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Noise and Vibration Impact Assessment
Transport for New South Wales
19-Aug-2019
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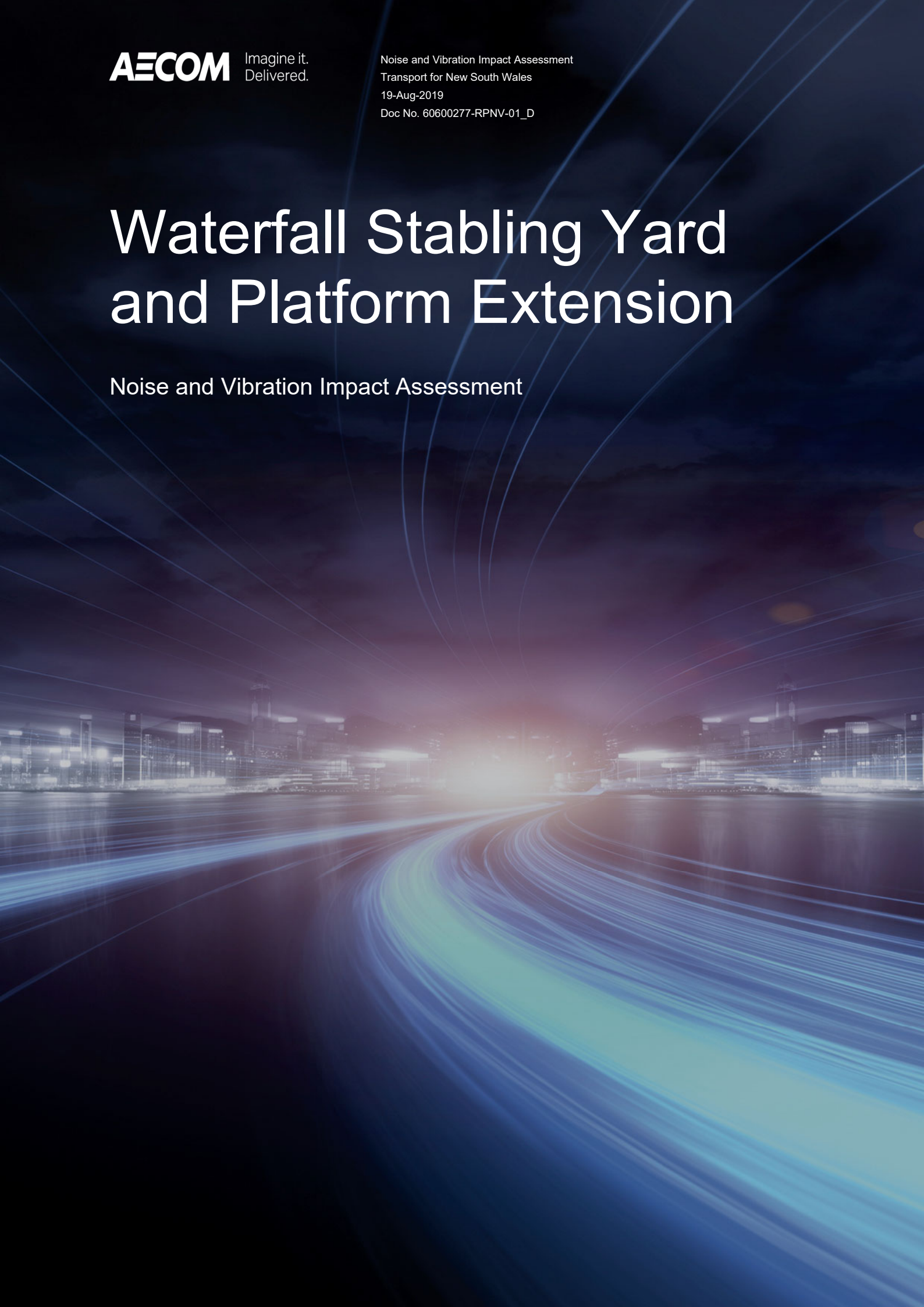
Waterfall Stabling Yard and Platform Extension

Noise and Vibration Impact Assessment



Waterfall Stabling Yard and Platform Extension

Noise and Vibration Impact Assessment

Client: Transport for New South Wales

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Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
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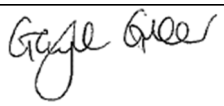
D	19-Aug-2019	Final	Gayle Greer Technical Director - Acoustics	

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Executive Summary

Transport for NSW (TfNSW) proposes to deliver service improvements on the T4 Illawarra Line, South Coast Line and T8 Airport Lines. The improvements would deliver greater capacity, reliability and connectivity for customers. To achieve this, TfNSW has developed the More Trains, More Services Program (the 'Program').

As part of the Program, TFNSW proposes to upgrade rail infrastructure in and around Waterfall Station (the Proposal). The upgrade is designed to support changes to the use of the Waterfall Station and stabling yards including a new stabling facility on the western side of the station so as to better serve the future operation of the T4 Illawarra and South Coast lines.

This noise and vibration impact assessment forms part of the Review of Environmental Factors (REF) which assesses the potential impacts of the Proposal on the environment. Relevant guidelines and assessment procedures have been followed to ensure all applicable State requirements have been considered.

A survey has been undertaken of the existing conditions throughout the Proposal area. Buildings throughout the Proposal area have been visually inspected (from the outside) to identify their likely use and the number of storeys. Background noise levels have been monitored at a residential receiver location to identify the existing noise environment throughout the Proposal area. The existing noise environment allows this assessment to define appropriate noise criteria.

A construction noise impact assessment has been conducted in accordance with the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009) and *Construction Noise and Vibration Strategy* (CNVS) (TfNSW, 2018). Reasonable worst-case construction scenarios have been assessed. Construction of the Proposal would occur both during standard construction hours and out of hours to minimise disruptions. The out of hours work would be subject to the processes outlined in Section 3.1.

The assessment of noise associated with the construction of the Proposal indicates some exceedances of the ICNG noise management levels at the most affected sensitive receivers. Exceedances of the noise management levels occur during the day and night at the most affected sensitive receivers during certain activities. The magnitude of these impacts is consistent with similar construction projects and highlights the need for effective noise mitigation and management planning.

Measures have been recommended to mitigate the construction noise impacts at adjacent sensitive receivers. Specific noise management and mitigation measures would be detailed in the contractor's Construction Noise and Vibration Management Plan. The recommended management and mitigation measures which would be considered in the plan include:

- Effective communication with community and affected receivers about mitigation measures
- Training of construction site workers
- Use of noise barriers
- Noise monitoring
- Appropriate selection and maintenance of equipment
- Scheduling of work for less sensitive time periods
- Situating plant in less noise sensitive locations
- Construction traffic management
- Respite periods.

Minimum working distances for vibration intensive construction works have been presented. Equipment size would be selected by the contractor taking into account the minimum working distances and the distance between the construction works and the most affected sensitive receiver. If works need to be undertaken within minimum working distances, vibration monitoring would be undertaken.

An assessment of the likely construction traffic indicated that the noise increases along construction traffic routes are predicted to be well below the 2 dB increase screening criteria. Therefore, no further assessment is required in accordance with the Environment Protection Authority's *NSW Road Noise Policy* (RNP) (DECCW 2011).

An operational rail assessment has been completed in accordance with the Environment Protection Authority's *Rail Infrastructure Noise Guideline* (RING). Noise levels have been predicted at sensitive receiver locations throughout the Proposal area during the daytime and night-time scenarios for the 'Build' and 'No build' scenarios. The assessment of noise associated with railway traffic within the Proposal area showed that there were no exceedances of the relevant criteria outlined in the RING. As a result, no further mitigation of rail noise is considered.

An operational noise assessment for fixed facilities and stationary locomotives has been completed in accordance with the Environment Protection Authority's *NSW Noise Policy for Industry* (NPfI), 2017. This portion of the assessment identified a number of exceedances in both the 'Build' and 'No Build' scenarios, of the relevant NPfI criteria during the night-time for the operation of the stabling facility. Mitigation measures to ameliorate noise impacts associated with the stabling facility have been discussed in Section 8.0.

1.0 Introduction

1.1 Overview

TfNSW proposes to deliver service improvements in the T4 Illawarra Line, South Coast Line and T8 Airport Lines, including capacity, reliability and connectivity improvements for customers. To achieve this, TfNSW has developed the More Trains More Services Program (the Program).

As part of the Program, the Waterfall Station Upgrade (the Proposal) would aim to support future operation of the T4 Illawarra and South Coast Lines.

AECOM Australia Pty Ltd (AECOM) has been commissioned by TfNSW to carry out a noise and vibration impact assessment for the construction and operation of the Proposal.

A glossary of acoustic terminology is provided in Appendix A.

1.2 Background

The Proposal would contribute to the transformation of the rail network to provide customers with more reliable, high capacity turn up and go services. In recent years, infrastructure constraints have been a barrier to enhancing services. In response to growth in demand on these lines, the next stages of the program will deliver a 30 per cent uplift in the total number of peak services on the T4 Illawarra Line, reducing crowding and providing a more comfortable journey for customers in the Sutherland Shire, Illawarra and South Coast.

1.3 The Proposal

The Proposal would include the following key elements:

- Reconstruction of the northern end of the existing island platform at Waterfall, including a 40 metre extension to facilitate 10-car New Intercity Fleet (NIF) trains
- Construction of a staff amenities building to the north west of the station
- Construction of an elevated staff footbridge between the new staff amenities building and the station platform
- Track re-configuration of the existing up sidings, up refuge loop, and up goods loop to allow freight trains to pull into the stabling loop, including an approximately 850 metre extension of the loop northwards adjacent to the western side of the existing line
- New suburban train stabling yard to the west of the existing main line

A detailed description of the Proposal is provided in Chapter 3 of the Waterfall stabling yard and platform extension REF.

1.4 Relevant guidelines

The relevant policies and guidelines for noise and vibration assessments in NSW that have been considered during the preparation of this report include:

- *Interim Construction Noise Guideline* (ICNG), Department of Environment and Climate Change, 2009
- *Construction Noise and Vibration Strategy* (CNVS), Transport for New South Wales (TfNSW), 2018
- *Assessing Vibration: A Technical Guideline* (AVATG), Department of Environment and Conservation (DEC)
- DIN 4150:Part 2-1999 *Structural vibration – Human exposure to vibration in buildings* (Deutsches Institut für Normung 1999)

- DIN 4150:Part 3-1999 *Structural vibration – Effects of vibration on structures* (Deutsches Institut für Normung 1999)
- *NSW Road Noise Policy* (RNP), Department of Environment, Climate Change and Water (DECCW), 2011
- *Noise Policy for Industry* (NPfI), Environment Protection Authority (EPA), 2017
- *Rail Infrastructure Noise Guideline* (RING), Environment Protection Authority (EPA), 2013.

2.0 Existing noise environment

2.1 Proposal area description

The Proposal is located at Waterfall Station, Waterfall, approximately 38 kilometres south of the Sydney CBD. The station is located adjacent to the Princes Highway, McKell Avenue and Kooraban Street. The Proposal would be undertaken wholly within the suburb of Waterfall in the Sutherland Shire Local Government Area (LGA).

The Proposal area, which includes the Waterfall Station upgrades and associated construction compounds and laydown areas, extends from approximately 740 metres south of Waterfall Station to approximately 1.8 kilometres north of Waterfall Station. The Proposal is bounded by the Princes Highway and the Hanrob Pet Hotel to the west, the Royal National Park to the east and the T4 Illawarra Line to the north and south.

The acoustic environment is dominated by road traffic noise from the Princes Highway in addition to railway noise.

An overview of the Proposal area showing the noise monitoring location and assessment receivers is shown in Figure 1 below.

Figure 1 Proposal overview

2.2 Receivers

Residential and non-residential receivers potentially affected by the construction and operation of the Proposal have been identified within the Proposal area (refer to Figure 1). Receivers predominantly comprise residential properties located within the suburb of Waterfall and extend the length of the Proposal along the Princes Highway. These noise sensitive receivers were identified using aerial photography, and their occupational uses were determined through a ground-truthing site survey exercise. This exercise, in conjunction with cadastral information, was used to determine the classification of any residential, commercial, industrial, educational and recreational buildings, as well as other uses (such as unoccupied sheds). Sensitive receivers in this area are predominantly one and two storey residential properties. Assessment criteria have been determined for all receivers as outlined in Section 3.0.

2.3 Noise monitoring

Ambient noise monitoring was conducted at one location within the Proposal area during May 2019. This included both long term monitoring and short term attended measurements.

The unattended noise measurements define the long term noise environment throughout the Proposal area and are used to define the construction and operational noise criteria. Attended noise measurements are carried out to determine what noise sources contribute to the local noise environment.

2.3.1 Instrumentation

Details of the equipment used for unattended long term noise monitoring are presented in Table 1. The noise monitoring location is shown graphically in Figure 1 above.

Table 1 Noise monitoring details

Address	Model	Serial number
1909 Princes Highway, Waterfall	Rion NL-52	00553967

The sound level meter used to conduct attended measurements was a Bruel & Kjaer 2250 (Serial Number 3009329). All acoustic instrumentation used for the assessment comply with the requirements of AS IEC 61672.1-2004 Electroacoustics – Sound level meters – Specifications and were calibrated before and after monitoring sessions with a drift in calibration not exceeding ± 0.5 dB.

All instruments used were within their current National Association of Testing Authorities, Australia (NATA) certified in-calibration period (i.e. calibration in the last two years).

2.3.2 Unattended background noise monitoring results

Unattended noise monitoring was carried out from 9 May 2019 to 17 May 2019 at one location considered to be representative of the noise sensitive receivers within the Proposal area (refer to Figure 1).

A sound level meter measures the noise level over the sample period and then determines L_{A1}, L_{A10}, L_{A90}, and L_{Aeq} levels of the noise environment. The L_{A1}, L_{A10} and L_{A90} levels are the levels exceeded for 1%, 10% and 90% of the sample period respectively. The L_{A1} is indicative of maximum noise levels due to individual noise events. The L_{A90} is considered to be the background noise level. The L_{Aeq} parameter is the energy averaged sound level over the measurement period. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

The assessment background level (ABL) is established by determining the lowest tenth-percentile level of the L_{A90} noise data acquired over each period of interest. The background noise level or rating background level (RBL) representing the day, evening and night-time assessment periods is based on the median of individual ABLs determined over the entire monitoring duration. The RBL is representative of the average minimum background sound level, or simply the background level.

A noise logger report including graphical representations of the logging results, a summary of the results and the measurement location is provided in Appendix C. A summary of the measured L_{A90} background noise levels and existing L_{Aeq} ambient noise levels is presented in Table 2.

Table 2 Existing background and ambient noise levels, dB(A)

Address	Rating background level, L_{A90}, dB(A)			Ambient noise levels, L_{Aeq} dB(A)		
	Day	Evening	Night	Day	Evening	Night
1909 Princes Highway, Waterfall	60	53	39	72	69	69

Notes:

1. *In accordance with the NPfI, time of day is defined as follows :*
   Day – the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays.
   Evening – the period from 6 pm to 10 pm.
   Night – the remaining periods.

2.3.3 Attended noise monitoring

Attended noise monitoring was conducted at the unattended monitoring location on 9 May 2019. The measurement was conducted over a 15 minute period. Weather conditions were clear on the day of monitoring, with no wind. The monitoring results from the attended measurements are presented in Table 3.

Table 3 Attended noise monitoring details

Address	Date	Time	Description	L_{Amax}, 15min dB(A)	L_{A10}, 15min dB(A)	L_{Aeq}, 15min dB(A)	L_{A90}, 15min dB(A)
1909 Princes Highway, Waterfall	9/5/2019	12:15 pm	Noise environment dominated by road traffic noise from Princes Highway, 70-71 dB(A). Train pass-by inaudible over heavy road traffic	88	82	71	59

3.0 Assessment criteria

3.1 Construction noise criteria

The ICNG is a NSW Government document that outlines methods to deal with the impacts of construction noise on residences and other sensitive land uses. It presents assessment approaches tailored to the scale of the construction project and identifies practices to minimise noise impacts. The ICNG recommends that a quantitative assessment is carried out for all major construction Proposals that are typically subject to the environmental impact assessment processes. A quantitative assessment, based on the likely construction scenarios, has been carried out for the Proposal.

Noise levels resulting from construction activities are predicted at nearby noise sensitive receivers using noise modelling software and are compared to the levels provided in the ICNG. Where an exceedance of the noise management levels (NMLs) is predicted the ICNG advises that receivers can be considered 'noise affected' and the proponent should apply all feasible and reasonable work practices to minimise the noise impact. The proponent should also inform all potentially affected residents of the nature of the works to be carried out, the expected noise level and duration, as well as contact details should they wish to make a complaint.

Where construction noise levels at the receiver reach 75 dB(A) residential receivers are considered to be 'highly noise affected' and the proponent should, in consultation with the community, consider restrictions to the hours of construction to provide respite periods.

The ICNG defines what is considered to be feasible and reasonable as follows:

- Feasible - a work practice or abatement measure is feasible if it is capable of being put into practice or of being engineered and is practical to build given project constraints such as safety and maintenance requirements
- Reasonable - selecting reasonable measures from those that are feasible involves making a judgment to determine whether the overall noise benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the measure.

Additionally the ICNG notes that strong justification is required for work that is proposed outside of standard working hours.

Residential receiver NMLs for this Proposal have been derived using the information presented below in Table 4.

Table 4 Construction noise management levels – Residential receivers (from the ICNG)

Time of day	Construction noise management level $L_{Aeq,15min}$	How to apply
Recommended standard hours: • Monday to Friday 7am to 6pm • Saturday 8am to 1pm • No work on Sundays or public holidays	Noise affected RBL + 10 dB(A)	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq,15\ min}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.

Time of day	Construction noise management level $L_{Aeq,15min}$	How to apply
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: - Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences - If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5 dB(A)	• A strong justification would typically be required for works outside the recommended standard hours • The proponent should apply all feasible and reasonable work practices to meet the noise affected level • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community • For guidance on negotiating agreements see section 7.2.2 of the ICNG.

Notes:

1. Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 metres above ground level. If the property boundary is more than 30 metres from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 metres of the residence. Noise levels may be higher at upper floors of the noise affected residence.

3.1.1 Construction hours

The majority of work required for the Proposal would be carried out during standard construction hours as recommended in the ICNG as follows:

7:00am to 6:00pm Monday to Friday

8:00am to 1:00pm Saturdays

No work on Sundays or public holidays.

Certain works may need to occur outside standard hours and/or as night works. These would generally occur during routine scheduled closures where part of the rail network is temporarily shut down. In addition to these possessions, the line is proposed to be shut down for a separate nine day period.

Out of hours works are required in some cases to minimise disruptions to customers, pedestrians, motorists and nearby sensitive receivers; and to ensure the safety of railway workers and operational assets. It is estimated that the nine day rail possession would be required to facilitate the following:

- modifications to overhead wiring
- signal relocation works
- crossover relocation works

- platform extension works
- track slew works.

Out of hours works may also be scheduled outside rail possession periods. The construction contractor would require approval from TfNSW for any out of hours work. The affected community would be notified as outlined in TfNSW's CNVS.

3.1.2 Construction noise management levels

Provided in Table 5 are the applicable NMLs for the Proposal, based on the RBLs in Table 2 and NMLs in Table 4.

Table 5 Construction noise management levels - residential receivers

Period	RBL L_{A90}, dB(A)	Standard hours noise management levels, $L_{Aeq,15min}$, dB(A)	Out-of-hours noise management levels, $L_{Aeq,15min}$, dB(A)
Day	60	70	65
Evening	53	-	58
Night	39	-	44

NMLs recommended by the ICNG for non-residential sensitive land uses, such as schools, hospitals or places of worship are provided in Table 6. NMLs for commercial and industrial premises are provided in Table 7.

Table 6 Construction noise management levels – non-residential sensitive land uses (from the ICNG)

Land use	Management level, $L_{Aeq(15\ min)}$
Classrooms at schools and other educational institutions	Internal noise level 45 dB(A)
Hospital wards and operating theatres	Internal noise level 45 dB(A)
Places of worship	Internal noise level 45 dB(A)
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	External noise level 65 dB(A)
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External noise level 60 dB(A)
Community centres	Depends on the intended use of the centre. Refer to the recommended "maximum" internal levels in AS2107 for specific uses.

Table 7 Construction noise management levels – Commercial and industrial land uses

Land use	Management level, $L_{Aeq(15min)}$
Industrial premises	External noise level 75 dB(A)
Offices, retail outlets	External noise level 70 dB(A)

3.1.3 Sleep disturbance

The ICNG requires a sleep disturbance assessment to be undertaken where construction works are planned to extend over more than two consecutive nights. The ICNG makes reference to the EPA's NSW *Environment Criteria for Road Traffic Noise* (ECRTN), now superseded by the NSW RNP, for the assessment of sleep disturbance. The RNP references the recommendations in the ECRTN as providing the most appropriate assessment guidance.

The guidance provided in the RNP for assessing the potential for sleep disturbance recommends that to minimise the risk of sleep disturbance during the night-time period (10pm to 7am), the $L_{A1(1\ min)}$ noise level outside a bedroom window should not exceed the $L_{A90(15\ min)}$ background noise level by more than 15 dB(A). The EPA considers it appropriate to use this metric as a screening criterion to assess the likelihood of sleep disturbance. If this screening criterion is found to be exceeded then a more detailed analysis must be undertaken that should include the extent that the maximum noise level exceeds the background noise level and the number of times this is likely to happen during the night-time period.

The RNP contains a review of research into sleep disturbance which represents NSW EPA advice on the subject of sleep disturbance due to noise events. It concludes that having considered the results of research to date that, 'Maximum internal noise levels below 50-55 dB(A) are unlikely to cause awakening reactions'. Therefore, given that an open window provides around 10 dB(A) in noise attenuation from outside to inside, external noise levels of 60-65 dB(A) are unlikely to result in awakening reactions.

Table 8 presents the sleep disturbance screening and sleep disturbance awakening reaction criteria.

Table 8 Construction noise sleep disturbance criteria

Night-time rating background level, dB(A)	Sleep disturbance screening $L_{A1(1min)}$ criteria, dB(A)	Sleep disturbance awakening reaction $L_{A1(1min)}$ criteria, dB(A)
39	54	65

3.1.4 Construction road traffic noise

Noise from construction traffic on public roads is not covered by the ICNG. However, the ICNG does refer to the ECRTN, which is now superseded by the RNP, for the assessment of noise arising from construction traffic on public roads.

To assess noise impacts from construction traffic, an initial screening test has been undertaken by evaluating whether existing road traffic noise levels would increase by more than 2 dB(A). Where the predicted noise increase is 2 dB(A) or less, then no further assessment is required. However, where the predicted noise level increase is greater than 2 dB(A), and the predicted road traffic noise level exceeds the road category specific criterion then noise mitigation should be considered for those receivers affected. The RNP does not require assessment of noise impact to commercial or industrial receivers.

3.2 Construction vibration criteria

The relevant standards/guidelines for the assessment of construction vibration are summarised in Table 9.

Table 9 Standards/guidelines used for assessing construction vibration

Item	Standard/guideline
Structural damage	German Standard DIN 4150 – Part 3 – *Structural Vibration in Buildings – Effects on Structures* (DIN 4150)
Human comfort (tactile vibration)	*Assessing Vibration: A Technical Guideline* (AVATG)[1]

Notes:

1. *This document is based upon the guidelines contained in British Standard 6472:1992, "Evaluation of human exposure to vibration in buildings (1-80 Hz)". This British Standard was superseded in 2008 with BS 6472-1:2008 "Guide to evaluation of human exposure to vibration in buildings – Part 1: Vibration sources other than blasting" and the 1992 version of the Standard was withdrawn. Although a new version of BS 6472 has been published, the Environment Protection Authority still requires vibration to be assessed in accordance with the 1992 version of the Standard at this point in time.*

Vibration, at levels high enough, has the potential to cause damage to structures and disrupt human comfort. Vibration and its associated effects are usually classified as continuous, impulsive or intermittent as follows:

- continuous vibration continues uninterrupted for a defined period and includes sources such as machinery and continuous construction activities
- impulsive vibration is a rapid build up to a peak followed by a damped decay. It may consist of several cycles at around the same amplitude, with durations of typically less than two seconds and no more than three occurrences in an assessment period. This may include occasional dropping of heavy equipment or loading activities
- intermittent vibration occurs where there are interrupted periods of continuous vibration, repeated periods of impulsive vibration or continuous vibration that varies significantly in magnitude. This may include intermittent construction activity, impact pile driving, jack hammers.

3.2.1 Structural Damage

At present, no Australian Standards exist for the assessment of building damage caused by vibration.

The German standard (DIN 4150) provides recommended maximum levels of vibration that reduce the likelihood of building damage caused by vibration and are presented in Table 10. DIN 4150 states that buildings exposed to higher levels of vibration than recommended limits would not necessarily result in damage.

Table 10 Structural damage safe limits for building vibration (from DIN 4150)

Group	Type of structure	At foundation - Less than 10 Hz	At foundation - 10 Hz to 50 Hz	At foundation - 50 Hz to 100 Hz[1]	Vibration at the horizontal plane of the highest floor for all frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20 mm/s	20 to 40 mm/s	40 to 50 mm/s	40 mm/s
2	Dwellings and buildings of similar design and/or use	5 mm/s	5 to 15 mm/s	15 to 20 mm/s	15 mm/s
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order/heritage listed)	3 mm/s	3 to 8 mm/s	8 to 10 mm/s	8 mm/s

Notes:

1. At frequencies above 100 Hz, the values given in this column may be used as minimum values

3.2.2 Human Comfort

The assessment of intermittent vibration outlined in the NSW EPA guideline AVATG is based on Vibration Dose Values (VDVs). The VDV accumulates the vibration energy received over the daytime and night-time periods.

Maximum and preferred VDVs for intermittent vibration arising from construction activities are listed in Table 11. The VDV criteria are based on the likelihood that a person would be annoyed by the level of vibration over the entire assessment period.

Table 11 Preferred and maximum vibration dose values for intermittent vibration (m/s$^{1.75}$) (from AVATG)

Location	Daytime [1] Preferred	Daytime Max	Night time Preferred	Night time Max
Critical areas[2]	0.1	0.2	0.1	0.2
Residences	0.2	0.4	0.13	0.26
Offices, schools, educational institutions and places of worship	0.4	0.8	0.4	0.8
Workshops	0.8	1.6	0.8	1.6

Notes:

1. *Day is defined as 7:00 am to 10:00 pm. Night is defined as 10:00 pm to 7:00 am*
2. *Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against continuous or impulsive criteria for critical areas.*

3.3 Operational noise criteria – Rail noise

The RING provides the applicable noise trigger levels for the assessment of airborne noise. These trigger levels are considered non mandatory and represent a point at which reasonable and feasible noise mitigation should be considered. It should be noted that this guideline does not apply to noise involving maintenance facilities for rolling stock (including stabling yards and shunting operations), which is assessed in accordance with the NPfI.

The RING provides noise trigger levels for both new and redeveloped rail lines. Since work associated with the Proposal comprises a redevelopment of the existing T4 Illawarra and South Coast Lines, all sensitive receivers surrounding the project area are subject to the redeveloped noise criteria.

Provided below is a summary of the RING trigger levels for redeveloped corridors.

Table 12 Airborne heavy rail noise trigger levels for residential land uses

Type of development	Noise trigger levels dB(A)	
	Day (7am to 10pm)	Night (10pm to 7am)
Redevelopment of existing rail line	Development increases existing $L_{Aeq(period)}$ rail noise levels by 2 dB or more, or existing L_{Amax} rail noise levels by 3 dB or more and predicted rail noise levels exceed:	
	65 $L_{Aeq(15hour)}$ or 85 L_{AFmax}	60 $L_{Aeq(9hour)}$ or 85 L_{AFmax}

In accordance with the RING, sensitive land uses other than residential (e.g. hospitals, schools) have their own specific noise trigger levels for rail redevelopments, applicable when the facility or space is in use. These applicable criteria are shown in Table 13.

Table 13 Airborne heavy rail noise trigger levels for applicable non-residential land uses

Land use	Redevelopment of existing rail line noise criteria (dB(A)) (when in use)
	Development increases existing $L_{Aeq(period)}$ rail noise levels by 2 dB or more, and resulting rail noise levels exceed:
Schools, educational institutions and child care centres	45 $L_{Aeq(1hr)}$ (internal)
Open space – Passive use	65 $L_{Aeq(15hr)}$ (external)

3.4 Operational noise criteria – Stabling facility and amenities building

The EPA's NPfI provides noise trigger levels for assessing the potential impact of noise from industry and includes a framework for considering feasible and reasonable noise mitigation measures. The assessment procedure for industrial noise sources has two components that must be considered:

- Controlling intrusive noise impacts in the short term for residences; and
- Maintaining noise level amenity for residences and other land uses.

3.4.1 Intrusiveness noise levels

The NPfI states that the intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (L_{Aeq} level), measured over a 15 minute period, does not exceed the RBL measured by more than 5 dB(A). The RBL is the background noise level to be used for assessment purposes and is determined by the methods given in Fact Sheet B of the NPfI. Adjustments are to be applied to the level of noise produced if the noise at the receiver contains annoying characteristics such as tonality or impulsiveness.

The intrusiveness noise levels applicable to the Proposal are presented in Table 14.

Table 14 Intrusiveness noise levels

Period	RBL. L_{A90}, dB(A)	Intrusiveness noise level (RBL + 5), dB(A)
Day	60	65
Evening	53	58
Night	39	44

Notes:

1. *In accordance with the NPfI, time of day is defined as follows :*
   Day – the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays.
   Evening – the period from 6 pm to 10 pm.
   Night – the remaining periods.

3.4.2 Protecting noise amenity

To limit continuing increases in noise levels, the maximum ambient noise level resulting from all industrial noise sources in an area should not normally exceed the acceptable levels specified in Table 2.2 of the NPfI. The residential receivers within the Proposal area are zoned as 'Rural residential' under Sutherland Shire Council's Local Environmental Plan (LEP 2015). However, given the existing road traffic noise levels in the area, measured noise levels indicate that the acoustic environment would be more accurately described as suburban.

It was observed during attended and unattended noise monitoring that:

- Road traffic noise from Princes Highway was the dominant source of noise
- The existing $L_{Aeq,period}$ traffic noise level is 10 dB(A) or more above the amenity noise level for some receiver types
- It is unlikely that traffic noise will reduce over time

Therefore, the high traffic noise provisions were applied in accordance with the NPfI, Section 2.4.1 for some receiver types. These were adopted in place of recommended amenity noise levels to derive the project amenity trigger levels as follows:

> *"High traffic project amenity noise level for industrial developments = $L_{Aeq,period(traffic)}$ minus 15 dB(A)"*

Where the recommended noise amenity level has been adopted, the project amenity noise level is equal to the recommended amenity level minus 5 dB(A). In addition, the project amenity level is converted from a period to 15 minutes by adding 3 dB(A). Therefore, the relevant project noise amenity level for each applicable type of receiver is shown below in Table 15.

Table 15 Recommended L_{Aeq} noise levels from industrial noise sources

Type of receiver	Period	Recommended amenity noise level, $L_{Aeq(period)}$	Measured $L_{Aeq,period(traffic)}$	Project amenity noise level, $L_{Aeq,15min}$
Residential Suburban	Day	55	72	60[1]
	Evening	45	69	57[1]
	Night	40	69	57[1]
School classroom - internal	Noisiest 1-hour period when in use	45[2]	-	48
School playground	When in use	55	-	58
Area specifically reserved for passive recreation (e.g. national park)	When in use	50	-	53
Commercial premises	When in use	65	-	68

Notes:

1. *The existing $L_{Aeq,period}$ traffic noise level is 10 dB(A) or more above the applicable recommended amenity noise level. Therefore, the high traffic noise provisions were applied in accordance with the NPfI, Section 2.4.1.*
2. *External noise levels are based on a 10 dB(A) reduction from outside to inside through an open window.*

3.4.3 Project noise trigger levels

The project noise trigger level is the lower of the intrusiveness and the amenity noise levels. Provided in Table 16 are the established project noise trigger levels for the assessment locations within the Proposal area. Table 16 presents the project noise trigger levels for the day, evening and night-time periods.

Table 16 Operational noise criteria

Type of receiver	Assessment period	Intrusive noise levels, $L_{Aeq,15min}$	Amenity noise levels, $L_{Aeq,15min}$	Project noise trigger levels, $L_{Aeq,15min}$
Residential suburban	Day	65	60	60
	Evening	58	57	57
	Night	44	57	44
School classroom - internal	Noisiest 1-hour period when in use	-	48	48
School playground	When in use	-	58	58
Area specifically reserved for passive recreation (e.g. national park)	When in use	-	53	53
Commercial premises	When in use	-	68	68

3.4.4 Maximum noise level assessment

The NPfI requires the potential for sleep disturbance to be assessed by considering maximum noise levels events during the night-time period.

Where the subject development/premises night-time noise levels at a residential location exceed the following screening levels a detailed maximum noise level event assessment should be undertaken:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,

The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period.

Based on the measured background noise levels during the night, the sleep disturbance criteria for the nearest noise sensitive residential receivers are presented in Table 17.

Table 17 Night-time sleep disturbance screening levels

Type of receiver	Measured night-time RBL, $L_{A90,15min}$, dB(A)	Sleep disturbance screening levels	
		$L_{Aeq,15min}$	L_{AFmax}
Residential	39	44	54

4.0 Construction noise assessment

4.1 Construction stages and scheduling

Construction activities to be carried out as part of the Proposal are outlined in Table 18. The work has been grouped into nine distinct construction stages based on proposed construction activities.

Certain work may need to occur outside standard construction hours. This has been discussed further in Section 3.1.1. In the absence of information regarding which activities are proposed to occur outside of standard construction hours, this assessment has considered all scenarios to be conducted both during standard construction hours and outside standard construction hours for completeness.

Table 18 Proposed construction activities

Construction stage	Activities
Site establishment and enabling works	• establishment and use of site compounds and temporary facilities (i.e. erect fencing, site offices, temporary toilets, hoarding, tree protection zones (TPZs), site offices, amenities and plant/material storage areas) • establishment of weatherproof access roads, including installation of construction road signage as per Traffic Management Plan (TMP) • clearing and grubbing of vegetation from works area, where possible • installation of environmental controls (i.e. erosion and sediment control fencing)
Utility works	• construction of new electrical infrastructure including padmount substations, transformers and associated wiring • construction of new signalling power room (8 x 3 m precast building) • removal of existing pole-top transformers throughout the stabling facility • removal of existing utility poles • installation of new cabling to connect all new electrical infrastructure • construction of new electrical overhead wiring structure footings • installation of overhead wiring on the extended freight loop • removal of redundant electrical overhead wiring • construction of new electrical section hut feeder structure (and decommission old section hut feeder) • relocation of signals and communication services • installation of new signal equipment room • installation of new water hydrant and associated infrastructure • relocation of existing Telstra infrastructure • installation of a combined services route.
Track modifications/stabling works	• civil works to facilitate track modifications including excavation and filling • removal of redundant tracks and sleepers • formation and installation of new tracks • slewing of existing tracks

Construction stage	Activities
	• re-signalling works • installation of electrical components (i.e. lighting, closed circuit television (CCTV), public address (PA) system, etc.) • stabling walkway works.
Retaining wall construction	• construct retaining wall along the extended section of the freight loop, including excavation, filling, drainage and other civil work)
Platform extension	• partial demolition of the existing station platform • construction of an extended platform using an inverted box culvert and cantilever design • crossover relocation • track slewing works including associated excavation drainage and track formation • resignalling works • installation of electrical components (i.e. lighting, CCTV, PA system, etc.) • line painting for delineation and wayfinding
Staff amenities building construction	• construct staff amenities building (including required excavation and drainage work) • installation of electrical components (i.e. lighting, CCTV, PA system, etc.) • line painting • upgrade of existing access road suitable for access by Sydney Trains vehicles to transport rubbish from new amenities building to a dumpster near the access gate.
Staff footbridge construction	• construct staff footbridge (including augured piling, required excavation and drainage work) • installation of electrical components (i.e. lighting, CCTV, PA system, electronic security locks, etc.) • line painting
Testing and commissioning	• testing electrical, communications and signalling components • commission new stabling roads • commission track
Demobilisation	• remove temporary site fencing • dismantling of temporary site compounds/hoarding areas • remove temporary construction signage

4.2 Plant and equipment levels

Presented in Table 19 are the typical sound power levels of the construction equipment to be used during each modelled construction scenario. The modelled scenarios include all equipment that could be reasonably assumed to be operating at the same time for an entire 15 minute period.

These sound power levels are typical values taken from data provided in Australian Standard AS2436-2010, “Guide to noise and vibration control on construction, demolition and maintenance sites”, the UK Department for Environment, Food and Rural Affairs “Update of noise database for prediction of noise on construction and open sites” noise database as well as AECOM’s noise database.

These sound power levels assume equipment is modern and in good working order. In AECOM’s experience, L_{A1} sound power levels of construction activities are typically up to eight decibels above L_{Aeq} sound power levels.

During the detailed design local site conditions and changes in work practices may cause some variation in the equipment used. While the equipment may vary, other major infrastructure projects have shown that due to the conservative approach to noise predictions, received noise levels are unlikely to be appreciably higher than those predicted in this assessment.

This approach is used at this point in the assessment to ensure that identified impacts are not under-predicted and adequate noise management and mitigation measures are considered early in the Proposal.

Table 19 Construction staging and typical sound power levels of construction equipment

Construction stage	Equipment	Sound power level, dB(A)
Site establishment and enabling works	Bobcat	104
	Trucks	98
	Lighting tower	95
	Generator	101
	Light vehicles	90
	Hand tools	98
	Total	**107**
Utility works	8t Excavator	99
	Trucks	98
	Lighting tower	95
	Jackhammer	108
	Demolition saw	110
	Hand tools	98
	Total	**113**
Track modifications / stabling works	Hydrema	107
	8t Excavator	99
	Front end loader	111
	Lighting tower	95
	Work train	115
	Tamper	112
	Ballast regulator	115

Construction stage	Equipment	Sound power level, dB(A)
	Total	**120**
Retaining wall construction	35t Rotary bored piling rig	103
	8t Excavator	99
	Lighting tower	95
	Concrete pump	105
	Franna crane	93
	Total	**108**
Platform extension	Hand tools	98
	Agitator	109
	Concrete pump	105
	Jackhammer	108
	Generator	101
	Lighting tower	95
	Hand tools	98
	Total	**113**
Staff amenities building construction	Trucks	98
	8t Excavator	99
	Generator	101
	Lighting tower	95
	Hand tools	98
	Total	**105**
Staff footbridge construction	Trucks	98
	8t Excavator	99
	Generator	101
	Lighting tower	95
	Franna crane	93
	Hand tools	98
	Total	**106**
Testing and commissioning	Trucks	98
	Hand tools	98
	Generator	101

Construction stage	Equipment	Sound power level, dB(A)
	Lighting tower	95
	Total	**106**
Demobilisation	Trucks	98
	Lighting tower	95
	Generator	101
	Light vehicles	90
	Bobcat	104
	Hand tools	98
	Total	**107**

4.3 Noise modelling methodology

Noise levels due to the construction activities shown in Table 19 were predicted at nearby noise sensitive receivers using SoundPLAN v8.0 noise modelling software. The noise model was created to represent 'reasonable' worst periods of construction work.

The following features were included in the noise model:

- Ground topography
- Ground absorption and reflection
- Receivers as shown in Figure 1
- Construction noise sources as outlined in Table 19.

Noise emissions from the construction sites have been modelled using an implementation of the ISO 9613-2:1996 propagation algorithm with neutral meteorological conditions.

It can be expected that there may be differences between predicted and measured noise levels due to variations in instantaneous operating conditions, plant in operation during the measurement and also the location of the plant equipment.

4.3.1 Construction modelling assumptions

The following assumptions were made in modelling the construction noise scenarios:

- All equipment would be operating simultaneously, which is unlikely hence a conservative assumption
- Equipment was assumed to be operating at the closest point in the Proposal area to each receiver, in order to present the worst-case scenario.
- Neutral atmospheric conditions i.e. relatively calm, no wind.

4.4 Predicted construction noise impacts

A summary of the number of receivers where construction noise levels are predicted to exceed NMLs during the loudest construction stages are presented for standard hours construction activities in Table 20 and for out of hours construction activities in Table 21. Out of hours work has been conservatively assessed against the more stringent night-time criteria. Appendix D presents the L_{Aeq} noise level contours for the construction activities for individual properties.

It is important to consider that this assessment is representative of the worst case 15 minute period of construction activity, while the construction equipment is at the nearest location to each sensitive receiver location. The assessed scenario does not represent the ongoing day to day noise impact at noise sensitive receivers for an extended period of time.

Particularly noisy activities, such as bored piling, are likely to persist for only a portion of the overall construction period. In addition, the predictions use the shortest separation distance to each sensitive receiver, however in reality the distance will vary between plant and sensitive receivers. For works that move along the rail alignment, rather than works located at a construction compound, noise exposure at each receiver would reduce due to increases in distance loss as the works progress along the alignment.

Table 20 Predicted construction noise impacts for residential receivers - Daytime

Construction scenario	NML	Number of receivers where noise levels >10 dB(A) above NML	Number of highly noise affected receivers where noise levels ≥75 dB(A)
Site establishment and enabling works	70	0	0
Utility works	70	0	0
Track modifications/stabling works	70	0	5
Retaining wall construction	70	0	0
Platform extension	70	0	0
Staff amenities building construction	70	0	0
Staff footbridge construction	70	0	0
Testing and commissioning	70	0	0
Demobilisation	70	0	0

Table 21 Predicted construction noise impacts for residential receivers – Night-time

Construction scenario	NML	Number of receivers where noise levels may exceed the NML			
		NML exceedance <5 dB(A)	NML exceedance 5-14 dB(A)	NML exceedance 15-25 dB(A)	NML exceedance >25 dB(A)
Site establishment and enabling works	44	23	42	7	0
Utility works	44	36	48	24	1
Track modifications/stabling works	44	17	66	38	23
Retaining wall construction	44	14	4	0	0
Platform extension	44	15	38	9	0
Staff amenities building construction	44	12	15	4	0
Staff footbridge construction	44	15	13	4	0
Testing and commissioning	44	23	33	13	0
Demobilisation	44	23	42	7	0

The results presented in Table 20 show that there are a limited number of exceedances of the NMLs adopted in Section 3.1 during the daytime. During standard construction hours, there are no receivers where noise levels are anticipated to exceed the NMLs by more than 10 dB(A), and no receivers are expected to be considered highly noise affected (> 75 dB(A)), with the exception of the 'Track modifications/stabling works' scenario. In this scenario, noise levels at up to five receivers are predicted to exceed the 75 dB(A) highly affected criteria. These receivers are located along the Princes Highway to the north of Kooraban Street.

The results presented in Table 21 show that during the night-time, noise levels at a large number of receivers are predicted to exceed the NMLs. Up to 144 receivers are predicted to exceed the NMLs in the worst-case scenario, which is also during 'Track modifications/stabling works. This is due to the large construction area where works are anticipated to take place.

Recommendations to mitigate construction noise impacts have been provided in Section 8.0.

4.5 Sleep disturbance assessment

Sleep disturbance is assessed using an $L_{A1(1\ min)}$ parameter, which is considered to be the maximum noise level excluding extraneous noise events. A sleep disturbance assessment has been undertaken for the proposed night works with the construction information available to date. The noise modelling results are provided in Table 22 below with predicted noise levels compared with the sleep awakening reaction criterion. Appendix D presents the predicted sleep disturbance noise levels and construction noise contours.

Table 22 Predicted L sleep disturbance impacts at residential receivers

Construction scenario	Sleep disturbance criteria, dB(A)	Maximum $L_{A1(1min)}$ noise level, dB(A)	Number of receivers where noise levels exceed	
			Sleep disturbance criteria	Awakening reaction criteria
Site establishment and enabling works	54	71	49	2
Utility works	54	75	73	22
Track modifications / stabling works	54	79	116	48
Retaining wall construction	54	60	4	0
Platform extension	54	69	38	8
Staff amenities building construction	54	66	16	2
Staff footbridge construction	54	65	7	0
Testing and commissioning	54	65	35	0
Demobilisation	54	71	49	2

A large number of exceedances of the sleep disturbance screening criteria have been predicted due to the night-time construction works associated with the Proposal. These receivers are predominantly located along the Princes Highway north of Kooraban Street, and also include receivers on Tharawal Lane and Warabin Street. In addition, noise associated with some of the works will exceed the awakening reaction screening criterion. The exceedances are attributed to the close proximity of the construction site to residences.

It should be noted that the works will generally be progressive so that not all receivers would be affected at any one time, or for the overall duration of the works.

An effective communication plan and noise management measures will need to be developed during detailed design to minimise the impacts upon affected sensitive receivers.

4.6 Construction traffic assessment

Construction activities were based on indicative construction movements and have been used in lieu of rigorously defined vehicle movements which would be determined during detailed design. Construction traffic movements in this assessment were used to conservatively assess the following number of vehicles:

- 50 light vehicle movements during the daytime and night-time periods.
- 50 heavy vehicle movements during the daytime and night-time periods.

Traffic counts for the existing daytime (7am – 10pm) and night-time (10pm – 7am) traffic flows along the nearest available major road to the Proposal (Heathcote Road) are presented in Table 23 below.

It has been assumed that current traffic consists of 10% heavy vehicles during the daytime and 20% in the night-time.

Table 23 Existing traffic flows and additional traffic flows due to construction traffic

Road	Period	Existing traffic flow		Additional traffic flow		Relative noise increase, dB(A)
		Light	Heavy	Light	Heavy	
Heathcote Road	Daytime	16,624	1,847	50	50	0.1
	Night-time	3,092	773	50	50	0.2

The results indicate that the predicted noise increases are significantly lower than the 2 dB(A) screening criteria presented in the RNP. As a result, no further consideration of construction traffic is required at this stage.

5.0 Construction vibration assessment

Vibration intensive work has the potential to occur as part of the construction work. Work may include the use of rock breaking, pile driving, jackhammering and vibratory rolling activities.

Typical minimum distances for the construction equipment that may be part of this Proposal are provided in Table 24. Minimum working distances have been developed to meet the recommended levels of vibration in British Standard 6472-1992 and DIN 4150, and are based upon the safe working distances presented in TfNSW's CNVS and AECOM's library of vibration data.

Minimum working distances should be adhered to when operating vibration intensive equipment near buildings in order to minimise the risk of discomfort to occupants and structural damage.

Table 24 Recommended minimum working distances for vibration intensive equipment

Equipment	Rating/description	Minimum working distance (metres)	
		Cosmetic damage[1]	Human response
Small hydraulic hammer	(300 kg – 5-12 t excavator)	2	7
Medium hydraulic hammer	(900 kg – 12-18 t excavator)	7	23
Large hydraulic hammer	(1600 kg – 18-34 t excavator)	22	73
Piling rig – bored	≤ 800 mm	2 (nominal)	N/A
Jackhammer	Hand held	1 (nominal)	Avoid contact with structure

Notes:

1. *More stringent conditions may apply to heritage or other sensitive structures*

The minimum working distances presented in Table 24 assume individual items of plant would be operating independently. Concurrent operation of vibration intensive equipment should be avoided, however if it is necessary to operate multiple items of equipment concurrently close to the safe working distance then vibration monitoring is recommended.

The minimum working distances for cosmetic damage are general considered to be conservative and working within them would not necessarily result in damage. However factors such as work practices and intervening ground conditions can affect vibration levels so vibration monitoring is recommended within these distances and should be carried out at the beginning of the work in order to refine the safe working distances for site specific conditions.

It is unlikely that vibration intensive equipment would be used within 30 m of sensitive receivers. A discussion of vibration mitigation is provided in Section 8.0.

6.0 Operational noise assessment – Rail noise

6.1 Overview

While the key features of the Proposal are to construct vital infrastructure to help facilitate new 10-car NIF trains in addition to future traffic growth, it is understood that these operational changes would occur independently to the Proposal. Therefore, the future changes in operational rail noise levels due to this Proposal are only brought about as a result of track slewing and extension works. An assessment of operational rail noise for the Proposal has been conducted in this section of the report.

In accordance with the RING, noise from freight locomotives idling at signals has also been included in this assessment. Due to the quasi steady-state nature of this noise, freight locomotives idling at signals has been assessed against the more stringent NPfI criteria outlined in Section 3.4, using the noise modelling methodology outlined in Section 7.2.

6.2 Noise modelling methodology

Predicted noise levels were modelled using SoundPLAN v8.0 environmental noise modelling software. Rail noise sources were modelled using the implementation of the Nordic Rail Prediction Method, Kilde Report 67/130 *"Noise from railway traffic"*.

In accordance with the RING, noise levels were predicted at 1 metre from the façade of each building, at a height of 1.5 metres above each floor.

Predicted noise levels include a +2.5 dB façade reflection to account for noise reflecting from the building façade.

6.3 Modelled scenarios

In accordance with the RING, a comparison was made between:

- The rail noise levels if the project proceeds (termed the 'build' option), and;
- The corresponding rail noise levels, due to general traffic growth that would have occurred if the project had not proceeded (termed the 'no build' option).
- Proposed freight trains idling at signals - One freight train consisting of 3 locomotives would be idling at signals to the north of the proposed Up Goods Loop. Note that idling freight locomotives would be considered steady state noise over the entire 15-minute assessment period. In AECOM's experience, maximum noise levels from such noise may be up to 2 dB higher than the L_{Aeq} noise levels. As a result, the predicted maximum noise levels will have a +2 dB correction applied for the maximum noise level assessment.

6.4 Modelling inputs and assumptions

The following features were included in the noise model:

- Ground topography
- Ground absorption and reflection
- Receivers
- Existing and future terrain elevation contours (it should be noted that the future elevation of the rail due to the implementation of retaining walls had to be inferred in lieu of information on final design elevation)
- Existing and future rail centrelines. It has been assumed that all passenger rail will run along the main up and down lines, whilst freight traffic will use the up and down goods loops. This is a conservative measure due to the closer proximity of the goods loop to sensitive receivers.
- Train movement number, lengths, speeds and rolling stock type. These movements have been taken from existing timetables for both passenger and freight movements and have assumed

30% growth for the design year of 10 years after opening. Additionally, it has been assumed that for the design scenario, all passenger trains will consist of 10-car NIF sets, whilst freight traffic will increase to a length of 1600 metres, with an additional locomotive.

- Rail noise source reference levels derived from TfNSW's *Rail Noise Database* (RNDB), 2014.
- Track conditions including the following corrections:
  - Turnouts and crossing in the existing and proposed future designs (+ 6 dB(A))
  - Radii where noise from wheel squeal and flanging could occur (+3 dB(A) where R>300m<500m, and +8 where R<300m).

Table 25 below details the sound power levels used for assessing idling freight locomotives at signals.

Table 25 Proposed idling of freight trains at signals - reference noise levels

Source	Sound power level (SWL), dB(A)	Notes
Idling freight locomotive	102 L_{Aeq}	Three locomotives would be idling at signals

6.5 Predicted operational noise levels

6.5.1 Operational rail noise

Presented in Table 26 below is a summary of the predicted exceedances of the applicable RING criteria for both the 'No build' and 'build' scenarios. It is noted that while there are some predicted exceedances of the overall L_{Amax} criteria, the change in noise levels between the 'Build' and the 'No build' option remains below the 3 dB(A) threshold outlined in the RING. Therefore, there are no predicted exceedances of the applicable RING criteria due to the operation of the Proposal. As a result, no further mitigation is considered necessary.

Detailed predicted noise levels at each assessment receiver is provided in Appendix E. A graphical representation of predicted noise results is provided in Appendix F.

Table 26 Summary of predicted operational rail noise level exceedances – in accordance with RING criteria

Scenario	Maximum daytime $L_{Aeq,15hr}$ noise level	Maximum night-time $L_{Aeq,9hr}$ noise level	Maximum L_{Amax} noise level	Number of receivers where noise levels exceed:		
				$L_{Aeq,15hr}$ noise trigger levels	$L_{Aeq,9hr}$ noise trigger levels	L_{Amax} noise trigger levels
No build	62	62	91	0	0	0
Build	62	63	93	0	0	0

6.5.2 Proposed idling of freight locomotives at signals

A summary of the predicted operational noise impact associated with idling of freight locomotives at signals is presented for daytime and night-time in Table 31. The results of this assessment show that there are no predicted exceedances of the project noise trigger levels.

Detailed predicted noise levels at each assessment receiver is provided in Appendix E. A graphical representation of predicted noise results is provided in Appendix F.

Table 27 Summary of predicted noise levels for idling freight locomotives - daytime

Meteorological condition	Project noise trigger level, dB(A)	Maximum L_{Aeq} noise level, dB(A)	Number of receivers exceeding project noise trigger levels
Standard	60	52	0

Meteorological condition	Project noise trigger level, dB(A)	Maximum L_{Aeq} noise level, dB(A)	Number of receivers exceeding project noise trigger levels
meteorological conditions			
Noise-enhancing meteorological conditions	60	53	0

Table 28 Summary of predicted noise levels for idling freight locomotives – night-time

Meteorological condition	Project noise trigger level, dB(A)	Maximum L_{Aeq} noise level, dB(A)	Number of receivers exceeding project noise trigger levels
Standard meteorological conditions	44	52	0
Noise-enhancing meteorological conditions	44	53	0

6.5.3 Maximum noise level assessment – Proposed idling freight locomotives at signals

Table 29 presents a summary of the sleep disturbance noise levels associated with idling freight locomotives scenarios. These noise levels were predicted at nearby residential receivers within the Proposal area.

Detailed predicted noise levels at each assessment receiver is provided in Appendix E. A graphical representation of predicted noise results is provided in Appendix F.

Table 29 Summary of predicted L_{Aeq} and L_{Amax} noise levels for maximum noise level assessment – Idling freight locomotives

Meteorological condition	Sleep disturbance L_{Aeq}		Sleep disturbance L_{Amax}	
	Screening level, dB(A)	Number of receivers exceeding L_{Aeq} noise levels, dB(A)	Screening level, dB(A)	Number of receivers exceeding L_{Amax} noise levels
Standard meteorological conditions	44	0	54	0
Noise-enhancing meteorological conditions	44	0	54	0

7.0 Operational noise assessment – Fixed facilities

7.1 Assessment overview

Noise emissions associated with the operation of the stabling facility and amenities building was assessed in accordance with the NPfI. Noise levels were predicted to nearby receiver locations based on typical operational noise from similar stabling yards and maintenance facilities, in addition to assumptions approved by TfNSW. The typical scenarios were modelled to assess the potential for noise emissions to impact nearby sensitive receiver locations and achieve the required project noise trigger levels presented in Section 3.4.3. The predicted noise levels are presented in Section 7.4 for 'reasonable' worst case daytime and night-time operations.

7.2 Noise modelling methodology

The operational noise levels were predicted using an implementation of CONCAWE[1] algorithms in the SoundPLAN v8.0 noise propagation software.

7.2.1 Meteorological conditions

Both standard and noise enhancing meteorological conditions were considered in accordance with the NPfI, with the following parameters:

Daytime/evening

- Standard meteorological conditions – Pasquill stability class D with wind speed up to 0.5 m/s at 10 metres.
- Noise enhancing meteorological conditions – Pasquill stability class D with wind speed up to 3 m/s at 10 metres.

Night-time

- Standard meteorological conditions – Pasquill stability class D with wind speed up to 0.5 m/s at 10 metres.
- Noise enhancing meteorological conditions – Pasquill stability class D with wind speed up to 3 m/s at 10 metres, and/or stability category F with winds up to 2 m/s at 10 metres.

Previous assessments have identified that the 3 m/s source to receiver wind meteorological condition predictions to be consistently between 0 dB(A) to 1 dB(A) higher than temperature inversion predictions. As such this report has limited the assessment of adverse conditions to the more conservative 3 m/s source to receiver wind meteorological condition.

The modelling includes:

- Ground topography
- Buildings and structures
- All identified noise producing items within the project site modelled as point or line sources where appropriate
- All sources are modelled to assume a 'reasonable' worst case 15-minute period scenario
- Ground absorption.

It can be expected that there may be differences between predicted and measured noise levels due to variations in instantaneous operating conditions, plant in operation during the measurement and also the location of the equipment and other noise sources.

All predicted noise levels are free field and 1.5 m above ground level at the most-affected point within a residential property boundary within 30 m of the nearest facade.

[1] CONCAWE – The oil companies' international study group for conservation of clean air and water – Europe (established in 1963) Report 4/81 "The propagation of noise from petroleum and petrochemical complexes to neighbouring communities".

7.3 Scenarios and noise sources modelled

This section discusses the assumed sources of noise emission from the stabling facility and amenities building. The activities are generally categorised into the following groups:

- Steady-state or quasi steady-state noise sources which typically produce continuous and consistent noise levels
- Discrete noise, which occurs infrequently and for short durations of time. This type of noise includes train horns.

To undertake the operational noise assessment in accordance with the NPfI, two operational noise scenarios were considered. These scenarios have been developed to represent 'reasonable' worst case operational conditions. The following details a list of noise sources and assumptions that have been considered in each scenario:

Scenario 1 – Existing fixed facilities

- Six 8-car T-set trains (Tangara Trains) would be stabled within the existing stabling facility located to the northeast of Waterfall station
- One of these trains would leave the stabling facility within any 15-minute assessment period, these trains would sound their horn prior to departure
- All trains would be operational with air conditioners and inverter units running
- Acoustic shielding from stabled trains has not been considered as a conservative assumption.

Scenario 2 – Proposed fixed facilities

- Ten 8-car T-set trains would be stabled within the new stabling facility, in addition to the six 8-car T-set trains stabled in the existing stabling facility to the north-east of Waterfall station
- One train would leave the proposed stabling facility, and one train would leave the existing stabling facility within the 15-minute assessment period, these trains would sound their horn prior to departure
- All trains would be operational with air conditioners and inverter units running
- Acoustic shielding from stabled trains has not been considered as a conservative assumption
- Rubbish transport using a light vehicle along the access road from the proposed amenities building to the Princes Highway, to be collected by a garbage truck just inside the access gate –. One light vehicle movement is assumed within a 15-minute period, with garbage truck collection to occur over a 2-minute period.

Table 30 provides the typical noise levels for operational plant used in the assessment.

Table 30 Stabling facility reference noise levels

Source	Sound power level (SWL), dB(A)	Notes
Air conditioner	77 L_{Aeq}	All trains in stabling yard – two units per car
Inverter	83 L_{Aeq}	All trains in stabling yard – one at both ends of each 4-car set
Compressor	91 L_{Aeq}	Trains leaving stabling yard – one unit at both ends of each 4-car set
Door test	68 L_{Aeq}	Trains leaving stabling yard – all doors on train
Electro-pneumatic brake test	114 $L_{A10,1min}$[1]	Trains leaving stabling yard – one at both ends of each 4-car set
Horn	110 $L_{A10,1min}$[2]	Trains leaving stabling yard – one 1-second burst at each end of train
Light vehicle	93 L_{Aeq}	One movement along access road to new amenities building – one movement includes one entry and one exit on the site
Garbage truck	102 L_{Aeq}[3]	One collection event lasting 2 minutes to occur during a 15-minute period

Notes:

1 *In the noise impact assessment this sound power level was adjusted for a 15-minute assessment period.*
2 *In the noise impact assessment this sound power level was adjusted for a 15-minute assessment period, assuming a 1-second burst.*
3 *Sound power level has been adjusted for a 15-minute assessment period, assuming a rubbish pickup to take 2 minutes.*

7.4 Noise modelling results

7.4.1 L_{Aeq} noise levels

A summary of the predicted operational noise impact associated with the operation of the existing stabling facility (Scenario 1), and proposed fixed facilities (Scenario 2) is presented for daytime and night-time in Table 31 through to Table 34. Detailed results for each assessed receiver are presented in Appendix G. A graphical presentation of results is shown in Appendix H.

Scenario 1 – Existing fixed facilities

Table 31 Summary of predicted noise levels for operation of existing fixed facilities - daytime

Meteorological condition	Project noise trigger level, dB(A)	Maximum L_{Aeq} noise level, dB(A)	Number of receivers exceeding project noise trigger levels
Standard meteorological conditions	60	48	0
Noise-enhancing meteorological conditions	60	48	0

Table 32 Summary of predicted noise levels for operation of existing fixed facilities – night-time

Meteorological condition	Project noise trigger level, dB(A)	Maximum L_{Aeq} noise level, dB(A)	Number of receivers exceeding project noise trigger levels
Standard meteorological conditions	44	48	11
Noise-enhancing meteorological conditions	44	48	11

Scenario 2 – Proposed fixed facilities

Table 33 Summary of predicted noise levels for operation of proposed fixed facilities - daytime

Meteorological condition	Project noise trigger level, dB(A)	Maximum L_{Aeq} noise level, dB(A)	Number of receivers exceeding project noise trigger levels
Standard meteorological conditions	60	52	0
Noise-enhancing meteorological conditions	60	52	0

Table 34 Summary of predicted noise levels for operation of proposed fixed facilities – night-time

Meteorological condition	Project noise trigger level, dB(A)	Maximum L_{Aeq} noise level, dB(A)	Number of receivers exceeding project noise trigger levels
Standard meteorological conditions	44	52	14
Noise-enhancing meteorological conditions	44	52	18

7.4.2 Maximum noise level assessment

Table 35 and Table 36 present a summary of the sleep disturbance noise levels associated with the operation of the fixed facilities and idling freight locomotives scenarios. These noise levels were predicted at nearby residential receivers within the Proposal area. Detailed results for each assessed receiver are presented in Appendix G. A graphical representation of results is shown in Appendix H.

Table 35 Summary of predicted L_{Aeq} and L_{Amax} noise levels for maximum noise level assessment – Existing fixed facilities

Meteorological condition	Sleep disturbance L_{Aeq}		Sleep disturbance L_{Amax}	
	Screening level, dB(A)	Number of receivers exceeding L_{Aeq} noise levels	Screening level, dB(A)	Number of receivers exceeding L_{Amax} noise levels
Standard meteorological conditions	44	11	54	10
Noise-enhancing meteorological conditions	44	11	54	12

Table 36 Summary of predicted L_{Aeq} and L_{Amax} noise levels for maximum noise level assessment – Proposed fixed facilities

Meteorological condition	Sleep disturbance L_{Aeq}		Sleep disturbance L_{Amax}	
	Screening level, dB(A)	Number of receivers exceeding L_{Aeq} noise levels	Screening level, dB(A)	Number of receivers exceeding L_{Amax} noise levels
Standard meteorological conditions	44	14	54	18
Noise-enhancing meteorological conditions	44	18	54	19

7.4.3 Discussion

The operational noise assessment presented in this section identified a number of exceedances of the project noise trigger levels as a result of the operation of the existing fixed facilities and the Proposal. These exceedances are located along the Princes Highway, directly adjacent to the Proposal. These exceedances are predominantly due to the proximity of stabling operations to residential receivers, in addition to the lower project noise trigger level during the night-time.

The assessment of the operation of the proposed facilities indicated that noise levels at up to 18 receivers may exceed the project noise trigger levels during the night-time for the worst-case meteorological conditions. Exceedances of up to 8 dB(A) are predicted. The same operational scenario during the daytime however is not predicted to exceed the project noise trigger levels at any receiver location.

It is noted that an assessment of existing stabling yard noise also identified a number of exceedances of the project noise trigger levels. The assessment found that noise levels at 11 receivers would exceed the project noise trigger levels for the worst-case meteorological conditions as a result of existing stabling yard operations.

A discussion of potential mitigation measures to ameliorate noise impacts associated with the stabling facility is included in Section 8.0

8.0 Mitigation measures

8.1 Construction noise and vibration mitigation

This section of the report presents construction noise and vibration mitigation measures to be considered for implementation to minimise and manage construction noise impacts.

The construction noise assessment presented in Section 4.0 of this report detailed a number of exceedances of the NMLs within the Proposal area. These were predicted as a result of various different construction activities. The following generic and receiver specific mitigation measures have been identified.

8.1.1 Construction Noise and Vibration Management Plan

A Construction Noise and Vibration Management Plan (CNVMP) should be developed for the Proposal and implemented prior to commencement of construction activities. The CNVMP should include all feasible and reasonable safeguards to manage the noise emissions from the site and any complaints which may occur due to construction noise. The CNVMP should include, as a minimum, the following:

- identification of nearby residences and other sensitive land uses
- description of approved hours of work
- description and identification of all construction activities, including work areas, equipment and duration
- description of what work practices (generic and specific) would be applied to minimise noise and vibration
- a complaints handling process
- noise and vibration monitoring procedures, including for heritage structures
- overview of community consultation required for identified high impact works.

Construction works should be planned and carried out during standard construction hours wherever possible. Table 37 presents the standard mitigation measures contained within the CNVS which should be considered as mitigation measures as part of the CNVMP.

Table 37 Transport for NSW's Construction Noise and Vibration Strategy standard mitigation measures

Action required	Safeguard details
Management measures	
Implement any project specific mitigation measures required	In addition to the measures set out in this table, any project specific mitigation measures identified in this report.
Implement stakeholder consultation measures	Periodic notification (monthly letterbox drop and website notification) detailing all upcoming construction activities will be delivered to sensitive receivers at least seven days prior to commencement of relevant works.
Site inductions	All employees, contractors and subcontractors will receive an environmental induction.
Behavioural practices	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items or slamming of doors.

Action required	Safeguard details
Noise monitoring	A noise monitoring program will be implemented to assist in confirming and controlling the site specific potential for disturbance at particularly sensitive localities at the commencement of activities and periodically during the construction program as the works progress. The program will be developed in accordance with the CNVMP and any approval/licence conditions. The results will be reviewed to determine if additional mitigation measures are required. All measurements will be undertaken in accordance with Australian Standard *1055.2018 – Acoustics – Description and measurement of environmental noise.*
Source controls	
Construction hours and scheduling	Where feasible and reasonable, construction will be carried out during the standard daytime working hours. Should out-of-hours works be required an out-of-hours works application form will be submitted to TfNSW for approval on a case-by-case basis. Work generating high noise and/or vibration levels will be scheduled during less sensitive time periods as far as practicable. This will potentially include the use breakers and jackhammers.
Construction respite period	Noise with special audible characteristics and vibration generating activities (including jack hammering) will only be carried out in continuous blocks, not exceeding three hours each, with a minimum respite period of one hour between each block. 'Continuous' includes any period during which there is less than a one hour respite between ceasing and recommencing any of the work. No more than two consecutive nights of noise with special audible characteristics and/or vibration generating work will be undertaken in the same area over any seven day period, unless otherwise approved by the relevant authority.
Equipment selection	Quieter and less vibration emitting construction methods will be used where feasible and reasonable (e.g. rubber wheeled instead of steel tracked plant). Equipment will be regularly inspected and maintained to ensure it is in good working order.
Maximum noise levels	The noise levels of plant and equipment will have operating sound power or sound pressure levels that would meet the predicted noise levels.
Rental plant and equipment	Noise emissions will be considered as part of the selection process.
Use and siting of plant	Simultaneous operation of noisy plant within discernible range of a sensitive receiver will be avoided. The offset distance between noisy plant and adjacent sensitive receivers will be maximised. Plant used intermittently will be throttled down or shut down. Plant and vehicles will be turned off when not in use. Noise-emitting plant will be directed away from sensitive receivers where reasonable and feasible.

Action required	Safeguard details
Plan work site and activities to minimise noise and vibration	Traffic flow, parking and loading/unloading areas will be planned to minimise reversing movements within the site. Truck drivers will be advised of designated vehicle routes, parking locations, acceptable delivery hours or other relevant practices (i.e. minimising the use of engine brakes, and no extended periods of engine idling).
Non-tonal reversing alarms	Non-tonal reversing beepers (or an equivalent mechanism) will be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Minimise disturbance arising from delivery of goods to construction sites	Loading and unloading of materials/deliveries will occur as far as possible from sensitive receivers. Site access points and roads will be selected as far as possible away from sensitive receivers. Dedicated loading/unloading areas will be shielded if close to sensitive receivers. Delivery vehicles will be fitted with straps rather than chains for unloading, wherever possible.
Silencers on mobile plant	Where possible noise from mobile plant will be reduced through additional fittings including: • residential grade mufflers • silenced air parking brake engagement.
Construction related traffic	Vehicle movements will be routed away from sensitive receivers and scheduled during less sensitive times. The speed of vehicles will be limited and the use of engine compression brakes will be minimised. On-site storage capacity will be maximised to reduce the need for truck movements during sensitive times.
Vibration minimum working distances	If vibration intensive equipment is to be used within the minimum working distances for cosmetic damage, as presented in Table 10, then it is recommended that attended vibration measurements are undertaken when work commences, to determine “site specific minimum working distances”. The minimum working distances for cosmetic damage from Table 10 are generally considered to be conservative and working within them would not necessarily result in damage however as factors such as work practices and intervening structures can affect vibration levels. In addition, vibration intensive work should not proceed within the site specific minimum working distances unless a permanent vibration monitoring system is installed approximately one metre from the building footprint, to warn operators (e.g. via flashing light, audible alarm, SMS) when vibration levels are approaching the peak particle velocity objective. It is also advisable to carry out building condition surveys of sensitive historical structures before construction work begins.

Action required	Safeguard details
Path controls	
Shield stationary noise sources such as pumps, compressors, fans, etc.	Stationary noise sources will be enclosed or shielded to the greatest extent possible whilst ensuring that the occupational health and safety of workers is maintained.
Shield sensitive receivers from noisy activities	Structures to shield residential receivers from noise will be used such as site shed placement, earth bunds, fencing, and erection of operational stage noise barriers (where practicable).

8.1.2 Community Consultation and Complaints Handling

All residents and sensitive receivers impacted by noise levels from the Proposal which are expected to exceed the NML should be consulted prior to the commencement of the particular activity, with the highest consideration given to those that are predicted to be most affected as a result of the works.

The information provided to the receivers would include:

- programmed times and locations of construction work
- the hours of proposed works
- construction noise and vibration impact predictions
- construction noise and vibration mitigation measures being implemented on site.

Community consultation regarding construction noise and vibration would be detailed in a Community Liaison Plan for the construction of the Proposal and would include a 24 hour hotline and complaints management process.

8.1.3 TfNSW's *Construction Noise and Vibration Strategy* - Additional Mitigation Measures

TfNSW's CNVS provides practical guidance on how to minimise, to the fullest extent practicable, the impacts on the community from airborne noise, ground-borne noise and vibration generated during the construction of TfNSW projects. This is managed through the application of all feasible and reasonable mitigation measures. Where exceedances are still expected to occur after standard mitigation measures have been applied, the CNVS recommends the implementation of additional mitigation measures. These mitigation measures are specified within the CNVS and presented in Table 38.

The provision of additional mitigation is based on the predicted exceedances above RBLs and when the exceedances occur. The RBLs can be found in Table 5.

Table 38 How to implement additional airborne noise management levels

Construction hours	Receiver perception	dB(A) above RBL	dB(A) above NML	Additional management measures
Standard hours Monday-Friday (7am-6pm) Saturday (8am-1pm)	Noticeable	5 to 10	0	-
	Clearly audible	> 10 to 20	< 10	-
	Moderately intrusive	> 20 to 30	> 10 to 20	PN, V
	Highly intrusive	> 30	> 20	PN, V
	75 dB(A) or greater	N/A	N/A	PN, V, SN
OOHW Period 1 Monday-Friday (6pm-10pm) Saturday (7am-8am, 1pm-10pm) Sunday/PH (8am-6pm)	Noticeable	5 to 10	< 5	-
	Clearly audible	> 10 to 20	5 to 15	PN
	Moderately intrusive	> 20 to 30	> 15 to 25	PN, V, SN, RO
	Highly intrusive	> 30	> 25	PN, V, SN, RO, RP[#], DR[#]
OOHW Period 2 Monday-Saturday (12am-7am, 10pm-12am) Sunday/PH (12am-8am, 6pm-12am)	Noticeable	5 to 10	< 5	PN
	Clearly audible	> 10 to 20	5 to 15	PN, V
	Moderately intrusive	> 20 to 30	> 15 to 25	PN, V, SN, RP, DR
	Highly intrusive	> 30	> 25	PN, V, SN, AA, RP, DR

Notes: *PN = Project notification* *SN = Specific notification, individual briefings, or phone call*
V = Verification monitoring *DR = Duration respite*
RP = Respite period *RO = Project specific respite order*
AA = Alternative accommodation

** SWLs used for the purpose of estimating noise impact shall be increased by 5 dB(A) where works will include: power saws for the cutting of timber, masonry & steel; grinding of metal, concrete or masonry; rock/line drilling; bitumen milling & profiling; jack hammering, rock hammering & rock breaking; or impact piling as a correction factor for noise with special audible characteristics.*

[#] Respite periods and duration reduction are not applicable when works are carried out during OOHW Period 1 Day only (i.e. Saturday 6am-7am & 1pm-6pm, Sundays / Public Holidays 8am-6am)

Table 39 outlines the additional mitigation measures, as outlined in the CNVS.

Table 39 Description of additional mitigation measures

Measure	Description	Abbreviation
Periodic Notification	For each project, a notification entitled 'Project Update' or 'Construction Update' is produced and distributed to stakeholders via letterbox drop and distributed to the project postal and/or email mailing lists. The same information will be published on the TfNSW website (www.transport.nsw.gov.au). Periodic notifications provide an overview of current and upcoming works across the project and other topics of interest. The objective is to engage, inform and provide project-specific messages. Advanced warning of potential disruptions (e.g. traffic changes or noisy works) can assist in reducing the impact on stakeholders. The approval conditions	PN

Measure	Description	Abbreviation
	for projects specify requirements for notification to sensitive receivers where works may impact on them. Content and length is determined on a project-by-project basis and must be approved by TfNSW prior to distribution. Most projects distribute notifications on a monthly basis. Each notification is graphically designed within a branded template. In certain circumstances media advertising may also be used to supplement Periodic Notifications, where considered effective. Periodic Notification may be advised by the Community Engagement Team in cases where AMMM are not triggered as shown in Tables 9 to 11, for example where community impacts extend beyond noise and vibration (traffic, light spill, parking etc). In these circumstances the Community Engagement Team will determine the community engagement strategy on a case-by-case basis.	
Verification Monitoring	Verification monitoring of noise and/or vibration during construction may be conducted at the affected receiver(s) or a nominated representative location (typically the nearest receiver where more than one receiver has been identified). Monitoring can be in the form of either unattended logging (i.e. for vibration provided there is an immediate feedback mechanism such as SMS capabilities) or operator attended surveys (i.e. for specific periods of construction noise). The purpose of monitoring is to confirm that: • construction noise and vibration from the project are consistent with the predictions in the noise assessment • mitigation and management of construction noise and vibration is appropriate for receivers affected by the works Where noise monitoring finds that the actual noise levels exceed those predicted in the noise assessment then immediate refinement of mitigation measures may be required and the Construction Noise and Vibration Impact Statement (CNVIS) amended. Refer to Section 8.4 for more details.	V
Specific Notification	Specific notifications are in the form of a personalised letter or phone call to identified stakeholders no later than seven calendar days ahead of construction activities that are likely to exceed the noise objectives. Alternatively (or in addition to), communications representatives from the contractor would visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities and provide an individual briefing. • Letters may be letterbox dropped or hand distributed • Phone calls provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposed	SN

Measure	Description	Abbreviation
	work and their specific needs • Individual briefings are used to inform stakeholders about the impacts of noisy activities and mitigation measures that will be implemented. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the project Specific notifications are used to support periodic notifications, or to advertise unscheduled works and must be approved by TfNSW prior to implementation/distribution.	
Respite Offer	The purpose of a project specific respite offer is to provide residents subjected to lengthy periods of noise or vibration respite from an ongoing impact. The offer could comprise pre-purchased movie tickets, bowling activities, meal vouchers or similar offer. This measure is determined on a case-by-case basis, and may not be applicable to all projects.	RO
Alternative Accommodation	Alternative accommodation options may be provided for residents living in close proximity to construction works that are likely to incur unreasonably high impacts. Alternative accommodation will be determined on a case-by-case basis and should provide a like-for-like replacement for permanent residents, including provisions for pets, where reasonable and feasible.	AA
Alternative construction methodology	Where the vibration assessment identifies that the proposed construction method has a high risk of causing structural damage to buildings near the works, the proponent will need to consider alternative construction options that achieve compliance with the Vibration Management Levels (VMLs) for building damage. For example, replace large rock breaker with smaller rock breakers or rock saws.	AC
Respite Period	OOHW during evening and night periods will be restricted so that receivers are impacted for no more than 3 consecutive evenings and no more than 2 consecutive nights in the same NCA in any one week. A minimum respite period of 4 evenings/5 nights shall be implemented between periods of consecutive evening and/or night works. Strong justification must be provided where it is not reasonable and feasible to implement these period restrictions (e.g. to minimise impacts to rail operations), and approval must be given by TfNSW through the OOHW Approval Protocol (Section 6). Note; this management measure does not apply to OOHW Period 1 – Days (See Table 1).	RP
Duration Reduction	Where Respite Periods (see management measure above) are considered to be counterproductive to reducing noise and vibration impacts to the community it may be beneficial to increase the number of consecutive evenings and/or nights through Duration Reduction to minimise the duration of the activity. This measure is determined on a project-by-project basis, and may not be applicable to all projects. Impacted receivers must be consulted and evidence of	DR

Measure	Description	Abbreviation
	community support for the Duration Reduction must be provided as justification for the Duration Reduction. A community engagement strategy must be agreed with and implemented in consultation with Community Engagement Representatives.	

8.2 Operational noise mitigation – Rail noise

The results of the operational rail noise assessment in Section 6.0 show that predicted noise levels due to rail traffic from the Proposal are not expected to exceed the RING noise trigger levels at any sensitive receiver during any assessment period. As a result, no noise mitigation is proposed.

8.3 Operational noise mitigation – Fixed facilities

8.3.1 Overview

The results of the assessment of fixed facilities associated with stabling facility operations identified a number of exceedances of the project noise trigger levels during the night-time. Noise levels at up to 18 receivers are predicted to exceed the project noise trigger levels for the worst-case meteorological condition, with exceedances of up to 8 dB(A) predicted. In addition, a sleep disturbance assessment considering maximum noise levels associated with the operation of the stabling facility also identified a number of exceedances of the nominated sleep disturbance criteria.

The largest contribution to these exceedances is noise associated with the preparation of trains prior to departure, such as brake testing and horn use.

A conservative approach was taken in developing the operational assumptions used to complete this assessment. This was done in order to ensure that operational noise impacts at sensitive receivers are not under-predicted, and adequate noise management and mitigation measures are considered early in the Proposal. The actual activities of the Proposal once fully operational may be less than what has been considered here and as such, the operational noise impacts would be lower.

It is noted that the assessment of the existing operations at the stabling facility to the northeast of Waterfall Station identified that using the current assumptions, the project noise trigger levels are already exceeded at a number of receivers.

It is also noted that the NPfI noise trigger levels do not represent mandatory noise limits. The project noise trigger level is a level that, if exceeded, would indicate a potential noise impact on the community, and so would 'trigger' a management response. In this case, the assessment should identify reasonable and feasible mitigation. For new developments and redevelopments, mitigation strategies should be considered in a hierarchical approach:

- Controlling noise at the source
- Once the controls at the source are exhausted, controlling the transmission of noise
- Once source and transmission controls are exhausted, considering mitigation measures at the noise-sensitive receivers.

Below details a list of mitigation measures that should be considered by the Proponent when determining reasonable and feasible mitigation measures. These options have been presented using the same hierarchical approach identified in the NPfI, and should also be considered in parallel with effective community consultation.

Source controls

- Alternative methods to testing or sounding horns prior to departure should be considered, as has been adopted at other Sydney Trains facilities. This would enable the train driver to warn of impending train movement without sounding the train horn when entering or exiting the stabling yard

- Prioritise moving trains out of the existing stabling facility first during noise sensitive periods. This measure would allow for greater distance between noise sources at the facility and receivers.
- Move trains out of the north of the proposed stabling facility instead of the south. This measure would allow for greater distance between noise sources at the facility and receivers.
- Stable quieter train sets wherever possible. This option would reduce overall noise emission from the proposed facility.
- Turn off stabled trains completely when not in use. This would reduce overall noise emission from the proposed facility.
- Rolling stock modifications to reduce noise from compressors, etc. during testing and preparation procedures. This would reduce overall noise emission from the proposed facility.
- Reduce the number of trains leaving during noise sensitive periods. This would reduce the overall noise level of the facility in addition to reducing the number of maximum noise events that would occur.

Transmission controls

- Construct a noise barrier or mound between the rail corridor and the road reserve along the Princes Highway adjacent to affected receivers. The use of barriers should be carefully considered with respect to negative impacts, such as unappealing visual impact or graffiti.
- Prioritise moving trains that are already sited behind other stabled trains in the facility. This would induce a shielding effect between the source and receiver.

At-receiver controls

- Architectural treatments such as the provision of mechanical ventilation and upgraded glazing of windows. The use of architectural treatments should be considered carefully with respect to cost effectiveness and is typically only considered feasible in cases where few receivers would be affected.

8.3.2 Noise reduction program

Based upon the outcome of this assessment, it is recommended that a noise reduction program as outlined in Section 6.2 of the NPfI be developed in order to provide a formal, structured approach to reduce noise to acceptable levels over time, by applying reasonable and feasible control measures. A noise reduction program would review the site-specific activities that would occur due to stabling operations and take into consideration the noise expectations of the community. The program would include the following elements:

- The aim and scope of the program
- Identification of noise levels and targets for the site
- Time frame for implementation of measures
- An upper limit for new equipment
- An upper limit for partial upgrades of the site
- Plans to eliminate problematic characteristics that have been identified, such as tonal and low-frequency noise
- A sound power target for relevant sections of the site
- Operating practices to reduce tonal emissions
- Training and awareness initiatives
- A compliance monitoring program to evaluate noise emission levels. This should be conducted within 6 months of opening of the Proposal
- Communicating with the affected community using tools such as a complaints handling process, liaison group or newsletters.

The above elements should be included in the noise reduction program. The program would also discuss all potential mitigation options presented in Section 8.3.1.

9.0 Conclusion

A Noise and Vibration Impact Assessment has been completed for the Waterfall Stabling Yard and Platform Extension (the Proposal). Nearby noise and vibration sensitive receivers were identified. Attended and unattended noise measurements were completed to characterise the existing noise environment. The measured noise levels were used to establish operational noise criteria and construction NMLs.

9.1 Construction noise

Construction work packages have been developed in consultation with TfNSW and the proposed equipment has been detailed within this report. Nine distinct construction stages were used in a computer-based noise model to determine the predicted noise levels generated from the Proposal.

The predicted construction noise levels exceed the construction NMLs at some receivers. The magnitude and number of exceedances are detailed in Section 4.4.

Measures have been recommended to mitigate construction noise impacts upon nearby sensitive receivers.

The final number, degree and nature of these measures would be selected by the contractor and be largely dependent on the construction strategy and work carried out. Specific noise management and mitigation measures would be detailed in the contractor's CNVMP. The recommended management and mitigation measures which would be considered in the plan include:

- Effective communication with community and affected receivers about mitigation measures
- Training of construction site workers
- Use of temporary noise barriers
- Monitoring
- Appropriate selection and maintenance of equipment
- Scheduling of work for less sensitive time periods
- Situating plant in less noise sensitive locations
- Construction traffic management
- Respite periods.

9.1.1 Construction traffic

An assessment of the likely construction traffic indicated that increases in road traffic noise levels would be considerably lower than the 2 dB(A) threshold outlined in the RNP. Therefore, no further assessment of construction traffic is required in accordance with the RNP.

9.2 Construction vibration

Minimum working distances to nearby structures have been recommended for nominated plant. If the minimum working distances are maintained, then no adverse impact from the vibration intensive works are likely in terms of human response or cosmetic damage. It is unlikely that work would be undertaken within the minimum working distances for heritage, commercial and residential receivers during the proposed vibration intensive works. Should works be required within the minimum working distances, the recommended additional mitigation measures would be implemented.

9.3 Operational noise – Rail Noise

An operational rail noise assessment was undertaken in accordance with the RING. The results of this assessment found that the predicted noise levels due to operational rail traffic within the Proposal area were below the noise trigger levels outlined in the RING. As a result, no further mitigation of operational rail traffic is currently proposed.

9.4 Operational noise – Fixed facilities

The results of the assessment of fixed facilities associated with stabling facility operations identified a number of exceedances of the project noise trigger levels during the night-time. In addition, a sleep disturbance assessment considering maximum noise levels associated with the operation of the stabling facility identified a number of exceedances of the nominated sleep disturbance criteria.

A number of potential mitigation options have been provided and should be considered by the Proponent when determining feasible and reasonable mitigation measures.

Based upon these outcomes, it is recommended that a noise reduction program as outlined in Section 6.2 of the NPfI be developed in order to provide a formal, structured approach to reduce noise to acceptable levels over time, by applying reasonable and feasible control measures. The program would review the site-specific activities that would occur due to stabling operations and take into consideration the noise expectations of the community. This has been discussed further in Section 8.3.

Appendix C

Logging results

Noise Logger Report

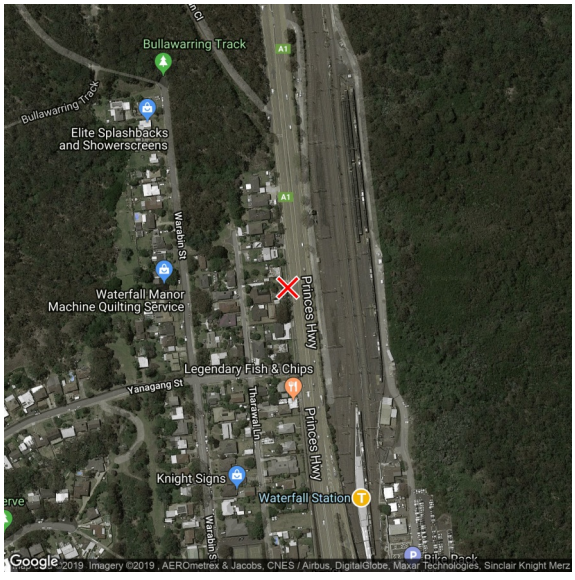
1909 Princes Highway, Waterfall

Item	Information
Logger Type	Rion NL52
Serial number	553967
Address	1909 Princes Highway, Waterfall
Location	Back Yard
Facade / Free Field	Free Field
Environment	Noise environment dominated by road traffic noise from Princes Highway. Train pass by inaudible over road traffic

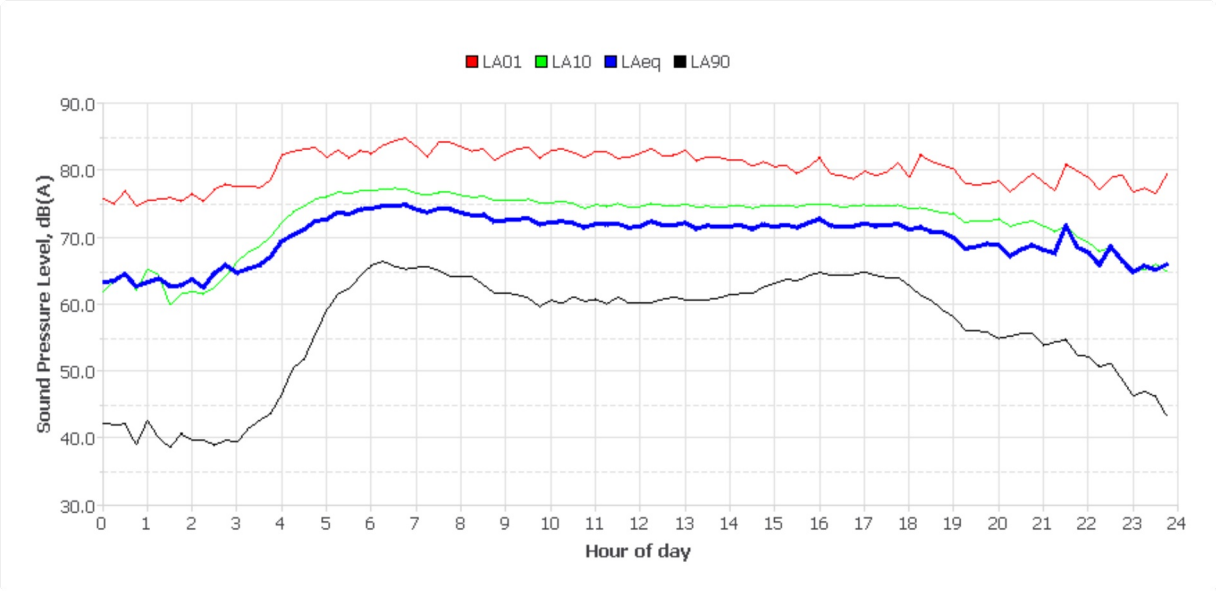
Measured noise levels

Logging Date	L_{Aeq} Day	Eve	Night	ABL Day	Eve	Night	$L_{Aeq,15hr}$	$L_{Aeq,9hr}$
Thu May 9 2019	71	69	67	-	54	-	71	67
Fri May 10 2019	72	69	70	-	-	-	72	70
Sat May 11 2019	71	67	67	-	-	40	68	67
Sun May 12 2019	72	70	65	55	56	38	72	65
Mon May 13 2019	72	70	70	60	50	39	72	70
Tue May 14 2019	72	69	70	-	52	38	71	70
Wed May 15 2019	72	69	70	60	53	37	72	70
Thu May 16 2019	72	70	70	60	53	40	72	70
Fri May 17 2019	73	-	70	-	-	-	73	70
Summary	**72**	**69**	**69**	**60**	**53**	**39**	**71**	**69**

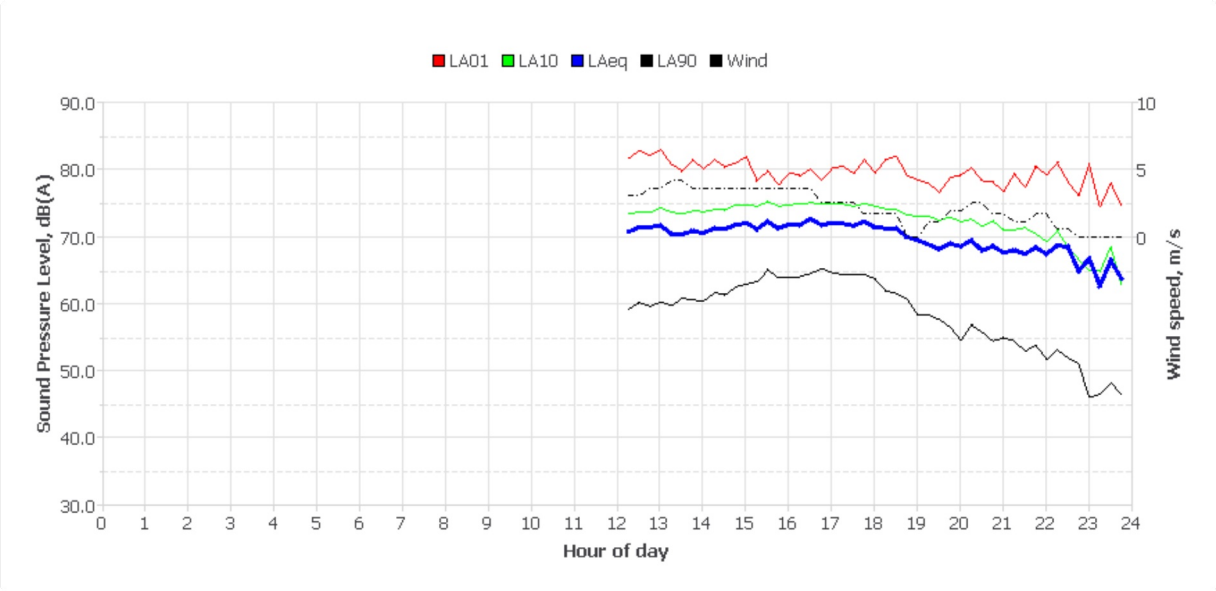
Note: Results denoted with '-' do not contain enough valid data for a value to be calculated. The data has been excluded either manually or automatically as a result of adverse weather conditions.

Logger Location	Logger Deployment Photo
	

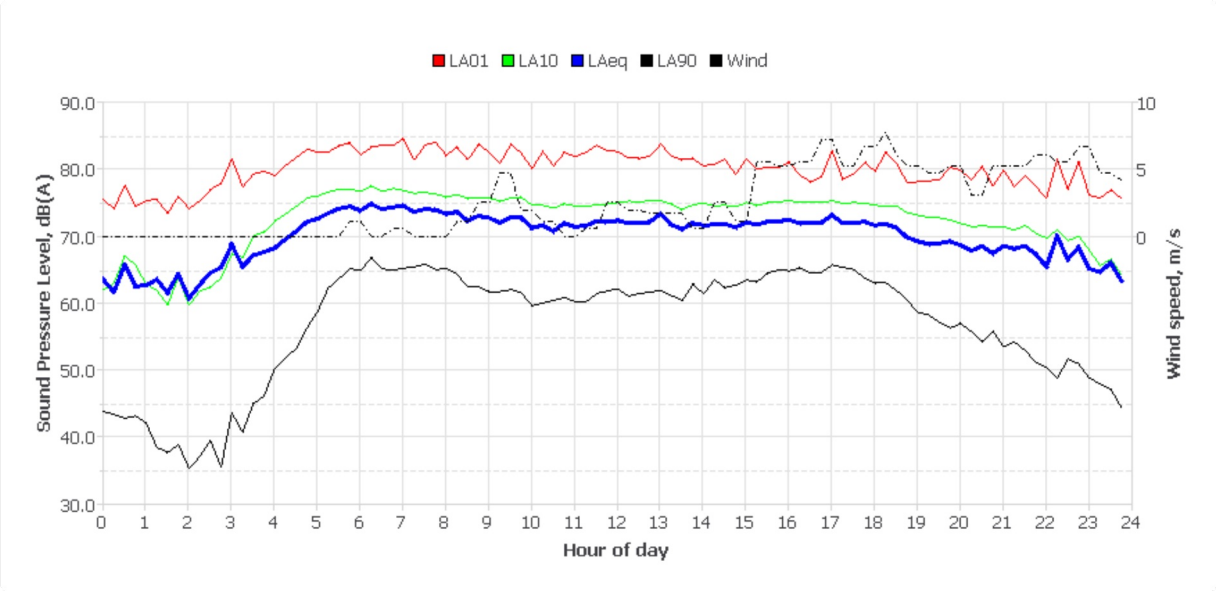
Typical Day



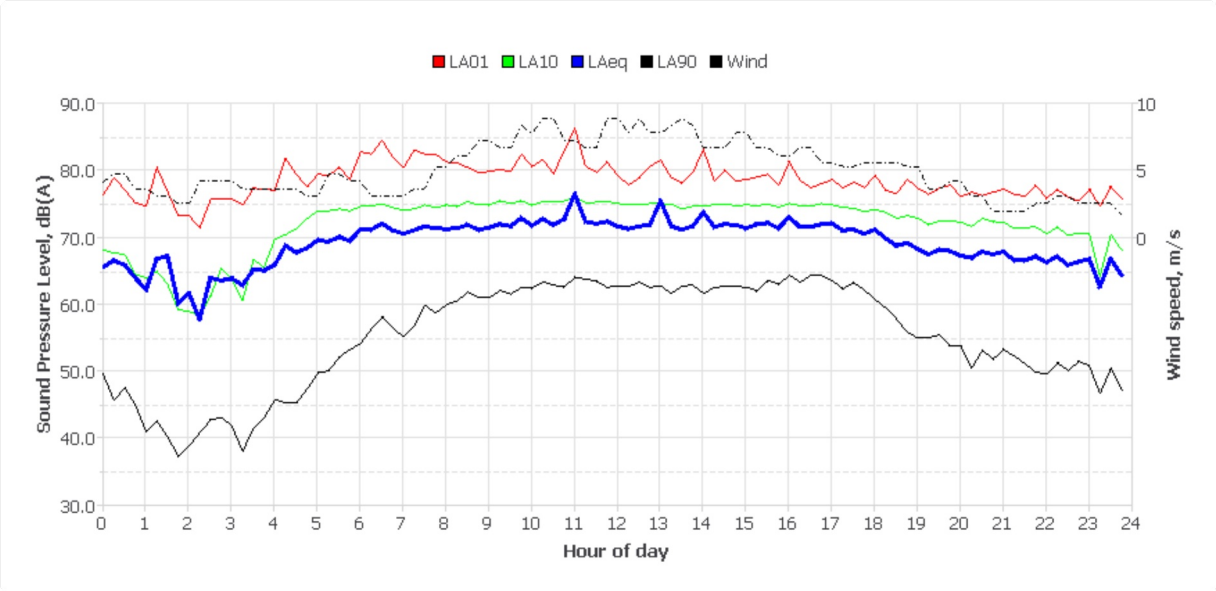
Thursday, 09 May 2019



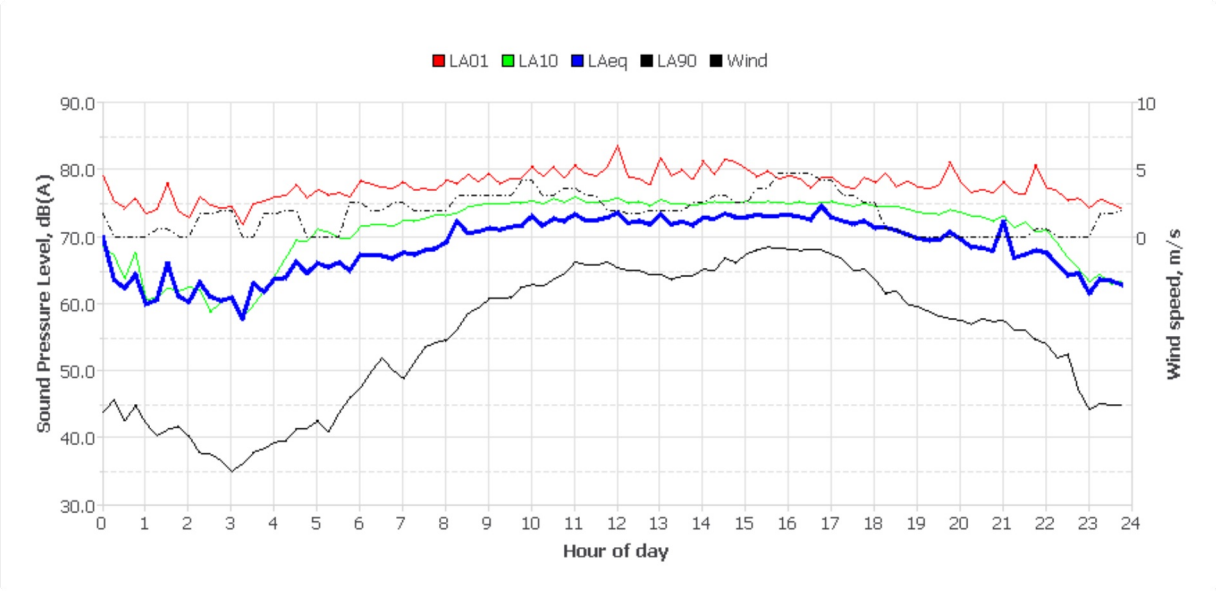
Friday, 10 May 2019



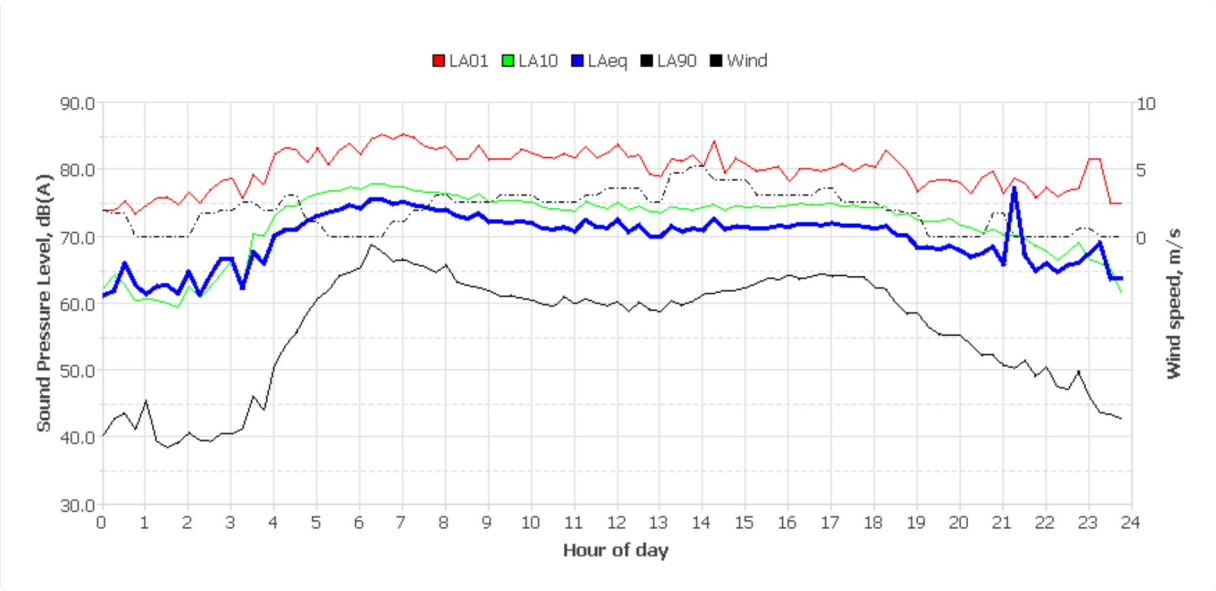
Saturday, 11 May 2019



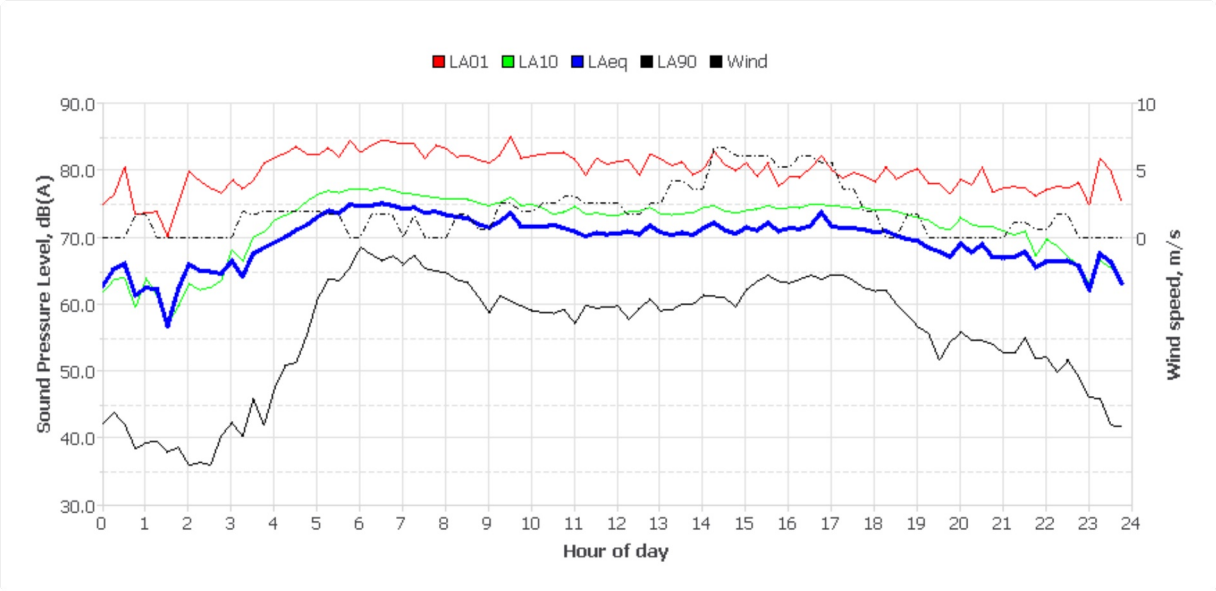
Sunday, 12 May 2019



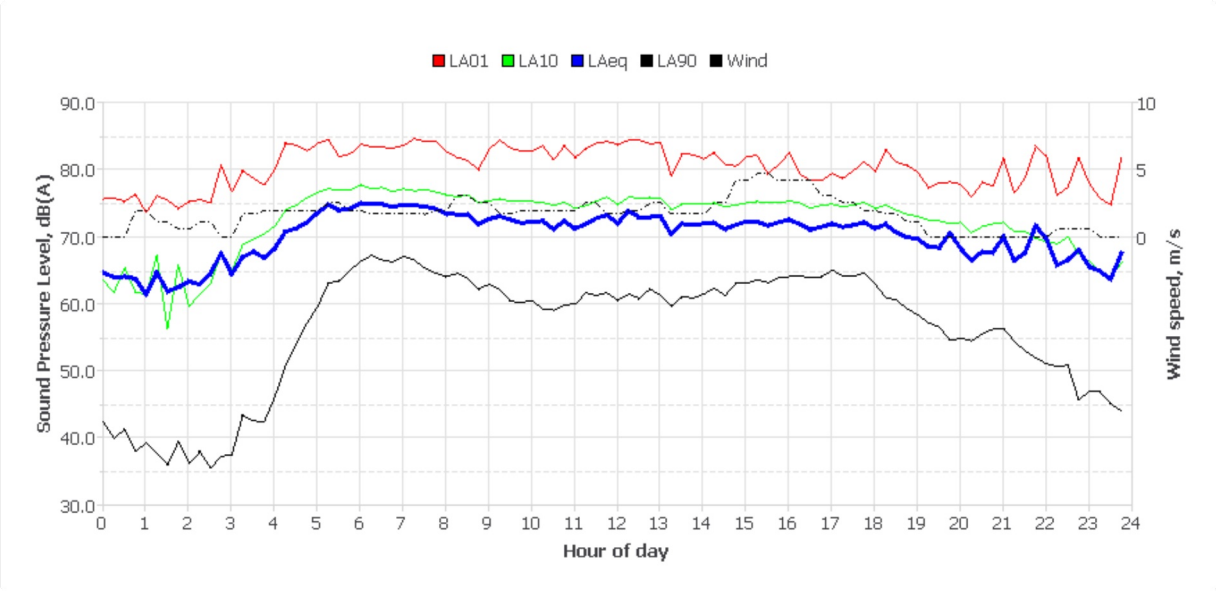
Monday, 13 May 2019



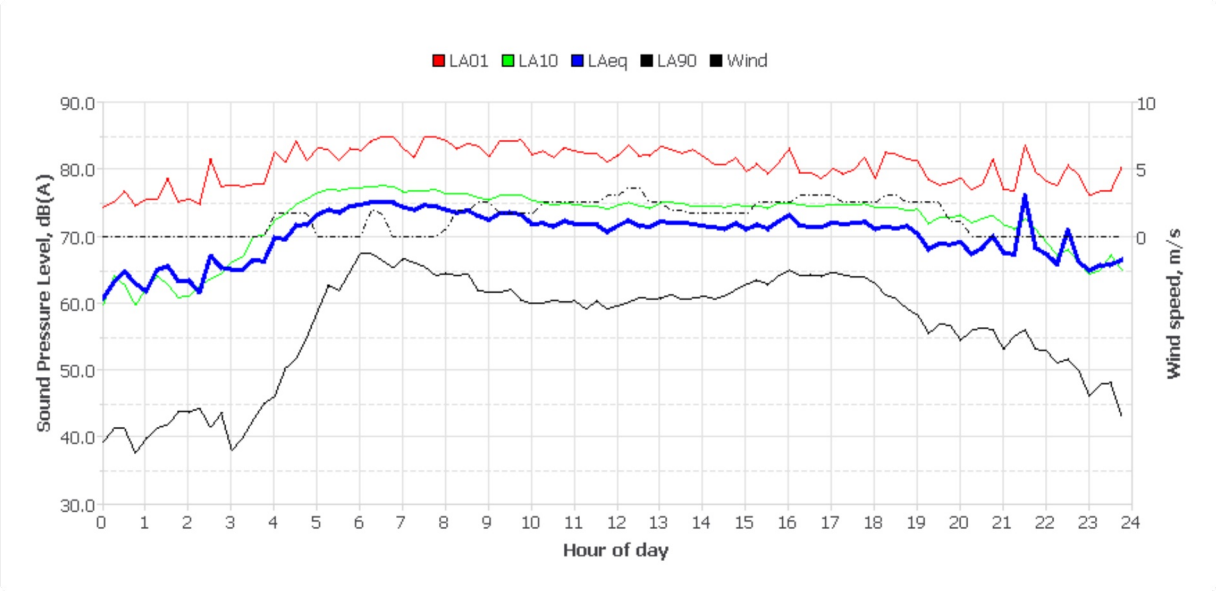
Tuesday, 14 May 2019



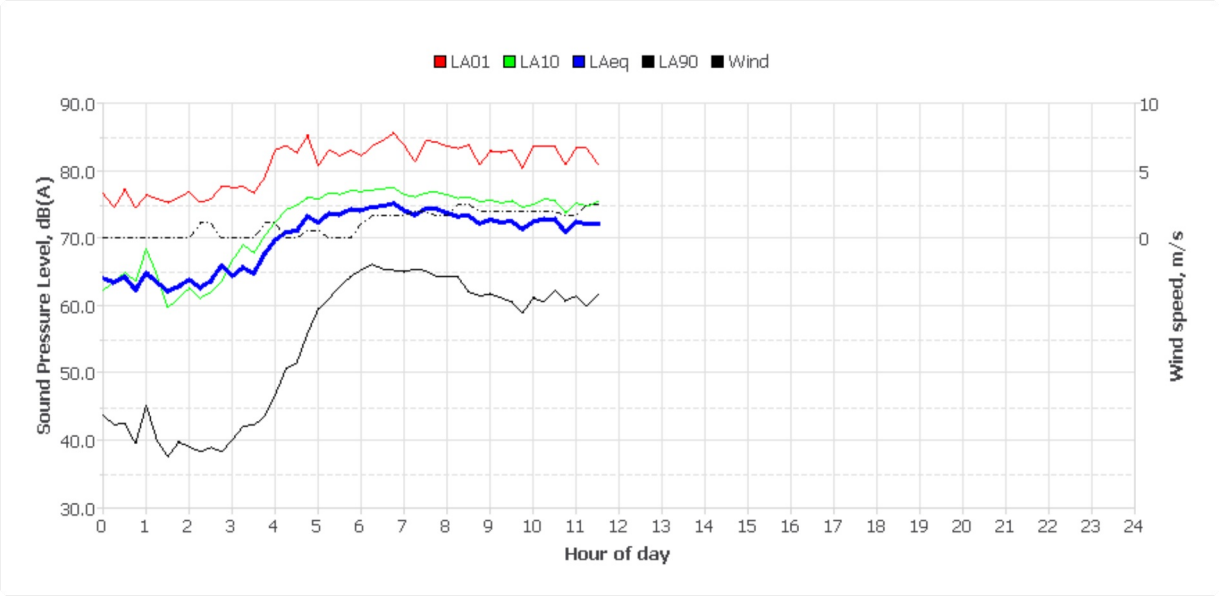
Wednesday, 15 May 2019



Thursday, 16 May 2019



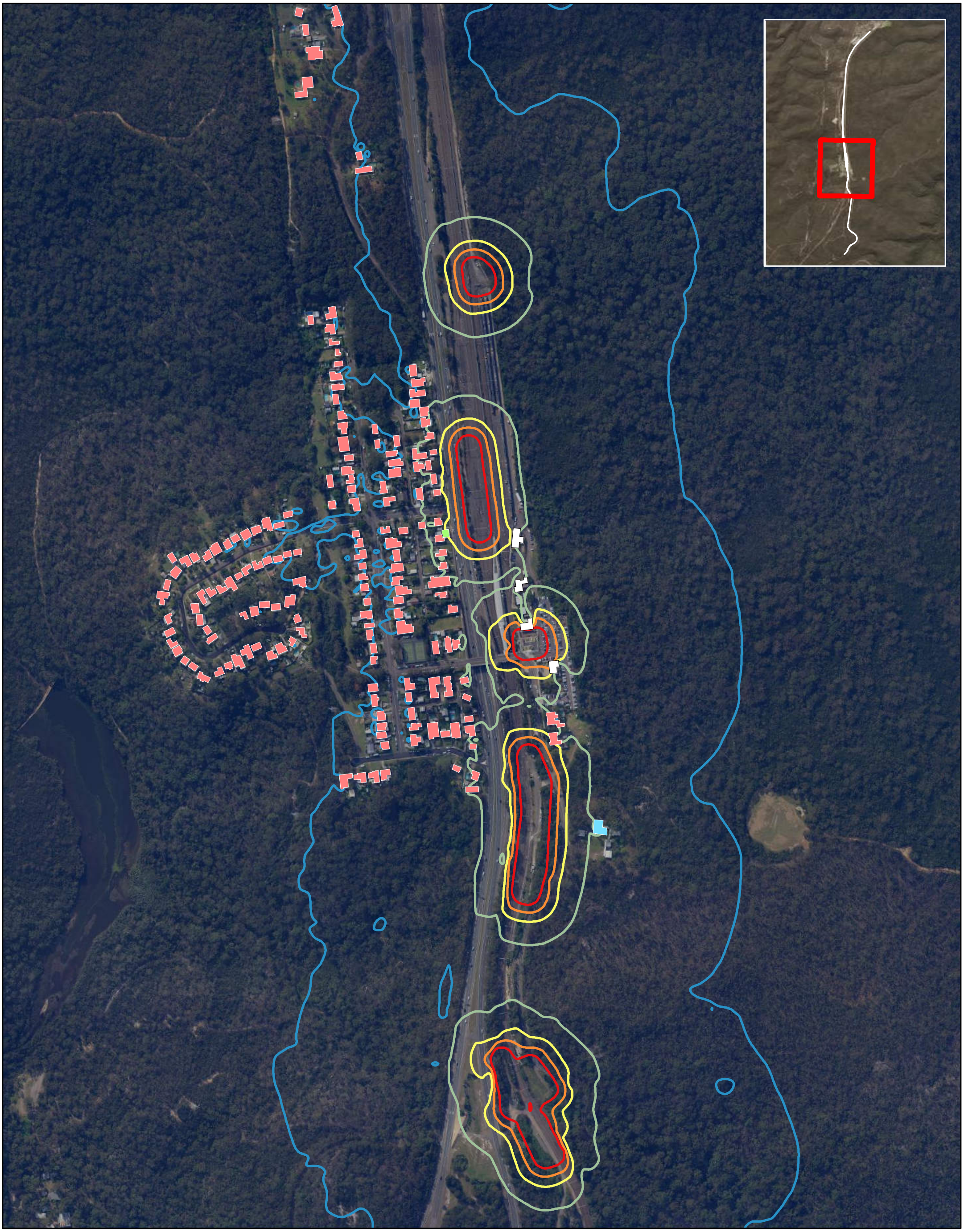
Friday, 17 May 2019



Appendix D

Construction noise contours

AECOM



Highly Noise Affected Level - 75 dB(A)
Standard Hours NML - 70 dB(A)
Out-of-Hours-Daytime NML - 65 dB(A)
Out-of-Hours Evening NML - 58 dB(A)
Standard Hours NML - 44 dB(A)

Residential
Commercial
School
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Site Establishment and Enabling Works

0 100 200 400 m

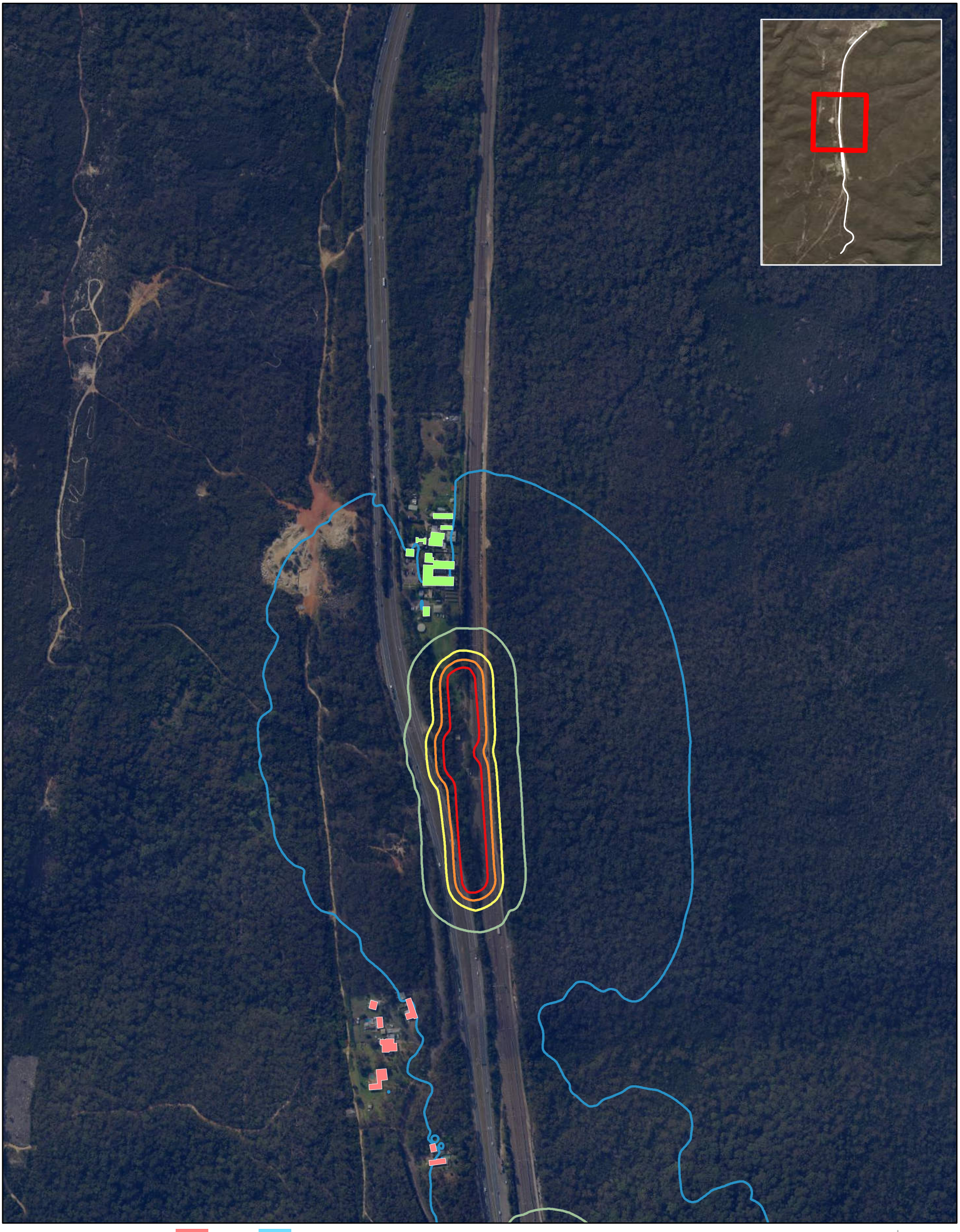
N

JUL 2019

60600277

D-1

AECOM



Highly Noise Affected Level - 75 dB(A)
Standard Hours NML - 70 dB(A)
Out-of-Hours-Daytime NML - 65 dB(A)
Out-of-Hours Evening NML - 58 dB(A)
Standard Hours NML - 44 dB(A)

Residential
Commercial
School
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Site Establishment and Enabling Works

0 100 200 400 m

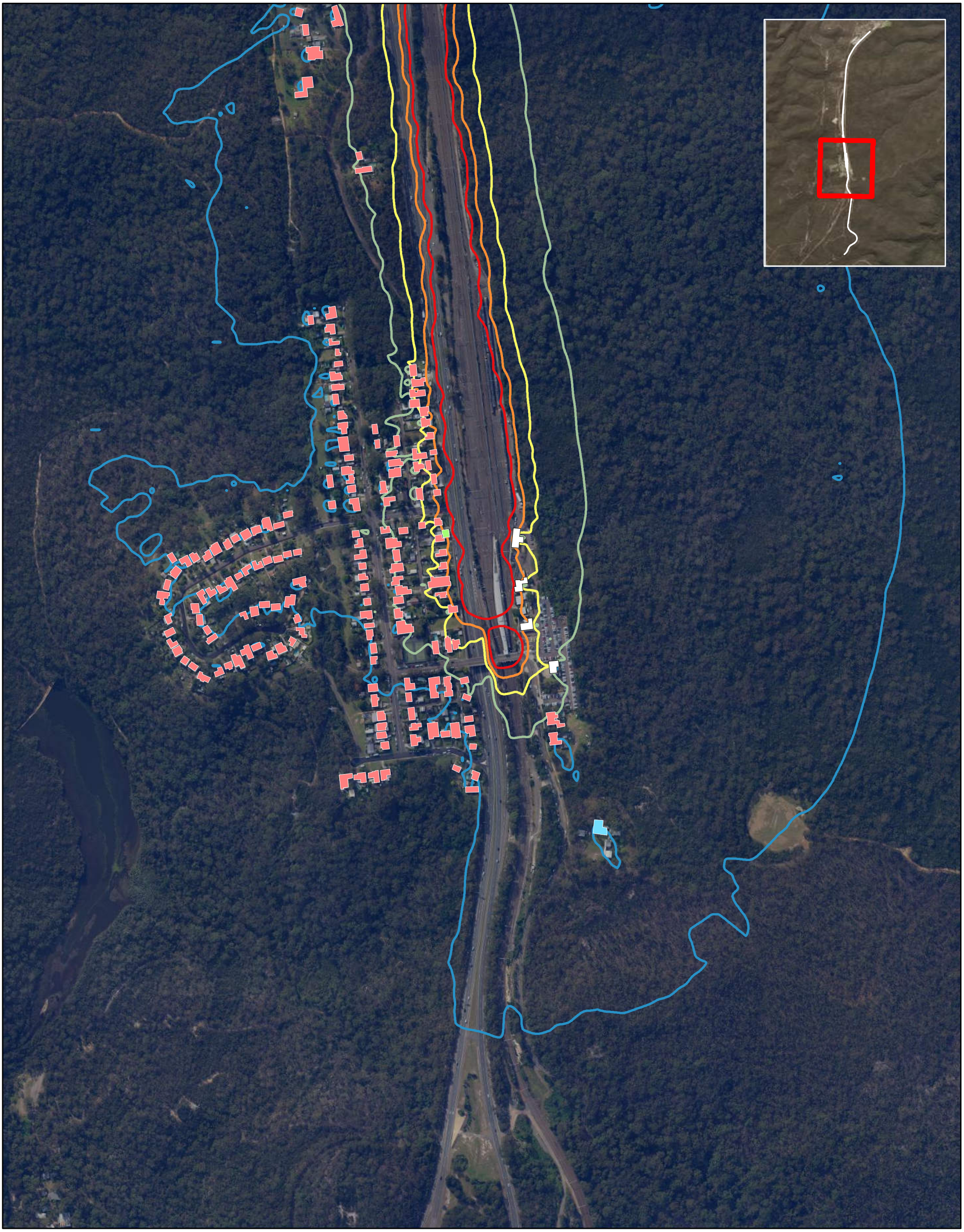
N

JUL 2019

60600277

D-2

AECOM



Highly Noise Affected Level - 75 dB(A)
Standard Hours NML - 70 dB(A)
Out-of-Hours-Daytime NML - 65 dB(A)
Out-of-Hours Evening NML - 58 dB(A)
Standard Hours NML - 44 dB(A)

Residential
Commercial
School
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Utility Works

0 100 200 400 m

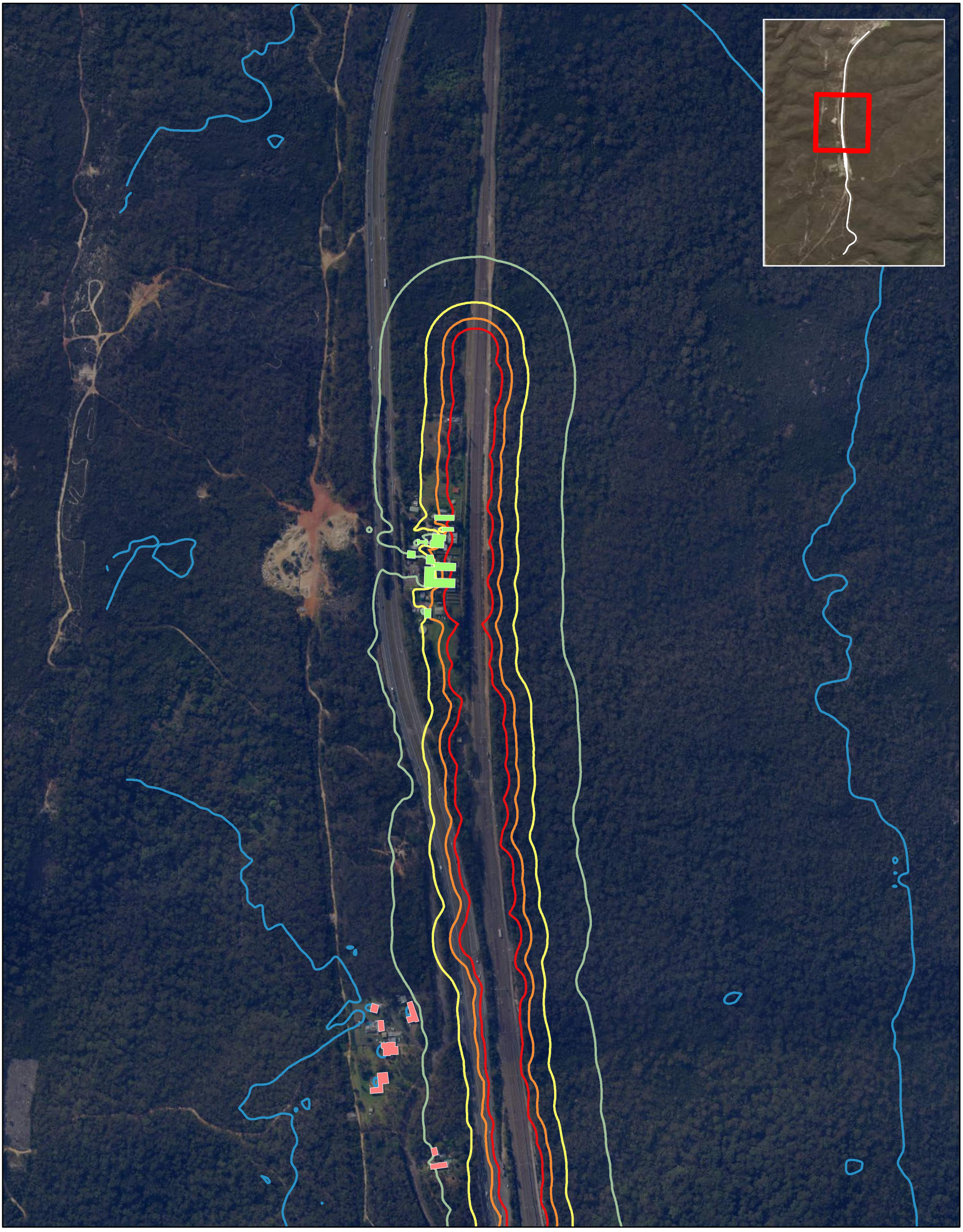
N

JUL 2019

60600277

D-3

AECOM



Highly Noise Affected Level - 75 dB(A)
Standard Hours NML - 70 dB(A)
Out-of-Hours-Daytime NML - 65 dB(A)
Out-of-Hours Evening NML - 58 dB(A)
Standard Hours NML - 44 dB(A)

Residential
Commercial
School
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Utility Works

0 100 200 400 m

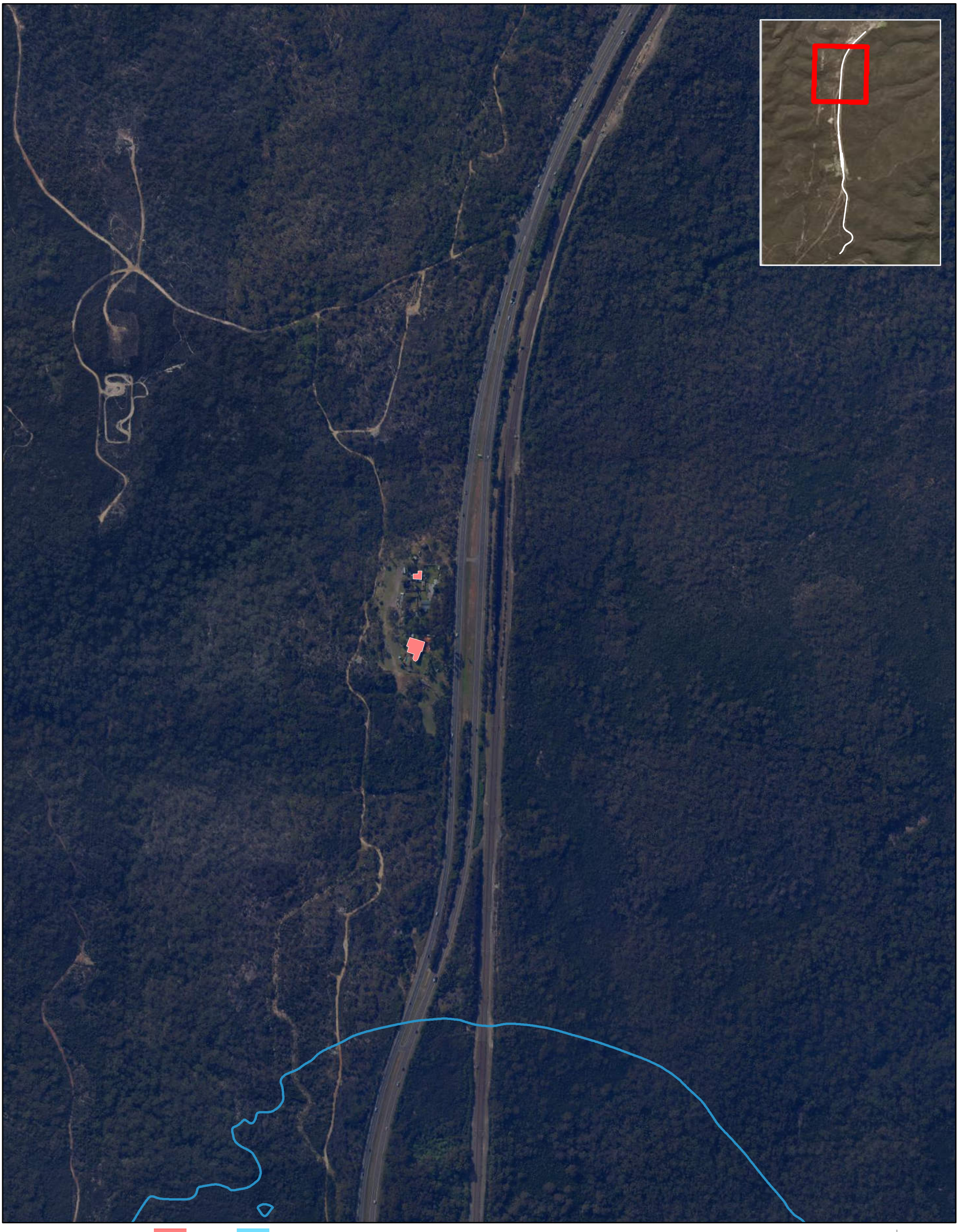
N

JUL 2019

60600277

D-4

AECOM



Standard Hours NML - 44 dB(A)

Residential

School

Commercial

Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Utility Works

0 100 200 400 m

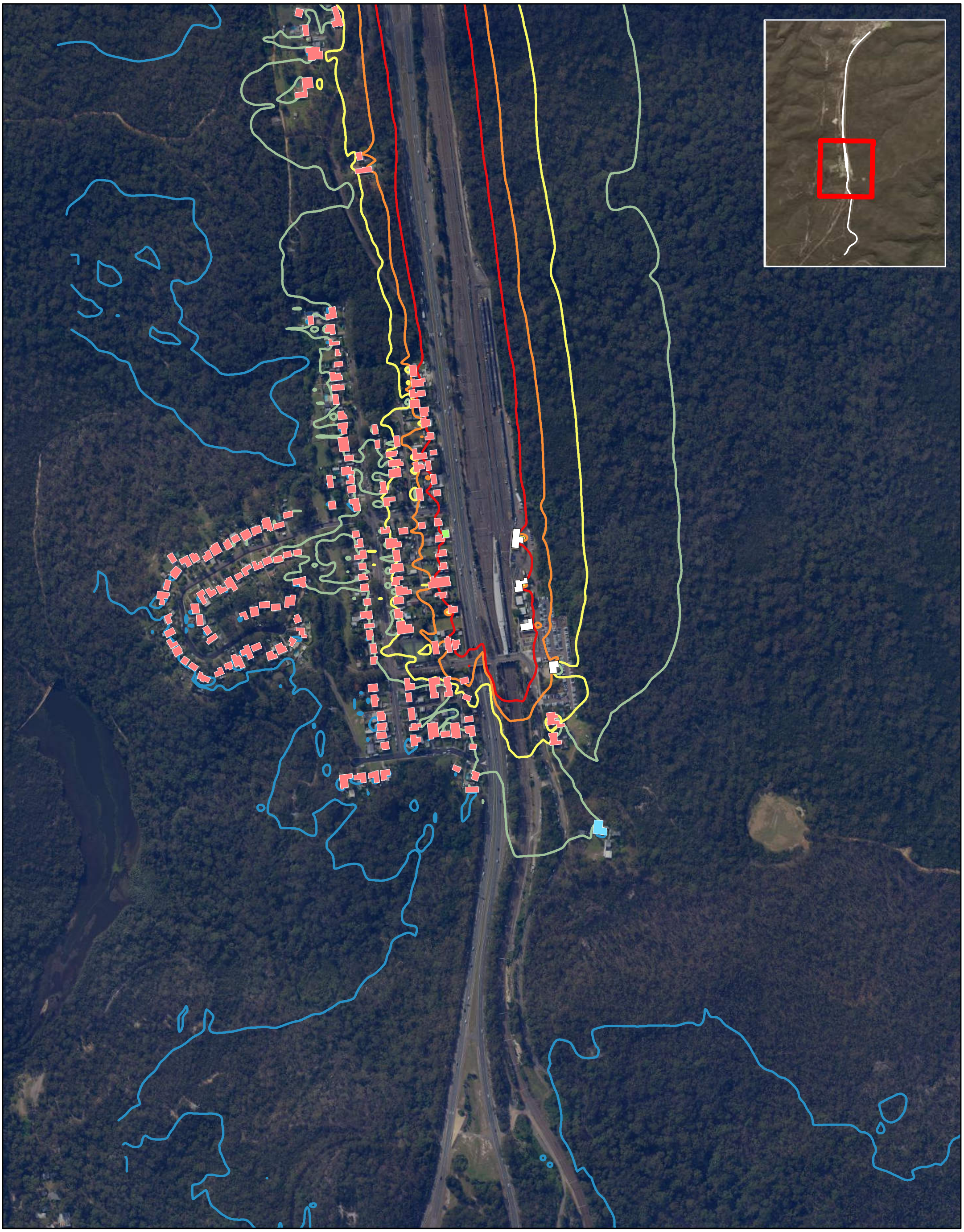
N

JUL 2019

60600277

D-5

AECOM



Highly Noise Affected Level - 75 dB(A)
Standard Hours NML - 70 dB(A)
Out-of-Hours-Daytime NML - 65 dB(A)
Out-of-Hours Evening NML - 58 dB(A)
Standard Hours NML - 44 dB(A)

Residential
Commercial
School
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Track Modifications / Stabling Works

0 100 200 400 m

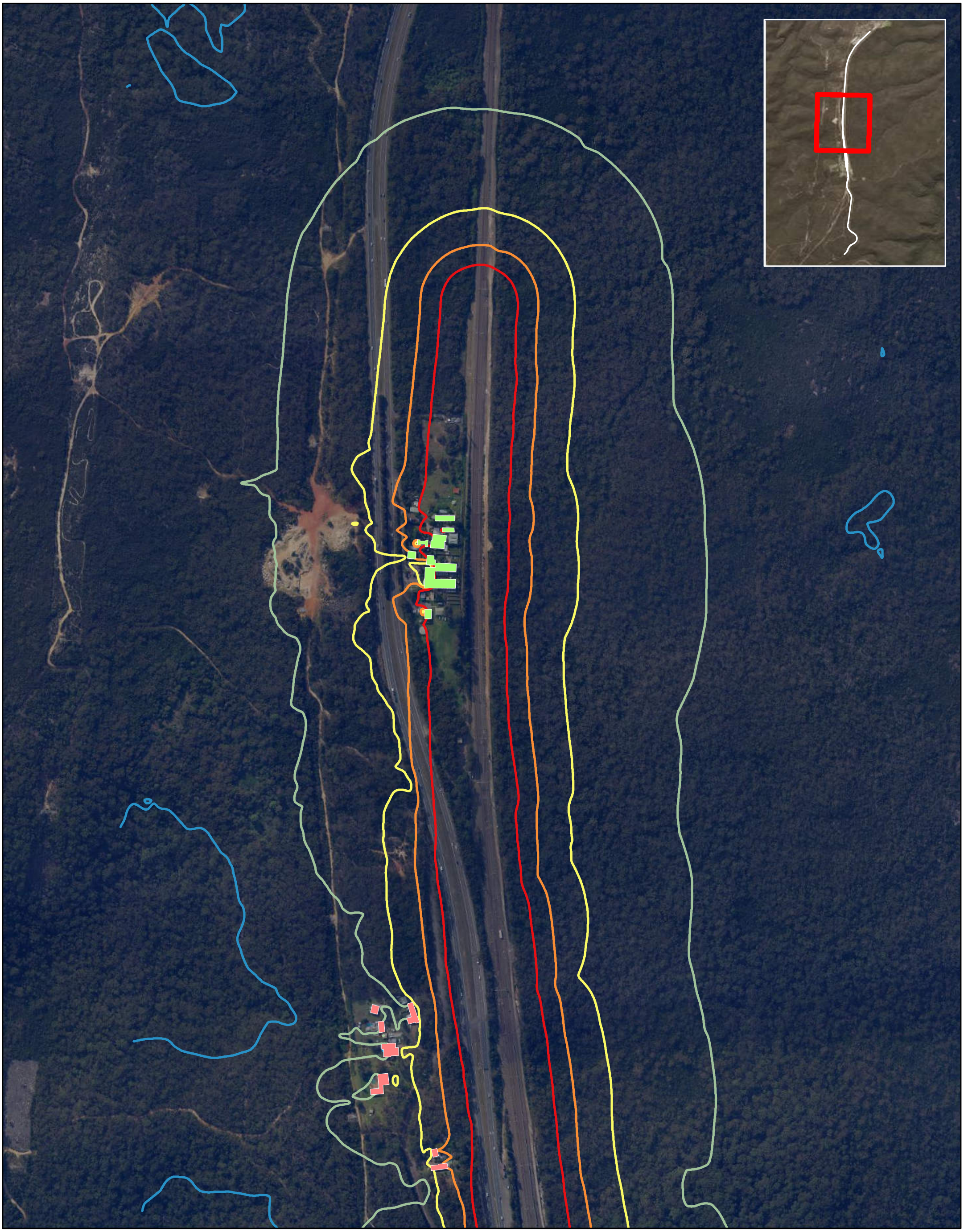
N

JUL 2019

60600277

D-6

AECOM



Highly Noise Affected Level - 75 dB(A)
Standard Hours NML - 70 dB(A)
Out-of-Hours-Daytime NML - 65 dB(A)
Out-of-Hours Evening NML - 58 dB(A)
Standard Hours NML - 44 dB(A)

Residential
Commercial
School
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Track Modifications / Stabling Works

0 100 200 400 m

N

JUL 2019

60600277

D-7

AECOM

Out-of-Hours Evening NML - 58 dB(A)
Standard Hours NML - 44 dB(A)
Residential
Commercial
School
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Track Modifications / Stabling Works

0 100 200 400 m

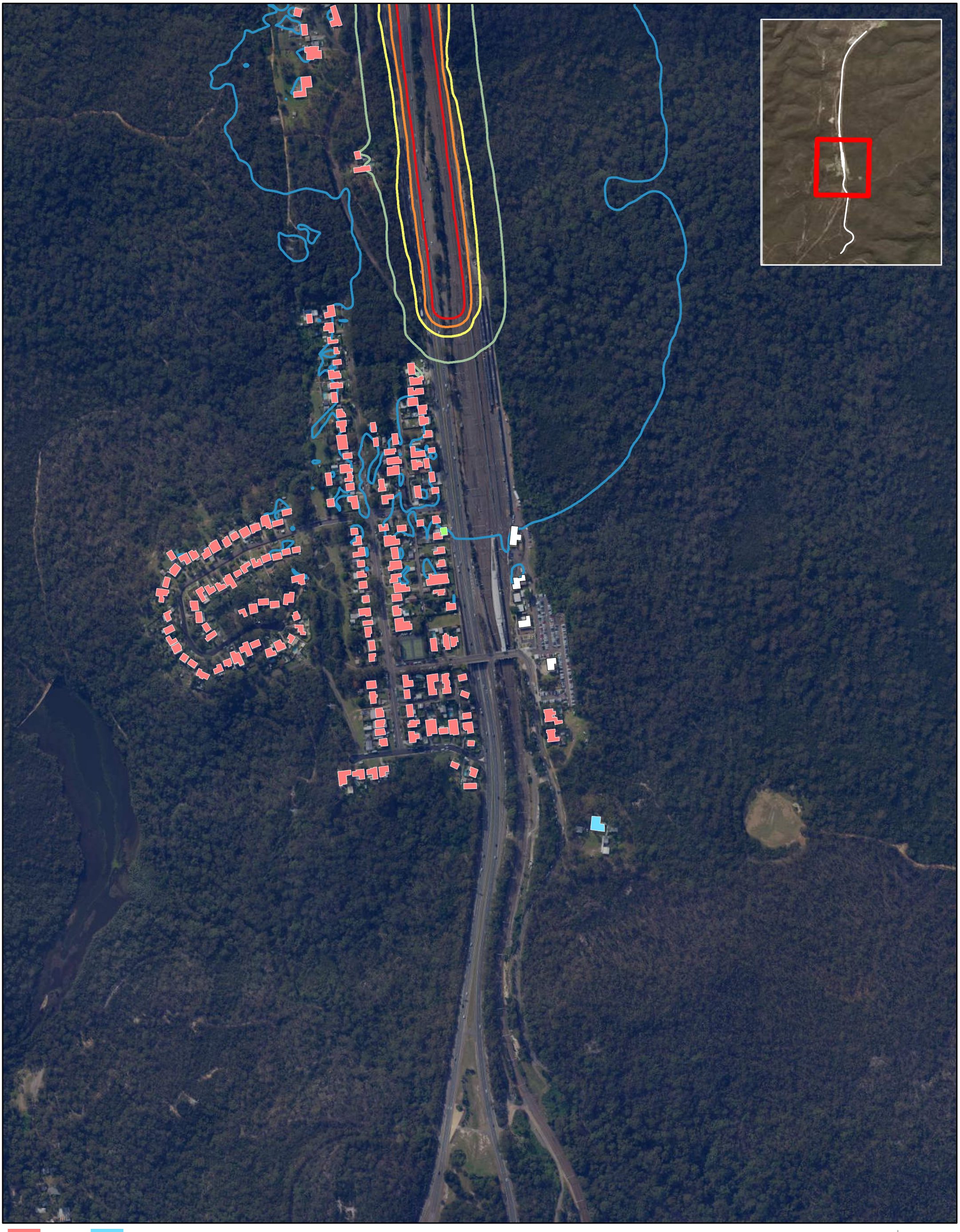
N

JUL 2019

60600277

D-8

AECOM



Residential
School
Commercial
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Retaining Wall Construction

0 100 200 400 m

N

JUL 2019

60600277

D-9

AECOM

Residential
School
Commercial
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Retaining Wall Construction

JUL 2019

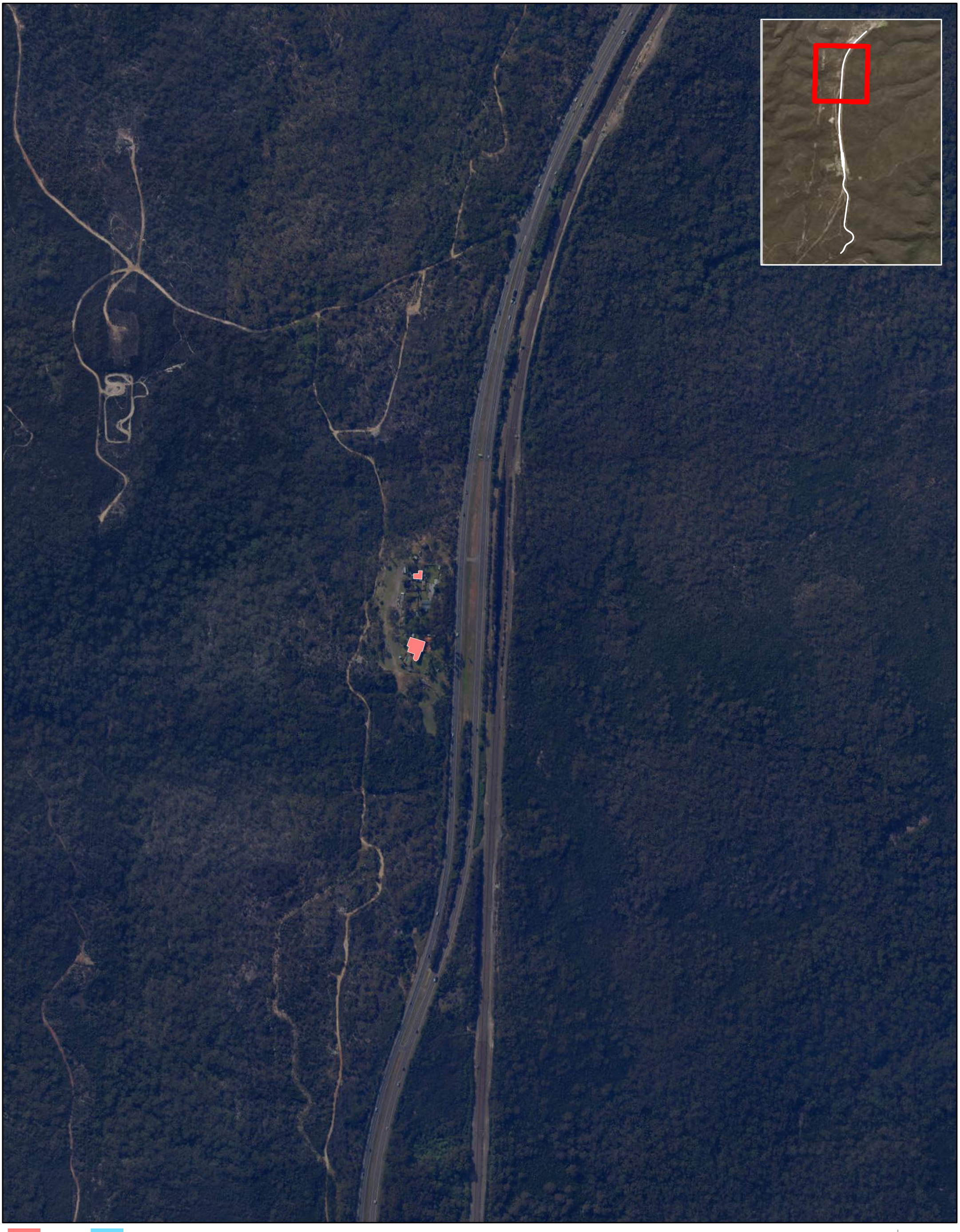
60600277

0 100 200 400 m

N

D-10

AECOM



Residential
School
Commercial
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Retaining Wall Construction

0 100 200 400 m

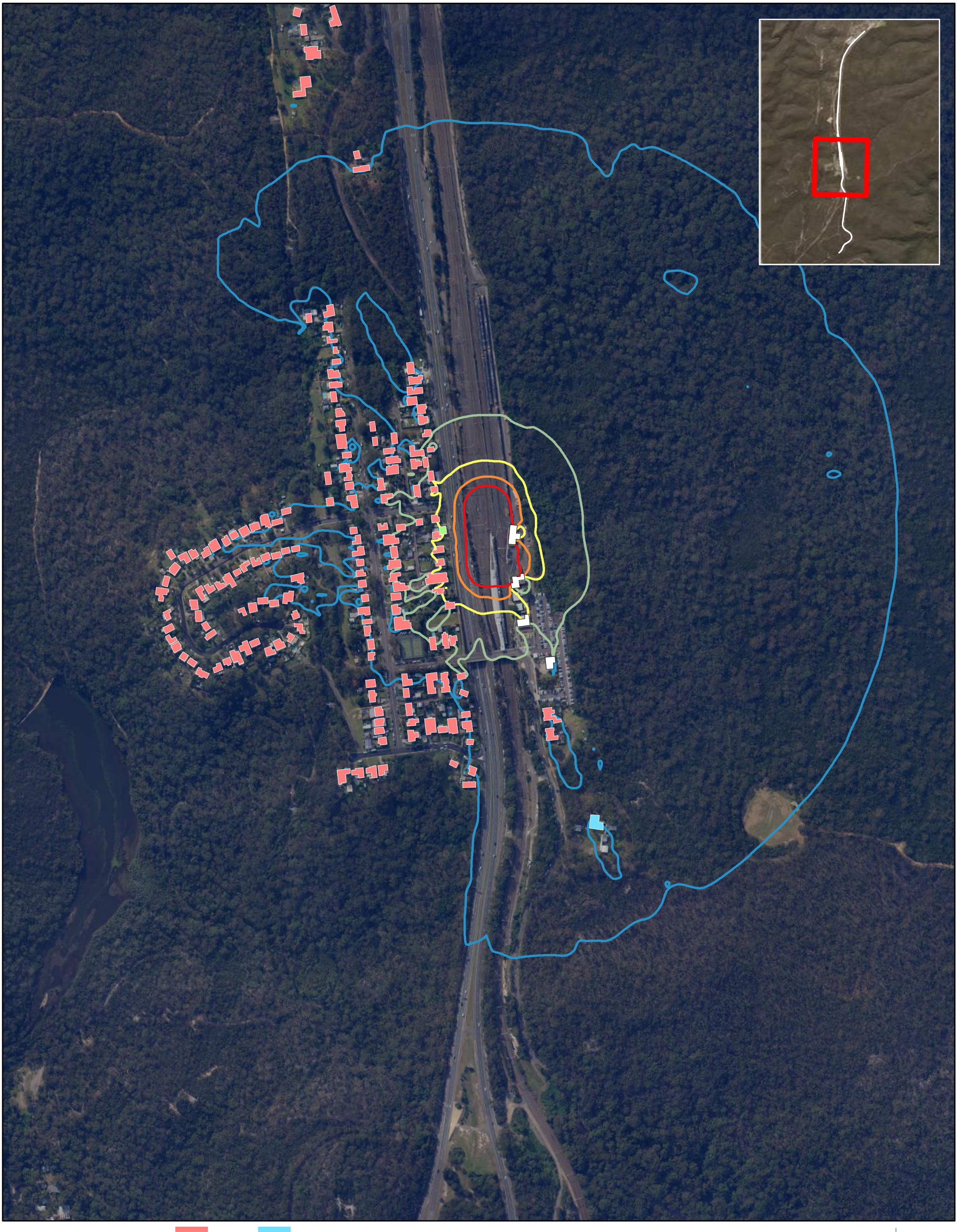
N

JUL 2019

60600277

D-11

AECOM



Highly Noise Affected Level - 75 dB(A)
Standard Hours NML - 70 dB(A)
Out-of-Hours-Daytime NML - 65 dB(A)
Out-of-Hours Evening NML - 58 dB(A)
Standard Hours NML - 44 dB(A)

Residential
Commercial
School
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Platform Extension

0 100 200 400 m

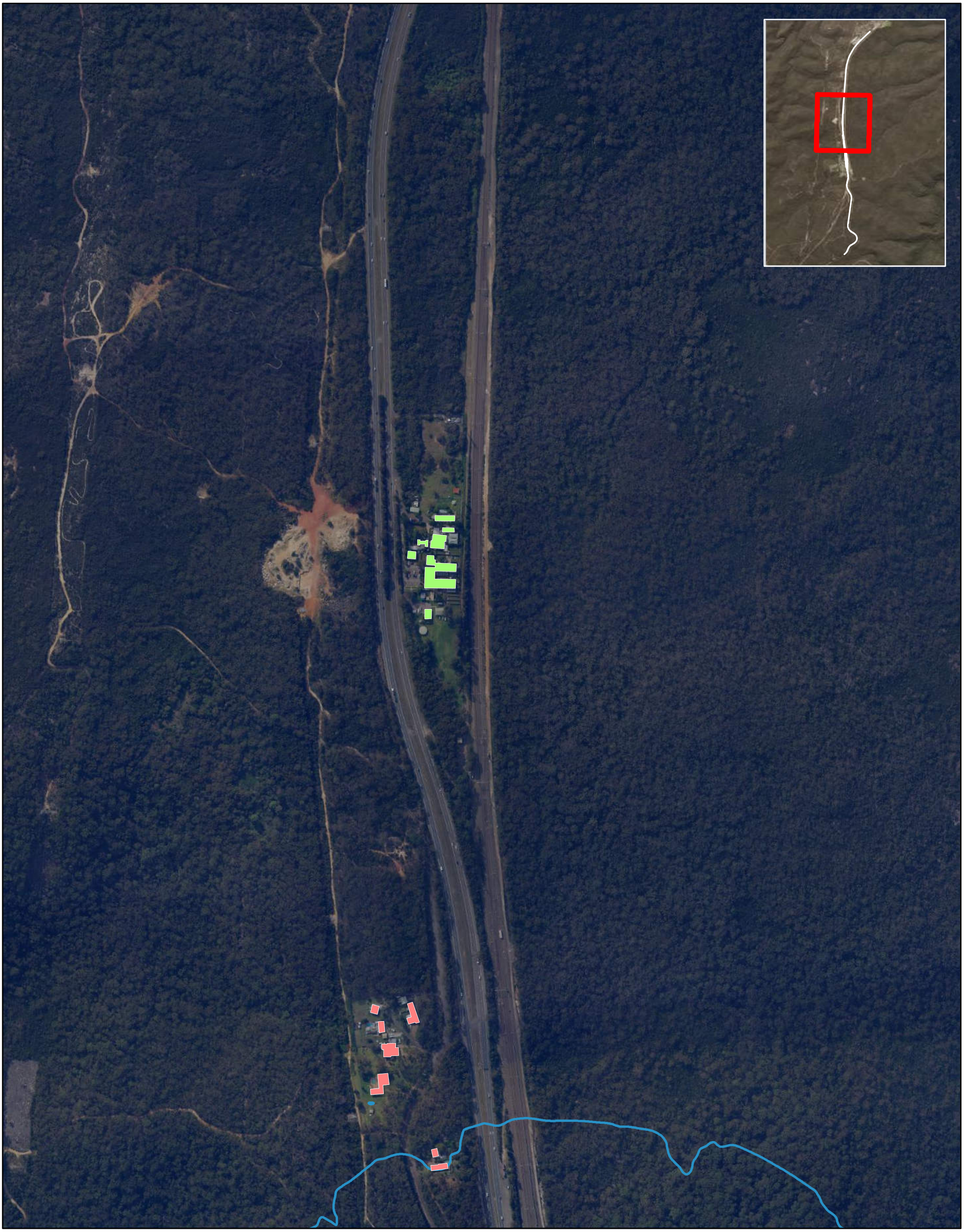
N

JUL 2019

60600277

D-12

AECOM



Standard Hours NML - 44 dB(A)
Residential
School
Commercial
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Platform Extension

JUL 2019

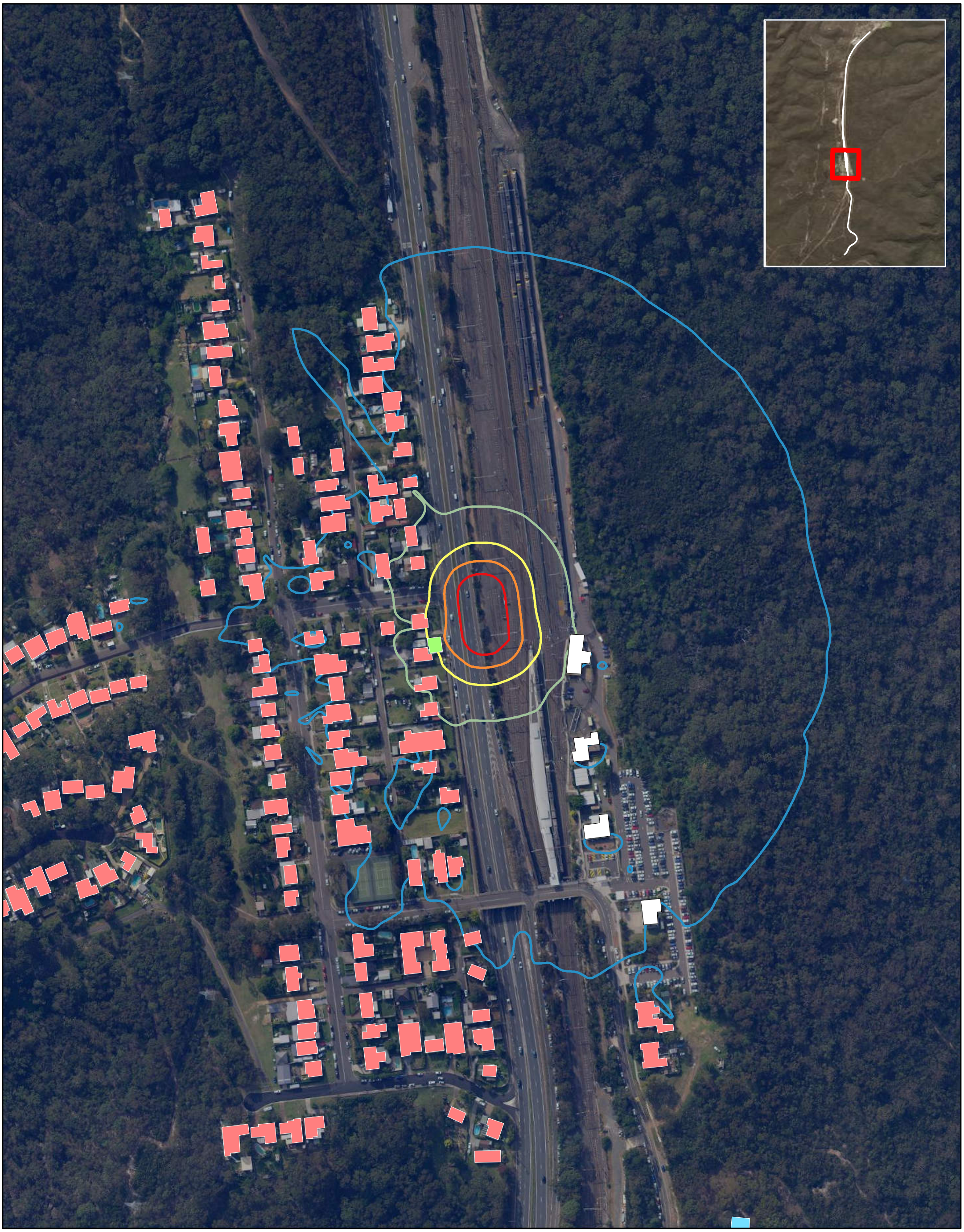
60600277

0 100 200 400 m

N

D-13

AECOM



Highly Noise Affected Level - 75 dB(A)
Standard Hours NML - 70 dB(A)
Out-of-Hours-Daytime NML - 65 dB(A)
Out-of-Hours Evening NML - 58 dB(A)
Standard Hours NML - 44 dB(A)

Residential
Commercial
School
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Staff Amenities Building Construction

0 100 200 m

N

JUL 2019

60600277

D-14

AECOM

Highly Noise Affected Level - 75 dB(A)
Standard Hours NML - 70 dB(A)
Out-of-Hours-Daytime NML - 65 dB(A)
Out-of-Hours Evening NML - 58 dB(A)
Standard Hours NML - 44 dB(A)

Residential
Commercial
School
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Staff Footbridge Construction

JUL 2019

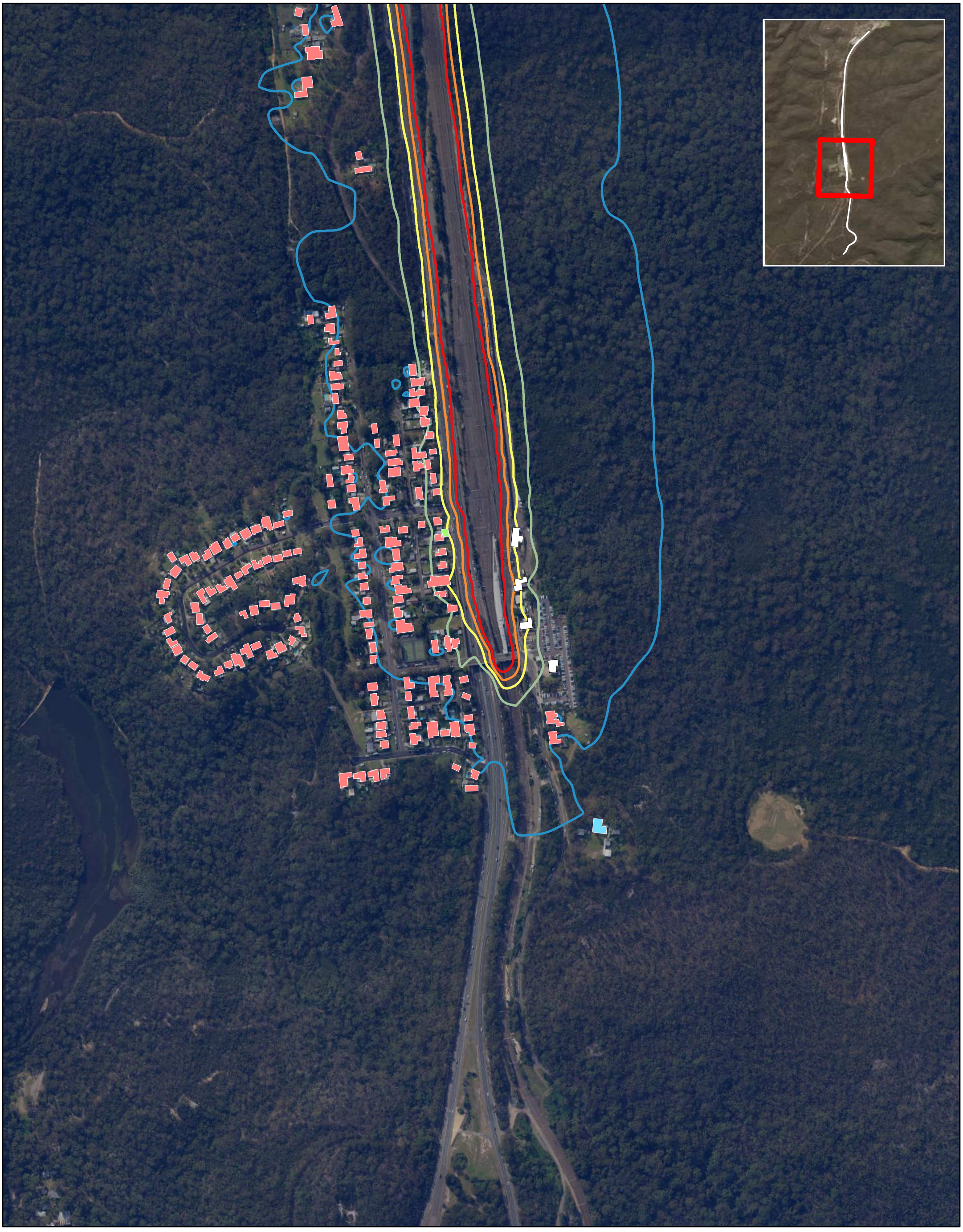
60600277

0 100 200 m

N

D-15

AECOM



Highly Noise Affected Level - 75 dB(A)
Standard Hours NML - 70 dB(A)
Out-of-Hours-Daytime NML - 65 dB(A)
Out-of-Hours Evening NML - 58 dB(A)
Standard Hours NML - 44 dB(A)

Residential
Commercial
School
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Testing and Commissioning

0 100 200 400 m

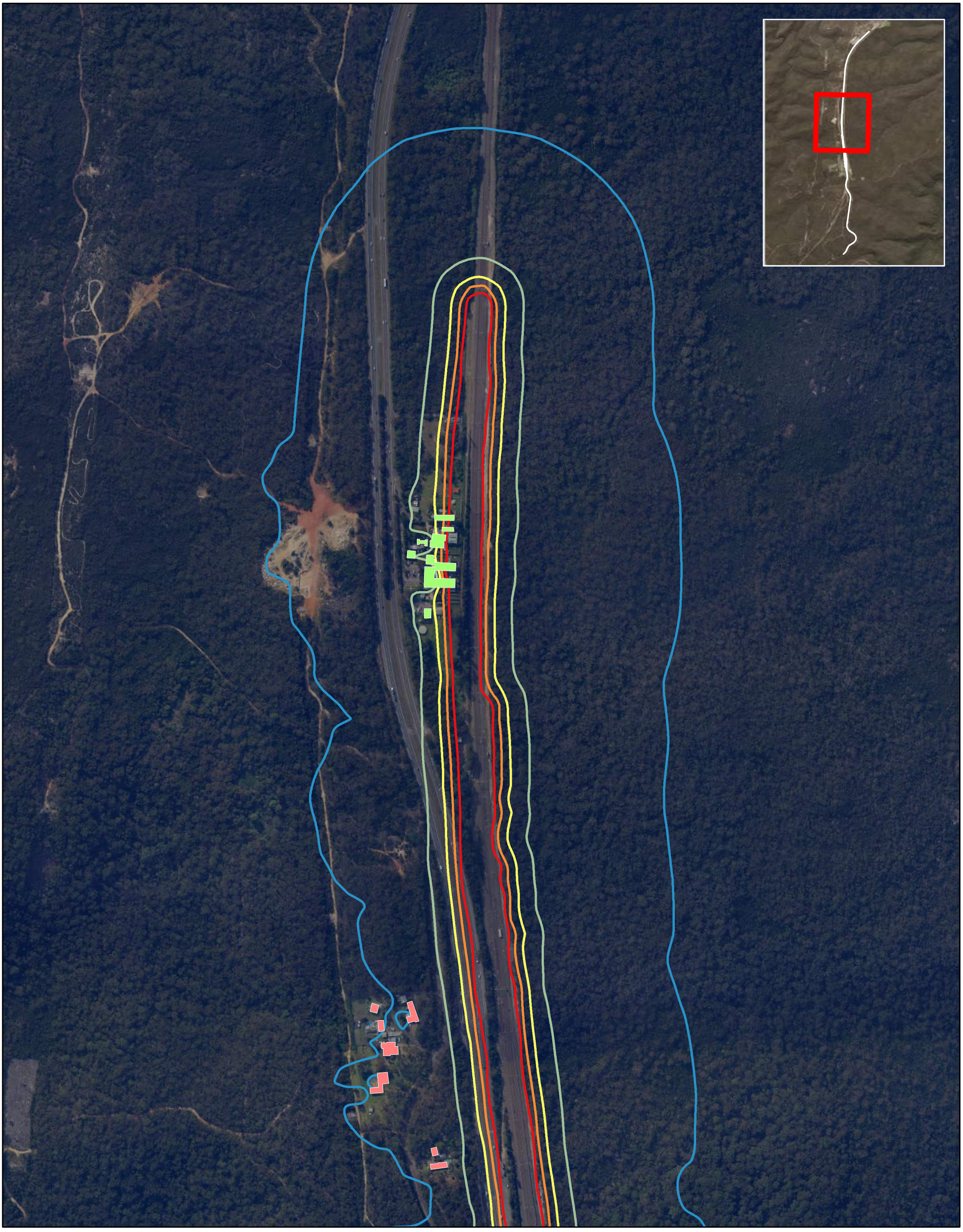
N

JUL 2019

60600277

D-16

AECOM



Highly Noise Affected Level - 75 dB(A)
Standard Hours NML - 70 dB(A)
Out-of-Hours-Daytime NML - 65 dB(A)
Out-of-Hours Evening NML - 58 dB(A)
Standard Hours NML - 44 dB(A)

Residential
Commercial
School
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Testing and Commissioning

0 100 200 400 m

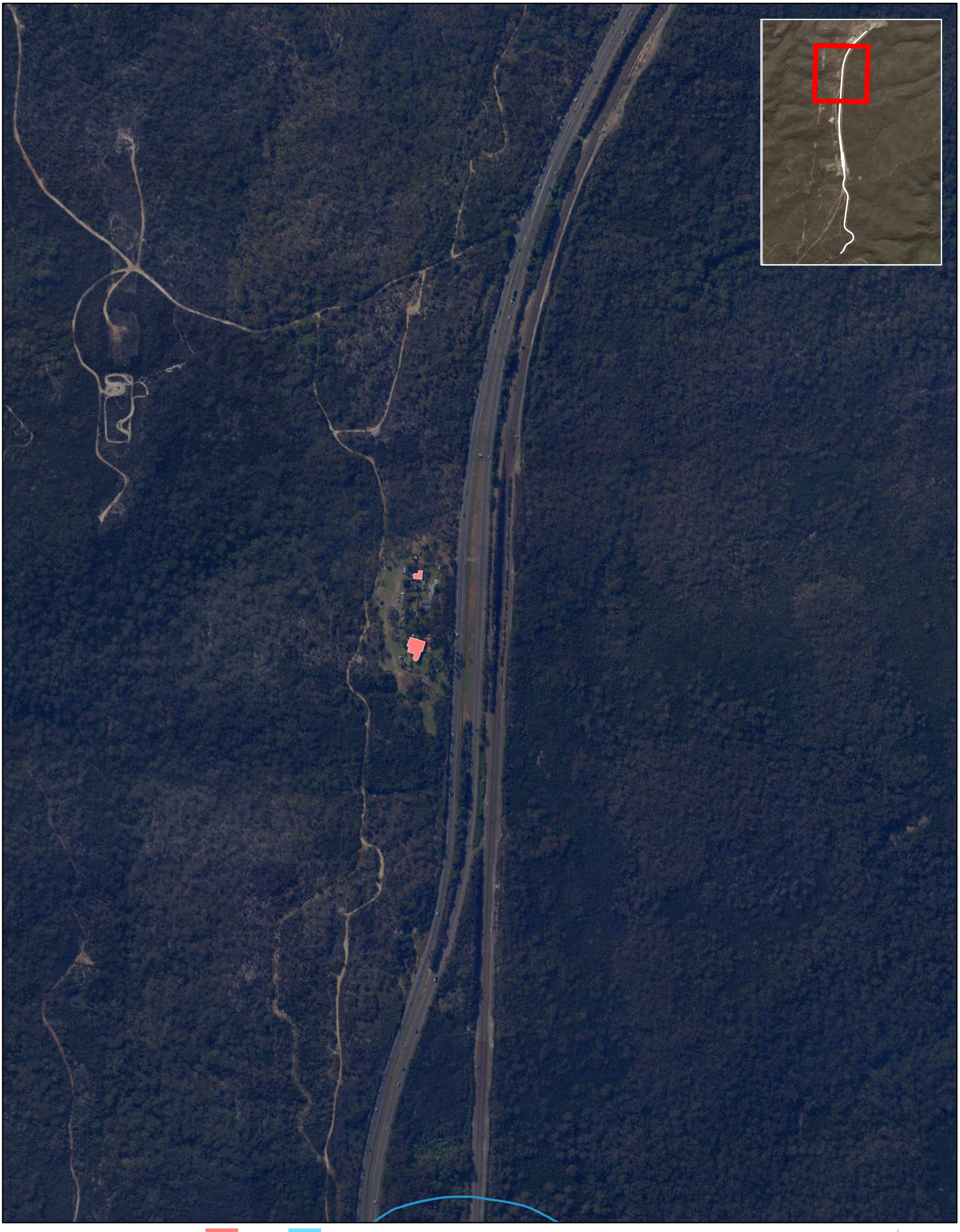
N

JUL 2019

60600277

D-17

AECOM



Standard Hours NML - 44 dB(A)

Residential

School

Commercial

Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Testing and Commissioning

JUL 2019

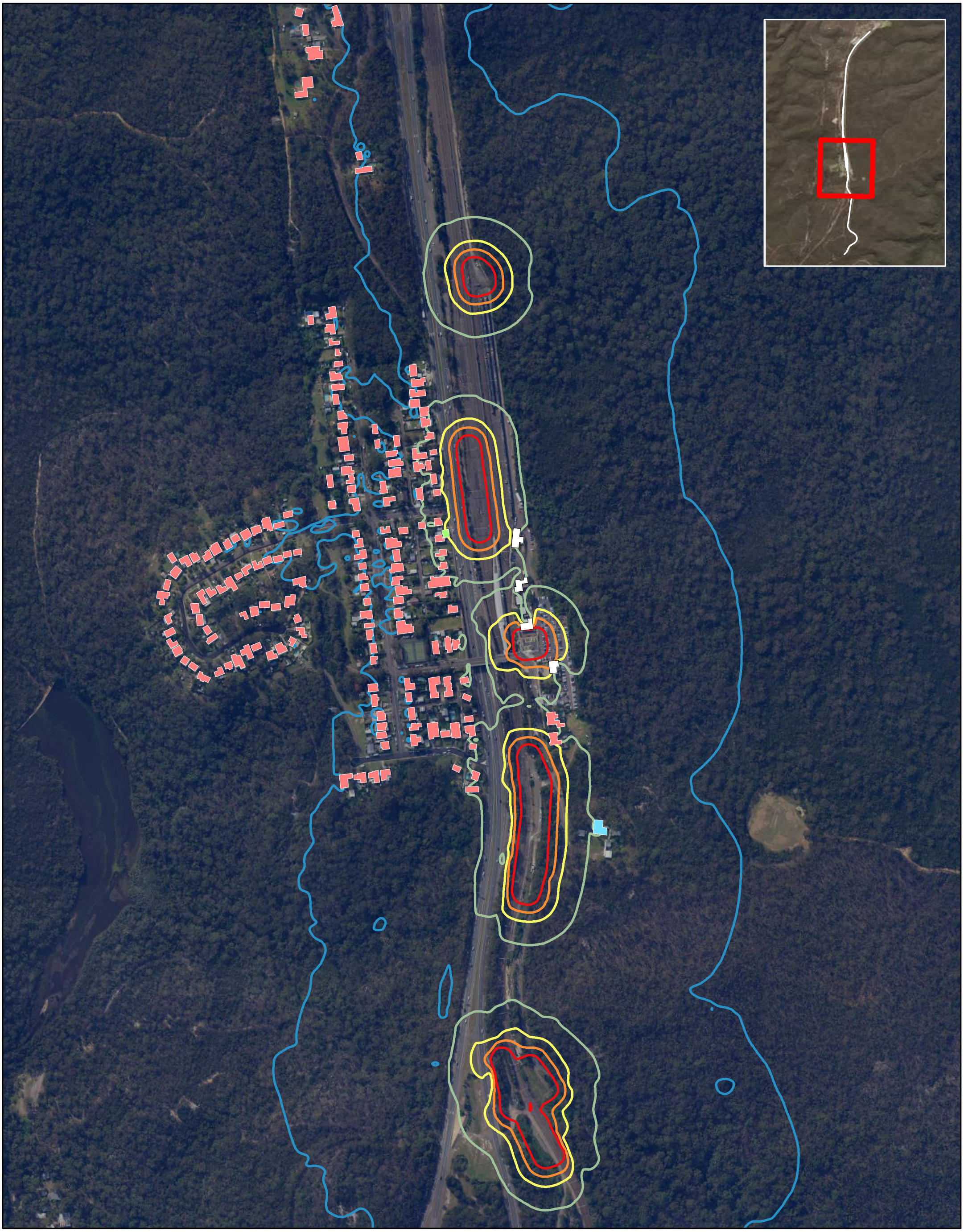
60600277

0 100 200 400 m

N

D-18

AECOM



Highly Noise Affected Level - 75 dB(A)
Standard Hours NML - 70 dB(A)
Out-of-Hours-Daytime NML - 65 dB(A)
Out-of-Hours Evening NML - 58 dB(A)
Standard Hours NML - 44 dB(A)

Residential
Commercial
School
Not Assessed

Waterfall Stabling Yard and Platform Extension

Construction Noise Contours - Demobilisation

0 100 200 400 m

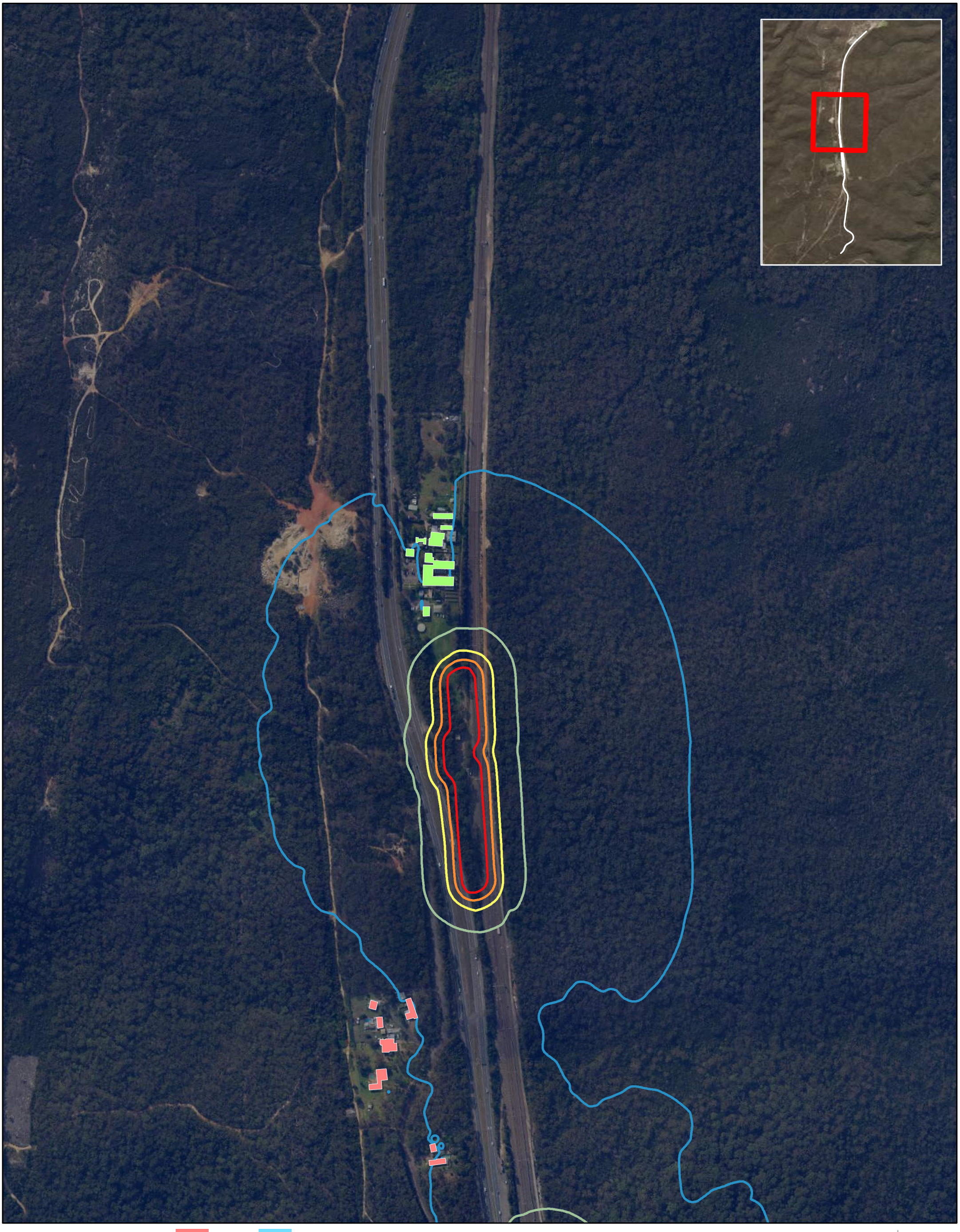
N

JUL 2019

60600277

D-19

AECOM



Highly Noise Affected Level - 75 dB(A)
Standard Hours NML - 70 dB(A)
Out-of-Hours-Daytime NML - 65 dB(A)
Out-of-Hours Evening NML - 58 dB(A)
Standard Hours NML - 44 dB(A)

Residential
Commercial
School
Not Assessed

Waterfall Stabling Yard and Platform Extension
Construction Noise Contours - Demobilisation

0 100 200 400 m

N

JUL 2019
60600277

D-20

Appendix E

Detailed operational noise results - Rail noise

Appendix E Detailed operational noise results - Rail noise

Receiver ID	$L_{Aeq(15hour)}$, dB(A)				$L_{Aeq(9hour)}$, dB(A)				L_{AFmax}. dB(A)				Exceeds
	Criteria	No Build	Build	Change	Criteria	No Build	Build	Change	Criteria	No Build	Build	Change	
1010	65	42	44	1.2	60	43	43	0.7	85	64	65	1.4	No
1011	65	47	48	1.2	60	47	48	0.8	85	71	72	0.9	No
1012	65	42	43	1.1	60	43	43	0.7	85	64	66	1.5	No
1013	65	44	46	1.5	60	45	46	0.9	85	70	71	1.1	No
1014	65	44	45	1	60	45	45	0.7	85	68	70	2.1	No
1015	65	53	53	0.8	60	53	54	0.5	85	80	81	1	No
1016	65	55	56	0.5	60	56	56	0.6	85	81	82	1.5	No
1017	65	43	43	0.6	60	43	43	0.5	85	71	72	0.7	No
1018	65	40	41	0.6	60	40	41	0.5	85	66	67	1.7	No
1019	65	43	43	0.5	60	43	43	0.5	85	69	70	1	No
1020	65	43	44	0.8	60	43	44	0.6	85	67	69	1.9	No
1021	65	42	43	0.6	60	42	43	0.6	85	68	70	1.2	No
1022	65	43	43	0.5	60	43	43	0.4	85	69	69	0	No
1023	65	56	56	0.7	60	55	56	0.7	85	86	86	0.1	No
1024	65	44	45	0.8	60	44	45	0.6	85	69	71	1.9	No
1025	65	58	59	0.5	60	58	59	1.1	85	89	89	0	No
1026	65	44	44	0.7	60	43	44	0.5	85	67	69	1.8	No

Receiver ID	$L_{Aeq(15hour)}$, dB(A)				$L_{Aeq(9hour)}$, dB(A)				L_{AFmax}. dB(A)				Exceeds
1027	65	60	61	0.5	60	60	61	0.8	85	88	88	0	No
1028	65	44	44	0.8	60	43	44	0.6	85	69	70	0.8	No
1029	65	56	57	0.4	60	56	57	0.6	85	87	87	-0.1	No
1030	65	58	59	0.6	60	58	59	1	85	88	88	0.1	No
1031	65	44	45	1.1	60	44	44	0.7	85	70	70	0.6	No
1032	65	58	59	0.5	60	58	58	0.7	85	89	89	0.1	No
1033	65	44	44	0.6	60	43	44	0.5	85	68	68	-0.3	No
1034	65	45	45	0.6	60	45	45	0.4	85	71	71	0.2	No
1035	65	59	60	0.5	60	59	60	1	85	90	90	0	No
1036	65	51	51	-0.1	60	50	50	-0.1	85	82	81	-1.3	No
1037	65	44	45	0.7	60	44	44	0.5	85	69	69	0	No
1038	65	45	45	0.6	60	44	45	0.5	85	71	71	0.1	No
1039	65	59	60	0.4	60	59	60	1	85	90	90	-0.2	No
1040	65	50	51	0.5	60	50	51	0.5	85	80	80	0.5	No
1041	65	56	56	0.3	60	55	56	0.6	85	86	86	-0.2	No
1042	65	43	44	0.7	60	43	44	0.6	85	69	69	0.6	No
1043	65	51	51	0.2	60	50	51	0.3	85	80	79	-0.3	No
1044	65	58	58	0.3	60	58	58	0.6	85	88	88	-0.2	No
1045	65	55	55	0.1	60	54	55	0.2	85	83	83	-0.7	No

Receiver ID	$L_{Aeq(15hour)}$, dB(A)				$L_{Aeq(9hour)}$, dB(A)				L_{AFmax}. dB(A)				Exceeds
1046	65	44	45	0.6	60	44	45	0.5	85	70	70	-0.1	No
1047	65	50	50	0.3	60	50	50	0.4	85	77	77	-0.2	No
1048	65	59	59	0.3	60	59	59	0.8	85	88	88	-0.3	No
1049	65	44	45	0.5	60	44	44	0.4	85	69	69	-0.1	No
1050	65	43	43	0.5	60	43	43	0.4	85	68	68	0	No
1051	65	49	49	0.3	60	48	49	0.3	85	75	75	-0.1	No
1052	65	45	45	0.4	60	45	45	0.3	85	70	70	-0.2	No
1053	65	60	60	0.3	60	59	60	0.9	85	88	88	0	No
1054	65	56	56	0.2	60	56	56	0.5	85	83	83	-0.1	No
1055	65	51	51	0	60	50	51	0.2	85	80	79	-0.7	No
1056	65	45	46	0.4	60	45	45	0.4	85	70	70	-0.3	No
1057	65	43	44	0.5	60	43	43	0.4	85	68	67	-0.6	No
1058	65	41	42	1	60	41	41	0.7	85	64	68	3.4	No
1059	65	60	60	0.2	60	60	60	0.6	85	88	88	-0.1	No
1060	65	41	43	1.1	60	41	42	0.9	85	65	71	5.6	No
1061	65	41	42	0.8	60	41	42	0.7	85	66	69	2.8	No
1062	65	55	56	0.3	60	55	56	0.7	85	83	82	-0.4	No
1063	65	41	41	0.6	60	41	41	0.4	85	62	62	-0.3	No
1064	65	50	50	0.3	60	50	50	0.4	85	79	79	0	No

Receiver ID	$L_{Aeq(15hour)}$, dB(A)				$L_{Aeq(9hour)}$, dB(A)				L_{AFmax}. dB(A)				Exceeds
1065	65	53	53	0.2	60	52	53	0.3	85	80	80	-0.1	No
1067	65	47	47	0.2	60	47	47	0.3	85	76	75	-0.8	No
1068	65	39	40	1.3	60	39	39	0.8	85	63	69	5.5	No
1070	65	40	41	0.6	60	40	41	0.5	85	63	63	0	No
1071	65	60	60	0	60	60	60	0.3	85	89	89	0	No
1072	65	52	52	0.3	60	52	52	0.3	85	80	80	0	No
1073	65	47	47	0.5	60	47	47	0.6	85	74	74	0.6	No
1074	65	41	42	1.3	60	40	41	0.9	85	65	71	6.4	No
1075	65	40	41	0.8	60	40	40	0.7	85	63	67	3.8	No
1076	65	42	43	0.7	60	42	43	0.5	85	66	68	2.6	No
1077	65	61	61	0.2	60	60	61	0.4	85	88	88	0	No
1078	65	42	42	0.7	60	42	42	0.6	85	68	69	1.6	No
1079	65	47	48	0.4	60	47	48	0.5	85	75	75	-0.1	No
1080	65	55	55	0.3	60	54	55	0.5	85	82	81	-0.1	No
1081	65	39	41	1.5	60	39	40	0.9	85	63	70	6.9	No
1082	65	40	42	1.4	60	40	41	1	85	65	71	6.4	No
1083	65	39	40	1.1	60	39	40	0.9	85	61	69	7.8	No
1084	65	42	43	0.8	60	42	42	0.7	85	68	69	1.3	No
1085	65	41	42	0.9	60	41	41	0.7	85	68	69	1.7	No

Receiver ID	$L_{Aeq(15hour)}$, dB(A)				$L_{Aeq(9hour)}$, dB(A)				L_{AFmax}. dB(A)				Exceeds
1086	65	39	41	1.5	60	39	40	1	85	63	71	8	No
1087	65	42	43	1	60	42	42	0.7	85	65	70	5.9	No
1088	65	47	47	0.3	60	47	47	0.3	85	71	71	0	No
1089	65	61	61	0.1	60	60	61	0.3	85	88	88	0	No
1090	65	55	55	0.2	60	55	56	0.4	85	82	82	0	No
1091	65	40	41	0.4	60	40	41	0.4	85	61	61	-0.1	No
1092	65	39	39	0.5	60	39	39	0.5	85	61	61	-0.1	No
1093	65	41	41	0.6	60	41	41	0.6	85	63	64	0.7	No
1094	65	48	48	0.3	60	48	48	0.3	85	72	72	-0.1	No
1095	65	54	54	0.2	60	54	55	0.4	85	81	81	0.1	No
1096	65	47	48	0.4	60	47	48	0.9	85	70	70	0	No
1097	65	61	61	0.1	60	61	61	0.1	85	88	88	0	No
1098	65	43	43	0.5	60	42	43	0.9	85	68	68	0	No
1100	65	39	39	0.6	60	38	39	0.7	85	62	62	-0.3	No
1101	65	47	47	0.3	60	47	48	0.4	85	71	71	-0.1	No
1102	65	43	43	0.5	60	43	43	0.8	85	67	67	0.1	No
1103	65	55	55	0.1	60	56	56	0.1	85	82	81	-0.8	No
1104	65	44	45	0.5	60	44	45	1	85	69	69	0	No
1105	65	60	60	0.1	60	60	60	0.2	85	87	88	0.4	No

Receiver ID	$L_{Aeq(15hour)}$, dB(A)				$L_{Aeq(9hour)}$, dB(A)				L_{AFmax}. dB(A)				Exceeds
1106	65	44	44	0.5	60	44	45	0.9	85	68	68	0	No
1107	65	39	40	0.8	60	39	40	0.8	85	63	67	3.4	No
1108	65	52	52	0.1	60	53	53	0.3	85	80	80	0.6	No
1109	65	48	48	0.5	60	47	48	1.1	85	72	72	0	No
1110	65	47	48	0.3	60	48	48	0.4	85	71	72	1.2	No
1111	65	45	46	0.5	60	45	46	1	85	69	69	0	No
1112	65	45	46	0.5	60	45	46	1	85	69	69	0	No
1113	65	42	42	0.5	60	41	42	0.9	85	65	65	0	No
1114	65	61	61	0.1	60	61	61	0.2	85	89	90	0.9	No
1115	65	47	47	0.6	60	46	47	1.1	85	71	71	0	No
1116	65	54	54	0.1	60	54	54	0.2	85	81	82	0.8	No
1117	65	48	48	0.4	60	48	48	0.4	85	71	72	0.6	No
1118	65	43	44	0.5	60	43	44	1	85	68	68	0	No
1119	65	41	41	0.6	60	40	41	1	85	64	64	0	No
1120	65	44	45	0.5	60	44	45	0.9	85	68	68	0.1	No
1121	65	42	43	0.7	60	42	43	1	85	66	66	0	No
1123	65	50	50	0.4	60	50	50	0.7	85	72	73	0.4	No
1124	65	56	56	0.3	60	56	56	0.4	85	84	86	1.7	No
1125	65	42	43	0.6	60	42	43	1	85	67	67	0	No

Receiver ID	$L_{Aeq(15hour)}$, dB(A)				$L_{Aeq(9hour)}$, dB(A)				L_{AFmax}. dB(A)				Exceeds
1126	65	44	44	0.5	60	44	45	0.9	85	68	68	0	No
1127	65	41	41	0.5	60	41	42	0.9	85	65	65	0	No
1128	65	50	50	0.4	60	50	51	0.8	85	72	72	0.6	No
1129	65	43	44	0.6	60	43	44	1	85	67	67	0	No
1130	65	44	44	0.5	60	44	45	0.8	85	68	68	0	No
1131	65	42	42	0.6	60	41	42	1	85	66	66	0	No
1132	65	60	60	0.2	60	60	60	0.4	85	87	89	1.8	No
1133	65	59	59	0	60	60	60	0	85	87	88	1.1	No
1134	65	45	45	0.5	60	45	46	1	85	69	69	0	No
1135	65	55	55	0.3	60	55	55	0.5	85	80	79	-1.2	No
1136	65	43	44	0.5	60	43	44	1	85	67	67	0	No
1137	65	50	51	0.5	60	50	51	0.9	85	73	74	0.6	No
1138	65	42	43	0.5	60	42	43	0.9	85	67	67	0	No
1139	65	45	45	0.6	60	44	46	1.1	85	69	69	0	No
1140	65	42	42	0.5	60	42	43	0.9	85	67	67	0	No
1141	65	51	52	0.5	60	51	52	0.9	85	74	74	0	No
1142	65	41	42	0.6	60	41	42	0.9	85	68	68	0	No
1143	65	46	47	0.6	60	46	47	1.2	85	70	70	0	No
1144	65	47	47	0.6	60	47	48	1	85	71	71	0	No

Receiver ID	$L_{Aeq(15hour)}$, dB(A)				$L_{Aeq(9hour)}$, dB(A)				L_{AFmax}. dB(A)				Exceeds
1145	65	39	40	0.5	60	39	40	0.8	85	64	64	0	No
1147	65	45	46	0.5	60	45	46	1	85	69	69	0	No
1148	65	48	48	0.5	60	47	48	1	85	73	73	0	No
1149	65	60	60	0.4	60	60	61	0.8	85	88	88	-0.1	No
1150	65	54	54	0.6	60	54	55	1.4	85	80	81	1.4	No
1151	65	57	58	0.9	60	57	58	1.6	85	83	85	1.9	No
1152	65	59	59	0.5	60	59	60	1.1	85	86	86	-0.4	No
1153	65	50	51	0.6	60	50	51	1	85	73	74	0.1	No
1154	65	55	56	0.6	60	55	56	1.4	85	81	82	1.2	No
1155	65	58	58	0.4	60	58	59	1.3	85	88	87	-0.9	No
1156	65	53	53	0.8	60	52	54	1.4	85	77	79	2.2	No
1157	65	55	56	0.7	60	55	56	1.5	85	83	83	0.5	No
1158	65	52	52	0.7	60	52	53	1.3	85	78	79	1.3	No
1159	65	58	59	0.6	60	58	59	1.4	85	89	88	-0.6	No
1160	65	61	62	0.5	60	61	63	1.3	85	90	91	0.2	No
1161	65	55	55	0.5	60	54	55	1	85	78	78	0	No
1162	65	55	55	0.5	60	54	55	1.1	85	78	78	0	No
1163	65	56	56	0.5	60	56	57	1.2	85	84	85	1.1	No
1164	65	56	57	0.8	60	56	58	1.6	85	85	86	1.2	No

Receiver ID	$L_{Aeq(15hour)}$, dB(A)				$L_{Aeq(9hour)}$, dB(A)				L_{AFmax}. dB(A)				Exceeds
1165	65	59	59	0.5	60	59	60	1.4	85	89	88	-0.4	No
1166	65	55	56	0.6	60	55	56	1.2	85	82	83	1.7	No
1167	65	53	54	0.6	60	53	54	1.1	85	76	76	0	No
1168	65	62	62	0.8	60	62	63	1.6	85	91	92	1.7	No
1169	65	57	58	0.8	60	57	58	1.6	85	84	86	2.2	No
1170	65	54	55	0.7	60	54	55	1.3	85	79	81	2.2	No
1171	65	59	59	0.6	60	59	61	1.8	85	88	89	1.4	No
1172	65	54	55	0.5	60	54	56	1.6	85	84	85	0.7	No
1173	65	57	57	0.7	60	56	58	1.4	85	82	83	1.9	No
1174	65	59	60	0.8	60	59	61	2	85	88	90	2	No
1175	65	54	55	0.7	60	54	56	1.5	85	79	81	2.1	No
1176	65	54	54	0.7	60	53	55	1.4	85	78	80	1.4	No
1177	65	55	55	0.7	60	54	56	1.2	85	78	79	0.9	No
1178	65	59	60	0.9	60	59	61	2	85	87	89	2.2	No

Predicted operational noise levels at assessment receivers for idling freight locomotives at signals - Daytime

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1001	Residential	60	30	-	33	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1002	Residential	60	34	-	38	-
1003	Commercial	63	52	-	53	-
1004	Commercial	63	52	-	53	-
1005	Commercial	63	44	-	45	-
1006	Commercial	63	49	-	50	-
1007	Commercial	63	48	-	49	-
1008	Commercial	63	50	-	50	-
1009	Commercial	63	30	-	31	-
1010	Residential	60	20	-	23	-
1011	Residential	60	26	-	30	-
1012	Residential	60	23	-	27	-
1013	Residential	60	28	-	32	-
1014	Residential	60	27	-	31	-
1015	Residential	60	33	-	37	-
1016	Residential	60	32	-	35	-
1017	Residential	60	<20	-	<20	-
1018	Residential	60	<20	-	<20	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1019	Residential	60	<20	-	20	-
1020	Residential	60	<20	-	20	-
1021	Residential	60	<20	-	20	-
1022	Residential	60	<20	-	<20	-
1023	Residential	60	32	-	35	-
1024	Residential	60	<20	-	21	-
1025	Residential	60	29	-	33	-
1026	Residential	60	<20	-	23	-
1027	Residential	60	29	-	33	-
1028	Residential	60	<20	-	20	-
1029	Residential	60	29	-	33	-
1030	Residential	60	30	-	34	-
1031	Residential	60	<20	-	<20	-
1032	Residential	60	31	-	35	-
1033	Residential	60	<20	-	21	-
1034	Residential	60	<20	-	20	-
1035	Residential	60	28	-	32	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1036	Residential	60	28	-	32	-
1037	Residential	60	<20	-	<20	-
1038	Residential	60	<20	-	22	-
1039	Residential	60	28	-	32	-
1040	Residential	60	29	-	32	-
1041	Residential	60	21	-	24	-
1042	Residential	60	<20	-	<20	-
1043	Residential	60	30	-	34	-
1044	Residential	60	22	-	26	-
1045	Residential	60	21	-	25	-
1046	Residential	60	<20	-	<20	-
1047	Residential	60	26	-	29	-
1048	Residential	60	27	-	31	-
1049	Residential	60	<20	-	<20	-
1050	Residential	60	<20	-	22	-
1051	Residential	60	28	-	32	-
1052	Residential	60	<20	-	<20	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1053	Residential	60	28	-	32	-
1054	Residential	60	21	-	25	-
1055	Residential	60	25	-	29	-
1056	Residential	60	<20	-	21	-
1057	Residential	60	24	-	28	-
1058	Residential	60	<20	-	21	-
1059	Residential	60	30	-	34	-
1060	Residential	60	<20	-	21	-
1061	Residential	60	<20	-	21	-
1062	Residential	60	27	-	31	-
1063	Residential	60	<20	-	21	-
1064	Residential	60	28	-	32	-
1065	Residential	60	28	-	31	-
1066	Commercial	63	27	-	31	-
1067	Residential	60	30	-	34	-
1068	Residential	60	<20	-	21	-
1069	Not Assessed	-	27	-	31	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1070	Residential	60	<20	-	21	-
1071	Residential	60	27	-	31	-
1072	Residential	60	30	-	34	-
1073	Residential	60	27	-	31	-
1074	Residential	60	<20	-	21	-
1075	Residential	60	<20	-	21	-
1076	Residential	60	22	-	26	-
1077	Residential	60	27	-	31	-
1078	Residential	60	<20	-	23	-
1079	Residential	60	29	-	33	-
1080	Residential	60	30	-	33	-
1081	Residential	60	<20	-	21	-
1082	Residential	60	<20	-	23	-
1083	Residential	60	<20	-	22	-
1084	Residential	60	20	-	24	-
1085	Residential	60	<20	-	23	-
1086	Residential	60	<20	-	22	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1087	Residential	60	23	-	26	-
1088	Residential	60	27	-	31	-
1089	Residential	60	27	-	31	-
1090	Residential	60	30	-	33	-
1091	Residential	60	<20	-	22	-
1092	Residential	60	<20	-	21	-
1093	Residential	60	<20	-	22	-
1094	Residential	60	27	-	31	-
1095	Residential	60	26	-	30	-
1096	Residential	60	27	-	31	-
1097	Residential	60	29	-	33	-
1098	Residential	60	<20	-	22	-
1099	Not Assessed	-	29	-	33	-
1100	Residential	60	<20	-	<20	-
1101	Residential	60	27	-	31	-
1102	Residential	60	<20	-	22	-
1103	Residential	60	29	-	33	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1104	Residential	60	20	-	24	-
1105	Residential	60	20	-	24	-
1106	Residential	60	<20	-	21	-
1107	Residential	60	<20	-	<20	-
1108	Residential	60	20	-	24	-
1109	Residential	60	25	-	29	-
1110	Residential	60	26	-	30	-
1111	Residential	60	22	-	26	-
1112	Residential	60	22	-	26	-
1113	Residential	60	<20	-	21	-
1114	Residential	60	29	-	33	-
1115	Residential	60	20	-	24	-
1116	Residential	60	<20	-	22	-
1117	Residential	60	26	-	30	-
1118	Residential	60	<20	-	23	-
1119	Residential	60	<20	-	<20	-
1120	Residential	60	<20	-	<20	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1121	Residential	60	<20	-	20	-
1122	Not Assessed	-	29	-	33	-
1123	Residential	60	26	-	30	-
1124	Residential	60	29	-	33	-
1125	Residential	60	<20	-	22	-
1126	Residential	60	20	-	24	-
1127	Residential	60	<20	-	<20	-
1128	Residential	60	25	-	28	-
1129	Residential	60	<20	-	21	-
1130	Residential	60	<20	-	<20	-
1131	Residential	60	<20	-	<20	-
1132	Residential	60	26	-	30	-
1133	Residential	60	29	-	33	-
1134	Residential	60	<20	-	<20	-
1135	Residential	60	26	-	30	-
1136	Residential	60	<20	-	<20	-
1137	Residential	60	26	-	30	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1138	Residential	60	<20	-	20	-
1139	Residential	60	<20	-	<20	-
1140	Residential	60	<20	-	<20	-
1141	Residential	60	23	-	27	-
1142	Residential	60	<20	-	<20	-
1143	Residential	60	<20	-	21	-
1144	Residential	60	<20	-	21	-
1145	Residential	60	<20	-	<20	-
1146	Not Assessed	-	26	-	30	-
1147	Residential	60	<20	-	21	-
1148	Residential	60	<20	-	<20	-
1149	Residential	60	26	-	30	-
1150	Residential	60	25	-	29	-
1151	Residential	60	26	-	30	-
1152	Residential	60	28	-	32	-
1153	Residential	60	<20	-	20	-
1154	Residential	60	<20	-	<20	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1155	Residential	60	<20	-	<20	-
1156	Residential	60	22	-	26	-
1157	Residential	60	<20	-	<20	-
1158	Residential	60	<20	-	<20	-
1159	Residential	60	<20	-	21	-
1160	Residential	60	28	-	32	-
1161	Residential	60	<20	-	<20	-
1162	Residential	60	<20	-	<20	-
1163	Residential	60	<20	-	<20	-
1164	Residential	60	<20	-	<20	-
1165	Residential	60	<20	-	21	-
1166	Residential	60	<20	-	<20	-
1167	Residential	60	<20	-	<20	-
1168	Residential	60	25	-	29	-
1169	Residential	60	<20	-	21	-
1170	Residential	60	<20	-	21	-
1171	Residential	60	<20	-	21	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1172	Residential	60	<20	-	<20	-
1173	Residential	60	<20	-	<20	-
1174	Residential	60	<20	-	<20	-
1175	Residential	60	<20	-	<20	-
1176	Residential	60	25	-	29	-
1177	Residential	60	25	-	29	-
1178	Residential	60	<20	-	<20	-
1179	School	60	24	-	28	-
National_Park_1	Passive Recreation	60	45	-	47	-
National_Park_2	Passive Recreation	60	21	-	24	-
National_Park_3	Passive Recreation	60	<20	-	<20	-

Table 40 Predicted operational noise levels at all residential assessment receivers for idling freight locomotives at signals - Night-time

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1001	Residential	44	30	-	33	-
1002	Residential	44	34	-	38	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1010	Residential	44	20	-	23	-
1011	Residential	44	26	-	30	-
1012	Residential	44	23	-	27	-
1013	Residential	44	28	-	32	-
1014	Residential	44	27	-	31	-
1015	Residential	44	33	-	37	-
1016	Residential	44	32	-	35	-
1017	Residential	44	<20	-	<20	-
1018	Residential	44	<20	-	<20	-
1019	Residential	44	<20	-	20	-
1020	Residential	44	<20	-	20	-
1021	Residential	44	<20	-	20	-
1022	Residential	44	<20	-	<20	-
1023	Residential	44	32	-	35	-
1024	Residential	44	<20	-	21	-
1025	Residential	44	29	-	33	-
1026	Residential	44	<20	-	23	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1027	Residential	44	29	-	33	-
1028	Residential	44	<20	-	20	-
1029	Residential	44	29	-	33	-
1030	Residential	44	30	-	34	-
1031	Residential	44	<20	-	<20	-
1032	Residential	44	31	-	35	-
1033	Residential	44	<20	-	21	-
1034	Residential	44	<20	-	20	-
1035	Residential	44	28	-	32	-
1036	Residential	44	28	-	32	-
1037	Residential	44	<20	-	<20	-
1038	Residential	44	<20	-	22	-
1039	Residential	44	28	-	32	-
1040	Residential	44	29	-	32	-
1041	Residential	44	21	-	24	-
1042	Residential	44	<20	-	<20	-
1043	Residential	44	30	-	34	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1044	Residential	44	22	-	26	-
1045	Residential	44	21	-	25	-
1046	Residential	44	<20	-	<20	-
1047	Residential	44	26	-	29	-
1048	Residential	44	27	-	31	-
1049	Residential	44	<20	-	<20	-
1050	Residential	44	<20	-	22	-
1051	Residential	44	28	-	32	-
1052	Residential	44	<20	-	<20	-
1053	Residential	44	28	-	32	-
1054	Residential	44	21	-	25	-
1055	Residential	44	25	-	29	-
1056	Residential	44	<20	-	21	-
1057	Residential	44	24	-	28	-
1058	Residential	44	<20	-	21	-
1059	Residential	44	30	-	34	-
1060	Residential	44	<20	-	21	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1061	Residential	44	<20	-	21	-
1062	Residential	44	27	-	31	-
1063	Residential	44	<20	-	21	-
1064	Residential	44	28	-	32	-
1065	Residential	44	28	-	31	-
1067	Residential	44	30	-	34	-
1068	Residential	44	<20	-	21	-
1070	Residential	44	<20	-	21	-
1071	Residential	44	27	-	31	-
1072	Residential	44	30	-	34	-
1073	Residential	44	27	-	31	-
1074	Residential	44	<20	-	21	-
1075	Residential	44	<20	-	21	-
1076	Residential	44	22	-	26	-
1077	Residential	44	27	-	31	-
1078	Residential	44	<20	-	23	-
1079	Residential	44	29	-	33	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1080	Residential	44	30	-	33	-
1081	Residential	44	<20	-	21	-
1082	Residential	44	<20	-	23	-
1083	Residential	44	<20	-	22	-
1084	Residential	44	20	-	24	-
1085	Residential	44	<20	-	23	-
1086	Residential	44	<20	-	22	-
1087	Residential	44	23	-	26	-
1088	Residential	44	27	-	31	-
1089	Residential	44	27	-	31	-
1090	Residential	44	30	-	33	-
1091	Residential	44	<20	-	22	-
1092	Residential	44	<20	-	21	-
1093	Residential	44	<20	-	22	-
1094	Residential	44	27	-	31	-
1095	Residential	44	26	-	30	-
1096	Residential	44	27	-	31	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1097	Residential	44	29	-	33	-
1098	Residential	44	<20	-	22	-
1100	Residential	44	<20	-	<20	-
1101	Residential	44	27	-	31	-
1102	Residential	44	<20	-	22	-
1103	Residential	44	29	-	33	-
1104	Residential	44	20	-	24	-
1105	Residential	44	20	-	24	-
1106	Residential	44	<20	-	21	-
1107	Residential	44	<20	-	<20	-
1108	Residential	44	20	-	24	-
1109	Residential	44	25	-	29	-
1110	Residential	44	26	-	30	-
1111	Residential	44	22	-	26	-
1112	Residential	44	22	-	26	-
1113	Residential	44	<20	-	21	-
1114	Residential	44	29	-	33	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1115	Residential	44	20	-	24	-
1116	Residential	44	<20	-	22	-
1117	Residential	44	26	-	30	-
1118	Residential	44	<20	-	23	-
1119	Residential	44	<20	-	<20	-
1120	Residential	44	<20	-	<20	-
1121	Residential	44	<20	-	20	-
1123	Residential	44	26	-	30	-
1124	Residential	44	29	-	33	-
1125	Residential	44	<20	-	22	-
1126	Residential	44	20	-	24	-
1127	Residential	44	<20	-	<20	-
1128	Residential	44	25	-	28	-
1129	Residential	44	<20	-	21	-
1130	Residential	44	<20	-	<20	-
1131	Residential	44	<20	-	<20	-
1132	Residential	44	26	-	30	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1133	Residential	44	29	-	33	-
1134	Residential	44	<20	-	<20	-
1135	Residential	44	26	-	30	-
1136	Residential	44	<20	-	<20	-
1137	Residential	44	26	-	30	-
1138	Residential	44	<20	-	20	-
1139	Residential	44	<20	-	<20	-
1140	Residential	44	<20	-	<20	-
1141	Residential	44	23	-	27	-
1142	Residential	44	<20	-	<20	-
1143	Residential	44	<20	-	21	-
1144	Residential	44	<20	-	21	-
1145	Residential	44	<20	-	<20	-
1147	Residential	44	<20	-	21	-
1148	Residential	44	<20	-	<20	-
1149	Residential	44	26	-	30	-
1150	Residential	44	25	-	29	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1151	Residential	44	26	-	30	-
1152	Residential	44	28	-	32	-
1153	Residential	44	<20	-	20	-
1154	Residential	44	<20	-	<20	-
1155	Residential	44	<20	-	<20	-
1156	Residential	44	22	-	26	-
1157	Residential	44	<20	-	<20	-
1158	Residential	44	<20	-	<20	-
1159	Residential	44	<20	-	21	-
1160	Residential	44	28	-	32	-
1161	Residential	44	<20	-	<20	-
1162	Residential	44	<20	-	<20	-
1163	Residential	44	<20	-	<20	-
1164	Residential	44	<20	-	<20	-
1165	Residential	44	<20	-	21	-
1166	Residential	44	<20	-	<20	-
1167	Residential	44	<20	-	<20	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1168	Residential	44	25	-	29	-
1169	Residential	44	<20	-	21	-
1170	Residential	44	<20	-	21	-
1171	Residential	44	<20	-	21	-
1172	Residential	44	<20	-	<20	-
1173	Residential	44	<20	-	<20	-
1174	Residential	44	<20	-	<20	-
1175	Residential	44	<20	-	<20	-
1176	Residential	44	25	-	29	-
1177	Residential	44	25	-	29	-
1178	Residential	44	<20	-	<20	-

Predicted L_{Aeq} and L_{Amax} noise levels for idling freight locomotives at signals – Maximum noise level assessment

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1001	Residential	44	30	-	54	32	-
1002	Residential	44	34	-	54	36	-
1010	Residential	44	20	-	54	22	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1011	Residential	44	26	-	54	28	-
1012	Residential	44	23	-	54	25	-
1013	Residential	44	28	-	54	30	-
1014	Residential	44	27	-	54	29	-
1015	Residential	44	33	-	54	35	-
1016	Residential	44	32	-	54	34	-
1017	Residential	44	<20	-	54	<20	-
1018	Residential	44	<20	-	54	<20	-
1019	Residential	44	<20	-	54	<20	-
1020	Residential	44	<20	-	54	<20	-
1021	Residential	44	<20	-	54	<20	-
1022	Residential	44	<20	-	54	<20	-
1023	Residential	44	32	-	54	34	-
1024	Residential	44	<20	-	54	<20	-
1025	Residential	44	29	-	54	31	-
1026	Residential	44	<20	-	54	21	-
1027	Residential	44	29	-	54	31	-
1028	Residential	44	<20	-	54	<20	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1029	Residential	44	29	-	54	31	-
1030	Residential	44	30	-	54	32	-
1031	Residential	44	<20	-	54	<20	-
1032	Residential	44	31	-	54	33	-
1033	Residential	44	<20	-	54	<20	-
1034	Residential	44	<20	-	54	<20	-
1035	Residential	44	28	-	54	30	-
1036	Residential	44	28	-	54	30	-
1037	Residential	44	<20	-	54	<20	-
1038	Residential	44	<20	-	54	20	-
1039	Residential	44	28	-	54	30	-
1040	Residential	44	29	-	54	31	-
1041	Residential	44	21	-	54	23	-
1042	Residential	44	<20	-	54	<20	-
1043	Residential	44	30	-	54	32	-
1044	Residential	44	22	-	54	24	-
1045	Residential	44	21	-	54	23	-
1046	Residential	44	<20	-	54	<20	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1047	Residential	44	26	-	54	28	-
1048	Residential	44	27	-	54	29	-
1049	Residential	44	<20	-	54	<20	-
1050	Residential	44	<20	-	54	20	-
1051	Residential	44	28	-	54	30	-
1052	Residential	44	<20	-	54	<20	-
1053	Residential	44	28	-	54	30	-
1054	Residential	44	21	-	54	23	-
1055	Residential	44	25	-	54	27	-
1056	Residential	44	<20	-	54	20	-
1057	Residential	44	24	-	54	26	-
1058	Residential	44	<20	-	54	<20	-
1059	Residential	44	30	-	54	32	-
1060	Residential	44	<20	-	54	<20	-
1061	Residential	44	<20	-	54	<20	-
1062	Residential	44	27	-	54	29	-
1063	Residential	44	<20	-	54	<20	-
1064	Residential	44	28	-	54	30	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1065	Residential	44	28	-	54	30	-
1067	Residential	44	30	-	54	32	-
1068	Residential	44	<20	-	54	<20	-
1070	Residential	44	<20	-	54	<20	-
1071	Residential	44	27	-	54	29	-
1072	Residential	44	30	-	54	32	-
1073	Residential	44	27	-	54	29	-
1074	Residential	44	<20	-	54	<20	-
1075	Residential	44	<20	-	54	<20	-
1076	Residential	44	22	-	54	24	-
1077	Residential	44	27	-	54	29	-
1078	Residential	44	<20	-	54	21	-
1079	Residential	44	29	-	54	31	-
1080	Residential	44	30	-	54	32	-
1081	Residential	44	<20	-	54	<20	-
1082	Residential	44	<20	-	54	21	-
1083	Residential	44	<20	-	54	20	-
1084	Residential	44	20	-	54	22	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1085	Residential	44	<20	-	54	21	-
1086	Residential	44	<20	-	54	20	-
1087	Residential	44	23	-	54	25	-
1088	Residential	44	27	-	54	29	-
1089	Residential	44	27	-	54	29	-
1090	Residential	44	30	-	54	32	-
1091	Residential	44	<20	-	54	20	-
1092	Residential	44	<20	-	54	<20	-
1093	Residential	44	<20	-	54	20	-
1094	Residential	44	27	-	54	29	-
1095	Residential	44	26	-	54	28	-
1096	Residential	44	27	-	54	29	-
1097	Residential	44	29	-	54	31	-
1098	Residential	44	<20	-	54	20	-
1100	Residential	44	<20	-	54	<20	-
1101	Residential	44	27	-	54	29	-
1102	Residential	44	<20	-	54	20	-
1103	Residential	44	29	-	54	31	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1104	Residential	44	20	-	54	22	-
1105	Residential	44	20	-	54	22	-
1106	Residential	44	<20	-	54	<20	-
1107	Residential	44	<20	-	54	<20	-
1108	Residential	44	20	-	54	22	-
1109	Residential	44	25	-	54	27	-
1110	Residential	44	26	-	54	28	-
1111	Residential	44	22	-	54	24	-
1112	Residential	44	22	-	54	24	-
1113	Residential	44	<20	-	54	<20	-
1114	Residential	44	29	-	54	31	-
1115	Residential	44	20	-	54	22	-
1116	Residential	44	<20	-	54	20	-
1117	Residential	44	26	-	54	28	-
1118	Residential	44	<20	-	54	21	-
1119	Residential	44	<20	-	54	<20	-
1120	Residential	44	<20	-	54	<20	-
1121	Residential	44	<20	-	54	<20	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1123	Residential	44	26	-	54	28	-
1124	Residential	44	29	-	54	31	-
1125	Residential	44	<20	-	54	20	-
1126	Residential	44	20	-	54	22	-
1127	Residential	44	<20	-	54	<20	-
1128	Residential	44	25	-	54	27	-
1129	Residential	44	<20	-	54	<20	-
1130	Residential	44	<20	-	54	<20	-
1131	Residential	44	<20	-	54	<20	-
1132	Residential	44	26	-	54	28	-
1133	Residential	44	29	-	54	31	-
1134	Residential	44	<20	-	54	<20	-
1135	Residential	44	26	-	54	28	-
1136	Residential	44	<20	-	54	<20	-
1137	Residential	44	26	-	54	28	-
1138	Residential	44	<20	-	54	<20	-
1139	Residential	44	<20	-	54	<20	-
1140	Residential	44	<20	-	54	<20	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1141	Residential	44	23	-	54	25	-
1142	Residential	44	<20	-	54	<20	-
1143	Residential	44	<20	-	54	<20	-
1144	Residential	44	<20	-	54	<20	-
1145	Residential	44	<20	-	54	<20	-
1147	Residential	44	<20	-	54	<20	-
1148	Residential	44	<20	-	54	<20	-
1149	Residential	44	26	-	54	28	-
1150	Residential	44	25	-	54	27	-
1151	Residential	44	26	-	54	28	-
1152	Residential	44	28	-	54	30	-
1153	Residential	44	<20	-	54	<20	-
1154	Residential	44	<20	-	54	<20	-
1155	Residential	44	<20	-	54	<20	-
1156	Residential	44	22	-	54	24	-
1157	Residential	44	<20	-	54	<20	-
1158	Residential	44	<20	-	54	<20	-
1159	Residential	44	<20	-	54	<20	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1160	Residential	44	28	-	54	30	-
1161	Residential	44	<20	-	54	<20	-
1162	Residential	44	<20	-	54	<20	-
1163	Residential	44	<20	-	54	<20	-
1164	Residential	44	<20	-	54	<20	-
1165	Residential	44	<20	-	54	<20	-
1166	Residential	44	<20	-	54	<20	-
1167	Residential	44	<20	-	54	<20	-
1168	Residential	44	25	-	54	27	-
1169	Residential	44	<20	-	54	<20	-
1170	Residential	44	<20	-	54	<20	-
1171	Residential	44	<20	-	54	<20	-
1172	Residential	44	<20	-	54	<20	-
1173	Residential	44	<20	-	54	<20	-
1174	Residential	44	<20	-	54	<20	-
1175	Residential	44	<20	-	54	<20	-
1176	Residential	44	25	-	54	27	-
1177	Residential	44	25	-	54	27	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1178	Residential	44	<20	-	54	<20	-

Appendix F

Operational noise contours - Rail noise

AECOM

Residential
School
Commercial
Not Assessed
Existing Rail Alignment
Daytime $L_{Aeq,15hr}$ = 65 dB(A)
Night-time $L_{Aeq,9hr}$ = 60 dB(A)

Waterfall Stabling Yard and Platform Extension

Operational Rail Noise Contours - No Build - L_{Aeq} Scenario

0 100 200 m

N

JUL 2019

60600277

F-1

AECOM

Residential
School
Commercial
Not Assessed
Existing Rail Alignment
Daytime $L_{Aeq,15hr}$ = 65 dB(A)
Night-time $L_{Aeq,9hr}$ = 60 dB(A)

Waterfall Stabling Yard and Platform Extension

Operational Rail Noise Contours - No Build - L_{Aeq} Scenario

0 100 200 m

N

JUL 2019

60600277

F-2

AECOM

Residential
School
Commercial
Not Assessed
Existing Rail Alignment
Daytime $L_{Aeq,15hr}$ = 65 dB(A)
Night-time $L_{Aeq,9hr}$ = 60 dB(A)

Waterfall Stabling Yard and Platform Extension

Operational Rail Noise Contours - No Build - L_{Aeq} Scenario

0 100 200 m

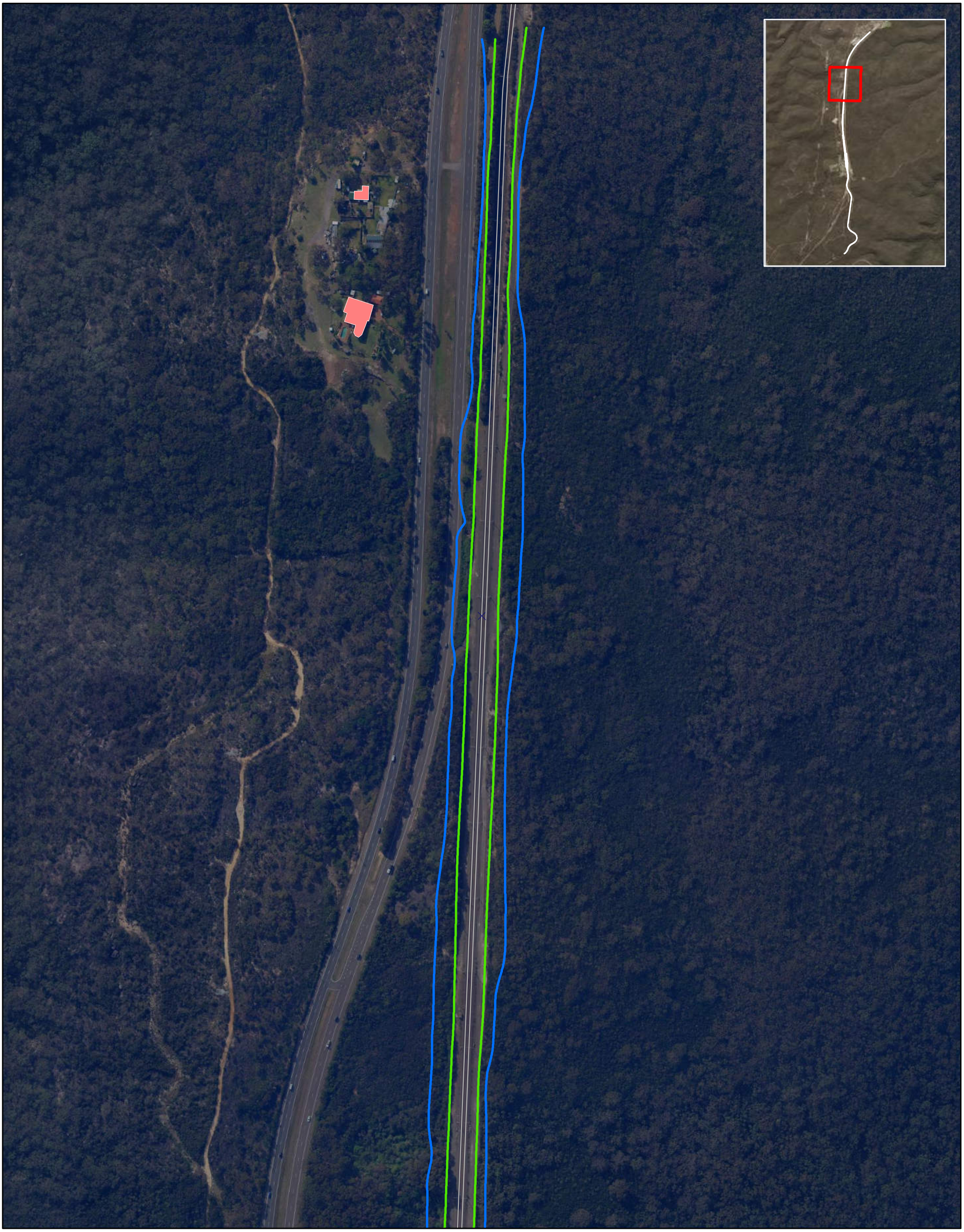
N

JUL 2019

60600277

F-3

AECOM



Residential
School
Commercial
Not Assessed
Existing Rail Alignment
Daytime $L_{Aeq,15hr}$ = 65 dB(A)
Night-time $L_{Aeq,9hr}$ = 60 dB(A)

Waterfall Stabling Yard and Platform Extension

Operational Rail Noise Contours - No Build - L_{Aeq} Scenario

0 100 200 m

N

JUL 2019

60600277

F-4

AECOM

Residential
School
Commercial
Not Assessed
L_{Amax} = 85 dB(A)
Existing Rail Alignment

Waterfall Stabling Yard and Platform Extension

Operational Rail Noise Contours - No Build - L_{Amax} Scenario

0 100 200 m

N

JUL 2019

60600277

F-5

AECOM

Residential
School
Commercial
Not Assessed
L_{Amax} = 85 dB(A)
Existing Rail Alignment

Waterfall Stabling Yard and Platform Extension
Operational Rail Noise Contours - No Build - L_{Amax} Scenario

0 100 200 m

N

JUL 2019
60600277

F-6

AECOM

Residential
School
Commercial
Not Assessed
L_{Amax} = 85 dB(A)
Existing Rail Alignment

Waterfall Stabling Yard and Platform Extension
Operational Rail Noise Contours - No Build - L_{Amax} Scenario

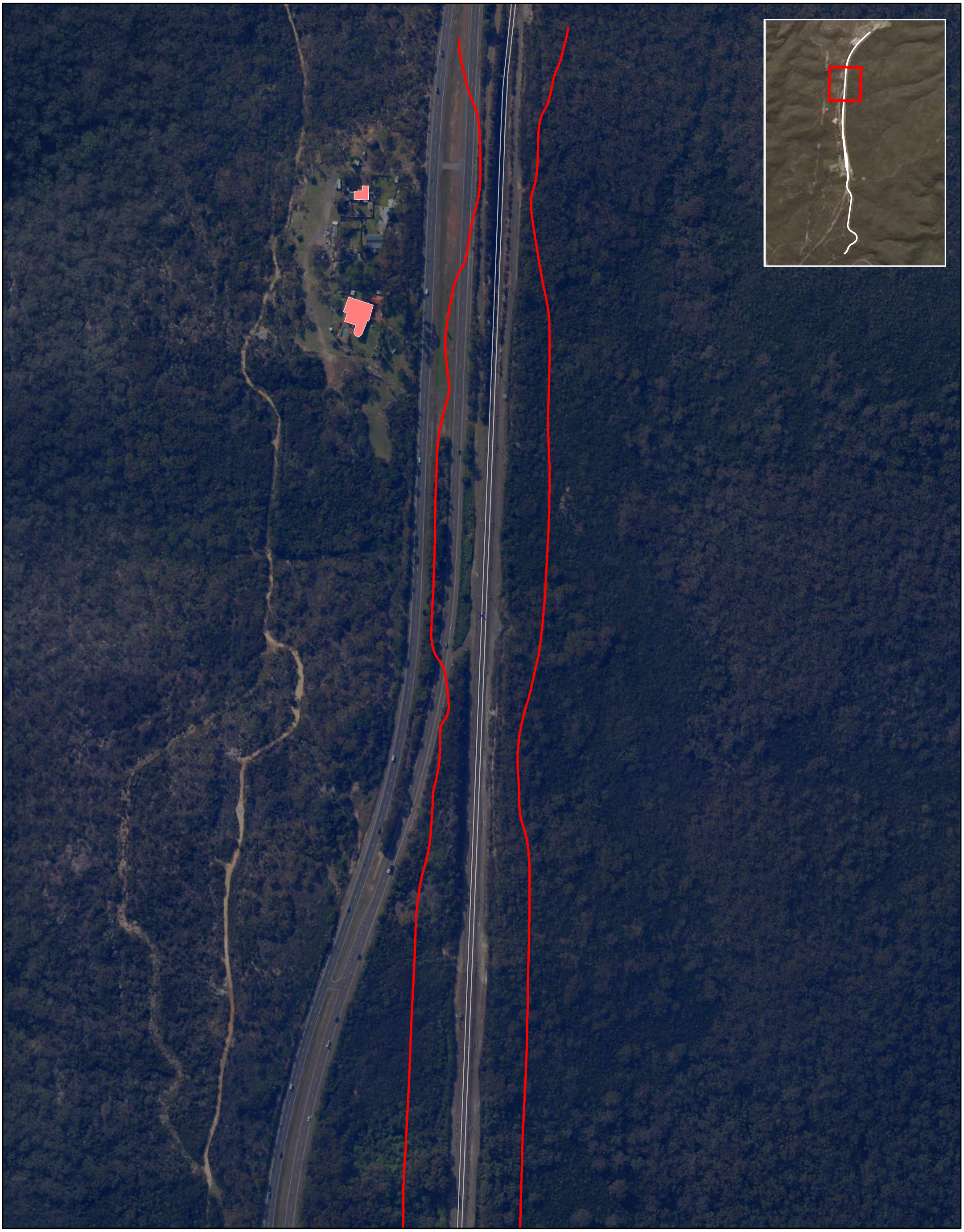
0 100 200 m

N

JUL 2019
60600277

F-7

AECOM



Residential
School
Commercial
Not Assessed
L_{Amax} = 85 dB(A)
Existing Rail Alignment

Waterfall Stabling Yard and Platform Extension

Operational Rail Noise Contours - No Build - L_{Amax} Scenario

0 100 200 m

N

JUL 2019

60600277

F-8

AECOM

Residential
School
Commercial
Not Assessed
Proposed Rail Alignment
Daytime $L_{Aeq,15hr}$ = 65 dB(A)
Night-time $L_{Aeq,9hr}$ = 60 dB(A)

Waterfall Stabling Yard and Platform Extension
Operational Rail Noise Contours - Build - L_{Aeq} Scenario

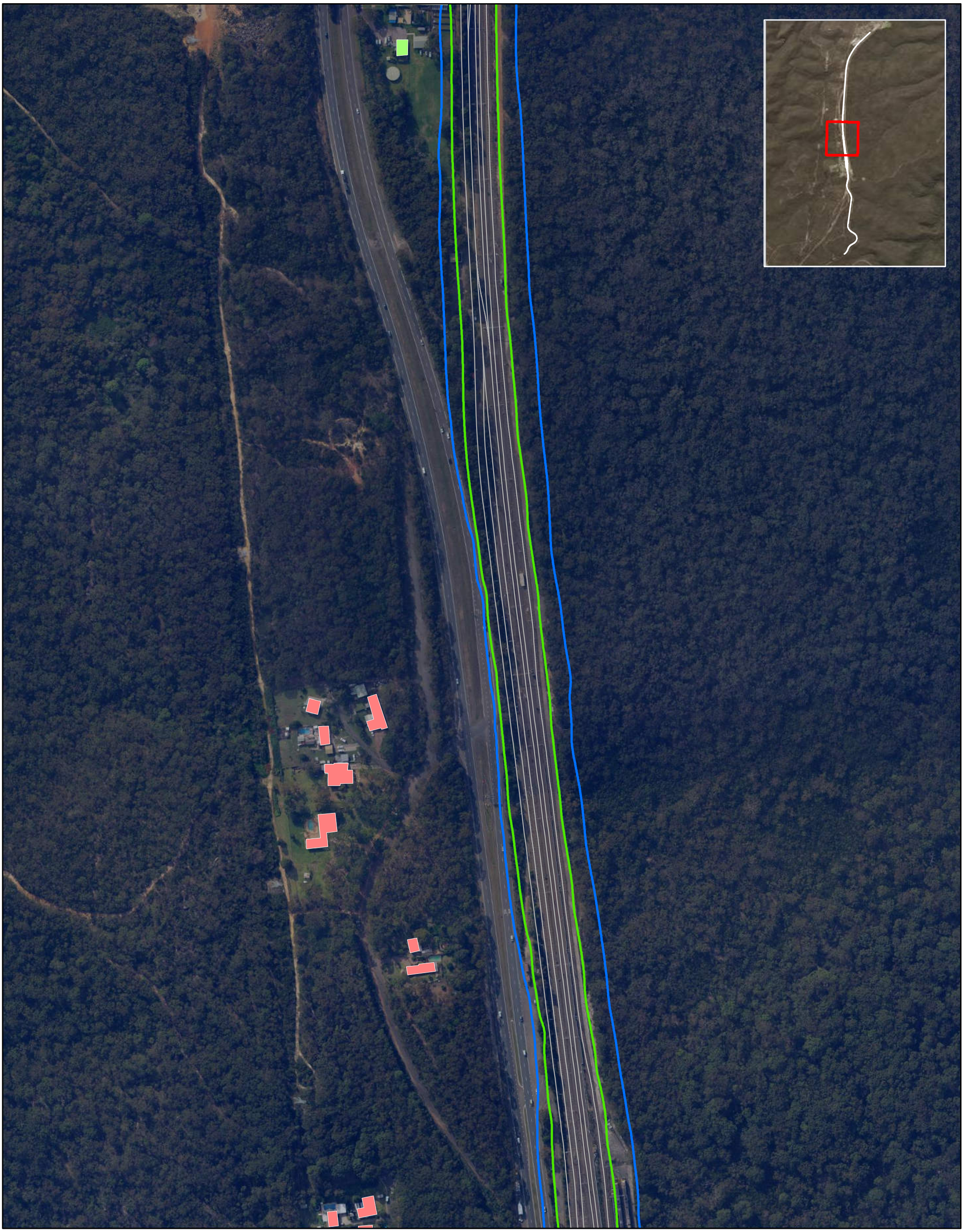
0 100 200 m

N

JUL 2019
60600277

F-9

AECOM



Residential
School
Commercial
Not Assessed
Proposed Rail Alignment
Daytime $L_{Aeq,15hr}$ = 65 dB(A)
Night-time $L_{Aeq,9hr}$ = 60 dB(A)

Waterfall Stabling Yard and Platform Extension

Operational Rail Noise Contours - Build - L_{Aeq} Scenario

0 100 200 m

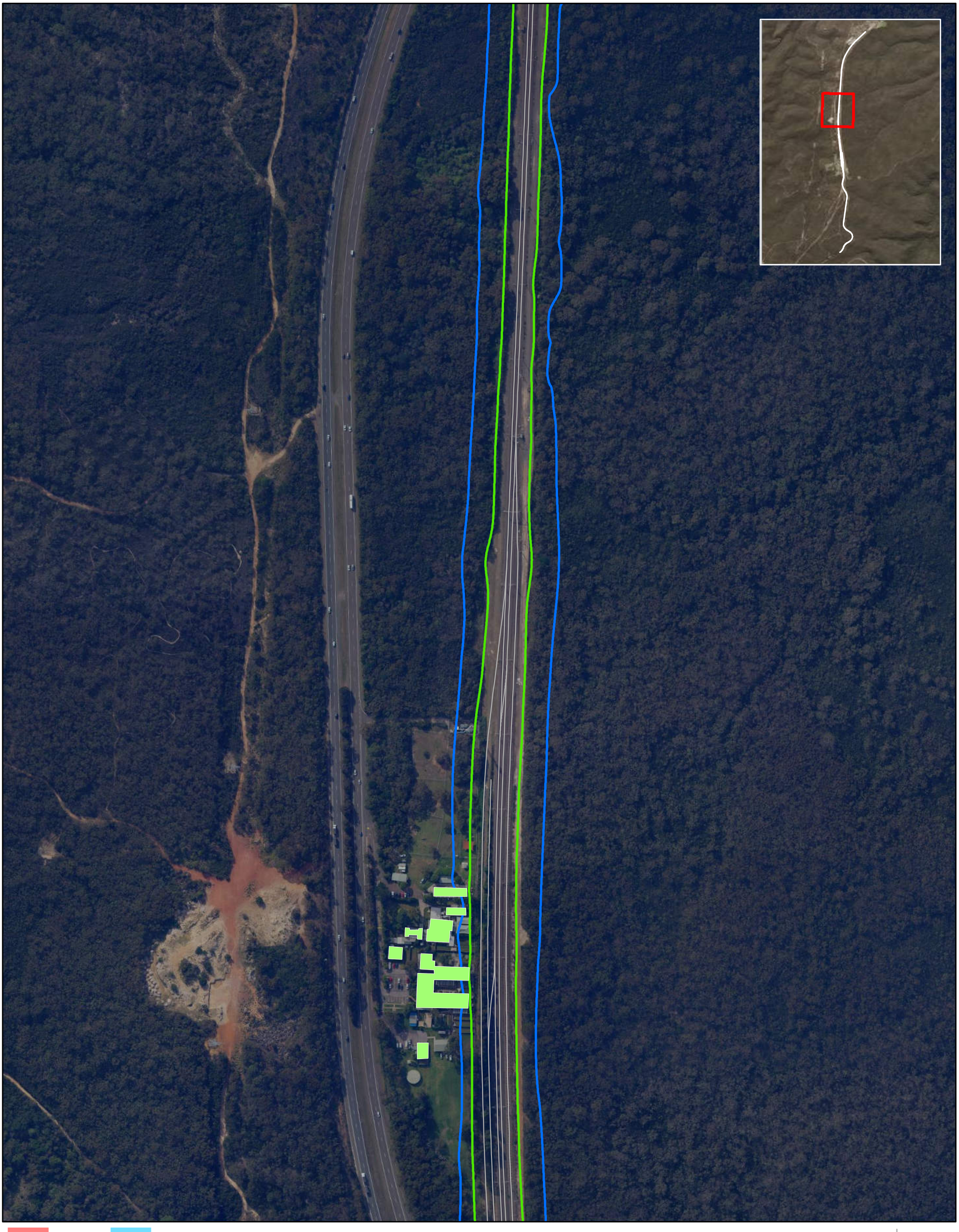
N

JUL 2019

60600277

F-10

AECOM



Residential
School
Commercial
Not Assessed
Proposed Rail Alignment
Daytime $L_{Aeq,15hr}$ = 65 dB(A)
Night-time $L_{Aeq,9hr}$ = 60 dB(A)

Waterfall Stabling Yard and Platform Extension
Operational Rail Noise Contours - Build - L_{Aeq} Scenario

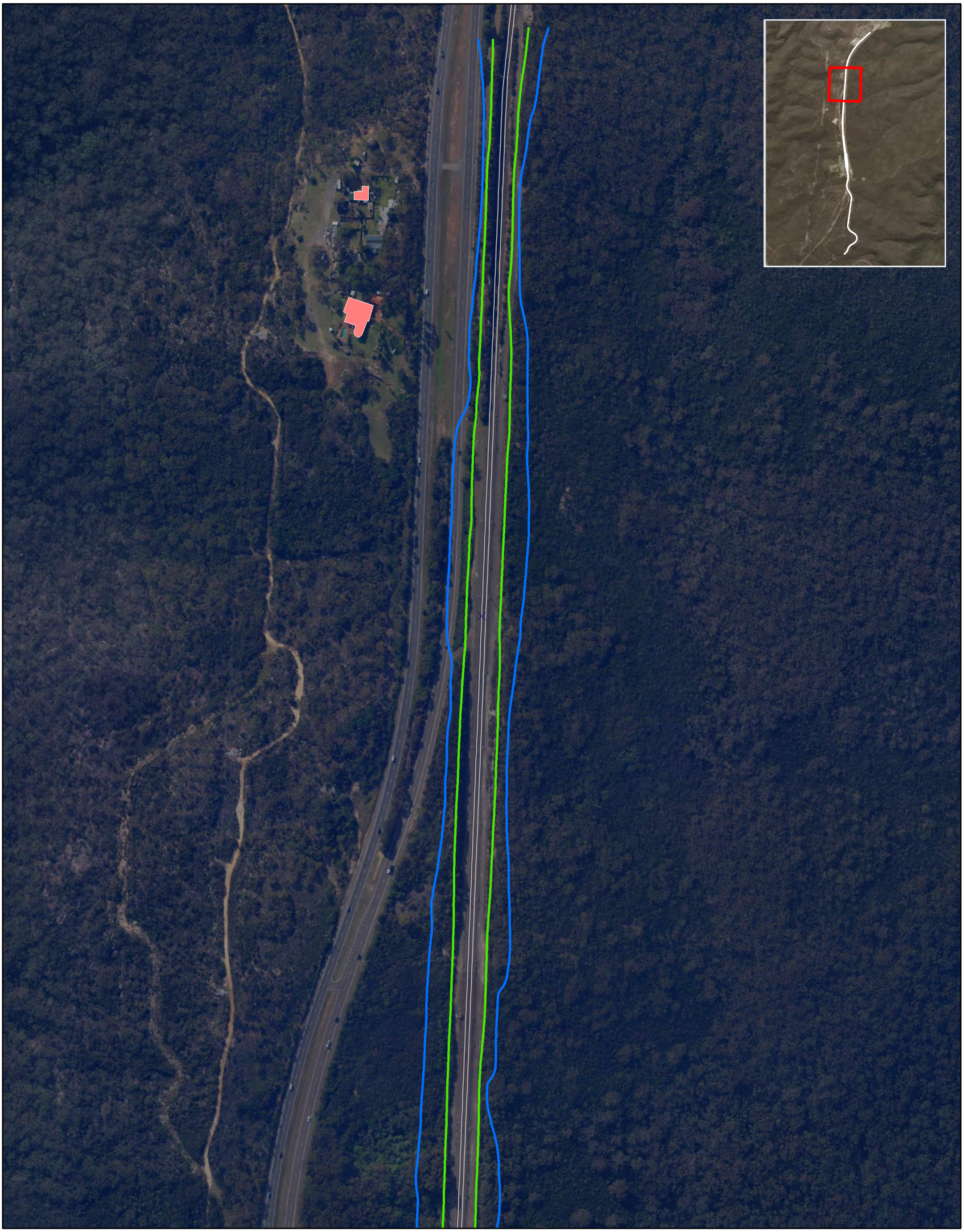
0 100 200 m

N

JUL 2019
60600277

F-11

AECOM



Residential
School
Commercial
Not Assessed
Proposed Rail Alignment
Daytime $L_{Aeq,15hr}$ = 65 dB(A)
Night-time $L_{Aeq,9hr}$ = 60 dB(A)

Waterfall Stabling Yard and Platform Extension
Operational Rail Noise Contours - Build - L_{Aeq} Scenario

0 100 200 m

N

JUL 2019
60600277

F-12

AECOM

Residential
School
L_{Amax} = 85 dB(A)
Commercial
Not Assessed
Proposed Rail Alignment

Waterfall Stabling Yard and Platform Extension
Operational Rail Noise Contours - Build - L_{Amax} Scenario

0 100 200 m

JUL 2019
60600277

F-13

AECOM

Residential
School
Commercial
Not Assessed
L_{Amax} = 85 dB(A)
Proposed Rail Alignment

Waterfall Stabling Yard and Platform Extension
Operational Rail Noise Contours - Build - L_{Amax} Scenario

0 100 200 m

N

JUL 2019
60600277

F-14

AECOM

Residential
School
Commercial
Not Assessed
L_{Amax} = 85 dB(A)
Proposed Rail Alignment

Waterfall Stabling Yard and Platform Extension
Operational Rail Noise Contours - Build - L_{Amax} Scenario

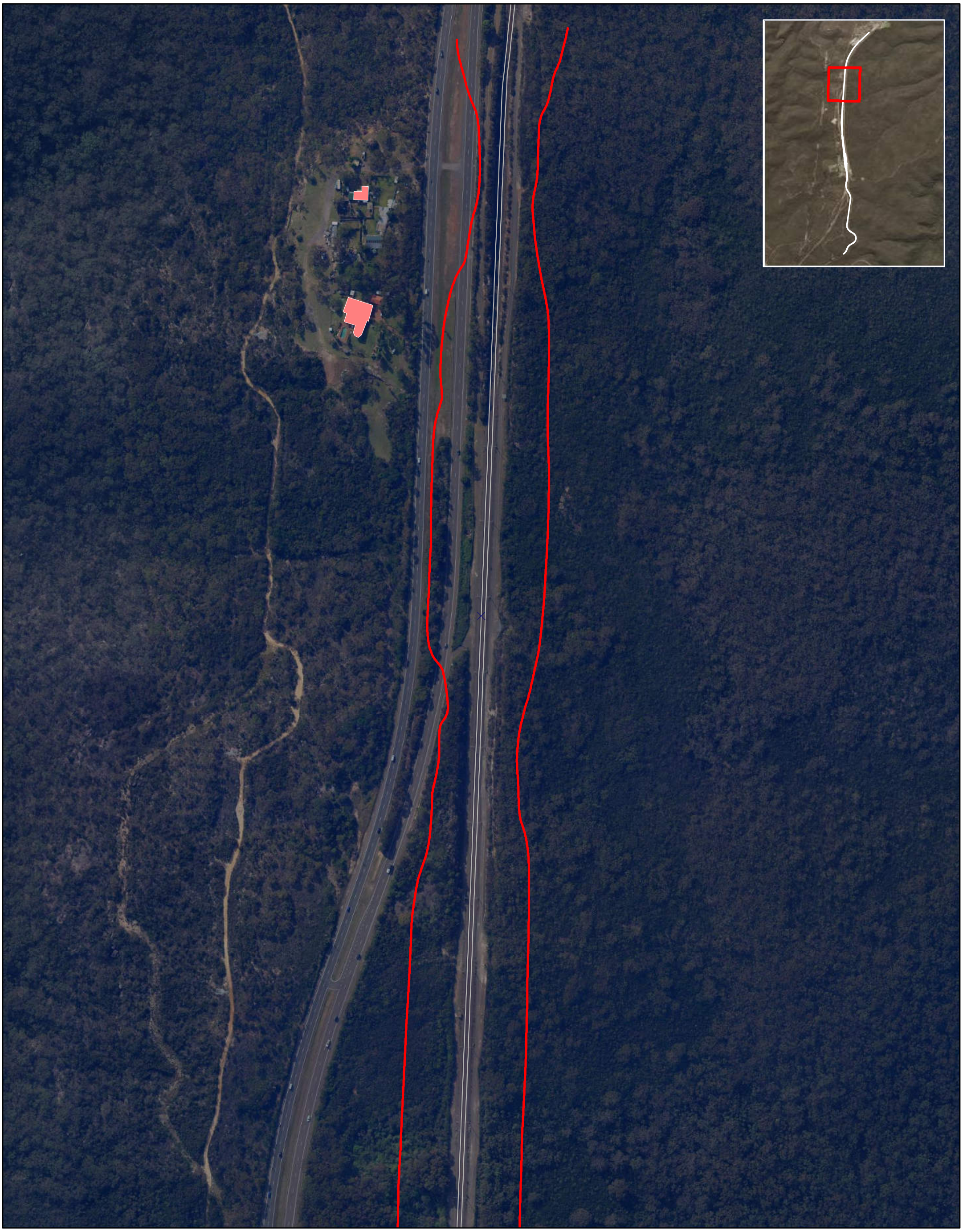
0 100 200 m

N

JUL 2019
60600277

F-15

AECOM



Residential
School
Commercial
Not Assessed
L_{Amax} = 85 dB(A)
Proposed Rail Alignment

Waterfall Stabling Yard and Platform Extension
Operational Rail Noise Contours - Build - L_{Amax} Scenario

0 100 200 m

JUL 2019
60600277

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Appendix G

Detailed operational noise results – Fixed facilities and idling freight locomotives

Appendix G Detailed operational noise results – Fixed facilities and idling freight locomotives

Table 41 Predicted operational noise levels at all assessment receivers for Scenario 1 - Existing fixed facilities - Daytime

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1001	Residential	60	<20	-	<20	-
1002	Residential	60	<20	-	<20	-
1003	Commercial	63	21	-	25	-
1004	Commercial	63	22	-	26	-
1005	Commercial	63	<20	-	20	-
1006	Commercial	63	22	-	26	-
1007	Commercial	63	22	-	26	-
1008	Commercial	63	23	-	26	-
1009	Commercial	63	23	-	27	-
1010	Residential	60	<20	-	<20	-
1011	Residential	60	29	-	32	-
1012	Residential	60	<20	-	<20	-
1013	Residential	60	<20	-	<20	-
1014	Residential	60	<20	-	<20	-
1015	Residential	60	20	-	22	-
1016	Residential	60	34	-	36	-
1017	Residential	60	25	-	27	-
1018	Residential	60	20	-	21	-
1019	Residential	60	24	-	26	-
1020	Residential	60	24	-	25	-
1021	Residential	60	24	-	25	-
1022	Residential	60	24	-	25	-
1023	Residential	60	44	-	44	-
1024	Residential	60	24	-	25	-
1025	Residential	60	48	-	48	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1026	Residential	60	24	-	25	-
1027	Residential	60	47	-	47	-
1028	Residential	60	25	-	26	-
1029	Residential	60	46	-	46	-
1030	Residential	60	46	-	47	-
1031	Residential	60	25	-	26	-
1032	Residential	60	47	-	47	-
1033	Residential	60	23	-	24	-
1034	Residential	60	24	-	24	-
1035	Residential	60	47	-	47	-
1036	Residential	60	35	-	35	-
1037	Residential	60	23	-	25	-
1038	Residential	60	26	-	26	-
1039	Residential	60	47	-	47	-
1040	Residential	60	32	-	32	-
1041	Residential	60	42	-	43	-
1042	Residential	60	23	-	24	-
1043	Residential	60	33	-	33	-
1044	Residential	60	46	-	46	-
1045	Residential	60	40	-	40	-
1046	Residential	60	24	-	26	-
1047	Residential	60	36	-	36	-
1048	Residential	60	46	-	46	-
1049	Residential	60	22	-	24	-
1050	Residential	60	<20	-	20	-
1051	Residential	60	28	-	29	-
1052	Residential	60	21	-	23	-
1053	Residential	60	46	-	47	-
1054	Residential	60	40	-	41	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1055	Residential	60	34	-	35	-
1056	Residential	60	25	-	26	-
1057	Residential	60	21	-	23	-
1058	Residential	60	21	-	23	-
1059	Residential	60	46	-	46	-
1060	Residential	60	20	-	22	-
1061	Residential	60	21	-	24	-
1062	Residential	60	41	-	42	-
1063	Residential	60	<20	-	<20	-
1064	Residential	60	36	-	37	-
1065	Residential	60	39	-	40	-
1066	Commercial	63	46	-	46	-
1067	Residential	60	32	-	34	-
1068	Residential	60	<20	-	<20	-
1069	Not Assessed	-	57	-	57	-
1070	Residential	60	<20	-	21	-
1071	Residential	60	41	-	41	-
1072	Residential	60	37	-	38	-
1073	Residential	60	32	-	34	-
1074	Residential	60	20	-	22	-
1075	Residential	60	<20	-	22	-
1076	Residential	60	25	-	27	-
1077	Residential	60	44	-	44	-
1078	Residential	60	26	-	27	-
1079	Residential	60	31	-	33	-
1080	Residential	60	40	-	41	-
1081	Residential	60	<20	-	<20	-
1082	Residential	60	20	-	22	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1083	Residential	60	<20	-	22	-
1084	Residential	60	25	-	27	-
1085	Residential	60	25	-	27	-
1086	Residential	60	20	-	22	-
1087	Residential	60	23	-	25	-
1088	Residential	60	31	-	33	-
1089	Residential	60	43	-	44	-
1090	Residential	60	40	-	41	-
1091	Residential	60	20	-	22	-
1092	Residential	60	<20	-	20	-
1093	Residential	60	<20	-	<20	-
1094	Residential	60	31	-	33	-
1095	Residential	60	38	-	40	-
1096	Residential	60	31	-	33	-
1097	Residential	60	42	-	43	-
1098	Residential	60	21	-	23	-
1099	Not Assessed	-	46	-	46	-
1100	Residential	60	<20	-	22	-
1101	Residential	60	30	-	32	-
1102	Residential	60	<20	-	<20	-
1103	Residential	60	41	-	42	-
1104	Residential	60	<20	-	22	-
1105	Residential	60	42	-	43	-
1106	Residential	60	21	-	23	-
1107	Residential	60	<20	-	21	-
1108	Residential	60	29	-	30	-
1109	Residential	60	26	-	28	-
1110	Residential	60	27	-	29	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1111	Residential	60	25	-	28	-
1112	Residential	60	<20	-	21	-
1113	Residential	60	<20	-	22	-
1114	Residential	60	42	-	44	-
1115	Residential	60	22	-	24	-
1116	Residential	60	37	-	39	-
1117	Residential	60	27	-	29	-
1118	Residential	60	<20	-	21	-
1119	Residential	60	<20	-	<20	-
1120	Residential	60	21	-	23	-
1121	Residential	60	20	-	23	-
1122	Not Assessed	-	42	-	44	-
1123	Residential	60	28	-	30	-
1124	Residential	60	39	-	41	-
1125	Residential	60	<20	-	22	-
1126	Residential	60	21	-	23	-
1127	Residential	60	<20	-	<20	-
1128	Residential	60	26	-	28	-
1129	Residential	60	<20	-	21	-
1130	Residential	60	<20	-	<20	-
1131	Residential	60	<20	-	<20	-
1132	Residential	60	38	-	40	-
1133	Residential	60	40	-	41	-
1134	Residential	60	<20	-	<20	-
1135	Residential	60	38	-	40	-
1136	Residential	60	<20	-	<20	-
1137	Residential	60	26	-	28	-
1138	Residential	60	<20	-	<20	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1139	Residential	60	<20	-	<20	-
1140	Residential	60	<20	-	<20	-
1141	Residential	60	23	-	25	-
1142	Residential	60	<20	-	<20	-
1143	Residential	60	<20	-	<20	-
1144	Residential	60	<20	-	<20	-
1145	Residential	60	<20	-	<20	-
1146	Not Assessed	-	37	-	38	-
1147	Residential	60	<20	-	<20	-
1148	Residential	60	<20	-	<20	-
1149	Residential	60	37	-	38	-
1150	Residential	60	32	-	34	-
1151	Residential	60	31	-	32	-
1152	Residential	60	38	-	39	-
1153	Residential	60	<20	-	21	-
1154	Residential	60	22	-	24	-
1155	Residential	60	32	-	34	-
1156	Residential	60	22	-	24	-
1157	Residential	60	20	-	22	-
1158	Residential	60	<20	-	21	-
1159	Residential	60	31	-	33	-
1160	Residential	60	36	-	39	-
1161	Residential	60	<20	-	<20	-
1162	Residential	60	<20	-	20	-
1163	Residential	60	<20	-	<20	-
1164	Residential	60	<20	-	<20	-
1165	Residential	60	31	-	33	-
1166	Residential	60	<20	-	<20	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1167	Residential	60	<20	-	<20	-
1168	Residential	60	33	-	36	-
1169	Residential	60	<20	-	20	-
1170	Residential	60	<20	-	<20	-
1171	Residential	60	29	-	31	-
1172	Residential	60	<20	-	<20	-
1173	Residential	60	<20	-	<20	-
1174	Residential	60	27	-	30	-
1175	Residential	60	<20	-	<20	-
1176	Residential	60	<20	-	<20	-
1177	Residential	60	<20	-	<20	-
1178	Residential	60	20	-	22	-
1179	School	60	29	-	32	-
National_Park_1	Passive Recreation	60	<20	-	22	-
National_Park_2	Passive Recreation	60	<20	-	22	-
National_Park_3	Passive Recreation	60	24	-	26	-

Table 42 Predicted operational noise levels at all residential assessment receivers for Scenario 1 - Existing fixed facilities - Night-time

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1001	Residential	44	<20	-	<20	-
1002	Residential	44	<20	-	<20	-
1010	Residential	44	<20	-	<20	-
1011	Residential	44	29	-	32	-
1012	Residential	44	<20	-	<20	-
1013	Residential	44	<20	-	<20	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1014	Residential	44	<20	-	<20	-
1015	Residential	44	20	-	22	-
1016	Residential	44	34	-	36	-
1017	Residential	44	25	-	27	-
1018	Residential	44	20	-	21	-
1019	Residential	44	24	-	26	-
1020	Residential	44	24	-	25	-
1021	Residential	44	24	-	25	-
1022	Residential	44	24	-	25	-
1023	Residential	44	44	-	44	-
1024	Residential	44	24	-	25	-
1025	Residential	44	48	4	48	4
1026	Residential	44	24	-	25	-
1027	Residential	44	47	3	47	3
1028	Residential	44	25	-	26	-
1029	Residential	44	46	2	46	2
1030	Residential	44	46	2	47	3
1031	Residential	44	25	-	26	-
1032	Residential	44	47	3	47	3
1033	Residential	44	23	-	24	-
1034	Residential	44	24	-	24	-
1035	Residential	44	47	3	47	3
1036	Residential	44	35	-	35	-
1037	Residential	44	23	-	25	-
1038	Residential	44	26	-	26	-
1039	Residential	44	47	3	47	3
1040	Residential	44	32	-	32	-
1041	Residential	44	42	-	43	-
1042	Residential	44	23	-	24	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1043	Residential	44	33	-	33	-
1044	Residential	44	46	2	46	2
1045	Residential	44	40	-	40	-
1046	Residential	44	24	-	26	-
1047	Residential	44	36	-	36	-
1048	Residential	44	46	2	46	2
1049	Residential	44	22	-	24	-
1050	Residential	44	<20	-	20	-
1051	Residential	44	28	-	29	-
1052	Residential	44	21	-	23	-
1053	Residential	44	46	2	47	3
1054	Residential	44	40	-	41	-
1055	Residential	44	34	-	35	-
1056	Residential	44	25	-	26	-
1057	Residential	44	21	-	23	-
1058	Residential	44	21	-	23	-
1059	Residential	44	46	2	46	2
1060	Residential	44	20	-	22	-
1061	Residential	44	21	-	24	-
1062	Residential	44	41	-	42	-
1063	Residential	44	<20	-	<20	-
1064	Residential	44	36	-	37	-
1065	Residential	44	39	-	40	-
1067	Residential	44	32	-	34	-
1068	Residential	44	<20	-	<20	-
1070	Residential	44	<20	-	21	-
1071	Residential	44	41	-	41	-
1072	Residential	44	37	-	38	-
1073	Residential	44	32	-	34	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1074	Residential	44	20	-	22	-
1075	Residential	44	<20	-	22	-
1076	Residential	44	25	-	27	-
1077	Residential	44	44	-	44	-
1078	Residential	44	26	-	27	-
1079	Residential	44	31	-	33	-
1080	Residential	44	40	-	41	-
1081	Residential	44	<20	-	<20	-
1082	Residential	44	20	-	22	-
1083	Residential	44	<20	-	22	-
1084	Residential	44	25	-	27	-
1085	Residential	44	25	-	27	-
1086	Residential	44	20	-	22	-
1087	Residential	44	23	-	25	-
1088	Residential	44	31	-	33	-
1089	Residential	44	43	-	44	-
1090	Residential	44	40	-	41	-
1091	Residential	44	20	-	22	-
1092	Residential	44	<20	-	20	-
1093	Residential	44	<20	-	<20	-
1094	Residential	44	31	-	33	-
1095	Residential	44	38	-	40	-
1096	Residential	44	31	-	33	-
1097	Residential	44	42	-	43	-
1098	Residential	44	21	-	23	-
1100	Residential	44	<20	-	22	-
1101	Residential	44	30	-	32	-
1102	Residential	44	<20	-	<20	-
1103	Residential	44	41	-	42	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1104	Residential	44	<20	-	22	-
1105	Residential	44	42	-	43	-
1106	Residential	44	21	-	23	-
1107	Residential	44	<20	-	21	-
1108	Residential	44	29	-	30	-
1109	Residential	44	26	-	28	-
1110	Residential	44	27	-	29	-
1111	Residential	44	25	-	28	-
1112	Residential	44	<20	-	21	-
1113	Residential	44	<20	-	22	-
1114	Residential	44	42	-	44	-
1115	Residential	44	22	-	24	-
1116	Residential	44	37	-	39	-
1117	Residential	44	27	-	29	-
1118	Residential	44	<20	-	21	-
1119	Residential	44	<20	-	<20	-
1120	Residential	44	21	-	23	-
1121	Residential	44	20	-	23	-
1123	Residential	44	28	-	30	-
1124	Residential	44	39	-	41	-
1125	Residential	44	<20	-	22	-
1126	Residential	44	21	-	23	-
1127	Residential	44	<20	-	<20	-
1128	Residential	44	26	-	28	-
1129	Residential	44	<20	-	21	-
1130	Residential	44	<20	-	<20	-
1131	Residential	44	<20	-	<20	-
1132	Residential	44	38	-	40	-
1133	Residential	44	40	-	41	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1134	Residential	44	<20	-	<20	-
1135	Residential	44	38	-	40	-
1136	Residential	44	<20	-	<20	-
1137	Residential	44	26	-	28	-
1138	Residential	44	<20	-	<20	-
1139	Residential	44	<20	-	<20	-
1140	Residential	44	<20	-	<20	-
1141	Residential	44	23	-	25	-
1142	Residential	44	<20	-	<20	-
1143	Residential	44	<20	-	<20	-
1144	Residential	44	<20	-	<20	-
1145	Residential	44	<20	-	<20	-
1147	Residential	44	<20	-	<20	-
1148	Residential	44	<20	-	<20	-
1149	Residential	44	37	-	38	-
1150	Residential	44	32	-	34	-
1151	Residential	44	31	-	32	-
1152	Residential	44	38	-	39	-
1153	Residential	44	<20	-	21	-
1154	Residential	44	22	-	24	-
1155	Residential	44	32	-	34	-
1156	Residential	44	22	-	24	-
1157	Residential	44	20	-	22	-
1158	Residential	44	<20	-	21	-
1159	Residential	44	31	-	33	-
1160	Residential	44	36	-	39	-
1161	Residential	44	<20	-	<20	-
1162	Residential	44	<20	-	20	-
1163	Residential	44	<20	-	<20	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1164	Residential	44	<20	-	<20	-
1165	Residential	44	31	-	33	-
1166	Residential	44	<20	-	<20	-
1167	Residential	44	<20	-	<20	-
1168	Residential	44	33	-	36	-
1169	Residential	44	<20	-	20	-
1170	Residential	44	<20	-	<20	-
1171	Residential	44	29	-	31	-
1172	Residential	44	<20	-	<20	-
1173	Residential	44	<20	-	<20	-
1174	Residential	44	27	-	30	-
1175	Residential	44	<20	-	<20	-
1176	Residential	44	<20	-	<20	-
1177	Residential	44	<20	-	<20	-
1178	Residential	44	20	-	22	-

Table 43 Predicted operational noise levels at all assessment receivers forScenario 2 - Proposed fixed facilities - Daytime

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1001	Residential	60	<20	-	21	-
1002	Residential	60	20	-	24	-
1003	Commercial	63	29	-	32	-
1004	Commercial	63	30	-	33	-
1005	Commercial	63	24	-	27	-
1006	Commercial	63	29	-	32	-
1007	Commercial	63	30	-	33	-
1008	Commercial	63	31	-	34	-
1009	Commercial	63	32	-	35	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1010	Residential	60	29	-	30	-
1011	Residential	60	38	-	39	-
1012	Residential	60	29	-	30	-
1013	Residential	60	32	-	33	-
1014	Residential	60	35	-	36	-
1015	Residential	60	43	-	43	-
1016	Residential	60	45	-	46	-
1017	Residential	60	33	-	34	-
1018	Residential	60	25	-	27	-
1019	Residential	60	31	-	32	-
1020	Residential	60	31	-	32	-
1021	Residential	60	31	-	32	-
1022	Residential	60	30	-	31	-
1023	Residential	60	50	-	50	-
1024	Residential	60	31	-	32	-
1025	Residential	60	52	-	52	-
1026	Residential	60	30	-	31	-
1027	Residential	60	52	-	52	-
1028	Residential	60	32	-	33	-
1029	Residential	60	50	-	50	-
1030	Residential	60	50	-	51	-
1031	Residential	60	33	-	35	-
1032	Residential	60	50	-	50	-
1033	Residential	60	31	-	33	-
1034	Residential	60	33	-	34	-
1035	Residential	60	50	-	50	-
1036	Residential	60	39	-	39	-
1037	Residential	60	32	-	34	-
1038	Residential	60	34	-	35	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1039	Residential	60	49	-	50	-
1040	Residential	60	34	-	35	-
1041	Residential	60	45	-	46	-
1042	Residential	60	31	-	33	-
1043	Residential	60	37	-	38	-
1044	Residential	60	47	-	48	-
1045	Residential	60	40	-	40	-
1046	Residential	60	33	-	35	-
1047	Residential	60	36	-	36	-
1048	Residential	60	48	-	48	-
1049	Residential	60	32	-	34	-
1050	Residential	60	29	-	31	-
1051	Residential	60	31	-	32	-
1052	Residential	60	30	-	32	-
1053	Residential	60	48	-	48	-
1054	Residential	60	41	-	42	-
1055	Residential	60	36	-	37	-
1056	Residential	60	32	-	33	-
1057	Residential	60	30	-	32	-
1058	Residential	60	29	-	31	-
1059	Residential	60	47	-	48	-
1060	Residential	60	30	-	33	-
1061	Residential	60	28	-	31	-
1062	Residential	60	42	-	43	-
1063	Residential	60	28	-	31	-
1064	Residential	60	39	-	40	-
1065	Residential	60	41	-	42	-
1066	Commercial	63	46	-	47	-
1067	Residential	60	36	-	38	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1068	Residential	60	29	-	31	-
1069	Not Assessed	-	57	-	57	-
1070	Residential	60	28	-	31	-
1071	Residential	60	41	-	41	-
1072	Residential	60	39	-	41	-
1073	Residential	60	36	-	38	-
1074	Residential	60	29	-	31	-
1075	Residential	60	29	-	31	-
1076	Residential	60	31	-	33	-
1077	Residential	60	44	-	45	-
1078	Residential	60	31	-	33	-
1079	Residential	60	36	-	38	-
1080	Residential	60	42	-	43	-
1081	Residential	60	27	-	30	-
1082	Residential	60	30	-	33	-
1083	Residential	60	27	-	30	-
1084	Residential	60	32	-	34	-
1085	Residential	60	31	-	33	-
1086	Residential	60	29	-	32	-
1087	Residential	60	30	-	33	-
1088	Residential	60	36	-	38	-
1089	Residential	60	44	-	45	-
1090	Residential	60	42	-	43	-
1091	Residential	60	29	-	31	-
1092	Residential	60	20	-	23	-
1093	Residential	60	27	-	30	-
1094	Residential	60	38	-	40	-
1095	Residential	60	41	-	43	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1096	Residential	60	34	-	36	-
1097	Residential	60	44	-	45	-
1098	Residential	60	29	-	31	-
1099	Not Assessed	-	46	-	47	-
1100	Residential	60	24	-	27	-
1101	Residential	60	36	-	38	-
1102	Residential	60	29	-	32	-
1103	Residential	60	43	-	44	-
1104	Residential	60	30	-	33	-
1105	Residential	60	42	-	44	-
1106	Residential	60	28	-	31	-
1107	Residential	60	28	-	31	-
1108	Residential	60	30	-	32	-
1109	Residential	60	28	-	30	-
1110	Residential	60	34	-	37	-
1111	Residential	60	31	-	33	-
1112	Residential	60	27	-	30	-
1113	Residential	60	21	-	24	-
1114	Residential	60	44	-	45	-
1115	Residential	60	29	-	32	-
1116	Residential	60	39	-	41	-
1117	Residential	60	33	-	35	-
1118	Residential	60	28	-	31	-
1119	Residential	60	26	-	29	-
1120	Residential	60	24	-	27	-
1121	Residential	60	27	-	30	-
1122	Not Assessed	-	43	-	45	-
1123	Residential	60	32	-	35	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1124	Residential	60	41	-	43	-
1125	Residential	60	28	-	31	-
1126	Residential	60	24	-	26	-
1127	Residential	60	22	-	25	-
1128	Residential	60	31	-	34	-
1129	Residential	60	27	-	30	-
1130	Residential	60	<20	-	21	-
1131	Residential	60	20	-	23	-
1132	Residential	60	39	-	41	-
1133	Residential	60	41	-	43	-
1134	Residential	60	<20	-	21	-
1135	Residential	60	39	-	42	-
1136	Residential	60	<20	-	22	-
1137	Residential	60	31	-	34	-
1138	Residential	60	<20	-	20	-
1139	Residential	60	<20	-	20	-
1140	Residential	60	<20	-	21	-
1141	Residential	60	29	-	32	-
1142	Residential	60	<20	-	<20	-
1143	Residential	60	<20	-	22	-
1144	Residential	60	20	-	23	-
1145	Residential	60	20	-	23	-
1146	Not Assessed	-	38	-	40	-
1147	Residential	60	20	-	23	-
1148	Residential	60	22	-	25	-
1149	Residential	60	38	-	40	-
1150	Residential	60	35	-	37	-
1151	Residential	60	35	-	37	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1152	Residential	60	40	-	41	-
1153	Residential	60	22	-	25	-
1154	Residential	60	24	-	26	-
1155	Residential	60	32	-	34	-
1156	Residential	60	26	-	29	-
1157	Residential	60	24	-	26	-
1158	Residential	60	21	-	24	-
1159	Residential	60	32	-	34	-
1160	Residential	60	38	-	41	-
1161	Residential	60	<20	-	21	-
1162	Residential	60	20	-	23	-
1163	Residential	60	<20	-	21	-
1164	Residential	60	<20	-	21	-
1165	Residential	60	32	-	35	-
1166	Residential	60	<20	-	22	-
1167	Residential	60	<20	-	22	-
1168	Residential	60	35	-	38	-
1169	Residential	60	22	-	25	-
1170	Residential	60	<20	-	21	-
1171	Residential	60	31	-	33	-
1172	Residential	60	<20	-	21	-
1173	Residential	60	<20	-	21	-
1174	Residential	60	27	-	30	-
1175	Residential	60	<20	-	21	-
1176	Residential	60	<20	-	21	-
1177	Residential	60	20	-	23	-
1178	Residential	60	21	-	24	-
1179	School	60	32	-	35	-
National_Pa	Passive	60	25	-	28	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
rk_1	Recreation					
National_Park_2	Passive Recreation	60	29	-	31	-
National_Park_3	Passive Recreation	60	31	-	33	-

Table 44 Predicted operational noise levels at all residential assessment receivers for Scenario 2 - Proposed fixed facilities - Night-time

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1001	Residential	44	<20	-	21	-
1002	Residential	44	20	-	24	-
1010	Residential	44	29	-	30	-
1011	Residential	44	38	-	39	-
1012	Residential	44	29	-	30	-
1013	Residential	44	32	-	33	-
1014	Residential	44	35	-	36	-
1015	Residential	44	43	-	43	-
1016	Residential	44	45	1	46	2
1017	Residential	44	33	-	34	-
1018	Residential	44	25	-	27	-
1019	Residential	44	31	-	32	-
1020	Residential	44	31	-	32	-
1021	Residential	44	31	-	32	-
1022	Residential	44	30	-	31	-
1023	Residential	44	50	6	50	6
1024	Residential	44	31	-	32	-
1025	Residential	44	52	8	52	8
1026	Residential	44	30	-	31	-
1027	Residential	44	52	8	52	8

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1028	Residential	44	32	-	33	-
1029	Residential	44	50	6	50	6
1030	Residential	44	50	6	51	7
1031	Residential	44	33	-	35	-
1032	Residential	44	50	6	50	6
1033	Residential	44	31	-	33	-
1034	Residential	44	33	-	34	-
1035	Residential	44	50	6	50	6
1036	Residential	44	39	-	39	-
1037	Residential	44	32	-	34	-
1038	Residential	44	34	-	35	-
1039	Residential	44	49	5	50	6
1040	Residential	44	34	-	35	-
1041	Residential	44	45	1	46	2
1042	Residential	44	31	-	33	-
1043	Residential	44	37	-	38	-
1044	Residential	44	47	3	48	4
1045	Residential	44	40	-	40	-
1046	Residential	44	33	-	35	-
1047	Residential	44	36	-	36	-
1048	Residential	44	48	4	48	4
1049	Residential	44	32	-	34	-
1050	Residential	44	29	-	31	-
1051	Residential	44	31	-	32	-
1052	Residential	44	30	-	32	-
1053	Residential	44	48	4	48	4
1054	Residential	44	41	-	42	-
1055	Residential	44	36	-	37	-
1056	Residential	44	32	-	33	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1057	Residential	44	30	-	32	-
1058	Residential	44	29	-	31	-
1059	Residential	44	47	3	48	4
1060	Residential	44	30	-	33	-
1061	Residential	44	28	-	31	-
1062	Residential	44	42	-	43	-
1063	Residential	44	28	-	31	-
1064	Residential	44	39	-	40	-
1065	Residential	44	41	-	42	-
1067	Residential	44	36	-	38	-
1068	Residential	44	29	-	31	-
1070	Residential	44	28	-	31	-
1071	Residential	44	41	-	41	-
1072	Residential	44	39	-	41	-
1073	Residential	44	36	-	38	-
1074	Residential	44	29	-	31	-
1075	Residential	44	29	-	31	-
1076	Residential	44	31	-	33	-
1077	Residential	44	44	-	45	1
1078	Residential	44	31	-	33	-
1079	Residential	44	36	-	38	-
1080	Residential	44	42	-	43	-
1081	Residential	44	27	-	30	-
1082	Residential	44	30	-	33	-
1083	Residential	44	27	-	30	-
1084	Residential	44	32	-	34	-
1085	Residential	44	31	-	33	-
1086	Residential	44	29	-	32	-
1087	Residential	44	30	-	33	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1088	Residential	44	36	-	38	-
1089	Residential	44	44	-	45	1
1090	Residential	44	42	-	43	-
1091	Residential	44	29	-	31	-
1092	Residential	44	20	-	23	-
1093	Residential	44	27	-	30	-
1094	Residential	44	38	-	40	-
1095	Residential	44	41	-	43	-
1096	Residential	44	34	-	36	-
1097	Residential	44	44	-	45	1
1098	Residential	44	29	-	31	-
1100	Residential	44	24	-	27	-
1101	Residential	44	36	-	38	-
1102	Residential	44	29	-	32	-
1103	Residential	44	43	-	44	-
1104	Residential	44	30	-	33	-
1105	Residential	44	42	-	44	-
1106	Residential	44	28	-	31	-
1107	Residential	44	28	-	31	-
1108	Residential	44	30	-	32	-
1109	Residential	44	28	-	30	-
1110	Residential	44	34	-	37	-
1111	Residential	44	31	-	33	-
1112	Residential	44	27	-	30	-
1113	Residential	44	21	-	24	-
1114	Residential	44	44	-	45	1
1115	Residential	44	29	-	32	-
1116	Residential	44	39	-	41	-
1117	Residential	44	33	-	35	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1118	Residential	44	28	-	31	-
1119	Residential	44	26	-	29	-
1120	Residential	44	24	-	27	-
1121	Residential	44	27	-	30	-
1123	Residential	44	32	-	35	-
1124	Residential	44	41	-	43	-
1125	Residential	44	28	-	31	-
1126	Residential	44	24	-	26	-
1127	Residential	44	22	-	25	-
1128	Residential	44	31	-	34	-
1129	Residential	44	27	-	30	-
1130	Residential	44	<20	-	21	-
1131	Residential	44	20	-	23	-
1132	Residential	44	39	-	41	-
1133	Residential	44	41	-	43	-
1134	Residential	44	<20	-	21	-
1135	Residential	44	39	-	42	-
1136	Residential	44	<20	-	22	-
1137	Residential	44	31	-	34	-
1138	Residential	44	<20	-	20	-
1139	Residential	44	<20	-	20	-
1140	Residential	44	<20	-	21	-
1141	Residential	44	29	-	32	-
1142	Residential	44	<20	-	<20	-
1143	Residential	44	<20	-	22	-
1144	Residential	44	20	-	23	-
1145	Residential	44	20	-	23	-
1147	Residential	44	20	-	23	-
1148	Residential	44	22	-	25	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1149	Residential	44	38	-	40	-
1150	Residential	44	35	-	37	-
1151	Residential	44	35	-	37	-
1152	Residential	44	40	-	41	-
1153	Residential	44	22	-	25	-
1154	Residential	44	24	-	26	-
1155	Residential	44	32	-	34	-
1156	Residential	44	26	-	29	-
1157	Residential	44	24	-	26	-
1158	Residential	44	21	-	24	-
1159	Residential	44	32	-	34	-
1160	Residential	44	38	-	41	-
1161	Residential	44	<20	-	21	-
1162	Residential	44	20	-	23	-
1163	Residential	44	<20	-	21	-
1164	Residential	44	<20	-	21	-
1165	Residential	44	32	-	35	-
1166	Residential	44	<20	-	22	-
1167	Residential	44	<20	-	22	-
1168	Residential	44	35	-	38	-
1169	Residential	44	22	-	25	-
1170	Residential	44	<20	-	21	-
1171	Residential	44	31	-	33	-
1172	Residential	44	<20	-	21	-
1173	Residential	44	<20	-	21	-
1174	Residential	44	27	-	30	-
1175	Residential	44	<20	-	21	-
1176	Residential	44	<20	-	21	-
1177	Residential	44	20	-	23	-

Receiver ID	Use	Proposal noise trigger levels, dB(A)	Neutral conditions		Noise enhancing meteorological conditions	
			$L_{Aeq(15min)}$ level, dB(A)	Exceed	$L_{Aeq(15min)}$ level, dB(A)	Exceed
1178	Residential	44	21	-	24	-

Table 45 Predicted L_{Aeq} and L_{Amax} noise levels for existing stabling facility – Maximum noise level assessment

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance
1001	Residential	44	<20	-	54	28	-
1002	Residential	44	<20	-	54	32	-
1010	Residential	44	<20	-	54	30	-
1011	Residential	44	32	-	54	40	-
1012	Residential	44	<20	-	54	27	-
1013	Residential	44	<20	-	54	24	-
1014	Residential	44	<20	-	54	31	-
1015	Residential	44	22	-	54	31	-
1016	Residential	44	36	-	54	47	-
1017	Residential	44	27	-	54	34	-
1018	Residential	44	21	-	54	33	-
1019	Residential	44	26	-	54	33	-
1020	Residential	44	25	-	54	33	-
1021	Residential	44	25	-	54	33	-
1022	Residential	44	25	-	54	33	-
1023	Residential	44	44	-	54	51	-
1024	Residential	44	25	-	54	33	-
1025	Residential	44	48	4	54	55	1
1026	Residential	44	25	-	54	34	-
1027	Residential	44	47	3	54	55	1
1028	Residential	44	26	-	54	34	-
1029	Residential	44	46	2	54	52	-
1030	Residential	44	47	3	54	54	-
1031	Residential	44	26	-	54	36	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance
1032	Residential	44	47	3	54	54	-
1033	Residential	44	24	-	54	34	-
1034	Residential	44	24	-	54	38	-
1035	Residential	44	47	3	54	55	1
1036	Residential	44	35	-	54	39	-
1037	Residential	44	25	-	54	39	-
1038	Residential	44	26	-	54	30	-
1039	Residential	44	47	3	54	55	1
1040	Residential	44	32	-	54	40	-
1041	Residential	44	43	-	54	52	-
1042	Residential	44	24	-	54	35	-
1043	Residential	44	33	-	54	39	-
1044	Residential	44	46	2	54	53	-
1045	Residential	44	40	-	54	42	-
1046	Residential	44	26	-	54	35	-
1047	Residential	44	36	-	54	40	-
1048	Residential	44	46	2	54	54	-
1049	Residential	44	24	-	54	34	-
1050	Residential	44	20	-	54	27	-
1051	Residential	44	29	-	54	38	-
1052	Residential	44	23	-	54	35	-
1053	Residential	44	47	3	54	55	1
1054	Residential	44	41	-	54	54	-
1055	Residential	44	35	-	54	45	-
1056	Residential	44	26	-	54	35	-
1057	Residential	44	23	-	54	35	-
1058	Residential	44	23	-	54	34	-
1059	Residential	44	46	2	54	57	3
1060	Residential	44	22	-	54	33	-
1061	Residential	44	24	-	54	33	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance
1062	Residential	44	42	-	54	44	-
1063	Residential	44	<20	-	54	24	-
1064	Residential	44	37	-	54	41	-
1065	Residential	44	40	-	54	45	-
1067	Residential	44	34	-	54	44	-
1068	Residential	44	<20	-	54	24	-
1070	Residential	44	21	-	54	32	-
1071	Residential	44	41	-	54	56	2
1072	Residential	44	38	-	54	46	-
1073	Residential	44	34	-	54	40	-
1074	Residential	44	22	-	54	32	-
1075	Residential	44	22	-	54	33	-
1076	Residential	44	27	-	54	35	-
1077	Residential	44	44	-	54	55	1
1078	Residential	44	27	-	54	35	-
1079	Residential	44	33	-	54	41	-
1080	Residential	44	41	-	54	51	-
1081	Residential	44	<20	-	54	26	-
1082	Residential	44	22	-	54	26	-
1083	Residential	44	22	-	54	32	-
1084	Residential	44	27	-	54	37	-
1085	Residential	44	27	-	54	34	-
1086	Residential	44	22	-	54	32	-
1087	Residential	44	25	-	54	33	-
1088	Residential	44	33	-	54	35	-
1089	Residential	44	44	-	54	58	4
1090	Residential	44	41	-	54	51	-
1091	Residential	44	22	-	54	24	-
1092	Residential	44	20	-	54	32	-
1093	Residential	44	<20	-	54	26	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance
1094	Residential	44	33	-	54	39	-
1095	Residential	44	40	-	54	50	-
1096	Residential	44	33	-	54	42	-
1097	Residential	44	43	-	54	58	4
1098	Residential	44	23	-	54	23	-
1100	Residential	44	22	-	54	32	-
1101	Residential	44	32	-	54	37	-
1102	Residential	44	<20	-	54	26	-
1103	Residential	44	42	-	54	53	-
1104	Residential	44	22	-	54	26	-
1105	Residential	44	43	-	54	58	4
1106	Residential	44	23	-	54	32	-
1107	Residential	44	21	-	54	31	-
1108	Residential	44	30	-	54	46	-
1109	Residential	44	28	-	54	37	-
1110	Residential	44	29	-	54	41	-
1111	Residential	44	28	-	54	36	-
1112	Residential	44	21	-	54	27	-
1113	Residential	44	22	-	54	32	-
1114	Residential	44	44	-	54	55	1
1115	Residential	44	24	-	54	35	-
1116	Residential	44	39	-	54	52	-
1117	Residential	44	29	-	54	41	-
1118	Residential	44	21	-	54	24	-
1119	Residential	44	<20	-	54	22	-
1120	Residential	44	23	-	54	31	-
1121	Residential	44	23	-	54	32	-
1123	Residential	44	30	-	54	42	-
1124	Residential	44	41	-	54	52	-
1125	Residential	44	22	-	54	32	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance
1126	Residential	44	23	-	54	32	-
1127	Residential	44	<20	-	54	22	-
1128	Residential	44	28	-	54	41	-
1129	Residential	44	21	-	54	32	-
1130	Residential	44	<20	-	54	27	-
1131	Residential	44	<20	-	54	24	-
1132	Residential	44	40	-	54	52	-
1133	Residential	44	41	-	54	54	-
1134	Residential	44	<20	-	54	31	-
1135	Residential	44	40	-	54	52	-
1136	Residential	44	<20	-	54	28	-
1137	Residential	44	28	-	54	40	-
1138	Residential	44	<20	-	54	31	-
1139	Residential	44	<20	-	54	31	-
1140	Residential	44	<20	-	54	31	-
1141	Residential	44	25	-	54	39	-
1142	Residential	44	<20	-	54	28	-
1143	Residential	44	<20	-	54	33	-
1144	Residential	44	<20	-	54	31	-
1145	Residential	44	<20	-	54	28	-
1147	Residential	44	<20	-	54	23	-
1148	Residential	44	<20	-	54	25	-
1149	Residential	44	38	-	54	51	-
1150	Residential	44	34	-	54	46	-
1151	Residential	44	32	-	54	43	-
1152	Residential	44	39	-	54	51	-
1153	Residential	44	21	-	54	32	-
1154	Residential	44	24	-	54	37	-
1155	Residential	44	34	-	54	49	-
1156	Residential	44	24	-	54	35	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance
1157	Residential	44	22	-	54	32	-
1158	Residential	44	21	-	54	34	-
1159	Residential	44	33	-	54	44	-
1160	Residential	44	39	-	54	50	-
1161	Residential	44	<20	-	54	31	-
1162	Residential	44	20	-	54	33	-
1163	Residential	44	<20	-	54	31	-
1164	Residential	44	<20	-	54	33	-
1165	Residential	44	33	-	54	46	-
1166	Residential	44	<20	-	54	33	-
1167	Residential	44	<20	-	54	33	-
1168	Residential	44	36	-	54	47	-
1169	Residential	44	20	-	54	32	-
1170	Residential	44	<20	-	54	28	-
1171	Residential	44	31	-	54	42	-
1172	Residential	44	<20	-	54	33	-
1173	Residential	44	<20	-	54	30	-
1174	Residential	44	30	-	54	39	-
1175	Residential	44	<20	-	54	30	-
1176	Residential	44	<20	-	54	30	-
1177	Residential	44	<20	-	54	29	-
1178	Residential	44	22	-	54	35	-

Table 46 Predicted L_{Aeq} and L_{Amax} noise levels for operation of fixed facilities – Maximum noise level assessment

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1001	Residential	44	21	-	54	28	-
1002	Residential	44	24	-	54	32	-
1010	Residential	44	30	-	54	30	-
1011	Residential	44	39	-	54	40	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1012	Residential	44	30	-	54	27	-
1013	Residential	44	33	-	54	24	-
1014	Residential	44	36	-	54	31	-
1015	Residential	44	43	-	54	31	-
1016	Residential	44	46	2	54	47	-
1017	Residential	44	34	-	54	41	-
1018	Residential	44	27	-	54	39	-
1019	Residential	44	32	-	54	40	-
1020	Residential	44	32	-	54	40	-
1021	Residential	44	32	-	54	40	-
1022	Residential	44	31	-	54	40	-
1023	Residential	44	50	6	54	58	4
1024	Residential	44	32	-	54	43	-
1025	Residential	44	52	8	54	61	7
1026	Residential	44	31	-	54	40	-
1027	Residential	44	52	8	54	62	8
1028	Residential	44	33	-	54	41	-
1029	Residential	44	50	6	54	59	5
1030	Residential	44	51	7	54	62	8
1031	Residential	44	35	-	54	45	-
1032	Residential	44	50	6	54	61	7
1033	Residential	44	33	-	54	37	-
1034	Residential	44	34	-	54	40	-
1035	Residential	44	50	6	54	62	8
1036	Residential	44	39	-	54	46	-
1037	Residential	44	34	-	54	43	-
1038	Residential	44	35	-	54	42	-
1039	Residential	44	50	6	54	61	7
1040	Residential	44	35	-	54	42	-
1041	Residential	44	46	2	54	58	4

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1042	Residential	44	33	-	54	36	-
1043	Residential	44	38	-	54	44	-
1044	Residential	44	48	4	54	59	5
1045	Residential	44	40	-	54	42	-
1046	Residential	44	35	-	54	38	-
1047	Residential	44	36	-	54	40	-
1048	Residential	44	48	4	54	57	3
1049	Residential	44	34	-	54	36	-
1050	Residential	44	31	-	54	36	-
1051	Residential	44	32	-	54	38	-
1052	Residential	44	32	-	54	37	-
1053	Residential	44	48	4	54	58	4
1054	Residential	44	42	-	54	54	-
1055	Residential	44	37	-	54	45	-
1056	Residential	44	33	-	54	39	-
1057	Residential	44	32	-	54	37	-
1058	Residential	44	31	-	54	36	-
1059	Residential	44	48	4	54	58	4
1060	Residential	44	33	-	54	38	-
1061	Residential	44	31	-	54	35	-
1062	Residential	44	43	-	54	51	-
1063	Residential	44	31	-	54	38	-
1064	Residential	44	40	-	54	46	-
1065	Residential	44	42	-	54	50	-
1067	Residential	44	38	-	54	44	-
1068	Residential	44	31	-	54	38	-
1070	Residential	44	31	-	54	37	-
1071	Residential	44	41	-	54	56	2
1072	Residential	44	41	-	54	46	-
1073	Residential	44	38	-	54	42	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1074	Residential	44	31	-	54	37	-
1075	Residential	44	31	-	54	37	-
1076	Residential	44	33	-	54	38	-
1077	Residential	44	45	1	54	55	1
1078	Residential	44	33	-	54	38	-
1079	Residential	44	38	-	54	49	-
1080	Residential	44	43	-	54	53	-
1081	Residential	44	30	-	54	36	-
1082	Residential	44	33	-	54	39	-
1083	Residential	44	30	-	54	36	-
1084	Residential	44	34	-	54	41	-
1085	Residential	44	33	-	54	38	-
1086	Residential	44	32	-	54	39	-
1087	Residential	44	33	-	54	37	-
1088	Residential	44	38	-	54	49	-
1089	Residential	44	45	1	54	58	4
1090	Residential	44	43	-	54	53	-
1091	Residential	44	31	-	54	37	-
1092	Residential	44	23	-	54	32	-
1093	Residential	44	30	-	54	36	-
1094	Residential	44	40	-	54	51	-
1095	Residential	44	43	-	54	54	-
1096	Residential	44	36	-	54	42	-
1097	Residential	44	45	1	54	58	4
1098	Residential	44	31	-	54	36	-
1100	Residential	44	27	-	54	36	-
1101	Residential	44	38	-	54	48	-
1102	Residential	44	32	-	54	39	-
1103	Residential	44	44	-	54	54	-
1104	Residential	44	33	-	54	39	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1105	Residential	44	44	-	54	58	4
1106	Residential	44	31	-	54	36	-
1107	Residential	44	31	-	54	39	-
1108	Residential	44	32	-	54	46	-
1109	Residential	44	30	-	54	38	-
1110	Residential	44	37	-	54	48	-
1111	Residential	44	33	-	54	40	-
1112	Residential	44	30	-	54	36	-
1113	Residential	44	24	-	54	32	-
1114	Residential	44	45	1	54	55	1
1115	Residential	44	32	-	54	38	-
1116	Residential	44	41	-	54	52	-
1117	Residential	44	35	-	54	48	-
1118	Residential	44	31	-	54	37	-
1119	Residential	44	29	-	54	36	-
1120	Residential	44	27	-	54	31	-
1121	Residential	44	30	-	54	36	-
1123	Residential	44	35	-	54	43	-
1124	Residential	44	43	-	54	53	-
1125	Residential	44	31	-	54	36	-
1126	Residential	44	26	-	54	32	-
1127	Residential	44	25	-	54	22	-
1128	Residential	44	34	-	54	41	-
1129	Residential	44	30	-	54	36	-
1130	Residential	44	21	-	54	27	-
1131	Residential	44	23	-	54	24	-
1132	Residential	44	41	-	54	52	-
1133	Residential	44	43	-	54	54	-
1134	Residential	44	21	-	54	31	-
1135	Residential	44	42	-	54	52	-

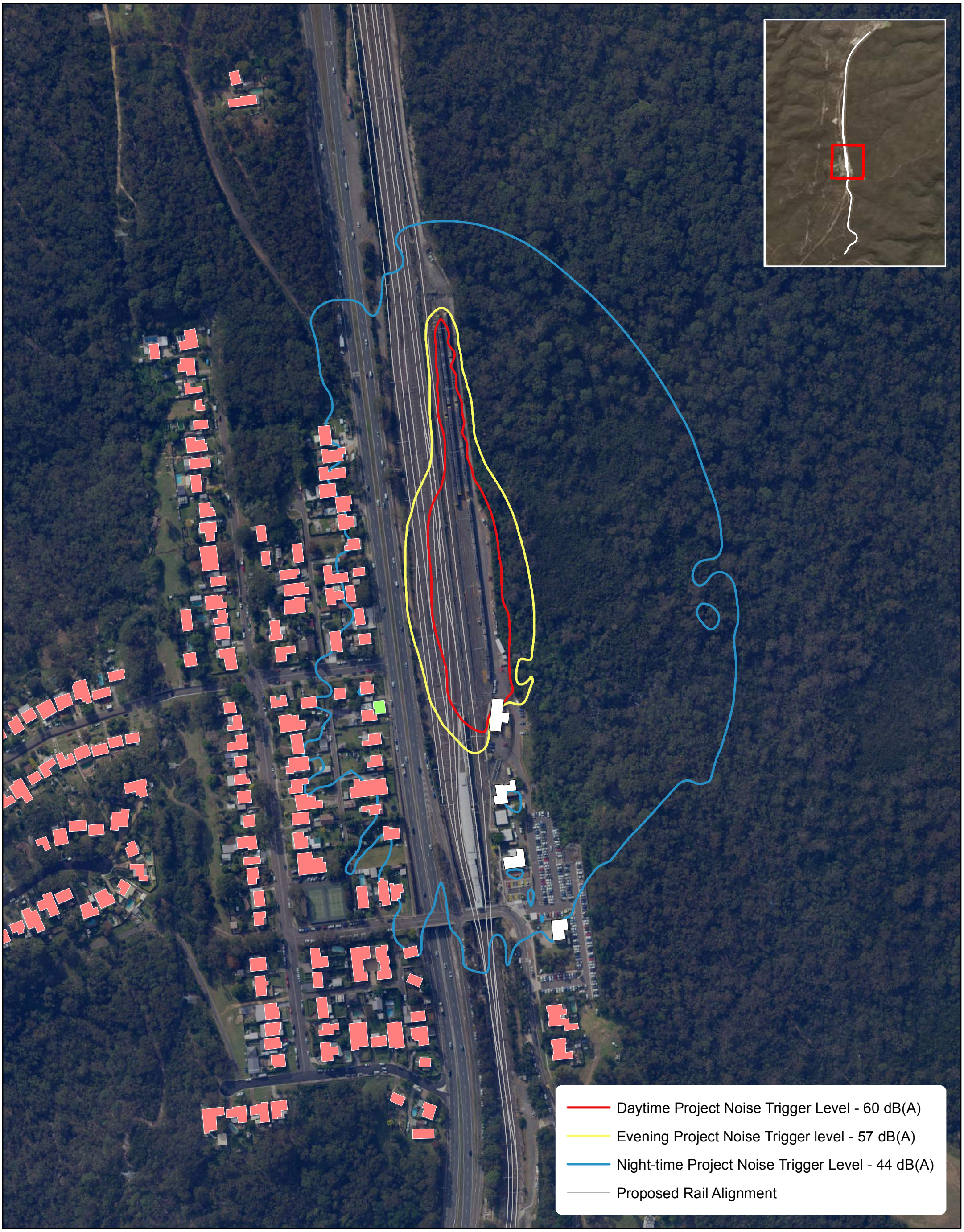
Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1136	Residential	44	22	-	54	28	-
1137	Residential	44	34	-	54	41	-
1138	Residential	44	20	-	54	31	-
1139	Residential	44	20	-	54	31	-
1140	Residential	44	21	-	54	31	-
1141	Residential	44	32	-	54	40	-
1142	Residential	44	<20	-	54	28	-
1143	Residential	44	22	-	54	34	-
1144	Residential	44	23	-	54	32	-
1145	Residential	44	23	-	54	34	-
1147	Residential	44	23	-	54	23	-
1148	Residential	44	25	-	54	25	-
1149	Residential	44	40	-	54	51	-
1150	Residential	44	37	-	54	47	-
1151	Residential	44	37	-	54	46	-
1152	Residential	44	41	-	54	51	-
1153	Residential	44	25	-	54	32	-
1154	Residential	44	26	-	54	37	-
1155	Residential	44	34	-	54	49	-
1156	Residential	44	29	-	54	36	-
1157	Residential	44	26	-	54	36	-
1158	Residential	44	24	-	54	34	-
1159	Residential	44	34	-	54	44	-
1160	Residential	44	41	-	54	50	-
1161	Residential	44	21	-	54	31	-
1162	Residential	44	23	-	54	34	-
1163	Residential	44	21	-	54	31	-
1164	Residential	44	21	-	54	33	-
1165	Residential	44	35	-	54	46	-
1166	Residential	44	22	-	54	33	-

Receiver ID	Use	Sound pressure level, L_{Aeq}, dB(A)			Sound pressure level, L_{Amax}, dB(A)		
		Screening level	$L_{Aeq(15min)}$ level, dB(A)	Exceedance	Screening level	L_{Amax} level, dB(A)	Exceedance
1167	Residential	44	22	-	54	33	-
1168	Residential	44	38	-	54	47	-
1169	Residential	44	25	-	54	34	-
1170	Residential	44	21	-	54	29	-
1171	Residential	44	33	-	54	42	-
1172	Residential	44	21	-	54	33	-
1173	Residential	44	21	-	54	30	-
1174	Residential	44	30	-	54	39	-
1175	Residential	44	21	-	54	30	-
1176	Residential	44	21	-	54	30	-
1177	Residential	44	23	-	54	30	-
1178	Residential	44	24	-	54	35	-

Appendix H

Operational noise contours - Stabling facility

AECOM



Waterfall Stabling Yard and Platform Extension

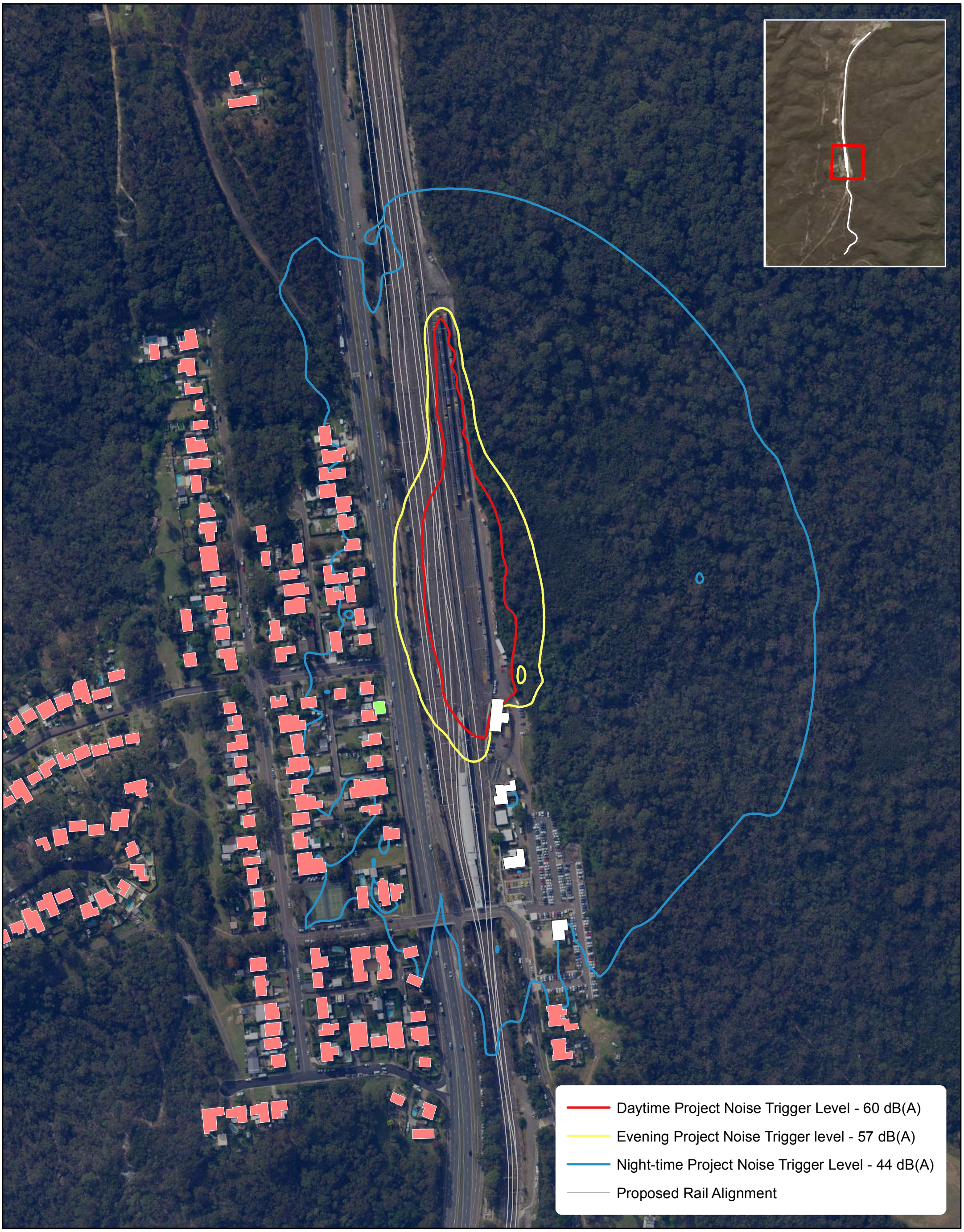
Existing Stabling Yard Noise - Standard Meteorological Conditions

AUG 2019

60600277

H-1

AECOM



Waterfall Stabling Yard and Platform Extension

Existing Stabling Yard Noise - Noise-enhancing Meteorological Conditions

AUG 2019

60600277

H-2

AECOM

Daytime Project Noise Trigger Level - 60 dB(A)

Evening Project Noise Trigger level - 57 dB(A)

Night-time Project Noise Trigger Level - 44 dB(A)

Proposed Rail Alignment

Residential

School

Commercial

Not Assessed

0 100 200 m

N

Waterfall Stabling Yard and Platform Extension

Operation of Fixed Facilities - Standard Meteorological Conditions

AUG 2019

60600277

H-3

AECOM

Daytime Project Noise Trigger Level - 60 dB(A)
Evening Project Noise Trigger level - 57 dB(A)
Night-time Project Noise Trigger Level - 44 dB(A)
Proposed Rail Alignment

Residential
School
Commercial
Not Assessed

0 100 200 m

N

Waterfall Stabling Yard and Platform Extension
Operation of Fixed Facilities - Standard Meteorological Conditions

AUG 2019
60600277

H-4

AECOM

Daytime Project Noise Trigger Level - 60 dB(A)

Evening Project Noise Trigger level - 57 dB(A)

Night-time Project Noise Trigger Level - 44 dB(A)

Proposed Rail Alignment

Residential

School

Commercial

Not Assessed

0 100 200 m

N

Waterfall Stabling Yard and Platform Extension

Operation of Fixed Facilities - Noise-enhancing Meteorological Conditions

AUG 2019

60600277

H-5

AECOM

Daytime Project Noise Trigger Level - 60 dB(A)
Evening Project Noise Trigger level - 57 dB(A)
Night-time Project Noise Trigger Level - 44 dB(A)
Proposed Rail Alignment

Residential
School
Commercial
Not Assessed

0 100 200 m

N

Waterfall Stabling Yard and Platform Extension
Operation of Fixed Facilities - Noise-enhancing Meteorological Conditions

AUG 2019
60600277

H-6

AECOM

Residential
School
Commercial
Not Assessed

0 100 200 m

N

Waterfall Stabling Yard and Platform Extension

Idling Freight Locomotives at Signals - Standard Meteorological Conditions

AUG 2019

60600277

H-7

AECOM

Waterfall Stabling Yard and Platform Extension

Idling Freight Locomotives at Signals - Noise-enhancing Meteorological Conditions

AUG 2019

60600277

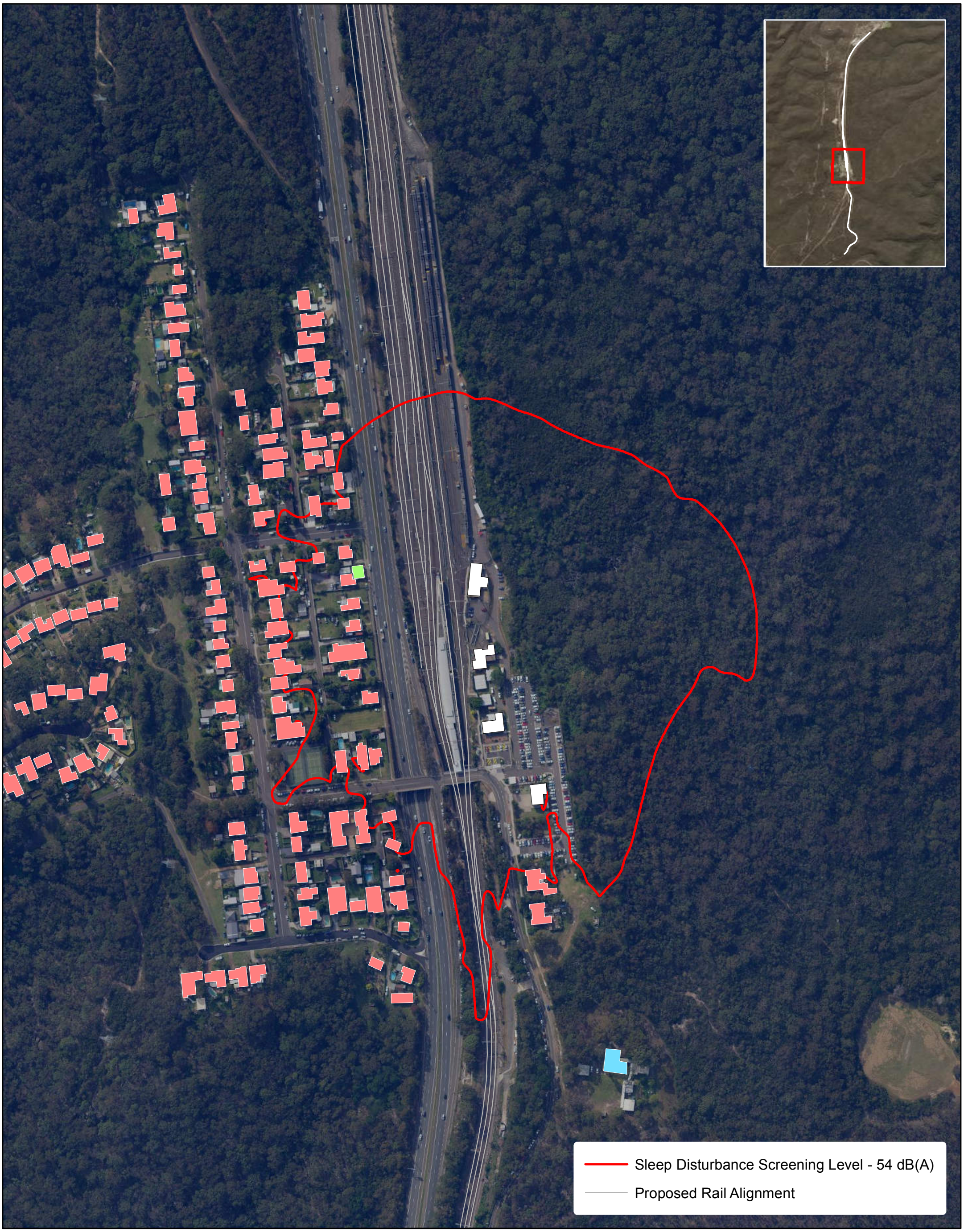
H-8

Residential
School
Commercial
Not Assessed

0 100 200 m

N

AECOM



Waterfall Stabling Yard and Platform Extension

Existing Stabling Yard Noise - Maximum Noise Level Assessment - Standard Meteorological Conditions

AUG 2019

60600277

H-9

Residential

School

Commercial

Not Assessed

0 100 200 m

N

AECOM

Sleep Disturbance Screening Level - 54 dB(A)

Proposed Rail Alignment

Waterfall Stabling Yard and Platform Extension

Existing Stabling Yard Noise - Maximum Noise Level Assessment - Noise-enhancing Meteorological Conditions

AUG 2019

60600277

H-10

Residential

School

Commercial

Not Assessed

0 100 200 m

N

AECOM

Sleep Disturbance Screening Level - 54 dB(A)

Proposed Rail Alignment

Residential

School

Commercial

Not Assessed

0 100 200 m

N

Waterfall Stabling Yard and Platform Extension

Operation of Fixed Facilities - Maximum Noise Level Assessment - Standard Meteorological Conditions

AUG 2019

60600277

H-11

Waterfall Stabling Yard and Platform Extension

Operation of Fixed Facilities - Maximum Noise Level Assessment - Standard Meteorological Conditions

AUG 2019

60600277

H-12

Residential
School
Commercial
Not Assessed

0 100 200 m

N

AECOM

Sleep Disturbance Screening Level - 54 dB(A)

Proposed Rail Alignment

Residential

School

Commercial

Not Assessed

0 100 200 m

N

Waterfall Stabling Yard and Platform Extension

Operation of Fixed Facilities - Maximum Noise Level Assessment - Noise-enhancing Meteorological Conditions

AUG 2019

60600277

H-13

AECOM

Sleep Disturbance Screening Level - 54 dB(A)

Proposed Rail Alignment

Waterfall Stabling Yard and Platform Extension

Operation of Fixed Facilities - Maximum Noise Level Assessment - Noise-enhancing Meteorological Conditions

AUG 2019

60600277

H-14

Residential

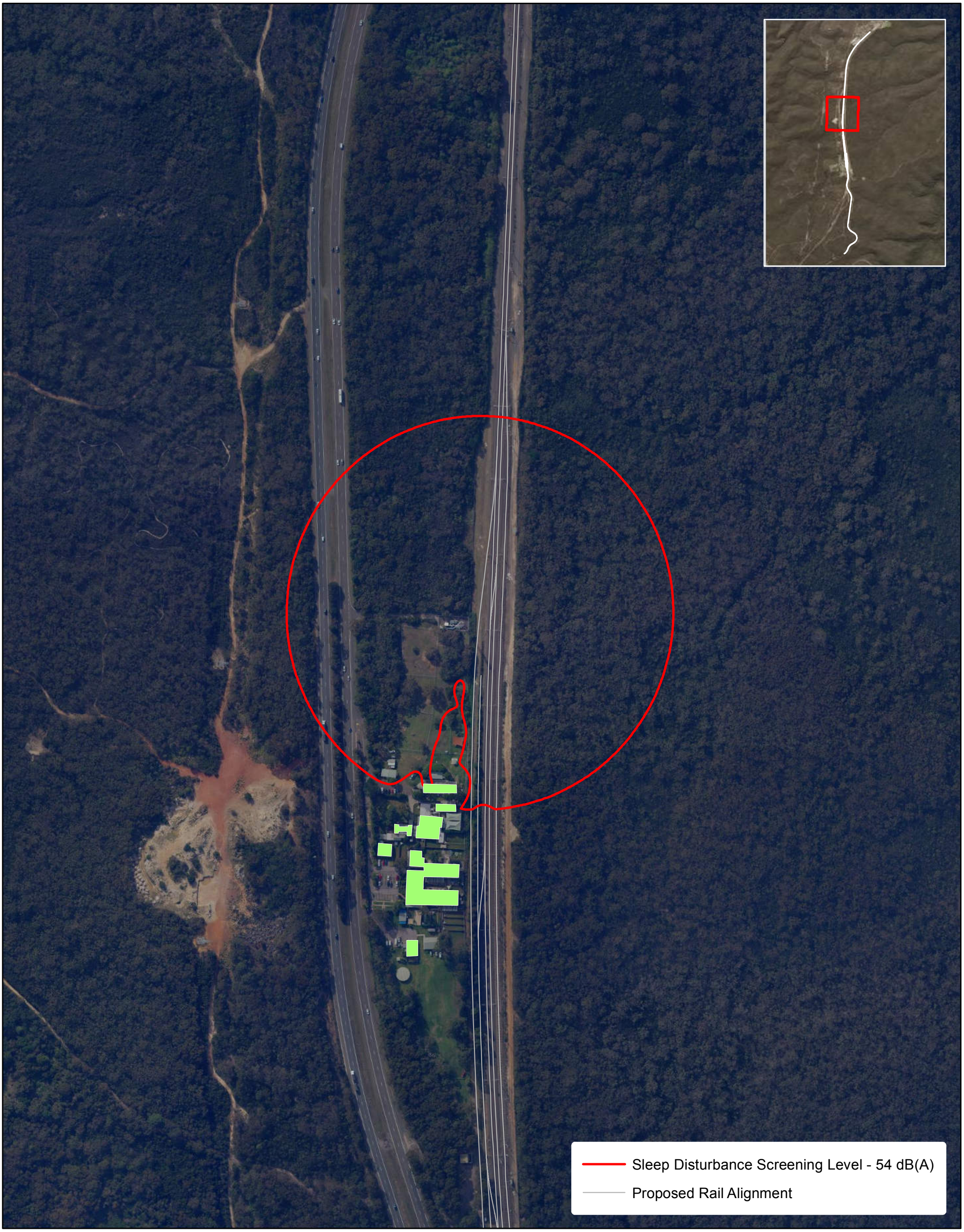
School

Commercial

Not Assessed

0 100 200 m

N



Waterfall Stabling Yard and Platform Extension

Idling Freight Locomotives at Signals - Maximum Noise Level Assessment - Standard Meteorological Conditions

AUG 2019

60600277

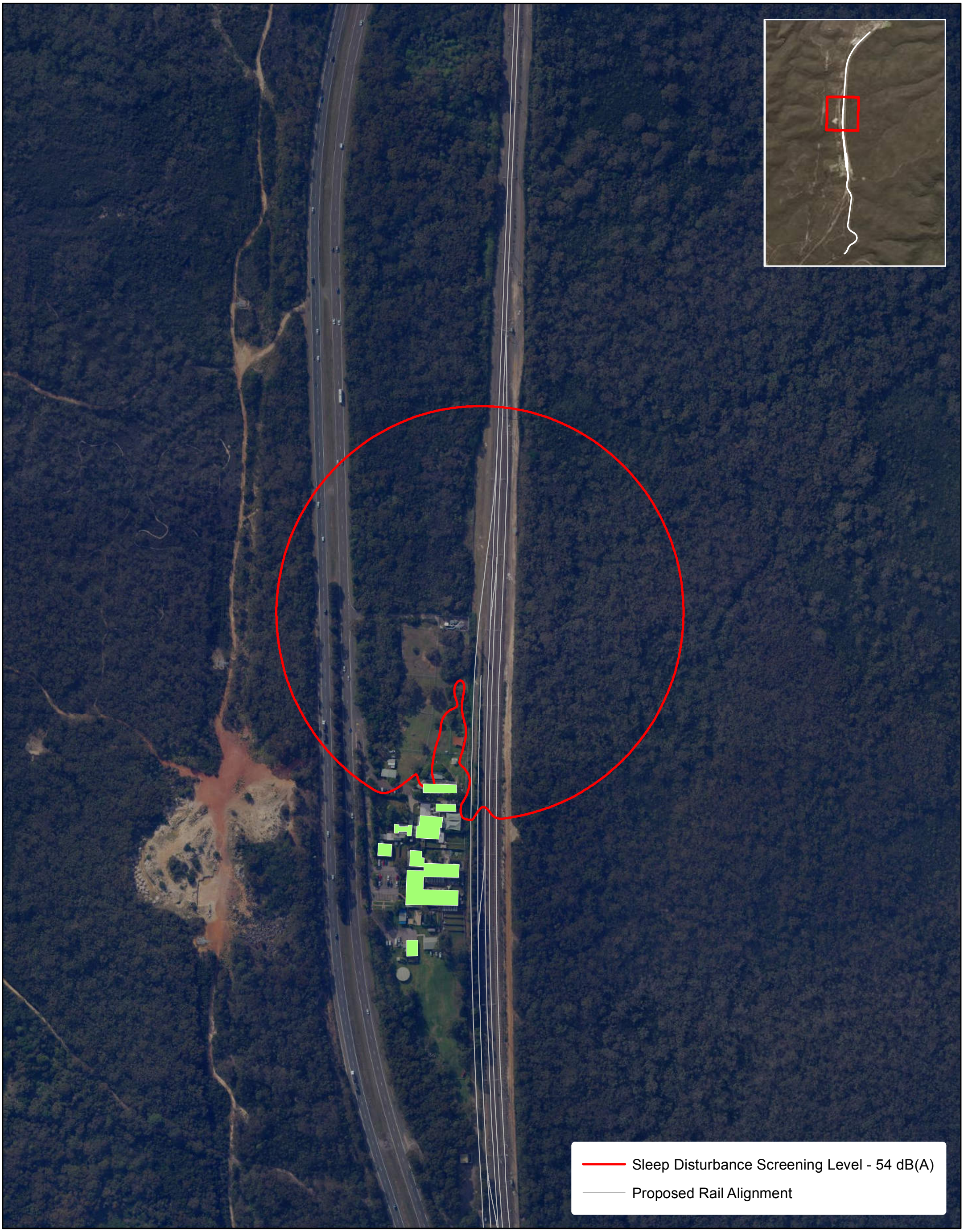
H-15

Residential
School
Commercial
Not Assessed

0 100 200 m

N

AECOM



Waterfall Stabling Yard and Platform Extension

Idling Freight Locomotives at Signals - Maximum Noise Level Assessment - Noise-enhancing Meteorological Conditions

AUG 2019

60600277

H-16

Residential
School
Commercial
Not Assessed

0 100 200 m

N