FOR INFORMATION PURPOSES ONLY

AURA DEVELOPMENT – PRECINCT 15 (WEST)

Bruce Highway and Bells Creek Road, Caloundra South QLD 4551

Road Traffic Noise Assessment

Stockland

Date
25 July 2024

Report
227401.0008.R04V05

DOCUMENT CONTROL

Prepared by: Trinity Consultants Australia
ABN 62 630 202 201
A: Level 3, 43 Peel Street
South Brisbane, QLD 4101
T: +61 7 3255 3355
E: brisbane@trinityconsultants.com

Reference	Date	Description	Prepared	Checked
227401.0008.R04V01	6/9/2023	For Issue	Bassam Al-Haddad	Samuel Wong
227401.0008.R04V02	27/9/2023	Text Updates	Bassam Al-Haddad	Samuel Wong
227401.0008.R04V03	24/1/2024	Response to SARA request (20/11/23)	Bassam Al-Haddad	Samuel Wong
227401.0008R04V04	4/7/2024	Response to SARA request (11/6/24)	Bassam Al-Haddad/Samuel Wong	Samuel Wong
227401.0008R04V05	25/7/2024	Response to SARA request (11/6/24) – mound height update	Bassam Al-Haddad/Samuel Wong	Samuel Wong

Document Approval	
Approver Signature	
Name	Samuel Wong
Title	Senior Manager

COPYRIGHT AND DISCLAIMERS

This report has been prepared by Trinity Consultants Australia (Trinity), with all reasonable skill, due care and diligence in accordance with Trinity Quality Assurance Systems, based on ISO 9001:2015. This report and the copyright thereof are the property of Trinity and must not be copied in whole or in part without the written permission of Trinity.

This report takes account of the timescale, resources and information provided by the Client, and is based on the interpretation of data collected, which has been accepted in good faith as being complete, accurate and valid.

Trinity disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

This report has been produced specifically for the Client and project nominated herein and must not be used or retained for any other purpose. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from Trinity.

CONTENTS

APPENDICES

1. INTRODUCTION

Trinity Consultants Australia (Trinity) has been commissioned by Stockland Development Pty Ltd to provide a road noise assessment for Precinct 15 West of the Aura residential development, located within the Caloundra South Priority Development Area (PDA).

Similar reports were prepared and lodged with EDQ as part of the ROL applications for residential lots within Precincts 2 (Baringa), 7 to 10 (Town Centre), 11 to 14 (Banya, Nirimbia), P15 (East) and 18 (Part).

Noise levels in Precinct 15 West are affected by the following transport noise corridors:

- Bruce Highway (State-controlled)
- Council controlled road to the east of P15 West (See **Figure 2.2**).

Both of these corridors have been included in the noise modelling to assess their impact on P15 West. This assessment is conducted independent of the P15 East assessment. Any bunding and / or noise barriers specified for Precinct 15 East can have an impact on Precinct 15 West. Should bunding and barrier development for Precinct 15 East affect Precinct 15 West, a revision to this report will be required.

The following bunding and barriers are modelled for this road traffic noise assessment:

- Bund adjacent to the Bruce Highway to the north of the CAMCOS rail corridor, which has been endorsed by EDQ and assumed to be fully constructed prior to P15 East dwellings being occupied.
- Proposed barriers:
  - Bunding along the Bruce Highway and along western boundary of P15 West, as provided in the digital terrain model by Egis (refer to **Appendix G** for bund design drawings).
  - A noise barrier of varying heights extending along the southern boundary of P15 West. This barrier will commence at the southern end of the highway bund and will span east along the southern boundary as shown in **Figure C3** in **Appendix C**. The barrier will assist in mitigating noise propagating around the bund and impacting on the southernmost sections of P15 West.
  - 2-2.5m barriers located on the eastern side of P15 West to mitigate Council controlled road noise levels (**Figure D3** in **Appendix D**).

The purpose of this report is as follows:

- Outline the relevant project noise criteria.
- Predict and assess the road traffic noise impact onto Precinct 15 West.
- Describe noise mitigation requirements.

It is noted that the CAMCOS rail corridor is further north of the proposed building lots at P15 West and due to separation distance and based on previous modelling conducted for P15 East, these nearest lots are not expected to be affected by rail noise. Therefore, rail noise has not been considered further in this noise assessment.

To aid in the understanding of the terms in this report, a glossary is included in **Appendix A**.

1.1 Information Request

Trinity completed an original noise assessment report in September 2023 (report 227401.0008.R04V02, 27 September 2023) as part of a development application for the subject site. SARA reviewed the application documents (including the noise report) and subsequently issued an information request on 20 November 2023. This request was responded to in January 2024 (report 227401.R04V03, 24 January 2024).

This report version (R04V05) responds to a further information request issued on 11 June 2024.

Table 1.1 presents a copy of the information request items relating to noise and a summary response, with reference to relevant sections.

Table 1.1: SARA Information Request (11 June 2024) and Summary Response

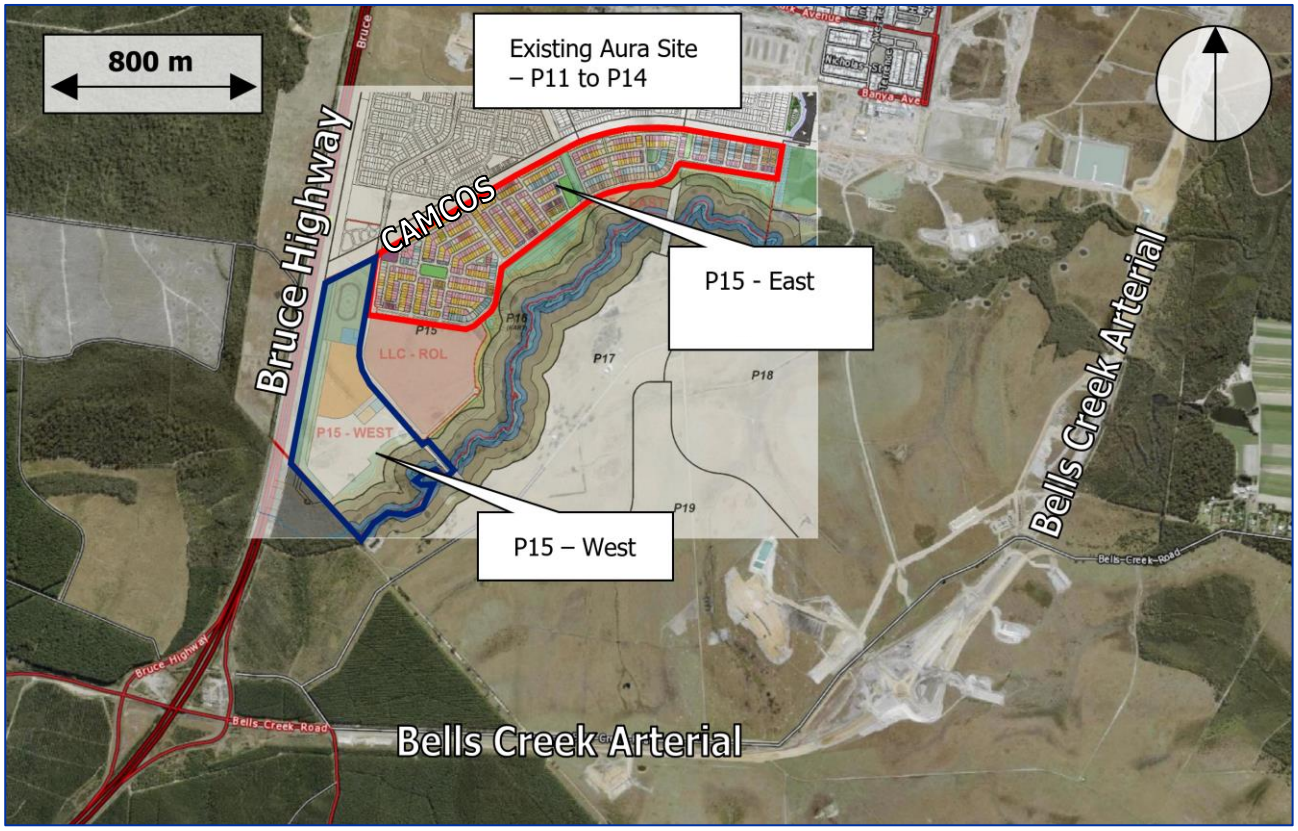
Information Request Item	Summary Response
Item 1a EDQ acknowledges that detail design of the acoustic mound is currently under assessment (Compliance Assessment DEV2021/1235/19). There is slight difference between the detail design and the concept design presented in the acoustic report dated 24/01/2024. Update the acoustic report to reflect the detail design drawings (Egis), include Egis acoustic mound drawings in the appendix of the report, include bulk earthworks plan (Egis) and pad levels of the lots.	The noise modelling has been updated to consider the latest detailed design drawings issued by Egis (Drawings 3058-DA021 and 022, and 3058-STI-SK02 to SK05, see **Appendix G**). Modelled pad levels based on the detailed design drawings are presented in **Appendix F**.
Item 1b Update Figure C.3 referencing the updated Egis drawings.	**Figure C.3** provides a reference to the relevant Egis detailed design drawings.
Item 1c The noise report assumes a road surface of dense graded asphalt for the Bruce Highway. Based on information available the road surface is not dense graded asphalt and is open grade asphalt.	The noise modelling has been updated to consider open graded asphalt along the Bruce Highway.
Item 1d S5.3 – Data greater than 12 months old shall not be applied in the noise assessment in accordance with the Department of Transport and Main Roads Transport Noise Management Code of Practice. The noise measurements which are used to verify the noise modelling are now approximately 6 years old and located a significant distance from the proposed sensitive uses. The monitoring shall be repeated at a location near to the highway boundary. Receiver location should be taken further south at the most affect residential lot and selected to avoid contamination from construction noise.	Noise monitoring was undertaken from 18 to 21 June 2024. The noise logger was located in the southern portion of P15 west, near the highway boundary. Through on site observations, it was confirmed that highway traffic was dominant and construction activity located further to the north/north-east was inaudible. Full details are provided in **Appendix E**. It is noted that the noise modelling is over-predicting by 3.8 dBA. This is slightly higher than the over-prediction observed for the 2018 monitoring data set (i.e. 3.2 dBA). Based on the results of both sets of monitoring, the model is conservatively predicting. It is noted that the predicted variations are consistent with the +/-3.6 dBA accuracy observed along Queensland roads, as detailed in the TMR CoP Vol 1.
Item 1e Table 5.3 – Check all corrections in the notes below the Table 5.3 and updated the predicted noise levels. LA10,1hr façade predictions should be higher than LA10,12hr free field predictions.	The corrections have been updated based on the most recent noise monitoring data.
Item 1f Section 5.4.2.2 - This section indicates, "The barrier is to be constructed with a material with minimum mass of 12.5 kg/m2 or minimum acoustic rating of Rw 23." These requirements are contrary to the requirements of MRTS15 and therefore these should be deleted from the report and replaced with reference to TMR Technical specifications.	The text has been updated to refer to MRTS15 and the TMR Road Traffic Noise Management Code of Practice Volume 1.
Item 1g Recommendations and Conclusions – This section states, "Full compliance with the SDAP limits at ground level is predicted (for noise generated by the Bruce Highway)." The proposed noise barriers do not achieve full compliance	Full compliance is predicted to be achieved with the 63 dBA façade limit at ground level and 60 dBA limit at private opens spaces, with the proposed barriers. Refer to **Figure C4** and **Figure C7**. **Figure C7** shows the predicted free-field noise levels for comparison to the 60 dBA private open space limit. The front portion of lots of 2395 to 2397 exceed this limit (by 1 dBA), however, it is noted, that the rear of the lots,

Information Request Item	Summary Response
with SDAP limits. The conclusions should include an assessment against all SDAP requirements, including assessment against the 60 dB(A) fee field noise criteria.	where private open spaces would be fully shielded and the noise model is over-predicting by + 3.8 dBA. Given this, compliance is considered to be achieved.
Item 2a The Figures have included built form on the lots. Provide commentary in the report regarding the assumptions of these houses. These houses must be assumed as single-storey houses, building setback and site cover (building footprint) in accordance with the PoD.	The revised noise modelling has conservatively excluded built form on the lots.
Item 2b As discussed in the meeting with Trinity Consultants and Stockland on 15 April 2024, the noise criteria for Precinct 15 West are to be clearly defined (e.g. recommended to be in accordance with QDC MP4.4). This would negate the need for individual dwelling noise assessment in accordance with AS2107 and AS3671. Amend the Traffic Noise Assessment accordingly or provide an alternative solution that removes this burden on individual lot owner/s to undertake a site-specific acoustic assessment. This is to ensure a streamline procedure and a consistent standard being applied.	The alternative approach is currently being reviewed by Stockland. For the purposes of this application, the methodology has not been amended and will be negotiated at a later date.

2. STUDY AREA DESCRIPTION

The development is within the existing Aura estate and will form part of the Caloundra South PDA on the Sunshine Coast. The site location of Precinct 15 West is shown in **Figure 2.1**, demarcated within a **dark blue** line (source: Queensland Globe).

Figure 2.1: Site Location



The site is currently vacant, and generally consists of cleared land.

The proposed development is surrounded by the following uses (refer **Figure 2.1**):

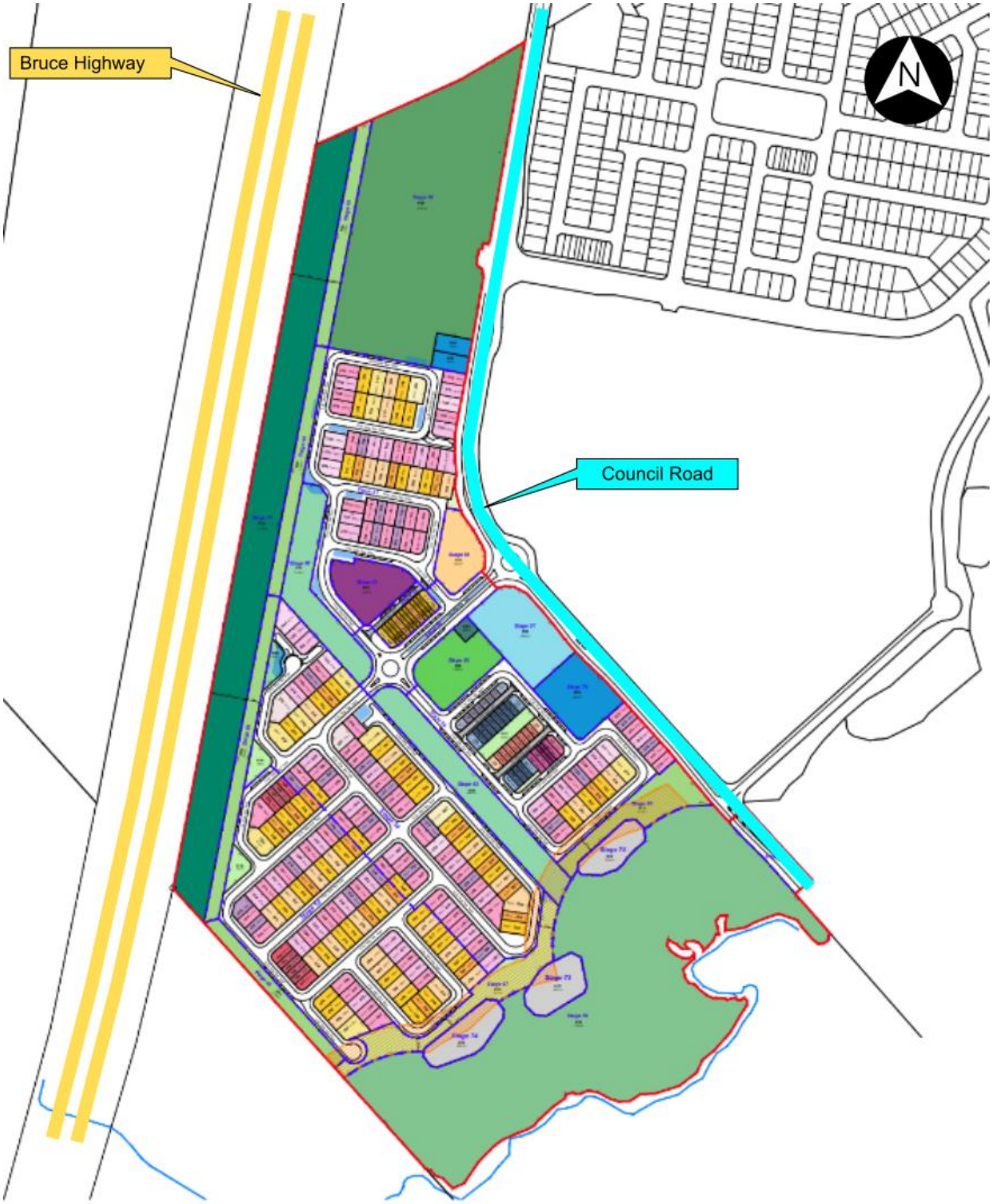
- CAMCOS rail corridor along the northern side of the site, and existing and future development further to the north on the opposite side of the CAMCOS corridor.
- Trunk connector road immediately east of the site, between Precinct 15 West and 15 East.
- Bruce Highway immediately to the west of the site.
- Land Lease Retirement Community (LLC) to the East of P15 West
- Aura development and Bells Creek Arterial further to the east. Due to the significant distance, the Bells Creek Arterial is not addressed in this report for P15 West.

As per the proposed ROL Plan (**Figure 2.2**), Precinct 15 is located west of the other proposed precincts and lies immediately south of the CAMCOS corridor. A trunk connector road passes through Precinct 15 which connects the precincts to the north and south of the subject site. This assessment will consider the internal trunk connector road (Council controlled) and Bruce Highway (TMR controlled) shown in **Figure 2.2** below.

Road traffic noise from the Bruce Highway is assessed separately in this report for the purpose of identifying compliance with the relevant State noise criteria (**Section 4.2**) and Council requirements (**Section 4.4**),

which are dependent on State-controlled noise impacts. As per **Section 4.4**, The applicable MP4.4[1] category for residential uses is determined by the total contribution from both Council and TMR controlled roads.

Figure 2.2: P15 West Structure Plan



[1] Queensland Development Code (QDC) Mandatory Part 4.4 (MP4.4).

3. PROPOSED DEVELOPMENT

The proposed Precinct 15 West development includes the following components:

- Residential allotments of various sizes (300 lots total).
- Neighbourhood parks.
- Neighbourhood centres.
- Community facilities.
- Childcare Centre
- Sports park.

A full-size site layout is included in **Appendix B**.

4. NOISE CRITERIA

4.1 Overview

Acoustic criteria for the project are required to assess the impact of both road traffic noise onto the various lots of the proposed development.

The acoustic assessment will be undertaken in accordance with the following relevant criteria:

- Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) State Assessment and Referral Agency (SARA) – State Development Assessment Provisions (SDAP).
- Department of Transport and Main Roads (TMR) – Road Traffic Noise Management: Code of Practice.
- Department of Housing and Public Works (HPW) – Queensland Development Code (QDC) Mandatory Part 4.4 (MP4.4) 'Buildings in transport noise corridors'.
- Department of Environment and Science (DES) – Environmental Protection Policy (Noise) and Environmental Protection Act.
- Sunshine Coast Council Planning Scheme 2014.
- Australian Standard AS/NZS 2107–2016: Acoustics— Recommended design sound levels and reverberation times for building interiors.

4.2 State Code 1: Development in a State-Controlled Road Environment

The development is subject to road traffic noise from the Bruce Highway, which is a State-controlled Road. Acoustic criteria for the project will need to address noise intrusion into the development in accordance with 'Module 1: Community Amenity' of SDAP. The current version of the SDAP is v3.0, effective 18 February, 2022.

The relevant performance outcomes and acceptable outcomes for developments (including sensitive uses not contained within Precinct 15 East) in a state-controlled road or type 1 multi modal corridor environment are presented in **Table 4.1** and reference tables **Table 4.2, 4.3** and **4.4.**

Table 4.1: SDAP State Code 1 Performance and Acceptable Outcomes

Performance Outcomes	Acceptable Outcomes
Reconfiguring a lot	
Involving the creation of 5 or fewer new residential lots adjacent to a state-controlled road or type 1 multi-modal corridor	
PO37 Development minimises free field noise intrusion from a state-controlled road.	AO37.1 Development provides a noise barrier or earth mound which is designed, sited and constructed: 1. to achieve the maximum free field acoustic levels in reference table 2 (item 2.1); 2. in accordance with: a. Chapter 7 integrated noise barrier design of the Transport Noise Management Code of Practice: Volume 1 (Road Traffic Noise), Department of Transport and Main Roads, 2013; b. Technical Specification-MRTS15 Noise Fences, Transport and Main Roads, 2019; c. Technical Specification-MRTS04 General Earthworks, Transport and Main Roads, 2020.

Performance Outcomes	Acceptable Outcomes
	OR AO37.2 Development achieves the maximum free field acoustic levels in reference table 2 (item 2.1) by alternative noise attenuation measures where it is not practical to provide a noise barrier or earth mound. OR AO37.3 Development provides a solid gap-free fence or other solid gap-free structure along the full extent of the boundary closest to the state-controlled road.
Involving the creation of 6 or more new residential lots adjacent to a state-controlled road or type 1 multi-modal corridor	
PO38 Reconfiguring a lot minimises free field noise intrusion from a state-controlled road.	AO38.1 Development provides noise barrier or earth mound which is designed, sited and constructed: 1. to achieve the maximum free field acoustic levels in reference table 2 (item 2.1); 2. in accordance with: a. Chapter 7 integrated noise barrier design of the Transport Noise Management Code of Practice: Volume 1 (Road Traffic Noise), Department of Transport and Main Roads, 2013; b. Technical Specification-MRTS15 Noise Fences, Transport and Main Roads, 2019; c. Technical Specification-MRTS04 General Earthworks, Transport and Main Roads, 2020. OR AO38.2 Development achieves the maximum free field acoustic levels in reference table 2 (item 2.1) by alternative noise attenuation measures where it is not practical to provide a noise barrier or earth mound.
Material change of use (accommodation activity)	
Ground floor level requirements adjacent to a state-controlled road or type 1 multi-modal corridor	
PO39 Development minimises noise intrusion from a state-controlled road in private open space.	AO39.1 Development provides a noise barrier or earth mound which is designed, sited and constructed: 1. to achieve the maximum free field acoustic levels in reference table 2 (item 2.2) for private open space at the ground floor level; 2. in accordance with: a. Chapter 7 integrated noise barrier design of the Transport Noise Management Code of Practice: Volume 1 (Road Traffic Noise), Department of Transport and Main Roads, 2013

Performance Outcomes	Acceptable Outcomes
	b. Technical Specification-MRTS15 Noise Fences, Transport and Main Roads, 2019; c. Technical Specification-MRTS04 General Earthworks, Transport and Main Roads, 2020. OR AO39.2 Development achieves the maximum free field acoustic level in reference table 2 (item 2.2) for private open space by alternative noise attenuation measures where it is not practical to provide a noise barrier or earth mound.
PO40 Development (excluding a relevant residential building or relocated building) minimises noise intrusion from a state-controlled road in habitable rooms at the facade.	AO40.1 Development (excluding a relevant residential building or relocated building) provides a noise barrier or earth mound which is designed, sited and constructed: 1. to achieve the maximum building façade acoustic level in reference table 1 (item 1.1) for habitable rooms; 2. in accordance with: a. Chapter 7 integrated noise barrier design of the Transport Noise Management Code of Practice: Volume 1 (Road Traffic Noise), Department of Transport and Main Roads, 2013; b. Technical Specification-MRTS15 Noise Fences, Transport and Main Roads, 2019; c. Technical Specification-MRTS04 General Earthworks, Transport and Main Roads, 2020. OR AO40.2 Development (excluding a relevant residential building or relocated building) achieves the maximum building façade acoustic level in reference table 1 (item 1.1) for habitable rooms by alternative noise attenuation measures where it is not practical to provide a noise barrier or earth mound.
PO41 Habitable rooms (excluding a relevant residential building or relocated building) are designed and constructed using materials to achieve the maximum internal acoustic level in reference table 3 (item 3.1).	No acceptable outcome is provided.
Above ground floor level requirements (accommodation activity) adjacent to a state-controlled road or type 1 multi-modal corridor	
PO42 Balconies, podiums, and roof decks include: 1. a continuous solid gap-free structure or balustrade (excluding gaps required for drainage purposes to comply with the Building Code of Australia);	No acceptable outcome is provided.

Performance Outcomes	Acceptable Outcomes
2. highly acoustically absorbent material treatment for the total area of the soffit above balconies, podiums, and roof decks.	
PO43 Habitable rooms (excluding a relevant residential building or relocated building) are designed and constructed using materials to achieve the maximum internal acoustic level in reference table 3 (item 3.1).	No acceptable outcome is provided.
Material change of use (other uses)	
Ground floor level requirements (childcare centre, educational establishment, hospital) adjacent to a state-controlled road or type 1 multi-modal corridor	
PO44 Development: 1. provides a noise barrier or earth mound that is designed, sited and constructed: a. to achieve the maximum free field acoustic level in reference table 2 (item 2.3) for all outdoor education areas and outdoor play areas; b. in accordance with: i. Chapter 7 integrated noise barrier design of the Transport Noise Management Code of Practice: Volume 1 (Road Traffic Noise), Department of Transport and Main Roads, 2013; ii. Technical Specification-MRTS15 Noise Fences, Transport and Main Roads, 2019; iii. Technical Specification-MRTS04 General Earthworks, Transport and Main Roads, 2020; or 2. achieves the maximum free field acoustic level in reference table 2 (item 2.3) for all outdoor education areas and outdoor play areas by alternative noise attenuation measures where it is not practical to provide a noise barrier or earth mound.	No acceptable outcome is provided.
PO45 Development involving a childcare centre or educational establishment: 1. provides a noise barrier or earth mound that is designed, sited and constructed: 2. to achieve the maximum building facade acoustic level in reference table 1 (item 1.2); 3. in accordance with: a. Chapter 7 integrated noise barrier design of the Transport Noise Management Code of Practice: Volume 1 (Road Traffic Noise), Department of Transport and Main Roads, 2013;	No acceptable outcome is provided.

Performance Outcomes	Acceptable Outcomes
b. Technical Specification-MRTS15 Noise Fences, Transport and Main Roads, 2019; c. Technical Specification-MRTS04 General Earthworks, Transport and Main Roads, 2020; or 4. achieves the maximum building facade acoustic level in reference table 1 (item 1.2) by alternative noise attenuation measures where it is not practical to provide a noise barrier or earth mound.	
PO46 Development involving: 1. indoor education areas and indoor play areas; or 2. sleeping rooms in a childcare centre; or 3. patient care areas in a hospital achieves the maximum internal acoustic level in reference table 3 (items 3.2-3.4)	No acceptable outcome is provided.
Above ground floor level requirements (childcare centre, educational establishment, hospital) adjacent to a state-controlled road or type 1 multi-modal corridor	
PO47 Development involving a childcare centre or educational establishment which have balconies, podiums or elevated outdoor play areas predicted to exceed the maximum free field acoustic level in reference table 2 (item 2.3) due to noise from a state-controlled road are provided with: 1. a continuous solid gap-free structure or balustrade (excluding gaps required for drainage purposes to comply with the Building Code of Australia); 2. highly acoustically absorbent material treatment for the total area of the soffit above balconies or elevated outdoor play areas.	No acceptable outcome is provided.

Table 4.2: Reference Table 1 - Maximum Building Façade Acoustic Levels

Applicable use	Acoustic levels
1.1: Accommodation activity	a. ≤60 dB(A) L10 (18 hour) façade corrected (measured L90 (8 hour) free field between 10pm and 6am ≤40 dB(A)) OR b. ≤63 dB(A) L10 (18 hour) façade corrected (measured L90 (8 hour) free field between 10pm and 6am > 40 dB(A))
1.2: Childcare centre or educational establishment	≤58 dB(A) L10 (1 hour) façade corrected (maximum hour during normal opening hours)

Table 4.3: Reference Table 2 - Maximum free field acoustic levels

Applicable use	Acoustic levels
2.1: Private open space for residential lots	a. ≤57 dB(A) L10 (18 hour) free field (measured L90 (18 hour) free field between 6am and 12 midnight ≤45 dB(A)) OR b. ≤60 dB(A) L10 (18 hour) free field (measured L90 (18 hour) free field between 6am and 12 midnight >45 dB(A))
2.2: Private open space for an accommodation activity (including lots created for a future accommodation activity)	
2.3: Outdoor education areas and outdoor play areas in a childcare centre or educational establishment	≤63 dB(A) L10 (12 hour) free field (between 6am and 6pm)

Table 4.4: Reference Table 3 - Maximum internal acoustic levels

Applicable use	Acoustic levels
3.1: Habitable rooms in an accommodation activity (excluding uses addressed in QDC MP4.4)	≤35 dB(A) Leq (1 hour) (maximum hour over 24 hours)
3.2: Indoor education areas and indoor play areas in a childcare centre or education establishment	
3.3: Sleeping rooms in a childcare centre	
3.4: Patient care areas in a hospital	

4.3 Queensland Development Code MP4.4

The Queensland Government has a number of mandatory codes that must be complied with at the building application stage for a home. These are referred to as Queensland Development Codes (QDC).

QDC Mandatory Part (MP) 4.4 relates to new buildings in transport noise corridors. This mandatory Code deals with buildings within residential developments close to gazetted roads, which includes the Bruce Highway but excludes the Council controlled trunk connector road. Advice from Sunshine Coast Council is that the MP4.4 category should be based on the combined noise level from the Bruce Highway and Council road, as discussed further in **Section 4.4**.

MP4.4 sets mandatory construction standards for new residential development, or additions to existing residential development, within a Transport Noise Corridor.

The noise level categories extend out to 57 dBA L_{10}(18 hour) for road traffic noise. The road noise categories and corresponding noise levels from Schedule 3, Table 1 of MP4.4 as follows:

- Road Noise:
  - Category 0: ≤ 57 dBA L_{10}(18 hour)
  - Category 1: 58 – 62 dBA L_{10}(18 hour)
  - Category 2: 63 – 67 dBA L_{10}(18 hour)
  - Category 3: 68 – 72 dBA L_{10}(18 hour)
  - Category 4: ≥ 73 dBA L_{10}(18 hour)

4.4 Sunshine Coast Council

On 14 April 2014 the Sunshine Coast Council (SCC) adopted the Sunshine Coast Planning Scheme 2014 and the associated planning scheme policies. The planning scheme and the planning scheme policies were gazetted on 2 May 2014 and commenced on 21 May 2014. The Sunshine Coast Planning Scheme 2014 replaces the Caloundra City Plan 2004 and Maroochydore City Plan 2000 planning schemes with one plan for the region.

With regards to the assessment of noise impacts, the relevant sections of the planning scheme are the Nuisance Code (Section 9.4.3) and the Planning Scheme Policy for the Nuisance Code (Section SC6.15). The Nuisance Code presents Performance Outcomes and Acceptable Outcomes for assessable development for acoustic amenity and noise but does not specifically nominate noise limits or assessment criteria. The Planning Scheme Policy for the Nuisance Code provides guidance for the assessment of road noise, live entertainment, amplified music and voices (patrons). The policy does not specify noise limits but references the following guidelines to achieve the nuisance code outcomes:

- Australian Standard AS/NZS2107–2000: Acoustics— Recommended design sound levels and reverberation times for building interiors. This document is superseded by the 2016 version.
- Department of Housing and Public Works (HPW) – Queensland Development Code (QDC) Mandatory Part 4.4 (MP4.4) 'Buildings in transport noise corridors'.
- Department of Environment and Science (DES) (formerly Department of Environment and Heritage Protection) – Environmental Protection Policy (Noise) and Environmental Protection Act.
- Department of Transport and Main Roads (TMR) – Road Traffic Noise Management: Code of Practice.

On 29th September 2014 Council advised that at the present time, road traffic noise intrusion into buildings should still be assessed against the criteria previously applied by Caloundra City Council and Maroochy Shire Council. Caloundra City Council and Maroochy Shire Council specified an external building facade limit of 63 dBA L_{10}(18 hour) (façade corrected) on residential land. For those instances where this external noise limit was predicted to be exceeded, the internal noise levels within habitable rooms were required to be designed to meet the recommended design sound levels stated in Table 1 of AS/NZS 2107-2016 entitled "Acoustics - Recommended design sound levels and reverberation times for building interiors".

On 10th March 2021 Council provided advice on their recommended approach to assessing allotments or residences affected by transport noise from both State and Council roads. The approach is outlined using the following rules:

1. Where the noise from the State controlled road/s is of a sufficient level to trigger QDC MP4.4 (i.e. 58 dBA L_{10}(18 hour) or higher) at a building façade, then determine the MP4.4 categories for the building facades based on the total noise from all (State and Council) roads;
2. Where the noise from the State controlled road/s is not of a sufficient level to trigger QDC MP4.4 (i.e. 57 dBA L_{10}(18 hour) or lower), but the noise from all (State and Council) roads is greater than 63 dBA L_{10}(18 hour) (i.e. the Council traffic noise limit) then determine the building requirements using AS3671 and AS2107 based on the noise from all (State & Council) roads; and
3. Where the noise from the State controlled road/s is not of a sufficient level to trigger QDC MP4.4 (i.e. 57 dBA L_{10}(18 hour) or lower), and the noise from all (State and Council) roads is not greater than 63 dBA L_{10}(18 hour) (i.e. the Council traffic noise limit) then no building upgrades are required. Note: If a room has multiple facades and requires AS3671/AS2107 assessment, as per dot point above, then the overall room is assessed per that method.

4.5 Australian Standard AS 2107:2016

For road traffic noise, Council recommends the most applicable assessment methodology would be the application of indoor noise levels specified in AS 2107:2016 "Acoustics - Recommended design sound levels and reverberation times for building interiors" (AS 2107). AS 2107 lists recommended internal noise levels for various building and room types, including residential bedrooms and other areas. For development near major and minor roads, the recommended design levels are as listed in **Table 4.9**.

Table 4.5: Recommended Internal Noise Levels from AS 2107:2106

Road Type	Type of Occupancy / Activity	Design Sound Level L_{eq} dBA
Minor Road	Living areas	30 to 40

Road Type	Type of Occupancy / Activity	Design Sound Level L_{eq} dBA
	Sleeping areas	30 to 35
	Work areas	35 to 40
Major Road	Living areas	35 to 45
	Sleeping areas	35 to 40
	Work areas	35 to 45

Of the above criteria, we would generally recommend the following internal design levels:

- Living rooms: 40 dBA (assessed using peak hour day/evening noise level).
- Work rooms: 40 dBA (assessed using peak hour day/evening noise level).
- Bedrooms: 35 dBA (assessed using peak hour night noise level).

4.6 Summary and Noise Limits

Based on the noise criteria prescribed by SDAP and Sunshine Coast Council, the road traffic noise criteria nominated for the development are as follows:

Road traffic noise – Bruce Highway (State controlled road):

- Residential lots:
  - At 1m outside buildings 63 dBA L_{10}(18 hour) including façade reflection.
  - For outdoor recreation areas 60 dBA L_{10}(18 hour) excluding façade reflection.
  - Application of MP4.4 to achieve acceptable internal noise levels.

Road traffic noise – Internal trunk connector road (Council controlled roads):

- Residential lots:
  - External facade noise limit: 63 dBA L_{10}(18 hour) (facade corrected).
  - Internal noise limit (if external limit exceeded): internal design noise levels from AS/NZS 2107:2016, specifically:
    - 35 dBA L_{eq}(1 hour) for bedrooms in residences.
    - 40 dBA L_{eq}(1 hour) for other habitable rooms in residences.

Road traffic noise – Both Bruce Highway (State controlled road) and internal trunk connector road (Council controlled roads):

- Road traffic noise from both State and Council controlled roads – follow the process advised by Council in **Section 4.4**.

A review of the predicted noise levels across the site indicates that the Bruce Highway traffic is of a sufficient level to trigger QDC MP4.4 (i.e. 58 dBA L_{10}(18 hour) or higher) across the whole P15 West site. Therefore, based on **Section 4.4**, Council requires that MP4.4 categories for the building facades are based on the total noise from all (State and Council) roads.

5. ROAD TRAFFIC NOISE ASSESSMENT

5.1 Noise Modelling

For the purposes of the assessment, predictions were undertaken in accordance with the methodology described in the United Kingdom, Department of Transport (1988) procedure, Calculation of Road Traffic Noise (CoRTN). CoRTN is commonly adopted in Australia for the assessment of road traffic noise impacts and has been subject to scientific studies to determine its performance in Queensland conditions (see Section 4.3.2.1 of the TMR Code of Practice).

The calculation method considers the influence of various elements of the road design including traffic flows, traffic fleet composition, road gradient, acoustic shielding by other buildings and elevations, and road surface type. The method predicts L_{10}(18hour) noise level which is the arithmetic average of the hourly noise levels exceeded 10% of the time between the hours of 6:00 am and midnight.

The SoundPLAN 8.2 computer model has been used to undertake the noise predictions in accordance with the CoRTN methodology. The following sections discuss the modelling inputs, assumptions and results.

5.2 Model Input Data

5.2.1 Traffic Data

Traffic volumes were provided by PricewaterhouseCoopers (PwC) and are based on forecasted volumes using the Aura Visum Model. This model assumes an ultimate road network in 2037 for assessment purposes given expected completion of development by 2027, i.e. 10 year future impact.

The traffic data for the Bruce Highway was provided for the year 2031, and Trinity was advised by Stockland to assume an annual growth rate of 3.5% for Bruce Highway traffic. The 18-hour (6am to midnight) traffic volume is estimated as 92% of the daily (AADT) volume, as advised by PWC. The Bruce Highway traffic data for Year 2037 is included in **Table 5.1**.

Table 5.1: Bruce Highway Year 2037 Traffic Data

Segment	Road / Section	Direction	Year 2037 Traffic Volumes		Heavy Vehicles (HV%)	Speed (km/h)
			AADT	18 hours (6am to midnight)		
B1	Bruce Highway – South of interchange	Northbound	53208	48951	15.1	110
B2	Bruce Highway – South of interchange	Southbound	45597	41949	17.0	110
*B3	Bruce Highway – North of interchange	Northbound	46729	42991	15.1	110
*B4	Bruce Highway – North of interchange	Southbound	41559	38234	17.0	110

Note: *Northern sections of the Bruce Highway are unlikely to materially affect modelled results for P15 East unlike those closer to the precinct (B1 and B2), but are modelled for sake of completeness

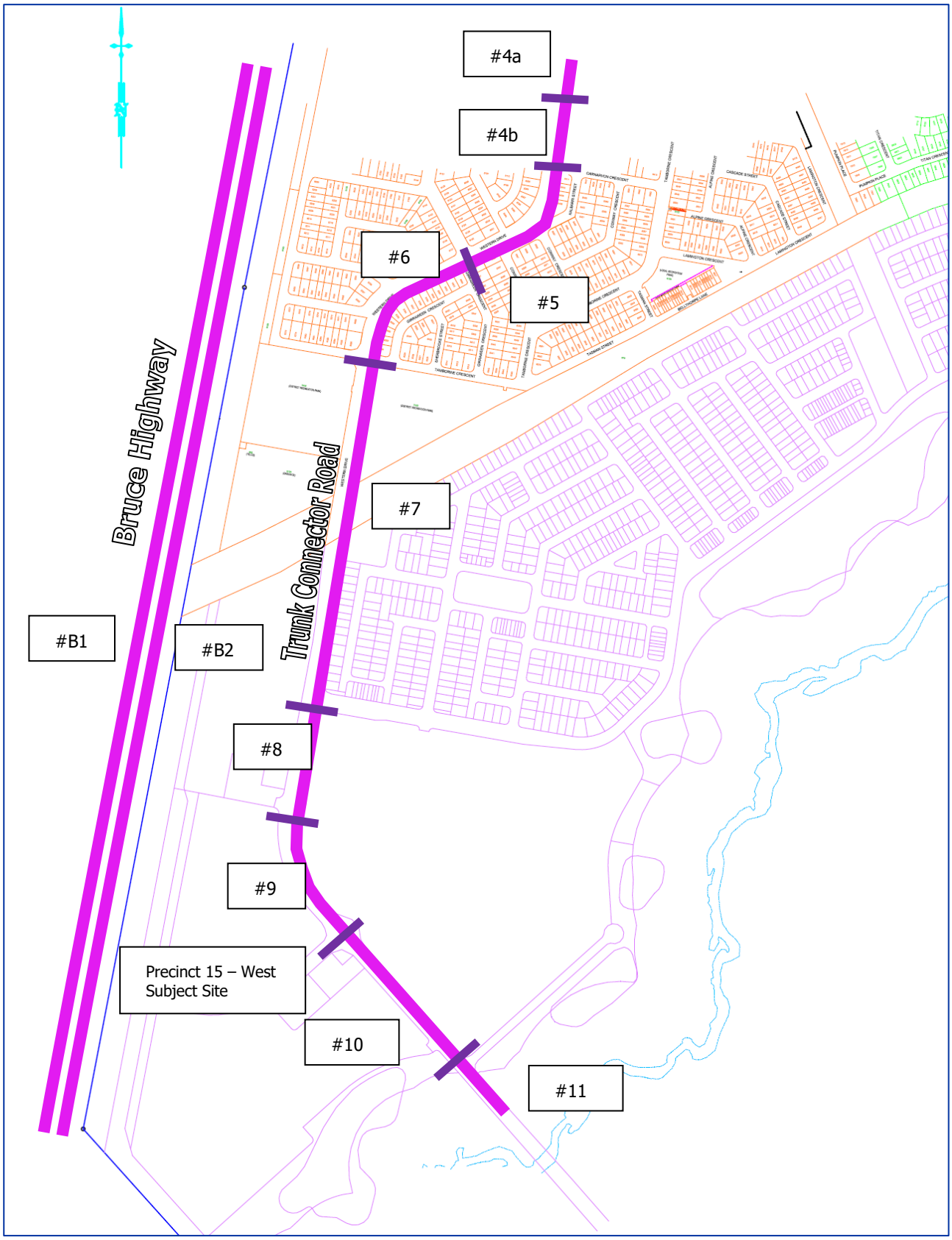
The predicted 2031 traffic volumes along the Council controlled internal road were provided by PwC and Trinity was advised by Stockland to assume an annual growth rate of 3.5% for this traffic. The calculated 2037 volumes are summarised in **Table 5.2** and relates to the road segments shown in **Figure 5.1**. Note: The road segment number is consistent with that used for the assessment of Precincts 11 to 14 of Aura to the north.

The 18-hour (6am to midnight) traffic volume is estimated as 92% of the daily (AADT) volume, as advised by PWC. The percentage of heavy vehicles is assumed as 3% as was used for the assessment of Precincts 11 to 14 of Aura to the north.

Table 5.2: Council Trunk Connector Year 2037 Traffic Data

Segment	Road / Section	Direction	Predicted Year 2037 Traffic Volumes		Heavy Vehicles (HV%)	Speed (km/h)
			AADT	18 hours (6am to midnight)		
4a	Internal (Trunk Connector) Road – Section 4a	Both	13352	12284	3	60
4b	Internal (Trunk Connector) Road – Section 4b	Both	9929	9134	3	60
5	Internal (Trunk Connector) Road – Section 5	Both	10570	9724	3	60
6	Internal (Trunk Connector) Road – Section 6	Both	9700	8924	3	60
7	Internal (Trunk Connector) Road – Section 7	Both	8761	8060	3	60
8	Internal (Trunk Connector) Road – Section 8	Both	7971	7333	3	60
9	Internal (Trunk Connector) Road – Section 9	Both	8305	7640	3	60
10	Internal (Trunk Connector) Road – Section 10	Both	9191	8456	3	60
11	Internal (Trunk Connector) Road – Section 11	Both	9929	9134	3	60

Figure 5.1: All Road Segments



5.2.2 Other Model Data

In addition to traffic flow data given above, the following assumptions and inputs were considered:

- Noise source height of 0.5m as per CoRTN methodology.
- Road surface corrections:
  - Bruce Highway: -2 dBA for Open Graded Asphalt.
  - Internal (Trunk Connector) Road: 0 dBA for Dense Graded Asphalt.
- Ground absorption of 1, i.e. fully absorptive, in model except for major roads which are fully reflective.
- Ground contours for the site and the surrounding area were obtained from Egis (refer to **Appendix G** for drawings, 3058-DA021 and 022, and 3058-STI-SK02 to SK05). The ground contours include the CAMCOS corridor earthworks, and the noise bund adjacent the Bruce Highway to the north of the CAMCOS corridor. A noise bund adjacent the Bruce Highway was not included south of the CAMCOS corridor.
- Receiver heights for the proposed lots were 1.8m above ground for ground floors and 4.6 m for the first floors.
- A +2.5 dBA facade reflection allowance is included in the noise level predictions at a facade.
- A - 1.7 dBA façade and – 0.7 dBA free-field calibration factor regarding CoRTN accuracy for Queensland Conditions (as presented in Section 4.3.2.1 of the TMR Code of Practice).

5.3 Model Verification

Model verification for the Bruce Highway is presented in **Appendix E**, based on noise monitoring completed in June 2024. It is not possible to verify the trunk connector road as it has not been constructed.

It is noted that the model is over-predicting by 4.7 dBA, therefore, the results of the modelling are considered conservative. The noise verification completed for the year 2018 monitoring also yielded an over-prediction (i.e. + 3.2 dBA).

5.4 Barriers, Calculations and Assessment

5.4.1 Overview

Road traffic noise levels have been predicted for the year 2037 for the following noise barrier scenarios:

- Scenario 1 - Proposed bund along Bruce Highway (western boundary of site), as incorporated into provided digital terrain model.
- Scenario 2 (see **Figure C.3**) - Proposed bund along Bruce Highway (western boundary of site) + additional barrier along southern boundary + noise barriers along eastern boundary (adjacent to Council road, see **Figure D.3**).

Modelling predictions have been made for the above barrier scenarios for Bruce Highway only, and for all roads (Bruce Highway and Council road).

Results are presented and assessed in the following sections.

5.4.2 Bruce Highway Traffic Only (2037)

5.4.2.1 Scenario 1 - With Highway Bund Only

Predicted noise level contours from the Bruce Highway with the proposed highway bund only are shown in **Figure C.1** (ground floor) and **C.2** (first floor) in **Appendix C**. The highway bund elevation levels are presented in **Appendix G**.

From the contour results it can be seen that the Precinct 15 West lots are subject to excessive noise levels (refer to the red external noise 63 dBA SDAP limit line) at the ground floor.

5.4.2.2 Scenario 2 - With Highway Bund + Southern Boundary Barrier + Eastern Boundary Barrier

To achieve compliance at the ground level, it is recommended that a barrier is constructed, commencing at the southern end of the highway bund and extending east along the southern boundary in accordance with **Figure C.3** in **Appendix C.** The barrier will extend along the south western edge of the site, and will be 4m to 6m above the ground level. The specific absolute heights are annotated in **Figure C.3**.

Predicted noise level contours with the additional southern barrier are shown in **Figure C.4** (ground floor) and **C.5** (first floor) in **Appendix C**. **Figure C.4** shows compliance with the 63 dBA façade-limit at ground floor.

Predicted noise level contours for outdoor areas are provided in **Figure C.7** in **Appendix C**. While outdoor noise limit exceedances are noted for lots 2395-2398 by up to 1 dBA, the following points are noted:

- Private open space (for which the 60 dBA limit applies) would be located in the rear of the lots. The houses in these lots will provide shielding from noise to any rear private open space, reducing noise levels even further.
- As discussed earlier, the model is over-predicting by +3.8 dBA (when comparing predicted and measured noise levels for the monitoring completed in June 2024, refer to **Appendix E**). Even adjusting the results down to a conservative +2.8 dBA model accuracy would result in full compliance.

Based on the above information, it is concluded that Precinct 15 West lots are compliant with the relevant noise limits at ground floor.

5.4.3 Noise from All Roads (2037)

5.4.3.1 With Highway Bund Only

Predicted noise level contours from all roads without any noise barriers are shown in **Figure D.1** (ground floor) and **D.2** (first floor) in **Appendix D**. It is noted that the southern boundary barrier discussed in **Section 5.4.2.2** is present in the model for this calculation.

From these contour results it can be seen that the Precinct 15 West lots that are closest to the trunk connector road are subject to MP4.4 noise category 2 requirements.

5.4.3.2 With Highway Bund + Southern Boundary Barrier + Eastern Boundary Barrier

To achieve reduce the noise category to 1 at ground level, it is recommended that 2.0-2.5 m noise barriers (relative to the building pad height) are constructed in accordance with **Figure D.3** in **Appendix D.** The barriers are described as follows:

- 2.5m high barrier applied to the boundary of the northmost residential lots within P15 West that are closest to the Council controlled road.
- 2m high barrier along the first row of other residential lots that are closest to the Council controlled road.

Predicted noise level contours from all roads (Bruce Highway and trunk connector road) with the proposed noise barriers from **Section 5.5.6** are shown in **Figure D.4** (ground floor) and **D.5** (first floor) in **Appendix D**.

From these contour results it can be seen that only MP4.4 category 1 requirements are required at ground level. Upper floor levels will still require category 2 acoustic treatment.

Refer to **Appendix F** for acoustic construction requirements. It is noted that QDC MP4.4 requirements are only required where it is triggered by the State requirements. QDC MP4.4 is not required beyond approximately 250 metres from the Bruce Highway, based on the Queensland Government State Planning Policy Interactive Mapping System. **Figure 5.2** presents the area affected by QDC MP4.4.

Figure 5.2: QDC MP4.4 Area

As discussed in **Section 4.4**, where QDC MP4.4 is not triggered (eastern portion of site), but the Council 63 dBA limit is exceeded, then acoustic construction should be based on AS 3671 and AS 2107.

5.4.4 Non-Residential Receivers

There are 4 lots identified for educational or community purposes:

- Lot 8105, 8106 and 8103 – community use

- Lot 8100 – childcare centre

All the above lots are located on the eastern side of P15 West along the Council road and furthest from the Bruce Highway.

As per the SDAP Code 1 requirements (see **Section 4.2**), the noise criteria for childcare, educational or hospital developments are as follows:

- Façade criteria – $L_{A10,1\text{-hour}}$ 58 dBA
- Free-field criteria for outdoor areas – 63 dBA $L_{A10,12\text{-hour}}$ (6 am to 6 pm)

Table 5.3 presents predicted State-controlled road traffic noise levels at Lots 8105, 8106, 8103 and 8100.

Table 5.3: Predicted Noise Levels at Childcare and Community Lots

Lot	Predicted $L_{A10,1hr}$ Façade-Corrected Noise Level dBA[a]	Predicted $L_{A10,12hr}$ Free-field Noise Level dBA[b]
8105 – Community	62	60
8106 – Community	63	60
8103 – Community	62	59
8100 – Childcare	63	60
Noise Criteria	**58**	**63**

Note a: $L_{A10,1hr}$ (façade-corrected) = $L_{A10,18\text{-hr}}$ + 2.5 (for façade) – 1.7 (for QLD calibration) + 2.6 (for $L_{A10,1hr}$ correction as per **Appendix E**)
Note b: $L_{A10,12hr}$ (free-field) = $L_{A10,18\text{-hr}}$ – 0.7 (for QLD calibration) + 1.2 (for $L_{A10,12hr}$ correction as per **Appendix E**)

The results of the modelling show compliance with the outdoor $L_{A10,12\text{-hr}}$ limit, but exceedance of the $L_{A10,1}$-hr façade limit. The modelling is noted to be conservative by locating receptors along the boundary of the lots closest to the Bruce Highway and excluding future buildings that would shielded noise from the Bruce Highway.

The specific use of the community lots have not been finalised and the State criteria would only apply if these are used for educational or hospital purposes. The 58 dBA $L_{A10,1\text{-hour}}$ limit is exceeded at the listed community lots, however, in the absence of detailed plans and as noted above, the predictions are made at the boundary of the lots closes to the Bruce Highway. Noise impacts can be addressed by:

- Siting any potential educational or hospital uses away from the Bruce Highway and shielded by other on-site buildings and structure
- Constructing acoustic barriers directly around the lot boundaries (in addition to the already considered highway earth bund and southern boundary barrier).

Regarding the child care lot, an exceedance of the façade noise limit is predicted at the boundary by up to 4 dBA and assuming no shielding from future buildings to the west. With potential two-storey buildings providing shielding, at least 5 dBA attenuation would be expected, resulting in compliance. In any case, boundary acoustic barriers would be located along the affected lot boundaries to mitigate noise impacts.

Based on the above information, potential noise impacts at potential child care, educational and hospital uses can be effectively managed through appropriate siting and local barriers. It would be premature to detail mitigation measures at the current stage of the project design, therefore, it is recommended that noise mitigation for non-residential receivers be reviewed during later design stages.

5.5 Acoustic Barrier Construction

5.5.1 Southern Boundary Barrier

The southern boundary barrier to mitigate Bruce Highway traffic noise will need to comply with TMR barrier requirements detailed in the following documents:

- TMR Specification MRTS15 Noise Fences (March 2019)

- TMR Road Traffic Noise Management Code of Practice Volume 1 (2013)

5.5.2 Eastern Boundary Barrier (Council Road)

Noise barriers along the Council may be constructed using timber, brick, concrete block, sheet metal or earth mound. The acoustic barrier may comprise a combination of an earth mound or crib lock wall and a timber fence on top. A solid timber barrier with overlapping palings is usually the most economical. The minimum acoustic requirement of the noise barrier is that it be solid and continuous with negligible holes and gaps between palings or panels or near the ground. The barrier is to be constructed with a material with minimum mass of 12.5 kg/m^2 or minimum acoustic rating of Rw 23.

6. RECOMMENDATIONS AND CONCLUSION

A road noise assessment has been conducted for Precinct 15 West of the Aura development. The results and recommendations of the assessment are as follows:

- The assessment of road traffic noise impacts has been undertaken with project design information current at the time of the assessment. Overall, the level of design information is considered appropriate for the current stage of assessment. The modelling output can be further refined following progression of the design of the development.
- Road traffic noise from the Bruce Highway and internal trunk connector roads (Council-controlled) have been assessed within this report.
- The results of the noise modelling scenarios are summarised below:
  - Scenario 1 - Proposed bund along Bruce Highway (western boundary of site), as incorporated into provided digital terrain model.
    - Predicted noise level contours from the Bruce Highway only for Scenario 1 are shown in **Figure C.1** (ground floor) and **C.2** (first floor) in **Appendix C**. From these contour results it can be seen that the Precinct 15 West lots are subject to excessive noise levels (refer to the red external noise 63 dBA SDAP limit line) at the ground floor. To achieve compliance at the ground level, it is recommended that the bund is extended in accordance with **Figure C.3** in **Appendix C.**
    - Predicted road traffic levels from all roads (State-controlled and Council-controlled) for Scenario 1 are presented in **Section 5.5.5** and in Figures **D.1** (ground floor) and **D.2** (first floor) in **Appendix D**. From these contour results it can be seen that QDC MP4.4 noise category 2 requirements apply to lots along the eastern boundary of the site, adjacent to the Council-controlled trunk collector road.
  - Scenario 2 - Proposed bund along Bruce Highway (western boundary of site) + additional barrier along southern boundary (see **Figure C.3**) + noise barriers along eastern boundary (see **Figure D3**)
    - Full compliance with the SDAP limits at ground level is predicted (for noise generated by the Bruce Highway)
      - While outdoor noise limit exceedances are noted by up to 1 dBA for part of lots 2395-2398 (see **Figure C.7**), private open space (for which the 60 dBA limit applies) would be located in the rear of the lots, shielded by the associated houses, and the model is over-predicting by 3.8 dBA (as per recent monitoring described in **Appendix E**). On this basis, full compliance is considered to be achieved.
    - QDC MP4.4 requirements are reduced to Category 1 at ground level (instead of 2). At first floor, Category 2 requirements still apply. **Appendix F** presents the acoustic construction requirements.
- On the basis of the above, the following noise mitigation barriers are recommended:
  - Noise mitigation for Bruce Highway:
    - An earth bund is constructed along the western boundary of the site, as used in the model and presented in **Appendix G**.
    - The earth bund is extended along the southern boundary as per **Figure C.3** in **Appendix C**. The extension can be a bund, acoustic barrier or combination.
  - Noise mitigation for Council road:
  - A 2.0-2.5 m acoustic barrier is constructed along eastern boundary lots as per **Figure D3** in **Appendix D**. The height of the barrier is relative to the building pad heights of the associated lots.

APPENDIX A GLOSSARY

Parameter or Term	Description
dB	The decibel (dB) is the unit measure of sound. Most noises occur in a range of 20 dB (quiet rural area at night) to 120 dB (nightclub dance floor or concert).
dBA	Noise levels are most commonly expressed in terms of the 'A' weighted decibel scale, dBA. This scale closely approximates the response of the human ear, thus providing a measure of the subjective loudness of noise and enabling the intensity of noises with different frequency characteristics (e.g. pitch and tone) to be compared.
Day	The period between 7am and 6pm.
Evening	The period between 6pm and 10pm.
Night	The period between 10pm and 7am.
Free-field	The description of a noise receiver or source location which is away from any significantly reflective objects (e.g. buildings, walls).
L_1	The noise level exceeded for 1% of the measurement period.
L_{10}	The noise level exceeded for 10% of the measurement period. It is sometimes referred to as the average maximum noise level.
L_{90}	The noise level exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.
L_{eq}	The equivalent continuous sound level, which is the constant sound level over a given time period, which is equivalent in total sound energy to the time-varying sound level, measured over the same time period.
$L_{eq,1hour}$	As for Leq except the measurement intervals are defined as 1 hour duration.
L_{max}	Maximum A-weighted sound pressure level.
L_{eq}(24 hour)	The average Leq noise level over the 24-hour period from midnight to midnight.
L_{10}(18 hour)	The arithmetic average of the one-hour L10 values between 6am and midnight. This parameter is used in the assessment of road traffic noise.
R_w	Weighted Sound Reduction Index – is a single number evaluation of the property of a partition to attenuate sounds. For the majority of partitions, the value of Rw will be similar to the value for STC. Partitions with particularly poor performance at 100 Hz may have lower values for Rw than for STC. Conversely, partitions with poor performance at 4000 Hz may have higher Rw than for STC. (As per AS1276.1-1999).
Habitable Rooms	According to the "Building Code of Australia" a Habitable Room is: " a room used for normal domestic activities and Includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room, home theatre, and sunroom, but Excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods."

APPENDIX B DRAWINGS

LEGEND

GENERAL

- Application Boundary
- Stage Boundary

LAND USE

- Multiple Residential Sites
- Centres
- Community
- Childcare Centre
- Indicative Bio Basin Location

OPEN SPACE

- Neighbourhood Sports Park
- Neighbourhood Recreation Park
- Civic Park
- District Linear Park
- Local Linear Park
- Landscape Buffer (Road Reserve)
- Drainage
- Conservation
- Highway Buffer
- Drainage (WSUD)

YIELD SUMMARY

28 Deep Lots

- 4.6m - Terrace
- 6.6m - Terrace
- 7.6m+ - End Terrace
- 10.0m - Villa
- 12.5m - Premium Villa
- 14.0m - Courtyard
- 16.0m - Traditional
- 18.0m - Premium Traditional

25 Deep Lots

- 7.5m - Front Loaded Terrace
- 9.0m+ - Front Loaded End Terrace
- 10.0m - Villa
- 12.5m - Premium Villa
- 14.0m - Courtyard
- 16.0m - Traditional
- 18.0m - Traditional

21 Deep Lots

- 6.6m - Terrace
- 7.8m+ - End Terrace

16.5 Deep Lots

- 6.6m - Terrace
- 9.0m+ - End Terrace

Urban Lots

- Urban Loft - Type H
- Urban Loft - Type G

URBIS

AURA - Precinct 15

Reconfiguring of a Lot - Overall

1:6000 @ A3

0 50 100 150 200 250 300

DATE: 09.05.2024
JOB NO: P0037213
DWG NO: ROL-01

APPENDIX C NOISE CONTOURS – BRUCE HIGHWAY ONLY

Scale 1:3673

0 20 40 80 120 160 m

Bruce Highway
At expected completion (2037)
Ground Floor (GF) - Highway Bund Only
Calculation Height = 1.8 m

Figure

C.1

Project Number: 227401.0008
Date: 22/07/2024
Drawn By: BAH
Prepared For: Stocklands Development

Levels L10 (18 hr)
(Facade Corrected) dB(A)
(+2.5 Facade Correction)
(-1.7 TMR Correction)

- 58 - 62 [Cat 1]
- 63 - 67 [Cat 2]
- 68 - 72 [Cat 3]
- = 73 [Cat 4]

Signs and symbols

- Road
- TMR Limit (63 dBA L10 (18 Hour))

Trinity Consultants Australia

ask | VISION ENVIRONMENT | Air Noise Environment

C:\Users\bassam.al-haddad\Downloads\0209 - Halycon Retirement Village P15\Aura Subdivision, Precinct 15, SC - Noise - 24-05-22 BA Edit\+P15W_2024_07_21_C.1.sgs

Scale 1:3673

0 20 40 80 120 160 m

N

Stage 51
Stage 58
Stage 59
Stage 56
Stage 70
Stage 52
Stage 62
Stage 64
Stage 68
Stage 75
Stage 77
Stage 55
Stage 65
Stage 67
Stage 73
Stage 69
Stage 74

Bruce Highway
At expected completion (2037)
First Floor (FF) - Highway Bund Only
Calculation Height = 4.6 m

Figure

C.2

Project Number: 227401.0008
Date: 22/07/2024
Drawn By: BAH
Prepared For: Stocklands Development

Levels L10 (18 hr)
(Facade Corrected) dB(A)
(+2.5 Facade Correction)
(-1.7 TMR Correction)

- 58 - 62 [Cat 1]
- 63 - 67 [Cat 2]
- 68 - 72 [Cat 3]
- = 73 [Cat 4]

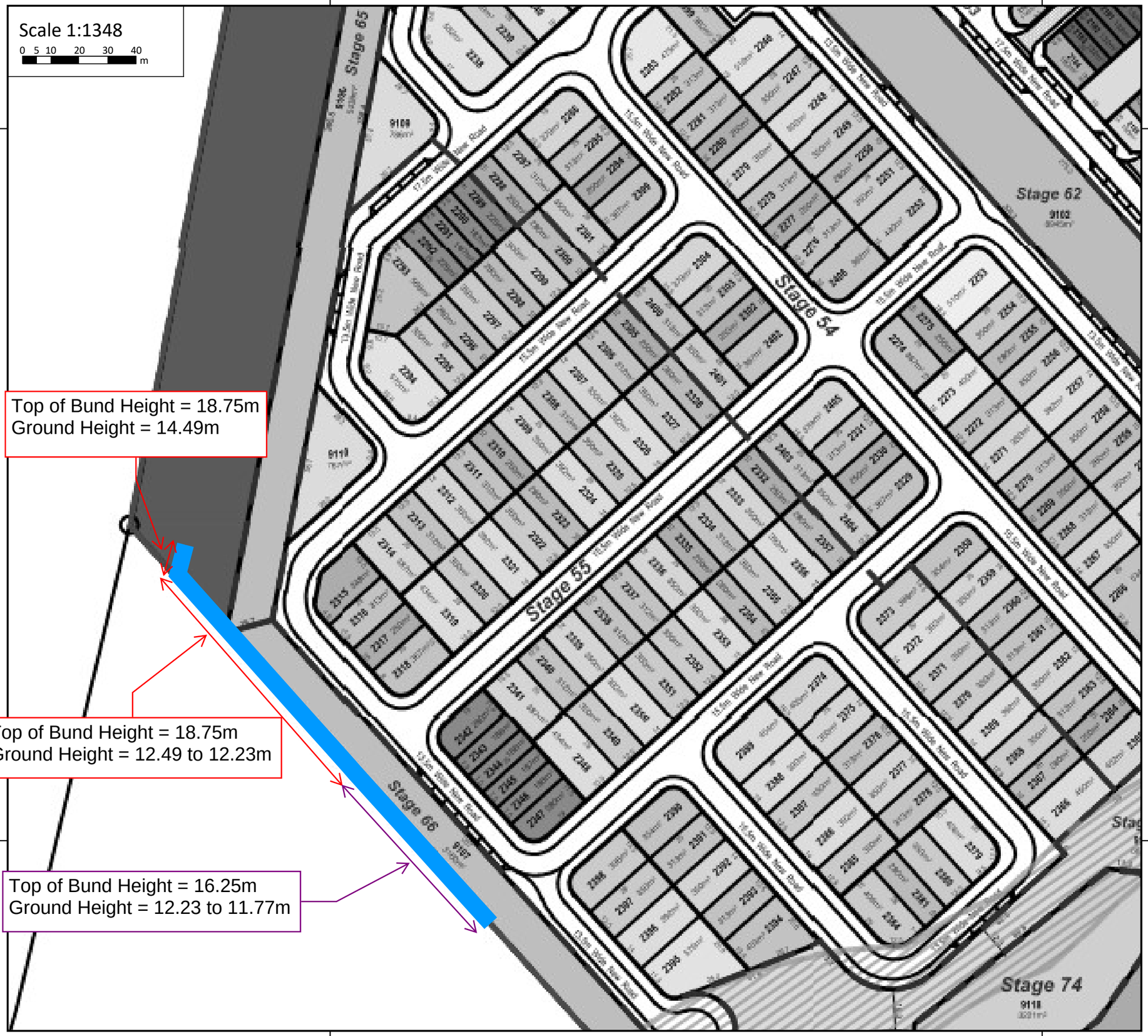
Signs and symbols

- Road
- TMR Limit (63 dBA L10 (18 Hour))

Trinity Consultants Australia

ask | VISION ENVIRONMENT | Air Noise Environment

C:\Users\bassam.al-haddad\Downloads\0209 - Halycon Retirement Village P15\Aura Subdivision, Precinct 15, SC - Noise - 24-05-22 BA Edit\+P15W_2024_07_21_C.2.sgs



Southern Boundary Barrier

Note: Barrier heights are relative to design heights in Egis Drawing 3058-DA021 and DA022, refer to Appendix G

Figure

C.3

Project Number: 227401.0008
Date: 22/07/2024
Drawn By: BAH
Prepared For: Stocklands Development

Signs and symbols

Southern Boundary Barrier

Trinity Consultants Australia

ask | VISION ENVIRONMENT | Air Noise Environment

C:\Users\bassam.al-haddad\Downloads\0209 - Halycon Retirement Village P15\Aura Subdivision, Precinct 15, SC - Noise - 24-05-22 BA Edit\+P15W_2024_07_01_C.3.sgs

Scale 1:3673

0 20 40 80 120 160 m

Bruce Highway Only
At expected completion (2037)
Ground Floor (GF) - With Highway Bund and Southern Boundary Barrier
Calculation Height = 1.8 m

Figure

C.4

Project Number: 227401.0008
Date: 22/07/2024
Drawn By: BAH
Prepared For: Stocklands Development

Levels L10 (18 hr)
(Facade Corrected) dB(A)
(+2.5 Facade Correction)
(-1.7 TMR Correction)

- 58 - 62 [Cat 1]
- 63 - 67 [Cat 2]
- 68 - 72 [Cat 3]
- = 73 [Cat 4]

Signs and symbols

- Road
- TMR Limit (63 dBA L10 (18 Hour))
- Southern Boundary Barrier

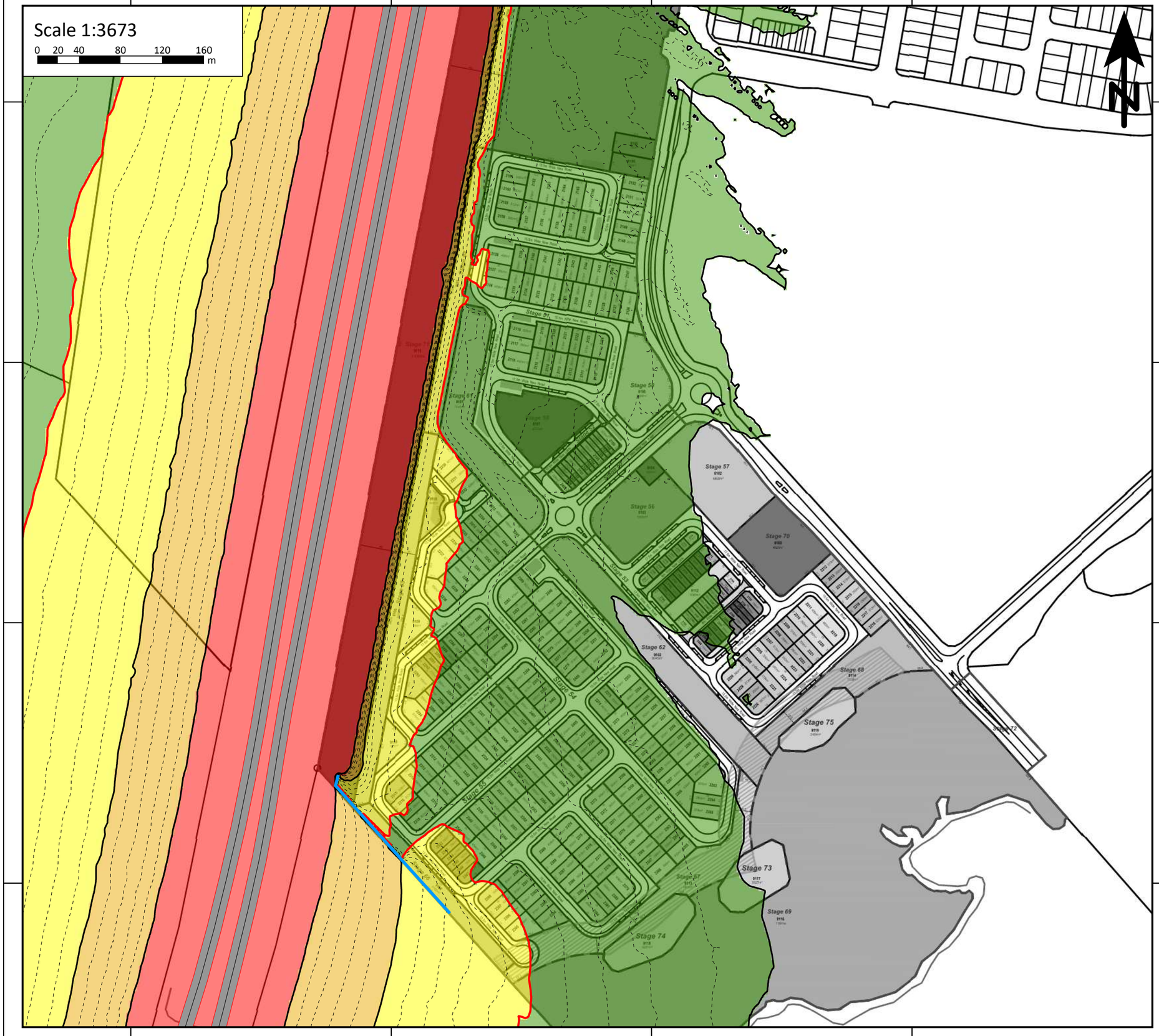
Trinity Consultants Australia

ask | VISION ENVIRONMENT | Air Noise Environment

C:\Users\bassam.al-haddad\Downloads\0209 - Halycon Retirement Village P15\Aura Subdivision, Precinct 15, SC - Noise - 24-05-22 BA Edit\+P15W_2024_07_21_C.4.sgs

Scale 1:3673

0 20 40 80 120 160 m



Bruce Highway Only
At expected completion (2037)
Ground Floor (FF) - With Highway Bund and Southern Boundary Barrier
Calculation Height = 4.6 m

Figure

C.5

Project Number: 227401.0008
Date: 22/07/2024
Drawn By: BAH
Prepared For: Stocklands Development

Levels L10 (18 hr)
(Facade Corrected) dB(A)
(+2.5 Facade Correction)
(-1.7 TMR Correction)

- 58 - 62 [Cat 1]
- 63 - 67 [Cat 2]
- 68 - 72 [Cat 3]
- = 73 [Cat 4]

Signs and symbols

- Road
- TMR Limit (63 dBA L10 (18 Hour))
- Southern Boundary Barrier

Trinity Consultants Australia

ask | VISION ENVIRONMENT | Air Noise Environment

C:\Users\bassam.al-haddad\Downloads\0209 - Halycon Retirement Village P15\Aura Subdivision, Precinct 15, SC - Noise - 24-05-22 BA Edit\+P15W_2024_07_21_C.5.sgs

Scale 1:3673

0 20 40 80 120 160 m

Bruce Highway Only
At expected completion (2037)
Ground Floor (GF) - With Highway Bund Only (No Barrier)
Calculation Height = 1.5 m

Figure

C.6

Project Number: 227401.0008
Date: 22/07/2024
Drawn By: BAH
Prepared For: Stocklands Development

Levels L10 (18 hr)
dB(A)
(-0.7 TMR Correction)

- 55 - 59
- 60 - 64
- 65 - 69
- = 70

Signs and symbols

- Road
- TMR Outdoor Limit (60 dBA L10 (18 Hour))

Trinity Consultants Australia

ask | VISION ENVIRONMENT | Air Noise Environment

C:\Users\bassam.al-haddad\Downloads\0209 - Halycon Retirement Village P15\Aura Subdivision, Precinct 15, SC - Noise - 24-05-22 BA Edit\+P15W_2024_07_01_C.6.sgs

Bruce Highway Only
At expected completion (2037)
Ground Floor (GF) - With Highway Bund and Southern Boundary Barrier
Calculation Height = 1.5 m

Figure

C.7

Project Number: 227401.0008
Date: 22/07/2024
Drawn By: BAH
Prepared For: Stocklands Development

Levels L10 (18 hr)
dB(A)
(-0.7 TMR Correction)

- 55 - 59
- 60 - 64
- 65 - 69
- = 70

Signs and symbols

- Road
- TMR Outdoor Limit (60 dBA L10 (18 Hour))
- Southern Boundary Barrier

Trinity Consultants Australia

C:\Users\bassam.al-haddad\Downloads\0209 - Halycon Retirement Village P15\Aura Subdivision, Precinct 15, SC - Noise - 24-05-22 BA Edit\+P15W_2024_07_01_C.7.sgs

APPENDIX D NOISE CONTOURS – ALL ROADS

Scale 1:3723

0 20 40 80 120 160 m

N

All Roads
At expected completion (2037)
Ground Floor (GF) - Highway Bund Only
Calculation Height = 1.8 m

Figure

D.1

Project Number: 227401.0008
Date: 22/07/2024
Drawn By: BAH
Prepared For: Stocklands Development

Levels L10 (18 hr)
(Facade Corrected) dB(A)
(+2.5 Facade Correction)
(-1.7 TMR Correction)

- 58 - 62 [Cat 1]
- 63 - 67 [Cat 2]
- 68 - 72 [Cat 3]
- = 73 [Cat 4]

Signs and symbols

- Road
- TMR Limit (63 dBA L10 (18 Hour))

Trinity Consultants Australia

ask | VISION ENVIRONMENT | Air Noise Environment

C:\Users\bassam.al-haddad\Downloads\0209 - Halycon Retirement Village P15\Aura Subdivision, Precinct 15, SC - Noise - 24-05-22 BA Edit\+P15W_2024_07_21_D.1.sgs

Scale 1:3723

0 20 40 80 120 160 m

N

All Roads
At expected completion (2037)
First Floor (FF) - Highway Bund Only
Calculation Height = 4.6 m

Figure

D.2

Project Number: 227401.0008
Date: 22/07/2024
Drawn By: BAH
Prepared For: Stocklands Development

Levels L10 (18 hr)
(Facade Corrected) dB(A)
(+2.5 Facade Correction)
(-1.7 TMR Correction)

- 58 - 62 [Cat 1]
- 63 - 67 [Cat 2]
- 68 - 72 [Cat 3]
- = 73 [Cat 4]

Signs and symbols

- Road
- TMR Limit (63 dBA L10 (18 Hour))

Trinity Consultants Australia

ask | VISION ENVIRONMENT | Air Noise Environment

C:\Users\bassam.al-haddad\Downloads\0209 - Halycon Retirement Village P15\Aura Subdivision, Precinct 15, SC - Noise - 24-05-22 BA Edit\+P15W_2024_07_21_D.2.sgs

Scale 1:3499

0 15 30 60 90 120 m

Barrier Locations - P15 West Eastern Side

Figure

D.3

Project Number: 227401.0008
Date: 22/07/2024
Drawn By: BAH
Prepared For: Stocklands Development

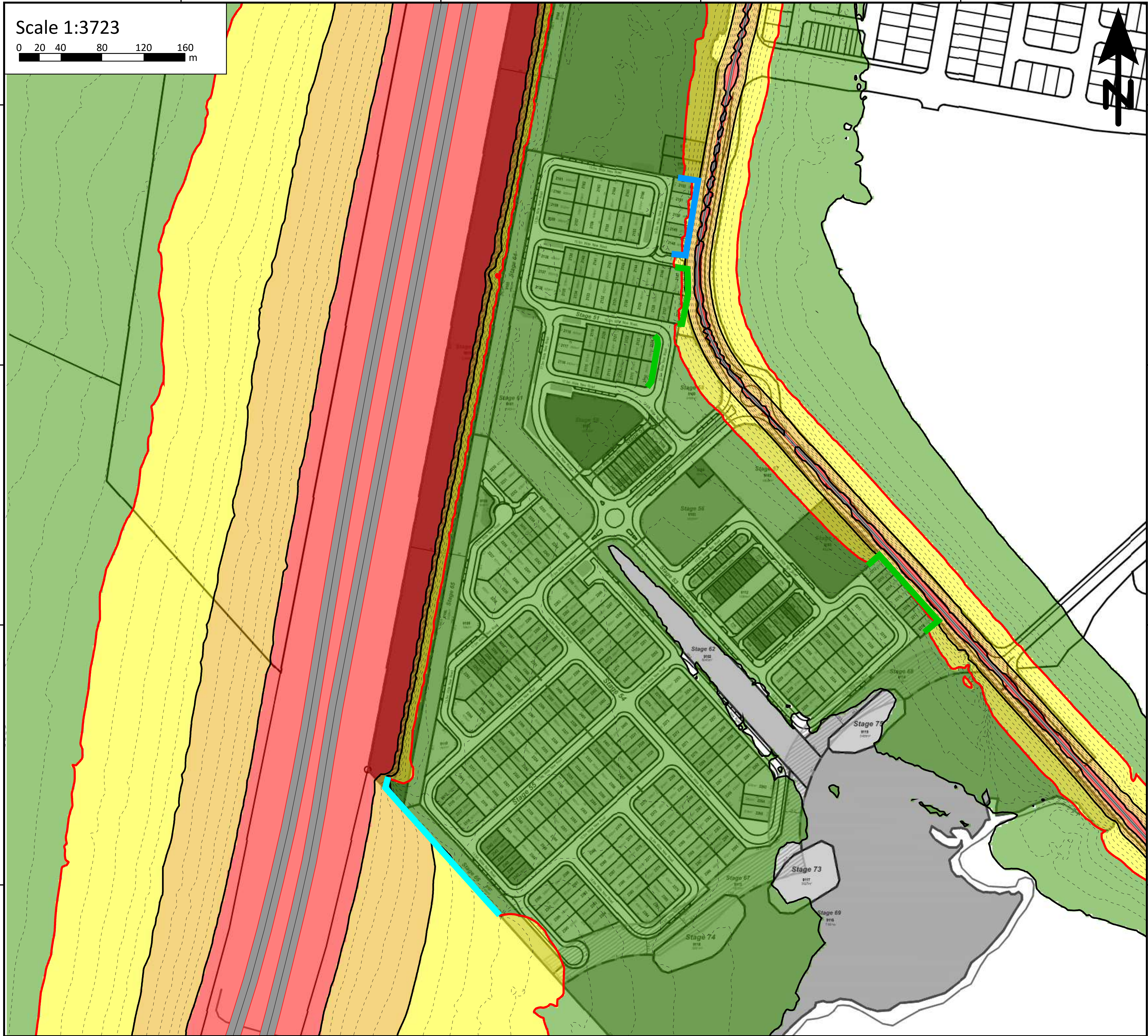
Signs and symbols

- Barrier (2.5m above pad)
- Barrier (2m above pad)
- Road

Trinity Consultants Australia

ask | VISION ENVIRONMENT | Air Noise Environment

C:\Users\bassam.al-haddad\Downloads\0209 - Halycon Retirement Village P15\Aura Subdivision, Precinct 15, SC - Noise - 24-05-22 BA Edit\+P15W_2024_07_21_D.3.sgs



All Roads
At expected completion (2037)
Ground Floor (GF) - With Highway Bund, Southern Boundary Barrier & Eastern Barriers
Calculation Height = 1.8 m

Figure

D.4

Project Number: 227401.0209
Date: 22/07/2024
Drawn By: BAH
Prepared For: Stocklands Development

Levels L10 (18 hr)
(Facade Corrected) dB(A)
(+2.5 Facade Correction)
(-1.7 TMR Correction)

- 58 - 62 [Cat 1]
- 63 - 67 [Cat 2]
- 68 - 72 [Cat 3]
- = 73 [Cat 4]

Signs and symbols

- Road
- TMR Limit (63 dBA L10 (18 Hour))
- Barrier (2m above pad)
- Barrier (2.5m above pad)
- Southern Boundary Barrier

Trinity Consultants Australia

ask VISION ENVIRONMENT Air Noise Environment

Scale 1:3723

0 20 40 80 120 160 m

N

All Roads
At expected completion (2037)
First Floor (FF) - With Highway Bund, Southern Boundary Barrier and Eastern Barriers
Calculation Height = 4.6 m

Figure

D.5

Project Number: 227401.0008
Date: 22/07/2024
Drawn By: BAH
Prepared For: Stocklands Development

Levels L10 (18 hr)
(Facade Corrected) dB(A)
(+2.5 Facade Correction)
(-1.7 TMR Correction)

- 58 - 62 [Cat 1]
- 63 - 67 [Cat 2]
- 68 - 72 [Cat 3]
- = 73 [Cat 4]

Signs and symbols

- Road
- TMR Limit (63 dBA L10 (18 Hour))
- Barrier (2m above pad)
- Barrier (2m above pad)
- Southern Boundary Barrier

Trinity Consultants Australia

ask | VISION ENVIRONMENT | Air Noise Environment

C:\Users\bassam.al-haddad\Downloads\0209 - Halycon Retirement Village P15\Aura Subdivision, Precinct 15, SC - Noise - 24-05-22 BA Edit\+P15W_2024_07_21_D.5.sgs

APPENDIX E NOISE VERIFICATION MONITORING

The following section presents the outcomes of the noise monitoring and verification of the noise model based on noise monitoring completed in June 2024.

Monitoring Locations

The location of the noise monitoring is shown as Location B on **Figure E1**. Location B is situated in the southern end of the P15 West development site.

Figure E1 Noise Monitoring Location B

Noise logging was undertaken at Location B from Tuesday 18th June to Sunday 23rd June 2024 using a field and laboratory calibrated Larson Davis 831C Type 1 environmental noise logger. Noise logging was undertaken in the free field.

Simultaneous meteorological monitoring was undertaken using a Davis Vantage Vue to confirm that conditions were suitable for noise monitoring. The weather station was located in the same location as the noise logger. The weather data shows that wind speeds were below 3 m/s and there was no rainfall for the duration of the monitoring. On this basis, all data is considered valid for the purpose of the assessment.

Monitoring Results

During setup and collection, it was confirmed that Bruce Highway traffic was the dominant noise source at the logging location. Construction noise was located in the north and north-east distance, and was not audible from the logger location. The microphone had a direct line of sight with Bruce Highway traffic, which is the ideal situation for verification modelling purposes.

The measured noise levels are shown in **Figure E3.**

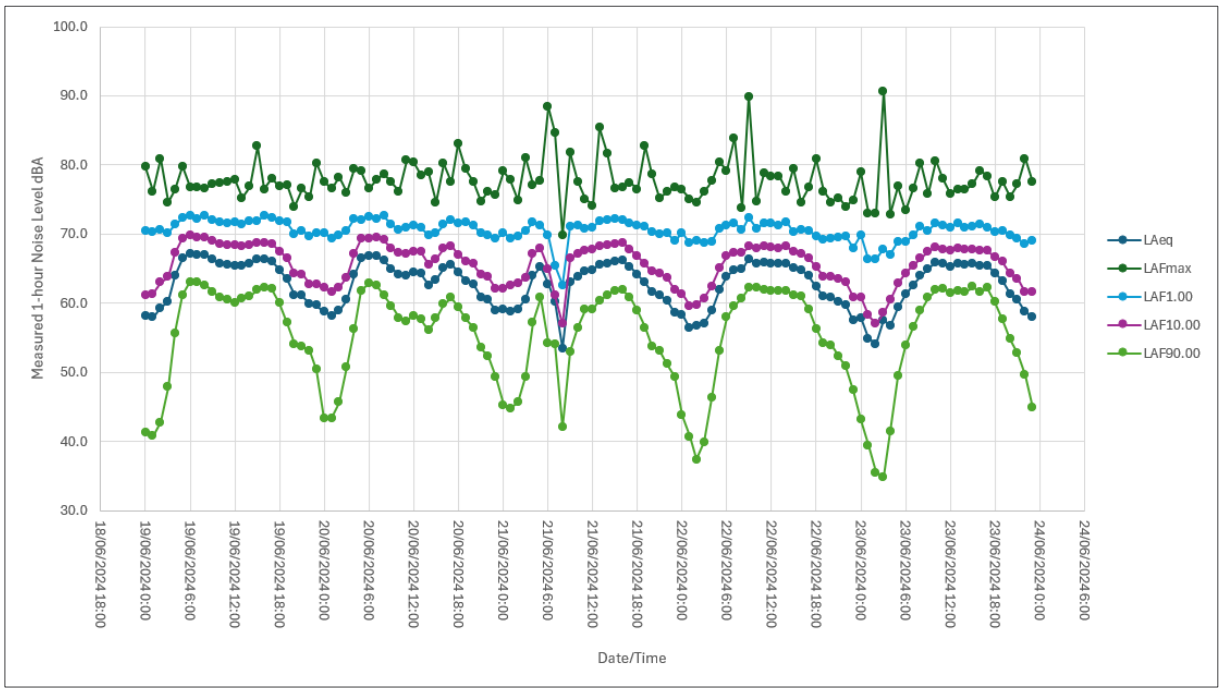


Figure E2 Graph of Noise Logging Results at Location A

The graph shoes an unusual dip in noise levels at 8:00 am on Friday 21st June. The cause of this dip is unknown and has the potential to skew noise parameter averages. For the purpose of calibration, noise data for the full weekdays prior to this (i.e. Wed/Thu) has been considered. It is noted that the TMR CoP Vol 1 requires a minimum of 48 hours of monitoring only. Saturday and Sunday has not been considered given these coincide with school holidays and are weekend days.

From the noise logging the statistical results have been summarised in **Table E1**.

Table E1 Daily Statistical Noise Levels at Location A

Day	Noise Levels dBA							
	L_{eq} (24 hour)	L_{10} (18 hour)	L_{10} (12 hour)	Maximum L_{eq} (1 hour)		L_{90} (8 hour)	L_{90} (18 hour)	L_{10} (1 hour)
				Day	Night			
Wed 19/6/24	64.7	67.5	68.8	65.6	61.9	50.6	59.4	69.8
Thu 20/6/24	63.9	66.8	67.8	64.6	61.5	50.6	57.8	69.5
Fri 21/6/24	63.3	65.6	66.2	64.0	58.9	45.2	56.0	68.8
Sat 22/6/24	63.3	66.2	67.6	64.6	57.6	42.8	58.1	68.3
Sun 23/6/24	63.2	66.1	67.2	64.5	61.6	48.3	58.1	68.1
AVG Wed/Thu	**64.3**	**67.1**	**68.3**	**65.1**	**61.7**	**50.6**	**58.6**	**69.7**

Based on the differences between the average L_{10}(18 hour), the L_{10}(1 hour), and the L_{10}(12 hour) levels, the following adjustments have been used to estimate L_{10}(12 hour) and L_{10}(1 hour) levels for this assessment:

- L_{10}(12 hour) = L_{10}(18 hour) + 1.2 dB; and
- L_{10}(1 hour) = L_{10}(18 hour) + 2.6 dB.

Noise Modelling Verification

The results of the noise survey carried out at Location B have been used to verify the road traffic noise model of the Bruce Highway. The following traffic data was adopted:

- The year 2022 traffic volume for the Bruce Highway (based on TMR count station 23931, immediately north of P15 West, but south of Caloundra Road overpass):
  - Northbound: 33891 AADT and 16.9 % HV
  - Southbound: 34115 AADT and 16.7 % HV
  - 5-year growth rate – 1.6% per annum
- Project 2024 traffic volumes based on 1.6% per annum growth rate:
  - Northbound: 32197 AADT and 16.9 % HV
  - Southbound: 32410 AADT and 16.7 % HV
  - 18-hour traffic 92% of AADT, based on the review of diurnal flows from the same count station.

The road traffic verification model uses the 2024 traffic flow and road alignment at the time of the monitoring to determine the L_{10}(18 hour).

Table E2**Table E2** compares the results obtained from the noise survey with the calculated results from the computer model.

Table E2 Existing and Calculated Road Traffic Noise Level

Receiver	Receptor Height (m)	Measured Noise Level (Free-Field) L_{10}(18 hour) dBA	Calculated Noise Level (Free-Field Corrected, -0.7 dB applied) L_{10}(18 hour) dBA	Difference (Predicted - Measured) dBA
Logger Location B	1.5	67.1	70.9	+3.8

Although the road traffic model is not within the desired ± 2.0 dBA accuracy range required for verification, the results are comparable with the +/- 3.6 dBA 'accuracy of calibrated calculation or prediction' for free-field sites contained within the Road Traffic Noise Management: Code of Practice (Table 4.3.2.1). Since the model is over-predicting the noise levels are used in the modelling with the expectation the results will provide conservative predictions.

It is noted that the accuracy of the model is similar to the +3.2 dBA variation identified using the 2018 monitoring data.

APPENDIX F ACOUSTIC CONSTRUCTION REQUIREMENTS

Table F1 Acoustic Construction Requirements

Lot No.	Pad Level (m)	$L_{A10,18hr}$ Façade-Correcte dBA		Construction Requirements (MP4.4 Category or AS 3671)	
		Ground Floor	First Floor	Ground Floor	First Floor
2100	14.64	60	61	-	-
2101	14.66	60	61	-	-
2102	14.70	60	61	-	-
2103	14.73	60	61	-	-
2104	14.75	60	61	-	-
2105	14.78	60	61	-	-
2106	14.82	60	61	-	-
2107	14.85	60	61	-	-
2108	14.87	60	62	-	-
2109	14.91	61	62	-	-
2110	15.64	61	62	-	-
2111	15.68	60	62	1	1
2112	15.73	61	62	1	1
2113	15.68	61	62	1	1
2114	15.63	61	62	1	1
2115	15.58	61	62	1	1
2116	15.39	61	63	1	2
2117	15.45	61	63	1	2
2118	15.52	61	63	1	2
2119	15.71	61	63	1	2
2120	15.76	61	62	1	1
2121	15.81	61	62	1	1
2122	15.86	61	62	1	1
2123	15.91	61	62	1	1
2124	15.98	61	63	-	-
2126	16.32	61	66	-	AS3671
2127	16.27	61	64	-	AS3671
2128	16.23	61	63	-	-
2129	16.17	61	62	1	1
2130	16.11	61	63	1	2
2131	16.05	61	63	1	2
2132	16.01	61	62	1	1
2133	15.94	61	63	1	2
2134	15.88	61	63	1	2
2135	15.83	61	63	1	2
2136	15.65	62	64	1	2
2137	15.72	62	64	1	2
2138	15.81	62	64	1	2
2139	16.10	61	63	1	2

Lot No.	Pad Level (m)	$L_{A10,18hr}$ Façade-Correcte dBA		Construction Requirements (MP4.4 Category or AS 3671)	
		Ground Floor	First Floor	Ground Floor	First Floor
2140	16.16	61	63	1	2
2141	16.21	61	63	1	2
2142	16.22	61	63	1	2
2143	16.22	61	63	1	2
2144	16.22	61	62	1	1
2145	16.17	61	62	1	1
2146	16.09	61	64	-	AS3671
2147	16.01	62	67	-	AS3671
2148	16.06	61	66	-	AS3671
2149	16.02	61	66	-	AS3671
2150	15.98	61	66	-	AS3671
2151	15.94	61	66	-	AS3671
2152	15.91	60	66	-	AS3671
2153	16.28	61	62	1	1
2154	16.35	61	62	1	1
2155	16.40	61	63	1	2
2156	16.33	61	63	1	2
2157	16.28	61	63	1	2
2158	16.05	62	64	1	2
2159	16.11	61	63	1	2
2160	16.17	61	63	1	2
2161	16.23	61	63	1	2
2162	16.20	61	63	1	2
2163	16.12	61	63	1	2
2164	16.04	61	62	1	1
2165	15.95	61	62	1	1
2166	15.84	61	62	1	1
2167	12.43	59	60	-	-
2168	12.47	58	60	-	-
2169	12.52	59	60	-	-
2170	12.56	59	60	-	-
2171	12.61	59	60	-	-
2172	12.65	59	60	-	-
2173	12.70	59	60	-	-
2174	12.70	59	60	-	-
2175	12.60	59	60	-	-
2176	12.68	59	60	-	-
2177	12.67	59	60	-	-
2178	12.64	59	60	-	-
2179	12.61	59	60	-	-
2180	12.58	58	60	-	-
2181	12.56	59	60	-	-
2182	12.53	58	60	-	-
2183	12.50	58	59	-	-

Lot No.	Pad Level (m)	$L_{A10,18hr}$ Façade-Correcte dBA		Construction Requirements (MP4.4 Category or AS 3671)	
		Ground Floor	First Floor	Ground Floor	First Floor
2184	12.47	58	59	-	-
2185	12.14	58	59	-	-
2186	12.18	58	59	-	-
2187	12.21	58	59	-	-
2188	12.24	58	59	-	-
2189	12.28	58	59	-	-
2190	12.31	58	59	-	-
2191	12.35	58	60	-	-
2192	12.38	58	59	-	-
2193	12.41	58	60	-	-
2194	12.39	58	60	-	-
2195	12.28	58	60	-	-
2196	12.36	58	60	-	-
2197	12.33	58	59	-	-
2198	12.30	58	59	-	-
2199	12.28	58	59	-	-
2200	12.24	58	59	-	-
2201	12.20	58	59	-	-
2202	12.16	58	59	-	-
2203	12.12	58	59	-	-
2204	12.08	58	59	-	-
2205	13.88	59	60	-	-
2206	13.95	59	60	-	-
2207	14.02	59	60	-	-
2208	14.06	59	60	-	-
2209	14.14	59	60	-	-
2210	14.10	59	60	-	-
2211	14.01	60	61	-	-
2212	14.08	61	68	-	AS3671
2213	14.02	61	67	-	AS3671
2214	13.96	62	68	-	AS3671
2215	13.90	62	68	-	AS3671
2216	13.85	62	68	-	AS3671
2217	13.80	63	69	-	AS3671
2218	13.74	63	69	-	AS3671
2219	13.83	60	61	-	-
2220	13.75	59	60	-	-
2221	13.70	59	60	-	-
2222	13.66	59	60	-	-
2223	13.62	59	60	-	-
2224	13.57	59	60	-	-
2225	13.52	59	59	-	-
2226	13.29	59	59	-	-
2227	13.42	59	59	-	-

Lot No.	Pad Level (m)	$L_{A10,18hr}$ Façade-Correcte dBA		Construction Requirements (MP4.4 Category or AS 3671)	
		Ground Floor	First Floor	Ground Floor	First Floor
2228	13.51	59	60	-	-
2229	13.60	59	59	-	-
2230	15.71	62	64	1	2
2231	15.72	62	64	1	2
2232	15.72	62	64	1	2
2233	15.84	61	63	1	2
2234	15.91	62	63	1	2
2235	16.03	62	64	1	2
2236	16.09	62	64	1	2
2237	16.05	62	64	1	2
2238	15.92	62	64	1	2
2239	15.65	62	63	1	2
2240	15.49	62	63	1	2
2241	15.33	61	63	1	2
2242	15.18	61	62	1	1
2243	15.06	61	62	1	1
2244	14.94	61	62	1	1
2245	14.79	61	62	1	1
2246	13.82	60	60	-	-
2247	13.75	59	60	-	-
2248	13.69	59	60	-	-
2249	13.63	59	60	-	-
2250	13.58	59	60	-	-
2251	13.53	59	60	-	-
2252	13.50	59	60	-	-
2253	13.34	59	60	-	-
2254	13.36	59	60	-	-
2255	13.30	59	60	-	-
2256	13.23	59	60	-	-
2257	15.97	62	63	1	2
2257	15.97	62	63	1	2
2258	13.11	59	60	-	-
2259	13.06	59	60	-	-
2260	13.08	59	60	-	-
2261	13.11	59	59	-	-
2262	13.05	59	60	-	-
2263	13.00	59	59	-	-
2264	13.03	59	60	-	-
2265	13.12	59	60	-	-
2266	13.44	59	60	-	-
2267	13.53	59	60	-	-
2268	13.61	59	60	-	-
2269	13.68	59	60	-	-
2270	13.74	59	60	-	-

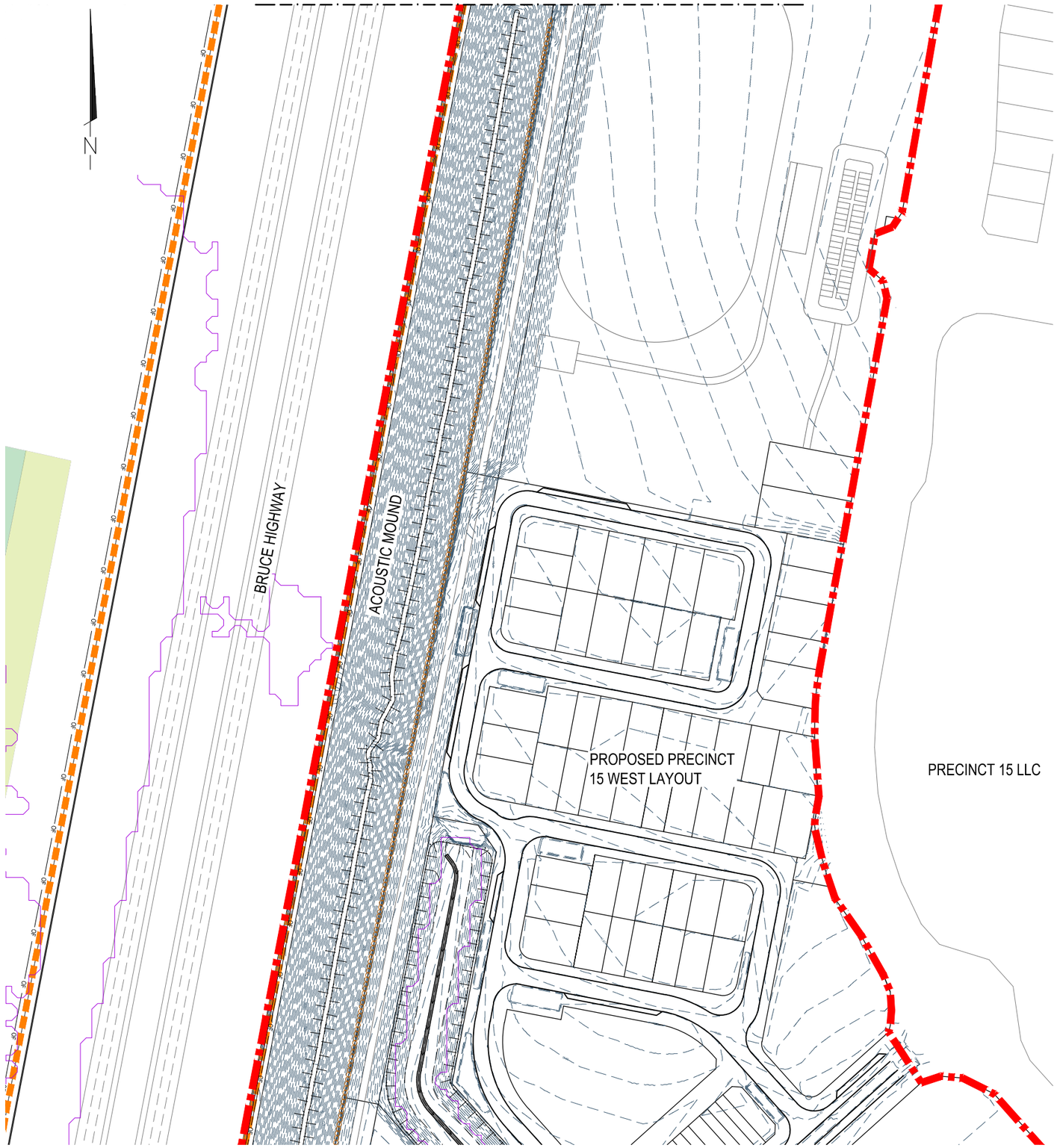
Lot No.	Pad Level (m)	$L_{A10,18hr}$ Façade-Correcte dBA		Construction Requirements (MP4.4 Category or AS 3671)	
		Ground Floor	First Floor	Ground Floor	First Floor
2271	13.81	59	60	-	-
2272	13.89	59	60	-	-
2273	13.97	59	60	-	-
2274	14.04	59	60	-	-
2275	13.99	59	60	-	-
2275	13.99	59	60	-	-
2276	14.35	59	60	-	-
2277	14.42	59	61	-	-
2278	14.48	60	61	-	-
2279	14.55	60	61	-	-
2280	14.62	60	61	-	-
2281	14.67	60	61	1	1
2282	14.74	60	61	1	1
2283	14.82	60	61	1	1
2284	14.83	61	62	1	1
2285	15.00	61	62	1	1
2286	15.14	61	62	1	1
2287	15.62	62	63	1	2
2288	15.77	62	63	1	2
2289	15.90	62	63	1	2
2290	16.03	62	64	1	2
2291	16.10	62	64	1	2
2292	16.13	62	64	1	2
2293	16.18	62	65	1	2
2294	15.67	62	64	1	2
2295	15.86	62	64	1	2
2296	15.78	62	64	1	2
2297	15.65	62	63	1	2
2298	15.51	61	63	1	2
2299	15.35	61	63	1	2
2300	15.23	61	62	1	1
2301	15.10	61	62	1	1
2302	14.41	60	61	-	-
2303	14.48	60	61	-	-
2304	14.58	60	61	1	1
2305	14.88	60	62	1	1
2306	14.99	60	62	1	1
2307	15.11	61	62	1	1
2308	15.24	61	62	1	1
2309	15.38	61	63	1	2
2310	15.39	61	63	1	2
2311	15.33	61	63	1	2
2312	15.25	61	63	1	2
2313	15.19	62	64	1	2

Lot No.	Pad Level (m)	$L_{A10,18hr}$ Façade-Correcte dBA		Construction Requirements (MP4.4 Category or AS 3671)	
		Ground Floor	First Floor	Ground Floor	First Floor
2314	15.10	62	64	1	2
2315	14.85	62	64	1	2
2316	14.85	61	64	1	2
2317	14.78	61	64	1	2
2318	14.53	61	63	1	2
2319	14.79	61	63	1	2
2320	14.84	61	63	1	2
2321	14.90	61	62	1	1
2322	14.94	61	62	1	1
2323	14.99	61	62	1	1
2324	14.96	61	62	1	1
2325	14.82	60	62	1	1
2326	14.70	60	62	1	1
2327	14.59	60	61	1	1
2328	14.47	60	61	-	-
2329	13.77	59	60	-	-
2330	13.98	59	60	-	-
2331	14.04	59	60	-	-
2332	14.44	60	61	-	-
2333	14.56	60	61	-	-
2334	14.66	60	61	-	-
2335	14.75	60	62	-	-
2336	14.87	61	62	-	-
2337	14.92	61	62	1	1
2338	14.86	61	63	1	2
2339	14.80	61	63	1	2
2340	14.74	61	63	1	2
2341	14.67	61	64	1	2
2342	14.52	61	65	1	2
2343	14.48	61	65	1	2
2344	14.44	61	65	1	2
2345	14.40	61	65	1	2
2346	14.38	61	65	1	2
2347	14.04	61	64	1	2
2348	14.50	61	63	1	2
2349	14.55	61	63	1	2
2350	14.60	61	63	-	-
2351	14.66	61	62	-	-
2352	14.69	60	62	-	-
2353	14.63	60	62	-	-
2354	14.49	60	61	-	-
2355	14.39	60	61	-	-
2356	14.29	60	61	-	-
2357	14.14	60	61	-	-

Lot No.	Pad Level (m)	$L_{A10,18hr}$ Façade-Correcte dBA		Construction Requirements (MP4.4 Category or AS 3671)	
		Ground Floor	First Floor	Ground Floor	First Floor
2358	13.76	59	60	-	-
2359	13.71	59	60	-	-
2360	13.65	59	60	-	-
2361	13.61	60	60	-	-
2362	13.55	59	60	-	-
2363	13.49	59	60	-	-
2364	13.46	59	60	-	-
2365	13.40	59	60	-	-
2366	13.75	60	61	-	-
2367	13.78	60	61	-	-
2368	13.82	60	61	-	-
2369	13.87	60	61	-	-
2370	13.90	60	61	-	-
2371	13.95	60	61	-	-
2372	13.98	60	61	-	-
2373	14.03	60	61	-	-
2374	14.35	60	62	-	-
2375	14.25	61	62	-	-
2376	14.17	61	62	-	-
2377	14.10	61	62	-	-
2378	14.01	61	61	-	-
2379	13.86	60	61	-	-
2380	13.91	60	61	-	-
2381	13.90	61	61	-	-
2384	13.85	61	62	-	-
2385	13.94	61	62	-	-
2386	14.02	61	62	-	-
2387	14.10	61	62	-	-
2388	14.17	61	62	-	-
2389	14.27	61	62	-	-
2390	14.25	62	63	-	-
2391	14.14	62	63	-	-
2392	14.04	62	63	-	-
2393	13.92	62	63	-	-
2394	13.85	62	63	-	-
2395	14.11	63	64	-	AS3671
2396	14.15	63	64	-	AS3671
2397	14.20	63	64	-	AS3671
2398	14.25	63	64	-	AS3671
2399	14.68	60	61	1	1
2399	14.68	60	61	1	1
2400	14.78	60	61	1	1
2401	14.39	60	61	-	-
2402	14.22	60	61	-	-

Lot No.	Pad Level (m)	$L_{A10,18hr}$ Façade-Correcte dBA		Construction Requirements (MP4.4 Category or AS 3671)	
		Ground Floor	First Floor	Ground Floor	First Floor
2403	14.35	60	61	-	-
2404	14.04	59	61	-	-
2405	14.11	59	60	-	-
2407	14.55	60	61	1	1
2408	14.59	60	61	-	-
2408	14.59	60	61	-	-
2409	14.62	60	61	-	-
8101	14.91	61	63	1	1
8102	14.58	67	68	AS3671	AS3671

APPENDIX G HIGHWAY BUFFER DRAWINGS



CONCEPT DESIGN:

1. ALL INFORMATION PRESENTED ON THIS DRAWING IS CONCEPTUAL ONLY AND TO BE CONFIRMED IN SUBSEQUENT DETAILED DESIGN. THROUGHOUT DETAILED DESIGN, BULK EARTHWORKS TO BE DEVELOPED TO BEST MATCH REQUIREMENTS OF THE OTHER PRECINCTS.
2. INDIVIDUAL LOT BENCHING TO BE CONFIRMED DURING DETAIL DESIGN. ALL LOTS TO FALL TO ADJACENT ROADWAY.

LEGEND

- RIPARIAN BUFFER ZONE
- FROG ZONE
- FROG BUFFER
- APPLICATION EXTENT P15 EAST
- PROPOSED PRECINCT BOUNDARY
- PROPOSED RETAINING WALL
- PROPOSED 100yr AR1 2100 FLOOD EXTENTS. EXTENTS BASED ON BMT FLOOD MODELLING AND MODIFIED FOR SITE FILLING

INITIAL ISSUE / AMENDMENTS	DES	DRN	CHK	APP	DATE	AMENDMENT DETAILS
	BE	BE	BG		21.09.23	
A	AT	NV	BG	BG	21.12.23	AMENDED TO SUIT RFI
B	BG	BG	BG	BG	29.04.24	AMENDED TO SUIT FURTHER ISSUES

STATUS: PRELIMINARY

APPROVED
BY: RPEQ NO:
SIGN: DATE:

SCALE: 0 10 20 30 40 50 60 70 80
SCALE 1:1000 (A1) SCALE 1:2000 (A3)

© 2023 Egis Consulting Pty Ltd
www.egis-group.com

CLIENT: STOCKLAND DEVELOPMENTS PTY LTD
Stockland AURA

PROJECT: STOCKLAND - AURA
PRECINCT 15 WEST
RECONFIGURATION OF A LOT

DRAWING TITLE: BULK EARTHWORKS DETAIL PLAN SHEET 1 OF 2

PROJECT No.	DRAWING No.	REVISION
21-000307	3058-DA021	B

DISCLAIMER: ALL DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY, DO NOT SCALE.

FOR CONTINUATION REFER SHEET 1

BRUCE HIGHWAY

ACOUSTIC MOUND

PROPOSED PRECINCT 15
WEST LAYOUT

BELLS CREEK SOUTH

LEGEND

- RIPARIAN BUFFER ZONE
- FROG ZONE
- FROG BUFFER
- APPLICATION EXTENT P15 EAST
- PROPOSED PRECINCT BOUNDARY
- PROPOSED RETAINING WALL
- PROPOSED 100yr AR1 2100 FLOOD EXTENTS. EXTENTS BASED ON BMT FLOOD MODELLING AND MODIFIED FOR SITE FILLING

N

CONCEPT DESIGN:

1. ALL INFORMATION PRESENTED ON THIS DRAWING IS CONCEPTUAL ONLY AND TO BE CONFIRMED IN SUBSEQUENT DETAILED DESIGN. THROUGHOUT DETAILED DESIGN, BULK EARTHWORKS TO BE DEVELOPED TO BEST MATCH REQUIREMENTS OF THE OTHER PRECINCTS.
2. INDIVIDUAL LOT BENCHING TO BE CONFIRMED DURING DETAIL DESIGN. ALL LOTS TO FALL TO ADJACENT ROADWAY.

INITIAL ISSUE	DES	DRN	CHK	APP	DATE	AMENDMENT DETAILS
	BE	BE	BG		21.09.23	
A	AT	NV	BG	BG	21.12.23	AMENDED TO SUIT RFI

AMENDMENTS

STATUS: PRELIMINARY

APPROVED
BY: RPEQ NO:
SIGN: DATE:

SCALE
0 10 20 30 40 50 60 70 80
SCALE 1:1000 (A1) SCALE 1:2000 (A3)

© 2023 Egis Consulting Pty Ltd
egis
www.egis-group.com

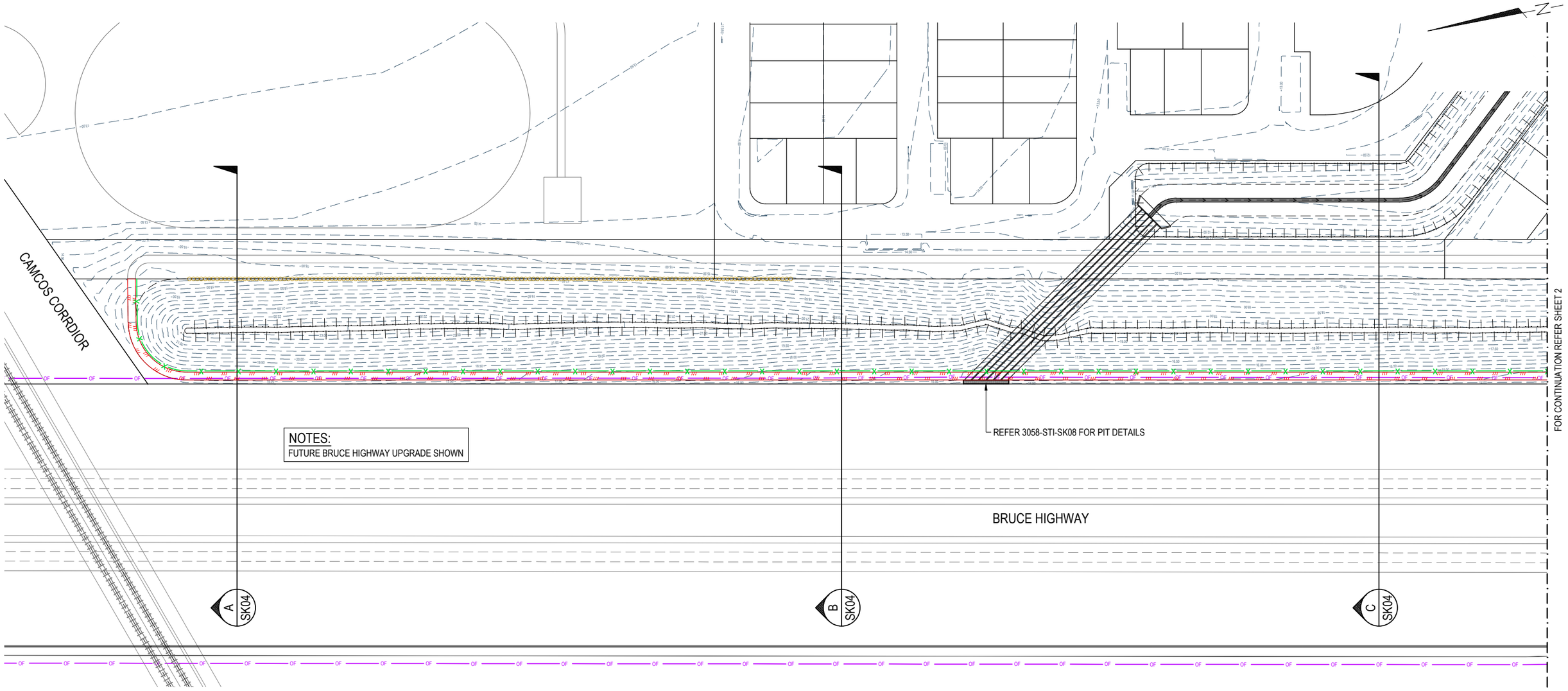
CLIENT: STOCKLAND DEVELOPMENTS PTY LTD
Stockland AURA

PROJECT: STOCKLAND - AURA
PRECINCT 15 WEST
RECONFIGURATION OF A LOT

DRAWING TITLE: BULK EARTHWORKS DETAIL PLAN SHEET 2 OF 2

PROJECT No.	DRAWING No.	REVISION
21-000307	3058-DA022	A

DISCLAIMER: ALL DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY, DO NOT SCALE.



NOTES:
FUTURE BRUCE HIGHWAY UPGRADE SHOWN

CONCEPT DESIGN:
ALL INFORMATION PRESENTED ON THIS DRAWING IS CONCEPTUAL ONLY AND TO BE CONFIRMED IN SUBSEQUENT DETAILED DESIGN

NOTES:
1. ULTIMATE BRUCE HIGHWAY UPGRADE SHOWN (PENDING DETAILED DESIGN).
2. ACOUSTIC MOUND AND FENCE LEVELS IN ACCORDANCE WITH TRINITY REPORTING.
3. LGIA INDICATES DISTRICT LINER PARK MAXIMUM CROSSFALL 1 IN 4 HOWEVER, DURING DETAILED DESIGN FURTHER RETAINING WALLS COULD BE INCORPORATED FOR LANDSCAPE AND AESTHETIC ENHANCEMENT.

LEGEND

- PROPOSED CONTOURS
- TOP OF BATTER
- BOTTOM OF BATTER
- SANDSTONE RETAINING WALL
- ACCESS TRACK
- OPTIC FIBRE
- FAUNA FENCE

INITIAL ISSUE	DES	DRN	CHK	APP	DATE	AMENDMENT DETAILS
	BG	BG	BG	BG	21.09.23	
A	AT	NV	BG	BG	21.12.23	AMENDED TO SUIT RFI
B	BG	NV	BG	BG	24.07.24	ACOUSTIC MOUND AMENDED

AMENDMENTS

STATUS: PRELIMINARY

APPROVED
BY: RPEQ NO:
SIGN: DATE:

SCALE
0 7.5 15 22.5 30 37.5 45 52.5 60
SCALE 1:750 (A1) SCALE 1:1500 (A3)

© 2023 Egis Consulting Pty Ltd
www.egis-group.com

CLIENT: STOCKLAND DEVELOPMENTS PTY LTD

PROJECT: PRECINCT 15 WEST STATE CONTROLLED INFRASTRUCTURE INTERFACE

DRAWING TITLE: ACOUSTIC ATTENUATION LAYOUT PLAN SHEET 1 OF 2

PROJECT No.	DRAWING No.	REVISION
21-000307	3058-STI-SK02	B

DISCLAIMER: ALL DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY, DO NOT SCALE.

FOR CONTINUATION REFER SHEET 1

N

BRUCE HIGHWAY

C SK04

D SK05

E SK05

F SK05

REFER 3058-STI-SK08 FOR PIT DETAILS

NOTES:
FUTURE BRUCE HIGHWAY UPGRADE SHOWN

NOTES:
1. ULTIMATE BRUCE HIGHWAY UPGRADE SHOWN (PENDING DETAILED DESIGN).
2. ACOUSTIC MOUND AND FENCE LEVELS IN ACCORDANCE WITH TRINITY REPORTING.
3. LGIA INDICATES DISTRICT LINER PARK MAXIMUM CROSSFALL 1 IN 4 HOWEVER, DURING DETAILED DESIGN FURTHER RETAINING WALLS COULD BE INCORPORATED FOR LANDSCAPE AND AESTHETIC ENHANCEMENT.

LEGEND
- PROPOSED CONTOURS
- TOP OF BATTER
- BOTTOM OF BATTER
- SANDSTONE RETAINING WALL
- ACCESS TRACK
- OPTIC FIBRE
- FAUNA FENCE
- ACCOUTIC FENCE

CONCEPT DESIGN:
ALL INFORMATION PRESENTED ON THIS DRAWING IS CONCEPTUAL ONLY AND TO BE CONFIRMED IN SUBSEQUENT DETAILED DESIGN

INITIAL ISSUE	DES	DRN	CHK	APP	DATE	AMENDMENT DETAILS
A	BG	BG	BG	BG	21.09.23	
B	AT	NV	BG	BG	21.12.23	AMENDED TO SUIT RFI
	BG	NV	BG	BG	24.07.24	ACOUSTIC MOUND AMENDED

AMENDMENTS

STATUS: PRELIMINARY

APPROVED
BY: RPEQ NO:
SIGN: DATE:

SCALE
0 7.5 15 22.5 30 37.5 45 52.5 60
SCALE 1:750 (A1) SCALE 1:1500 (A3)

© 2023 Egis Consulting Pty Ltd
egis
www.egis-group.com

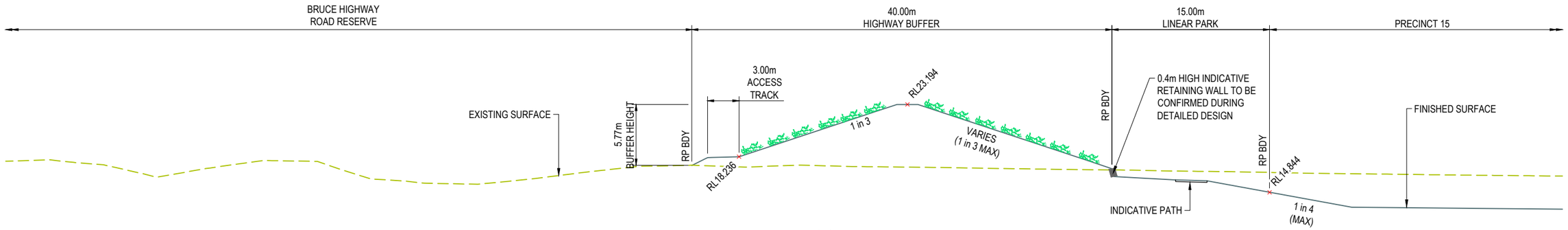
CLIENT: STOCKLAND DEVELOPMENTS PTY LTD
Stockland AURA

PROJECT: PRECINCT 15 WEST STATE CONTROLLED INFRASTRUCTURE INTERFACE

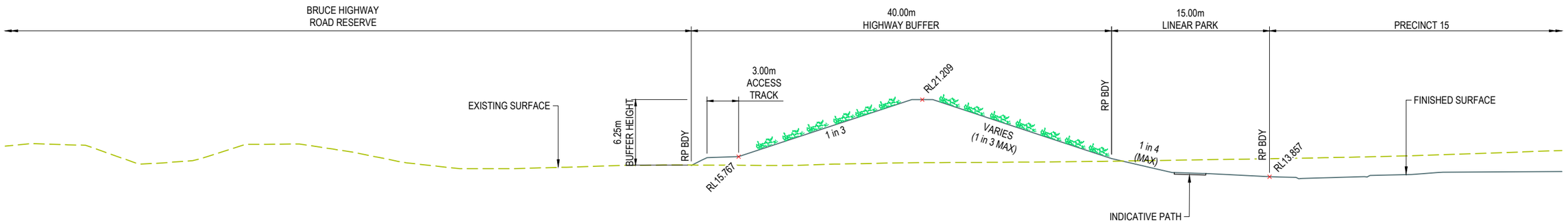
DRAWING TITLE: ACOUSTIC ATTENUATION LAYOUT PLAN SHEET 2 OF 2

PROJECT No.	DRAWING No.	REVISION
21-000307	3058-STI-SK03	B

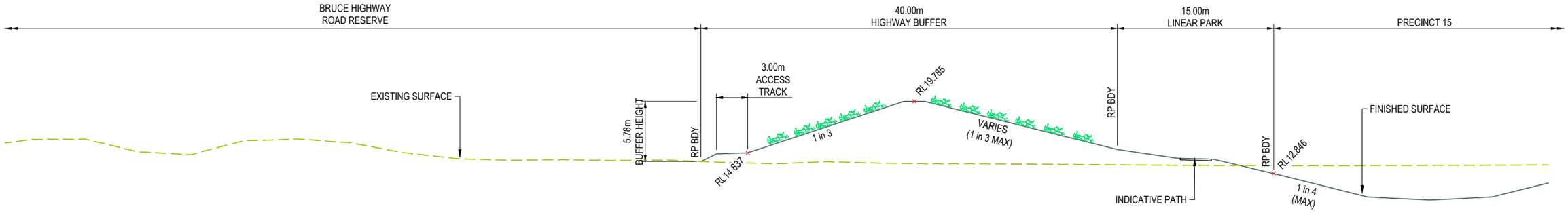
DISCLAIMER: ALL DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY, DO NOT SCALE.



SECTION A
SCALE (A1): 1:200
SCALE (A3): 1:400
SK02



SECTION B
SCALE (A1): 1:200
SCALE (A3): 1:400
SK02



SECTION C
SCALE (A1): 1:200
SCALE (A3): 1:400
SK02

NOTES:

1. ULTIMATE BRUCE HIGHWAY UPGRADE SHOWN (PENDING DETAILED DESIGN).
2. TOP OF BUND LEVEL DERIVED FROM INFORMATION PROVIDED BY TMR FOR FUTURE BRUCE HIGHWAY UPGRADE LEVELS AND ASK CONSULTING ACOUSTIC REPORTING DATED JULY 2020 MINIMUM ACOUSTIC MOUND HEIGHT.
3. LGIP INDICATES DISTRICT LINER PARK MAXIMUM CROSSFALL 1 IN 4 (DESIRED 1 IN 6) HOWEVER, DURING DETAILED DESIGN MINOR RETAINING WALLS COULD BE INCORPORATED FOR LANDSCAPE AND AESTHETIC ENHANCEMENT.

CONCEPT DESIGN:

ALL INFORMATION PRESENTED ON THIS DRAWING IS CONCEPTUAL ONLY AND TO BE CONFIRMED IN SUBSEQUENT DETAILED DESIGN

INITIAL ISSUE	DES	DRN	CHK	APP	DATE	AMENDMENT DETAILS
	BG	BG	BG	BG	21.09.23	
A	AT	NV	BG	BG	21.12.23	AMENDED TO SUIT RFI
B	BG	NV	BG	BG	24.07.24	ACOUSTIC MOUND AMENDED

STATUS: PRELIMINARY

APPROVED
BY: RPEQ NO:
SIGN: DATE:

SCALE
0 150 300 450 600 750 900 1050 1200
SCALE 1:1500 (A1) SCALE 1:3000 (A3)

© 2023 Egis Consulting Pty Ltd
www.egis-group.com

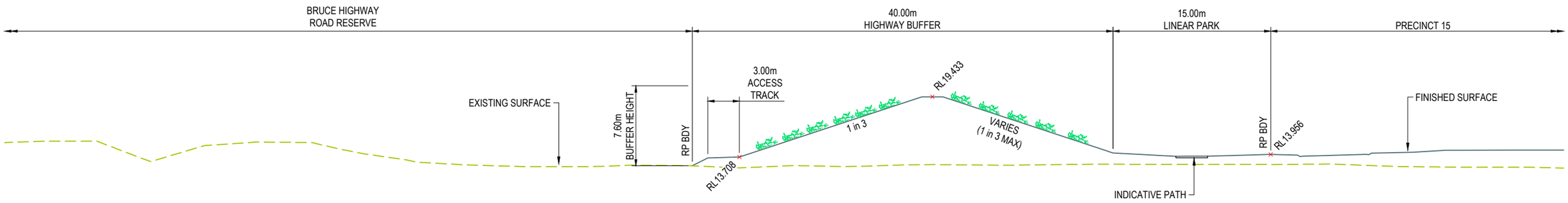
CLIENT: STOCKLAND DEVELOPMENTS PTY LTD
Stockland AURA

PROJECT: PRECINCT 15 WEST
STATE CONTROLLED
INFRASTRUCTURE INTERFACE

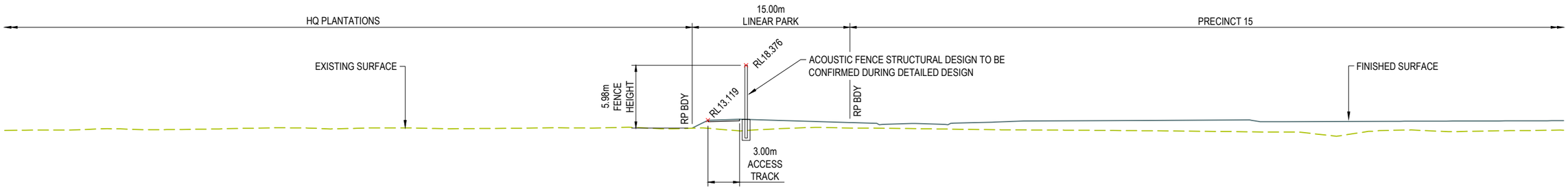
DRAWING TITLE: ACOUSTIC ATTENUATION
CROSS SECTIONS
SHEET 1 OF 2

PROJECT No.	DRAWING No.	REVISION
21-000307	3058-STI-SK04	B

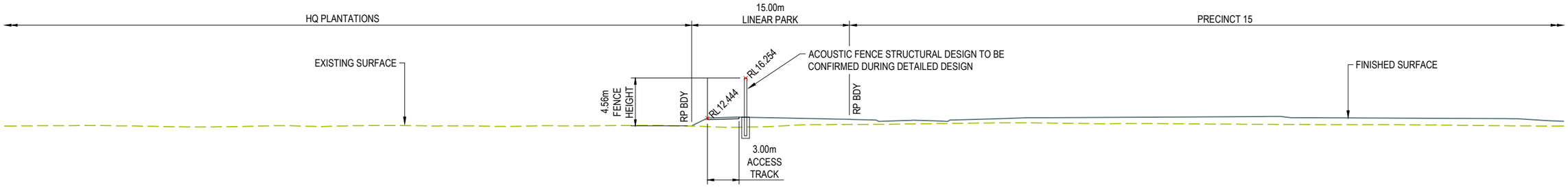
DISCLAIMER: ALL DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY, DO NOT SCALE.



SECTION D
SCALE (A1): 1:200
SCALE (A3): 1:400
SK02



SECTION E
SCALE (A1): 1:200
SCALE (A3): 1:400
SK02



SECTION F
SCALE (A1): 1:200
SCALE (A3): 1:400
SK02

NOTES:

1. ULTIMATE BRUCE HIGHWAY UPGRADE SHOWN (PENDING DETAILED DESIGN).
2. TOP OF BUND LEVEL DERIVED FROM INFORMATION PROVIDED BY TMR FOR FUTURE BRUCE HIGHWAY UPGRADE LEVELS AND ASK CONSULTING ACOUSTIC REPORTING DATED JULY 2020 MINIMUM ACOUSTIC MOUND HEIGHT.
3. LGIP INDICATES DISTRICT LINER PARK MAXIMUM CROSSFALL 1 IN 4 (DESIRED 1 IN 6) HOWEVER, DURING DETAILED DESIGN MINOR RETAINING WALLS COULD BE INCORPORATED FOR LANDSCAPE AND AESTHETIC ENHANCEMENT.

CONCEPT DESIGN:

ALL INFORMATION PRESENTED ON THIS DRAWING IS CONCEPTUAL ONLY AND TO BE CONFIRMED IN SUBSEQUENT DETAILED DESIGN

INITIAL ISSUE	DES	DRN	CHK	APP	DATE	AMENDMENT DETAILS
	BG	BG	BG	BG	21.09.23	
A	AT	NV	BG	BG	21.12.23	AMENDED TO SUIT RFI
B	BG	NV	BG	BG	24.07.24	ACOUSTIC MOUND AMENDED

AMENDMENTS

STATUS: PRELIMINARY

APPROVED
BY: RPEQ NO:
SIGN: DATE:

SCALE
0 150 300 450 600 750 900 1050 1200
SCALE 1:1500 (A1) SCALE 1:3000 (A3)

© 2023 Egis Consulting Pty Ltd
www.egis-group.com

CLIENT: STOCKLAND DEVELOPMENTS PTY LTD

PROJECT: PRECINCT 15 WEST STATE CONTROLLED INFRASTRUCTURE INTERFACE

DRAWING TITLE: ACOUSTIC ATTENUATION CROSS SECTIONS SHEET 2 OF 2

PROJECT No.	DRAWING No.	REVISION
21-000307	3058-STI-SK05	B

DISCLAIMER: ALL DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY, DO NOT SCALE.

Trinity Consultants Australia

BRISBANE

A: Level 3, 43 Peel Street
South Brisbane, QLD 4101
T: +61 7 3255 3355
E: brisbane@trinityconsultants.com

GLADSTONE (Vision Environment)

A: Unit 3, 165 Auckland Street
PO Box 1267
Gladstone, QLD, 4680
T: +61 7 4972 7530
E: office@visionenvironment.com.au

SYDNEY

A: Level 6, 69 Reservoir Street
Surry Hills, NSW 2010
T: +61 2 8217 0706
E: sydney@trinityconsultants.com

Acoustics • Air Quality • Marine Ecology • Noise • Stack Testing • Water Quality