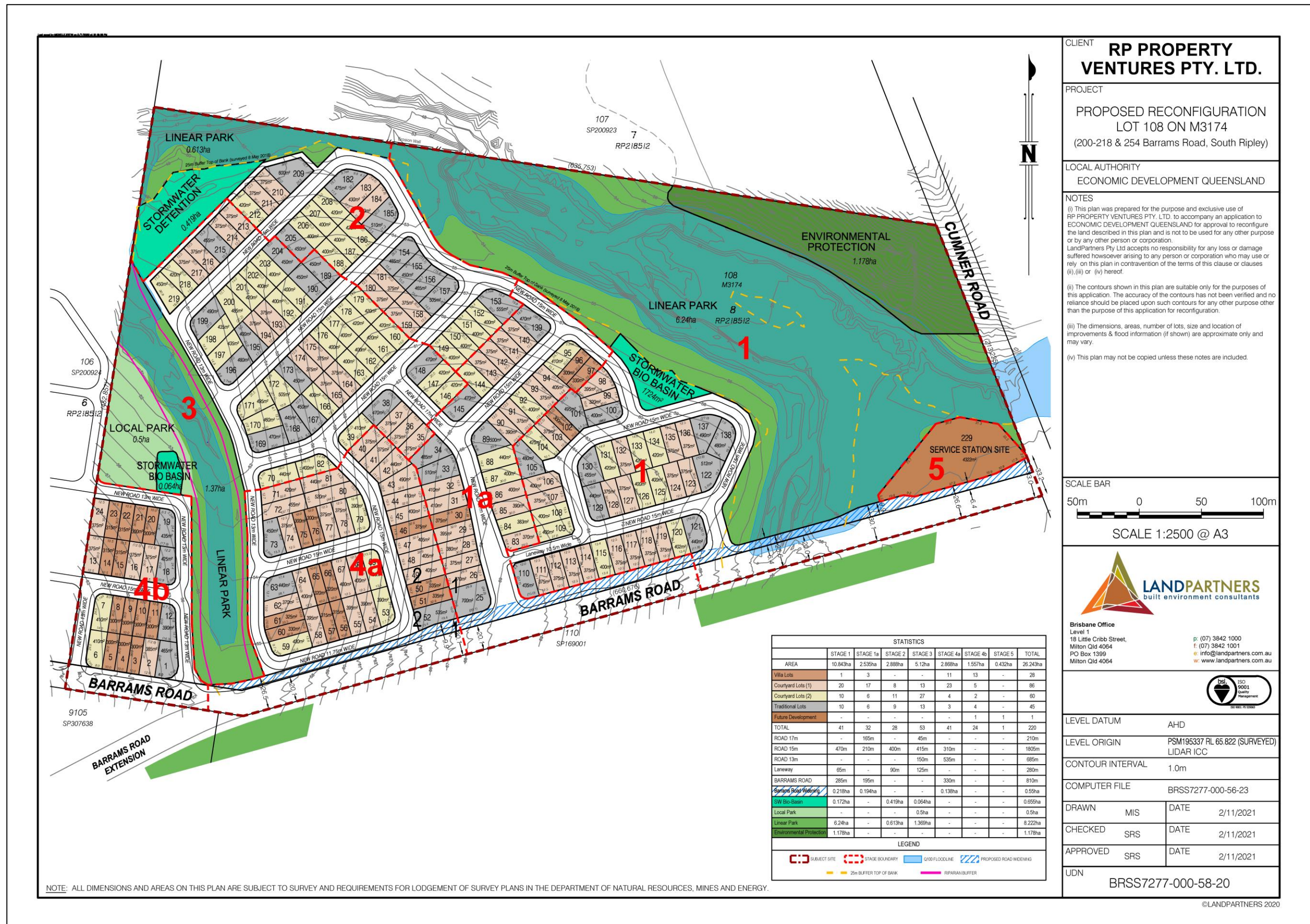


Figure 2 – Plan of Development

Figures 3 and 4: Noise Contour Plots





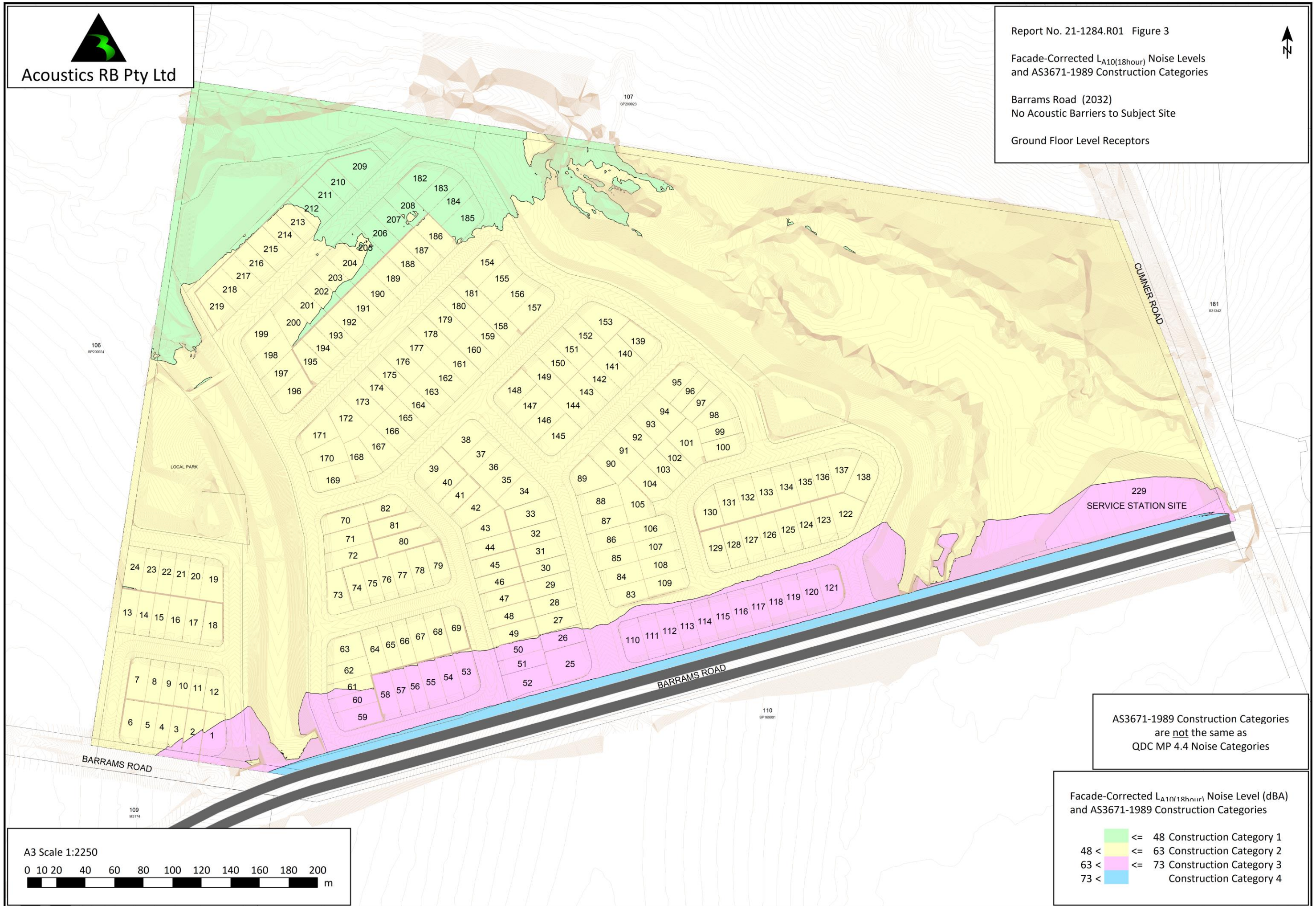
Acoustics RB Pty Ltd

Report No. 21-1284.R01 Figure 3

Facade-Corrected $L_{A10(18hr)}$ Noise Levels
and AS3671-1989 Construction Categories

Barrams Road (2032)
No Acoustic Barriers to Subject Site

Ground Floor Level Receptors

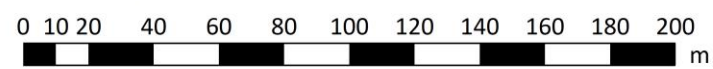


AS3671-1989 Construction Categories
are not the same as
QDC MP 4.4 Noise Categories

Facade-Corrected $L_{A10(18hr)}$ Noise Level (dBA)
and AS3671-1989 Construction Categories

- ≤ 48 Construction Category 1
- $48 <$ ≤ 63 Construction Category 2
- $63 <$ ≤ 73 Construction Category 3
- $73 <$ Construction Category 4

A3 Scale 1:2250





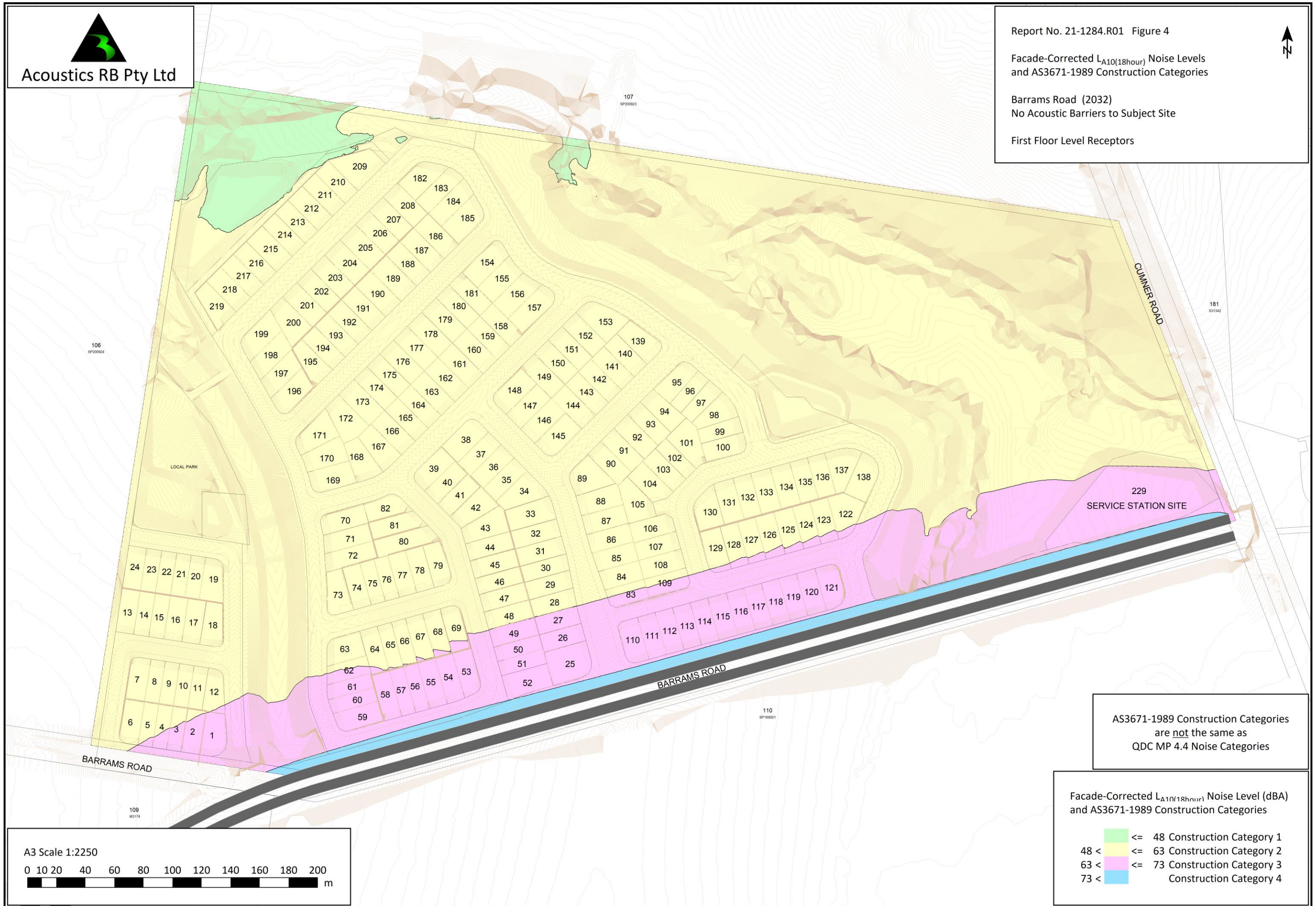
Acoustics RB Pty Ltd

Report No. 21-1284.R01 Figure 4

Facade-Corrected $L_{A10(18hr)}$ Noise Levels
and AS3671-1989 Construction Categories

Barrams Road (2032)
No Acoustic Barriers to Subject Site

First Floor Level Receptors

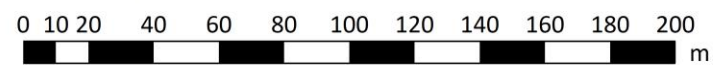


AS3671-1989 Construction Categories
are not the same as
QDC MP 4.4 Noise Categories

Facade-Corrected $L_{A10(18hr)}$ Noise Level (dBA)
and AS3671-1989 Construction Categories

- ≤ 48 Construction Category 1
- $48 <$ ≤ 63 Construction Category 2
- $63 <$ ≤ 73 Construction Category 3
- $73 <$ Construction Category 4

A3 Scale 1:2250



106
SP200624

107
SP200623

181
S31342

110
SP16001

109
M3174