Appendix A Acoustic terminology

1 Sound Level or Noise Level

The terms "sound" and "noise" are almost interchangeable, except that in common usage "noise" is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or L_P are commonly used to represent Sound Pressure Level. The symbol L_A represents A.weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-5} Pa.

2 "A" Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an "A. weighting" filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A.weighting. Sound Levels measured without any weighting are referred to as "linear", and the units are expressed as dB(lin) or dB.

3 Sound Power Level

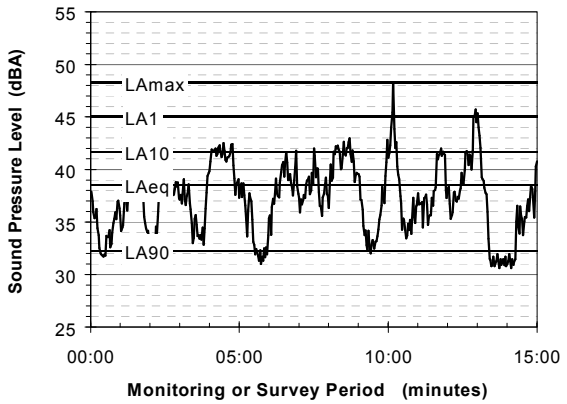
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or L_W, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN}, where L_{AN} is the A.weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} The noise level exceed for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

L_{Aeq} The A.weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time.varying sound.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the "repeatable minimum" L_{A90} noise level over the daytime and night.time measurement periods, as required by the EPA. In addition the method produces mean or "average" levels representative of the other descriptors (L_{Aeq}, L_{A10}, etc).

5 Tonality

Tonal noise contains one or more prominent tones (ie distinct frequency components), and is normally regarded as more offensive than "broad band" noise.

6 Impulsiveness

An impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.

7 Frequency Analysis

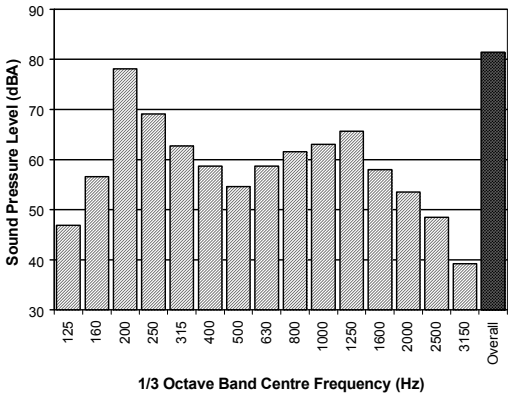
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (3 bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



8 Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of "peak" velocity or "rms" velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as "peak particle velocity", or PPV. The latter incorporates "root mean squared" averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse.

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/V_o), where V_o is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used by some organizations.

9 Human Perception of Vibration

People are able to "feel" vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as "normal" in a car, bus or train is considerably higher than what is perceived as "normal" in a shop, office or dwelling.

10 Over:Pressure

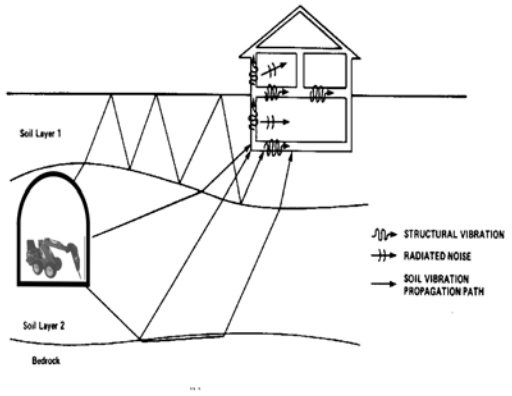
The term "over.pressure" is used to describe the air pressure pulse emitted during blasting or similar events. The peak level of an event is normally measured using a microphone in the same manner as linear noise (ie unweighted), at frequencies both in and below the audible range.

11 Ground:borne Noise, Structure:borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed "structure.borne noise", "ground.borne noise" or "regenerated noise". This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of ground.borne or structure.borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents the various paths by which vibration and ground.borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term "regenerated noise" is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise

Appendix B Project Conditions of Approval

Infrastructure Approval

Section 115ZB of the *Environmental Planning and Assessment Act 1979*

I grant approval to the State significant infrastructure application referred to in schedule A, subject to the conditions in schedules B to F.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts including economic and social impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the ongoing environmental management of the development.

The Hon Brad Hazzard MP
Minister for Planning and Infrastructure

Sydney 17 JUL 2013 2013

SCHEDULE A

Application no.:	SSI-5132
Proponent:	Transport for NSW
Consent Authority:	Minister for Planning and Infrastructure
Land:	Land required for the construction and operation of the proposal, generally between Epping and Thornleigh
Infrastructure:	Construction and operation of the Epping to Thornleigh Third Track, including operation and construction/modifications of stations; station precincts; service facilities; rail infrastructure and systems.
State significant infrastructure:	The Proposal is State significant infrastructure by virtue of Schedule 3, Clause 1(1) of the State and Regional Development SEPP.

DEFINITIONS

Act, the	*Environmental Planning and Assessment Act, 1979.*
Ancillary Facility	Temporary facility for construction, including for example an office and amenities compound, construction compound, batch plant (concrete or bitumen), materials storage compound, maintenance workshop, testing laboratory or long-term (greater than 6 months) material stockpile area.
Conditions of approval	The Minister's conditions of approval for the SSI.
Construction	Includes all work in respect of the SSI other than: a) survey, acquisitions, building/ road dilapidation surveys; b) investigative drilling/ excavation, c) minor clearing or translocation of vegetation; d) establishing ancillary facilities/ construction work sites (in locations meeting the criteria identified in the Conditions of Approval); e) installation of environmental impact mitigation measures, fencing, enabling works; f) other activities determined by the Environmental Representative to have minimal environmental impact (e.g. access roads, adjustments to services/ utilities, etc). Work where a heritage item, threatened species, populations or endangered ecological communities would be affected, that work is classified as construction, unless otherwise approved by the Director General in consultation with the Office of Environment and Heritage and/ or the Heritage Council of NSW.
Department, the	Department of Planning and Infrastructure.
Director General, the	Director General of the Department of Planning and Infrastructure.
Director General's approval, agreement or satisfaction	A written approval from the Director General (or nominee). Where the Director General's approval, agreement or satisfaction is required under a condition of this approval, the Director General will endeavour to provide a response within one month of receiving an approval, agreement or satisfaction request. The Director General may ask for additional information if the approval, agreement or satisfaction request is considered incomplete. When further information is requested, the time taken for the Proponent to respond in writing will be added to the one month period.
DPI	Department of Primary Industries
EEC	Endangered ecological community
EIS	Environmental Impact Statement
Enabling Works	Works which allow isolation of the site so that access for construction can be provided.
EPA	Environment Protection Authority.
EPL	Environment Protection Licence under the *Protection of the Environment Operations Act 1997.*

Feasible and Reasonable	Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. Feasible relates to engineering considerations and what is practical to build. Reasonable relates to the application of judgement in arriving at a decision, taking into account mitigation benefits and cost of mitigation versus benefits provided, community views and nature and extent of potential improvements. Where requested by the Director General, the Proponent shall provide evidence as to how feasible and reasonable measures were considered and taken into account.
Heritage	Encompasses both Aboriginal and historic heritage including sites that predate European settlement, and a shared history since European settlement such as a shared associations in pastoral landscapes as well as associations linked with the mission period.
Heritage Item	An item as defined under the *Heritage Act 1977*, and assessed as being of local, State and/ or National heritage significance, and/or an Aboriginal Object or Aboriginal Place as defined under the *National Parks and Wildlife Act 1974.*
High noise impact works and activities	Means jack hammering, rock breaking or hammering, pile driving, vibratory rolling, cutting of pavement, concrete or steel or other work occurring on the surface that generates noise with impulsive, intermittent, tonal or low frequency characteristics.
IGANRIP	*Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects* (DECC and DoP, 2007).
Minister, the	Minister for Planning and Infrastructure
NOW	NSW Office of Water
OEH	Office of Environment and Heritage
Operation	Means the operation of the SSI, but does not include commissioning trials of equipment or temporary use of parts of the SSI during construction.
Proponent	Transport for NSW
Publicly available	Available for inspection by a member of the general public (for example available on an internet website).
Relevant council(s)	Hornsby Shire or Parramatta City Council
Rail curve	Rail curves with a horizontal radius of less than 500 metres.
RING	*Rail Infrastructure Noise Guideline* (EPA, 2013).
RMS	Roads and Maritime Services
Sensitive receiver	Residence, education institution (e.g. school, university, TAFE college), health care facility (e.g. nursing home, hospital), religious facility (e.g. church), children's day care facility, community centres, and recreation areas.
SSI	Means the infrastructure approved under this approval and as generally described in Schedule A.

SCHEDULE B

ADMINISTRATIVE CONDITIONS

TERMS OF APPROVAL

B1. The Proponent shall carry out the SSI generally in accordance with the:
   (a) SSI Application SSI-5132;
   (b) *Epping to Thornleigh Third Track: Environmental Impact Statement*, dated 13 September 2012;
   (c) *Epping to Thornleigh Third Track Submissions Report,* dated 13 March 2013; and
   (d) conditions of this approval.

B2. In the event of an inconsistency between:
   (a) the conditions of this approval and any document listed from condition B1(a) to B1(c) inclusive, the conditions of this approval shall prevail to the extent of the inconsistency; and
   (b) any document listed from condition B1(a) to B1(c) inclusive, the most recent document shall prevail to the extent of the inconsistency.

B3. The Proponent shall comply with any reasonable requirement(s) of the Director General arising from the Department's assessment of:
   (a) any reports, plans or correspondence that are prepared and/or submitted in accordance with this approval; and
   (b) the implementation of any actions or measures contained within these reports, plans or correspondence.

B4. Subject to confidentiality, the Proponent shall make all documents required under this approval available for public inspection on request.

LIMITS OF APPROVAL

B5. This approval shall lapse 10 years after the date on which it is granted, unless the works the subject of this SSI approval are physically commenced on or before that date.

STATUTORY REQUIREMENTS

B6. The Proponent shall ensure that the SSI complies with all relevant legislation and that all licences, permits and approvals are obtained as required by law and maintained as required throughout the life of the SSI. No condition of this approval removes the obligation for the Proponent to obtain, renew or comply with such licences, permits or approvals.

B7. Any changes to the scope of the infrastructure activity shall be subject to a consistency review. Should the review identify activity scope and environmental impacts inconsistent with the assessed infrastructure activity, a modification to the infrastructure activity approval would be required.

STAGING

B8. The Proponent may elect to construct and/ or operate the SSI in stages. Where staging is proposed, the Proponent shall submit a Staging Report to the Director General prior to the commencement of the first proposed stage. The Staging Report shall provide details of:
   (a) how the SSI would be staged, including general details of work activities associated with each stage and the general timing of when each stage would commence; and

(b) details of the relevant conditions of approval, which would apply to each stage and how these shall be complied with across and between the stages of the SSI.

Where staging of the SSI is proposed, these conditions of approval are only required to be complied with at the relevant time and to the extent that they are relevant to the specific stage(s).

The Proponent shall ensure that an updated Staging Report (or advice that no changes to staging are proposed) is submitted to the Director General prior to the commencement of each stage, identifying any changes to the proposed staging or applicable conditions.

B9. The Proponent shall ensure that all plans, sub-plans and other management documents required by the conditions of this approval and relevant to each stage (as identified in the Staging Report) are submitted to the Director General no later than one month prior to the commencement of the relevant stages, unless otherwise agreed by the Director General.

Note: These conditions do not relate to staged infrastructure within the meaning of section 115ZD of the EP&A Act.

COMPLIANCE

B10. The Proponent shall ensure that any strategy, plan, program (or the like) incorporates mitigation measures identified in the documents listed in condition B1, as relevant, and as modified by this approval.

B11. The Proponent shall ensure that employees, contractors and sub-contractors are aware of, and the need to comply with, the conditions of this approval relevant to their respective activities.

B12. The Proponent shall be responsible for environmental impacts resulting from the actions of all persons that it invites onto the site, including contractors, sub-contractors and authorised visitors.

SCHEDULE C

ENVIRONMENTAL PERFORMANCE

NOISE AND VIBRATION

Operational Noise and Vibration

C1. Rail line components of the SSI shall be designed and operated with the objective of not exceeding the airborne and ground-borne noise trigger levels at existing development, at each stage of the SSI, as presented in IGANRIP or RING, whichever is the most conservative.

For the purpose of this condition, existing development includes all development that at the date of this approval, has been carried out in the vicinity of the rail corridor and any such development approved prior to the determination of this SSI, but only to the extent that the location of the development is known.

C2. Stationary facilities (including stations) shall be designed and operated with the objective of meeting operational noise levels derived from the *NSW Industrial Noise Policy* (NSW Government, 2000).

C3. The SSI shall be designed and operated with the objective of not exceeding the vibration goals for human exposure for existing sensitive receivers, as presented in *Assessing Vibration: a Technical Guideline* (DECC, 2006).

C4. The Proponent shall prepare an Operational Noise and Vibration Review (ONVR) to confirm noise and vibration control measures that will be implemented for the SSI. The ONVR shall be prepared in consultation with the EPA and relevant Councils and shall:

(a) identify the appropriate operational noise and vibration objectives and levels for receiving existing development, including all sensitive receivers;

(b) predict the operational noise and vibration impacts at receiving existing development based on the final design and operation of the SSI. This prediction shall include a safety factor on train numbers and re-examination of curve squeal. Noise predictions shall be presented in catchments with each sensitive receiver clearly identified and described (including type and number of storeys) with their appropriate noise predictions. Absolute noise levels shall be presented to the nearest whole decibel, and the 'increase' in noise presented to a single decimal place;

(c) assess all feasible and reasonable noise and vibration mitigation measures, with a preferential focus on source control and design consistent with IGANRIP. The feasible and reasonable analysis shall be transparent and fully justified and shall include, but not be limited to the consideration of subjective noise factors, such as the number of noisy events, the duration of noisy events and the characteristics of the noise (e.g. wheel squeal, low frequency noise) and consideration of the following mitigations measures:
- signal relocation;
- composite sleepers;
- rail dampeners;
- gauge face lubricators for curve track and squeal;
- noise barriers/bunds, including low profile rail barriers close to the track; and
- property treatments;

(d) include a mitigation plan for each catchment showing all sensitive receivers where IGANRIP triggers are exceeded and a strategy to mitigate the noise, including the identification of specific physical and other mitigation measures for

controlling noise and vibration at the source and at the receiver including location, type and timing for the implementation of mitigation measures;

(e) include a consultation strategy to seek feedback from directly affected property owners on the noise and vibration mitigation measures;

(f) include procedures for operational noise and vibration complaints management, including investigation and monitoring (subject to complainant agreement); and

(g) incorporate results from the Source Noise Monitoring Plan (condition C5).

Notwithstanding the feasible and reasonable noise mitigation assessment, gauge face lubricators for curve squeal shall be implemented as part of the SSI. Should operational noise monitoring (conditions C5 and F2) identify lubricators not effective in reducing curve squeal, property treatments or other mitigation measures if deemed more practicable, are to be implemented for sensitive receivers immediately adjacent (generally within 50m from the newly constructed track) to rail curves on the downside (western side) of the rail corridor, irrespective of IGANRIP/RING noise trigger level exceedances.

The ONVR (and any subsequent amendment) is to be independently verified by a noise and vibration expert. The scope of the verification exercise undertaken by the noise and vibration expert is to be developed by the Proponent in consultation with the EPA. The verification will be undertaken at the Proponent's expense and the independent expert shall be approved by the Director-General. The ONVR and independent review is to be submitted to and approved by the Director-General prior to the commencement of the laying of rail track or the construction of physical noise mitigation structures, unless otherwise agreed to by the Director-General.

The Proponent shall implement the identified noise and vibration control measures prior to operation and make the ONVR publicly available.

Source Noise Monitoring Plan

C5. The Proponent shall prepare a Source Noise Monitoring Plan for the SSI rail corridor to assist in identifying and managing noisy freight locomotives and their rolling stock. The Plan shall be prepared prior to operation and in consultation with the EPA and shall include:

(a) real time noise monitoring at a representative rail curve that potentially cause wheel squeal and other annoying rail noise characteristics;

(b) the identification of noisy freight locomotives and their rolling stock and associated noise levels; and

(c) the reporting of monitored data to be made publicly available within a reasonable time frame.

Monitoring results shall be incorporated into the development of initiatives to address broader rail noise within the corridor and across the rail network. Monitoring results shall be reported and addressed in the Operational Noise and Vibration Compliance Monitoring and Assessment Report (condition F2).

BIODIVERSITY

Water courses

C6. All works taking place in, on or under waterfront land, as defined by the *Water Management Act,* shall be undertaken in accordance with the NOW's *Guidelines for Controlled Activities.*

C7. Watercourses affected by the proposal shall, where feasible and reasonable, be rehabilitated to emulate a natural stream system. The rehabilitation of watercourses

shall be consistent with the NSW Office of Water *Guidelines for Controlled Activities;* and stream armouring should be minimised to the greatest extent practicable.

Biodiversity Offset Package

C8. Within twelve months of the commencement of construction, or as otherwise agreed to by the Director General, the Proponent shall develop and submit a Biodiversity Offset Package for the approval of the Director General. The Package shall detail how the ecological values lost as a result of the SSI will be offset. The Package shall be developed in consultation with OEH and the relevant Council(s) and shall (unless otherwise agreed by the Director General) include, but not necessarily be limited to:

(a) the identification of the extent, types and condition of habitat that shall be lost or degraded as a result of the SSI, including the consideration of indirect impacts on adjacent retained vegetation and impacts caused through weed incursion and other potential edge effects;
(b) the objectives and biodiversity outcomesto be achieved;
(c) the final suite of the biodiversity offset measures selected and secured with consideration of the Biodiversity Offset Strategy and subject to the conditions of this approval;
(d) the management and monitoring requirements for biodiversity offset measures proposed to ensure the outcomes of the package are achieved, including:
    i) the monitoring of the condition of species and ecological communities at offset locations;
    ii) the methodology for the monitoring program(s), including the number and location of offset monitoring sites, and the sampling frequency at these sites;
    iii) provisions for the annual reporting of the monitoring results for a set period of time as determined in consultation with the OEH; and
(e) timing and responsibilities for the implementation of the provisions of the Package.

Land offsets shall be consistent with the *Principles for the use of Biodiversity Offsets in NSW* and the *Interim Policy on Assessing and Offsetting Biodiversity Impacts of Part 3A, State Significant Development (SSD) and State Significant Infrastructure (SSI) Projects* (OEH, 2011). Any land offset shall be enduring and be secured by a conservation mechanism which protects and manages the land in perpetuity. Where land offsets cannot solely achieve compensation for the loss of affected biodiversity, additional measures shall be provided to collectively deliver a biodiversity offset in accordance with the *Interim Policy on Assessing and Offsetting Biodiversity Impacts of Part 3A, State Significant Development (SSD) and State Significant Infrastructure (SSI) Projects* (OEH, 2011) and to provide a positive biodiversity outcome for the region.

Where possible, priority shall be given to securing offset sites as near to the location of the impact/loss as possible to assist with the preservation of the specific endemic community of the area and assure that the ecological and amenity benefits of retaining endemic vegetation remain within the locality.

Where monitoring indicates biodiversity outcomes are not being achieved, remedial actions, (such as improved land management measures or changes to the size and/or location of the offset area), shall be developed. Such remedial actions shall be documented under an addendum to the Biodiversity Offset Package and the addendum be submitted to and approved by the Director-General, prior to the implementation of that addendum.

TRANSPORT AND ACCESS

C9. The SSI shall be designed and constructed with the objective of minimising adverse changes to existing access arrangements and services for other transport modes (including pedestrians and cycles) and, where feasible and reasonable facilitate an improved level of access and service to other transport modes comparable to the existing situation.

C10. In relation to new or modified roads (including rail bridges), parking, pedestrian and cycle infrastructure, the SSI shall be designed:
(a) in consultation with the relevant road authority and Council(s);
(b) in consideration of road safety and traffic network impacts;
(c) to meet relevant design, engineering and safety guidelines, including Austroads Guide to Traffic Engineering Practice; and
(d) is certified by an appropriately qualified person that has considered the above matters.

C11. Bridgeworks and other structures in the proximity of the road and associated transport networks shall be designed to ensure the efficient and safe operation of the networks.

C12. The proponent shall implement, to the greatest extent practicable and subject to the conditions of this approval, the mitigation measures and strategies identified in section 6 of the *Epping to Thornleigh Third Track EIS: Technical Paper - Traffic and Transport* dated September 2012.

AIR QUALITY

C13. The SSI shall be operated with the objective of meeting ambient air quality impact assessment criteria for identified pollutants as presented in Table 3.1 of *Epping to Thornleigh Third Track EIS: Technical Paper – Air Quality* dated September 2012.

SOIL, WATER QUALITY AND HYDROLOGY

C14. Except as may be provided by an EPL, the SSI shall be constructed and operated to comply with section 120 of the Protection of the Environment Operations Act 1997, which prohibits the pollution of waters.

Flooding

C15. The SSI shall be designed, to the extent that is feasible and reasonable, to not worsen existing flooding characteristics in the vicinity of the infrastructure activity. Not worsen is defined as:
(a) a maximum increase in inundation levels upstream of the SSI of 50 mm in a 1 in 100 year ARI rainfall event; and
(b) a maximum increase in inundation time of one hour in a 1 in 100 year ARI rainfall event.

Any increase in flow velocity in a 100 year ARI flood event should minimise the potential for soil erosion and scouring.

Groundwater

C16. The SSI shall be designed to avoid impacts on existing bores and user rights, to the greatest extent practicable. Where impacts cannot be avoided, impacts shall be minimised and monitored as part of the Water Quality Monitoring Program (condition C17).

Water Quality Monitoring Program

C17. A Water Quality Monitoring Program shall be prepared and implemented to monitor impacts on surface and groundwater quality resources during construction and operation. The Program shall be developed in consultation with the DPI and shall include but not necessarily be limited to:

(a) identification of surface and groundwater quality monitoring locations which are representative of the potential extent of impacts from the SSI;

(b) identification of works and activities during construction and operation of the SSI, including emergencies and spill events, that have the potential to impact on surface water quality of potentially affected waterways;

(c) presentation of parameters and standards against which any changes to water quality will be assessed, having regard to the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000* (Australian and New Zealand Environment Conservation Council, 2000);

(d) representative background monitoring of surface and groundwater quality parameters prior to the commencement of construction, to establish baseline water conditions, unless otherwise agreed by the Director General;

(e) a minimum monitoring period of 12 months following the completion of construction or until the affected waterways and/ or groundwater resources affected by the SSI are certified by an independent expert as being rehabilitated to an acceptable condition. The monitoring shall also confirm the establishment of operational water control measures (such as sedimentation basins and vegetation swales);

(f) contingency and ameliorative measures in the event that adverse impacts to water quality are identified; and

(g) reporting of the monitoring results to the Department and DPI.

The Program shall be submitted to the Director General prior to the commencement of construction of the SSI, or as otherwise agreed by the Director General. A copy of the Program shall also be submitted to the DPI prior to its implementation.

Earthworks

C18. The SSI shall be designed to ensure the maintenance of land stability and geological integrity to protect property and infrastructure. The design shall be informed by appropriate geotechnical investigations and the report detailing these investigations and design responses shall be made publicly available.

In locations identified through the geotechnical investigations, of having a stability risk to property and infrastructure, monitoring shall be undertaken throughout construction of those works with a potential risk and for a period of not less than 6 months after construction of those works with a potential risk. The investigation, SSI design and monitoring regime shall be informed by an appropriately qualified geotechnical professional

Land Contamination

C19. To protect the environment and human health from contamination, measures to identify, handle and manage potential contaminated soil, materials and groundwater shall be incorporated into the Construction Environmental Management Plan (condition E33). If remediation of contaminants is required, a soil sampling validation report shall be prepared verifying that the site has been remediated to a standard consistent with the intended land use.

Note: Terms used in this condition have the same meaning as in the *Contaminated Land Management Act 1997*.

WASTE MANAGEMENT

C20. All waste materials removed from the site shall only be directed to a waste management facility or premises lawfully permitted to accept the materials.

C21. Waste generated outside the site shall not be received at the site for storage, treatment, processing, reprocessing, or disposal on the site, except as expressly permitted by a licence under the Protection of the Environment Operations Act 1997, if such a licence is required in relation to that waste.

C22. All liquid and/or non-liquid waste generated on the site shall be assessed and classified in accordance with Waste Classification Guidelines (Department of Environment, Climate Change and Water, 2009), or any superseding document.

HAZARDS AND RISK

C23. Dangerous goods, as defined by the *Australian Dangerous Goods Code*, shall be stored and handled strictly in accordance with:

(a) all relevant Australian Standards;

(b) for liquids, a minimum bund volume requirement of 110% of the volume of the largest single stored volume within the bund; and

(c) the *Environment Protection Manual for Authorised Officers: Bunding and Spill Management,* technical bulletin (EPA, 1997).

In the event of an inconsistency between the requirements listed above, the most stringent requirement shall prevail to the extent of the inconsistency.

UTILITIES AND SERVICES

C24. Utilities, services and other infrastructure potentially affected by construction shall be identified prior to construction affecting the item, to determine requirements for access to, diversion, protection, and/or support. Consultation with the relevant owner and/or provider of services that are likely to be affected by the SSI shall be undertaken to make suitable arrangements for access to, diversion, protection, and/or support of the affected infrastructure as required. The Proponent shall ensure that disruption to any service is minimised and shall work with the relevant service provider to advise local residents and businesses affected prior to any planned disruption of service.

C25. The Proponent shall consult with the relevant road authority regarding the use of any weight restricted road by heavy construction vehicles if required.

HERITAGE

C26. During detailed design and construction of the SSI, impacts to heritage items and conservation areas shall, where feasible and reasonable, be avoided and minimised, under the guidance of an appropriately qualified heritage specialist. Where impacts are unavoidable, work shall be undertaken in accordance with the strategy outlined in the Construction Heritage Management Plan (condition E34(e)).

C27. The Proponent shall not, where feasible and reasonable, physically affect the heritage listed causeway at Devlins Creek. The measures to protect the causeway during construction, management and remedial actions (if damage occurs) should be detailed under the Construction Heritage Management Plan (condition E34(e)).

C28. Prior to the commencement of pre-construction and/ or construction activities that may impact the historical archaeological causeway at Devlins Creek, the Proponent shall undertake an archaeological excavation program, to the extent that the causeway is

impacted by the SSI and where it is safe to do so, in accordance with the Heritage Council of NSW Archaeological Assessments Guideline (1996) using a methodology prepared in consultation with the Heritage Council of NSW. This work shall be undertaken by an appropriately qualified archaeological heritage consultant.

C29. Within 2 years of completing the work at C28, unless otherwise agreed by the Director General, the Proponent shall submit a report containing the findings of the excavations, including artefact analysis, and the identification of a final repository for any finds, prepared in consultation with the Heritage Council of NSW.

C30. Archival recording of directly impacted heritage items, including the side platform and subway structure at Beecroft, shall be undertaken in accordance with the NSW Heritage Council Guidelines.

URBAN DESIGN AND LANDSCAPING

C31. An Urban Design and Landscape Plan shall be prepared and implemented for the SSI. The Plan shall be prepared by appropriately qualified persons(s) in consultation with RailCorp, relevant Councils and the community and shall present an integrated design and landscape plan for the SSI. The Plan shall include, but not necessarily be limited to:

a) identification of urban design principles and standards based on:
   i. local environmental and heritage values,
   ii. urban design context,
   iii. sustainable design and maintenance,
   iv. transport and land use integration;
   v. passenger and community safety and security;
   vi. community amenity and privacy, and
   vii. relevant design standards and guidelines such as the *NSW Sustainable Design Guidelines for Rail* (v2.0, TfNSW, 2011), *Bridge Aesthetics Design guidelines to improve the appearance of bridges in NSW* (RMS, 2012), *Guidelines for the Development of Public Transport Interchange Facilities* (Ministry of Transport, 2008) and *Crime Prevention Through Environmental Design Principles* (Department of Urban Affairs and Planning, 2001), and relevant Agency and Council design standards.
b) the location of existing and retained vegetation and landscaping;
c) a description of disturbed areas and details of the strategies to progressively rehabilitate regenerate and/ or revegetate these areas. Details of species to be replanted/ revegetated shall be provided, including their appropriateness to the area and habitat for threatened species;
d) specific measures to limit the visual impacts of the proposed elevated concourse of Cheltenham Station, including limiting privacy and overshadowing impacts;
e) design details of built elements (retaining walls, bridges, viaducts, stations, parking areas etc) and measures to minimise the impact of these elements, including an embankment and retaining wall plan that avoids, where feasible and reasonable, the use of shotcrete;
f) an assessment of the visual screening affects of existing vegetation and the proposed landscaping and built elements. Where receivers have been identified as likely to experience a moderate or high visual impact as a result of the operation and residual impacts are likely to remain, the Proponent shall, in consultation with affected receivers, identify opportunities for providing at-receiver landscaping to further screen views of the SSI. Where agreed to with the landowner, these measures shall be implemented during the construction of the SSI;
g) graphics such as sections, perspective views and sketches for key elements of the SSI, including, but not limited to built elements of the SSI;

h) monitoring and maintenance procedures for the built elements (including graffiti management), rehabilitated vegetation and landscaping (including weed control) including performance indicators, responsibilities, timing and duration and contingencies where rehabilitation of vegetation and landscaping measures fail; and
i) evidence of consultation with the relevant council and community on the proposed urban design and landscape measures prior to its finalisation.

The Plan shall be submitted to and approved by the Director General prior to the commencement of permanent built works (excluding those works that are subject to prescribed engineering standards and the like such as railway tracks, signal boxes, overhead wiring etc) and/ or landscaping, unless otherwise agreed by the Director General. The Plan may be submitted in stages to suit the staged construction program of the SSI.

SCHEDULE D

COMMUNITY INFORMATION, REPORTING AND AUDITING

COMMUNITY INFORMATION, CONSULTATION AND INVOLVEMENT

D1. A **Stakeholder and Community Involvement Plan** shall be prepared and implemented to provide mechanisms to facilitate communication between the Proponent (and its contractor(s)), the Environmental Representative (condition E32), the relevant Council(s) and community stakeholders (particularly adjoining landowners) on the construction environmental management of the SSI. The Plan shall include, but not be limited to:

(a) identification of community and business stakeholders to be consulted as part of the Strategy, including affected and adjoining landowners;

(b) procedures and mechanisms for the regular distribution of information to community and business stakeholders on construction progress, construction activities that are likely to affect their amenity and matters associated with environmental management;

(c) the formation of community/business-based forums that focus on key environmental management issues for the SSI. The Strategy shall provide detail on the structure, scope, objectives and frequency of the forums;

(d) procedures and mechanisms through which community and business stakeholders can discuss or provide feedback to the Proponent and/or Environmental Representative in relation to the environmental management and delivery of the SSI;

(e) procedures and mechanisms through which the Proponent can respond to enquiries or feedback from community and business stakeholders in relation to the environmental management and delivery of the SSI; and

(f) procedures and mechanisms that would be implemented to resolve issues/ disputes that may arise between parties on the matters relating to environmental management and the delivery of the SSI. This may include the use of an appropriately qualified and experienced independent mediator.

Issues that shall be addressed through the Community Communication Plan include (but are not necessarily limited to) construction traffic and access arrangements, construction noise and vibration, impacts to local businesses, land uses and community facilities, and other construction generated impacts.

The Proponent shall maintain and implement the Plan throughout construction of the SSI. The Plan shall be submitted to and approved by the Director General prior to the commencement of construction, or as otherwise agreed by the Director General.

Complaints and Enquiries Procedure

D2. Prior to the commencement of construction, or as otherwise agreed by the Director General, the Proponent shall ensure that the following are available for community enquiries and complaints for the duration of construction:

(a) a 24 hour telephone number(s) on which complaints and enquiries about the SSI may be registered;

(b) a postal address to which written complaints and enquires may be sent;

(c) an email address to which electronic complaints and enquiries may be transmitted; and

(d) a mediation system for complaints unable to be resolved.

The telephone number, the postal address and the email address shall be published in newspaper(s) circulating in the local area prior to the commencement of construction. This information shall also be provided on the website (or dedicated pages) required by this approval.

D3. Prior to the commencement of construction, or as otherwise agreed by the Director General, the Proponent shall prepare and implement a Construction Complaints Management System consistent with *AS 4269: Complaints Handling* and maintain the System for the duration of construction and up to 12 months following completion of the SSI.

Information on all complaints received, including the means by which they were addressed and whether resolution was reached, with or without mediation, shall be maintained in a complaints register and included in the construction compliance reports required by this approval. The information contained within the System shall be made available to the Director General on request.

Provision of Electronic Information

D4. Prior to the commencement of construction, or as otherwise agreed by the Director General, the Proponent shall establish and maintain a new website, or dedicated pages within an existing website, for the provision of electronic information associated with the SSI, for the duration of construction and for 12 months following completion of the SSI. The Proponent shall, subject to confidentiality, publish and maintain up-to-date information on the website, dedicated pages or linkages including, but not necessarily limited to:

(a) information on the current implementation status of the SSI;
(b) a copy of the documents referred to under condition B1 of this approval, and any documentation supporting modifications to this approval that may be granted from time to time;
(c) a copy of this approval and any future modification to this approval;
(d) a copy of key relevant environmental approvals, licences or permits required and obtained in relation to the SSI;
(e) a copy of each current strategy, plan, program or other document required under this approval;
(f) the outcomes of compliance tracking in accordance with condition D5 of this approval; and
(g) details of contact point(s) to which community complaints and enquiries may be directed, including a telephone number, a postal address and an email address.

COMPLIANCE MONITORING AND TRACKING

Compliance Tracking Program

D5. The Proponent shall develop and implement a Compliance Tracking Program to track compliance with the requirements of this approval. The Program shall be submitted to and approved by the Director General prior to the commencement of construction and operate for a minimum of one year following commencement of operation. The Program shall include, but not necessarily be limited to:

(a) provisions for the notification of the Director General prior to the commencement of construction of the SSI (including prior to each stage, where works are being staged);
(b) provisions for periodic review of the compliance status of the SSI against the requirements of this approval;
(c) provisions for periodic reporting of compliance status to the Director General, including a Pre-Construction Compliance Report, during construction reporting, and a Post-Construction Compliance Report;
(d) a program for independent environmental auditing in accordance with ISO 19011:2003 - Guidelines for Quality and / or Environmental Management Systems Auditing;
(e) mechanisms for recording environmental incidents during construction and actions taken in response to those incidents;
(f) provisions for reporting environmental incidents (as defined in D6) to the Director General and relevant public authorities during construction;

(g) procedures for rectifying any non-compliance identified during environmental auditing, review of compliance or incident management; and
(h) provisions for ensuring all employees, contractors and sub-contractors are aware of, and comply with, the conditions of this approval relevant to their respective activities.

Incident Reporting

D6. The Proponent shall notify the Director General of any incident with actual or potential significant off-site impacts on people or the biophysical environment within 24 hours of becoming aware of the incident. The Proponent shall provide full written details of the incident to the Director-General within seven days of the date on which the incident occurred..

SCHEDULE E

CONSTRUCTION ENVIRONMENTAL MANAGEMENT

NOISE AND VIBRATION

Construction Hours

E1. Except as permitted by an EPL, construction activities associated with the SSI shall be undertaken during the following standard construction hours:

(a) 7:00am to 6:00pm Mondays to Fridays, inclusive; and
(b) 8:00am to 1:00pm Saturdays;
(c) at no time on Sundays or public holidays.

E2. Except as permitted by an EPL, high noise impact works and activities shall only be undertaken:

(a) between the hours of 8:00 am to 6:00 pm Monday to Fridays;
(b) between the hours of 8:00 am to 1:00 pm Saturday; and
(c) in continuous blocks not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block.

For the purposes of this condition 'continuous' includes any period during which there is less than a one hour respite between ceasing and recommencing any of the work that is the subject of this condition.

E3. Notwithstanding conditions E1 to E2, construction activities outside of the prescribed construction hours may be undertaken in any of the following circumstances:

(a) (i) construction works that generate air-borne noise that is no more that 5 dB(A) above rating background level at any residence in accordance with the *Interim Construction Noise Guideline* (DECC, 2009); and
(ii) construction works that generate air-borne noise that is no more than the noise management levels specified in Table 3 of the *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009) at other sensitive receivers; and
(iii) construction works that generate continuous or impulsive vibration values, measured at the most affected residence, that are no more than those for human exposure to vibration, specified for residences in Table 2.2 of *Assessing Vibration: a technical guideline* (DEC, 2006); and
(iv) works that generate intermittent vibration values, measured at the most affected residence, that are no more than those for human exposure to vibration, specified for residences in Table 2.4 of *Assessing Vibration: a technical guideline* (DEC, 2006);
(b) where a negotiated agreement has been reached with affected receivers, where the prescribed noise and vibration levels can not be achieved;
(c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons;
(d) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm; and
(e) works approved through an EPL, including for works identified in an out of hours procedure.

Notwithstanding the above, the Proponent shall limit construction outside of standard construction hours, particularly during the night time period, to the greatest extent practicable.

Construction Noise and Vibration

E4. The SSI shall be constructed with the aim of achieving the construction noise management levels detailed in the *Interim Construction Noise Guideline* (DECC, 2009). All feasible and reasonable noise mitigation measures shall be implemented and any activities that could exceed the construction noise management levels shall be identified and managed in accordance with the Construction Noise and Vibration Management Plan (condition E34 (b)).

Note: The *Interim Construction Noise Guideline* identifies 'particularly annoying' activities that require the addition of 5dB(A) to the predicted level before comparing to the construction Noise Management Levels.

E5. The SSI shall be constructed with the aim of achieving the following construction vibration goals:

(a) for structural damage, the vibration limits set out in the German Standard *DIN 4150-3: Structural Vibration - effects of vibration on structures*; and

(b) for human exposure, the acceptable vibration values set out in the *Environmental Noise Management Assessing Vibration: A Technical Guideline* (Department of Environment and Conservation, 2006).

E6. Except as permitted by an EPL, the airblast overpressure generated by blasting associated with the SSI shall not exceed the criteria specified in Table 1 when measured at the most affected residence or other sensitive receiver.

Table 1 - Airblast overpressure criteria

Airblast overpressure (dB(Lin Peak))	Allowable exceedance
115	5% of total number of blasts over a 12 month period
120	0%

E7. Except as permitted by an EPL, the ground vibration generated by blasting associated with the SSI shall not exceed the criteria specified in Table 2 when measured at the most affected residence or other sensitive receiver.

Table 2 – Peak particle velocity criteria

Receiver	Peak particle velocity (mm/s)	Allowable exceedance
Residence on privately owned land	5	5% of total number of blasts over a 12 month period
	10	0%
Other sensitive receivers	5	0%
Historic heritage structures	3	0%
Public infrastructure	50	0%

E8. Should blasting be required, the Proponent shall prepare a Blast Management Plan for the SSI, which shall:

(a) assess the potential noise and vibration impacts of the blasting activities and set criteria limits for airblast overpressure and ground vibration;

(b) identify a strategy to minimise and manage blasting impacts including preparation of an appropriate community information program;

(c) identification of feasible and reasonable procedures and mitigation measures to ensure relevant vibration and blasting criteria are achieved, including a suitable blast program, applicable buffer distances for vibration intensive works, use of low-vibration generating equipment/ vibration dampeners or alternative construction methodology;

(d) include pre and post construction dilapidation surveys of property where blasting and/ or vibration may result in damage to buildings and structures (including surveys being undertaken immediately following a monitored exceedance of the criteria), consistent with condition E25. Any damage caused by blasting shall meet the requirements of condition E26;
(e) include a monitoring program to enable modification of blast design where monitoring indicates impacts are greater than the criteria limits; and
(f) identify a strategy for receiving, investigating and responding to complaints.

The methods contained in AS2187.2-2006 shall be utilised by the Proponent to manage blasting to minimise ground vibration and overpressure impacts.

The Plan shall form a component of the Construction Noise and Vibration Management Plan required by condition E34.

E9. For any section of construction where blasting is proposed, a series of initial trials at reduced scale shall be conducted prior to production blasting to determine site-specific blast response characteristics and to define allowable blast sizes to meet the airblast overpressure and ground vibration limits in this approval.

E10. Wherever feasible and reasonable, piling activities shall be undertaken using quieter alternative methods than impact or percussion piling, such as bored piles or vibrated piles.

E11. The Proponent shall consult with potentially-affected community, religious, educational institutions and vibration-sensitive businesses and where reasonable and feasible schedule noise and vibration generating construction works in the vicinity of the receivers outside of sensitive periods, unless appropriate other arrangements are made.

E12. During construction, Proponents of other major construction works in the vicinity of the SSI shall be consulted, and reasonable steps taken to coordinate works to minimise impacts on, and maximise respite for affected sensitive receivers.

BIODIVERSITY

E13. The clearing of native vegetation shall be minimised with the objective of reducing impacts to any threatened species or EECs to the greatest extent practicable.

Pre clearing surveys

E14. Prior to construction, pre clearing surveys and inspections for native fauna and threatened flora species and habitat features shall be undertaken. The surveys and inspections, and any subsequent relocation of species, shall be undertaken under the guidance of a qualified ecologist and the methodology incorporated into the Construction Flora and Fauna Management Plan (condition E34).

Nest Box Plan

E15. Prior to the commencement of construction work that would result in the disturbance of vegetation with habitat trees (or as otherwise agreed by the Director General), a Nest Box Plan to provide replacement hollows for displaced fauna shall be prepared in consultation with the relevant Council(s). The Plan, to be incorporated into the Construction Environmental Management Plan (condition E33) and Biodiversity Offset Package (condition C8), shall detail the number and type of nest boxes to be installed,

which shall be justified based on the number and type of hollows removed (based on pre clearing surveys), the density of hollows in the area to be cleared and in adjacent areas, and the availability of adjacent food resources. The Plan shall also consider the relocation of any hollows removed from the site to provide for potential nesting habitat. The Plan shall also provide details of maintenance protocols for the nest boxes installed including responsibilities, timing and duration.

TRANSPORT AND ACCESS

Road Dilapidation

E16. Upon determining the haulage route(s) for construction vehicles associated with the SSI, and prior to use of the haulage route(s) by heavy vehicles, an independent and qualified person or team shall undertake a **Road Dilapidation Report** on local roads from the construction access/ egress point(s) to the arterial road network. The report shall assess the current condition of the road and describe mechanisms to restore any damage that may result due to traffic and transport related to the construction of the SSI, during construction. The Report shall be submitted to the relevant road authority for review prior to use of the haulage routes(s).

Following completion of construction, a subsequent report shall be prepared to assess any damage that may have resulted from the construction of the SSI.

Measures undertaken to restore or reinstate roads affected by the SSI shall be undertaken in a timely manner, in accordance with the reasonable requirements of the relevant road authority, and at the full expense of the Proponent.

Access

E17. Safe pedestrian and cyclist access through or around worksites shall be maintained during construction. In circumstances where pedestrian and cyclist access is restricted due to construction activities, a feasible and reasonable alternate route shall be provided and signposted.

E18. Construction vehicles (including staff vehicles) associated with the SSI shall be managed to:
(a) minimise parking or queuing on public roads;
(b) minimise the use of local roads (through residential streets and town centres) to gain access to construction sites and compounds;
(c) minimise traffic past schools and child care centres, particularly during opening and closing periods; and
(d) adhere to the nominated haulage routes identified in the Construction Traffic Management Plan (condition E34).

E19. The Proponent shall ensure all lane and road closures and diversions are minimised and carried out to the satisfaction of the relevant road authority.

E20. Access to property shall be maintained during construction unless otherwise agreed with the property owner in advance. Access that is physically affected by the infrastructure activity shall be reinstated to at least an equivalent standard, in consultation with the property owner.

AIR QUALITY

E21. The SSI shall be constructed in a manner that minimises dust emissions from the site, including wind-blown and traffic-generated dust and tracking of material onto public roads. All activities on the site shall be undertaken with the objective of minimising

visible emissions of dust from the site. Should such visible dust emissions occur at any time, the Proponent shall identify and implement feasible and reasonable dust mitigation measures, including cessation of relevant works, as appropriate, such that emissions of visible dust cease.

SOIL, WATER QUALITY AND HYDROLOGY

Construction Soil and Water Management

E22. Soil and water management measures consistent with *Managing Urban Stormwater - Soils and Construction Vols 1 and 2, 4th Edition* (Landcom, 2004) shall be employed during the construction of the SSI to minimise soil erosion and the discharge of sediment and other pollutants to land and/or waters.

E23. Where available and practicable, and of appropriate chemical and biological quality, stormwater, recycled water or other water sources shall be used in preference to potable water for construction activities, including concrete mixing and dust control.

PROPERTY AND BUSINESS IMPACTS

E24. The Proponent shall design and construct the SSI with the objective of minimising impacts to, and interference with, third party property and infrastructure, and that such infrastructure and property is protected during construction and operation.

Impacts to Third Party Property and Structures

E25. The Proponent shall, prior to the commencement of construction for each part of the SSI that may impact on surrounding properties at risk from damage:

(a) where agreed with the property owner, undertake independent inspections of these properties prior to construction in accordance with *AS 4349.1 'Inspection of Buildings'*. This inspection shall be undertaken by appropriately qualified and experienced persons, and report on property features that may be affected by construction;

(b) contact the owners of all buildings on which property inspections are to be conducted before the inspection, or as otherwise agreed by the affected property owner, and advise of the scope and methodology for the inspection, and of the process for making a property damage claim;

(c) provide a copy of the property inspection report to the owner of each property inspected prior to construction that could affect the property;

(d) determine an appropriate property vibration criteria and management and protection measures to ensure that property damage (including cosmetic damage) will be avoided; and

(e) maintain a register of all properties inspected by the Proponent, indicating whether the owner accepted or refused the property inspection offer, and provide a copy of the register to the Director General upon request.

Reports advising on the risk of damage to properties shall be made available upon request to the Director General.

E26. Any damage caused to property as a result of the SSI shall be rectified or the property owner compensated, within a reasonable timeframe, with the costs borne by the Proponent. This condition is not intended to limit any claims that the property owner may have against the Proponent.

VISUAL AMENITY

E27. The SSI shall be constructed in a manner that minimises visual impacts resulting from construction compounds. Where feasible and reasonable, this shall include retaining existing vegetation around the perimeter of construction compounds, providing permanent landscaping to soften views of compounds, minimising light spillage, and incorporating treatments and finishes within key elements of temporary structures that reflect the context within which the compounds are located.

REHABILITATION

E28. Where land associated with construction sites are not proposed to be utilised as part of the operational stage of the SSI, the Proponent shall ensure that these sites are fully rehabilitated to either the same level or better than their pre-construction condition, and that rehabilitation activities are commenced prior to the operation of the SSI, in consultation with the relevant landowner.

ANCILLARY FACILITIES

E29. Unless otherwise approved by the Director General, the location of Ancillary Facilities, not identified in the documents listed in B1, shall:
(a) be located more than 50 metres from a waterway;
(b) be located within or as close as possible to where the SSI is being carried out;
(c) have ready access to the road network;
(d) be located to minimise the need for heavy vehicles to travel through residential areas;
(e) be sited on relatively level land;
(f) be separated from nearest residences by at least 200 metres (or at least 300 metres for a temporary batching plant);
(g) not require vegetation clearing beyond that already required by the SSI;
(h) not impact on heritage items (including areas of archaeological sensitivity) beyond those already impacted by the SSI;
(i) not unreasonably affect the land use of adjacent properties;
(j) be above the 20 ARI flood level unless a contingency plan to manage flooding is prepared and implemented; and
(k) provide sufficient area for the storage of raw materials to minimise, to the greatest extent practical, the number of deliveries required outside standard construction hours.

The location of the ancillary facilities shall be identified in the Construction Environmental Management Plan (condition E33) and include consideration of the above criteria. Where the above criteria cannot be met for any proposed ancillary facility, the Proponent shall demonstrate to the satisfaction of the Director General that there will be no significant adverse impact from that facility's construction or operation. Such assessment(s) can be submitted separately or as part of the Construction Environmental Management Plan.

E30. The Director General's approval is not required for minor ancillary facilities (e.g. lunch sheds, office sheds and portable toilet facilities and minor stockpiles) that do not comply with the criteria set out in condition E29 of this approval and which:
(a) are located within an active construction zone within the rail corridor; and
(b) have been assessed by the Environmental Representative to have:

(i) minimal amenity impacts to surrounding residences, with consideration of matters such as noise and vibration impacts, traffic and access impacts, dust and odour impacts and visual (including light spill) impacts; and
(ii) minimal environmental impact in respect to waste management, listed flora and fauna communities, soil and water and heritage not beyond those approved for the project; and

(c) have environmental and amenity impacts that can be managed through the implementation of environmental measures detailed in a site specific Environmental Control Map, consistent with the measures identified in the Construction Environment Management Plan for the project.

E31. All Ancillary Facilities shall be rehabilitated to at least their pre-construction condition, unless otherwise agreed by the landowner where relevant.

ENVIRONMENTAL REPRESENTATIVE

E32. Prior to the commencement of construction of the SSI, or as otherwise agreed by the Director General, the Proponent shall nominate for the approval of the Director General a suitably qualified and experienced Environment Representative(s) that is independent of the design and construction personnel. The Proponent shall employ the Environmental Representative(s) for the duration of construction, or as otherwise agreed by the Director General. The Environment Representative(s) shall:

(a) be the principal point of advice in relation to the environmental performance of the SSI;
(b) monitor the implementation of environmental management plans and monitoring programs required under this approval and advise the Proponent upon the achievement of these plans/ programs;
(c) have responsibility for considering and advising the Proponent on matters specified in the conditions of this approval, and other licences and approvals related to the environmental performance and impacts of the SSI;
(d) ensure that environmental auditing is undertaken in accordance with the Proponent's Environmental Management System(s);
(e) be given the authority to approve/ reject minor amendments to the Construction Environment Management Plan. What constitutes a "minor" amendment shall be clearly explained in the Construction Environment Management Plan (condition E33);
(f) be given the authority and independence to advise on reasonable steps to be taken to avoid or minimise unintended or adverse environmental impacts; and
(g) be consulted in responding to the community concerning the environmental performance of the SSI where the resolution of points of conflict between the Proponent and the community is required.

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

E33. Prior to the commencement of construction, or as otherwise agreed by the Director General, the Proponent shall prepare and implement (following approval) a Construction Environmental Management Plan for the SSI. The Plan shall outline the environmental management practices and procedures that are to be followed during construction, and shall be prepared in consultation with the relevant government agencies and Council(s) in accordance with the *Guideline for the Preparation of Environmental Management Plans* (DIPNR, 2004). The Plan shall include, but not necessarily be limited to:

(a) a description of activities to be undertaken during construction of the SSI (including staging and scheduling);

(b) statutory and other obligations that the Proponent is required to fulfil during construction, including approvals, consultations and agreements required from authorities and other stakeholders under key legislation and policies;
(c) a description of the roles and responsibilities for relevant employees involved in the construction of the SSI, including relevant training and induction provisions for ensuring that employees, including contractors and sub-contractors are aware of their environmental and compliance obligations under these conditions of approval;
(d) an environmental risk analysis to identify the key environmental performance issues associated with the construction phase; and
(e) details of how environmental performance would be managed and monitored to meet acceptable outcomes, including what actions will be taken to address identified potential adverse environmental impacts (including any impacts arising from the staging of the construction of the SSI). In particular, the following environmental performance issues shall be addressed in the Plan:
    (i) compounds and Ancillary Facilities;
    (ii) ecological impacts;
    (iii) noise and vibration;
    (iv) traffic and access;
    (v) soil, water quality and spoil;
    (vi) groundwater and groundwater discharge;
    (vii) soil contamination, groundwater contamination, hazardous material and waste;
    (viii) air quality and dust;
    (ix) landscape and visual amenity;
    (x) Aboriginal and historic heritage; and
    (xi) hazard and risk.

The Plan shall be submitted for the approval of the Director General no later than one month prior to the commencement of construction, or as otherwise agreed by the Director General. The Plan may be prepared in stages, however, construction works shall not commence until written approval has been received from the Director General.

Note: The approval of a Construction Environmental Management Plan does not relieve the Proponent of any requirement associated with this SSI approval. If there is an inconsistency with an approved Construction Environmental Management Plan and the conditions of this SSI approval, the requirements of this SSI approval prevail.

E34. As part of the Construction Environmental Management Plan for the SSI required under condition E33 the Proponent shall prepare and implement:
(a) a Construction Compound and Ancillary Facilities Management Plan to detail the management of construction compounds and Ancillary Facilities associated with the SSI. The Plan shall include but not be limited to:
    (i) a description of each facility, its components and the surrounding environment;
    (ii) details of the activities to be carried out at each facility, including the hours of use and the storage of dangerous and hazardous goods;
    (iii) an assessment against the locational criteria outlined in condition E29;
    (iv) details of the mitigation and management procedures specific to the facility that would be implemented to minimise environmental and amenity impacts and an assessment of the adequacy of the mitigation or offsetting measures;
    (v) identification of the timing for the completion of activities at the facility and how the site will be decommissioned (including any necessary rehabilitation); and
    (vi) mechanisms for the monitoring, review and amendment of this Plan.

(b) a Construction Noise and Vibration Management Plan to detail how construction noise and vibration impacts will be minimised and managed. The Plan shall be consistent with the guidelines contained in the *Interim Construction Noise Guidelines* (DECC, 2009). The Plan shall be developed in consultation with the EPA and shall include, but not be limited to:
   (i) identification of sensitive receivers and relevant construction noise and vibration goals applicable to the SSI stipulated in this approval;
   (ii) details of construction activities and an indicative schedule for construction works, including the identification of key noise and/or vibration generating construction activities (based on representative construction scenarios, including at ancillary facilities) that have the potential to generate noise and/or vibration impacts on surrounding sensitive receivers, particularly residential areas;
   (iii) identification of feasible and reasonable measures proposed to be implemented to minimise and manage construction noise impacts (including construction traffic noise impacts);
   (iv) a Blast Management Plan (condition E8), if relevant;
   (v) identification of feasible and reasonable procedures and mitigation measures to ensure relevant vibration criteria are achieved, including applicable buffer distances for vibration intensive works, use of low-vibration generating equipment/ vibration dampeners or alternative construction methodology, and pre- and post- construction dilapidation surveys of sensitive structures where vibration is likely to result in damage to buildings and structures (including surveys being undertaken immediately following a monitored exceedance of the criteria);
   (vi) a description of how the effectiveness of mitigation and management measures would be monitored during the proposed works, clearly indicating how often this monitoring would be conducted, the locations where monitoring would take place, how the results of this monitoring would be recorded and reported, and, if any exceedance is detected, how any non-compliance would be rectified; and
   (vii) mechanisms for the monitoring, review and amendment of this Plan.

(c) A Construction Traffic Management Plan to manage construction traffic and transport access impacts of the SSI. The Plan shall be developed in consultation with and meet the reasonable requirements of the relevant road authority, and/or transport operator, and shall include but not be necessarily limited to:
   (i) identification of construction traffic routes and construction traffic volumes (including heavy vehicle/ spoil haulage) on these routes;
   (ii) details of vehicle movements for construction sites and site compounds including parking, dedicated vehicle turning areas, and ingress and egress points;
   (iii) identification of construction impacts that could result in disruption of traffic, public transport, pedestrian and cycle access, property access, including details of oversize load movements;
   (iv) identification of potential traffic noise impacts, sensitive receivers and sensitive times of the day;
   (v) details of management measures to minimise traffic impacts, including driver training, temporary road work traffic control measures, onsite vehicle queuing and parking areas and management measures to minimise peak time congestion and measures to ensure safe pedestrian and cycle access;
   (vi) a response plan which sets out a proposed response to any traffic, construction or other incident; and
   (vii) mechanisms for the monitoring, review and amendment of this Plan.

(d) A Construction Soil and Water Quality Management Plan to manage soil, surface and groundwater impacts during construction of the SSI. The Plan shall be developed in consultation with the DPI and relevant Council(s) and include, but not necessarily be limited to:
   (i) details of construction activities and their locations, which have the potential to impact on human health and the environment, including water courses, stormwater flows, and groundwater;
   (ii) surface water and ground water impact assessment criteria consistent with the principles of the Australian and New Zealand Environment Conservation Council (ANZECC) guidelines;
   (iii) management measures to be used to minimise surface and groundwater impacts, including details of how spoil and fill material required by the SSI will be sourced, handled, stockpiled, reused and managed; erosion and sediment control measures; groundwater interception, dewatering, storage and disposal measures; and the consideration of flood events;
   (iv) management measures for contaminated soils, material and groundwater, and a contingency plan to be implemented in the case of unanticipated discovery of contaminants during construction (including a Contamination Management Plan and Asbestos Management Plan);
   (v) a description of how the effectiveness of these actions and measures would be monitored during the proposed works, clearly indicating how often this monitoring would be undertaken, the locations where monitoring would take place, how the results of the monitoring would be recorded and reported, and, if any exceedance of the criteria is detected how any non-compliance can be rectified. This shall include the requirements of the Water Quality Monitoring Program (condition C17); and
   (vi) mechanisms for the monitoring, review and amendment of this Plan.

(e) a Construction Heritage Management Plan to detail how construction impacts on Aboriginal and Historic heritage will be minimised and managed. The Plan shall include, but not necessarily be limited to:
   (i) In relation to Aboriginal Heritage:
      I. developed in consultation with registered Aboriginal stakeholders where Aboriginal Heritage impacts are identified;
      II. procedures for dealing with previously unidentified Aboriginal objects (excluding human remains) including cessation of works in the vicinity, assessment of the significance of the item(s) and determination of appropriate mitigation measures including when works can re-commence by a suitably qualified archaeologist in consultation with the Department and registered Aboriginal stakeholders and assessment of the consistency of any new Aboriginal heritage impacts against the approved impacts of the SSI, and registering of the new site in the OEH's Aboriginal Heritage Information Management System (AHIMS) register;
      III. procedures for dealing with human remains, including cessation of works in the vicinity and notification of the Department, NSW Police Force, OEH and registered Aboriginal stakeholders and not recommencing any works in the area unless authorised by the OEH and/ or the NSW Police Force;
      IV. heritage training and induction processes for construction personnel (including procedures for keeping records of inductions) and obligations under the conditions of this approval including site identification, protection and conservation of Aboriginal cultural heritage; and
      V. procedures for Aboriginal consultation and involvement for the duration of the SSI where Aboriginal Heritage impacts are identified; and

(ii) In relation to Historic Heritage:
   I. developed in consultation with the NSW Heritage Council and the relevant Council;
   II. identification of Heritage items directly and indirectly affected by the SSI;
   III. details of management measures to be implemented to prevent and minimise impacts on heritage items (including further heritage investigations, archival recordings and/ or measures to protect unaffected sites during construction works in the vicinity);
   IV. details of monitoring and reporting requirements for impacts on heritage items; and
   V. procedures for dealing with previously unidentified relics, including cessation of works in the vicinity, assessment of the significance of the item(s) and determination of appropriate mitigation measures including when works can re-commence by a suitably qualified and experienced archaeologist in consultation with the OEH and RailCorp heritage specialist, and the Department, and assessment of the consistency of any new heritage impacts against the approved impacts of the SSI.

(iii) heritage training and induction processes for construction personnel (including procedures for keeping records of inductions) and obligations under the conditions of this approval including site identification, protection and conservation of Aboriginal and historic heritage; and

(iv) mechanisms for the monitoring, review and amendment of this Plan.

(f) a Construction Flora and Fauna Management Plan to detail how construction impacts on ecology will be minimised and managed. The Plan shall be developed in consultation with the OEH and relevant Councils and shall include, but not necessarily be limited to:

i. plans for impacted and adjoining areas showing vegetation communities; important flora and fauna habitat areas; locations where threatened species, populations or ecological communities have been recorded; including pre-clearing surveys to confirm the location of threatened flora and fauna species and associated habitat features;

ii. the identification of areas to be cleared and details of management measures (such as fencing, clearing procedures, removal and relocation of fauna during clearing, habitat tree management and construction worker education) to avoid any residual habitat damage or loss and to minimise or eliminate time lags between the removal and subsequent replacement of habitat. Specifically, temporary fencing is to be placed around all retained vegetation areas containing *Epacris purpurascens var. purpurascens* in the vicinity of the construction footprint; vegetation management plan(s) for sites where vegetation is proposed to be retained and adjacent to the construction footprint;

iii. identification of measures to reduce disturbance to bats and nocturnal birds (and other sensitive fauna);

iv. weed management measures focusing on early identification of invasive weeds and effective management controls;

v. rehabilitation details, including identification of flora species and sources, and measures for the management and main*tenance of rehabilitated areas (includ*ing duration of the implementation of such measures);

vi. a description of how the effectiveness of these management measures would be monitored;

vii. a procedure for dealing with fauna and unexpected EEC/ threatened species identified during construction, including cessation of work and notification of the Department, determination of appropriate mitigation

measures (including relevant re-location measures) and updating of ecological monitoring and/ or biodiversity offset requirements; and

viii. mechanisms for the monitoring, review and amendment of this Plan.

(g) a Construction Air Quality Management Plan to detail how construction impacts on air quality will be minimised and managed. The Plan shall be developed in consultation with relevant Councils and shall include, but not necessarily be limited to:

i. the identification of potential sources of dust;
ii. dust management objectives;
iii. management and mitigation measures to be implemented, including measures during weather conditions where high level dust episodes are probable (such as strong winds in dry weather);
iv. a monitoring program to assess compliance with the identified objectives; and
v. mechanisms for the monitoring, review and amendment of this Plan

SCHEDULE F

OPERATIONAL ENVIRONMENTAL MANAGEMENT

OPERATIONAL ENVIRONMENTAL MANAGEMENT

F1. Prior to the commencement of operation, the Proponent shall incorporate the SSI into existing environmental management systems administered by the Proponent and prepared in accordance with the AS/NZS ISO 14000 Environmental Management System series or equivalent.

OPERATIONAL NOISE

Operational Noise and Vibration Compliance Monitoring and Assessment

F2. The Proponent shall undertake noise and vibration compliance monitoring and assessments to confirm the predictions of the noise assessment and mitigations referred to in the ONVR (condition C4). The noise and vibration compliance assessment shall be developed in consultation with the EPA and be undertaken at twelve months, 5 years and 10 years of the commencement of operation of the SSI, or as otherwise agreed by the Director-General. The assessment shall include, but not necessarily be limited to:

(a) noise and vibration monitoring and compliance assessment, to assess compliance with conditions C1 to C3 of this approval and the ONVR;

(b) an assessment methodology and the outcomes of the Source Noise Monitoring Plan and other relevant Rail Noise Initiatives developed and implemented for the SSI (condition F3);

(c) details of any complaints received relating to operational noise and vibration impacts;

(d) an assessment of the performance and effectiveness of the applied noise and vibration mitigation measures;

(e) any required recalibration of the noise and vibration model, including consideration of freight train movements should the average number of night time trains exceed the projected value used for the noise mitigation design of the ONVR; and

(f) identification, if required, of further noise and vibration mitigation measures to meet the requirements of C1 to C3 of this approval and the objectives identified in the ONVR.

An Operational Noise and Vibration Compliance Assessment Report providing the results of the assessment shall be submitted to the Director-General and the EPA within 60 days of its completion and made publicly available. If the assessment indicates an exceedance of the noise and vibration objectives and predictions identified in the ONVR, the Proponent shall implement further feasible and reasonable measures to mitigate these exceedances in consultation with affected property owners (where required).

Rail Noise Initiatives

F3. The Proponent shall ensure that the rail corridor associated with the SSI is considered in the development of initiatives to manage existing noise across the rail network. Where feasible and reasonable, initiatives that would address broader rail noise should be implemented as they relate to the SSI corridor. The implementation of these initiatives shall be reported in the Operational Noise and Vibration Compliance and Monitoring Assessment Report (condition F2).

DESIGN AND LANDSCAPING

Maintenance

F4. The ongoing maintenance and operation costs of design and landscaping items and works implemented as part of this SSI approval shall remain the Proponent's responsibility until satisfactory arrangements have been put in place for the transfer of the asset to the relevant authority. Prior to the transfer of assets, the Proponent will maintain items and works to the design standards established in the Design and Landscape Plan (condition C31).

Appendix C Stations INP assessment report

global environmental solutions

Epping to Thornleigh Third Track

Operational Noise and Vibration Review

Railway Station Operational Noise Compliance Assessment

Cheltenham and Pennant Hills Stations

Report Number 610.13080-R1R1

14 May 2014

ETTT Alliance
Level 12, 423 Pennant Hills Road
PENNANT HILLS NSW 2120

Version: Revision 1

Epping to Thornleigh Third Track

Operational Noise and Vibration Review

Railway Station Operational Noise Compliance Assessment

Cheltenham and Pennant Hills Stations

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1 INTRODUCTION

1.1 Project Overview

The Epping to Thornleigh Third Track Project (ETTT) involves the construction of six kilometres of new and upgraded track within the rail corridor between Epping and Thornleigh Stations on the western side of the existing tracks.

The new (third) track will separate northbound freight from all-stops passenger train movements along the steep incline between Epping and Thornleigh. This will help provide additional capacity for northbound freight trains, particularly during the daytime when passenger trains currently have priority.

The ETTT Project includes the modification of Cheltenham Station and Pennant Hills Station to accommodate the additional third track and to provide additional facility upgrades.

1.2 Report Objectives

SLR Consulting Australia Pty Ltd (SLR) has been engaged by the Epping to Thornleigh Third Track Alliance (the ETTT Alliance) to prepare an operational noise compliance assessment for Cheltenham and Pennant Hills Stations as required by the project Conditions of Approval (CoA). Condition C2 of the project CoA requires that:

> *C2. Stationary facilities (including stations) shall be designed and operated with the objective of meeting operational noise levels derived from the NSW Industrial Noise Policy (NSW Government, 2000).*

A commitment was also made in the *Northern Sydney Freight Corridor Epping to Thornleigh Third Track Submissions Report* (March 2013), that:

> *"The PA system at Cheltenham Station would be designed and installed in accordance with applicable best practice standards/guidelines."*

1.3 Relevant Guidelines

The following NSW *Environment Protection Authority*[1] (EPA) document with relevance to the Project in terms of noise has been used in this assessment:

- Operational Noise - *Industrial Noise Policy* (EPA 2000).

1.4 Terminology

Specific acoustic terminology is used within this assessment. An explanation of common terms is included as **Appendix A**.

1 Noise and Vibration guidelines managed by EPA are available at the following web address (http://www.epa.nsw.gov.au/noise/index.htm)

2 ASSESSMENT APPROACH

Cheltenham Station and Pennant Hills Station are classified as existing industrial noise sources and are therefore assessed according to the process outlined in Section 10 of the Industrial Noise Policy (INP) titled “Applying the policy to existing industrial premises”.

Assessment of the station upgrades includes measurements of the existing background noise levels, quantifying existing station noise emissions at the nearest receivers, and comparison of predicted future operational noise levels against project-specific noise criteria.

3 PROJECT DESCRIPTION

3.1 Cheltenham Station Upgrade

The key feature of the Cheltenham Station upgrade is an access upgrade to make the station compliant with the Disability Discrimination Act (1982). The new design includes construction of a small concourse (on the southern side of the existing overbridge) to allow space for ticketing facilities, two new lifts, and stairs to provide access to the existing platforms.

The Cheltenham Station upgrade will include installation of a new station Public Address (PA) system. Currently the station PA is limited to 2 loudspeakers located under the Up-side shelter, one loudspeaker located on the Up-side Platform 1, and three loudspeakers located within the Down-side Platform 2 shelter which only service the area under underneath and immediately adjacent the loudspeakers. The existing PA system does not change its volume depending on ambient noise levels.

The new PA design will include 22 loudspeakers distributed along Platform 1, 22 loudspeakers are distributed along Platform 2, and 12 loudspeakers distributed within the future concourse area. The new PA will also respond to ambient noise levels.

3.2 Pennant Hills Station Upgrade

The Pennant Hills Station upgrade will include extension of the concourse, a new lift and stairs, modifications to the footpath and roadway on Yarrara Road, and a replacement footbridge south of the station.

The Pennant Hills Station upgrade will also include modification to the existing station PA system with 21 new loudspeakers to be installed along Platforms 2 and 3, and 14 loudspeakers are to be distributed within the concourse area. Currently loudspeakers are located on Platform 1, Platform 2 and the existing concourse. The existing PA system does not change its volume depending on ambient noise. The additional speakers to be installed will simply extend the existing system and will therefore not change its functionality.

4 EXISTING ACOUSTIC ENVIRONMENT

In order to characterise the existing noise environment and to establish present background and ambient noise levels upon which to base the noise criteria, environmental noise monitoring is required. Noise measurements were performed in the vicinity of Pennant Hills Station by SKM during July 2013 as described in *Background Noise Monitoring Update* (SKM Report No EN04211 230913 Rev 03 dated 18 December 2013). The noise monitoring locations near Pennant Hills Station are shown as locations NM1 and NM2 in **Figure 1**.

Additional ambient noise measurements have been undertaken by SLR in the vicinity of Cheltenham Station from Thursday 7 November 2013 to Sunday 17 November 2013 at location NM3 as shown in **Figure 1**.

Figure 1 Noise monitoring and measurements locations

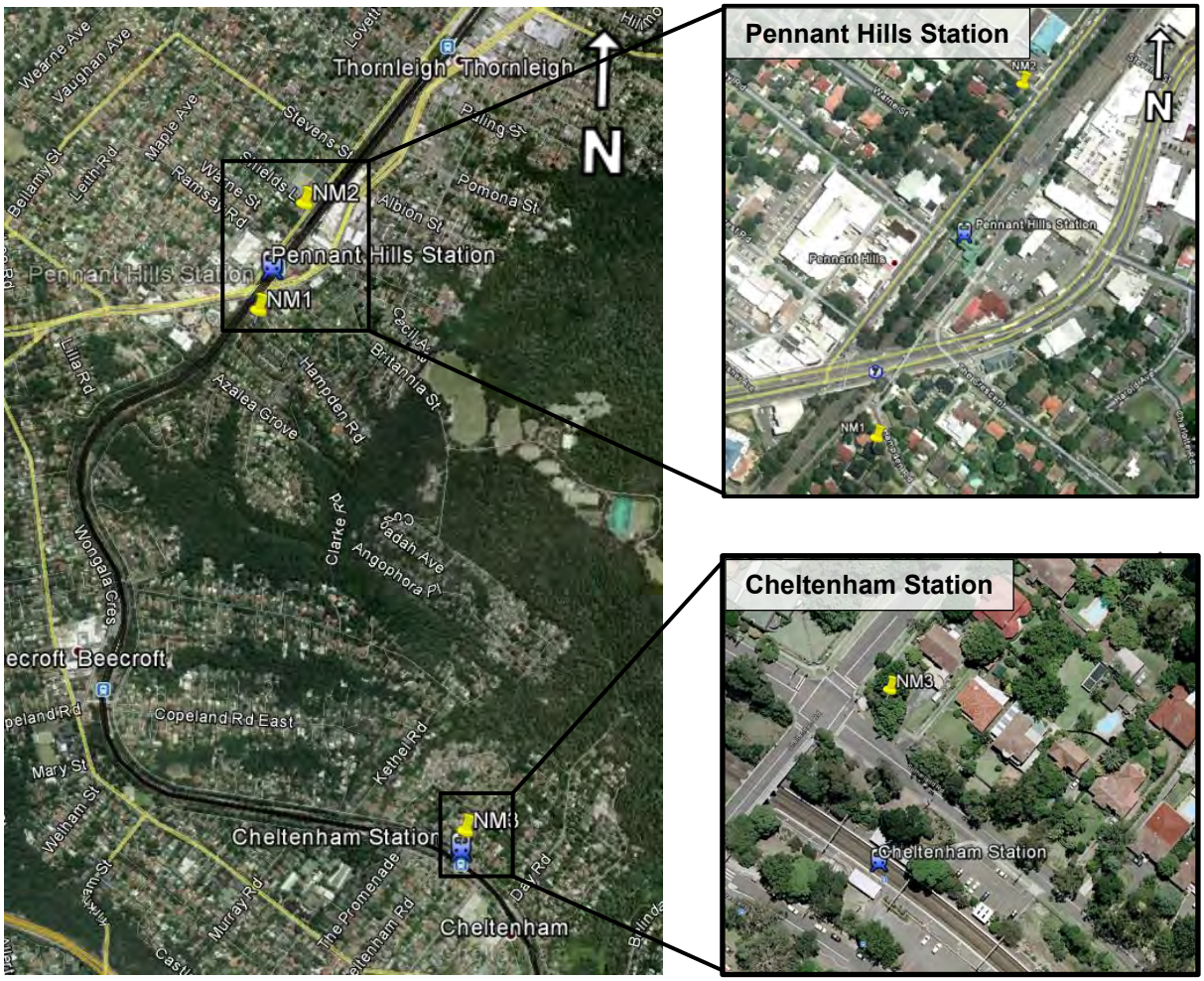


Image from Google Earth

4.1 Noise Environment - Pennant Hills Station

SKM report *EN04211 230913* describes monitoring at two residential locations in the vicinity of Pennant Hills Station as shown in **Figure 1**. Monitoring location NM1 was approximately 140 m south of Pennant Hills Station on the Up-side of the alignment (2 Hampden Road, Pennant Hills). Monitoring location NM2 was approximately 110 m north of Pennant Hills Station (56 Yarrara Road, Pennant Hills). A summary of the noise data collected during the monitoring period is presented in **Table 1**.

Table 1 Unattended Noise Logger Results – Pennant Hills

Location	Period	Measurement Parameter (dBA)	
		L_{A90} (RBL)	L_{Aeq}
NM1 2 Hampden Rd Pennant Hills	Daytime 07:00-18:00	43	55
	Evening 18:00-22:00	42	53
	Night-time 22:00-07:00	38	53
NM2 56 Yarrara Rd Pennant Hills	Daytime 07:00-18:00	48	62
	Evening 18:00-22:00	46	61
	Night-time 22:00-07:00	39	59

4.2 Noise Environment - Cheltenham Station

One Svantek Type 957 noise logger (serial number 20669) was deployed from 7 November 2013 to 17 November 2013 at location NM3 as shown in **Figure 1**. NM3 was approximately 40 m north of Cheltenham Station, at 20 Sutherland Road, Cheltenham.

This location was selected based on an inspection of the potentially affected areas, giving consideration to other noise sources which may influence the recordings, security issues for the noise monitoring device and gaining permission for access to the location from the resident or landowner.

The results of the noise monitoring have been processed in accordance with the procedures contained in the *Industrial Noise Policy* (INP) so as to establish representative noise levels in the area at the residences. This includes the removal of weather and construction noise influences, and also the influence of rail freight transportation noise (since the inclusion of this source would potentially result in less stringent amenity noise goals for the stations).

A summary of the unattended continuous noise monitoring, performed during the INP defined time periods, is contained in **Table 2**. A full graphical representation of the unattended noise monitoring results is provided in **Appendix B**.

The results of continuous unattended noise monitoring at this location show levels typical of a suburban noise environment with relatively low night-time background noise levels. Daytime noise levels are likely to be dominated by the natural environment, rail traffic, and road traffic on surrounding roads.

Table 2 Unattended Noise Logger Results - Cheltenham

Location	Period[1]	Measurement Parameter (dBA)	
		L_{A90} (RBL)	L_{Aeq}
NM3 20 Sutherland Rd, Cheltenham	Daytime	43	57
	Evening	41	55
	Night-time	31	49

Note 1: INP Governing Periods - Day: 7:00 am to 6:00 pm Monday to Saturday, 8:00 am to 6:00 pm Sundays & Public Holidays, Evening: 6:00 pm to 10:00 pm, Night: 10:00 pm to 7:00 am Monday to Saturday, 10:00 pm to 8:00 am Sundays & Public Holidays.

4.3 Attended Noise Measurements – Cheltenham Station

Additional measurements have been performed by SLR in order to characterise the existing noise environment in the area surrounding Cheltenham Station.

4.3.1 Attended Noise Measurement Procedure

An operator-attended ambient noise survey was conducted on Thursday 7 November 2013 at noise monitoring location NM3 (20 Sutherland Road, Cheltenham), shown in **Figure 1**. The operator-attended noise measurements were performed using a calibrated Brüel & Kjær Type 2260 Sound Level Meter (serial number 2414605).

To quantify the noise emissions from key station noise sources, additional noise measurements were undertaken on Monday 25 November 2013 within the station boundary. The additional operator-attended noise measurements were performed using a calibrated Brüel & Kjær Type 2270 Sound Level Meter (serial number 3003729).

Instrument calibration was checked before and after each measurement survey, with the variation in calibrated levels not exceeding 1 dB between consecutive checks (AS 1055.1-1997).

The acoustic instrumentation employed throughout the noise monitoring survey was designed to comply with the requirements of AS IEC 61672.1-2004: *Electroacoustics - Sound level meters - Specifications* as a type 1 precision sound level meter and has an accuracy suitable for both field and laboratory use. Both the meter and calibrator carry current NATA calibration certificates.

4.3.2 Attended Noise Measurement Results NM3

A summary of the operator-attended ambient noise survey at NM3 is shown in **Table 3**.

Table 3 Operator Attended Ambient Noise Survey NM3

Measurement Location	Measured Noise Levels (dBA)			Observations (dBA)
	L_{Amax}	L_{Aeq}	L_{A90}	
NM3 20 Sutherland Road, 11:30 am 07/11/2013 5 min Attended Calm, No rain	69	55	45	Road traffic: Light vehicles: 64 LAmax Heavy vehicles: 69 LAmax Rail Traffic: 55 LAmax Construction Equipment: Street Sweeper: 60 LAmax
NM3 20 Sutherland Road, 11:46 am 07/11/2013 9 min Attended Calm, No rain	72	57	47	Road traffic: Light vehicles: 63 LAmax Heavy vehicles: 72 LAmax Pedestrians: 42 LAmax
NM3 20 Sutherland Road, 12:09 pm 07/11/2013 5 min Attended Calm, No rain	80	60	47	Road traffic: Light vehicles: 60 LAmax Heavy vehicles: 64 LAmax Rail Traffic: 53 LAmax Construction Equipment: Fencing: 80 LAmax Radio: 56 LAmax

Daytime ambient noise levels were observed to be largely controlled by the natural environment as well as road and rail traffic.

While construction activities did not dominate the background noise levels during all the attended measurements, the state of the nearby construction site suggests that construction noise may be present at times during the monitoring period.

During the attended noise measurement period several trains stopped at Cheltenham Station. During the attended noise measurements, no industrial noise sources were audible at the measurement location. This indicates that key station operational noise sources such as PA systems and mechanical plant were either not operational during this period, or these noise sources are not audible at the nearest sensitive receivers.

4.3.3 Attended Noise Measurement Results Cheltenham Station

A summary of the additional operator-attended station noise source survey is shown in **Table 4**.

Table 4 Operator Attended Ambient Noise Survey Cheltenham Station

Measurement Location	Measured Noise Levels (dBA)			Observations (dBA)
	L_{Amax}	L_{Aeq}	L_{A90}	
Platform 1 04:21 pm 25/11/2013 Station Manager announcement ~3 m from loudspeaker	88	74	53	Station manager making personal announcement using station PA
Platform 1 04:33 pm 25/11/2013 Automatic announcement ~3 m from loudspeaker	73	65	53	Automatic announcement
Footpath Sutherland Road 04:40 pm 25/11/2013 Automatic announcement 25m from loudspeaker	53	51	50	Announcement barely audible over background. Not clearly discernible in spectra. Announcement contribution not measureable.

From the results of attended near-field noise measurements shown in **Table 4** it can be seen that the L_{Aeq} sound pressure level measured immediately beneath the station PA loudspeakers was 65 dBA for typical automatic station announcements.

Attended measurements undertaken at the station boundary on Sutherland Road did not obtain measureable noise levels from automatic PA announcements as the PA system was barely audible over the L_{A90} background noise level of 50 dBA.

It is understood that the existing station PA system at Cheltenham Station has an automated gain reduction for evening and night-time periods where the volume of the system is reduced by a fixed attenuation value. This would suggest the station PA system noise levels at surrounding receivers is lower in the evening and night-time periods that what was observed during the attended measurements.

Digital Voice Announcements from on board trains were not observed for any train stops during either of the site surveys.

5 OPERATIONAL NOISE ASSESSMENT CRITERIA

5.1 Operational Noise Assessment Criteria

Noise emissions associated with the operational phase of the Project have been assessed in accordance with the NSW OEH *Industrial Noise Policy* (INP) and the online Application Notes to the INP.

The INP provides two separate noise criteria: one to account for intrusive noise and the other to protect the amenity of particular land uses. These criteria are applicable at the "most-affected" boundary of the receptor property. Guidance on screening criteria to identify the potential for sleep disturbance is provided in the online Application Notes to the INP.

5.1.1 INP Criteria for Intrusive Noise

To protect against intrusive noise, the INP states that the noise level of the source in question, measured over a period of 15 minutes, must not exceed the ambient background noise level (in terms of the RBL), for the daytime, evening and night-time periods at the applicable sensitive residential receptors, ie:

$$\text{Noise source (dBA } L_{Aeq(15minute)}) \leq \text{RBL (dBA } L_{A90}) + 5 \text{ dBA}$$

Based on the INP methodology and the RBL values shown in **Section 4**, the intrusive noise criteria applicable at sensitive residential receptors near to the Project are shown in **Table 5**.

5.1.2 INP Criteria for Amenity

To preserve the acoustic amenity of an area, the INP specifies maximum noise levels for particular land uses and activities during the daytime, evening and night-time periods.

The residential areas would be considered 'Suburban' in the vicinity of the Project (for both Pennant Hills Station and Cheltenham Station) in the context of the INP definitions of land use types.

Attended and unattended measurements indicate that no existing industrial noise sources are audible at the nearest sensitive receivers during the daytime. This indicates that existing station operational noise sources such as PA and mechanical plant are not audible at the nearest sensitive receivers. At the locations near Pennant Hills Station, road traffic noise was observed.

As there are no measureable existing industrial noise sources in the Project area, and no evidence to suggest that there will be future industrial developments, it is appropriate to use the 'recommended acceptable noise levels' specified in the INP for a suburban area as the amenity criteria for the Project at Cheltenham Station. The same criteria apply at Pennant Hills Station, except during times when existing road traffic noise levels are more than 10 dB above the 'recommended acceptable noise levels'. In this situation, the amenity criteria become the existing road traffic noise level minus 10 dB.

Other sensitive receiver types have been observed within the project area. These include active recreation areas, educational facilities, places of worship, and hotels.

The INP amenity criteria for noise emissions from the Project are presented in **Table 5**.

5.1.3 Sleep Disturbance Screening Criterion

The current approach to assessing potential sleep disturbance is to apply an initial screening criterion of background plus 15 dB (as described in the Application Notes to the INP), and to undertake further analysis if the screening criterion cannot be achieved. The sleep disturbance screening criterion applies outside bedroom windows during the night-time period. Where the screening criterion cannot be met, the additional analysis should consider the level of exceedance as well as factors such as:

- How often high noise events would occur
- The time of day (normally between 10pm and 7am)
- Whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods).

Other guidelines that contain advice relating to potential sleep disturbance impacts should also be considered, including the *Road Noise Policy* (RNP). The RNP provides a review of research into sleep disturbance. From the research to date, the RNP concludes that:

- Maximum internal noise levels below 50 dBA to 55 dBA are unlikely to awaken people from sleep
- One or two events per night, with maximum internal noise levels of 65 dBA to 70 dBA, are not likely to affect health and wellbeing significantly.

It is generally accepted that internal noise levels in a dwelling, with the windows open are 10 dB lower than external noise levels. Based on a worst case minimum attenuation, with windows open, of 10 dB, the first conclusion above suggests that short term external noises of 60 dBA to 65 dBA are unlikely to cause awakening reactions. The second conclusion suggests that one or two noise events per night with maximum external noise levels of 75 dBA to 80 dBA are not likely to affect health and wellbeing significantly.

The sleep disturbance screening criteria $L_{A1(1minute)}$ derived from the night-time ambient noise levels for residential receivers are shown in **Table 5**.

5.2 Project Specific Operational Noise Criteria

A summary of the operational noise criteria for the Project is provided in **Table 5**. For the purpose of this assessment, the worst case 15-minute period includes the maximum quantity of active noise sources that the facilities have the capacity to operate. This approach would be expected to provide a conservative outcome for the predicted $L_{Aeq(15minute)}$ noise level. Therefore the predicted L_{Aeq} noise level may be compared directly against both the INP intrusiveness and amenity criteria.

Table 5 Summary of Operational Noise Criteria

Receptor Type	Assessment Period	Existing Noise Level, dBA		Operational Noise Criteria, dBA		
		RBL	$L_{Aeq(Period)}$	Intrusive $L_{Aeq(15min)}$	Amenity $L_{Aeq(Period)}$	Sleep Disturbance Screening Level, $L_{A1(1minute)}$
Residential (South of Pennant Hills Station, NM1)	Daytime	43	55	48	55	n/a
	Evening	42	53	47	45	n/a
	Night	38	53	43	43	53
Residential (North of Pennant Hills Station, NM2)	Daytime	48	62	53	55	n/a
	Evening	46	61	51	51	n/a
	Night	39	59	44	49	54
Residential (North of Cheltenham Station, NM3)	Daytime	43	57	48	55	n/a
	Evening	41	55	46	45	n/a
	Night	31	49	36	40	46
Commercial	When in use	n/a	n/a	n/a	65	n/a
Educational	When in use	n/a	n/a	n/a	45[1]	n/a
Active recreation area	When in use	n/a	n/a	n/a	55	n/a

Note 1: External levels, based on the internal levels specified in the INP plus 10 dB (assuming open windows).

6 OPERATIONAL NOISE MODELLING

6.1 Modelling Overview

This assessment considers the normal operation of the upgraded stations. At Cheltenham, this "normal operation" includes a PA systems that operates at variable volume depending on the ambient noise level, consistent with commitment made in the *Northern Sydney Freight Corridor Epping to Thornleigh Third Track Submissions Report* (March 2013) that "The PA system at Cheltenham Station would be designed and installed in accordance with applicable best practice standards/guidelines."

6.2 Noise Modelling Procedure

In order to calculate the noise emission levels at the various noise sensitive receiver locations, a SoundPLAN (Version 7.1) environmental computer model was developed. SoundPLAN is a software package which enables compilation of a sophisticated computer model comprising a digitised ground map (containing ground contours and buildings), the location and acoustic sound power levels of potentially critical noise sources on site and the location of receivers for assessment purposes.

The computer model can generate noise emission levels taking into account such factors as the source sound power levels and locations, distance attenuation, ground absorption, air absorption and shielding attenuation, as well as meteorological conditions, including wind effects.

The CONCAWE prediction methodology was utilised within SoundPLAN. The CONCAWE prediction method is specially designed for industrial facilities and incorporates the influence of wind effects and the stability of the atmosphere. For this project where the receivers are in relatively close proximity to the source, meteorological effects are not expected to affect the predictions.

6.3 Station Noise Sources

The noise sources with potential for noise emissions during standard operation of the stations include:

Cheltenham Station

- Lifts on platforms
- Station Public Address (PA) system
- Station building mechanical ventilation plant
- Cars in the car park area

Pennant Hills Station

- Lifts on platforms
- Station Public Address (PA) system
- Station building mechanical ventilation plant
- Road traffic associated with the transport interchange

On-board Digital Voice Announcements at open train doors have not been included in the assessment, as these are not used under standard operating procedures. The use of these systems (which are fitted to some but not all rolling stock) is independent of the design of the stations.

It is assumed that all noise sources may operate at any time, irrespective of the time of day. The following sections describe the assumptions made in modelling each of these noise sources.

6.3.1 Mechanical Plant

It has been assumed that air conditioning plant for the station buildings would operate continuously and will not be acoustically enclosed.

Source noise levels of the station lifts and the outdoor air conditioning condensers were obtained from the SLR Consulting database.

6.3.2 Public Address Systems (PA)

Automated PA announcements are expected to be broadcast twice per train and with no more than one additional automated safety message broadcast every 15 minutes per platform.

The PA system future design modelled for Cheltenham Station has been modelled with loudspeakers located according to station drawings "*ETTT-2001-CO-141637"* to "*ETTT-2001-CO-141667".* 22 loudspeakers are distributed along platform 1, 22 loudspeakers are distributed along platform 2, and 12 loudspeakers are distributed within the concourse area as per drawing "*ETTT-2001-CO-141664*".

The PA system future design modelled for Pennant Hills Station has been modelled with loudspeakers located according to station drawings "*ETTT-2001-CO-161633"* to "*ETTT-2001-CO-161635".* 21 loudspeakers are distributed along platform 2 and 3, and 14 loudspeakers are distributed within the concourse area as per drawing "*ETTT-2001-CO-161636*".

Loudspeaker mounting positions and orientations for Cheltenham and Pennant Hills Stations have been derived from the project drawings. The loudspeaker directionalities have been based on the performance specifications published by the loudspeaker manufacturer.

The normal operation of the future station facilities will include the automated control of PA system sound pressure levels. It is anticipated that the auto-ranging PA system will produce sound pressure levels at the platform level shown in **Table 6**.

Table 6 Auto-Gain PA System Sound Pressure Levels

Station	Period	Measured ambient noise level L_{Aeq} dBA[1]	Gain-adjusted SPL including +10 dB signal-noise target $L_{Aeq(announcement)}$ dBA[2]	Minimum PA SPL $L_{Aeq(announcement)}$ dBA[3]	Resultant PA SPL $L_{Aeq(announcement)}$ dBA
Cheltenham (NM3)	Daytime	57	67	59	67
	Evening	55	65	59	65
	Night-time	49	59	59	59
Pennant Hills (NM2)	Daytime	62	72	59	72
	Evening	61	71	59	71
	Night-time	53	63	59	63

Note 1: Ambient noise measurement descriptor assumed to be LAeq. This represents a conservative gain adjustment

Note 2: Signal to noise ratio derived from target specified in "*Epping-Chatswood Rail Line Final Design Report*"

Note 3: Minimum noise level nominated in RailCorp standard F2013/6201 and other publications listed in **Section 6.5**

PA system sound pressure levels shown in **Table 6** are in accordance with the normal operating ranges outlined in Section 18.2 of "*RailCorp standard F2013/6201*" which specifies the *typical* SPL operating range of the system and a maximum 75 dBA L_{Aeq} sound pressure level within patron areas over the duration of an announcement.

Signal to noise ratio adjusted levels shown in **Table 6** include a background L_{Aeq} +10 dB adjustment as per targets provided for Epping to Chatswood station PA systems stipulated in Chapter 12, Section 8.7 of "*Epping-Chatswood Rail Line Final Design Report*" dated January 2006.

The minimum sound pressure level for PA announcements shown in **Table 6** is derived from operational sound pressure level specifications outlined in Section 4.12 of Acoustic Directions Report 100627 titled "*Revised Acoustic Specifications for Platform Announcement Systems at Open or Semi-Enclosed Suburban Stations*" dated June 2010.

6.3.3 Commuter Car Parking

Acoustic modelling of the commuter car park noise emissions was carried out in SoundPLAN V7.1 using the methodology of Bayerisches Landesamt für Umwelt's report *Parking Area Noise*. The *Parking Area Noise* prediction methodology utilises an L_{Aeq} based source sound power level that is representative of one complete vehicle movement in one hour for normal parking motions (ie entering the car park, searching for a car parking space, opening and closing car doors, re-starting the engine and exiting the car park).

The major variables accounted for in this methodology include the number of vehicle movements, the location of the commuter car park relative to noise sensitive receivers, design of building facades, and the construction materials and surface finish.

The Cheltenham at-grade car park accommodates a total capacity of 62 car spaces and 5 motorcycle spaces. The parking areas are distributed around the station with a total of 44 spaces on the Down-side of the station and 23 spaces on the Up-side.

6.3.4 Transport Interchange Facilities

The existing Pennant Hills station has transport interchange facilities on both the Up-side and the Down-side of the station. There are bus stops on the station side of Yarrara Road immediately outside the station. There are also several bus stops on both sides of Railway Street immediately outside the station.

Because the Pennant Hills Station upgrade does not include supply of additional bus services, there will be increase on road traffic or interchange operations due to the project. There are no significant road modifications included in the scope of the Pennant Hills Station Upgrade.

Because there will be no additional operational traffic generated by the project, and there will be no significant changes to surrounding roads; the station upgrade will not result in a significant increase in bus interchange noise levels. Therefore, transport interchange facility noise is not considered further in this assessment.

6.4 Modifying Factor Adjustments

The noise from the station PA system is considered to be intermittent in nature and therefore a modifying factor adjustment of +5 dB was applied to the source noise level for night-time operation in accordance with the INP.

6.5 Noise Modelling Results and Assessment

The noise modelling results presented in **Table 7** and **Table 8** represent the noise emissions from the future station facilities under normal operating conditions with the PA system volumes controlled automatically.

Table 7 Predicted Operational Noise Levels – Cheltenham Station

Receptor	Predicted Noise Level, dBA				Intrusiveness Criteria, dBA $L_{Aeq(15minute)}$		Amenity Criteria, dBA $L_{Aeq(period)}$				Sleep Disturbance Screening Criteria, dBA $L_{A1(1minute)}$
	Day LAeq	Evening LAeq	Night LAeq	LAmax[1]	Day	Evening	Night	Day	Evening	Night	
Residential	43	38	36	60	48	46	36	55	45	40	46
Active Recreation	40	35	33	49	n/a	n/a	n/a	55	n/a	n/a	n/a

Note 1: Night-time LAmax level – shaded levels exceed the sleep disturbance screening criterion.

Table 8 Predicted Operational Noise Levels – Pennant Hills Station

Receptor	Predicted Noise Level, dBA				Intrusiveness Criteria, dBA $L_{Aeq(15minute)}$			Amenity Criteria, dBA $L_{Aeq(period)}$			Sleep Disturbance Screening Criteria, dBA $L_{A1(1minute)}$
	Day L_{Aeq}	Evening L_{Aeq}	Night L_{Aeq}	L_{Amax}[1]	Day	Evening	Night	Day	Evening	Night	
Residential (South of station)	42	38	29	55	48	47	43	55	45	43	53
Residential (North of station)	53	49	40	65	53	51	44	55	51	49	54
Commercial	52	48	39	65	n/a	n/a	n/a	65	n/a	n/a	n/a
Educational	31	27	18	44	n/a	n/a	n/a	45	n/a	n/a	n/a
Active Recreation	41	38	28	54	n/a	n/a	n/a	55	n/a	n/a	n/a

Note 1: Night-time LAmax level – shaded levels exceed the sleep disturbance screening criterion.

6.5.1 Cheltenham Station Operational Noise Levels Discussion

From the operational noise modelling results presented in **Table 7** for Cheltenham Station, it can be seen that under normal operation, L_{Aeq} noise levels comply with the project specific noise criteria at all receivers.

The predicted maximum noise levels shown in **Table 7** for Cheltenham Station show an exceedance of the sleep disturbance screening criterion by up to 14 dB. The source of this exceedance is noise from the car-park (eg car door closing). The maximum noise levels from the PA system at night at residential receivers are predicted to be less, around 48 dBA. The predicted maximum levels at residential receivers remain below the level that would be expected to cause awakening reactions, and noise from car parking activities is considered to be consistent with the current noise impacts. For this reason, sleep disturbance impacts are not expected as a result of the station upgrade at Cheltenham.

6.5.2 Pennant Hills Station Operational Noise Levels Discussion

From the operational noise modelling results presented in **Table 8** for Pennant Hills Station, it can be seen that under normal operation, L_{Aeq} noise levels comply with the project specific noise criteria at all receivers.

These predicted maximum noise levels shown in **Table 8** for Pennant Hills Station show potential exceedances of the sleep disturbance screening criterion by up to 2 dB (south of the station) and 11 dB (north of the station). These maximum noise levels are due to the PA system. However, the predicted maximum levels at residential receivers remain below the level that would be expected to cause awakening reactions. For this reason, sleep disturbance impacts are not expected as a result of the station upgrades.

7 CONCLUSIONS

The noise predictions indicate that the operational noise levels at the nearest sensitive receivers will be compliant with the INP intrusiveness and amenity noise goals.

While there is the potential for exceedances of the sleep disturbance screening criteria at Cheltenham due to maximum noise emissions from the car park, and at Pennant Hills due to the PA system, the predicted maximum levels remain below the level that would be expected to cause awakening reactions. For this reason, sleep disturbance impacts are not expected as a result of the station upgrades at either Cheltenham or Pennant Hills.

1 Sound Level or Noise Level

The terms "sound" and "noise" are almost interchangeable, except that in common usage "noise" is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or L_P are commonly used to represent Sound Pressure Level. The symbol L_A represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-5} Pa.

2 "A" Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an "A-weighting" filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as "linear", and the units are expressed as dB(lin) or dB.

3 Sound Power Level

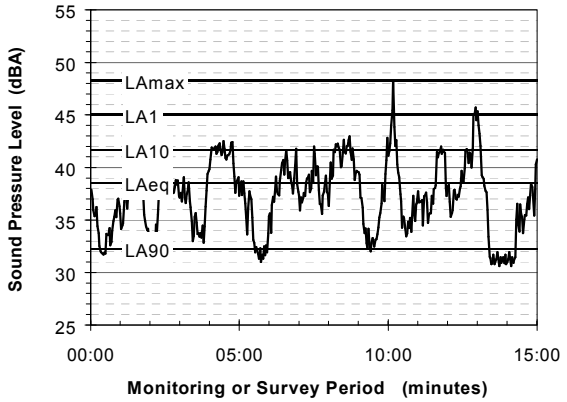
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or L_W, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN}, where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} The noise level exceed for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

L_{Aeq} The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the "repeatable minimum" L_{A90} noise level over the daytime and night-time measurement periods, as required by the EPA. In addition the method produces mean or "average" levels representative of the other descriptors (L_{Aeq}, L_{A10}, etc).

5 Tonality

Tonal noise contains one or more prominent tones (ie distinct frequency components), and is normally regarded as more offensive than "broad band" noise.

6 Impulsiveness

An impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.

7 Frequency Analysis

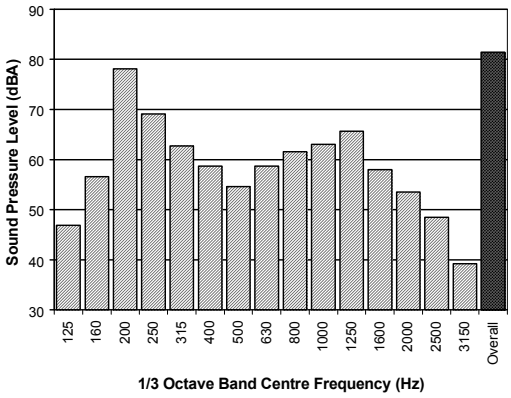
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (3 bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



8 Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of "peak" velocity or "rms" velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as "peak particle velocity", or PPV. The latter incorporates "root mean squared" averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse.

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/V_o), where V_o is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used by some organizations.

9 Human Perception of Vibration

People are able to "feel" vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as "normal" in a car, bus or train is considerably higher than what is perceived as "normal" in a shop, office or dwelling.

10 Over:Pressure

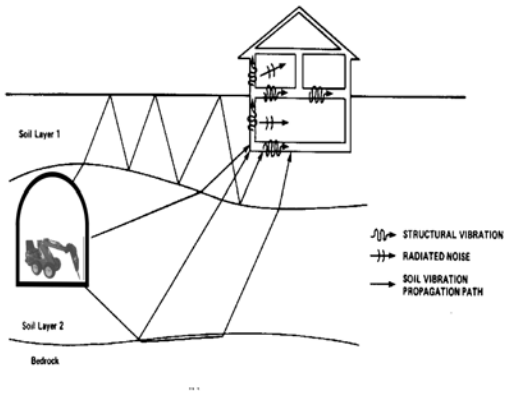
The term "over-pressure" is used to describe the air pressure pulse emitted during blasting or similar events. The peak level of an event is normally measured using a microphone in the same manner as linear noise (ie unweighted), at frequencies both in and below the audible range.

11 Ground:borne Noise, Structure:borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed "structure-borne noise", "ground-borne noise" or "regenerated noise". This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

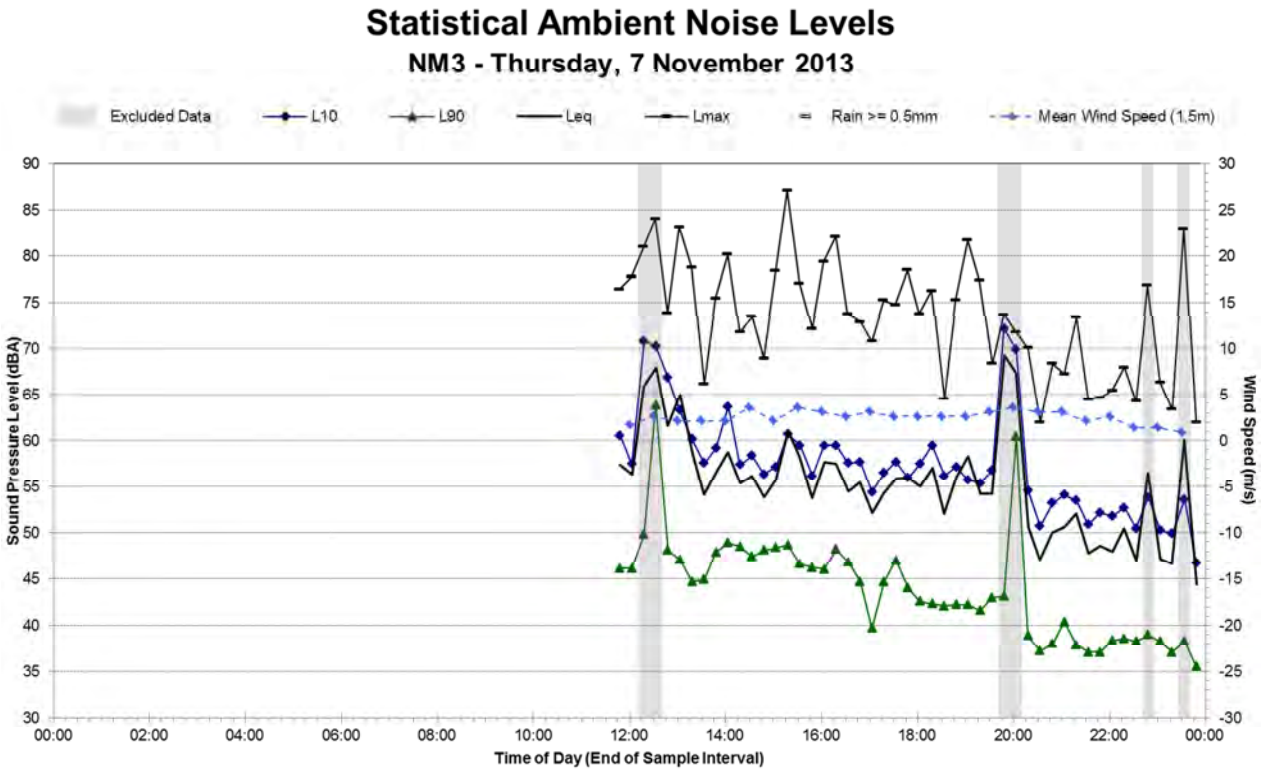
Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

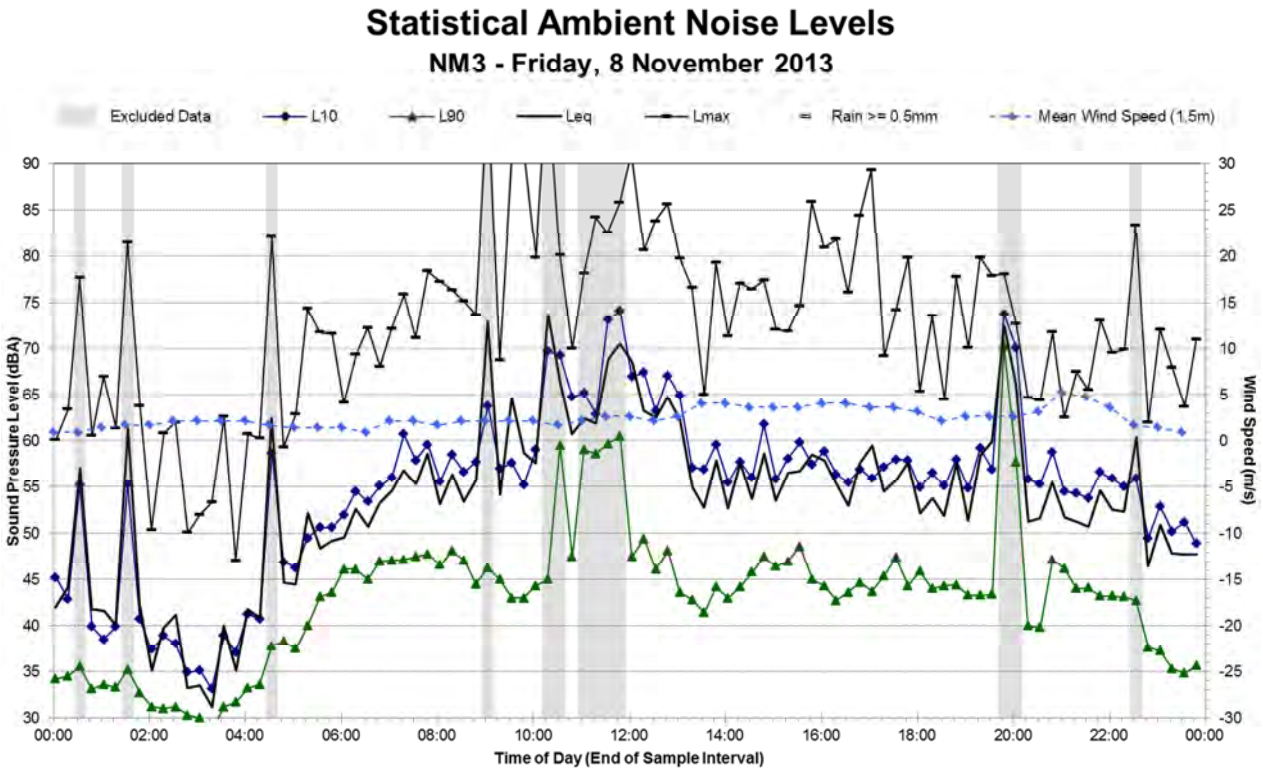
The following figure presents the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.

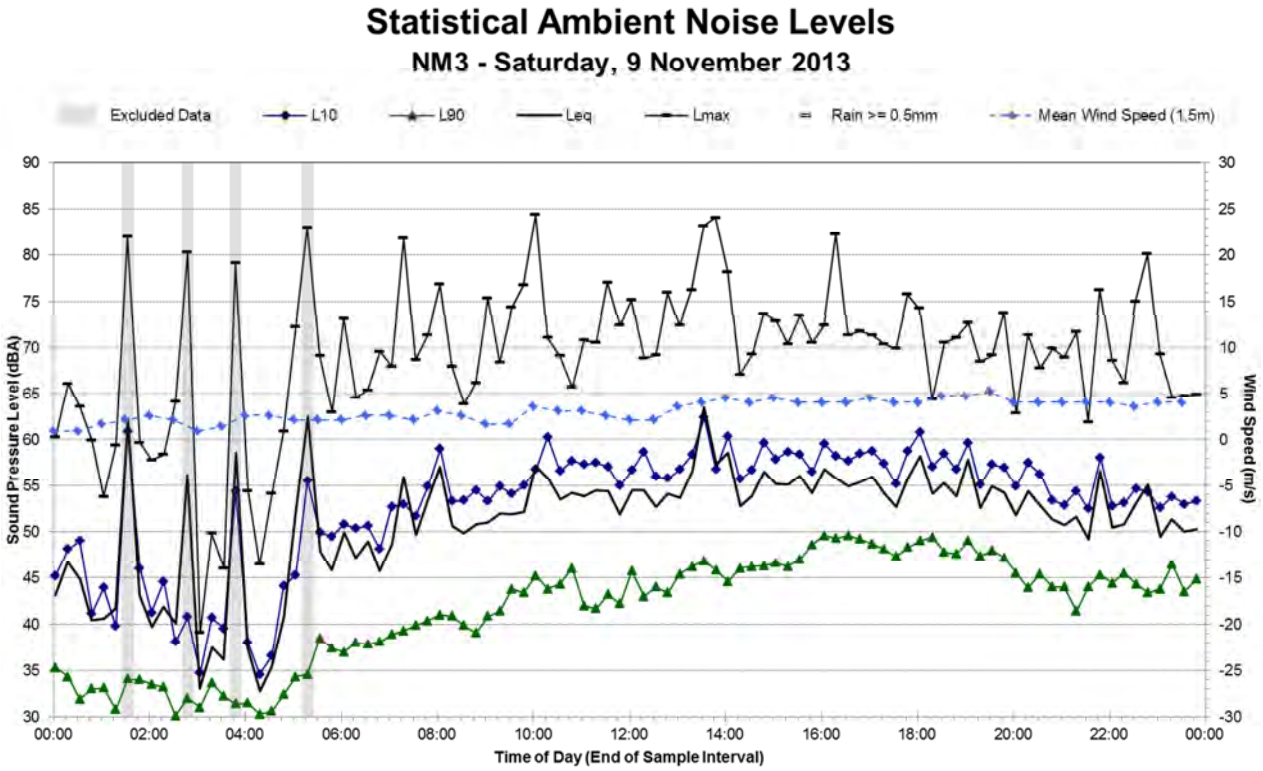


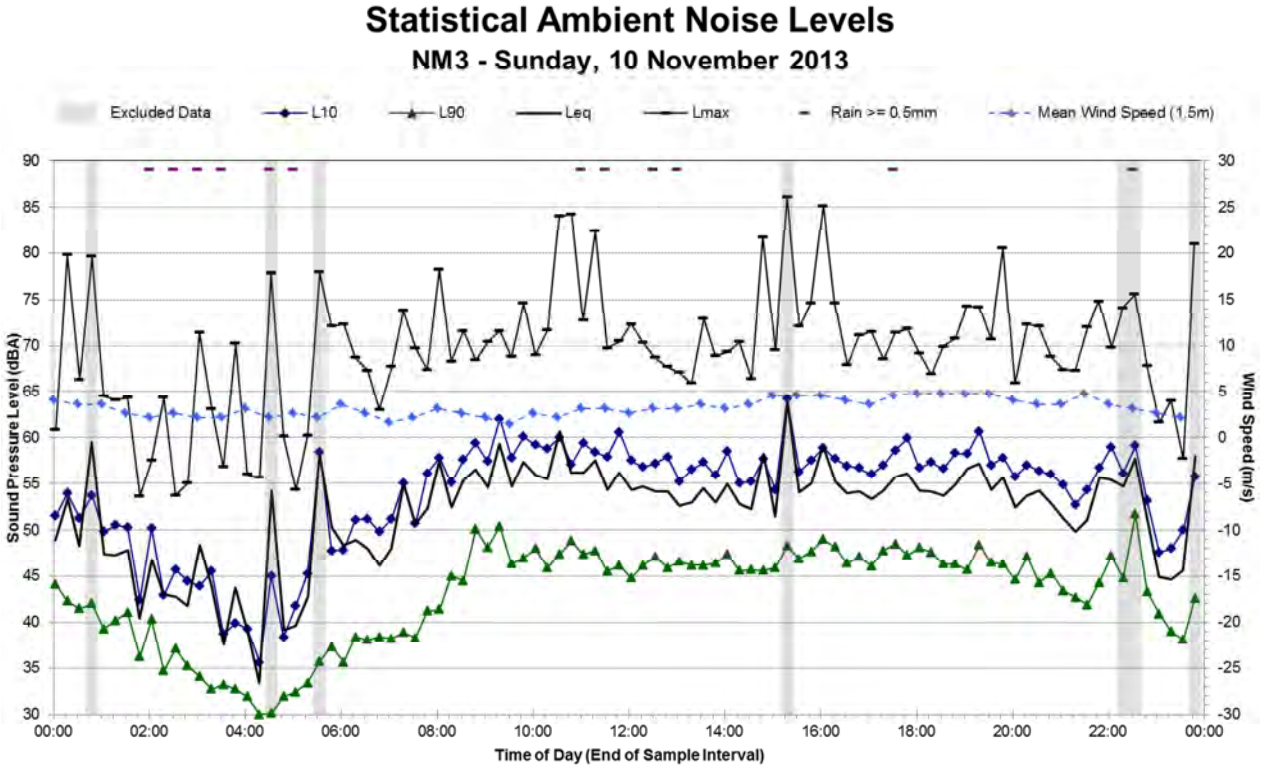
The term "regenerated noise" is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise

Ambient Noise Monitoring Results – NM3



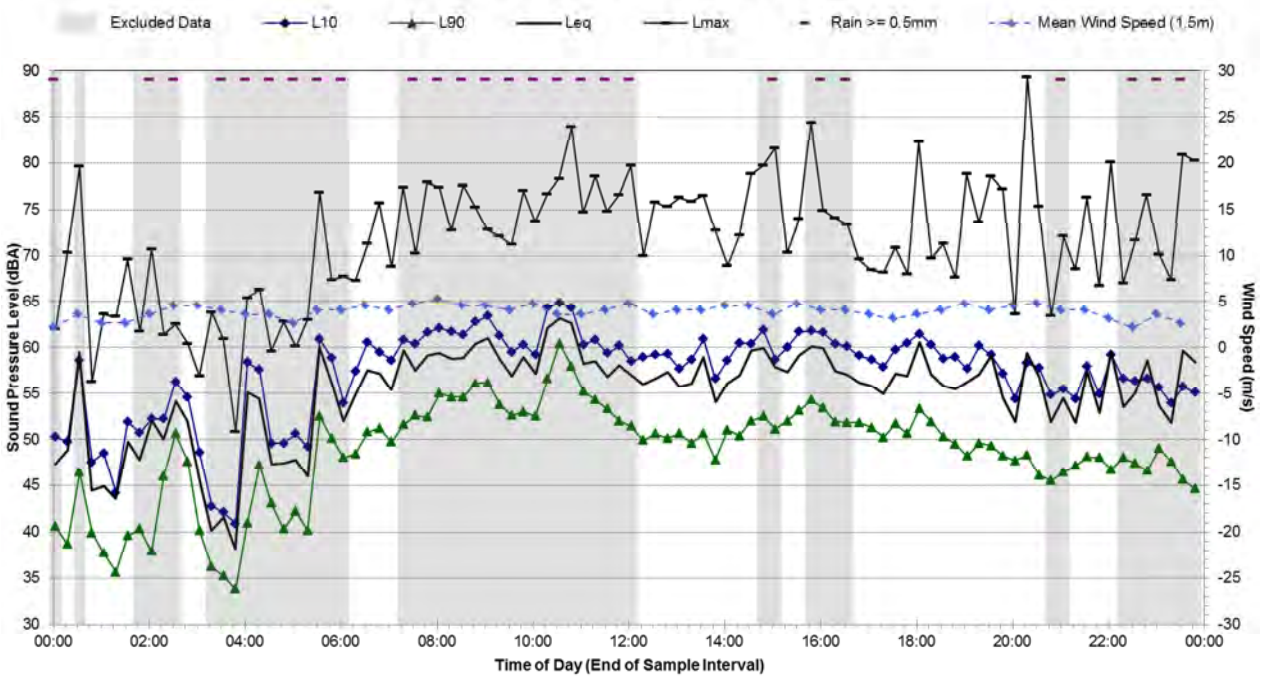



Statistical Ambient Noise Levels
NM3 - Saturday, 9 November 2013
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
NM3 - Sunday, 10 November 2013
Excluded Data
L10
L90
Leq
Lmax
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

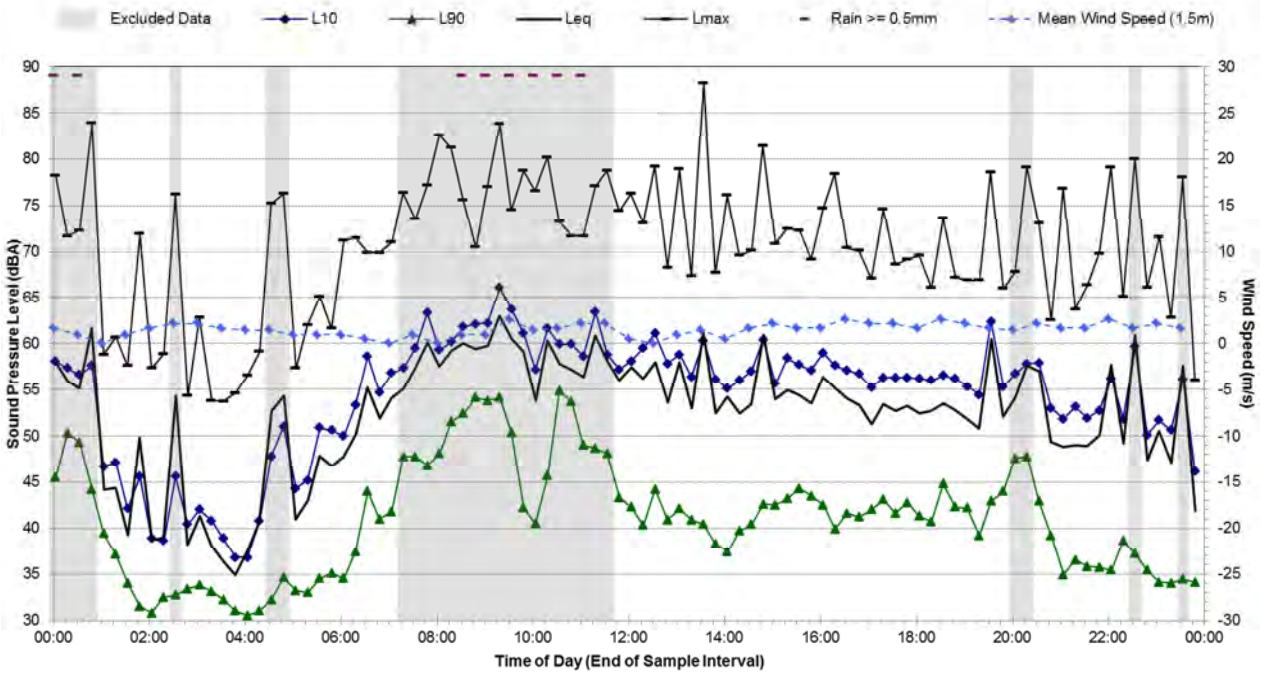
Statistical Ambient Noise Levels

NM3 - Monday, 11 November 2013



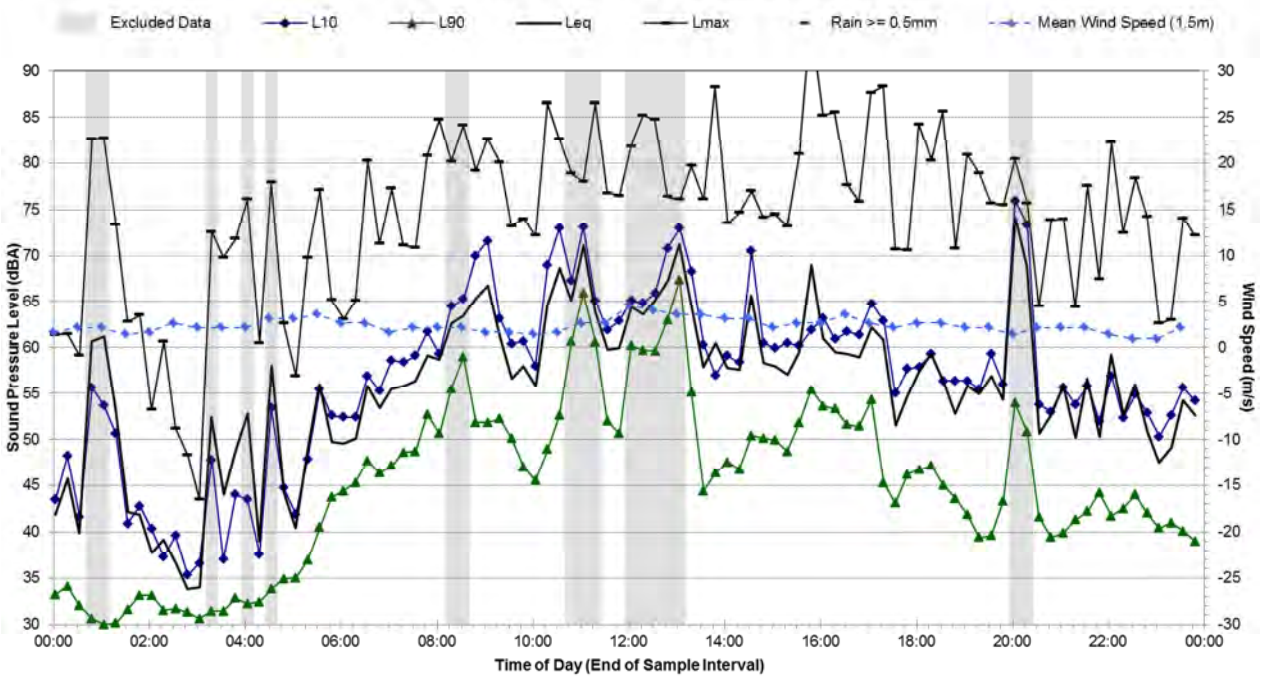
Statistical Ambient Noise Levels

NM3 - Tuesday, 12 November 2013



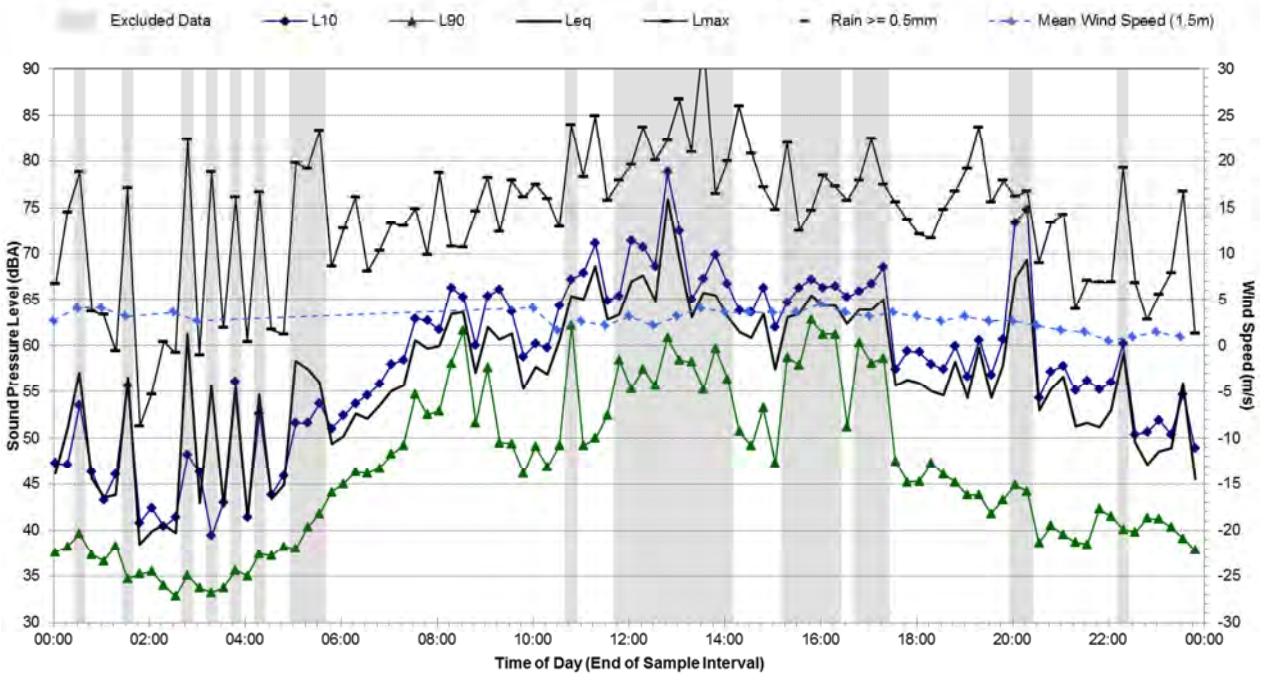
Statistical Ambient Noise Levels

NM3 - Wednesday, 13 November 2013



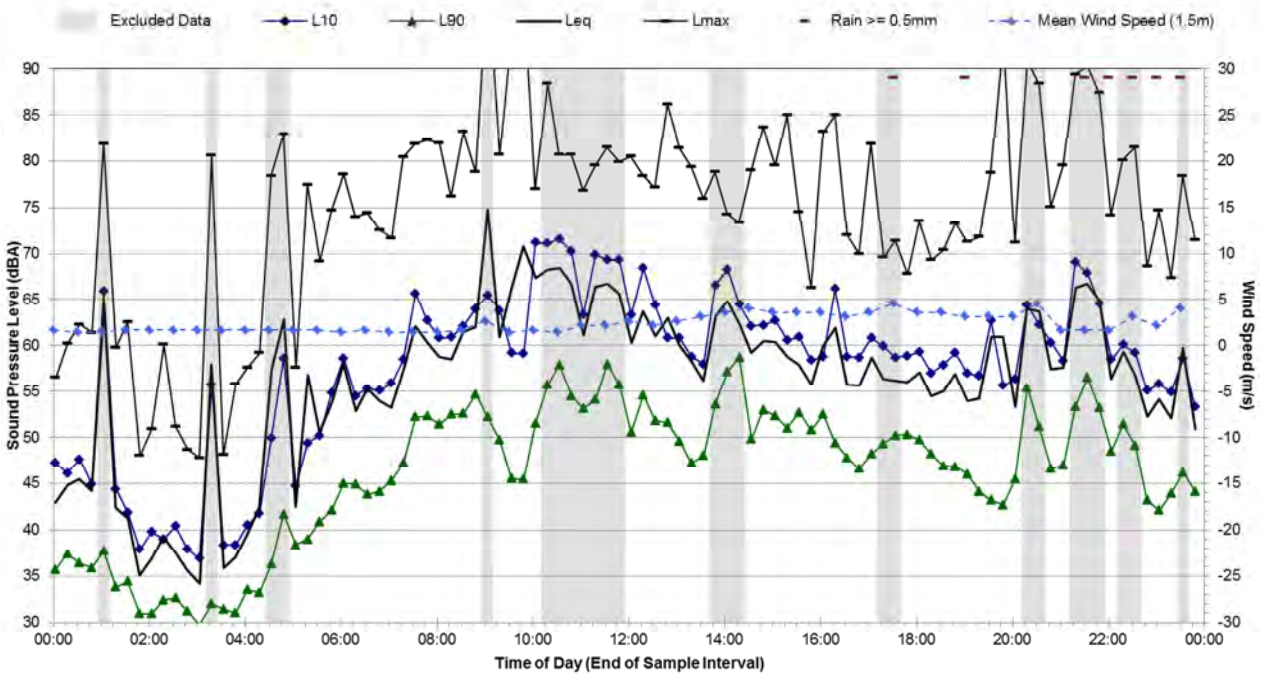
Statistical Ambient Noise Levels

NM3 - Thursday, 14 November 2013



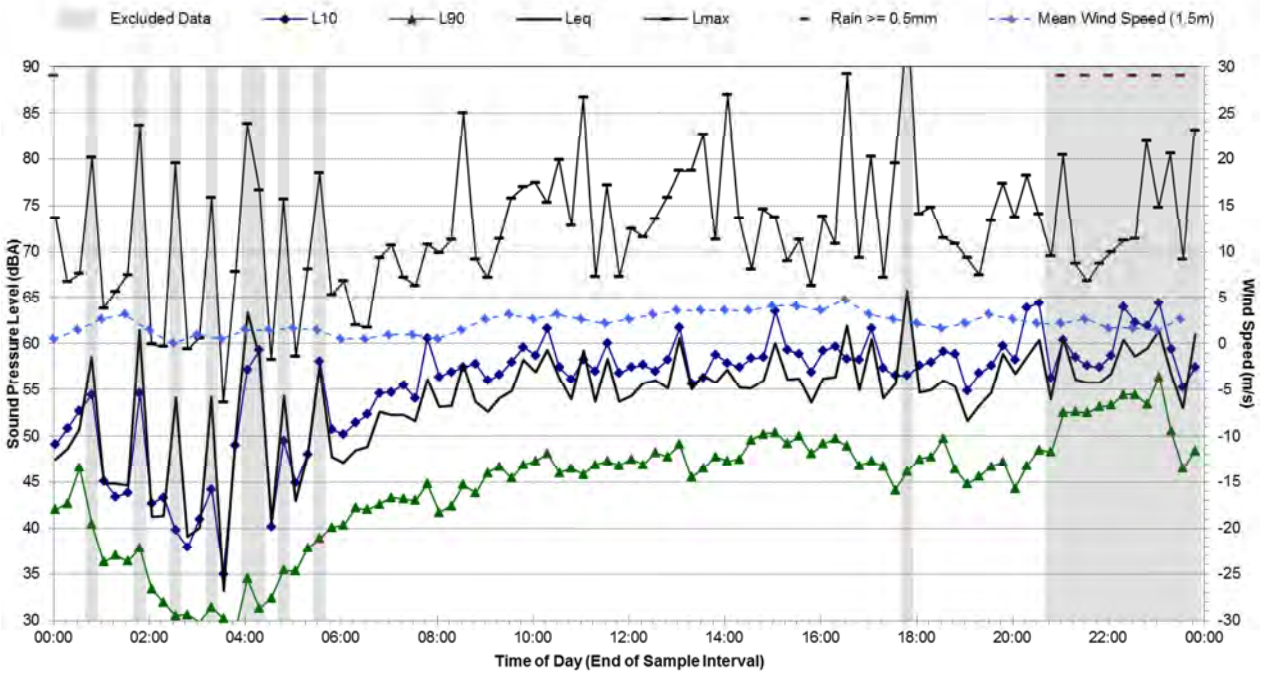
Statistical Ambient Noise Levels

NM3 - Friday, 15 November 2013

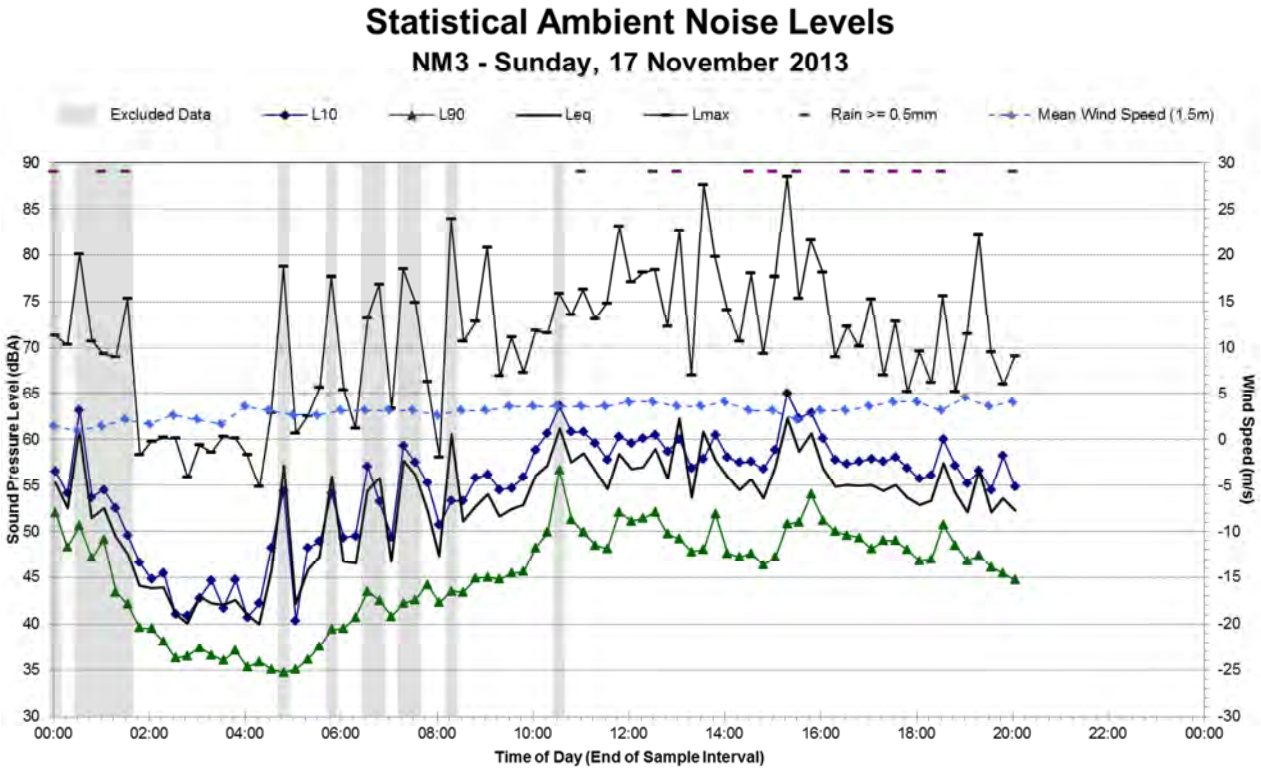


Statistical Ambient Noise Levels

NM3 - Saturday, 16 November 2013



Ambient Noise Monitoring Results – NM3



Appendix D Unmitigated scenarios noise prediction tables

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA01	DN	1ĩ5 Ray Rd	G	Pl of Worship	51	50	54	53	47	54	82	73	82	52	50	54	54	46	54	83	75	83	54	49	55	56	44	56	83	75	83	1.8	2.2	0.9	NO
NCA01	DN	1ĩ5 Ray Rd	1	Pl of Worship	52	52	55	54	49	55	82	75	82	53	52	55	55	48	56	83	76	83	55	51	57	57	47	57	83	76	83	1.3	1.7	0.8	NO
NCA01	DN	74 Rawson St	2	Residential	60	60	63	62	56	63	89	84	89	60	59	63	62	56	63	90	83	90	62	58	64	64	54	64	90	83	90	1.2	1.6	1.3	NO
NCA01	DN	74 Rawson St	3	Residential	60	60	63	62	56	63	89	83	89	60	60	63	62	56	63	90	83	90	63	59	64	64	54	64	90	83	90	1.3	1.6	1.2	NO
NCA01	DN	74 Rawson St	4	Residential	60	60	63	62	56	63	89	83	89	60	60	63	62	56	63	90	83	90	62	59	64	64	55	64	90	83	90	1.2	1.6	1.2	NO
NCA01	DN	74 Rawson St	5	Residential	60	60	63	62	56	63	89	83	89	60	60	63	62	56	63	91	83	91	63	59	64	64	55	64	91	83	91	1.2	1.6	1.4	NO
NCA01	DN	74 Rawson St	6	Residential	60	60	63	62	56	63	89	83	89	60	60	63	62	56	63	91	83	91	62	59	64	64	54	64	91	83	91	1.3	1.6	1.2	NO
NCA01	DN	74 Rawson St	7	Residential	60	60	63	62	56	63	89	83	89	60	60	63	62	56	63	91	83	91	62	59	64	64	55	64	91	83	91	1.2	1.6	1.2	NO
NCA01	DN	74 Rawson St	2	Residential	60	60	63	62	56	63	89	84	89	60	59	63	62	56	63	91	83	91	63	58	64	64	54	64	91	83	91	1.1	1.4	1.5	NO
NCA01	DN	74 Rawson St	3	Residential	60	60	63	62	56	63	89	84	89	60	59	63	62	56	63	91	84	91	63	58	64	64	54	64	91	84	91	1.1	1.4	1.5	NO
NCA01	DN	74 Rawson St	4	Residential	60	60	63	62	56	63	89	84	89	60	59	63	62	56	63	91	84	91	63	58	64	64	54	64	91	84	91	1.1	1.4	1.4	NO
NCA01	DN	74 Rawson St	5	Residential	60	60	63	62	56	63	89	84	89	60	59	63	62	56	63	91	84	91	63	58	64	64	54	64	91	84	91	1.1	1.4	1.3	NO
NCA01	DN	74 Rawson St	6	Residential	60	60	63	62	56	63	89	84	89	60	59	63	62	56	63	91	84	91	62	58	64	64	54	64	91	84	91	1.0	1.3	1.3	NO
NCA01	DN	74 Rawson St	7	Residential	60	60	63	62	56	63	89	84	89	60	59	63	62	56	63	90	84	90	62	58	64	64	54	64	90	84	90	1.0	1.3	1.2	NO
NCA01	DN	74 Rawson St	2	Residential	53	54	57	56	51	57	84	79	84	54	54	57	56	51	57	85	79	85	57	54	58	58	49	59	85	79	85	1.4	1.8	0.9	NO
NCA01	DN	74 Rawson St	3	Residential	53	54	57	56	51	57	84	79	84	54	55	57	56	51	57	85	79	85	57	54	58	58	50	59	85	79	85	1.3	1.8	0.9	NO
NCA01	DN	74 Rawson St	4	Residential	53	54	57	56	51	57	84	79	84	54	55	57	56	51	57	85	79	85	57	54	58	58	50	59	85	79	85	1.4	1.9	0.9	NO
NCA01	DN	74 Rawson St	5	Residential	54	55	57	56	51	57	84	79	84	54	55	57	56	51	57	85	79	85	57	54	58	58	50	59	85	79	85	1.4	1.8	0.9	NO
NCA01	DN	74 Rawson St	6	Residential	54	55	57	56	51	57	84	79	84	54	55	57	56	51	57	85	79	85	57	54	58	58	50	59	85	79	85	1.4	1.8	0.9	NO
NCA01	DN	74 Rawson St	7	Residential	53	54	57	56	51	57	84	79	84	54	55	57	56	51	57	84	79	84	57	54	58	58	50	59	84	79	84	1.3	1.8	0.9	NO
NCA01	DN	7 Ray Rd	G	Residential	51	51	54	53	47	54	80	73	80	51	47	52	52	44	53	81	72	81	53	46	54	54	42	55	81	72	81	0.3	0.8	1.1	NO
NCA01	DN	7 Ray Rd	1	Residential	51	52	55	53	48	55	80	74	80	51	49	53	53	45	54	82	73	82	54	48	55	55	44	55	82	73	82	0.2	0.8	1.2	NO
NCA01	DN	7 Ray Rd	2	Residential	52	53	56	54	49	55	81	75	81	52	51	54	54	47	55	82	74	82	55	50	56	56	46	56	82	74	82	0.3	0.8	1.3	NO
NCA01	DN	9 Ray Rd	G	Residential	51	51	54	53	47	54	80	73	80	51	48	53	53	44	53	81	73	81	53	47	54	55	42	55	81	73	81	0.3	0.9	1.0	NO
NCA01	DN	9 Ray Rd	1	Residential	51	52	55	53	48	55	80	74	80	51	49	53	53	45	54	81	73	81	54	48	55	55	44	55	81	73	81	0.1	0.7	1.2	NO
NCA01	DN	9 Ray Rd	2	Residential	52	53	55	54	49	55	80	74	80	52	50	54	53	47	54	81	73	81	54	49	55	55	45	56	81	73	81	0.1	0.7	1.0	NO
NCA01	DN	13ĩ15 Ray Rd	G	Residential	51	52	54	53	48	54	80	74	80	51	48	53	53	44	53	81	73	81	54	47	54	55	43	55	81	73	81	0.1	0.7	1.0	NO
NCA01	DN	13ĩ15 Ray Rd	1	Residential	51	52	55	54	49	55	80	74	80	51	49	53	53	45	54	81	73	81	54	48	55	55	44	55	81	73	81	0.0	0.6	1.0	NO
NCA01	DN	13ĩ15 Ray Rd	2	Residential	52	53	55	54	49	55	80	75	80	52	51	54	54	47	55	81	73	81	54	50	56	56	46	56	81	73	81	0.2	0.8	1.0	NO
NCA01	DN	17ĩ19 Ray Rd	G	Residential	50	50	53	52	47	53	79	74	79	50	47	52	52	43	52	80	72	80	52	46	53	54	42	54	80	72	80	0.3	0.8	0.9	NO
NCA01	DN	17ĩ19 Ray Rd	1	Residential	51	52	55	53	48	55	79	75	79	51	49	53	53	46	54	80	73	80	54	48	55	55	44	55	80	73	80	0.2	0.7	1.0	NO
NCA01	DN	17ĩ19 Ray Rd	2	Residential	52	53	55	54	49	55	79	75	79	52	51	54	54	47	55	80	73	80	54	50	56	56	46	56	80	73	80	0.1	0.7	1.0	NO
NCA01	DN	21 Ray Rd	G	Residential	49	49	52	51	45	52	78	72	78	49	47	51	51	43	51	79	71	79	52	46	53	53	41	53	79	71	79	0.8	1.2	1.3	NO
NCA01	DN	21 Ray Rd	1	Residential	51	51	54	53	47	54	80	74	80	51	49	53	53	45	53	81	72	81	53	48	54	55	44	55	81	72	81	0.5	1.1	1.0	NO
NCA01	DN	21 Ray Rd	2	Residential	51	52	55	54	48	55	79	74	79	51	50	54	53	46	54	80	72	80	54	49	55	55	45	55	80	72	80	0.2	0.7	1.0	NO
NCA01	DN	6 Ray Rd	G	Residential	52	51	55	54	47	55	82	74	82	53	46	54	55	42	55	83	74	83	55	46	56	56	41	57	83	74	83	1.2	1.5	1.5	NO
NCA01	DN	6 Ray Rd	1	Residential	53	53	56	55	49	56	82	76	82	54	49	55	55	45	56	83	75	83	56	48	57	57	43	57	83	75	83	0.6	1.1	1.5	NO
NCA01	DN	6 Ray Rd	2	Residential	54	54	57	56	51	57	82	77	82	54	50	56	56	47	56	84	75	84	57	50	57	58	45	58	84	75	84	0.2	0.7	1.3	NO
NCA01	DN	6 Ray Rd	G	Residential	53	52	55	54	48	55	81	74	81	53	47	54	54	43	55	83	73	83	55	47	56	56	42	56	83	73	83	0.6	1.1	1.8	NO
NCA01	DN	6 Ray Rd	1	Residential	53	53	56	55	50	56	81	75	81	53	49	55	55	45	55	83	74	83	56	48	57	57	44	57	83	74	83	0.1	0.7	1.6	NO
NCA01	DN	6 Ray Rd	2	Residential	54	55	57	56	51	57	82	76	82	54	50	55	55	47	56	83	74	83	56	50	57	57	45	58	83	74	83	ĩ0.2	0.5	1.4	NO
NCA01	DN	2ĩ4 Edensor St	G	Residential	53	54	57	55	50	57	81	76	81	53	49	55	55	45	55	83	74	83	56	48	57	57	43	57	83	74	83	0.0	0.6	1.6	NO
NCA01	DN	2ĩ4 Edensor St	1	Residential	54	55	57	56	51	57	82	77	82	54	50	55	55	46	56	83	75	83	56	49	57	57	45	58	83	75	83	ĩ0.3	0.3	1.5	NO
NCA01	DN	2ĩ4 Edensor St	2	Residential	55	55	58	57	52	58	82	77	82	54	52	56	56	48	57	83	75	83	57	51	58	58	47	58	83	75	83	ĩ0.2	0.3	1.4	NO
NCA01	DN	2ĩ4 Edensor St	G	Residential	53	52	56	55	49	56	81	75	81	52	47	54	54	43	54	82	73	82	55	46	56	56	42	56	82	73	82	0.0	0.5	1.7	NO
NCA01	DN	2ĩ4 Edensor St	1	Residential	53	54	56	55	50	56	81	76	81	53	49	54	55	45	55	83	74	83	55	48	56	56	44	57	83	74	83	ĩ0.3	0.3	1.7	NO
NCA01	DN	2ĩ4 Edensor St	2	Residential	54	54	57	56	51	57	81	76	81	53	50	55	55	47	56	83	75	83	56	50	57	57	45	57	83	75	83	ĩ0.4	0.3	1.6	NO
NCA01	UP	9 Oxford St	G	Other	58	56	60	60	52	60	89	80	89	58	56	60	59	52	60	89	80	89	60	55	61	61	51	62	89	80	89	1.4	1.4	ĩ0.8	NO
NCA01	UP	9 Oxford St	1	Other	59	58	61	60	54	61	89	83	89	58	58	61	60	54	61	89	83	89	61	57	62	62	53	63	89	83	89	0.9	1.1	ĩ0.9	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA01	UP	29 Oxford St	G	Educational	53	53	56	55	49	56	85	78	85	53	53	56	55	49	56	84	78	84	55	52	57	57	48	57	84	78	84	1.3	1.6	ĩ0.6	NO
NCA01	UP	29 Oxford St	1	Educational	53	54	57	56	50	57	85	80	85	54	54	57	56	50	57	84	79	84	56	53	58	58	49	58	84	79	84	1.1	1.5	ĩ0.6	NO
NCA01	UP	29 Oxford St	2	Educational	54	55	58	57	51	58	84	81	84	55	55	58	56	51	57	84	80	84	57	54	58	58	49	59	84	80	84	0.8	1.2	ĩ0.5	NO
NCA01	UP	31 Oxford St	G	Educational	59	60	62	61	56	62	89	85	89	59	60	63	61	57	62	87	85	87	61	59	63	63	55	64	87	85	87	0.9	1.3	ĩ2.2	NO
NCA01	UP	31 Oxford St	1	Educational	59	60	63	61	56	63	89	85	89	59	60	63	61	57	62	87	85	87	61	59	63	63	55	64	87	85	87	0.7	1.1	ĩ2.2	NO
NCA01	UP	31 Oxford St	G	Educational	59	60	62	61	56	62	89	85	89	59	60	63	61	57	62	87	85	87	61	59	63	63	55	64	87	85	87	1.0	1.4	ĩ2.0	NO
NCA01	UP	31 Oxford St	1	Educational	60	60	63	62	57	63	89	86	89	59	61	63	61	57	63	87	86	87	62	60	64	63	56	64	87	86	87	0.7	1.1	ĩ2.0	NO
NCA01	UP	31 Oxford St	G	Pl of Worship	50	49	53	52	46	53	83	74	83	50	49	53	52	46	53	82	74	82	53	48	54	54	44	54	82	74	82	1.2	1.4	ĩ0.4	NO
NCA01	UP	31 Oxford St	1	Pl of Worship	51	51	54	53	47	54	83	76	83	51	51	54	53	47	54	82	75	82	54	50	55	55	46	56	82	75	82	1.3	1.5	ĩ0.4	NO
NCA01	UP	31 Oxford St	2	Pl of Worship	52	52	55	54	49	55	83	77	83	53	52	55	55	48	56	83	76	83	55	51	57	57	47	57	83	76	83	1.4	1.7	ĩ0.3	NO
NCA01	UP	2ĩ4 Chester St	G	Residential	50	51	53	52	47	53	81	76	81	49	51	53	51	47	53	80	76	80	52	50	54	53	46	54	80	76	80	0.5	1.0	ĩ1.4	NO
NCA01	UP	2ĩ4 Chester St	1	Residential	50	51	53	52	47	53	81	76	81	50	51	53	52	47	53	80	76	80	52	50	54	54	46	54	80	76	80	0.5	1.0	ĩ1.4	NO
NCA01	UP	2ĩ4 Chester St	G	Residential	50	51	54	52	47	53	81	76	81	50	51	53	52	47	53	80	76	80	52	50	54	54	46	54	80	76	80	0.5	1.0	ĩ1.3	NO
NCA01	UP	2ĩ4 Chester St	1	Residential	50	51	54	52	48	54	82	76	82	50	51	54	52	48	53	80	76	80	52	50	54	54	46	55	80	76	80	0.5	1.0	ĩ1.3	NO
NCA01	UP	1ĩ3 Oxford St	G	Residential	59	55	60	61	52	61	89	79	89	57	54	59	59	51	60	87	79	87	59	53	60	61	49	61	87	79	87	0.0	0.2	ĩ2.0	NO
NCA01	UP	1ĩ3 Oxford St	1	Residential	59	57	61	61	54	62	89	81	89	57	56	60	59	52	60	87	81	87	59	55	61	61	51	62	87	81	87	ĩ0.5	ĩ0.2	ĩ2.0	NO
NCA01	UP	1ĩ3 Oxford St	2	Residential	59	57	61	61	54	62	89	81	89	57	56	60	59	52	60	87	81	87	59	55	61	61	51	62	87	81	87	ĩ0.6	ĩ0.3	ĩ2.0	NO
NCA01	UP	1ĩ3 Oxford St	3	Residential	59	57	61	61	54	62	89	81	89	57	56	60	59	52	60	87	81	87	59	55	61	61	51	62	87	81	87	ĩ0.7	ĩ0.4	ĩ1.9	NO
NCA01	UP	1ĩ3 Oxford St	G	Residential	59	56	61	61	53	62	90	81	90	58	56	60	60	52	61	89	81	89	61	55	62	62	51	62	89	81	89	0.7	0.7	ĩ1.5	NO
NCA01	UP	1ĩ3 Oxford St	1	Residential	60	58	62	62	55	62	90	84	90	58	58	61	60	54	61	88	84	88	61	57	62	62	53	63	88	84	88	0.1	0.2	ĩ1.8	NO
NCA01	UP	1ĩ3 Oxford St	2	Residential	60	58	62	62	55	63	90	84	90	58	58	61	60	54	61	88	84	88	61	57	62	62	53	63	88	84	88	0.1	0.2	ĩ1.7	NO
NCA01	UP	1ĩ3 Oxford St	3	Residential	60	59	62	62	55	63	90	83	90	59	58	61	60	55	61	88	83	88	61	57	62	62	53	63	88	83	88	0.1	0.3	ĩ1.7	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA02	DN	34ĩ40 Edensor St	G	Residential	54	55	57	56	51	57	82	77	82	54	52	56	56	48	56	82	76	82	56	51	58	58	47	58	82	76	82	0.2	0.7	0.4	NO
NCA02	DN	34ĩ40 Edensor St	1	Residential	55	56	58	57	52	58	82	78	82	54	54	57	56	50	57	82	76	82	57	53	58	58	49	59	82	76	82	0.1	0.6	0.4	NO
NCA02	DN	34ĩ40 Edensor St	2	Residential	55	57	59	57	53	59	82	79	82	55	55	58	57	52	58	82	78	82	57	54	59	59	50	59	82	78	82	0.2	0.8	0.3	NO
NCA02	DN	34ĩ40 Edensor St	3	Residential	56	57	60	58	54	59	82	79	82	56	56	59	57	53	59	82	79	82	58	55	60	59	51	60	82	79	82	0.3	0.9	0.3	NO
NCA02	DN	6 Edensor St	G	Residential	54	54	57	55	50	57	82	76	82	53	49	55	55	45	56	83	74	83	56	48	57	57	43	57	83	74	83	0.0	0.6	1.7	NO
NCA02	DN	6 Edensor St	1	Residential	54	55	58	56	51	57	82	77	82	54	50	55	56	46	56	83	75	83	56	49	57	57	45	58	83	75	83	ĩ0.5	0.3	1.6	NO
NCA02	DN	6 Edensor St	2	Residential	55	56	58	57	52	58	82	77	82	54	52	56	56	48	57	84	75	84	57	51	58	58	47	58	84	75	84	ĩ0.4	0.3	1.5	NO
NCA02	DN	6 Edensor St	3	Residential	55	56	59	57	52	58	82	77	82	55	54	57	57	50	58	84	76	84	57	53	59	59	49	59	84	76	84	0.1	0.7	1.6	NO
NCA02	DN	10 Edensor St	G	Residential	53	54	57	55	50	56	82	76	82	53	49	55	55	45	55	83	74	83	56	48	57	57	43	57	83	74	83	0.0	0.5	1.8	NO
NCA02	DN	10 Edensor St	1	Residential	54	55	57	56	51	57	82	77	82	54	50	55	55	46	56	84	74	84	56	49	57	57	45	58	84	74	84	ĩ0.4	0.3	1.7	NO
NCA02	DN	10 Edensor St	2	Residential	55	56	58	57	52	58	82	78	82	54	52	56	56	48	57	84	75	84	57	51	58	58	46	58	84	75	84	ĩ0.5	0.2	1.5	NO
NCA02	DN	10 Edensor St	3	Residential	55	56	59	57	53	58	82	78	82	55	53	57	57	50	57	84	76	84	57	53	59	59	48	59	84	76	84	ĩ0.1	0.6	1.7	NO
NCA02	DN	14 Edensor St	G	Residential	53	54	57	55	50	57	82	77	82	53	48	55	55	45	55	84	74	84	56	48	56	57	43	57	84	74	84	ĩ0.1	0.5	1.7	NO
NCA02	DN	14 Edensor St	1	Residential	54	55	58	56	51	57	82	78	82	54	50	55	55	46	56	84	75	84	56	49	57	57	45	58	84	75	84	ĩ0.5	0.2	1.6	NO
NCA02	DN	14 Edensor St	2	Residential	55	56	58	57	52	58	82	79	82	54	52	56	56	48	57	84	76	84	57	51	58	58	46	58	84	76	84	ĩ0.6	0.1	1.5	NO
NCA02	DN	14 Edensor St	3	Residential	55	56	59	57	53	59	83	79	83	55	54	57	57	50	57	84	76	84	57	53	59	59	49	59	84	76	84	ĩ0.2	0.4	1.5	NO
NCA02	DN	18 Edensor St	G	Residential	53	53	56	55	50	56	82	77	82	53	48	54	55	45	55	84	72	84	56	47	56	57	43	57	84	72	84	0.0	0.5	1.5	NO
NCA02	DN	18 Edensor St	1	Residential	54	54	57	56	51	57	82	78	82	54	50	55	55	46	56	84	73	84	56	49	57	57	45	57	84	73	84	ĩ0.4	0.2	1.5	NO
NCA02	DN	18 Edensor St	2	Residential	55	56	58	57	52	58	83	79	83	54	51	56	56	48	56	84	75	84	56	50	57	58	46	58	84	75	84	ĩ0.7	0.0	1.4	NO
NCA02	DN	18 Edensor St	3	Residential	55	56	59	57	53	59	83	79	83	55	53	57	56	49	57	84	75	84	57	52	58	58	48	59	84	75	84	ĩ0.6	0.0	1.2	NO
NCA02	DN	18 Edensor St	G	Residential	54	53	56	55	50	56	82	77	82	53	48	54	55	45	55	84	73	84	56	47	56	57	43	57	84	73	84	0.0	0.5	1.7	NO
NCA02	DN	18 Edensor St	1	Residential	54	55	57	56	51	57	83	78	83	54	50	55	55	46	56	84	74	84	56	49	57	57	45	57	84	74	84	ĩ0.3	0.2	1.6	NO
NCA02	DN	18 Edensor St	2	Residential	55	56	58	57	52	58	83	79	83	54	51	56	56	48	57	84	75	84	57	50	58	58	46	58	84	75	84	ĩ0.6	0.1	1.4	NO
NCA02	DN	18 Edensor St	3	Residential	55	57	59	57	53	59	83	79	83	55	53	57	57	49	57	84	76	84	57	52	58	58	48	59	84	76	84	ĩ0.6	0.1	1.3	NO
NCA02	DN	24ĩ32 Edensor St	G	Residential	54	53	56	56	50	57	83	76	83	53	50	55	55	46	56	83	74	83	56	49	57	57	45	57	83	74	83	0.4	0.7	0.6	NO
NCA02	DN	24ĩ32 Edensor St	1	Residential	54	55	57	56	51	57	83	78	83	54	51	56	56	48	56	83	74	83	56	50	57	58	46	58	83	74	83	0.0	0.5	0.7	NO
NCA02	DN	24ĩ32 Edensor St	2	Residential	55	56	58	57	52	58	83	79	83	55	53	57	56	49	57	83	76	83	57	52	58	58	48	59	83	76	83	ĩ0.2	0.3	0.7	NO
NCA02	DN	24ĩ32 Edensor St	3	Residential	56	57	59	58	53	59	83	80	83	55	55	58	57	51	58	83	77	83	58	54	59	59	50	59	83	77	83	ĩ0.2	0.4	0.6	NO
NCA02	DN	24ĩ32 Edensor St	G	Residential	53	54	57	55	50	56	82	77	82	53	49	55	55	45	55	83	72	83	56	48	56	57	44	57	83	72	83	ĩ0.2	0.4	1.3	NO
NCA02	DN	24ĩ32 Edensor St	1	Residential	54	55	57	56	51	57	82	78	82	53	51	55	55	47	56	83	73	83	56	50	57	57	46	57	83	73	83	ĩ0.5	0.1	1.2	NO
NCA02	DN	24ĩ32 Edensor St	2	Residential	55	56	58	57	52	58	82	79	82	54	52	56	56	49	56	83	74	83	56	51	58	58	47	58	83	74	83	ĩ0.6	0.0	1.1	NO
NCA02	DN	24ĩ32 Edensor St	3	Residential	55	56	59	57	53	59	82	79	82	55	54	57	56	50	57	83	75	83	57	53	58	58	49	59	83	75	83	ĩ0.4	0.2	0.9	NO
NCA02	DN	34ĩ40 Edensor St	G	Residential	54	55	57	56	51	57	82	77	82	54	53	56	56	49	57	82	77	82	56	52	58	58	48	58	82	77	82	0.6	1.0	0.3	NO
NCA02	DN	34ĩ40 Edensor St	1	Residential	55	56	58	57	52	58	82	78	82	55	55	58	57	51	58	82	78	82	57	54	59	59	50	59	82	78	82	0.5	1.0	0.3	NO
NCA02	DN	34ĩ40 Edensor St	2	Residential	55	57	59	58	53	59	82	79	82	55	56	59	57	52	59	82	79	82	58	55	60	59	51	60	82	79	82	0.4	0.9	0.4	NO
NCA02	DN	34ĩ40 Edensor St	3	Residential	56	57	60	58	54	59	82	79	82	56	57	59	58	53	59	82	79	82	58	56	60	60	52	60	82	79	82	0.5	1.1	0.4	NO
NCA02	DN	1 Kandy Av	G	Residential	55	56	58	57	52	58	85	80	85	55	51	56	57	47	57	86	79	86	58	50	58	59	46	59	86	79	86	ĩ0.2	0.5	1.0	NO
NCA02	DN	1 Kandy Av	1	Residential	56	57	59	58	53	59	85	81	85	55	53	57	57	49	58	86	80	86	58	52	59	59	48	59	86	80	86	ĩ0.4	0.3	0.9	NO
NCA02	DN	1 Kandy Av	2	Residential	56	58	60	58	54	60	85	82	85	56	55	59	58	52	59	86	80	86	58	54	60	60	50	60	86	80	86	ĩ0.1	0.6	0.8	NO
NCA02	DN	1 Kandy Av	G	Residential	56	56	59	58	52	59	86	81	86	56	51	57	57	47	58	87	81	87	58	50	59	59	46	59	87	81	87	0.1	0.8	0.8	NO
NCA02	DN	1 Kandy Av	1	Residential	56	57	60	58	54	60	86	82	86	56	54	58	58	50	59	87	82	87	59	53	60	60	48	60	87	82	87	ĩ0.1	0.5	0.9	NO
NCA02	DN	1 Kandy Av	2	Residential	57	59	61	59	55	61	87	83	87	57	56	60	59	53	60	87	82	87	59	55	61	61	51	61	87	82	87	0.0	0.6	0.7	NO
NCA02	DN	2 Kandy Av	G	Residential	55	57	59	57	53	59	84	80	84	55	53	57	57	49	57	85	78	85	58	52	59	59	48	59	85	78	85	ĩ0.4	0.3	1.0	NO
NCA02	DN	3 Kandy Av	G	Residential	52	54	56	55	50	56	84	77	84	53	53	56	55	49	56	84	78	84	55	52	57	57	48	57	84	78	84	1.0	1.5	0.3	NO
NCA02	DN	3 Kandy Av	1	Residential	55	56	59	57	53	58	85	80	85	55	56	59	57	52	58	85	80	85	58	55	60	59	51	60	85	80	85	1.0	1.5	0.4	NO
NCA02	DN	3 Kandy Av	2	Residential	56	57	60	58	54	59	83	80	83	56	57	59	58	53	59	83	80	83	58	56	60	60	52	60	83	80	83	0.5	1.1	0.5	NO
NCA02	DN	3 Kandy Av	3	Residential	56	58	60	58	54	59	83	81	83	56	57	60	58	54	59	83	81	83	58	56	61	60	52	61	83	81	83	0.7	1.3	0.6	NO
NCA02	DN	3 Kandy Av	G	Residential	52	53	55	54	49	55	79	75	79	52	51	54	53	47	54	80	73	80	54	50	56	55	46	56	80	73	80	0.3	0.9	0.8	NO
NCA02	DN	3 Kandy Av	1	Residential	54	55	58	56	52	58	81	77	81	54	55	57	56	51	57	81	77	81	57	54	58	58	50	59	81	77	81	0.5	1.1	0.5	NO
NCA02	DN	3 Kandy Av	2	Residential	56	57	60	58	54	59	83	81	83	56	57	59	58	53	59	84	80	84	58	56	60	60	52	60	84	80	84	0.5	1.0	0.6	NO
NCA02	DN	3 Kandy Av	3	Residential	56	58	60	58	54	60	83	81	83	56	57	60	58	54	59	84	81	84	59	57	61	60	52	61	84	81	84	0.7	1.2	0.6	NO
NCA02	DN	3 Kandy Av	G	Residential	52	53	55	54	49	55	81	76	81	51	50	54	53	46	54	82	73	82	54	49	55	55	45	56	82	73	82	ĩ0.2	0.5	0.8	NO
NCA02	DN	3 Kandy Av	1	Residential	53	54	56	55	50	56	81	77	81	53	52	55	54	48	55	82	74	82	55	51	56	56	47	57	82	74	82	0.1	0.7	0.9	NO
NCA02	DN	3 Kandy Av	2	Residential	54	55	58	56	52	57	82	79	82	54	54	57	56	51	57	83	78	83	56	53	58	58	49	58	83	78	83	0.5	1.0	0.8	NO
NCA02	DN	3 Kandy Av	3	Residential	54	55	58	56	52	57	82	79	82	54	55	58	56	51	57	83	79	83	56	54	58	58	50	59	83	79	83	0.9	1.4	0.9	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA02	DN	3 Kandy Av	G	Residential	52	53	55	54	49	55	80	75	80	52	51	54	54	47	55	81	73	81	54	50	56	56	46	56	81	73	81	0.3	0.8	0.3	NO
NCA02	DN	3 Kandy Av	1	Residential	54	55	58	56	52	58	80	77	80	54	54	57	56	50	57	81	77	81	56	53	58	58	49	58	81	77	81	0.4	0.9	0.5	NO
NCA02	DN	3 Kandy Av	2	Residential	56	57	59	58	54	59	83	80	83	56	56	59	57	53	59	83	80	83	58	56	60	59	51	60	83	80	83	0.5	1.0	0.5	NO
NCA02	DN	3 Kandy Av	3	Residential	56	57	60	58	54	59	83	80	83	56	57	60	58	54	59	83	80	83	58	56	60	60	52	61	83	80	83	0.7	1.2	0.5	NO
NCA02	DN	3 Kandy Av	G	Residential	48	49	51	50	45	51	77	73	77	48	47	50	50	44	51	77	72	77	50	46	52	51	42	52	77	72	77	0.4	1.0	0.7	NO
NCA02	DN	3 Kandy Av	1	Residential	48	49	52	50	45	51	77	73	77	48	49	51	50	45	51	77	73	77	51	48	52	52	44	53	77	73	77	0.9	1.4	0.7	NO
NCA02	DN	3 Kandy Av	2	Residential	49	50	53	51	46	52	77	73	77	50	50	53	51	46	53	77	73	77	52	49	54	53	45	54	77	73	77	1.1	1.5	0.6	NO
NCA02	DN	3 Kandy Av	G	Residential	54	54	57	56	50	57	84	78	84	54	51	56	56	47	57	84	79	84	57	50	58	58	46	58	84	79	84	0.7	1.2	0.6	NO
NCA02	DN	3 Kandy Av	1	Residential	55	55	58	57	52	58	84	79	84	55	53	57	57	49	57	84	80	84	57	52	59	59	48	59	84	80	84	0.6	1.1	0.6	NO
NCA02	DN	3 Kandy Av	2	Residential	56	57	59	58	53	59	84	80	84	56	55	59	57	52	59	85	80	85	58	54	60	59	50	60	85	80	85	0.6	1.1	0.6	NO
NCA02	DN	3 Kandy Av	G	Residential	47	48	51	49	45	51	75	72	75	47	47	50	49	44	50	76	71	76	50	46	52	51	42	52	76	71	76	0.6	1.2	0.5	NO
NCA02	DN	3 Kandy Av	1	Residential	48	49	52	50	45	51	75	71	75	48	48	51	50	45	51	76	71	76	51	48	52	52	44	53	76	71	76	0.8	1.3	0.5	NO
NCA02	DN	3 Kandy Av	2	Residential	52	52	55	54	49	55	78	74	78	52	52	55	54	49	55	79	74	79	54	51	56	56	47	56	79	74	79	1.1	1.6	0.9	NO
NCA02	DN	4 Kandy Av	G	Residential	53	54	57	55	50	56	82	77	82	53	51	55	55	48	56	83	75	83	55	51	57	57	46	57	83	75	83	0.1	0.7	0.7	NO
NCA02	DN	6 Kandy Av	G	Residential	53	54	56	55	50	56	83	79	83	52	50	54	54	47	55	84	75	84	55	49	56	56	45	56	84	75	84	ĩ0.5	0.2	0.8	NO
NCA02	DN	6 Kandy Av	G	Residential	49	50	53	51	46	52	78	73	78	49	49	52	51	45	52	78	71	78	52	48	53	53	44	54	78	71	78	0.7	1.2	0.8	NO
NCA02	DN	6 Kandy Av	G	Residential	50	50	53	52	46	53	78	73	78	50	48	52	51	44	52	79	71	79	52	47	53	53	43	54	79	71	79	0.6	1.0	0.7	NO
NCA02	DN	8 Kandy Av	G	Residential	50	52	54	53	48	54	79	75	79	51	51	54	53	47	54	80	74	80	53	50	55	54	46	55	80	74	80	0.8	1.2	0.5	NO
NCA02	DN	8 Kandy Av	1	Residential	54	55	57	56	51	57	81	78	81	54	54	57	55	51	57	81	78	81	56	53	58	57	49	58	81	78	81	0.5	1.1	0.6	NO
NCA02	DN	4A Kandy Av	G	Residential	54	55	58	56	51	57	82	78	82	54	50	55	56	46	56	84	75	84	56	49	57	57	45	58	84	75	84	ĩ0.6	0.1	1.1	NO
NCA02	DN	8A Kandy Av	G	Residential	51	52	55	53	48	54	82	77	82	51	48	53	53	44	53	83	75	83	53	47	54	54	43	55	83	75	83	ĩ0.5	0.3	0.7	NO
NCA02	DN	8A Kandy Av	1	Residential	53	54	56	55	50	56	82	78	82	53	52	55	55	48	55	83	75	83	55	51	56	56	46	57	83	75	83	0.1	0.7	0.6	NO
NCA02	UP	36 Cambridge St	G	Residential	59	60	63	61	57	62	89	85	89	58	60	62	60	57	62	86	85	86	60	59	63	62	56	63	86	85	86	0.2	0.7	ĩ2.5	NO
NCA02	UP	36 Cambridge St	1	Residential	59	61	63	61	57	63	89	85	89	58	61	63	60	57	62	86	85	86	61	60	63	63	56	63	86	85	86	0.2	0.6	ĩ2.5	NO
NCA02	UP	36 Cambridge St	2	Residential	59	61	63	61	57	63	89	85	89	59	61	63	60	57	62	86	85	86	61	60	63	63	56	63	86	85	86	0.1	0.6	ĩ2.5	NO
NCA02	UP	38 Cambridge St	G	Residential	59	60	62	61	56	62	88	85	88	58	60	62	60	57	62	86	85	86	60	59	63	62	55	63	86	85	86	0.3	0.7	ĩ2.1	NO
NCA02	UP	38 Cambridge St	1	Residential	59	61	63	61	57	63	88	85	88	58	61	63	60	57	62	86	85	86	61	60	63	62	56	63	86	85	86	0.3	0.7	ĩ2.1	NO
NCA02	UP	38 Cambridge St	2	Residential	59	61	63	61	57	63	88	85	88	58	61	63	60	57	62	86	85	86	61	60	63	62	56	63	86	85	86	0.2	0.7	ĩ2.1	NO
NCA02	UP	40 Cambridge St	G	Residential	58	60	62	61	56	62	88	85	88	58	60	62	60	56	61	86	85	86	60	59	63	62	55	63	86	85	86	0.3	0.7	ĩ1.9	NO
NCA02	UP	40 Cambridge St	1	Residential	59	61	63	61	57	63	88	85	88	58	61	63	60	57	62	86	85	86	61	60	63	62	56	63	86	85	86	0.3	0.7	ĩ1.9	NO
NCA02	UP	40 Cambridge St	2	Residential	59	61	63	61	57	63	88	85	88	58	61	63	60	57	62	86	85	86	61	60	63	62	56	63	86	85	86	0.2	0.7	ĩ1.8	NO
NCA02	UP	42 Cambridge St	G	Residential	59	60	63	61	57	62	88	85	88	58	60	63	60	57	62	87	85	87	61	59	63	62	55	63	87	85	87	0.4	0.9	ĩ1.4	NO
NCA02	UP	42 Cambridge St	1	Residential	59	61	63	61	57	63	88	85	88	59	61	63	61	57	62	87	85	87	61	60	64	63	56	64	87	85	87	0.3	0.8	ĩ1.4	NO
NCA02	UP	42 Cambridge St	2	Residential	59	61	63	61	57	63	88	85	88	59	61	63	61	57	62	87	85	87	61	60	64	63	56	64	87	85	87	0.3	0.8	ĩ1.4	NO
NCA02	UP	46 Cambridge St	G	Residential	59	61	63	62	58	63	88	85	88	59	61	63	61	58	63	88	86	88	61	60	64	63	56	64	88	86	88	0.5	1.0	ĩ0.8	NO
NCA02	UP	46 Cambridge St	1	Residential	60	61	64	62	58	63	88	86	88	59	61	63	61	58	63	88	86	88	61	60	64	63	56	64	88	86	88	0.4	0.9	ĩ0.8	NO
NCA02	UP	46 Cambridge St	2	Residential	60	61	64	62	58	63	88	86	88	59	61	63	61	58	63	88	86	88	61	60	64	63	56	64	88	86	88	0.4	0.9	ĩ0.9	NO
NCA02	UP	46 Cambridge St	3	Residential	59	61	64	62	58	63	88	85	88	59	61	63	61	58	63	88	85	88	61	60	64	63	56	64	88	85	88	0.4	0.9	ĩ0.8	NO
NCA02	UP	46 Cambridge St	G	Residential	59	61	63	62	58	63	88	85	88	59	61	63	61	58	63	88	86	88	61	60	64	63	56	64	88	86	88	0.5	1.0	ĩ0.8	NO
NCA02	UP	46 Cambridge St	1	Residential	60	61	64	62	58	63	88	86	88	59	61	63	61	58	63	88	86	88	61	60	64	63	56	64	88	86	88	0.4	0.9	ĩ0.8	NO
NCA02	UP	46 Cambridge St	2	Residential	60	61	64	62	58	63	88	86	88	59	61	63	61	58	63	88	86	88	61	60	64	63	56	64	88	86	88	0.4	0.9	ĩ0.9	NO
NCA02	UP	46 Cambridge St	3	Residential	59	61	64	62	58	63	88	85	88	59	61	63	61	58	63	88	85	88	61	60	64	63	56	64	88	85	88	0.4	0.9	ĩ0.8	NO
NCA02	UP	50ĩ54 Cambridge St	G	Residential	60	61	64	62	58	63	89	86	89	60	61	64	62	58	63	88	86	88	62	60	64	64	56	64	88	86	88	0.6	1.1	ĩ0.9	NO
NCA02	UP	50ĩ54 Cambridge St	1	Residential	60	62	64	62	58	63	89	86	89	60	62	64	62	58	63	88	86	88	62	61	64	64	57	64	88	86	88	0.6	1.1	ĩ0.9	NO
NCA02	UP	50ĩ54 Cambridge St	G	Residential	60	62	64	62	58	64	89	85	89	60	62	64	62	58	63	88	85	88	62	61	64	64	57	65	88	85	88	0.5	1.1	ĩ0.8	NO
NCA02	UP	50ĩ54 Cambridge St	1	Residential	60	62	64	62	58	63	89	85	89	60	62	64	62	58	63	88	85	88	62	61	64	64	57	64	88	85	88	0.5	1.1	ĩ0.7	NO
NCA02	UP	50ĩ54 Cambridge St	G	Residential	50	51	54	52	47	53	79	73	79	50	51	54	52	47	53	79	73	79	53	50	55	54	46	55	79	73	79	1.0	1.4	ĩ0.5	NO
NCA02	UP	50ĩ54 Cambridge St	1	Residential	52	54	56	54	50	55	80	77	80	52	54	56	54	50	55	79	77	79	54	53	57	56	49	57	79	77	79	0.7	1.2	ĩ0.4	NO
NCA02	UP	56 Cambridge St	G	Residential	58	60	62	60	56	62	89	85	89	58	60	62	60	56	61	88	85	88	60	59	63	62	55	63	88	85	88	0.6	1.1	ĩ0.8	NO
NCA02	UP	1ĩ3 Chester St	G	Residential	44	45	48	46	41	47	73	67	73	44	45	47	46	41	47	72	67	72	46	44	48	48	40	48	72	67	72	0.5	0.9	ĩ1.1	NO
NCA02	UP	1ĩ3 Chester St	1	Residential	45	46	49	47	42	48	74	68	74	45	46	48	47	42	48	73	68	73	47	45	49	49	41	49	73	68	73	0.6	1.0	ĩ1.0	NO
NCA02	UP	1ĩ3 Chester St	2	Residential	47	48	50	49	44	50	75	69	75	47	48	50	49	44	50	74	69	74	49	47	51	51	43	51	74	69	74	0.8	1.1	ĩ0.8	NO
NCA02	UP	1ĩ3 Chester St	G	Residential	45	46	49	47	42	48	74	69	74	45	46	48	47	42	48	72	69	72	47	45	49	49	41	49	72	69	72	0.6	1.0	ĩ1.3	NO
NCA02	UP	1ĩ3 Chester St	1	Residential	46	47	49	48	43	49	74	69	74	46	47	49	48	43	49	73	69	73	48	46	50	50	42	50	73	69	73	0.6	1.0	ĩ1.2	NO
NCA02	UP	1ĩ3 Chester St	2	Residential	49	49	52	51	45	52	77	71	77	49	49	52	50	45	52	76	71	76	51	48	53	52	44	53	76	71	76	0.9	1.3	ĩ0.7	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA02	UP	5 Chester St	G	Residential	48	49	51	50	45	51	79	73	79	47	49	51	49	45	51	79	73	79	50	48	52	51	44	52	79	73	79	0.6	1.1	ĩ0.8	NO
NCA02	UP	5 Chester St	1	Residential	48	49	52	50	45	51	79	74	79	48	49	51	50	45	51	78	73	78	50	48	52	52	44	52	78	73	78	0.7	1.2	ĩ0.7	NO
NCA02	UP	5 Chester St	2	Residential	49	50	53	51	46	53	81	74	81	50	50	53	51	46	53	80	74	80	52	49	54	53	45	54	80	74	80	1.0	1.3	ĩ0.9	NO
NCA02	UP	5 Chester St	G	Residential	46	47	49	48	43	49	77	70	77	46	47	49	48	43	49	75	70	75	48	46	50	50	42	50	75	70	75	0.5	0.9	ĩ1.6	NO
NCA02	UP	5 Chester St	1	Residential	47	48	50	49	44	50	77	71	77	47	48	50	48	44	50	75	71	75	49	47	51	50	43	51	75	71	75	0.6	1.0	ĩ1.5	NO
NCA02	UP	5 Chester St	2	Residential	49	49	52	51	46	52	78	72	78	49	49	52	51	46	52	77	72	77	51	48	53	53	44	53	77	72	77	0.9	1.3	ĩ0.5	NO
NCA02	UP	30ĩ34 Chester St	G	Residential	59	60	63	61	57	62	89	84	89	58	60	62	60	57	62	86	84	86	60	59	63	62	55	63	86	84	86	0.2	0.6	ĩ3.0	NO
NCA02	UP	30ĩ34 Chester St	1	Residential	59	60	63	61	57	62	89	84	89	58	60	62	60	57	62	86	84	86	61	59	63	62	55	63	86	84	86	0.2	0.6	ĩ3.0	NO
NCA02	UP	30ĩ34 Chester St	2	Residential	59	60	63	61	57	62	89	84	89	58	60	62	60	57	62	86	84	86	61	59	63	62	55	63	86	84	86	0.2	0.6	ĩ3.0	NO
NCA02	UP	30ĩ34 Chester St	G	Residential	59	60	63	61	57	62	89	85	89	58	60	62	60	57	62	86	85	86	60	59	63	62	55	63	86	85	86	0.3	0.7	ĩ2.8	NO
NCA02	UP	30ĩ34 Chester St	1	Residential	59	61	63	61	57	63	89	85	89	58	61	63	60	57	62	86	85	86	61	60	63	62	56	63	86	85	86	0.2	0.6	ĩ2.8	NO
NCA02	UP	30ĩ34 Chester St	2	Residential	59	61	63	61	57	63	89	85	89	58	61	63	60	57	62	86	85	86	61	60	63	62	56	63	86	85	86	0.2	0.6	ĩ2.8	NO
NCA02	UP	30ĩ34 Chester St	G	Residential	50	51	54	52	48	53	80	75	80	49	51	53	51	48	53	78	75	78	51	50	54	53	46	54	78	75	78	0.3	0.7	ĩ1.7	NO
NCA02	UP	30ĩ34 Chester St	1	Residential	50	52	54	52	48	54	80	75	80	50	52	54	52	48	53	78	75	78	52	51	54	54	47	54	78	75	78	0.3	0.7	ĩ1.7	NO
NCA02	UP	30ĩ34 Chester St	2	Residential	51	52	54	53	48	54	80	75	80	50	52	54	52	48	54	78	75	78	52	51	55	54	47	55	78	75	78	0.4	0.8	ĩ1.6	NO
NCA02	UP	30ĩ34 Chester St	G	Residential	51	52	55	53	49	55	82	77	82	51	52	55	53	49	54	80	77	80	53	51	55	55	47	55	80	77	80	0.4	0.9	ĩ2.2	NO
NCA02	UP	30ĩ34 Chester St	1	Residential	51	53	55	53	49	55	82	77	82	51	52	55	53	49	54	80	77	80	53	52	55	55	48	56	80	77	80	0.4	0.9	ĩ2.1	NO
NCA02	UP	30ĩ34 Chester St	2	Residential	52	53	56	54	49	55	83	77	83	52	53	55	54	49	55	81	77	81	54	52	56	56	48	56	81	77	81	0.5	1.0	ĩ2.0	NO
NCA02	UP	40 Cambridge St	G	Residential	44	45	48	46	42	47	71	68	71	43	45	47	45	41	47	69	68	69	45	44	48	47	40	48	69	68	69	0.1	0.6	ĩ1.4	NO
NCA02	UP	40 Cambridge St	1	Residential	45	47	49	47	43	49	72	70	72	45	46	49	47	43	48	71	69	71	47	45	49	49	41	49	71	69	71	0.3	0.7	ĩ1.5	NO
NCA02	UP	40 Cambridge St	2	Residential	49	49	52	51	46	52	77	72	77	49	49	52	51	46	52	77	72	77	51	48	53	52	44	53	77	72	77	0.9	1.2	ĩ0.5	NO
NCA02	UP	9 Derby St	G	Residential	47	48	51	49	44	50	76	70	76	47	48	51	49	44	50	76	70	76	50	47	51	51	43	52	76	70	76	0.9	1.3	ĩ0.3	NO
NCA02	UP	11 Derby St	G	Residential	52	53	56	54	50	55	83	78	83	52	53	56	54	50	55	83	78	83	54	53	57	56	48	57	83	78	83	0.8	1.3	ĩ0.5	NO
NCA02	UP	11 Derby St	1	Residential	54	55	57	56	52	57	84	80	84	54	55	57	56	52	57	84	80	84	56	54	58	58	50	58	84	80	84	0.8	1.3	0.1	NO
NCA02	UP	15 Derby St	G	Residential	48	49	52	50	46	52	78	73	78	48	49	52	50	46	51	77	73	77	50	48	52	52	44	53	77	73	77	0.5	1.0	ĩ0.7	NO
NCA02	UP	15 Derby St	1	Residential	51	51	54	53	48	54	82	75	82	51	51	54	53	48	54	82	75	82	54	50	55	55	46	56	82	75	82	1.1	1.5	ĩ0.3	NO
NCA02	UP	16 Derby St	G	Residential	50	51	53	52	47	53	83	77	83	50	51	53	52	47	53	83	77	83	52	50	54	54	46	54	83	77	83	0.8	1.2	ĩ0.7	NO
NCA02	UP	16 Derby St	1	Residential	52	53	55	54	49	55	84	79	84	51	53	55	53	49	55	83	79	83	54	52	56	55	48	56	83	79	83	0.8	1.2	ĩ0.7	NO
NCA02	UP	17ĩ19 Derby St	G	Residential	60	62	64	62	58	63	91	87	91	59	62	64	61	58	63	90	87	90	62	61	64	63	57	64	90	87	90	0.4	1.0	ĩ1.2	NO
NCA02	UP	17ĩ19 Derby St	1	Residential	60	62	64	62	58	64	91	87	91	60	62	64	62	58	63	90	87	90	62	61	65	64	57	65	90	87	90	0.5	1.0	ĩ1.2	NO
NCA02	UP	17ĩ19 Derby St	G	Residential	60	62	64	62	58	63	90	88	90	59	62	64	61	58	63	89	88	89	61	61	64	63	57	64	89	88	89	0.2	0.8	ĩ1.6	NO
NCA02	UP	17ĩ19 Derby St	1	Residential	59	62	64	62	58	63	90	88	90	59	62	63	61	58	63	89	88	89	61	61	64	63	57	64	89	88	89	0.2	0.8	ĩ1.6	NO
NCA02	UP	17ĩ19 Derby St	G	Residential	63	66	68	66	62	67	93	92	93	63	66	67	65	62	67	91	92	92	65	65	68	67	61	68	91	92	92	0.2	0.9	ĩ1.6	NO
NCA02	UP	17ĩ19 Derby St	1	Residential	63	66	68	65	62	67	93	91	93	63	66	67	65	62	67	91	91	91	65	65	68	67	61	68	91	91	91	0.3	0.8	ĩ1.8	NO
NCA02	UP	17ĩ19 Derby St	G	Residential	58	60	62	61	57	62	89	87	89	58	60	62	60	57	62	87	87	87	60	59	63	62	55	63	87	87	87	0.4	0.9	ĩ1.4	NO
NCA02	UP	17ĩ19 Derby St	1	Residential	58	60	62	60	57	62	89	86	89	58	60	62	60	57	62	87	86	87	60	59	63	62	55	63	87	86	87	0.4	0.9	ĩ1.4	NO
NCA02	UP	17ĩ19 Derby St	G	Residential	57	59	61	59	55	61	89	84	89	57	59	61	59	55	61	88	84	88	60	58	62	61	54	62	88	84	88	0.7	1.2	ĩ0.8	NO
NCA02	UP	17ĩ19 Derby St	1	Residential	58	60	62	60	56	62	89	85	89	58	60	62	60	56	61	88	85	88	60	59	63	62	55	63	88	85	88	0.5	1.1	ĩ0.8	NO
NCA02	UP	17ĩ19 Derby St	G	Residential	51	53	55	54	49	55	82	78	82	51	53	55	53	49	55	81	78	81	54	52	56	55	48	56	81	78	81	0.7	1.1	ĩ1.3	NO
NCA02	UP	17ĩ19 Derby St	1	Residential	52	53	56	54	50	56	82	78	82	52	53	56	54	50	55	81	78	81	54	53	57	56	48	57	81	78	81	0.6	1.1	ĩ1.3	NO
NCA02	UP	18 Derby St	G	Residential	53	54	57	55	51	57	83	78	83	53	54	57	55	51	56	82	78	82	55	54	58	57	49	58	82	78	82	0.7	1.2	ĩ0.8	NO
NCA02	UP	18 Derby St	1	Residential	55	56	58	57	52	58	85	79	85	54	56	58	56	52	58	84	79	84	57	55	59	58	51	59	84	79	84	0.7	1.2	ĩ0.9	NO
NCA02	UP	20 Derby St	G	Residential	54	55	57	56	51	57	84	79	84	54	55	57	56	51	57	83	79	83	56	54	58	58	50	58	83	79	83	0.8	1.2	ĩ1.1	NO
NCA02	UP	21 Derby St	G	Residential	59	60	62	61	56	62	89	86	89	58	60	63	60	57	62	88	86	88	61	60	63	62	55	63	88	86	88	0.8	1.2	ĩ1.6	NO
NCA02	UP	21 Derby St	1	Residential	59	61	63	62	58	63	89	87	89	59	61	63	61	58	63	88	87	88	61	60	64	63	56	64	88	87	88	0.4	1.0	ĩ1.7	NO
NCA02	UP	4/23 Derby St	G	Residential	58	58	61	60	55	61	89	84	89	58	59	62	60	56	62	88	86	88	60	59	63	62	55	63	88	86	88	1.4	1.7	ĩ1.6	NO
NCA02	UP	4/23 Derby St	1	Residential	59	60	63	61	56	62	89	86	89	59	61	63	61	57	62	88	86	88	61	60	63	63	56	64	88	86	88	0.8	1.2	ĩ1.6	NO
NCA02	UP	4/23 Derby St	G	Residential	58	60	62	61	56	62	89	87	89	58	60	63	60	57	62	87	87	87	61	60	63	63	56	63	87	87	87	0.9	1.3	ĩ1.5	NO
NCA02	UP	4/23 Derby St	1	Residential	59	61	63	61	57	63	89	87	89	59	61	63	61	58	63	87	87	87	61	60	64	63	56	64	87	87	87	0.5	1.1	ĩ1.6	NO
NCA02	UP	24A Derby St	G	Residential	56	56	59	58	52	59	86	82	86	56	57	60	58	54	59	84	82	84	58	56	60	60	52	61	84	82	84	1.3	1.6	ĩ1.3	NO
NCA02	UP	24A Derby St	1	Residential	56	57	60	58	53	60	86	82	86	56	58	60	58	54	60	84	83	84	58	57	61	60	53	61	84	83	84	1.0	1.3	ĩ1.3	NO
NCA02	UP	26 Derby St	G	Residential	56	55	58	58	51	59	85	81	85	56	57	59	58	53	59	84	82	84	58	56	60	60	52	60	84	82	84	1.5	1.7	ĩ1.3	NO
NCA02	UP	22A Derby St	G	Residential	54	55	58	56	51	58	85	81	85	54	56	58	56	52	57	84	81	84	56	55	59	58	51	59	84	81	84	1.0	1.3	ĩ1.1	NO
NCA02	UP	24 Derby St	G	Residential	55	56	58	57	52	58	86	82	86	55	57	59	57	53	59	84	82	84	57	56	60	59	52	60	84	82	84	1.2	1.5	ĩ1.3	NO
NCA02	UP	24 Derby St	1	Residential	56	57	59	58	53	59	86	82	86	56	57	59	57	54	59	84	82	84	58	56	60	60	52	60	84	82	84	0.9	1.3	ĩ1.3	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax					
NCA	**Side**	**Address**	**Level**	**Description**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**day**	**night**	**max**	**trig?**
NCA02	UP	2A Somerset St	G	Residential	52	52	55	54	48	55	82	78	82	52	53	55	54	49	55	81	79	81	54	52	56	56	48	57	81	79	81	1.4	1.6	ĩ1.0	NO
NCA02	UP	1 Surrey St	G	Residential	60	61	64	62	58	63	89	85	89	59	61	64	61	58	63	88	85	88	62	60	64	63	56	64	88	85	88	0.5	1.0	ĩ0.7	NO
NCA02	UP	1 Surrey St	1	Residential	60	61	64	62	58	63	89	85	89	59	61	63	61	58	63	88	85	88	62	60	64	63	56	64	88	85	88	0.5	1.0	ĩ0.6	NO
NCA02	UP	2 Surrey St	G	Residential	47	48	50	49	44	50	78	72	78	47	48	50	49	44	50	78	72	78	49	47	51	51	43	51	78	72	78	0.9	1.4	ĩ0.6	NO
NCA02	UP	2 Surrey St	1	Residential	48	49	52	50	45	52	78	73	78	48	49	52	50	46	52	78	73	78	51	48	53	52	44	53	78	73	78	1.0	1.4	ĩ0.5	NO
NCA02	UP	2 Surrey St	2	Residential	50	51	53	52	47	53	79	74	79	50	50	53	52	47	53	79	74	79	53	50	54	54	46	55	79	74	79	1.1	1.5	ĩ0.4	NO
NCA02	UP	2A Surrey St	G	Residential	59	61	63	62	58	63	88	85	88	59	61	63	61	58	63	87	85	87	61	60	64	63	56	64	87	85	87	0.4	0.9	ĩ1.1	NO
NCA02	UP	2A Surrey St	1	Residential	59	61	63	62	58	63	88	85	88	59	61	63	61	58	63	87	85	87	61	60	64	63	56	64	87	85	87	0.4	0.9	ĩ1.1	NO
NCA02	UP	2A Surrey St	2	Residential	59	61	63	62	58	63	88	85	88	59	61	63	61	58	63	87	85	87	61	60	64	63	56	64	87	85	87	0.3	0.9	ĩ1.1	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA03	DN	9 Old Beecroft Rd	G	Residential	51	50	53	53	46	54	81	77	81	51	51	54	53	47	54	82	77	82	53	50	55	55	46	56	82	77	82	1.9	2.2	0.7	NO
NCA03	DN	11 Old Beecroft Rd	G	Residential	53	52	55	55	48	55	84	79	84	53	52	55	55	49	56	85	79	85	55	51	57	57	47	58	85	79	85	2.1	2.2	0.5	NO
NCA03	DN	11 Old Beecroft Rd	1	Residential	53	53	56	56	49	56	84	80	84	53	53	56	55	50	56	85	80	85	56	53	58	57	49	58	85	80	85	1.4	1.7	0.5	NO
NCA03	DN	15 Old Beecroft Rd	G	Residential	54	53	56	56	49	57	86	79	86	54	53	56	56	49	56	87	79	87	56	52	59	58	48	59	87	79	87	2.4	2.5	0.7	NO
NCA03	DN	17 Old Beecroft Rd	G	Residential	56	56	59	58	52	59	86	82	86	56	56	59	58	52	59	87	82	87	58	55	61	60	51	61	87	82	87	1.9	2.1	0.8	YES
NCA03	DN	17 Old Beecroft Rd	1	Residential	57	57	60	59	53	60	86	83	86	57	57	60	59	54	60	87	83	87	59	56	61	61	52	62	87	83	87	1.4	1.8	0.7	NO
NCA03	DN	19 Old Beecroft Rd	G	Residential	57	56	59	59	52	60	87	81	87	57	56	60	59	52	60	88	82	88	59	55	61	61	51	62	88	82	88	2.1	2.2	0.9	YES
NCA03	DN	19 Old Beecroft Rd	1	Residential	57	57	60	60	54	61	87	82	87	58	58	61	60	54	61	88	83	88	60	57	62	62	53	62	88	83	88	1.5	1.8	0.9	NO
NCA03	DN	21 Old Beecroft Rd	G	Residential	57	55	59	59	51	59	88	80	88	57	56	59	59	52	60	88	81	88	59	55	61	61	51	62	88	81	88	2.1	2.1	0.8	YES
NCA03	DN	23 Old Beecroft Rd	G	Residential	57	55	59	59	51	60	88	78	88	58	55	60	59	52	60	89	78	89	60	54	61	61	50	62	89	78	89	1.9	2.0	1.0	YES
NCA03	DN	25 Old Beecroft Rd	G	Residential	57	56	60	60	52	60	88	79	88	58	57	60	60	53	61	90	80	90	60	56	62	62	52	62	90	80	90	1.9	2.1	1.3	YES
NCA03	DN	27 Old Beecroft Rd	G	Residential	56	55	59	58	51	59	87	81	87	57	55	59	59	52	60	88	81	88	59	55	60	61	50	61	88	81	88	1.7	1.9	1.3	NO
NCA03	DN	29 Old Beecroft Rd	G	Residential	57	57	60	59	53	60	88	83	88	58	58	61	60	54	61	90	83	90	60	57	62	62	53	62	90	83	90	1.8	2.1	1.5	YES
NCA03	DN	29 Old Beecroft Rd	1	Residential	58	58	61	60	55	61	88	84	88	59	59	62	61	55	62	90	84	90	61	58	63	63	54	63	90	84	90	1.6	2.0	1.5	YES
NCA03	DN	33 Old Beecroft Rd	G	Residential	57	57	60	59	53	60	87	82	87	57	57	60	59	54	60	89	83	89	60	56	61	61	52	62	89	83	89	1.6	2.0	1.6	YES
NCA03	DN	33 Old Beecroft Rd	1	Residential	57	58	60	59	54	60	87	83	87	58	58	61	60	54	61	89	83	89	60	57	62	62	53	62	89	83	89	1.6	2.0	1.6	YES
NCA03	DN	25A Old Beecroft Rd	G	Residential	57	56	60	59	53	60	88	81	88	58	57	60	60	53	61	89	82	89	60	56	62	62	52	62	89	82	89	1.8	2.0	1.3	YES
NCA03	DN	31 Old Beecroft Rd	G	Residential	56	57	60	59	53	60	88	82	88	57	57	60	59	54	60	89	83	89	60	56	61	61	52	62	89	83	89	1.8	2.1	1.5	YES
NCA03	DN	82 The Crescent	G	Residential	57	57	60	59	54	60	88	83	88	58	57	61	60	54	61	89	84	89	60	56	62	62	52	62	89	84	89	1.3	1.7	0.8	NO
NCA03	DN	84 The Crescent	G	Residential	57	57	60	59	53	60	88	83	88	57	57	60	59	53	60	89	83	89	60	56	61	61	52	62	89	83	89	1.3	1.7	0.9	NO
NCA03	DN	86 The Crescent	G	Residential	57	57	60	59	53	60	88	84	88	57	57	60	59	54	60	89	84	89	60	56	61	61	52	62	89	84	89	1.3	1.7	0.8	NO
NCA03	DN	86 The Crescent	G	Residential	54	54	57	56	50	57	87	81	87	54	53	57	56	50	57	88	81	88	57	53	58	58	49	59	88	81	88	1.3	1.7	0.6	NO
NCA03	DN	88 The Crescent	G	Residential	55	55	58	58	51	59	88	82	88	56	55	58	58	51	59	88	82	88	58	54	60	60	50	60	88	82	88	1.2	1.6	0.5	NO
NCA03	DN	88 The Crescent	G	Residential	53	52	56	55	48	56	87	79	87	53	52	56	55	48	56	87	79	87	56	51	57	57	47	58	87	79	87	1.3	1.7	0.3	NO
NCA03	DN	90 The Crescent	G	Residential	54	54	57	56	50	57	86	80	86	54	54	57	56	50	57	86	80	86	57	53	58	58	49	59	86	80	86	1.2	1.6	0.0	NO
NCA03	DN	90 The Crescent	1	Residential	55	54	58	57	50	58	87	80	87	55	54	58	57	51	58	86	80	86	57	53	59	59	49	60	86	80	86	1.2	1.5	ĩ0.2	NO
NCA03	DN	90 The Crescent	G	Residential	50	47	51	52	43	52	83	73	83	49	47	51	51	43	52	83	73	83	52	46	53	54	42	54	83	73	83	1.3	1.4	ĩ0.8	NO
NCA03	DN	90 The Crescent	1	Residential	51	49	53	53	45	54	84	75	84	51	49	53	53	45	53	84	75	84	53	48	54	55	44	55	84	75	84	1.3	1.5	ĩ0.5	NO
NCA03	DN	92 The Crescent	G	Residential	53	52	56	55	49	56	84	78	84	53	52	56	55	49	56	84	78	84	55	51	57	57	47	57	84	78	84	1.2	1.5	0.0	NO
NCA03	DN	94 The Crescent	G	Residential	52	51	54	54	47	55	83	77	83	52	51	54	54	47	55	83	77	83	54	50	56	56	46	56	83	77	83	1.2	1.7	0.3	NO
NCA03	DN	94 The Crescent	1	Residential	53	52	56	56	49	56	83	78	83	54	53	56	55	49	56	84	78	84	56	52	57	58	48	58	84	78	84	1.2	1.6	0.2	NO
NCA03	DN	94 The Crescent	G	Residential	51	51	54	53	47	54	81	74	81	52	52	55	54	48	55	82	76	82	54	51	56	56	47	57	82	76	82	1.8	2.2	1.2	NO
NCA03	DN	94 The Crescent	1	Residential	53	53	56	55	49	56	84	77	84	54	54	57	56	50	57	84	79	84	56	53	58	58	49	58	84	79	84	1.5	1.8	0.2	NO
NCA03	DN	96 The Crescent	G	Residential	52	51	55	54	47	55	83	76	83	53	53	56	55	49	56	85	78	85	55	52	57	57	48	58	85	78	85	2.5	2.8	1.3	NO
NCA03	DN	96 The Crescent	1	Residential	54	53	56	56	49	57	85	78	85	55	54	57	56	51	57	86	80	86	57	53	58	59	49	59	86	80	86	2.0	2.3	1.1	NO
NCA03	DN	98 The Crescent	G	Residential	49	46	51	51	43	52	83	73	83	51	50	54	53	46	54	84	77	84	53	49	55	55	45	56	84	77	84	3.7	3.7	1.6	NO
NCA03	DN	100 The Crescent	G	Residential	53	51	55	55	48	56	85	77	85	55	54	57	57	51	58	87	81	87	57	53	59	59	49	59	87	81	87	3.5	3.6	2.2	NO
NCA03	DN	102 The Crescent	G	Residential	54	52	56	56	49	57	86	78	86	56	56	59	58	52	59	88	82	88	58	55	60	60	51	60	88	82	88	3.5	3.7	2.1	NO
NCA03	DN	102 The Crescent	1	Residential	56	55	59	58	52	59	88	81	88	56	57	60	58	53	59	89	83	89	59	56	61	60	52	61	89	83	89	2.0	2.3	1.0	YES
NCA03	DN	104 The Crescent	G	Residential	55	54	58	57	51	58	87	81	87	56	56	59	58	53	59	88	82	88	58	55	60	60	51	61	88	82	88	2.8	3.0	1.0	YES
NCA03	DN	104 The Crescent	1	Residential	57	57	60	59	54	60	88	83	88	57	58	61	59	55	61	89	84	89	60	57	62	61	53	62	89	84	89	1.7	2.1	0.8	YES
NCA03	DN	106 The Crescent	G	Residential	55	54	57	57	50	58	86	80	86	56	55	58	58	51	59	87	81	87	58	54	60	60	50	61	87	81	87	2.7	2.9	0.8	YES
NCA03	DN	106 The Crescent	1	Residential	57	57	60	59	53	60	87	83	87	57	58	60	59	54	60	88	83	88	59	57	62	61	53	62	88	83	88	1.7	2.0	0.8	YES
NCA03	DN	108 The Crescent	G	Residential	56	56	59	59	52	59	87	82	87	57	56	59	59	52	60	88	83	88	59	55	61	61	51	62	88	83	88	2.4	2.5	0.9	YES
NCA03	DN	108 The Crescent	1	Residential	57	58	60	60	54	61	87	83	87	57	58	61	59	54	61	88	83	88	60	57	62	61	53	62	88	83	88	1.4	1.8	0.9	NO
NCA03	UP	2 Sutherland Rd	G	Residential	55	53	57	58	50	58	87	82	87	55	54	58	57	51	58	86	83	86	58	53	59	60	49	60	86	83	86	1.5	1.8	ĩ0.6	NO
NCA03	UP	3 Sutherland Rd	G	Residential	56	55	59	58	52	59	87	82	87	56	56	59	58	53	59	85	82	85	58	55	60	60	51	60	85	82	85	1.2	1.4	ĩ1.3	NO
NCA03	UP	3 Sutherland Rd	1	Residential	57	57	60	59	54	60	87	84	87	57	58	60	59	54	60	85	84	85	59	57	61	61	53	61	85	84	85	0.9	1.3	ĩ1.4	NO
NCA03	UP	5 Sutherland Rd	G	Residential	56	56	59	58	52	59	87	82	87	56	56	59	58	53	59	86	83	86	58	55	60	60	51	61	86	83	86	1.1	1.4	ĩ1.2	NO
NCA03	UP	5 Sutherland Rd	1	Residential	57	58	60	59	54	60	87	84	87	57	58	61	59	54	60	85	84	85	59	57	61	61	53	62	85	84	85	0.9	1.3	ĩ1.4	NO
NCA03	UP	9 Sutherland Rd	G	Residential	57	56	60	59	53	60	88	84	88	57	57	60	59	53	60	87	84	87	59	56	61	61	52	61	87	84	87	1.0	1.3	ĩ1.3	NO
NCA03	UP	9 Sutherland Rd	1	Residential	57	58	61	59	54	61	87	84	87	57	58	61	59	55	60	86	85	86	59	57	61	61	53	62	86	85	86	0.8	1.1	ĩ1.4	NO
NCA03	UP	11 Sutherland Rd	G	Residential	49	48	52	52	45	52	83	77	83	49	49	52	51	45	52	81	77	81	51	48	53	53	44	54	81	77	81	1.0	1.3	ĩ1.2	NO
NCA03	UP	11 Sutherland Rd	G	Residential	49	49	52	52	45	52	80	75	80	49	49	52	51	45	52	79	75	79	51	48	53	53	44	53	79	75	79	0.8	1.1	ĩ0.8	NO
NCA03	UP	15 Sutherland Rd	G	Residential	46	46	49	48	42	49	76	71	76	46	46	49	48	42	49	75	72	75	48	45	50	50	41	50	75	72	75	0.9	1.3	ĩ0.7	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA03	UP	17 Sutherland Rd	G	Residential	57	55	59	59	51	60	89	81	89	56	55	58	58	51	59	88	81	88	58	54	60	60	50	61	88	81	88	0.4	0.8	ĩ0.2	NO
NCA03	UP	19 Sutherland Rd	G	Residential	57	55	59	59	51	60	87	79	87	56	55	58	58	51	59	87	79	87	58	54	60	60	49	61	87	79	87	0.7	0.9	ĩ0.1	NO
NCA03	UP	19 Sutherland Rd	1	Residential	58	58	61	60	54	61	88	84	88	58	58	61	60	54	61	87	84	87	60	57	62	62	53	62	87	84	87	0.8	1.2	ĩ0.5	NO
NCA03	UP	21 Sutherland Rd	G	Residential	48	48	51	50	44	51	75	69	75	48	48	51	50	44	51	74	69	74	50	47	52	52	43	52	74	69	74	0.7	1.1	ĩ0.7	NO
NCA03	UP	21 Sutherland Rd	1	Residential	52	52	55	54	48	55	80	76	80	52	52	55	54	48	55	79	76	79	54	51	56	56	47	56	79	76	79	0.7	1.2	ĩ0.4	NO
NCA03	UP	35 Sutherland Rd	G	Residential	55	52	57	57	49	58	88	80	88	55	53	57	57	49	58	88	80	88	57	52	58	59	48	59	88	80	88	1.0	1.2	ĩ0.1	NO
NCA03	UP	35 Sutherland Rd	1	Residential	57	55	59	59	51	59	89	82	89	56	55	59	58	51	59	89	82	89	58	54	60	60	50	61	89	82	89	0.9	1.2	ĩ0.4	NO
NCA03	UP	35 Sutherland Rd	G	Residential	54	51	55	56	47	56	87	78	87	53	51	55	55	47	55	86	78	86	55	50	56	57	46	57	86	78	86	0.5	0.7	ĩ0.1	NO
NCA03	UP	35 Sutherland Rd	1	Residential	56	54	58	58	51	59	87	81	87	55	54	58	57	50	58	87	81	87	57	53	59	59	49	60	87	81	87	0.4	0.7	ĩ0.4	NO
NCA03	UP	37 Sutherland Rd	G	Residential	55	52	57	58	48	58	88	79	88	55	53	57	57	49	58	87	80	87	57	52	58	59	48	59	87	80	87	1.1	1.3	ĩ0.2	NO
NCA03	UP	37 Sutherland Rd	G	Residential	54	51	56	56	47	56	86	79	86	54	52	56	56	48	56	85	80	85	56	51	57	58	47	58	85	80	85	1.5	1.7	ĩ0.6	NO
NCA03	UP	51ĩ57 Sutherland Rd	G	Residential	48	48	51	51	45	52	75	72	75	48	49	51	50	45	51	74	72	74	50	48	52	52	44	53	74	72	74	0.8	1.3	ĩ0.6	NO
NCA03	UP	51ĩ57 Sutherland Rd	1	Residential	51	51	54	53	48	54	79	75	79	51	51	54	53	48	54	78	74	78	53	50	55	55	46	56	78	74	78	0.8	1.3	ĩ0.8	NO
NCA03	UP	59 Sutherland Rd	G	Residential	45	45	48	47	41	48	70	65	70	44	45	48	46	41	48	69	65	69	47	44	48	48	40	49	69	65	69	0.6	1.1	ĩ0.3	NO
NCA03	UP	59 Sutherland Rd	1	Residential	48	48	51	51	45	52	76	70	76	48	48	51	50	45	51	76	70	76	50	47	52	52	43	53	76	70	76	0.8	1.2	ĩ0.1	NO
NCA03	UP	61 Sutherland Rd	G	Residential	56	55	59	58	52	59	88	82	88	56	56	59	58	52	59	87	82	87	58	55	60	60	51	60	87	82	87	1.0	1.3	ĩ0.4	NO
NCA03	UP	61 Sutherland Rd	1	Residential	57	57	60	59	53	60	88	83	88	57	57	60	59	53	60	88	83	88	59	56	61	61	52	61	88	83	88	0.9	1.3	ĩ0.5	NO
NCA03	UP	61 Sutherland Rd	G	Residential	53	52	56	56	48	56	87	79	87	53	52	56	55	48	56	86	79	86	55	51	57	57	47	58	86	79	86	1.0	1.3	ĩ0.5	NO
NCA03	UP	61 Sutherland Rd	1	Residential	55	54	58	57	51	58	88	81	88	55	54	58	57	51	58	87	81	87	57	53	59	59	49	59	87	81	87	1.0	1.3	ĩ0.6	NO
NCA03	UP	11A Sutherland Rd	G	Residential	56	56	59	58	52	59	87	83	87	55	56	59	57	52	59	86	83	86	57	55	59	59	51	60	86	83	86	0.9	1.2	ĩ1.4	NO
NCA03	UP	11A Sutherland Rd	G	Residential	57	57	60	60	53	60	90	85	90	57	58	60	59	54	60	88	85	88	59	57	61	61	53	62	88	85	88	0.8	1.2	ĩ1.2	NO
NCA03	UP	25 Sutherland Rd	G	Residential	55	54	58	57	50	58	85	78	85	54	54	57	56	50	57	84	79	84	56	53	58	59	49	59	84	79	84	0.5	0.8	ĩ0.8	NO
NCA03	UP	25 Sutherland Rd	G	Residential	47	47	50	50	44	51	76	71	76	47	47	50	49	44	50	76	72	76	49	47	51	51	42	52	76	72	76	0.8	1.3	ĩ0.4	NO
NCA03	UP	25 Sutherland Rd	G	Residential	48	47	51	50	43	51	76	71	76	47	47	50	49	44	50	76	71	76	50	46	51	52	42	52	76	71	76	0.8	1.2	0.0	NO
NCA03	UP	25 Sutherland Rd	G	Residential	57	55	59	59	52	60	87	79	87	56	55	59	59	52	59	87	78	87	59	54	60	61	50	61	87	78	87	0.6	0.9	0.0	NO
NCA03	UP	33 Sutherland Rd	G	Residential	51	50	53	53	46	54	84	77	84	51	51	54	53	47	54	83	78	83	53	50	54	55	46	55	83	78	83	1.1	1.5	ĩ0.7	NO
NCA03	UP	33 Sutherland Rd	G	Residential	49	48	52	51	44	52	80	74	80	49	48	52	51	44	52	79	74	79	51	47	53	53	43	53	79	74	79	0.9	1.3	ĩ0.6	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA04	DN	125 Beecroft Rd	G	Residential	52	52	55	55	49	56	89	80	89	53	52	56	55	49	56	89	83	89	55	52	57	57	48	58	89	83	89	1.5	1.9	0.0	NO
NCA04	DN	125 Beecroft Rd	1	Residential	56	56	59	58	52	59	92	83	92	56	56	59	58	52	59	92	85	92	59	55	60	60	51	61	92	85	92	1.3	1.7	0.0	NO
NCA04	DN	127 Beecroft Rd	G	Residential	54	54	57	56	51	57	88	78	88	54	54	57	56	51	57	88	78	88	57	54	58	59	50	59	88	78	88	1.2	1.6	0.0	NO
NCA04	DN	127 Beecroft Rd	G	Residential	55	55	58	57	52	58	90	80	90	56	55	58	58	52	59	90	85	90	58	55	60	60	51	60	90	85	90	1.5	1.9	0.1	NO
NCA04	DN	129 Beecroft Rd	G	Residential	52	52	55	54	48	55	84	76	84	52	52	55	54	48	55	84	76	84	55	52	56	56	48	57	84	76	84	1.2	1.6	0.0	NO
NCA04	DN	131 Beecroft Rd	G	Residential	53	53	56	55	49	56	88	79	88	53	53	56	55	49	56	88	79	88	55	52	57	57	48	58	88	79	88	1.2	1.6	0.0	NO
NCA04	DN	133 Beecroft Rd	G	Residential	51	51	54	53	47	54	85	75	85	51	51	54	53	47	54	85	75	85	54	51	55	55	47	56	85	75	85	1.2	1.6	0.0	NO
NCA04	DN	22 Cheltenham Rd	G	Residential	56	54	58	58	50	59	87	82	87	55	54	58	58	50	58	86	82	86	58	54	59	60	49	60	86	82	86	0.9	1.2	ĩ1.1	NO
NCA04	DN	22 Cheltenham Rd	1	Residential	57	56	60	59	52	60	88	85	88	57	57	60	60	53	60	88	85	88	60	56	61	62	52	62	88	85	88	1.5	1.9	0.0	NO
NCA04	DN	24 Cheltenham Rd	G	Residential	53	53	56	55	48	56	83	81	83	52	52	55	54	48	55	83	81	83	54	51	56	56	47	57	83	81	83	0.3	0.8	ĩ0.1	NO
NCA04	DN	24 Cheltenham Rd	1	Residential	54	53	56	56	49	57	83	81	83	53	53	56	55	49	56	84	81	84	55	52	57	57	48	58	84	81	84	0.7	1.2	0.4	NO
NCA04	DN	26 Cheltenham Rd	G	Residential	51	50	53	53	45	54	81	78	81	50	49	52	52	45	53	80	77	80	52	48	54	54	44	54	80	77	80	0.4	0.8	ĩ1.0	NO
NCA04	DN	44 Cheltenham Rd	G	Residential	49	48	52	51	44	52	80	74	80	49	48	52	51	44	52	79	72	79	51	47	53	53	43	54	79	72	79	1.1	1.6	ĩ0.1	NO
NCA04	DN	44 Cheltenham Rd	1	Residential	51	50	54	54	46	54	80	78	80	51	50	54	53	47	54	79	76	79	53	50	55	55	46	56	79	76	79	0.7	1.2	ĩ0.4	NO
NCA04	DN	46 Cheltenham Rd	G	Residential	49	47	51	51	43	52	79	75	79	48	47	51	50	43	51	78	73	78	50	46	52	52	42	53	78	73	78	0.6	1.0	ĩ0.4	NO
NCA04	DN	48 Cheltenham Rd	G	Residential	49	46	51	51	42	51	80	73	80	48	47	50	50	43	51	79	74	79	50	46	52	52	42	53	79	74	79	0.9	1.2	ĩ1.3	NO
NCA04	DN	48 Cheltenham Rd	1	Residential	50	49	53	53	44	53	82	76	82	50	49	52	52	45	53	82	76	82	52	48	54	54	44	55	82	76	82	0.9	1.2	ĩ0.4	NO
NCA03	DN	1 Lyne Rd	G	Residential	51	51	54	53	47	54	82	77	82	51	51	54	53	47	54	82	77	82	53	50	55	55	46	55	82	77	82	1.1	1.6	0.3	NO
NCA04	DN	2 Murray Rd	G	Residential	56	53	58	58	50	58	86	77	86	56	54	58	58	50	59	86	77	86	58	53	59	60	49	60	86	77	86	1.7	1.8	ĩ0.3	NO
NCA04	DN	2 Murray Rd	1	Residential	57	54	59	59	50	59	87	78	87	57	55	59	59	52	60	87	79	87	59	55	61	61	51	61	87	79	87	1.9	1.9	ĩ0.3	NO
NCA04	DN	4 Murray Rd	G	Residential	48	46	50	50	43	51	80	73	80	48	46	50	50	43	51	80	73	80	50	46	52	52	42	53	80	73	80	1.4	1.6	0.1	NO
NCA04	DN	6 Murray Rd	G	Residential	49	48	52	52	44	52	84	75	84	50	48	52	52	44	52	84	75	84	52	47	53	54	43	54	84	75	84	1.3	1.6	ĩ0.2	NO
NCA04	DN	6 Murray Rd	1	Residential	52	50	54	54	47	54	86	80	86	52	50	54	54	47	54	86	80	86	54	50	55	56	46	56	86	80	86	1.2	1.6	ĩ0.2	NO
NCA04	DN	50 The Crescent	G	Residential	58	57	61	60	53	61	89	86	89	58	57	60	60	53	61	90	86	90	60	56	62	62	52	62	90	86	90	0.8	1.2	0.9	NO
NCA04	DN	50 The Crescent	1	Residential	58	57	61	60	53	61	88	86	88	58	57	61	60	53	61	90	86	90	60	57	62	62	52	63	90	86	90	1.2	1.6	1.4	NO
NCA04	DN	52 The Crescent	G	Residential	59	58	61	61	53	61	89	86	89	58	58	61	60	53	61	90	87	90	61	57	62	62	53	63	90	87	90	0.9	1.3	1.2	NO
NCA04	DN	54 The Crescent	G	Residential	59	59	62	62	54	62	89	87	89	60	59	63	62	55	63	92	88	92	62	59	64	64	54	64	92	88	92	1.6	2.0	2.1	YES
NCA04	DN	56 The Crescent	G	Residential	60	59	62	62	54	62	89	87	89	60	59	63	62	55	63	92	87	92	62	59	64	64	54	64	92	87	92	1.6	2.0	2.2	YES
NCA04	DN	58 The Crescent	G	Residential	60	59	62	62	54	62	89	87	89	60	58	62	62	54	62	91	86	91	62	58	63	64	53	64	91	86	91	1.3	1.7	1.9	NO
NCA03	DN	76 The Crescent	G	Residential	57	58	61	60	54	61	88	84	88	58	58	61	60	54	61	89	84	89	60	57	62	62	53	62	89	84	89	1.3	1.7	0.8	NO
NCA03	DN	76 The Crescent	G	Residential	57	57	60	59	53	60	87	82	87	57	57	60	59	53	60	88	83	88	59	56	61	61	52	62	88	83	88	1.2	1.5	0.8	NO
NCA03	DN	78 The Crescent	G	Residential	57	57	60	59	53	60	87	83	87	57	57	60	59	53	60	88	83	88	59	56	61	61	52	61	88	83	88	1.3	1.6	0.8	NO
NCA03	DN	78 The Crescent	G	Residential	56	57	59	58	53	59	87	83	87	56	57	60	58	53	60	88	83	88	59	56	61	60	52	61	88	83	88	1.2	1.7	0.8	NO
NCA03	DN	80 The Crescent	G	Residential	57	57	60	59	53	60	87	83	87	57	57	60	59	53	60	88	83	88	59	56	61	61	52	61	88	83	88	1.3	1.7	0.8	NO
NCA03	DN	80 The Crescent	1	Residential	58	58	61	60	54	61	88	84	88	58	58	61	60	54	61	88	84	88	60	57	62	62	53	62	88	84	88	1.1	1.6	0.8	NO
NCA03	DN	80 The Crescent	G	Residential	56	57	60	58	53	60	87	83	87	57	57	60	59	53	60	88	84	88	59	56	61	61	52	61	88	84	88	1.2	1.7	0.8	NO
NCA03	DN	80 The Crescent	1	Residential	57	57	60	59	53	60	87	83	87	57	57	60	59	53	60	88	84	88	59	56	61	61	52	61	88	84	88	1.1	1.7	0.8	NO
NCA04	DN	4 The Crescent	G	Residential	60	61	64	62	57	64	93	84	93	60	61	64	62	57	64	93	84	93	63	61	65	64	57	65	93	84	93	1.1	1.6	0.0	NO
NCA04	DN	6 The Crescent	G	Residential	60	61	63	62	57	63	92	83	92	60	61	63	62	57	63	92	83	92	62	60	64	64	56	65	92	83	92	1.1	1.5	0.0	NO
NCA04	DN	8 The Crescent	G	Residential	59	59	62	61	56	62	90	82	90	59	59	62	61	56	62	90	82	90	61	59	63	63	55	64	90	82	90	1.2	1.6	0.0	NO
NCA04	DN	12 The Crescent	G	Residential	58	59	61	60	55	62	89	83	89	59	59	62	61	55	62	89	83	89	61	58	63	63	54	63	89	83	89	1.4	1.7	ĩ0.1	NO
NCA04	DN	10 The Crescent	G	Residential	58	59	62	61	55	62	91	82	91	59	59	62	61	55	62	91	82	91	61	58	63	63	54	63	91	82	91	1.3	1.7	0.0	NO
NCA04	DN	14 The Crescent	G	Residential	57	58	61	59	54	61	87	82	87	57	57	60	59	53	60	88	82	88	59	56	61	61	52	61	88	82	88	0.3	0.7	0.4	NO
NCA04	DN	14 The Crescent	1	Residential	58	58	61	60	55	61	87	83	87	58	59	61	60	55	61	88	83	88	60	58	62	62	54	63	88	83	88	1.2	1.7	0.8	NO
NCA04	DN	16 The Crescent	G	Residential	58	59	62	60	55	62	89	85	89	59	59	62	61	55	62	90	85	90	61	58	63	63	54	63	90	85	90	1.5	2.0	1.0	YES
NCA04	DN	16 The Crescent	1	Residential	59	60	62	61	56	62	89	85	89	60	60	63	61	56	63	90	85	90	62	59	64	63	55	64	90	85	90	1.5	1.9	1.1	NO
NCA04	DN	18 The Crescent	G	Residential	58	58	61	60	54	61	89	84	89	59	59	62	60	55	61	90	84	90	61	58	63	62	54	63	90	84	90	1.7	2.1	1.3	YES
NCA04	DN	20 The Crescent	G	Residential	58	58	61	60	54	61	90	84	90	58	58	61	60	54	61	91	85	91	61	58	62	62	54	63	91	85	91	1.7	2.0	1.0	YES
NCA04	DN	20 The Crescent	1	Residential	58	58	61	60	54	61	90	85	90	59	59	62	61	55	62	91	85	91	61	58	63	63	54	63	91	85	91	1.7	2.1	1.0	YES
NCA04	DN	22 The Crescent	G	Residential	56	55	59	58	51	59	88	81	88	57	56	59	59	52	60	89	82	89	59	55	60	61	51	61	89	82	89	1.9	2.1	0.8	YES
NCA04	DN	24 The Crescent	G	Residential	57	55	59	59	51	60	89	79	89	57	55	59	59	51	60	89	80	89	59	55	61	61	51	62	89	80	89	1.8	1.9	0.4	NO
NCA04	DN	24 The Crescent	1	Residential	58	56	60	60	52	61	89	81	89	58	57	61	60	53	61	90	82	90	60	56	62	62	53	63	90	82	90	2.0	2.1	0.7	YES
NCA04	DN	26 The Crescent	G	Residential	57	57	60	59	53	60	87	83	87	57	57	60	59	54	60	88	84	88	59	57	61	61	53	62	88	84	88	1.6	2.0	0.8	YES
NCA04	DN	28 The Crescent	G	Residential	56	56	59	58	53	59	86	83	86	56	57	59	58	53	59	87	83	87	59	56	60	60	52	61	87	83	87	1.4	1.8	0.7	NO
NCA04	DN	30 The Crescent	G	Residential	53	53	56	55	49	56	84	80	84	53	53	56	55	50	56	84	80	84	56	53	58	57	49	58	84	80	84	1.5	1.8	0.6	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax					
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA04	DN	30 The Crescent	1	Residential	54	54	57	56	50	57	84	80	84	55	54	57	57	51	58	84	81	84	57	54	59	59	50	59	84	81	84	1.6	1.9	0.6	NO
NCA04	DN	32 The Crescent	G	Residential	58	59	61	60	55	61	88	86	88	58	59	62	60	55	61	89	85	89	61	58	63	62	54	63	89	85	89	1.3	1.8	1.0	NO
NCA04	DN	32 The Crescent	1	Residential	58	59	61	60	55	61	88	85	88	58	59	62	60	55	61	89	85	89	61	58	63	62	54	63	89	85	89	1.4	1.8	1.1	NO
NCA04	DN	14A The Crescent	G	Residential	59	59	62	61	55	62	89	84	89	59	59	62	61	56	62	90	85	90	61	59	63	63	55	64	90	85	90	1.5	1.9	1.0	NO
NCA04	DN	16A The Crescent	G	Residential	50	50	53	52	47	53	83	75	83	50	51	54	52	47	53	83	76	83	53	50	55	54	46	55	83	76	83	1.3	1.7	0.2	NO
NCA04	DN	16A The Crescent	1	Residential	53	53	56	55	49	56	87	78	87	53	53	56	55	49	56	87	78	87	56	53	57	57	49	58	87	78	87	1.3	1.7	0.1	NO
NCA04	DN	24A The Crescent	G	Residential	57	54	59	59	50	59	87	78	87	57	55	59	59	51	59	87	78	87	59	54	60	61	50	61	87	78	87	1.7	1.9	0.1	NO
NCA04	DN	24B The Crescent	G	Residential	55	54	58	57	50	58	86	80	86	56	54	58	57	51	58	87	80	87	58	54	59	59	50	60	87	80	87	1.6	1.8	0.4	NO
NCA04	DN	24B The Crescent	G	Residential	54	53	57	56	49	57	85	80	85	54	53	57	56	50	57	86	80	86	56	53	58	58	49	59	86	80	86	1.6	1.8	0.8	NO
NCA04	DN	2 The Crescent	G	Residential	59	61	63	62	57	63	90	85	90	60	60	63	62	57	63	90	85	90	62	60	64	64	56	64	90	85	90	0.8	1.4	0.1	NO
NCA04	DN	28 The Promenade	G	Residential	51	50	53	53	46	54	82	74	82	51	51	54	53	47	54	83	74	83	53	50	55	55	46	55	83	74	83	1.4	1.8	0.1	NO
NCA04	DN	28 The Promenade	G	Residential	46	45	49	48	42	49	77	71	77	46	46	49	48	42	49	77	71	77	49	45	50	50	41	51	77	71	77	1.4	1.7	0.1	NO
NCA04	UP	16 Cheltenham Rd	G	Residential	53	52	55	55	47	55	82	79	82	51	50	54	53	46	54	81	77	81	54	50	55	55	46	56	81	77	81	ĩ0.2	0.3	ĩ1.6	NO
NCA04	UP	16 Cheltenham Rd	G	Residential	52	51	54	54	46	54	83	79	83	51	49	53	53	45	53	81	78	81	53	49	54	55	45	55	81	78	81	0.1	0.5	ĩ1.4	NO
NCA04	UP	27 Cheltenham Rd	G	Residential	51	50	53	53	45	53	82	77	82	49	48	52	51	44	52	79	72	79	51	47	53	53	43	54	79	72	79	ĩ0.3	0.2	ĩ3.1	NO
NCA04	UP	27 Cheltenham Rd	1	Residential	52	51	55	54	47	55	83	79	83	52	50	54	54	46	54	81	76	81	54	49	55	56	45	56	81	76	81	0.4	0.8	ĩ1.7	NO
NCA04	UP	23 Chorley Av	G	Residential	45	44	47	47	40	48	77	69	77	45	45	48	47	41	48	77	69	77	47	44	49	49	40	49	77	69	77	1.3	1.7	0.0	NO
NCA04	UP	23 Chorley Av	1	Residential	47	46	50	49	43	50	81	73	81	47	47	50	49	43	50	81	72	81	50	46	51	51	42	52	81	72	81	1.3	1.7	ĩ0.1	NO
NCA04	UP	25 Chorley Av	G	Residential	52	53	56	55	49	56	81	77	81	53	53	56	55	49	56	81	76	81	55	52	57	57	48	57	81	76	81	1.2	1.5	ĩ0.1	NO
NCA04	UP	25 Chorley Av	1	Residential	54	53	57	56	50	57	83	77	83	54	53	57	56	50	57	83	77	83	56	53	58	58	49	58	83	77	83	1.4	1.7	ĩ0.1	NO
NCA04	UP	26 Chorley Av	G	Residential	47	47	50	49	44	50	80	72	80	48	47	50	49	44	50	80	72	80	50	47	52	52	43	52	80	72	80	1.2	1.6	ĩ0.1	NO
NCA04	UP	26 Chorley Av	1	Residential	51	51	54	53	47	54	83	75	83	51	51	54	53	47	54	83	75	83	53	50	55	55	46	56	83	75	83	1.2	1.6	ĩ0.1	NO
NCA04	UP	1 Cobran Rd	G	Residential	55	52	57	57	49	58	86	77	86	55	53	57	57	49	58	87	77	87	57	52	58	59	48	59	87	77	87	1.4	1.7	0.4	NO
NCA04	UP	1 Cobran Rd	1	Residential	58	56	60	60	52	61	89	80	89	58	57	60	60	53	61	88	80	88	60	56	62	62	52	63	88	80	88	1.4	1.6	ĩ0.5	NO
NCA04	UP	3 Cobran Rd	G	Residential	54	53	56	56	49	57	85	78	85	54	53	56	56	49	57	84	78	84	56	52	58	58	48	58	84	78	84	1.1	1.5	ĩ0.4	NO
NCA04	UP	3 Cobran Rd	1	Residential	55	54	58	57	51	58	85	79	85	55	54	58	57	51	58	84	79	84	57	53	59	59	49	59	84	79	84	1.1	1.5	ĩ0.6	NO
NCA04	UP	3 Cobran Rd	G	Residential	52	51	55	54	48	55	81	76	81	52	51	55	54	47	55	81	76	81	54	50	56	56	46	56	81	76	81	0.9	1.3	ĩ0.5	NO
NCA04	UP	3 Cobran Rd	1	Residential	53	53	56	56	49	56	83	76	83	53	53	56	55	49	56	82	77	82	56	52	57	57	48	58	82	77	82	1.0	1.4	ĩ0.5	NO
NCA04	UP	4 Cobran Rd	G	Residential	48	47	50	50	43	51	79	74	79	47	47	50	49	44	50	78	74	78	50	47	51	51	42	52	78	74	78	1.0	1.4	ĩ0.5	NO
NCA04	UP	4 Cobran Rd	1	Residential	52	51	54	54	47	55	84	77	84	52	51	54	54	47	55	83	77	83	54	50	55	56	46	56	83	77	83	1.1	1.5	ĩ0.7	NO
NCA04	UP	5 Cobran Rd	G	Residential	53	53	56	55	49	56	83	78	83	53	53	56	55	49	56	83	78	83	55	52	57	57	48	58	83	78	83	1.1	1.4	ĩ0.4	NO
NCA04	UP	5 Cobran Rd	1	Residential	54	53	56	56	50	57	83	78	83	54	53	56	56	50	57	83	78	83	56	52	58	58	48	58	83	78	83	1.0	1.4	ĩ0.5	NO
NCA04	UP	5 Cobran Rd	G	Residential	53	53	56	55	49	56	85	78	85	53	53	56	55	49	56	84	78	84	56	52	57	57	48	58	84	78	84	1.1	1.5	ĩ0.4	NO
NCA04	UP	5 Cobran Rd	1	Residential	54	54	57	56	50	57	85	79	85	54	54	57	56	50	57	84	79	84	56	53	58	58	49	59	84	79	84	1.1	1.5	ĩ0.4	NO
NCA04	UP	7 Cobran Rd	G	Residential	52	51	55	54	48	55	82	75	82	52	51	55	54	48	55	81	75	81	54	51	56	56	46	56	81	75	81	1.1	1.5	ĩ0.5	NO
NCA04	UP	2B Sutherland Rd	G	Residential	56	55	59	58	52	59	87	83	87	56	56	59	58	52	59	87	83	87	58	55	60	60	51	61	87	83	87	1.0	1.4	ĩ0.5	NO
NCA04	UP	2B Sutherland Rd	1	Residential	57	57	60	59	53	60	88	84	88	57	57	60	59	53	60	87	84	87	59	56	61	61	52	61	87	84	87	1.0	1.3	ĩ0.5	NO
NCA04	UP	2D Cobran Rd	G	Residential	51	46	52	53	42	53	84	70	84	51	46	52	53	42	53	84	70	84	53	45	54	55	41	55	84	70	84	1.7	1.8	ĩ0.5	NO
NCA04	UP	2D Cobran Rd	1	Residential	54	53	57	57	49	57	85	78	85	55	53	57	57	49	57	84	78	84	57	52	58	58	48	59	84	78	84	1.3	1.6	ĩ0.6	NO
NCA04	UP	2D Cobran Rd	G	Residential	56	55	59	59	52	59	88	82	88	56	56	59	58	52	59	87	82	87	58	55	60	60	51	61	87	82	87	1.0	1.4	ĩ0.5	NO
NCA04	UP	2D Cobran Rd	1	Residential	57	57	60	59	53	60	88	83	88	57	57	60	59	53	60	88	83	88	60	56	61	61	52	62	88	83	88	1.1	1.4	ĩ0.5	NO
NCA04	UP	1 Day Rd	G	Residential	48	45	49	50	41	50	80	72	80	47	45	49	49	41	50	79	72	79	49	44	51	51	40	52	79	72	79	1.2	1.4	ĩ0.7	NO
NCA04	UP	1 Day Rd	1	Residential	50	48	52	52	44	53	81	74	81	50	48	52	52	44	52	80	74	80	52	47	53	54	43	54	80	74	80	0.7	1.0	ĩ0.8	NO
NCA04	UP	2 Day Rd	G	Residential	59	58	61	61	54	61	89	85	89	58	57	61	60	54	61	89	85	89	60	57	62	62	52	63	89	85	89	0.8	1.2	ĩ0.4	NO
NCA04	UP	4 Day Rd	G	Residential	55	55	58	57	51	58	84	82	84	54	54	57	56	50	57	84	82	84	56	53	58	58	49	59	84	82	84	0.1	0.6	ĩ0.4	NO
NCA04	UP	4 Day Rd	1	Residential	56	56	59	58	52	59	84	82	84	55	55	58	57	51	58	84	82	84	57	54	59	59	50	59	84	82	84	0.0	0.5	ĩ0.4	NO
NCA04	UP	6 Day Rd	G	Residential	53	53	56	55	48	56	81	80	81	51	51	54	53	47	54	81	78	81	53	50	55	55	46	56	81	78	81	ĩ0.6	0.0	ĩ0.4	NO
NCA04	UP	6 Day Rd	1	Residential	53	53	56	55	49	56	82	81	82	52	52	55	54	48	55	81	79	81	54	51	56	56	47	56	81	79	81	ĩ0.6	0.1	ĩ0.4	NO
NCA04	UP	1 Glenelg Pl	G	Residential	52	50	54	54	46	55	85	78	85	52	50	54	54	47	54	85	78	85	54	50	55	56	46	56	85	78	85	1.1	1.4	0.1	NO
NCA04	UP	1 Glenelg Pl	1	Residential	54	54	57	56	50	57	88	82	88	54	54	57	56	50	57	88	82	88	56	53	58	58	49	58	88	82	88	1.0	1.4	0.0	NO
NCA04	UP	1 Kethel Rd	G	Residential	56	53	58	58	50	59	88	82	88	56	54	58	58	50	59	88	82	88	58	53	59	60	49	60	88	82	88	1.3	1.5	ĩ0.5	NO
NCA04	UP	3 Kethel Rd	G	Residential	54	52	56	56	49	57	86	82	86	53	53	56	56	49	56	86	82	86	56	52	57	58	48	58	86	82	86	1.2	1.5	ĩ0.7	NO
NCA04	UP	24 Sutherland Rd	G	Residential	53	52	55	55	48	56	81	77	81	52	52	55	54	48	55	80	75	80	55	51	56	56	47	57	80	75	80	0.9	1.2	ĩ0.9	NO
NCA04	UP	26 Sutherland Rd	G	Residential	51	50	53	53	46	54	81	74	81	51	50	53	53	46	54	81	74	81	53	50	55	55	46	55	81	74	81	1.2	1.7	0.0	NO
NCA04	UP	26 Sutherland Rd	G	Residential	51	49	53	53	45	53	79	75	79	50	49	53	52	45	53	77	74	77	53	49	54	54	44	55	77	74	77	1.0	1.4	ĩ1.6	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA04	UP	28 Sutherland Rd	G	Residential	55	56	58	57	52	58	85	82	85	55	56	58	57	52	58	85	82	85	57	55	59	59	51	60	85	82	85	1.0	1.4	ĩ0.5	NO
NCA04	UP	28 Sutherland Rd	G	Residential	48	48	51	50	44	51	79	72	79	49	48	51	51	44	52	79	72	79	51	47	53	53	43	53	79	72	79	1.7	2.1	0.0	NO
NCA04	UP	28 Sutherland Rd	1	Residential	51	50	54	53	46	54	80	73	80	51	50	54	53	46	54	80	73	80	53	49	55	55	45	56	80	73	80	1.3	1.7	0.0	NO
NCA04	UP	30 Sutherland Rd	G	Residential	57	58	60	59	54	60	88	85	88	57	58	60	59	54	60	87	85	87	59	57	61	61	53	61	87	85	87	0.9	1.4	ĩ0.5	NO
NCA04	UP	32 Sutherland Rd	G	Residential	58	59	61	60	55	61	88	86	88	58	59	61	60	55	61	87	86	87	60	58	62	62	54	62	87	86	87	0.8	1.3	ĩ0.5	NO
NCA04	UP	34 Sutherland Rd	G	Residential	56	56	59	58	52	59	86	83	86	56	56	59	58	53	59	86	83	86	58	56	60	60	52	61	86	83	86	1.0	1.4	ĩ0.6	NO
NCA04	UP	38 Sutherland Rd	G	Residential	57	56	59	59	52	60	88	84	88	57	56	59	59	52	60	87	84	87	59	55	60	61	52	61	87	84	87	1.1	1.4	ĩ0.5	NO
NCA04	UP	44 Sutherland Rd	G	Residential	57	57	60	59	53	60	88	84	88	57	57	60	59	53	60	88	84	88	59	56	61	61	52	61	88	84	88	0.9	1.2	ĩ0.5	NO
NCA04	UP	44 Sutherland Rd	G	Residential	57	56	60	59	52	60	88	85	88	57	56	60	59	53	60	88	85	88	59	56	61	61	52	61	88	85	88	1.1	1.4	ĩ0.5	NO
NCA04	UP	46 Sutherland Rd	G	Residential	55	54	58	57	50	58	86	81	86	55	54	57	56	51	57	85	81	85	57	54	58	59	50	59	85	81	85	0.9	1.3	ĩ0.6	NO
NCA04	UP	46 Sutherland Rd	G	Residential	56	57	60	59	53	60	87	82	87	56	57	60	58	53	59	86	82	86	59	56	61	60	52	61	86	82	86	1.0	1.4	ĩ0.6	NO
NCA04	UP	46 Sutherland Rd	1	Residential	55	55	58	57	51	58	86	81	86	55	55	58	57	51	58	86	81	86	57	54	59	59	50	60	86	81	86	1.0	1.3	ĩ0.6	NO
NCA04	UP	50 Sutherland Rd	G	Residential	54	53	57	56	49	57	85	79	85	54	53	57	56	50	57	84	79	84	56	53	58	58	49	58	84	79	84	1.0	1.4	ĩ0.5	NO
NCA04	UP	52 Sutherland Rd	G	Residential	54	53	57	56	49	57	84	78	84	54	53	57	56	50	57	83	78	83	56	53	58	58	49	58	83	78	83	1.1	1.5	ĩ0.6	NO
NCA04	UP	54 Sutherland Rd	G	Residential	53	52	55	55	48	56	81	75	81	53	52	55	55	48	55	80	75	80	55	51	56	57	47	57	80	75	80	1.1	1.4	ĩ0.5	NO
NCA04	UP	56 Sutherland Rd	G	Residential	52	50	54	54	47	55	82	75	82	52	50	54	54	47	55	82	75	82	54	50	55	56	46	56	82	75	82	1.1	1.4	ĩ0.2	NO
NCA04	UP	58 Sutherland Rd	G	Residential	52	50	54	54	47	55	82	74	82	52	51	54	54	47	55	82	74	82	54	50	55	56	46	56	82	74	82	1.1	1.3	ĩ0.4	NO
NCA04	UP	58 Sutherland Rd	1	Residential	55	53	57	58	49	58	86	75	86	55	53	57	57	49	58	86	75	86	58	53	59	59	49	60	86	75	86	1.4	1.6	ĩ0.5	NO
NCA04	UP	60 Sutherland Rd	G	Residential	57	56	60	59	53	60	88	82	88	57	56	60	59	53	60	88	82	88	59	56	61	61	52	62	88	82	88	1.1	1.5	ĩ0.4	NO
NCA04	UP	60 Sutherland Rd	1	Residential	58	58	61	60	54	61	88	83	88	58	58	61	60	54	61	88	83	88	60	57	62	62	53	63	88	83	88	1.2	1.5	ĩ0.4	NO
NCA04	UP	62 Sutherland Rd	G	Residential	57	57	60	59	53	60	87	82	87	57	57	60	59	53	60	87	82	87	59	56	61	61	52	61	87	82	87	1.0	1.3	ĩ0.4	NO
NCA04	UP	64 Sutherland Rd	G	Residential	56	55	59	59	51	59	88	82	88	56	55	58	58	51	59	87	82	87	58	54	60	60	51	61	87	82	87	1.0	1.3	ĩ0.4	NO
NCA04	UP	68 Sutherland Rd	G	Residential	58	56	60	60	52	60	88	83	88	57	56	60	59	52	60	88	83	88	59	56	61	61	52	62	88	83	88	1.1	1.3	ĩ0.5	NO
NCA04	UP	72 Sutherland Rd	G	Residential	59	58	61	61	55	62	89	83	89	58	58	61	60	55	61	89	83	89	60	58	62	62	54	63	89	83	89	0.9	1.3	ĩ0.1	NO
NCA04	UP	74 Sutherland Rd	G	Residential	57	56	59	59	52	60	87	78	87	57	56	59	59	52	60	86	79	86	59	56	60	61	52	61	86	79	86	1.1	1.4	ĩ0.6	NO
NCA04	UP	76 Sutherland Rd	G	Residential	57	56	59	59	52	60	87	79	87	57	56	59	59	52	60	86	79	86	59	55	60	61	51	61	86	79	86	1.1	1.3	ĩ0.5	NO
NCA04	UP	78 Sutherland Rd	G	Residential	59	59	62	61	55	62	91	84	91	59	59	62	61	55	62	91	84	91	61	58	63	63	55	63	91	84	91	0.9	1.3	0.0	NO
NCA04	UP	60B Sutherland Rd	G	Residential	52	52	55	54	49	55	83	78	83	51	52	55	54	49	55	83	78	83	54	52	56	56	48	56	83	78	83	0.9	1.4	0.0	NO
NCA04	UP	60B Sutherland Rd	1	Residential	53	54	57	55	50	56	85	78	85	53	54	57	55	50	56	85	78	85	55	53	57	57	49	58	85	78	85	0.9	1.4	0.0	NO
NCA04	UP	62B Sutherland Rd	G	Residential	55	55	58	57	51	58	86	81	86	55	55	58	57	51	58	86	81	86	57	55	59	59	51	60	86	81	86	1.0	1.4	ĩ0.5	NO
NCA04	UP	62B Sutherland Rd	1	Residential	56	57	59	58	53	59	87	82	87	56	57	59	58	53	59	87	82	87	58	56	60	60	52	61	87	82	87	0.9	1.3	0.0	NO
NCA04	UP	64A Sutherland Rd	G	Residential	54	54	57	56	50	57	84	80	84	54	54	57	56	50	57	84	80	84	56	53	58	58	49	59	84	80	84	1.0	1.5	ĩ0.3	NO
NCA04	UP	64A Sutherland Rd	1	Residential	56	56	59	58	52	59	87	81	87	56	56	59	58	53	59	87	81	87	58	56	60	60	52	61	87	81	87	1.0	1.4	0.0	NO
NCA04	UP	66A Sutherland Rd	G	Residential	56	54	58	58	50	59	86	80	86	56	54	58	58	50	58	86	80	86	58	54	59	60	50	60	86	80	86	1.1	1.4	ĩ0.6	NO
NCA04	UP	2 Sutherland Rd	G	Residential	58	56	60	60	52	61	88	81	88	58	56	60	60	52	61	88	81	88	60	56	61	62	51	62	88	81	88	1.3	1.6	ĩ0.5	NO
NCA04	UP	2 Sutherland Rd	1	Residential	58	57	60	60	53	61	88	81	88	58	57	60	60	53	60	87	81	87	60	56	61	62	52	62	87	81	87	1.2	1.5	ĩ0.6	NO
NCA04	UP	2 Sutherland Rd	G	Residential	58	56	60	60	52	61	89	82	89	58	56	60	60	52	61	89	81	89	60	55	61	62	51	62	89	81	89	1.3	1.5	ĩ0.5	NO
NCA04	UP	2 Sutherland Rd	1	Residential	59	58	61	61	54	62	89	84	89	59	58	61	61	54	61	89	83	89	61	57	62	63	53	63	89	83	89	1.2	1.5	ĩ0.5	NO
NCA04	UP	4 Sutherland Rd	G	Residential	56	54	58	59	49	59	87	81	87	55	52	57	57	48	58	86	81	86	57	52	58	59	47	59	86	81	86	ĩ0.2	0.4	ĩ0.5	NO
NCA04	UP	6 Sutherland Rd	G	Residential	57	56	60	60	52	60	87	83	87	56	54	58	58	49	58	86	81	86	58	53	59	60	49	60	86	81	86	ĩ0.8	ĩ0.2	ĩ0.6	NO
NCA04	UP	8 Sutherland Rd	G	Residential	59	59	62	61	55	62	87	87	87	56	54	58	58	50	59	86	80	86	58	54	60	60	49	61	86	80	86	ĩ2.5	ĩ1.6	ĩ0.8	NO
NCA04	UP	10 Sutherland Rd	G	Residential	59	58	62	61	54	62	88	86	88	57	56	59	59	52	60	87	82	87	59	55	60	61	51	61	87	82	87	ĩ1.2	ĩ0.5	ĩ1.1	NO
NCA04	UP	12 Sutherland Rd	G	Residential	58	58	61	61	54	61	88	85	88	57	57	60	59	53	60	87	84	87	59	56	61	61	52	62	87	84	87	ĩ0.3	0.3	ĩ0.7	NO
NCA04	UP	14 Sutherland Rd	G	Residential	58	58	61	60	53	61	87	86	87	57	57	60	59	53	60	87	85	87	59	56	61	61	52	61	87	85	87	ĩ0.3	0.3	ĩ0.5	NO
NCA04	UP	14 Sutherland Rd	1	Residential	59	59	62	61	54	62	87	86	87	58	58	61	60	54	61	87	85	87	60	57	62	62	53	62	87	85	87	ĩ0.2	0.4	ĩ0.6	NO
NCA04	UP	16 Sutherland Rd	G	Residential	59	58	62	61	54	62	88	86	88	58	58	61	60	54	61	88	86	88	60	57	62	62	53	62	88	86	88	ĩ0.1	0.4	ĩ0.8	NO
NCA04	UP	16 Sutherland Rd	1	Residential	59	59	62	61	54	62	89	86	89	58	58	61	60	54	61	88	85	88	60	57	62	62	53	62	88	85	88	ĩ0.1	0.3	ĩ1.1	NO
NCA04	UP	18 Sutherland Rd	G	Residential	59	58	61	61	54	61	89	86	89	57	57	60	59	53	60	87	85	87	59	56	61	61	52	62	87	85	87	ĩ0.4	0.1	ĩ1.3	NO
NCA04	UP	20 Sutherland Rd	G	Residential	55	54	57	57	50	58	85	82	85	53	53	56	55	49	56	83	79	83	55	52	57	57	48	58	83	79	83	ĩ0.3	0.2	ĩ1.9	NO
NCA04	UP	20 Sutherland Rd	G	Residential	56	54	58	58	50	59	87	82	87	55	53	57	57	49	58	86	79	86	57	53	59	59	48	59	86	79	86	0.4	0.8	ĩ1.3	NO
NCA04	UP	20 Sutherland Rd	G	Residential	53	52	56	56	48	56	85	82	85	52	50	54	54	46	54	83	79	83	54	49	55	56	45	56	83	79	83	ĩ0.8	ĩ0.3	ĩ2.1	NO
NCA04	UP	20 Sutherland Rd	G	Residential	48	46	50	50	41	50	80	72	80	47	44	49	49	40	49	79	68	79	49	44	50	51	39	51	79	68	79	0.6	0.7	ĩ0.8	NO
NCA04	UP	22 Sutherland Rd	G	Residential	53	52	55	55	48	56	82	78	82	52	51	55	54	47	55	82	75	82	55	50	56	56	46	57	82	75	82	0.8	1.1	ĩ0.4	NO
NCA04	UP	12A Sutherland Rd	G	Residential	54	53	56	56	49	57	82	79	82	53	52	55	55	48	56	81	78	81	55	51	57	57	47	57	81	78	81	0.3	0.8	ĩ0.9	NO
NCA04	UP	2A Sutherland Rd	G	Residential	52	50	54	54	46	54	85	78	85	51	50	53	53	46	54	84	78	84	53	49	55	55	44	56	84	78	84	0.9	1.2	ĩ0.7	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax					
NCA	**Side**	**Address**	**Level**	**Description**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**day**	**night**	**max**	**trig?**
NCA04	UP	2A Sutherland Rd	G	Residential	58	56	60	60	52	61	88	85	88	57	56	60	59	52	60	88	85	88	59	55	61	61	51	62	88	85	88	0.7	1.1	ĩ0.4	NO
NCA04	UP	4A Sutherland Rd	G	Residential	57	54	59	59	50	60	88	83	88	56	54	58	58	50	59	87	82	87	58	53	59	60	49	61	87	82	87	0.4	0.7	ĩ0.5	NO

Individual Receiver Noise Model Results ‑ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA05	DN	111 Beecroft Rd	G	Other	64	63	67	66	59	67	103	98	103	64	63	67	66	59	67	103	98	103	67	62	68	69	58	69	103	98	103	1.3	1.7	0.1	NO
NCA05	DN	1 The Crescent	G	Active Recreation	63	64	66	66	60	67	102	97	102	64	64	67	66	60	67	102	97	102	66	63	68	68	59	69	102	97	102	1.4	1.8	0.0	NO
NCA05	DN	90ï96 Beecroft Rd	G	Educational	60	60	63	63	56	64	100	93	100	61	60	64	63	56	64	100	93	100	63	59	65	65	55	65	100	93	100	1.2	1.7	0.0	NO
NCA05	DN	Cheltenham Scout Hall	G	Other	67	69	71	70	66	71	101	96	101	70	69	73	71	66	72	104	100	104	72	69	74	73	65	74	104	100	104	2.3	2.9	2.9	NO
NCA05	DN	90ï96 Beecroft Rd	G	Educational	61	60	63	63	57	64	100	94	100	61	60	64	63	57	64	100	94	100	63	60	65	65	56	65	100	94	100	1.2	1.7	0.1	NO
NCA05	DN	Cheltenham Scout Hall	G	Other	67	69	71	69	65	71	99	95	99	69	69	72	71	65	72	102	99	102	72	69	73	73	65	74	102	99	102	2.3	2.9	3.0	NO
NCA05	DN	90ï96 Beecroft Rd	G	Educational	61	60	63	63	57	64	100	94	100	61	60	64	63	57	64	100	94	100	63	60	65	65	55	65	100	94	100	1.2	1.7	0.0	NO
NCA05	DN	90ï96 Beecroft Rd	1	Educational	61	61	64	63	57	64	100	94	100	61	61	64	63	57	64	100	94	100	63	60	65	65	56	66	100	94	100	1.2	1.7	0.0	NO
NCA05	DN	90ï96 Beecroft Rd	G	Educational	57	56	60	59	52	60	96	92	96	57	56	60	59	52	60	96	92	96	59	55	61	61	51	62	96	92	96	1.3	1.8	0.3	NO
NCA05	DN	90ï96 Beecroft Rd	1	Educational	58	57	60	60	53	61	97	93	97	58	57	60	60	53	61	97	93	97	60	56	61	62	52	62	97	93	97	1.1	1.6	0.1	NO
NCA05	DN	90ï96 Beecroft Rd	2	Educational	58	57	61	60	53	61	97	93	97	58	57	61	60	53	61	97	93	97	60	56	62	62	52	63	97	93	97	1.2	1.6	0.1	NO
NCA05	DN	90ï96 Beecroft Rd	G	Educational	59	59	62	62	55	63	98	93	98	60	59	62	62	55	63	98	93	98	62	58	63	64	54	64	98	93	98	1.2	1.7	0.1	NO
NCA05	DN	90ï96 Beecroft Rd	1	Educational	60	60	63	63	56	64	99	94	99	60	60	63	63	56	63	99	94	99	63	59	64	65	55	65	99	94	99	1.1	1.6	0.1	NO
NCA05	DN	90ï96 Beecroft Rd	2	Educational	61	60	63	63	56	64	100	94	100	61	60	63	63	56	64	100	94	100	63	59	65	65	55	65	100	94	100	1.2	1.6	0.0	NO
NCA05	DN	102ï104 Beecroft Rd	G	Residential	60	60	63	63	57	64	100	92	100	61	60	64	63	57	64	100	92	100	63	60	65	65	56	65	100	92	100	1.1	1.6	ï0.1	NO
NCA05	DN	102ï104 Beecroft Rd	1	Residential	61	60	64	63	57	64	100	92	100	61	60	64	63	57	64	100	92	100	63	60	65	65	56	65	100	92	100	1.1	1.6	ï0.2	NO
NCA05	DN	106 Beecroft Rd	G	Residential	61	61	64	63	57	64	100	92	100	61	61	64	63	57	64	100	92	100	63	60	65	65	56	66	100	92	100	1.3	1.7	ï0.1	NO
NCA05	DN	106 Beecroft Rd	1	Residential	61	61	64	63	57	64	100	92	100	61	61	64	63	57	64	100	92	100	64	60	65	66	56	66	100	92	100	1.2	1.7	0.0	NO
NCA05	DN	108 Beecroft Rd	G	Residential	61	61	64	63	57	64	100	93	100	61	61	64	63	57	64	100	93	100	63	60	65	65	56	66	100	93	100	1.3	1.8	ï0.1	NO
NCA05	DN	108 Beecroft Rd	1	Residential	61	61	64	63	57	64	100	93	100	61	61	64	63	57	64	100	93	100	63	60	65	65	56	66	100	93	100	1.3	1.8	ï0.1	NO
NCA05	DN	110 Beecroft Rd	G	Residential	61	61	64	63	57	64	100	93	100	61	61	64	63	57	64	100	93	100	63	60	65	65	56	66	100	93	100	1.3	1.7	ï0.1	NO
NCA05	DN	112 Beecroft Rd	G	Residential	60	60	63	63	57	64	100	92	100	61	60	64	63	57	64	100	92	100	63	60	65	65	56	65	100	92	100	1.3	1.7	0.0	NO
NCA05	DN	114 Beecroft Rd	G	Residential	60	60	63	62	56	63	98	91	98	60	60	63	62	56	63	98	91	98	62	59	64	64	55	65	98	91	98	1.2	1.7	0.0	NO
NCA05	DN	115 Beecroft Rd	G	Residential	61	61	64	64	58	65	100	93	100	62	61	64	64	58	65	100	94	100	64	61	66	66	57	66	100	94	100	1.2	1.7	0.0	NO
NCA05	DN	116 Beecroft Rd	G	Residential	59	59	62	61	55	62	97	90	97	59	59	62	61	55	62	97	90	97	61	58	63	63	54	64	97	90	97	1.3	1.8	0.0	NO
NCA05	DN	118 Beecroft Rd	G	Residential	59	59	62	61	55	62	98	91	98	60	59	62	62	55	62	98	91	98	62	58	63	64	54	64	98	91	98	1.4	1.9	0.0	NO
NCA04	DN	121 Beecroft Rd	G	Residential	58	59	62	60	55	61	93	87	93	58	59	61	60	55	61	93	87	93	61	58	62	62	54	63	93	87	93	0.9	1.5	0.0	NO
NCA04	DN	121 Beecroft Rd	1	Residential	59	60	62	61	56	62	95	88	95	59	59	62	61	56	62	95	88	95	61	59	63	63	55	64	95	88	95	1.1	1.6	0.1	NO
NCA04	DN	123 Beecroft Rd	G	Residential	56	57	60	59	54	60	93	87	93	57	57	60	59	53	60	93	87	93	59	56	61	61	52	61	93	87	93	0.9	1.5	0.0	NO
NCA04	DN	125 Beecroft Rd	G	Residential	60	60	63	62	57	63	91	84	91	60	60	63	62	57	63	91	84	91	62	60	64	64	56	65	91	84	91	1.1	1.6	0.0	NO
NCA05	DN	2D The Crescent	G	Residential	60	61	64	63	57	64	99	92	99	61	61	64	63	57	64	99	92	99	63	60	65	65	56	65	99	92	99	1.1	1.7	0.0	NO
NCA05	DN	2C The Crescent	G	Residential	59	59	62	61	56	62	96	89	96	59	59	62	61	55	62	96	89	96	61	59	63	63	55	64	96	89	96	1.2	1.7	0.0	NO
NCA05	DN	2B The Crescent	G	Residential	58	59	62	61	55	62	94	87	94	58	58	61	60	55	61	94	87	94	61	58	62	62	54	63	94	87	94	0.8	1.3	ï0.1	NO
NCA05	UP	136 Copeland Rd	G	Residential	63	62	65	65	58	66	102	97	102	63	62	65	65	58	66	102	97	102	65	61	67	67	57	68	102	97	102	1.1	1.6	0.0	NO
NCA05	UP	138 Copeland Rd	G	Residential	60	59	63	62	56	63	99	94	99	60	59	63	62	56	63	99	94	99	62	59	64	64	55	65	99	94	99	1.1	1.6	0.1	NO
NCA05	UP	140 Copeland Rd	G	Residential	57	57	60	59	53	60	95	91	95	57	56	60	59	53	60	95	91	95	59	56	61	61	52	62	95	91	95	1.0	1.5	0.0	NO
NCA05	UP	144 Copeland Rd	G	Residential	56	56	59	59	53	60	96	91	96	57	56	59	59	53	60	96	91	96	59	56	60	61	52	61	96	91	96	1.2	1.6	0.3	NO
NCA05	UP	144 Copeland Rd	1	Residential	57	57	60	60	53	60	96	91	96	57	57	60	59	53	60	96	91	96	59	56	61	62	52	62	96	91	96	1.0	1.6	0.0	NO
NCA05	UP	80 Sutherland Rd	G	Residential	58	58	61	60	55	62	91	85	91	58	59	61	60	55	61	91	85	91	60	58	62	62	54	63	91	85	91	0.9	1.4	0.0	NO
NCA05	UP	84 Sutherland Rd	G	Residential	63	62	66	65	59	66	103	97	103	62	62	65	64	59	65	102	97	102	64	62	66	67	58	67	102	97	102	0.6	1.2	ï0.3	NO
NCA05	UP	84 Sutherland Rd	1	Residential	64	63	67	66	60	67	103	98	103	63	64	67	65	60	67	103	98	103	65	63	67	68	59	68	103	98	103	0.7	1.3	ï0.1	NO
NCA05	UP	86 Sutherland Rd	G	Residential	62	62	65	64	58	65	102	96	102	62	62	65	64	58	65	102	96	102	64	61	66	66	58	67	102	96	102	0.8	1.3	0.0	NO
NCA05	UP	88 Sutherland Rd	G	Residential	63	63	66	65	59	66	102	97	102	63	63	66	65	59	66	103	97	103	65	62	67	67	58	68	103	97	103	1.0	1.5	0.1	NO
NCA05	UP	88 Sutherland Rd	1	Residential	64	64	67	66	60	67	103	98	103	64	64	67	66	60	67	103	98	103	66	63	68	68	59	69	103	98	103	1.0	1.5	ï0.1	NO
NCA05	UP	90 Sutherland Rd	G	Residential	64	64	67	66	60	67	103	98	103	64	64	67	66	60	67	103	98	103	66	63	68	68	59	69	103	98	103	1.0	1.5	0.2	NO
NCA05	UP	92 Sutherland Rd	G	Residential	63	63	66	66	59	66	103	98	103	63	63	66	65	59	66	103	98	103	66	62	67	68	58	68	103	98	103	1.1	1.6	0.0	NO
NCA05	UP	92 Sutherland Rd	1	Residential	64	64	67	67	60	67	104	99	104	64	64	67	66	60	67	104	99	104	66	63	68	68	59	69	104	99	104	1.0	1.5	0.0	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax					
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA06	DN	23 Wongala Cres	G	Residential	63	62	65	65	58	66	102	97	102	61	60	64	64	56	64	100	95	100	64	59	65	66	55	66	100	95	100	ĩ0.3	0.2	ĩ1.6	NO
NCA06	DN	25 Wongala Cres	G	Residential	62	60	64	64	57	65	101	96	101	60	59	63	63	55	63	99	94	99	63	58	64	65	54	65	99	94	99	ĩ0.2	0.3	ĩ1.6	NO
NCA06	UP	94 Sutherland Rd	G	Residential	61	59	63	63	55	64	100	93	100	61	59	63	63	55	64	100	93	100	63	58	64	65	54	66	100	93	100	1.2	1.6	0.0	NO
NCA06	UP	139 Copeland Rd	G	Residential	51	50	54	54	47	54	90	81	90	51	50	54	54	47	54	90	81	90	54	50	55	56	46	56	90	81	90	1.1	1.6	0.0	NO
NCA06	UP	1 Malton Rd	G	Residential	52	50	55	55	47	55	90	83	90	52	50	54	54	46	55	90	82	90	55	49	56	56	45	57	90	82	90	1.2	1.5	ĩ0.1	NO
NCA06	UP	4 Malton Rd	G	Residential	57	55	59	59	51	60	96	91	96	57	55	59	59	51	60	96	91	96	59	55	60	61	50	61	96	91	96	1.4	1.8	0.2	NO
NCA06	UP	6 Malton Rd	G	Residential	47	46	49	49	42	50	84	76	84	47	46	49	49	42	50	84	76	84	49	45	50	51	41	51	84	76	84	1.1	1.5	ĩ0.1	NO
NCA06	UP	6 Malton Rd	1	Residential	48	47	51	50	43	51	85	78	85	48	47	51	50	43	51	85	77	85	51	46	52	52	42	53	85	77	85	1.3	1.6	0.0	NO
NCA06	UP	100A Sutherland	G	Residential	59	57	61	62	52	63	100	95	100	60	57	62	63	53	63	101	96	101	62	57	63	65	52	65	101	96	101	2.0	2.5	0.9	YES
NCA06	UP	96 Sutherland Rd	G	Residential	62	59	64	64	55	65	102	97	102	62	59	64	64	55	65	102	97	102	64	59	65	66	54	67	102	97	102	1.3	1.9	0.0	NO
NCA06	UP	98A Sutherland Rd	G	Residential	61	59	63	64	55	65	102	98	102	62	59	64	64	55	65	102	98	102	64	58	65	66	54	66	102	98	102	1.3	2.0	0.0	YES
NCA06	UP	100 Sutherland Rd	G	Residential	62	59	64	64	55	65	103	98	103	62	60	64	65	55	65	103	98	103	64	59	65	67	54	67	103	98	103	1.7	2.3	0.5	YES
NCA06	UP	100 Sutherland Rd	1	Residential	63	60	65	65	56	66	104	99	104	63	60	65	65	56	66	104	99	104	65	60	66	68	55	68	104	99	104	1.4	2.1	0.1	YES
NCA06	UP	102 Sutherland Rd	G	Residential	61	58	63	63	54	64	102	96	102	61	59	63	64	54	64	102	97	102	63	58	64	66	54	66	102	97	102	1.9	2.5	0.6	YES
NCA06	UP	94B Sutherland Rd	G	Residential	60	58	62	63	53	63	100	96	100	61	57	62	63	53	63	101	96	101	62	57	64	65	52	65	101	96	101	1.3	1.8	0.1	NO
NCA06	UP	94B Sutherland Rd	1	Residential	61	58	63	63	54	64	101	96	101	61	58	63	63	54	64	101	96	101	63	58	64	66	53	66	101	96	101	1.5	1.9	0.0	NO
NCA06	UP	94A Sutherland Rd	G	Residential	61	58	63	63	54	64	100	94	100	61	58	63	63	54	63	100	94	100	63	58	64	65	53	65	100	94	100	1.1	1.6	0.0	NO
NCA06	UP	104 Sutherland Rd	G	Residential	62	60	64	65	56	65	103	98	103	63	60	65	65	56	65	103	98	103	64	60	66	67	55	67	103	98	103	1.5	2.1	0.3	YES
NCA06	UP	106 Sutherland Rd	G	Residential	63	62	65	65	58	66	102	97	102	63	62	66	65	58	66	103	97	103	65	61	67	68	57	68	103	97	103	1.3	1.7	0.1	NO
NCA06	UP	104A Sutherland Rd	G	Residential	63	61	65	65	56	66	104	98	104	63	61	65	65	57	66	104	98	104	65	60	66	68	56	68	104	98	104	1.5	2.1	0.2	YES
NCA06	UP	1 Wandeen Av	G	Residential	65	63	67	67	59	68	104	98	104	65	63	67	67	59	68	104	98	104	67	62	68	69	58	69	104	98	104	1.2	1.7	0.0	NO
NCA06	UP	1 Wandeen Av	G	Residential	64	63	67	67	59	67	104	98	104	64	63	67	67	59	67	104	98	104	66	62	68	69	58	69	104	98	104	1.0	1.6	0.0	NO
NCA06	UP	2 Wandeen Av	G	Residential	63	61	66	66	57	66	104	98	104	64	62	66	66	57	66	104	98	104	66	61	67	68	56	68	104	98	104	1.4	1.9	0.0	NO
NCA06	UP	2 Wandeen Av	G	Residential	63	61	65	65	57	66	103	97	103	63	61	65	65	57	66	103	97	103	65	60	66	67	56	68	103	97	103	1.4	1.9	0.0	NO
NCA06	UP	2 Wandeen Av	1	Residential	63	62	66	66	58	66	104	97	104	64	62	66	66	58	66	104	97	104	66	61	67	68	57	68	104	97	104	1.3	1.8	0.0	NO
NCA06	UP	3 Wandeen Av	G	Residential	61	59	63	63	55	64	101	96	101	61	59	63	63	55	64	101	96	101	63	58	64	65	54	65	101	96	101	1.3	1.8	ĩ0.1	NO
NCA06	UP	5 Wandeen Av	G	Residential	59	57	61	61	53	62	99	94	99	59	57	61	61	53	62	99	94	99	61	56	62	63	52	64	99	94	99	1.4	1.9	ĩ0.1	NO
NCA06	UP	2A Wandeen Av	G	Residential	54	52	56	56	48	57	94	89	94	54	52	56	56	47	57	94	89	94	56	51	57	58	47	59	94	89	94	1.4	1.9	0.0	NO
NCA06	UP	2A Wandeen Av	1	Residential	55	53	57	58	49	58	96	91	96	56	53	57	58	49	58	96	91	96	58	52	59	60	48	60	96	91	96	1.2	1.8	ĩ0.1	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA07	DN	45 Wongala Cres	G	Educational	59	59	62	61	55	62	98	91	98	59	59	62	61	55	62	98	92	98	61	58	63	63	54	64	98	92	98	1.0	1.5	0.2	NO
NCA07	DN	39ĩ41 Wongala Cres	G	Educational	57	56	60	59	53	60	96	89	96	57	57	60	59	53	60	96	89	96	59	56	61	61	52	61	96	89	96	1.1	1.6	0.2	NO
NCA07	DN	2 Albert Rd	G	Residential	63	63	66	65	59	66	102	94	102	63	63	66	66	60	67	103	95	103	66	62	67	68	59	68	103	95	103	1.6	2.1	0.8	YES
NCA07	DN	2 Albert Rd	1	Residential	64	64	67	66	60	67	104	96	104	64	65	68	67	61	68	104	98	104	67	64	68	69	60	69	104	98	104	1.6	2.1	0.8	YES
NCA07	DN	4 Albert Rd	G	Residential	56	56	59	58	53	59	96	90	96	57	56	60	59	53	60	96	90	96	59	56	61	61	52	61	96	90	96	1.4	1.9	0.2	NO
NCA07	DN	4 Albert Rd	1	Residential	56	56	59	59	53	60	96	90	96	57	57	60	59	53	60	96	90	96	59	56	61	61	52	62	96	90	96	1.6	2.1	0.2	YES
NCA07	DN	6 Albert Rd	G	Residential	59	60	62	62	56	63	99	93	99	60	60	63	62	56	63	99	94	99	62	59	64	64	55	64	99	94	99	1.2	1.8	0.3	NO
NCA07	DN	6 Albert Rd	1	Residential	60	60	63	62	56	63	99	94	99	60	60	63	62	57	63	100	94	100	62	60	64	65	56	65	100	94	100	1.3	1.8	0.4	NO
NCA07	DN	3 Boundary Rd	G	Residential	58	59	61	60	55	61	88	84	88	58	60	62	60	56	61	89	85	89	60	59	63	62	55	63	89	85	89	1.0	1.5	0.6	NO
NCA07	DN	8 Chapman Av	G	Residential	50	49	52	52	45	53	89	81	89	50	49	53	52	45	53	89	81	89	52	48	54	54	44	55	89	81	89	1.2	1.7	0.1	NO
NCA07	DN	10 Chapman Av	G	Residential	53	52	55	55	48	56	91	85	91	53	51	55	55	47	55	91	85	91	55	50	56	57	46	57	91	85	91	1.0	1.4	ĩ0.3	NO
NCA07	DN	10A Chapman Av	G	Residential	49	48	52	51	45	52	87	77	87	49	48	52	51	45	52	87	77	87	51	48	53	53	44	54	87	77	87	1.1	1.5	0.1	NO
NCA07	DN	24 Lilla Rd	G	Residential	60	60	63	62	57	63	99	94	99	60	60	63	62	57	63	99	94	99	62	59	64	64	55	65	99	94	99	1.0	1.6	0.0	NO
NCA07	DN	26 Lilla Rd	G	Residential	58	58	61	60	54	61	97	90	97	58	58	61	60	54	61	97	90	97	60	57	62	62	53	63	97	90	97	1.0	1.6	0.0	NO
NCA07	DN	28 Lilla Rd	G	Residential	63	64	67	66	60	67	103	97	103	64	64	67	66	60	67	103	97	103	66	63	68	68	59	69	103	97	103	1.2	1.8	0.0	NO
NCA07	DN	1 Sherwood Cl	G	Residential	63	63	66	65	59	66	101	98	101	59	59	62	61	55	62	97	93	97	62	58	63	63	54	64	97	93	97	ĩ2.8	ĩ2.2	ĩ3.9	NO
NCA07	DN	2 Sherwood Cl	G	Residential	60	61	63	63	57	64	99	95	99	60	60	63	63	57	64	99	94	99	63	59	64	65	56	65	99	94	99	0.9	1.4	ĩ0.3	NO
NCA07	DN	2 Sherwood Cl	1	Residential	62	62	65	64	59	65	101	96	101	62	62	65	65	59	66	101	96	101	65	62	66	67	58	67	101	96	101	1.2	1.7	0.1	NO
NCA07	DN	121 Wongala Cres	G	Residential	56	57	59	59	53	60	95	88	95	56	57	60	59	53	60	95	88	95	59	56	60	61	52	61	95	88	95	1.0	1.5	0.2	NO
NCA07	DN	123 Wongala Cres	G	Residential	56	57	60	59	53	60	92	84	92	56	57	60	58	53	60	92	84	92	58	56	60	60	52	61	92	84	92	0.7	1.2	ĩ0.1	NO
NCA07	DN	125 Wongala Cres	G	Residential	55	57	59	58	53	59	86	82	86	55	57	59	57	53	59	86	82	86	57	56	60	59	52	60	86	82	86	0.6	1.2	0.2	NO
NCA07	DN	125 Wongala Cres	1	Residential	57	58	61	59	55	60	87	84	87	57	59	61	59	55	60	87	84	87	59	58	61	61	54	62	87	84	87	0.6	1.1	0.2	NO
NCA07	DN	127 Wongala Cres	G	Residential	55	56	58	57	52	58	86	81	86	55	56	58	57	52	58	86	81	86	57	55	59	59	51	59	86	81	86	0.7	1.3	ĩ0.4	NO
NCA07	DN	29 Wongala Cres	G	Residential	57	56	59	59	52	60	95	90	95	57	55	59	59	52	59	95	90	95	59	55	60	61	50	61	95	90	95	0.7	1.2	0.0	NO
NCA07	DN	31 Wongala Cres	G	Residential	55	54	57	57	50	58	93	87	93	54	53	57	56	49	57	93	87	93	56	52	58	58	48	59	93	87	93	0.7	1.2	ĩ0.1	NO
NCA07	DN	33 Wongala Cres	G	Residential	53	53	56	55	49	56	91	80	91	53	53	56	55	49	56	92	80	92	55	52	57	57	48	58	92	80	92	1.3	1.7	0.3	NO
NCA07	DN	35 Wongala Cres	G	Residential	56	55	58	58	51	59	94	84	94	56	55	58	58	51	59	94	84	94	58	54	59	60	50	60	94	84	94	1.1	1.5	0.1	NO
NCA07	DN	37 Wongala Cres	G	Residential	54	53	56	56	50	57	93	83	93	54	53	57	56	50	57	93	83	93	56	53	58	58	49	59	93	83	93	1.3	1.8	0.1	NO
NCA07	DN	47 Wongala Cres	G	Residential	57	57	60	60	53	61	96	90	96	58	57	60	60	54	61	97	91	97	60	57	61	62	53	62	97	91	97	1.2	1.7	0.6	NO
NCA07	DN	47 Wongala Cres	1	Residential	59	58	62	61	55	62	98	92	98	59	59	62	61	55	62	99	93	99	61	58	63	63	54	64	99	93	99	1.3	1.8	0.7	NO
NCA07	DN	49 Wongala Cres	G	Residential	61	61	64	63	57	64	100	95	100	61	61	64	63	58	64	101	95	101	63	60	65	66	56	66	101	95	101	1.3	1.8	0.4	NO
NCA07	DN	49 Wongala Cres	1	Residential	61	61	64	64	58	65	101	95	101	62	62	65	64	58	65	101	96	101	64	61	66	66	57	67	101	96	101	1.5	2.0	0.9	YES
NCA07	DN	51 Wongala Cres	G	Residential	62	62	65	64	58	65	101	96	101	62	62	65	64	59	65	102	96	102	64	61	66	66	57	67	102	96	102	1.1	1.6	0.3	NO
NCA07	DN	53 Wongala Cres	G	Residential	63	63	66	65	59	66	102	97	102	63	63	66	65	60	66	103	97	103	65	62	67	67	58	68	103	97	103	1.0	1.5	0.3	NO
NCA07	DN	55 Wongala Cres	G	Residential	63	63	66	65	60	66	102	97	102	63	63	66	65	60	66	103	97	103	65	63	67	67	59	68	103	97	103	0.9	1.4	0.2	NO
NCA07	DN	57 Wongala Cres	G	Residential	63	63	66	65	60	66	102	97	102	63	64	67	66	60	67	103	97	103	66	63	67	68	59	68	103	97	103	1.2	1.7	0.3	NO
NCA07	DN	59 Wongala Cres	G	Residential	62	62	65	64	58	65	101	96	101	62	62	65	64	59	65	101	97	101	64	61	66	66	57	67	101	97	101	1.4	1.9	0.5	NO
NCA07	DN	61 Wongala Cres	G	Residential	62	62	65	64	58	65	101	97	101	63	63	66	65	59	66	102	97	102	65	62	67	67	58	67	102	97	102	1.5	2.0	0.6	YES
NCA07	DN	63 Wongala Cres	G	Residential	62	62	65	65	59	66	101	96	101	63	63	66	65	59	66	102	97	102	65	62	67	67	58	68	102	97	102	1.5	2.0	0.6	YES
NCA07	DN	65 Wongala Cres	G	Residential	62	62	65	64	58	65	101	96	101	63	62	66	65	59	66	102	96	102	65	62	66	67	58	67	102	96	102	1.4	1.9	0.6	NO
NCA07	DN	65 Wongala Cres	1	Residential	63	63	66	65	60	66	102	97	102	64	64	67	66	60	67	103	97	103	66	63	68	68	59	68	103	97	103	1.5	2.0	0.5	YES
NCA07	DN	75 Wongala Cres	G	Residential	60	60	63	62	57	63	99	94	99	60	60	63	62	57	63	99	94	99	62	59	64	64	55	65	99	94	99	1.2	1.7	0.0	NO
NCA07	DN	75 Wongala Cres	1	Residential	61	61	64	63	58	64	100	94	100	61	61	64	63	58	64	100	94	100	63	60	65	65	56	66	100	94	100	1.3	1.8	0.0	NO
NCA07	DN	77 Wongala Cres	G	Residential	57	57	60	60	54	61	96	91	96	58	57	61	60	54	61	96	91	96	60	57	62	62	53	62	96	91	96	1.2	1.7	0.1	NO
NCA07	DN	77 Wongala Cres	1	Residential	60	60	63	62	56	63	99	93	99	60	60	63	62	56	63	99	93	99	62	59	64	64	55	65	99	93	99	1.3	1.7	0.2	NO
NCA07	DN	79 Wongala Cres	G	Residential	63	63	66	65	59	66	102	97	102	63	63	66	65	59	66	102	97	102	65	62	67	67	58	68	102	97	102	1.3	1.8	0.0	NO
NCA07	DN	79 Wongala Cres	1	Residential	63	63	66	65	60	66	102	97	102	64	64	67	66	60	67	102	97	102	66	63	68	68	59	68	102	97	102	1.4	2.0	0.3	NO
NCA07	DN	81 Wongala Cres	G	Residential	61	61	64	63	58	64	99	97	99	61	60	64	63	57	64	99	96	99	63	59	65	65	55	66	99	96	99	0.7	1.1	ĩ0.7	NO
NCA07	DN	81 Wongala Cres	1	Residential	63	63	66	65	60	66	102	97	102	63	63	66	65	60	66	102	97	102	66	62	67	67	58	68	102	97	102	1.3	1.8	0.3	NO
NCA07	DN	89 Wongala Cres	G	Residential	64	64	67	66	61	67	103	98	103	64	64	67	66	61	67	103	98	103	67	63	68	68	59	69	103	98	103	1.2	1.7	0.0	NO
NCA07	DN	89 Wongala Cres	1	Residential	64	65	67	67	61	68	104	98	104	65	65	68	67	61	68	104	98	104	67	64	69	69	60	69	104	98	104	1.2	1.8	0.0	NO
NCA07	DN	89 Wongala Cres	2	Residential	64	65	68	67	61	68	104	98	104	65	65	68	67	61	68	104	98	104	67	64	69	69	60	69	104	98	104	1.2	1.8	0.1	NO
NCA07	DN	93 Wongala Cres	G	Residential	63	64	66	66	60	67	103	97	103	64	63	67	66	60	67	102	97	102	66	63	67	68	59	68	102	97	102	1.1	1.6	ĩ0.1	NO
NCA07	DN	97 Wongala Cres	G	Residential	63	64	67	66	60	67	103	97	103	64	64	67	66	60	67	103	97	103	66	63	68	68	59	68	103	97	103	1.1	1.6	0.0	NO
NCA07	DN	95 Wongala Cres	G	Residential	63	63	66	65	60	66	102	96	102	63	63	66	65	60	66	102	96	102	66	62	67	67	58	68	102	96	102	1.1	1.6	0.0	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA07	DN	99 Wongala Cres	G	Residential	63	64	66	66	60	67	102	98	102	64	63	67	66	60	67	102	98	102	66	63	68	68	59	68	102	98	102	1.2	1.7	0.0	NO
NCA07	DN	107 Wongala Cres	G	Residential	61	61	64	64	58	65	100	95	100	62	61	64	64	58	65	100	95	100	64	60	65	66	56	66	100	95	100	1.1	1.6	0.0	NO
NCA07	DN	107 Wongala Cres	1	Residential	62	62	65	64	58	65	101	96	101	62	62	65	64	58	65	101	96	101	64	61	66	66	57	67	101	96	101	1.0	1.5	0.0	NO
NCA07	DN	105 Wongala Cres	G	Residential	62	62	65	64	58	65	101	96	101	62	62	65	64	58	65	101	96	101	64	61	66	66	57	67	101	96	101	1.1	1.6	0.0	NO
NCA07	DN	109 Wongala Cres	G	Residential	61	61	64	63	57	64	100	95	100	61	61	64	63	57	64	100	95	100	63	60	65	65	56	66	100	95	100	1.0	1.5	ĩ0.1	NO
NCA07	DN	109 Wongala Cres	1	Residential	62	62	65	64	58	65	101	96	101	62	62	65	64	58	65	101	96	101	64	61	66	66	57	66	101	96	101	0.8	1.3	ĩ0.2	NO
NCA07	DN	111 Wongala Cres	G	Residential	60	60	63	62	56	63	99	93	99	60	60	63	62	56	63	99	93	99	62	59	64	64	55	64	99	93	99	0.9	1.5	ĩ0.1	NO
NCA07	DN	113ĩ115 Wongala Cres	G	Residential	59	59	62	61	55	62	98	92	98	59	59	62	61	55	62	98	92	98	61	58	63	63	54	63	98	92	98	1.1	1.6	0.1	NO
NCA07	DN	113ĩ115 Wongala Cres	1	Residential	59	59	62	61	56	62	99	93	99	59	59	62	61	56	62	99	93	99	61	58	63	63	54	64	99	93	99	0.9	1.5	0.0	NO
NCA07	DN	27A Wongala Cres	G	Residential	60	59	62	62	55	63	99	94	99	59	57	61	61	53	62	98	92	98	61	57	63	63	52	64	98	92	98	0.1	0.6	ĩ1.1	NO
NCA07	DN	71ĩ73 Wongala Cres	G	Residential	63	63	66	65	59	66	102	96	102	63	63	66	65	60	66	102	97	102	66	62	67	68	58	68	102	97	102	1.5	2.0	0.5	YES
NCA07	DN	71ĩ73 Wongala Cres	1	Residential	63	63	66	66	60	67	103	97	103	64	64	67	66	60	67	103	97	103	66	63	68	68	59	69	103	97	103	1.5	2.0	0.5	YES
NCA07	DN	67 Wongala Cres	G	Residential	63	63	66	65	59	66	102	97	102	63	63	66	65	59	66	102	97	102	65	62	67	67	58	68	102	97	102	1.3	1.7	0.2	NO
NCA07	DN	67 Wongala Cres	1	Residential	63	63	66	65	60	66	103	97	103	64	64	67	66	60	67	103	98	103	66	63	68	68	59	68	103	98	103	1.4	2.0	0.4	NO
NCA07	DN	67A Wongala Cres	G	Residential	62	61	65	64	58	65	101	94	101	62	61	65	64	58	65	101	94	101	64	61	66	66	57	67	101	94	101	1.2	1.6	0.2	NO
NCA07	DN	67A Wongala Cres	1	Residential	63	63	66	65	59	66	102	95	102	63	63	66	65	60	66	103	96	103	65	62	67	68	58	68	103	96	103	1.5	2.0	0.5	YES
NCA07	DN	101ĩ103 Wongala Cres	G	Residential	62	62	65	64	59	66	101	96	101	63	62	66	65	59	66	101	96	101	65	62	67	67	58	67	101	96	101	1.2	1.7	0.1	NO
NCA07	UP	1 Tristania Way	G	Residential	61	61	64	64	58	65	100	95	100	62	61	64	64	58	65	100	95	100	64	60	65	66	57	66	100	95	100	1.1	1.6	0.1	NO
NCA07	UP	3 Tristania Way	G	Residential	54	55	57	57	51	58	93	88	93	55	55	58	57	51	58	94	88	94	57	54	58	59	50	59	94	88	94	1.0	1.5	0.1	NO
NCA07	UP	5 Cassia Grove	G	Residential	59	59	62	61	55	62	98	92	98	59	59	62	61	55	62	98	92	98	61	58	63	63	54	64	98	92	98	1.1	1.5	0.0	NO
NCA07	UP	7 Cassia Grove	G	Residential	53	53	56	56	50	57	89	83	89	54	53	57	56	50	57	89	83	89	56	53	58	58	49	58	89	83	89	1.1	1.6	0.0	NO
NCA07	UP	7 Cassia Grove	1	Residential	56	56	59	58	53	60	93	88	93	57	56	60	59	53	60	93	88	93	59	56	61	61	52	61	93	88	93	1.2	1.7	0.1	NO
NCA07	UP	8 Cassia Grove	G	Residential	50	50	53	52	46	53	88	79	88	50	50	53	52	46	53	88	79	88	52	49	54	54	45	55	88	79	88	1.1	1.5	0.1	NO
NCA07	UP	8 Cassia Grove	1	Residential	52	51	54	54	48	55	90	81	90	52	51	54	54	47	55	90	81	90	54	50	56	56	46	56	90	81	90	1.2	1.6	0.0	NO
NCA07	UP	9 Cassia Grove	G	Residential	54	55	58	56	52	58	86	80	86	54	55	58	56	52	58	85	80	85	57	55	59	58	51	59	85	80	85	0.8	1.3	ĩ0.2	NO
NCA07	UP	10 Cassia Grove	G	Residential	49	49	52	52	46	53	86	79	86	49	49	52	51	46	52	86	79	86	52	49	53	54	45	54	86	79	86	1.0	1.5	0.0	NO
NCA07	UP	11 Cassia Grove	G	Residential	55	56	59	57	53	59	85	81	85	55	56	59	57	53	58	84	81	84	57	56	59	59	52	60	84	81	84	0.6	1.2	ĩ0.3	NO
NCA07	UP	12 Cassia Grove	G	Residential	45	45	48	47	41	48	81	71	81	45	45	48	47	42	48	81	71	81	47	45	49	49	40	50	81	71	81	1.1	1.6	0.0	NO
NCA07	UP	12 Cassia Grove	1	Residential	47	47	50	49	43	50	83	73	83	47	47	50	49	44	50	83	73	83	49	46	51	51	42	52	83	73	83	1.1	1.6	ĩ0.1	NO
NCA07	UP	14 Cassia Grove	G	Residential	50	51	53	52	47	53	83	75	83	50	51	53	52	47	53	83	75	83	52	50	54	54	46	54	83	75	83	0.9	1.5	0.0	NO
NCA07	UP	14 Cassia Grove	1	Residential	53	54	56	55	50	56	85	78	85	53	54	56	55	50	56	85	78	85	55	53	57	57	49	57	85	78	85	0.9	1.4	0.1	NO
NCA07	UP	15 Cassia Grove	G	Residential	56	57	60	58	54	60	86	83	86	56	58	60	58	54	60	86	83	86	58	57	61	60	53	61	86	83	86	0.9	1.4	ĩ0.5	NO
NCA07	UP	6 Clement Cl	G	Residential	56	57	59	58	53	59	88	83	88	57	58	60	59	54	60	87	85	87	59	57	61	61	53	61	87	85	87	1.7	2.0	ĩ0.6	YES
NCA07	UP	6 Clement Cl	1	Residential	57	59	61	59	55	61	88	85	88	57	59	61	59	56	61	87	85	87	59	59	62	61	54	62	87	85	87	1.1	1.6	ĩ0.6	NO
NCA07	UP	8 Clement Cl	G	Residential	52	52	55	54	48	55	83	78	83	52	53	55	54	49	55	83	79	83	54	52	56	56	48	56	83	79	83	1.3	1.7	ĩ0.5	NO
NCA07	UP	8 Clement Cl	1	Residential	53	54	56	55	50	56	84	79	84	53	54	57	55	51	56	83	80	83	55	53	57	57	49	58	83	80	83	1.1	1.5	ĩ0.5	NO
NCA07	UP	10 Clement Cl	G	Residential	51	51	54	53	47	54	83	77	83	51	52	55	53	49	54	82	78	82	53	51	55	55	47	56	82	78	82	1.5	1.9	ĩ0.5	NO
NCA07	UP	10 Clement Cl	1	Residential	52	53	55	54	49	55	83	78	83	52	53	56	54	50	56	82	79	82	54	53	57	56	49	57	82	79	82	1.2	1.6	ĩ0.5	NO
NCA06	UP	2 Malton Rd	G	Residential	62	61	65	65	57	65	102	95	102	63	61	65	65	57	65	102	96	102	65	60	66	67	56	67	102	96	102	1.3	1.7	0.0	NO
NCA06	UP	2 Malton Rd	1	Residential	63	62	66	66	58	66	103	97	103	63	62	66	66	58	66	102	97	102	66	61	67	68	57	68	102	97	102	1.1	1.6	ĩ0.2	NO
NCA07	UP	1 Garrett Rd	G	Residential	53	52	56	56	48	56	92	85	92	53	51	56	56	48	56	92	85	92	56	51	57	58	46	58	92	85	92	1.3	1.7	0.1	NO
NCA07	UP	1 Garrett Rd	1	Residential	56	54	58	58	50	59	95	88	95	56	54	58	58	50	59	95	88	95	58	53	59	60	49	60	95	88	95	1.2	1.7	ĩ0.1	NO
NCA07	UP	1 Narena Cl	G	Residential	59	59	62	62	55	63	99	94	99	59	59	62	61	56	62	99	94	99	61	58	63	63	55	64	99	94	99	0.7	1.3	0.1	NO
NCA07	UP	2 Narena Cl	G	Residential	60	59	62	62	55	63	98	90	98	60	59	62	62	55	63	98	90	98	62	58	63	64	54	64	98	90	98	1.2	1.6	0.3	NO
NCA07	UP	2 Narena Cl	1	Residential	62	61	65	64	58	65	100	94	100	62	62	65	64	58	65	101	94	101	64	61	66	66	57	67	101	94	101	1.3	1.8	0.3	NO
NCA07	UP	3 Narena Cl	G	Residential	52	51	55	54	47	55	90	82	90	52	51	55	54	48	55	90	82	90	54	50	56	56	46	57	90	82	90	1.2	1.7	0.3	NO
NCA07	UP	4 Narena Cl	G	Residential	56	55	59	58	51	59	94	89	94	56	55	59	58	52	59	94	89	94	58	54	60	60	50	61	94	89	94	1.1	1.5	0.2	NO
NCA07	UP	4 Narena Cl	1	Residential	59	59	62	61	55	62	98	93	98	59	59	62	61	55	62	98	93	98	61	58	63	63	54	64	98	93	98	1.1	1.6	0.1	NO
NCA07	UP	6 Narena Cl	G	Residential	55	55	58	57	51	58	94	89	94	55	55	58	57	51	58	94	89	94	57	54	59	59	50	60	94	89	94	1.0	1.5	0.1	NO
NCA07	UP	2 Tristania Way	G	Residential	61	61	64	63	57	64	100	95	100	60	61	64	62	57	64	100	95	100	62	60	64	65	56	65	100	95	100	0.7	1.3	0.1	NO
NCA07	UP	2 Tristania Way	1	Residential	61	62	65	64	58	65	101	96	101	61	62	64	63	58	64	101	96	101	63	61	65	65	57	66	101	96	101	0.6	1.2	0.1	NO
NCA07	UP	110ĩ112 Sutherland Rd	G	Residential	56	55	59	59	51	59	95	88	95	56	55	59	58	51	59	95	88	95	58	54	60	60	50	61	95	88	95	1.1	1.4	ĩ0.1	NO
NCA07	UP	114 Sutherland Rd	G	Residential	52	51	55	54	47	55	90	81	90	52	51	54	54	47	55	90	80	90	54	50	56	56	46	56	90	80	90	1.0	1.4	ĩ0.2	NO
NCA07	UP	116 Sutherland Rd	G	Residential	54	53	56	56	49	57	92	84	92	54	53	56	56	49	57	92	84	92	56	52	57	58	48	58	92	84	92	1.0	1.5	ĩ0.2	NO
NCA07	UP	118 Sutherland Rd	G	Residential	51	51	54	54	47	55	90	80	90	52	51	54	54	47	54	90	80	90	54	50	55	56	46	56	90	80	90	1.1	1.6	0.0	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax					
NCA	**Side**	**Address**	**Level**	**Description**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**day**	**night**	**max**	**trig?**
NCA07	UP	120A Sutherland Rd	G	Residential	56	55	59	58	52	59	95	88	95	56	55	59	58	52	59	95	88	95	58	55	60	60	51	61	95	88	95	1.2	1.6	0.0	NO
NCA07	UP	120 Sutherland Rd	G	Residential	52	51	54	54	48	55	90	81	90	52	51	54	54	48	55	90	81	90	54	50	55	56	46	56	90	81	90	1.1	1.5	0.0	NO
NCA07	UP	120 Sutherland Rd	1	Residential	54	54	57	57	50	57	93	83	93	55	54	57	57	50	57	93	83	93	57	53	58	59	49	59	93	83	93	1.2	1.7	0.1	NO
NCA07	UP	120 Sutherland Rd	G	Residential	51	51	54	54	47	54	90	80	90	51	51	54	53	47	54	90	80	90	54	50	55	56	46	56	90	80	90	1.1	1.5	ĩ0.1	NO
NCA07	UP	124 Sutherland Rd	G	Residential	59	58	62	61	55	62	97	92	97	59	58	62	61	55	62	98	93	98	61	58	63	63	54	64	98	93	98	1.1	1.6	0.1	NO
NCA07	UP	126 Sutherland Rd	G	Residential	61	61	64	63	57	64	100	95	100	61	61	64	63	57	64	100	95	100	63	60	65	65	56	66	100	95	100	1.1	1.6	0.2	NO

Individual Receiver Noise Model Results ‘ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA07	UP	128 Sutherland Rd	G	Residential	62	61	64	64	58	65	101	96	101	62	62	65	64	58	65	101	96	101	64	61	66	66	57	67	101	96	101	1.1	1.7	0.4	NO
NCA07	UP	132 Sutherland Rd	G	Residential	59	58	62	62	55	62	98	94	98	58	57	60	60	53	61	97	92	97	60	56	61	62	52	63	97	92	97	‘0.4	0.2	‘1.5	NO
NCA07	UP	134 Sutherland Rd	G	Residential	62	61	65	64	58	65	101	97	101	61	61	64	63	58	64	101	96	101	63	60	65	65	57	66	101	96	101	0.4	1.0	‘0.2	NO
NCA07	UP	136 Sutherland Rd	G	Residential	61	61	64	63	57	64	100	95	100	61	61	64	63	57	64	100	95	100	63	60	65	65	56	65	100	95	100	0.7	1.2	0.0	NO
NCA07	UP	112A Sutherland Rd	G	Residential	55	53	57	57	49	58	93	85	93	55	53	57	57	49	57	93	85	93	57	53	58	59	48	59	93	85	93	1.1	1.4	0.0	NO
NCA07	UP	112A Sutherland Rd	1	Residential	57	56	60	60	52	60	96	88	96	57	56	60	59	52	60	96	88	96	60	55	61	61	51	62	96	88	96	1.2	1.5	0.0	NO
NCA07	UP	122 Sutherland Rd	G	Residential	55	54	58	57	51	58	93	87	93	55	54	58	57	51	58	94	87	94	57	54	59	59	50	60	94	87	94	1.2	1.7	0.1	NO
NCA07	UP	122 Sutherland Rd	1	Residential	58	58	61	61	54	61	97	91	97	59	58	61	61	54	62	97	91	97	61	57	62	63	53	63	97	91	97	1.3	1.7	0.1	NO
NCA07	UP	122B Sutherland Rd	G	Residential	54	54	57	57	50	58	93	85	93	55	54	57	57	51	58	93	85	93	57	53	58	59	49	59	93	85	93	1.1	1.6	0.0	NO
NCA07	UP	122A Sutherland Rd	G	Residential	53	53	56	55	49	56	92	86	92	53	53	56	55	49	56	92	86	92	55	52	57	57	48	58	92	86	92	1.0	1.5	0.0	NO
NCA07	UP	5 Tristania Way	G	Residential	49	49	52	51	45	52	85	79	85	49	49	52	51	45	52	85	79	85	52	48	53	53	44	54	85	79	85	1.0	1.5	0.0	NO
NCA07	UP	7 Tristania Way	G	Residential	50	50	53	52	46	53	88	83	88	50	50	53	52	46	53	88	83	88	52	49	54	54	45	55	88	83	88	1.0	1.6	0.0	NO
NCA08	DN	72 Yarrara Rd	1	Residential	59	58	62	61	54	62	91	86	91	62	62	65	64	57	65	94	91	94	64	61	66	66	57	67	94	91	94	4.5	4.6	3.5	YES
NCA08	DN	74 Yarrara Rd	1	Residential	59	58	62	61	54	62	91	86	91	62	62	65	64	57	65	94	91	94	64	61	66	66	57	67	94	91	94	4.4	4.5	3.3	YES
NCA08	DN	78 Yarrara Rd	1	Residential	59	57	61	61	53	62	91	85	91	62	61	64	64	57	64	94	90	94	64	61	66	66	56	66	94	90	94	4.4	4.5	2.8	YES

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					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA08	DN	5 City View Rd	G	Residential	59	60	62	61	56	62	90	86	90	59	60	62	61	56	62	91	86	91	61	59	63	63	55	64	91	86	91	1.1	1.6	1.1	NO
NCA08	DN	5 City View Rd	1	Residential	59	60	63	61	56	63	90	86	90	60	60	63	61	56	63	91	86	91	62	59	64	63	55	64	91	86	91	1.0	1.5	1.3	NO
NCA08	DN	5 City View Rd	2	Residential	59	61	63	61	57	63	90	86	90	60	61	63	62	57	63	91	86	91	62	60	64	64	56	64	91	86	91	1.1	1.6	1.3	NO
NCA08	DN	5 City View Rd	3	Residential	59	61	63	61	57	63	90	86	90	60	61	63	62	57	63	91	86	91	62	60	64	64	56	64	91	86	91	1.0	1.6	1.3	NO
NCA08	DN	5 City View Rd	4	Residential	59	61	63	61	57	63	90	86	90	60	61	63	62	57	63	91	86	91	62	60	64	64	56	64	91	86	91	1.0	1.6	1.3	NO
NCA08	DN	5 City View Rd	5	Residential	59	61	63	61	57	63	90	86	90	60	61	63	62	57	63	91	86	91	62	60	64	64	56	64	91	86	91	1.0	1.6	1.2	NO
NCA08	DN	5 City View Rd	6	Residential	59	61	63	61	57	63	89	86	89	60	61	63	62	57	63	91	86	91	62	60	64	64	56	64	91	86	91	1.0	1.6	1.2	NO
NCA08	DN	5 City View Rd	7	Residential	59	61	63	61	57	63	89	86	89	60	61	63	62	57	63	90	85	90	62	60	64	64	56	64	90	85	90	1.0	1.6	1.1	NO
NCA08	DN	5 City View Rd	G	Residential	59	61	63	62	57	63	91	87	91	60	61	63	62	57	63	92	87	92	62	60	64	64	56	65	92	87	92	1.1	1.7	1.3	NO
NCA08	DN	5 City View Rd	1	Residential	60	61	63	62	57	63	90	87	90	60	61	64	62	57	63	92	87	92	62	60	64	64	56	65	92	87	92	1.1	1.6	1.4	NO
NCA08	DN	5 City View Rd	2	Residential	60	61	63	62	57	63	90	87	90	60	61	64	62	57	63	92	87	92	63	60	65	64	56	65	92	87	92	1.1	1.7	1.3	NO
NCA08	DN	5 City View Rd	3	Residential	60	61	63	62	57	63	90	87	90	60	61	64	62	57	63	92	87	92	63	60	65	64	56	65	92	87	92	1.1	1.7	1.3	NO
NCA08	DN	5 City View Rd	4	Residential	60	61	63	62	57	63	90	86	90	60	61	64	62	57	63	92	87	92	63	60	65	64	56	65	92	87	92	1.2	1.6	1.3	NO
NCA08	DN	5 City View Rd	5	Residential	60	61	63	62	57	63	90	86	90	60	61	64	62	57	63	91	86	91	62	60	64	64	56	65	91	86	91	1.1	1.6	1.3	NO
NCA08	DN	5 City View Rd	6	Residential	60	61	63	62	57	63	90	86	90	60	61	64	62	57	63	91	86	91	62	60	64	64	56	65	91	86	91	1.1	1.6	1.1	NO
NCA08	DN	5 City View Rd	7	Residential	60	61	63	62	57	63	90	86	90	60	61	63	62	57	63	91	86	91	62	60	64	64	56	65	91	86	91	1.0	1.6	1.1	NO
NCA08	DN	94 Yarrara Rd	1	Residential	58	56	60	60	51	60	90	82	90	60	59	63	62	55	63	91	88	91	62	59	64	64	54	64	91	88	91	4.0	4.2	1.6	YES
NCA08	UP	27 Azalea Grove	G	Residential	57	56	60	59	53	60	88	82	88	57	58	61	60	54	61	88	85	88	60	57	61	62	53	62	88	85	88	1.8	2.1	ĩ0.5	YES
NCA08	UP	27 Azalea Grove	1	Residential	58	59	62	60	55	62	88	85	88	58	60	62	60	56	62	88	86	88	61	59	63	63	55	63	88	86	88	1.2	1.7	ĩ0.4	NO
NCA08	UP	32 Azalea Grove	G	Residential	49	49	52	52	45	53	82	76	82	50	50	53	52	47	53	81	78	81	52	50	54	54	46	55	81	78	81	1.8	2.1	ĩ0.6	NO
NCA08	UP	32 Azalea Grove	1	Residential	50	50	53	52	47	53	82	77	82	50	51	54	53	48	54	81	78	81	53	51	55	55	47	55	81	78	81	1.5	1.9	ĩ0.6	NO
NCA08	UP	34 Azalea Grove	G	Residential	53	52	55	55	48	56	84	78	84	53	53	56	55	50	56	83	80	83	55	53	57	57	49	58	83	80	83	1.7	2.0	ĩ0.6	NO
NCA08	UP	34 Azalea Grove	1	Residential	53	53	56	55	50	56	83	80	83	53	54	57	56	51	57	83	81	83	56	54	58	58	50	58	83	81	83	1.4	1.8	ĩ0.7	NO
NCA08	UP	36 Azalea Grove	G	Residential	54	54	57	57	50	58	86	80	86	55	55	58	57	52	58	86	82	86	57	55	59	59	51	60	86	82	86	1.7	2.0	ĩ0.5	NO
NCA08	UP	36 Azalea Grove	1	Residential	55	56	58	57	52	58	86	82	86	55	57	59	58	53	59	86	83	86	58	56	60	60	52	60	86	83	86	1.4	1.8	ĩ0.6	NO
NCA08	UP	38 Azalea Grove	G	Residential	58	54	60	60	50	61	91	80	91	58	56	60	60	52	60	91	82	91	60	55	61	62	51	62	91	82	91	1.4	1.5	ĩ0.1	NO
NCA08	UP	14 Binomea Pl	G	Residential	53	54	57	56	50	57	84	79	84	53	54	57	56	51	57	83	79	83	56	54	58	58	50	58	83	79	83	1.0	1.4	ĩ0.1	NO
NCA08	UP	15 Binomea Pl	G	Residential	49	49	52	51	46	52	82	77	82	49	50	53	51	47	53	82	78	82	51	49	54	53	45	54	82	78	82	1.4	1.8	ĩ0.4	NO
NCA08	UP	15 Binomea Pl	1	Residential	50	51	53	52	47	53	82	77	82	50	51	54	52	47	53	82	78	82	52	50	54	54	46	55	82	78	82	0.9	1.4	ĩ0.4	NO
NCA08	UP	16 Binomea Pl	G	Residential	53	53	56	55	49	56	85	81	85	53	54	56	55	50	56	85	81	85	55	53	57	57	49	58	85	81	85	1.2	1.7	ĩ0.7	NO
NCA08	UP	17 Binomea Pl	G	Residential	52	51	55	54	47	55	85	79	85	52	52	55	54	49	55	85	81	85	54	52	56	56	48	57	85	81	85	1.7	2.0	ĩ0.7	NO
NCA08	UP	17 Binomea Pl	1	Residential	53	53	56	55	49	56	85	81	85	53	54	56	55	50	56	85	81	85	55	53	57	57	49	58	85	81	85	1.2	1.6	ĩ0.6	NO
NCA08	UP	19 Binomea Pl	G	Residential	53	51	55	55	47	56	86	78	86	53	52	56	55	48	56	85	80	85	55	51	57	57	47	57	85	80	85	1.6	1.7	ĩ0.5	NO
NCA08	UP	19 Binomea Pl	1	Residential	53	53	56	56	49	57	86	80	86	54	54	57	56	50	57	85	81	85	56	53	58	58	49	58	85	81	85	1.4	1.8	ĩ0.4	NO
NCA08	UP	21 Binomea Pl	G	Residential	59	54	60	61	50	61	92	80	92	58	55	59	60	51	60	92	82	92	60	54	61	62	50	62	92	82	92	0.6	0.8	ĩ0.2	NO
NCA08	UP	21 Binomea Pl	1	Residential	60	59	63	62	55	63	92	86	92	60	60	63	62	56	63	92	87	92	62	59	64	64	55	65	92	87	92	1.2	1.6	ĩ0.3	NO
NCA08	UP	1/18ĩ20 Binomea Pl	G	Residential	60	59	62	62	55	63	92	86	92	60	61	63	62	57	63	92	88	92	62	60	64	64	56	65	92	88	92	1.8	2.0	ĩ0.3	YES
NCA08	UP	1/18ĩ20 Binomea Pl	1	Residential	62	63	66	64	59	65	93	90	93	62	63	65	64	60	65	92	90	92	64	62	66	66	58	66	92	90	92	0.5	1.1	ĩ0.2	NO
NCA08	UP	2/18ĩ20 Binomea Pl	G	Residential	61	62	64	63	58	64	92	88	92	60	62	64	62	58	64	92	88	92	63	61	65	65	57	65	92	88	92	0.5	1.1	ĩ0.2	NO
NCA08	UP	2/18ĩ20 Binomea Pl	1	Residential	61	63	65	63	59	65	92	89	92	61	62	65	63	59	64	92	89	92	63	62	65	65	58	66	92	89	92	0.5	1.1	ĩ0.2	NO
NCA08	UP	3/18ĩ20 Binomea Pl	G	Residential	55	53	57	57	49	58	89	80	89	54	52	57	56	49	57	89	80	89	57	51	58	58	47	59	89	80	89	0.9	1.2	ĩ0.3	NO
NCA08	UP	3/18ĩ20 Binomea Pl	1	Residential	56	56	59	59	53	60	90	83	90	56	56	59	58	53	59	89	83	89	58	55	60	60	51	61	89	83	89	0.8	1.2	ĩ0.5	NO
NCA08	UP	4/18ĩ20 Binomea Pl	G	Residential	55	56	59	58	52	59	88	83	88	56	56	59	58	53	59	87	84	87	58	56	60	60	52	60	87	84	87	1.3	1.7	ĩ0.5	NO
NCA08	UP	4/18ĩ20 Binomea Pl	1	Residential	56	57	60	58	53	60	88	84	88	56	57	60	58	54	60	87	84	87	58	57	61	60	53	61	87	84	87	0.9	1.4	ĩ0.5	NO
NCA08	UP	1 Clement Cl	G	Residential	51	51	54	54	48	55	82	78	82	52	52	55	54	49	55	82	79	82	54	51	56	56	47	56	82	79	82	1.4	1.8	ĩ0.6	NO
NCA08	UP	1 Clement Cl	1	Residential	52	53	55	54	49	55	82	79	82	52	53	56	54	50	56	82	79	82	54	52	57	56	48	57	82	79	82	1.2	1.6	ĩ0.5	NO
NCA08	UP	3 Clement Cl	G	Residential	49	49	52	51	45	52	79	75	79	49	50	52	51	46	52	79	75	79	51	49	53	53	45	54	79	75	79	1.3	1.7	0.0	NO
NCA08	UP	3 Clement Cl	1	Residential	50	50	53	52	47	53	79	76	79	50	51	53	52	47	53	79	76	79	52	50	54	54	46	55	79	76	79	1.1	1.5	0.0	NO
NCA08	UP	4 Clement Cl	G	Residential	56	55	59	58	52	59	88	82	88	56	57	60	58	53	60	87	84	87	58	56	61	61	52	61	87	84	87	1.9	2.2	ĩ0.5	YES
NCA08	UP	4 Clement Cl	1	Residential	57	58	61	59	54	61	88	84	88	57	59	61	59	55	61	87	86	87	60	58	62	62	54	62	87	86	87	1.3	1.7	ĩ0.6	NO
NCA08	UP	1A Hampden Rd	G	Residential	54	52	56	56	48	56	83	75	83	54	53	56	56	49	57	83	76	83	56	52	58	58	48	58	83	76	83	1.6	1.9	0.0	NO
NCA08	UP	1A Hampden Rd	1	Residential	55	54	58	57	50	58	84	77	84	56	55	58	58	51	58	84	79	84	58	54	59	60	50	60	84	79	84	1.7	2.0	0.2	NO
NCA08	UP	2A Hampden Rd	G	Residential	60	60	63	62	56	63	93	85	93	60	59	63	62	56	63	92	85	92	62	59	64	64	54	64	92	85	92	0.8	1.2	ĩ0.2	NO
NCA08	UP	2A Hampden Rd	1	Residential	62	62	65	64	58	65	93	88	93	61	62	65	63	59	65	93	88	93	64	61	66	65	57	66	93	88	93	0.7	1.2	ĩ0.1	NO
NCA08	UP	2B Hampden Rd	G	Residential	55	53	57	57	49	57	88	79	88	55	53	57	57	49	57	87	79	87	57	52	58	59	48	59	87	79	87	1.3	1.6	ĩ0.7	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA08	UP	2B Hampden Rd	1	Residential	57	56	60	59	52	60	90	82	90	58	56	60	59	53	60	89	82	89	60	56	61	61	51	62	89	82	89	1.4	1.6	ĩ0.6	NO
NCA08	UP	2C Hampden Rd	G	Residential	56	55	59	58	52	59	90	82	90	56	55	59	58	52	59	89	82	89	58	55	60	60	51	61	89	82	89	1.0	1.4	ĩ0.6	NO
NCA08	UP	2C Hampden Rd	1	Residential	57	57	60	59	53	60	90	83	90	57	57	60	59	53	60	89	83	89	59	56	61	61	52	61	89	83	89	0.9	1.3	ĩ0.7	NO
NCA08	UP	2 Hampden Rd	G	Residential	51	48	53	53	45	53	84	71	84	51	48	53	52	45	53	83	71	83	53	48	54	54	44	55	83	71	83	1.3	1.5	ĩ0.5	NO
NCA08	UP	2 Hampden Rd	1	Residential	54	51	56	56	47	56	87	73	87	54	51	56	56	47	56	87	74	87	56	50	57	58	46	58	87	74	87	1.6	1.7	ĩ0.1	NO
NCA08	UP	381 Pennant Hills Rd	G	Residential	46	45	49	48	41	49	75	68	75	46	45	49	48	41	49	75	68	75	48	44	50	50	40	50	75	68	75	1.1	1.5	0.0	NO
NCA08	UP	381 Pennant Hills Rd	1	Residential	48	48	51	50	44	51	78	70	78	48	47	51	50	43	51	78	70	78	50	47	52	52	42	53	78	70	78	1.3	1.7	ĩ0.1	NO
NCA08	UP	381 Pennant Hills Rd	G	Residential	52	50	55	54	46	55	84	78	84	53	52	56	55	47	56	85	79	85	56	51	57	57	47	58	85	79	85	2.3	2.6	0.6	NO
NCA08	UP	381 Pennant Hills Rd	1	Residential	53	51	55	55	47	56	85	78	85	54	53	57	56	48	57	86	81	86	57	52	58	58	48	59	86	81	86	2.6	2.8	0.6	NO
NCA08	UP	381 Pennant Hills Rd	G	Residential	51	49	53	53	46	54	81	75	81	52	50	54	53	46	54	81	74	81	54	50	55	56	45	56	81	74	81	2.0	2.3	0.0	NO
NCA08	UP	381 Pennant Hills Rd	1	Residential	53	52	56	55	48	56	82	76	82	54	53	56	55	49	56	82	76	82	56	52	57	57	48	58	82	76	82	1.7	2.1	0.0	NO
NCA08	UP	381 Pennant Hills Rd	G	Residential	52	49	54	54	45	55	85	77	85	53	51	55	55	46	55	85	79	85	55	50	56	57	46	57	85	79	85	2.5	2.6	0.1	NO
NCA08	UP	381 Pennant Hills Rd	1	Residential	53	49	54	55	45	55	86	78	86	54	52	56	56	47	56	86	80	86	56	51	57	58	47	58	86	80	86	2.8	2.8	0.3	NO
NCA08	UP	381 Pennant Hills Rd	G	Residential	53	51	55	55	47	56	82	75	82	54	52	56	56	48	56	83	77	83	56	51	57	58	47	58	83	77	83	2.2	2.4	0.7	NO
NCA08	UP	381 Pennant Hills Rd	1	Residential	54	53	57	56	49	57	83	77	83	55	54	58	57	50	58	84	79	84	57	53	59	59	49	59	84	79	84	2.2	2.4	0.8	NO

Individual Receiver Noise Model Results ‐ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA09	DN	70 Yarrara Rd	G	Other	58	58	61	61	53	61	90	85	90	60	60	63	62	55	63	92	87	92	63	59	64	64	54	65	92	87	92	3.0	3.2	2.0	NO
NCA09	DN	70 Yarrara Rd	G	Other	59	58	62	62	54	62	91	85	91	62	61	64	64	57	64	94	88	94	64	60	66	66	56	66	94	88	94	3.8	3.8	2.9	NO
NCA09	DN	52‐54 Yarrara Rd	G	Active Recreation	58	57	60	60	53	61	89	83	89	59	58	62	61	54	62	90	86	90	62	57	63	63	53	63	90	86	90	2.7	2.7	0.8	NO
NCA09	DN	52‐54 Yarrara Rd	G	Active Recreation	55	54	57	57	50	57	86	81	86	55	55	58	57	51	58	87	82	87	58	54	60	59	50	60	87	82	87	2.1	2.4	0.7	NO
NCA09	DN	1‐3 Stevens St	G	Residential	59	59	62	61	55	62	91	86	91	60	60	63	62	56	63	91	86	91	62	60	64	64	55	64	91	86	91	2.0	2.4	0.8	YES
NCA09	DN	26 Yarrara Rd	G	Residential	58	58	61	60	54	61	89	84	89	59	59	62	61	55	62	90	85	90	62	59	63	63	54	64	90	85	90	2.3	2.5	0.7	YES
NCA09	DN	28 Yarrara Rd	G	Residential	58	57	60	60	53	61	88	83	88	59	59	62	61	54	62	89	85	89	61	58	63	63	53	63	89	85	89	2.4	2.6	0.7	YES
NCA09	DN	56 Yarrara Rd	G	Residential	58	58	61	60	54	61	89	85	89	60	59	63	62	55	62	90	87	90	62	58	64	64	54	64	90	87	90	2.6	2.9	0.9	YES
NCA09	DN	58 Yarrara Rd	G	Residential	58	57	61	60	52	61	90	86	90	60	59	62	62	54	62	91	87	91	62	58	63	63	54	64	91	87	91	2.9	3.0	1.0	YES

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	Freight	Passenger	Total	day	night	max	trig?
NCA10	DN	1 Fulbourne Av	G	Educational	58	58	61	60	54	61	91	85	91	59	58	62	61	54	62	92	87	92	62	58	63	63	53	63	92	87	92	2.2	2.4	0.9	NO
NCA10	DN	1 Fulbourne Av	G	Educational	56	57	60	58	53	59	90	85	90	57	57	60	59	53	60	91	86	91	60	56	62	61	52	62	91	86	91	1.9	2.2	0.9	NO
NCA10	DN	2 Stevens St	G	Residential	58	59	62	60	55	62	90	86	90	59	60	63	61	56	62	91	86	91	62	59	64	63	55	64	91	86	91	2.0	2.2	0.8	YES
NCA10	DN	4 Yarrara Rd	G	Residential	54	53	56	56	49	56	85	78	85	54	54	57	56	50	57	84	81	84	57	54	58	58	49	58	84	81	84	2.0	1.8	ĩ1.7	NO
NCA10	DN	6 Yarrara Rd	G	Residential	53	53	56	55	48	56	85	78	85	53	53	56	55	49	56	82	79	82	56	53	58	57	48	57	82	79	82	1.8	1.6	ĩ2.4	NO
NCA10	DN	8 Yarrara Rd	G	Residential	53	53	56	55	48	56	85	78	85	53	53	56	55	49	56	82	79	82	56	53	58	57	48	57	82	79	82	1.6	1.4	ĩ2.7	NO
NCA10	DN	12 Yarrara Rd	G	Residential	52	52	55	54	48	55	83	76	83	54	53	57	56	49	57	88	78	88	57	53	59	58	48	58	88	78	88	3.3	3.2	5.0	YES
NCA10	DN	12 Yarrara Rd	G	Residential	54	54	57	56	50	57	85	78	85	56	56	59	58	52	59	89	80	89	58	55	60	59	50	60	89	80	89	3.3	3.3	3.9	YES
NCA10	DN	14 Yarrara Rd	G	Residential	54	55	58	56	51	57	86	80	86	57	57	60	58	53	59	89	82	89	59	56	61	60	52	61	89	82	89	3.5	3.6	3.4	YES
NCA10	DN	16 Yarrara Rd	G	Residential	55	56	58	57	52	58	87	82	87	57	57	60	59	53	60	90	83	90	59	57	61	61	52	61	90	83	90	3.1	3.3	2.8	YES
NCA10	DN	18 Yarrara Rd	G	Residential	55	57	59	57	53	58	87	83	87	57	58	60	59	54	60	89	84	89	59	57	61	60	52	61	89	84	89	2.3	2.7	2.1	YES
NCA10	DN	22 Yarrara Rd	G	Residential	55	57	59	57	53	58	87	84	87	56	58	60	58	54	59	88	84	88	59	57	61	60	53	61	88	84	88	1.9	2.3	0.7	YES
NCA10	DN	24 Yarrara Rd	G	Residential	58	61	62	60	57	62	89	87	89	59	60	63	60	57	62	90	87	90	61	60	63	62	55	63	90	87	90	1.0	1.6	0.7	NO
NCA10	DN	24 Yarrara Rd	G	Residential	58	60	62	60	56	61	89	87	89	58	60	62	60	56	62	90	87	90	61	60	63	62	55	63	90	87	90	1.2	1.7	0.7	NO
NCA10	DN	2 Yarrara Rd	G	Pl of Worship	53	52	55	55	47	55	85	78	85	53	54	57	55	49	56	85	82	85	56	54	58	57	49	58	85	82	85	2.6	2.4	ĩ0.3	NO
NCA10	DN	2 Yarrara Rd	1	Pl of Worship	55	54	57	57	49	57	86	80	86	55	56	59	57	51	58	86	84	86	58	56	60	59	51	60	86	84	86	2.5	2.3	ĩ0.4	NO
NCA10	DN	10 Yarrara Rd	G	Pl of Worship	54	53	57	56	49	57	85	76	85	54	54	58	56	50	57	85	77	85	57	54	59	58	49	59	85	77	85	2.3	2.1	ĩ0.1	NO
NCA10	UP	311 Pennant Hills Rd	G	Pl of Worship	48	47	51	49	43	50	79	74	79	48	48	51	50	44	51	79	75	79	51	47	53	52	43	52	79	75	79	2.0	2.0	0.0	NO
NCA10	UP	311 Pennant Hills Rd	G	Pl of Worship	46	46	49	48	42	49	77	72	77	46	46	50	48	42	49	77	73	77	49	46	51	50	41	51	77	73	77	1.8	1.8	ĩ0.3	NO
NCA10	UP	2A2 Paling St	G	Residential	47	46	50	49	42	50	80	72	80	47	46	50	49	42	50	79	72	79	50	46	52	51	41	51	79	72	79	1.9	1.5	ĩ0.5	NO
NCA10	UP	2A2 Paling St	1	Residential	51	48	53	52	44	53	84	74	84	51	48	53	53	44	53	84	74	84	54	48	55	54	43	55	84	74	84	2.4	1.9	0.2	NO
NCA10	UP	2A2 Paling St	2	Residential	53	50	55	54	45	55	86	76	86	53	50	55	55	46	55	86	76	86	56	50	57	56	45	57	86	76	86	2.5	1.8	ĩ0.2	NO
NCA10	UP	294ĩ296 Pennant Hills Rd	G	Residential	61	64	66	63	60	65	93	91	93	61	64	66	62	60	64	92	91	92	63	63	66	64	59	65	92	91	92	0.7	0.9	ĩ1.0	NO
NCA10	UP	294ĩ296 Pennant Hills Rd	1	Residential	61	64	66	64	60	65	93	92	93	61	64	66	63	60	65	92	92	92	64	64	67	65	59	66	92	92	92	0.7	1.0	ĩ1.1	NO
NCA10	UP	294ĩ296 Pennant Hills Rd	2	Residential	61	64	66	63	60	65	93	92	93	61	64	66	63	60	65	92	92	92	63	64	67	65	59	66	92	92	92	0.7	1.0	ĩ1.1	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	G	Residential	60	63	65	62	59	64	92	91	92	60	63	65	62	60	64	91	91	91	63	63	66	64	58	65	91	91	91	0.7	1.1	ĩ1.0	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	1	Residential	60	64	65	62	60	64	92	91	92	60	64	65	62	60	64	91	91	91	63	63	66	64	58	65	91	91	91	0.5	1.0	ĩ0.9	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	2	Residential	60	64	65	62	60	64	92	91	92	60	63	65	62	60	64	91	91	91	63	63	66	64	58	65	91	91	91	0.5	0.9	ĩ1.0	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	G	Residential	59	62	64	61	58	63	92	90	92	59	62	64	61	58	63	91	90	91	61	61	65	63	57	64	91	90	91	0.7	1.0	ĩ1.0	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	1	Residential	59	62	64	61	58	63	91	90	91	59	62	64	61	58	63	91	90	91	61	62	65	63	57	64	91	90	91	0.7	0.9	ĩ0.9	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	2	Residential	59	62	64	61	58	63	91	90	91	59	62	64	61	58	63	90	90	90	61	62	65	63	57	64	90	90	90	0.6	1.0	ĩ1.0	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	G	Residential	59	62	63	61	58	62	91	90	91	59	62	64	61	58	62	90	90	90	61	61	64	62	57	63	90	90	90	0.7	1.0	ĩ1.0	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	1	Residential	59	62	64	61	58	63	90	90	90	59	62	64	61	58	63	89	90	90	61	61	65	63	57	64	89	90	90	0.6	1.0	ĩ0.4	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	2	Residential	59	62	64	61	58	63	90	90	90	59	62	64	61	58	63	89	90	90	61	62	65	63	57	64	89	90	90	0.6	0.9	ĩ0.5	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	G	Residential	60	62	64	62	58	63	92	90	92	60	63	65	62	59	63	91	91	91	62	62	65	64	58	65	91	91	91	1.0	1.4	ĩ1.1	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	1	Residential	61	64	66	63	60	65	93	92	93	61	64	66	63	60	65	91	92	92	63	63	66	65	59	66	91	92	92	0.3	0.9	ĩ0.8	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	2	Residential	61	64	66	63	61	65	92	92	92	61	64	66	63	61	65	91	92	92	63	64	67	65	59	66	91	92	92	0.4	0.9	ĩ0.8	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	G	Residential	61	64	66	63	60	65	92	91	92	61	64	66	63	60	65	91	91	91	63	63	66	65	59	66	91	91	91	0.5	1.0	ĩ0.8	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	1	Residential	61	64	66	63	60	65	92	91	92	61	64	66	63	60	65	91	91	91	63	63	66	65	59	66	91	91	91	0.3	0.9	ĩ0.7	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	2	Residential	61	64	66	63	60	65	92	91	92	61	64	66	63	60	65	91	91	91	63	63	66	65	59	66	91	91	91	0.4	0.9	ĩ0.8	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	G	Residential	61	64	66	63	60	65	92	91	92	61	64	66	63	60	65	91	91	91	63	63	66	65	59	66	91	91	91	0.4	1.0	ĩ0.7	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	1	Residential	61	64	66	63	60	65	92	91	92	61	64	66	63	60	65	91	91	91	63	63	66	65	59	66	91	91	91	0.4	1.0	ĩ0.8	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	2	Residential	61	64	66	63	60	65	92	91	92	61	64	66	63	60	65	91	91	91	63	63	66	65	59	66	91	91	91	0.4	1.0	ĩ0.8	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	G	Residential	62	65	67	64	61	66	93	92	93	62	65	66	64	61	66	92	92	92	64	64	67	66	59	67	92	92	92	0.4	1.1	ĩ0.3	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	1	Residential	62	65	66	64	61	66	93	92	93	62	64	66	64	61	66	93	92	93	64	64	67	66	59	67	93	92	93	0.5	1.1	ĩ0.3	NO
NCA10	UP	298ĩ312 Pennant Hills Rd	2	Residential	62	64	66	64	61	66	93	92	93	62	64	66	64	61	66	92	92	92	64	64	67	66	59	67	92	92	92	0.4	1.1	ĩ0.3	NO
NCA10	UP	305 Pennant Hills Rd	G	Residential	50	49	52	52	44	53	84	77	84	50	49	53	52	45	53	84	78	84	53	49	54	54	44	54	84	78	84	2.0	1.8	0.0	NO
NCA10	UP	305 Pennant Hills Rd	1	Residential	52	50	54	53	46	54	84	79	84	52	51	55	54	47	54	84	80	84	54	51	56	55	46	56	84	80	84	2.1	1.9	ĩ0.2	NO
NCA10	UP	307 Pennant Hills Rd	G	Residential	47	46	49	49	42	49	78	72	78	47	47	50	49	42	50	78	74	78	50	46	52	51	42	51	78	74	78	2.1	2.0	0.1	NO
NCA10	UP	307 Pennant Hills Rd	G	Residential	48	47	51	50	43	51	78	73	78	48	48	51	50	43	51	78	75	78	51	47	53	52	43	52	78	75	78	2.0	1.8	0.0	NO
NCA10	UP	2A1 Paling St	G	Residential	47	46	50	49	42	50	79	73	79	47	47	50	49	42	50	79	73	79	50	46	51	51	41	51	79	73	79	1.6	1.5	ĩ0.5	NO
NCA10	UP	2A1 Paling St	1	Residential	51	48	53	53	44	53	85	74	85	51	49	53	53	44	54	85	75	85	54	48	55	55	43	55	85	75	85	2.5	1.8	ĩ0.1	NO
NCA10	UP	2A1 Paling St	2	Residential	54	51	55	55	46	56	87	77	87	54	51	56	55	47	56	87	77	87	56	50	58	57	46	58	87	77	87	2.4	1.7	ĩ0.6	NO
NCA10	UP	2A1 Paling St	G	Residential	46	45	49	48	41	48	79	72	79	46	45	49	47	41	48	78	72	78	48	45	50	49	40	50	78	72	78	1.6	1.3	ĩ0.6	NO
NCA10	UP	2A1 Paling St	1	Residential	49	47	51	51	42	52	83	74	83	50	47	52	51	43	52	83	74	83	52	46	54	53	42	53	83	74	83	2.2	1.7	ĩ0.1	NO

Individual Receiver Noise Model Results ĩ IGANRIP (no factor on train numbers)					IGANRIP RESULTS 2016 before opening									IGANRIP RESULTS 2016 after opening									IGANRIP RESULTS 2026 after opening									Increase due to project under IGANRIP			
					LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax			LAeq Day			LAeq Night			LAmax						
NCA	**Side**	**Address**	**Level**	**Description**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**Freight**	**Passenger**	**Total**	**day**	**night**	**max**	**trig?**
NCA10	UP	2A1 Paling St	2	Residential	53	49	54	54	45	55	87	76	87	53	49	55	54	45	55	86	76	86	55	49	57	56	44	56	86	76	86	2.4	1.7	ĩ0.4	NO
NCA10	UP	313ĩ315a Pennant Hills Rd	G	Residential	43	45	47	45	40	46	73	71	73	43	45	47	45	41	47	73	72	73	46	44	48	47	40	48	73	72	73	1.4	1.7	0.5	NO
NCA10	UP	313ĩ315a Pennant Hills Rd	1	Residential	47	47	50	48	42	49	79	73	79	47	47	50	49	43	50	79	74	79	49	46	51	51	42	51	79	74	79	1.6	1.8	0.0	NO
NCA10	UP	313ĩ315a Pennant Hills Rd	2	Residential	50	48	52	51	44	52	83	75	83	50	49	52	51	44	52	83	75	83	52	48	54	53	44	54	83	75	83	1.9	1.7	0.0	NO
NCA10	UP	313ĩ315a Pennant Hills Rd	G	Residential	45	46	49	47	42	48	75	72	75	46	47	49	47	42	49	75	73	75	48	46	50	49	41	50	75	73	75	1.4	1.7	ĩ0.2	NO
NCA10	UP	313ĩ315a Pennant Hills Rd	1	Residential	50	48	52	52	44	52	83	74	83	50	49	53	52	44	53	83	75	83	53	48	54	54	44	54	83	75	83	2.3	1.9	0.2	NO
NCA10	UP	313ĩ315a Pennant Hills Rd	2	Residential	54	50	55	55	46	56	87	76	87	54	51	56	55	47	56	87	77	87	57	51	58	57	46	58	87	77	87	2.5	1.8	ĩ0.4	NO
NCA10	UP	313ĩ315a Pennant Hills Rd	G	Residential	43	45	47	45	40	46	73	71	73	43	45	47	45	41	47	73	72	73	46	44	48	47	40	48	73	72	73	1.4	1.7	0.5	NO
NCA10	UP	313ĩ315a Pennant Hills Rd	1	Residential	47	47	50	48	42	49	79	73	79	47	47	50	49	43	50	79	74	79	49	46	51	51	42	51	79	74	79	1.6	1.8	0.0	NO
NCA10	UP	313ĩ315a Pennant Hills Rd	2	Residential	50	48	52	51	44	52	83	75	83	50	49	52	51	44	52	83	75	83	52	48	54	53	44	54	83	75	83	1.9	1.7	0.0	NO
NCA10	UP	313ĩ315b Pennant Hills Rd	G	Residential	41	43	45	43	38	44	70	70	70	41	43	45	43	38	44	71	70	71	43	42	46	45	38	46	71	70	71	1.2	1.7	0.2	NO
NCA10	UP	2A3 Paling St	G	Residential	46	45	49	48	40	49	79	71	79	46	45	49	48	41	49	78	71	78	49	44	50	50	40	50	78	71	78	1.8	1.4	ĩ0.6	NO

Appendix E Noise barrier assessment tables

Wheel Rail Sources Only, Low Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	12	4	0.0	0.0	0.00	0.00	0	No
$ 804,420	1.25	0.5	No	12	4	7.8	7.8	0.04	0.04	10	No
$ 804,420	1.5	0.75	No	12	4	7.0	14.9	0.07	0.19	18	No
$ 807,120	1.75	1	No	12	4	7.2	22.1	0.08	0.19	27	No

Wheel Rail Sources Only, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	12	4	0.0	0.0	0.00	0.00	0	No
$ 598,860	1	1	No	12	4	0.7	0.7	0.00	0.00	1	No
$ 598,860	1.5	1.5	No	12	4	0.4	1.1	0.00	0.01	2	No
$ 598,860	2	2	No	12	4	1.4	2.5	0.01	0.02	4	No
$ 655,380	2.5	2.5	No	12	4	2.5	5.0	0.01	0.03	8	No
$ 711,900	3	3	No	12	4	2.9	7.9	0.02	0.04	11	No
$ 849,600	3.5	3.5	No	12	4	4.9	12.8	0.02	0.07	15	No
$ 987,480	4	4	No	11	4	4.8	17.6	0.03	0.06	18	No
$ 1,045,260	4.5	4.5	No	11	4	5.8	23.4	0.03	0.08	22	No
$ 1,103,220	5	5	No	10	3	5.4	28.8	0.04	0.07	26	No
$ 1,336,680	5.5	5.5	No	10	3	5.6	34.4	0.04	0.07	26	No
$ 1,483,380	6	6	No	10	3	5.4	39.8	0.04	0.07	27	No
$ 1,630,080	6.5	6.5	No	9	2	4.9	44.7	0.05	0.06	27	No
$ 1,689,840	7	7	No	9	2	5.0	49.7	0.05	0.07	29	No
$ 1,884,780	7.5	7.5	No	9	2	4.3	54.0	0.05	0.06	29	No
$ 2,079,720	8	8	No	8	2	4.3	58.4	0.05	0.06	28	No

Overall Noise, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	12	4	0.0	0.0	0.00	0.00	0	No
$ 598,860	1	1	No	12	4	4.1	4.1	0.03	0.03	7	No
$ 598,860	1.5	1.5	No	12	4	3.7	7.8	0.03	0.05	13	No
$ 598,860	2	2	No	12	4	3.6	11.4	0.04	0.05	19	No
$ 655,380	2.5	2.5	No	12	4	3.8	15.2	0.04	0.05	23	No
$ 711,900	3	3	No	12	4	4.2	19.4	0.04	0.06	27	No
$ 849,600	3.5	3.5	No	12	4	5.0	24.4	0.05	0.07	29	No
$ 987,480	4	4	No	12	4	6.4	30.8	0.05	0.08	31	No
$ 1,045,260	4.5	4.5	No	12	4	9.2	40.0	0.06	0.12	38	No
$ 1,103,220	5	5	No	12	4	10.6	50.6	0.07	0.14	46	No
$ 1,336,680	5.5	5.5	No	12	4	15.3	65.9	0.08	0.20	49	No
$ 1,483,380	6	6	No	12	4	16.9	82.8	0.09	0.23	56	No
$ 1,630,080	6.5	6.5	No	12	4	17.1	99.8	0.10	0.23	61	No
$ 1,689,840	7	7	No	12	4	15.6	115.5	0.11	0.21	68	No
$ 1,884,780	7.5	7.5	No	12	4	14.2	129.7	0.12	0.19	69	No
$ 2,079,720	8	8	No	12	4	12.1	141.8	0.12	0.16	68	No

Notes

For this sub-catchment, the noise barrier considered starts at Track Chainage 23.5 km and ends at Track Chainage 23.65 km (150 m). The analysis indicates that a barrier at this location would not meet the minimum acoustic benefit requirements, and would not be cost-effective. Therefore, a barrier is not recommended at this location.

To be considered cost-effective in an absolute sense, a barrier must provide at least 100 dB benefit per $1M, for either wheel/rail noise or overall noise. Cost-effectiveness is also checked to confirm the TNBA and MBVA are both > 0.2 dB per m^2.

A barrier highlighted in green achieves the minimum benefit requirements and maximises the "dB per $1M". This barrier is taken to be the "acoustic optimum" barrier height. This barrier is recommended only if it is cost-effective and higher than the "target" height.

A barrier highlighted in blue achieves the noise goals at all triggered receiver points. This barrier is taken to be the "target" barrier height. The "target" barrier height is recommended only if it is cost-effective, meets the minimum benefit requirements and is higher than the "acoustic optimum" height.

Wheel Rail Sources Only, Low Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
			No	1	1						No
$ 2,359,632	1.25	0.5	No			10.3	10.3	0.02	0.02	4	No
$ 2,359,632	1.5	0.75	No			6.1	16.4	0.02	0.06	7	No
$ 2,367,552	1.75	1	No			8.0	24.4	0.03	0.07	10	No

Wheel Rail Sources Only, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
			No	1	1						No
$ 1,756,656	1	1	No			21.0	21.0	0.05	0.05	12	No
$ 1,756,656	1.5	1.5	No			14.9	35.9	0.05	0.07	20	No
$ 1,756,656	2	2	No			14.6	50.5	0.06	0.07	29	No
$ 1,922,448	2.5	2.5	No			16.0	66.5	0.06	0.07	35	No
$ 2,088,240	3	3	Yes			14.2	80.7	0.06	0.06	39	No
$ 2,492,160	3.5	3.5	Yes			16.9	97.6	0.06	0.08	39	No
$ 2,896,608	4	4	Yes			13.1	110.7	0.06	0.06	38	No
$ 3,066,096	4.5	4.5	Yes			8.2	118.9	0.06	0.04	39	No
$ 3,236,112	5	5	Yes			1.2	120.1	0.05	0.01	37	No
$ 3,920,928	5.5	5.5	Yes			0.2	120.3	0.05	0.00	31	No
$ 4,351,248	6	6	Yes			0.1	120.4	0.05	0.00	28	No
$ 4,781,568	6.5	6.5	Yes			0.0	120.4	0.04	0.00	25	No
$ 4,956,864	7	7	Yes			0.1	120.5	0.04	0.00	24	No
$ 5,528,688	7.5	7.5	Yes			0.0	120.5	0.04	0.00	22	No
$ 6,100,512	8	8	Yes			0.0	120.5	0.03	0.00	20	No

Overall Noise, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
			No	25	19						No
$ 1,756,656	1	1	No	25	19	27.6	27.6	0.06	0.06	16	No
$ 1,756,656	1.5	1.5	No	24	18	20.2	47.8	0.07	0.09	27	No
$ 1,756,656	2	2	Yes	22	17	21.1	69.0	0.08	0.10	39	No
$ 1,922,448	2.5	2.5	Yes	22	17	23.4	92.4	0.08	0.11	48	No
$ 2,088,240	3	3	Yes	20	16	28.0	120.3	0.09	0.13	58	No
$ 2,492,160	3.5	3.5	Yes	18	14	33.3	153.7	0.10	0.15	62	No
$ 2,896,608	4	4	Yes	16	12	36.7	190.4	0.11	0.17	66	No
$ 3,066,096	4.5	4.5	Yes	14	11	36.0	226.4	0.11	0.16	74	No
$ 3,236,112	5	5	No	11	8	38.1	264.5	0.12	0.17	82	No
$ 3,920,928	5.5	5.5	Yes	7	4	39.9	304.4	0.13	0.18	78	No
$ 4,351,248	6	6	Yes	3	1	39.4	343.8	0.13	0.18	79	No
$ 4,781,568	6.5	6.5	Yes	0	0	33.9	377.7	0.13	0.15	79	No
$ 4,956,864	7	7	Yes	0	0	17.8	395.5	0.13	0.08	80	No
$ 5,528,688	7.5	7.5	Yes	0	0	12.3	407.8	0.12	0.06	74	No
$ 6,100,512	8	8	Yes	0	0	4.6	412.4	0.12	0.02	68	No

Notes

For this sub-catchment, the noise barrier considered starts at Track Chainage 24.44 km and ends at Track Chainage 24.88 km (440 m). The analysis indicates that a barrier at this location would not be cost-effective. Therefore, a barrier is not recommended at this location.

To be considered cost-effective in an absolute sense, a barrier must provide at least 100 dB benefit per $1M, for either wheel/rail noise or overall noise. Cost-effectiveness is also checked to confirm the TNBA and MBVA are both > 0.2 dB per m^2.

A barrier highlighted in green achieves the minimum benefit requirements and maximises the "dB per $1M". This barrier is taken to be the "acoustic optimum" barrier height. This barrier is recommended only if it is cost-effective and higher than the "target" height.

A barrier highlighted in blue achieves the noise goals at all triggered receiver points. This barrier is taken to be the "target" barrier height. The "target" barrier height is recommended only if it is cost-effective, meets the minimum benefit requirements and is higher than the "acoustic optimum" height.

Wheel Rail Sources Only, Low Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
			No								No
$ 1,179,816	1.25	0.5	No			12.3	12.3	0.04	0.04	10	No
$ 1,179,816	1.5	0.75	No			6.0	18.3	0.06	0.11	16	No
$ 1,183,776	1.75	1	No			9.1	27.4	0.07	0.16	23	No

Wheel Rail Sources Only, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
			No								No
$ 878,328	1	1	No			10.2	10.2	0.05	0.05	12	No
$ 878,328	1.5	1.5	No			7.7	17.9	0.05	0.07	20	No
$ 878,328	2	2	No			9.7	27.6	0.06	0.09	31	No
$ 961,224	2.5	2.5	No			11.3	38.9	0.07	0.10	40	No
$ 1,044,120	3	3	No			11.8	50.7	0.08	0.11	49	No
$ 1,246,080	3.5	3.5	Yes			8.6	59.3	0.08	0.08	48	No
$ 1,448,304	4	4	Yes			7.6	66.9	0.08	0.07	46	No
$ 1,533,048	4.5	4.5	Yes			6.2	73.1	0.07	0.06	48	No
$ 1,618,056	5	5	No			5.8	78.9	0.07	0.05	49	No
$ 1,960,464	5.5	5.5	No			4.8	83.7	0.07	0.04	43	No
$ 2,175,624	6	6	No			2.4	86.1	0.07	0.02	40	No
$ 2,390,784	6.5	6.5	No			0.8	87.0	0.06	0.01	36	No
$ 2,478,432	7	7	Yes			0.3	87.3	0.06	0.00	35	No
$ 2,764,344	7.5	7.5	Yes			0.0	87.3	0.05	0.00	32	No
$ 3,050,256	8	8	Yes			0.0	87.3	0.05	0.00	29	No

Overall Noise, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
			No	16	11						No
$ 878,328	1	1	No	15	11	14.6	14.6	0.07	0.07	17	No
$ 878,328	1.5	1.5	No	14	11	7.8	22.4	0.07	0.07	25	No
$ 878,328	2	2	No	13	11	8.7	31.1	0.07	0.08	35	No
$ 961,224	2.5	2.5	No	13	11	9.4	40.5	0.07	0.09	42	No
$ 1,044,120	3	3	No	13	11	9.4	49.9	0.08	0.09	48	No
$ 1,246,080	3.5	3.5	No	13	11	9.3	59.2	0.08	0.08	48	No
$ 1,448,304	4	4	No	11	11	11.0	70.2	0.08	0.10	48	No
$ 1,533,048	4.5	4.5	No	10	10	14.6	84.7	0.09	0.13	55	No
$ 1,618,056	5	5	No	8	8	19.1	103.8	0.09	0.17	64	No
$ 1,960,464	5.5	5.5	No	8	8	18.8	122.7	0.10	0.17	63	No
$ 2,175,624	6	6	No	7	7	16.2	138.9	0.11	0.15	64	No
$ 2,390,784	6.5	6.5	No	6	6	14.5	153.3	0.11	0.13	64	No
$ 2,478,432	7	7	No	5	5	13.8	167.1	0.11	0.13	67	No
$ 2,764,344	7.5	7.5	No	4	4	12.3	179.4	0.11	0.11	65	No
$ 3,050,256	8	8	Yes	2	2	12.3	191.7	0.11	0.11	63	No

Notes

For this sub-catchment, the noise barrier considered starts at Track Chainage 24.9 km and ends at Track Chainage 25.12 km (220 m). The analysis indicates that a barrier at this location would not be cost-effective. Therefore, a barrier is not recommended at this location.

To be considered cost-effective in an absolute sense, a barrier must provide at least 100 dB benefit per $1M, for either wheel/rail noise or overall noise. Cost-effectiveness is also checked to confirm the TNBA and MBVA are both > 0.2 dB per m^2.

A barrier highlighted in green achieves the minimum benefit requirements and maximises the "dB per $1M". This barrier is taken to be the "acoustic optimum" barrier height. This barrier is recommended only if it is cost-effective and higher than the "target" height.

A barrier highlighted in blue achieves the noise goals at all triggered receiver points. This barrier is taken to be the "target" barrier height. The "target" barrier height is recommended only if it is cost-effective, meets the minimum benefit requirements and is higher than the "acoustic optimum" height.

Wheel Rail Sources Only, Low Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	6	3	0.0	0.0	0.00	0.00	0	No
$ 536,280	1.25	0.5	No	6	3	0.9	0.9	0.01	0.01	2	No
$ 536,280	1.5	0.75	No	6	3	0.7	1.6	0.01	0.03	3	No
$ 538,080	1.75	1	No	6	3	0.8	2.4	0.01	0.03	4	No

Wheel Rail Sources Only, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	6	3	0.0	0.0	0.00	0.00	0	No
$ 399,240	1	1	No	6	3	5.9	5.9	0.06	0.06	15	No
$ 399,240	1.5	1.5	No	5	2	5.9	11.8	0.08	0.12	29	No
$ 399,240	2	2	No	5	2	5.7	17.5	0.09	0.11	44	No
$ 436,920	2.5	2.5	No	4	1	4.1	21.6	0.09	0.08	49	No
$ 474,600	3	3	No	4	1	0.2	21.8	0.07	0.00	46	No
$ 566,400	3.5	3.5	No	4	1	0.1	21.9	0.06	0.00	39	No
$ 658,320	4	4	No	4	1	0.0	21.9	0.05	0.00	33	No
$ 696,840	4.5	4.5	No	4	1	0.1	22.0	0.05	0.00	32	No
$ 735,480	5	5	No	4	1	0.0	22.0	0.04	0.00	30	No
$ 891,120	5.5	5.5	No	4	1	0.1	22.1	0.04	0.00	25	No
$ 988,920	6	6	No	4	1	0.0	22.1	0.04	0.00	22	No
$ 1,086,720	6.5	6.5	No	4	1	0.0	22.1	0.03	0.00	20	No
$ 1,126,560	7	7	No	4	1	0.0	22.1	0.03	0.00	20	No
$ 1,256,520	7.5	7.5	No	4	1	0.1	22.3	0.03	0.00	18	No
$ 1,386,480	8	8	No	4	1	0.0	22.3	0.03	0.00	16	No

Overall Noise, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	7	4	0.0	0.0	0.00	0.00	0	No
$ 399,240	1	1	No	7	4	6.3	6.3	0.06	0.06	16	No
$ 399,240	1.5	1.5	No	6	3	3.6	9.9	0.07	0.07	25	No
$ 399,240	2	2	No	6	3	3.5	13.3	0.07	0.07	33	No
$ 436,920	2.5	2.5	No	6	3	4.2	17.5	0.07	0.08	40	No
$ 474,600	3	3	No	6	3	0.3	17.8	0.06	0.01	38	No
$ 566,400	3.5	3.5	No	6	3	0.4	18.2	0.05	0.01	32	No
$ 658,320	4	4	No	6	3	0.1	18.3	0.05	0.00	28	No
$ 696,840	4.5	4.5	No	6	3	0.1	18.4	0.04	0.00	26	No
$ 735,480	5	5	No	6	3	0.0	18.4	0.04	0.00	25	No
$ 891,120	5.5	5.5	No	6	3	0.2	18.7	0.03	0.00	21	No
$ 988,920	6	6	No	6	3	0.1	18.8	0.03	0.00	19	No
$ 1,086,720	6.5	6.5	No	6	3	0.1	18.9	0.03	0.00	17	No
$ 1,126,560	7	7	No	6	3	0.2	19.1	0.03	0.00	17	No
$ 1,256,520	7.5	7.5	No	6	3	0.1	19.2	0.03	0.00	15	No
$ 1,386,480	8	8	No	6	3	0.1	19.2	0.02	0.00	14	No

Notes

For this sub-catchment, the noise barrier considered starts at Track Chainage 25.28 km and ends at Track Chainage 25.38 km (100 m). The analysis indicates that a barrier at this location would not meet the minimum acoustic benefit requirements, and would not be cost-effective. Therefore, a barrier is not recommended at this location.

To be considered cost-effective in an absolute sense, a barrier must provide at least 100 dB benefit per $1M, for either wheel/rail noise or overall noise. Cost-effectiveness is also checked to confirm the TNBA and MBVA are both > 0.2 dB per m^2.

A barrier highlighted in green achieves the minimum benefit requirements and maximises the "dB per $1M". This barrier is taken to be the "acoustic optimum" barrier height. This barrier is recommended only if it is cost-effective and higher than the "target" height.

A barrier highlighted in blue achieves the noise goals at all triggered receiver points. This barrier is taken to be the "target" barrier height. The "target" barrier height is recommended only if it is cost-effective, meets the minimum benefit requirements and is higher than the "acoustic optimum" height.

Wheel Rail Sources Only, Low Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	13	7	0.0	0.0	0.00	0.00	0	No
$ 2,842,284	1.25	0.5	No	8	2	41.1	41.1	0.06	0.06	14	No
$ 2,842,284	1.5	0.75	No	5	0	22.7	63.9	0.08	0.17	22	No
$ 2,851,824	1.75	1	Yes	5	0	28.1	91.9	0.10	0.21	32	No

Wheel Rail Sources Only, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	13	7	0.0	0.0	0.00	0.00	0	No
$ 2,402,172	1	1	No	8	2	29.4	29.4	0.06	0.06	12	No
$ 2,402,172	1.5	1.5	No	6	1	29.7	59.1	0.07	0.11	25	No
$ 2,402,172	2	2	No	4	1	39.4	98.4	0.09	0.15	41	No
$ 2,601,876	2.5	2.5	Yes	2	0	47.5	145.9	0.11	0.18	56	No
$ 2,801,580	3	3	Yes	1	0	44.2	190.1	0.12	0.17	68	No
$ 3,288,120	3.5	3.5	Yes	1	0	29.9	220.0	0.12	0.11	67	No
$ 3,775,296	4	4	Yes	1	0	14.8	234.7	0.11	0.06	62	No
$ 3,979,452	4.5	4.5	Yes	1	0	7.9	242.7	0.10	0.03	61	No
$ 4,184,244	5	5	Yes	1	0	6.3	249.0	0.09	0.02	60	No
$ 5,009,136	5.5	5.5	Yes	0	0	4.4	253.4	0.09	0.02	51	No
$ 5,527,476	6	6	Yes	0	0	3.1	256.5	0.08	0.01	46	No
$ 6,045,816	6.5	6.5	Yes	0	0	1.8	258.3	0.07	0.01	43	No
$ 6,256,968	7	7	Yes	0	0	2.0	260.2	0.07	0.01	42	No
$ 6,945,756	7.5	7.5	Yes	0	0	1.8	262.0	0.07	0.01	38	No
$ 7,634,544	8	8	Yes	0	0	1.2	263.2	0.06	0.00	34	No

Overall Noise, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	32	21	0.0	0.0	0.00	0.00	0	No
$ 2,402,172	1	1	No	29	19	26.1	26.1	0.05	0.05	11	No
$ 2,402,172	1.5	1.5	No	27	18	22.3	48.4	0.06	0.08	20	No
$ 2,402,172	2	2	Yes	26	17	25.1	73.5	0.07	0.09	31	No
$ 2,601,876	2.5	2.5	Yes	24	16	31.2	104.7	0.08	0.12	40	No
$ 2,801,580	3	3	Yes	22	15	36.4	141.1	0.09	0.14	50	No
$ 3,288,120	3.5	3.5	Yes	19	12	42.1	183.2	0.10	0.16	56	No
$ 3,775,296	4	4	Yes	19	12	44.1	227.3	0.11	0.17	60	No
$ 3,979,452	4.5	4.5	Yes	18	12	44.0	271.2	0.11	0.17	68	No
$ 4,184,244	5	5	No	15	12	60.9	332.2	0.13	0.23	79	No
$ 5,009,136	5.5	5.5	Yes	8	7	77.5	409.6	0.14	0.29	82	No
$ 5,527,476	6	6	Yes	1	1	69.0	478.7	0.15	0.26	87	No
$ 6,045,816	6.5	6.5	Yes	0	0	45.9	524.6	0.15	0.17	87	No
$ 6,256,968	7	7	Yes	0	0	16.4	541.0	0.15	0.06	86	No
$ 6,945,756	7.5	7.5	Yes	0	0	5.5	546.5	0.14	0.02	79	No
$ 7,634,544	8	8	Yes	0	0	2.8	549.3	0.13	0.01	72	No

Notes

For this sub-catchment, the noise barrier considered starts at Track Chainage 25.84 km and ends at Track Chainage 26.37 km (530 m). The analysis indicates that a barrier at this location would not be cost-effective. Therefore, a barrier is not recommended at this location.

To be considered cost-effective in an absolute sense, a barrier must provide at least 100 dB benefit per $1M, for either wheel/rail noise or overall noise. Cost-effectiveness is also checked to confirm the TNBA and MBVA are both > 0.2 dB per m^2.

A barrier highlighted in green achieves the minimum benefit requirements and maximises the "dB per $1M". This barrier is taken to be the "acoustic optimum" barrier height. This barrier is recommended only if it is cost-effective and higher than the "target" height.

A barrier highlighted in blue achieves the noise goals at all triggered receiver points. This barrier is taken to be the "target" barrier height. The "target" barrier height is recommended only if it is cost-effective, meets the minimum benefit requirements and is higher than the "acoustic optimum" height.

Wheel Rail Sources Only, Low Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	15	12	0.0	0.0	0.00	0.00	0	No
$ 1,447,956	1.25	0.5	No	15	12	22.2	22.2	0.07	0.07	15	No
$ 1,447,956	1.5	0.75	No	15	12	19.6	41.9	0.10	0.29	29	No
$ 1,452,816	1.75	1	No	15	12	22.6	64.5	0.14	0.33	44	No

Wheel Rail Sources Only, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	15	12	0.0	0.0	0.00	0.00	0	No
$ 1,223,748	1	1	No	15	12	0.8	0.8	0.00	0.00	1	No
$ 1,223,748	1.5	1.5	No	15	12	2.3	3.1	0.01	0.02	3	No
$ 1,223,748	2	2	No	15	12	3.9	7.0	0.01	0.03	6	No
$ 1,325,484	2.5	2.5	No	15	12	7.6	14.6	0.02	0.06	11	No
$ 1,427,220	3	3	No	15	12	11.4	26.1	0.03	0.08	18	No
$ 1,675,080	3.5	3.5	No	14	12	14.9	40.9	0.04	0.11	24	No
$ 1,923,264	4	4	No	14	12	19.4	60.4	0.06	0.14	31	No
$ 2,027,268	4.5	4.5	No	13	11	29.7	90.1	0.07	0.22	44	No
$ 2,131,596	5	5	No	12	11	38.6	128.7	0.10	0.29	60	No
$ 2,551,824	5.5	5.5	No	8	8	39.9	168.6	0.11	0.30	66	No
$ 2,815,884	6	6	No	3	3	33.5	202.1	0.12	0.25	72	No
$ 3,079,944	6.5	6.5	Yes	1	1	26.7	228.9	0.13	0.20	74	No
$ 3,187,512	7	7	Yes	0	0	22.5	251.3	0.13	0.17	79	No
$ 3,538,404	7.5	7.5	Yes	0	0	13.7	265.0	0.13	0.10	75	No
$ 3,889,296	8	8	Yes	0	0	7.5	272.4	0.13	0.06	70	No

Overall Noise, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	15	12	0.0	0.0	0.00	0.00	0	No
$ 1,223,748	1	1	No	15	12	0.7	0.7	0.00	0.00	1	No
$ 1,223,748	1.5	1.5	No	15	12	1.8	2.5	0.01	0.01	2	No
$ 1,223,748	2	2	No	15	12	3.0	5.5	0.01	0.02	4	No
$ 1,325,484	2.5	2.5	No	15	12	6.1	11.6	0.02	0.05	9	No
$ 1,427,220	3	3	No	15	12	9.4	21.0	0.03	0.07	15	No
$ 1,675,080	3.5	3.5	No	15	12	12.0	33.0	0.03	0.09	20	No
$ 1,923,264	4	4	No	15	12	16.1	49.1	0.05	0.12	26	No
$ 2,027,268	4.5	4.5	No	15	12	26.4	75.5	0.06	0.20	37	No
$ 2,131,596	5	5	No	12	11	38.6	114.0	0.08	0.29	53	No
$ 2,551,824	5.5	5.5	No	8	8	35.5	149.5	0.10	0.26	59	No
$ 2,815,884	6	6	No	3	3	28.7	178.2	0.11	0.21	63	No
$ 3,079,944	6.5	6.5	No	1	1	22.2	200.4	0.11	0.16	65	No
$ 3,187,512	7	7	No	0	0	20.5	220.9	0.12	0.15	69	No
$ 3,538,404	7.5	7.5	No	0	0	20.7	241.6	0.12	0.15	68	No
$ 3,889,296	8	8	Yes	0	0	30.9	272.5	0.13	0.23	70	No

Notes

For this sub-catchment, the noise barrier considered starts at Track Chainage 26.42 km and ends at Track Chainage 26.69 km (270 m). The analysis indicates that a barrier at this location would not be cost-effective. Therefore, a barrier is not recommended at this location.

To be considered cost-effective in an absolute sense, a barrier must provide at least 100 dB benefit per $1M, for either wheel/rail noise or overall noise. Cost-effectiveness is also checked to confirm the TNBA and MBVA are both > 0.2 dB per m^2.

A barrier highlighted in green achieves the minimum benefit requirements and maximises the "dB per $1M". This barrier is taken to be the "acoustic optimum" barrier height. This barrier is recommended only if it is cost-effective and higher than the "target" height.

A barrier highlighted in blue achieves the noise goals at all triggered receiver points. This barrier is taken to be the "target" barrier height. The "target" barrier height is recommended only if it is cost-effective, meets the minimum benefit requirements and is higher than the "acoustic optimum" height.

Wheel Rail Sources Only, Low Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	25	22	0.0	0.0	0.00	0.00	0	No
$ 1,930,608	1.25	0.5	Yes	22	20	189.6	189.6	0.38	0.38	98	Yes
$ 1,930,608	1.5	0.75	Yes	20	18	59.1	248.8	0.41	0.59	129	Yes
$ 1,937,088	1.75	1	Yes	18	16	46.0	294.7	0.42	0.46	152	Yes

Wheel Rail Sources Only, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	25	22	0.0	0.0	0.00	0.00	0	No
$ 1,812,960	1	1	No	25	22	56.5	56.5	0.14	0.14	31	No
$ 1,812,960	1.5	1.5	Yes	24	22	63.6	120.1	0.20	0.32	66	Yes
$ 1,812,960	2	2	Yes	22	20	72.8	193.0	0.24	0.36	106	Yes
$ 1,963,680	2.5	2.5	Yes	20	18	63.2	256.1	0.26	0.32	130	Yes
$ 2,114,400	3	3	Yes	18	16	48.0	304.1	0.25	0.24	144	Yes
$ 2,481,600	3.5	3.5	Yes	16	14	35.3	339.4	0.24	0.18	137	No
$ 2,849,280	4	4	Yes	13	11	26.7	366.1	0.23	0.13	128	No
$ 3,003,360	4.5	4.5	Yes	9	7	24.0	390.1	0.22	0.12	130	No
$ 3,157,920	5	5	Yes	7	5	25.5	415.6	0.21	0.13	132	No
$ 3,780,480	5.5	5.5	Yes	6	4	16.5	432.1	0.20	0.08	114	No
$ 4,171,680	6	6	Yes	6	4	12.7	444.8	0.19	0.06	107	No
$ 4,562,880	6.5	6.5	Yes	4	2	10.6	455.4	0.18	0.05	100	No
$ 4,722,240	7	7	Yes	4	2	11.1	466.5	0.17	0.06	99	No
$ 5,242,080	7.5	7.5	Yes	3	1	9.6	476.0	0.16	0.05	91	No
$ 5,761,920	8	8	Yes	2	1	5.6	481.6	0.15	0.03	84	No

Overall Noise, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	25	22	0.0	0.0	0.00	0.00	0	No
$ 1,812,960	1	1	No	25	22	54.1	54.1	0.14	0.14	30	No
$ 1,812,960	1.5	1.5	Yes	24	22	58.6	112.7	0.19	0.29	62	No
$ 1,812,960	2	2	Yes	22	20	64.4	177.1	0.22	0.32	98	Yes
$ 1,963,680	2.5	2.5	Yes	21	19	54.5	231.6	0.23	0.27	118	Yes
$ 2,114,400	3	3	Yes	20	18	40.9	272.5	0.23	0.20	129	Yes
$ 2,481,600	3.5	3.5	Yes	19	17	31.3	303.8	0.22	0.16	122	No
$ 2,849,280	4	4	Yes	16	14	30.5	334.3	0.21	0.15	117	No
$ 3,003,360	4.5	4.5	Yes	11	9	32.4	366.7	0.20	0.16	122	No
$ 3,157,920	5	5	Yes	7	5	35.2	401.9	0.20	0.18	127	No
$ 3,780,480	5.5	5.5	Yes	6	4	24.2	426.1	0.19	0.12	113	No
$ 4,171,680	6	6	Yes	6	4	18.6	444.7	0.19	0.09	107	No
$ 4,562,880	6.5	6.5	Yes	4	2	14.3	459.0	0.18	0.07	101	No
$ 4,722,240	7	7	Yes	4	2	13.0	472.0	0.17	0.06	100	No
$ 5,242,080	7.5	7.5	Yes	3	1	11.7	483.6	0.16	0.06	92	No
$ 5,761,920	8	8	Yes	2	1	7.4	491.0	0.15	0.04	85	No

Notes

For this sub-catchment, the noise barrier considered starts at Track Chainage 26.8 km and ends at Track Chainage 27.2 km (400 m). The analysis indicates a barrier targeting wheel-rail noise is feasible and reasonable. Either a low barrier or a conventional barrier would be cost-effective. A barrier is therefore recommended at this location.

To be considered cost-effective in an absolute sense, a barrier must provide at least 100 dB benefit per $1M, for either wheel/rail noise or overall noise. Cost-effectiveness is also checked to confirm the TNBA and MBVA are both > 0.2 dB per m^2.

A barrier highlighted in green achieves the minimum benefit requirements and maximises the "dB per $1M". This barrier is taken to be the "acoustic optimum" barrier height. This barrier is recommended only if it is cost-effective and higher than the "target" height.

A barrier highlighted in blue achieves the noise goals at all triggered receiver points. This barrier is taken to be the "target" barrier height. The "target" barrier height is recommended only if it is cost-effective, meets the minimum benefit requirements and is higher than the "acoustic optimum" height.

Wheel Rail Sources Only, Low Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	27	21	0.0	0.0	0.00	0.00	0	No
$ 1,287,072	1.25	0.5	No	27	21	14.6	14.6	0.05	0.05	11	No
$ 1,287,072	1.5	0.75	No	26	21	11.3	25.8	0.07	0.19	20	No
$ 1,291,392	1.75	1	No	26	21	12.6	38.5	0.09	0.21	30	No

Wheel Rail Sources Only, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	27	21	0.0	0.0	0.00	0.00	0	No
$ 1,087,776	1	1	No	27	21	34.6	34.6	0.14	0.14	32	No
$ 1,087,776	1.5	1.5	No	26	21	36.0	70.6	0.20	0.30	65	No
$ 1,087,776	2	2	Yes	26	21	44.1	114.7	0.24	0.37	105	Yes
$ 1,178,208	2.5	2.5	Yes	26	21	48.5	163.2	0.27	0.40	139	Yes
$ 1,268,640	3	3	Yes	23	18	48.4	211.6	0.29	0.40	167	Yes
$ 1,488,960	3.5	3.5	Yes	21	16	47.2	258.7	0.31	0.39	174	Yes
$ 1,709,568	4	4	Yes	20	15	42.7	301.5	0.31	0.36	176	Yes
$ 1,802,016	4.5	4.5	Yes	19	14	37.4	338.9	0.31	0.31	188	Yes
$ 1,894,752	5	5	Yes	15	12	33.6	372.4	0.31	0.28	197	Yes
$ 2,268,288	5.5	5.5	Yes	13	10	30.4	402.8	0.31	0.25	178	Yes
$ 2,503,008	6	6	Yes	13	10	27.8	430.6	0.30	0.23	172	Yes
$ 2,737,728	6.5	6.5	Yes	12	9	23.5	454.1	0.29	0.20	166	No
$ 2,833,344	7	7	Yes	7	5	21.5	475.6	0.28	0.18	168	No
$ 3,145,248	7.5	7.5	Yes	6	4	18.7	494.3	0.27	0.16	157	No
$ 3,457,152	8	8	Yes	6	4	15.6	509.9	0.27	0.13	147	No
$ 1,894,752	5	2.5-7.5	Yes	14	10		372.4	0.31		197	Yes

Overall Noise, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	27	21	0.0	0.0	0.00	0.00	0	No
$ 1,087,776	1	1	No	27	21	32.4	32.4	0.14	0.14	30	No
$ 1,087,776	1.5	1.5	No	26	21	33.9	66.3	0.18	0.28	61	No
$ 1,087,776	2	2	No	26	21	40.7	106.9	0.22	0.34	98	No
$ 1,178,208	2.5	2.5	Yes	26	21	41.1	148.0	0.25	0.34	126	Yes
$ 1,268,640	3	3	Yes	25	20	39.6	187.7	0.26	0.33	148	Yes
$ 1,488,960	3.5	3.5	Yes	25	20	39.4	227.1	0.27	0.33	153	Yes
$ 1,709,568	4	4	Yes	25	20	42.2	269.3	0.28	0.35	158	Yes
$ 1,802,016	4.5	4.5	Yes	20	15	45.4	314.7	0.29	0.38	175	Yes
$ 1,894,752	5	5	Yes	15	12	48.8	363.5	0.30	0.41	192	Yes
$ 2,268,288	5.5	5.5	Yes	13	10	38.5	402.0	0.30	0.32	177	Yes
$ 2,503,008	6	6	Yes	13	10	31.3	433.3	0.30	0.26	173	Yes
$ 2,737,728	6.5	6.5	Yes	12	9	28.0	461.3	0.30	0.23	168	Yes
$ 2,833,344	7	7	Yes	7	5	25.5	486.8	0.29	0.21	172	Yes
$ 3,145,248	7.5	7.5	Yes	6	4	21.0	507.8	0.28	0.17	161	No
$ 3,457,152	8	8	Yes	6	4	17.6	525.4	0.27	0.15	152	No
$ 1,894,752	5	2.5-7.5	Yes	14	10		367.2	0.31		194	Yes

Notes

For this sub-catchment, the noise barrier considered starts at Track Chainage 27.4 km and ends at Track Chainage 27.64 km (240 m). The analysis indicates a conventional barrier targeting wheel-rail noise would be feasible, reasonable and optimise cost-effectiveness. It would also benefit overall noise. A barrier is therefore recommended at this location.

To be considered cost-effective in an absolute sense, a barrier must provide at least 100 dB benefit per $1M, for either wheel/rail noise or overall noise. Cost-effectiveness is also checked to confirm the TNBA and MBVA are both > 0.2 dB per m^2.

A barrier highlighted in green achieves the minimum benefit requirements and maximises the "dB per $1M". This barrier is taken to be the "acoustic optimum" barrier height. This barrier is recommended only if it is cost-effective and higher than the "target" height.

A barrier highlighted in blue achieves the noise goals at all triggered receiver points. This barrier is taken to be the "target" barrier height. The "target" barrier height is recommended only if it is cost-effective, meets the minimum benefit requirements and is higher than the "acoustic optimum" height.

Wheel Rail Sources Only, Low Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	31	18	0.0	0.0	0.00	0.00	0	No
$ 1,930,608	1.25	0.5	No	31	18	58.2	58.2	0.13	0.13	30	No
$ 1,930,608	1.5	0.75	No	31	18	33.3	91.5	0.17	0.37	47	No
$ 1,937,088	1.75	1	Yes	29	18	40.3	131.8	0.21	0.45	68	Yes

Wheel Rail Sources Only, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	31	18	0.0	0.0	0.00	0.00	0	No
$ 1,631,664	1	1	No	31	18	21.5	21.5	0.06	0.06	13	No
$ 1,631,664	1.5	1.5	No	31	18	27.9	49.4	0.09	0.16	30	No
$ 1,631,664	2	2	No	31	18	47.4	96.8	0.13	0.26	59	No
$ 1,767,312	2.5	2.5	Yes	31	18	58.6	155.4	0.17	0.33	88	No
$ 1,902,960	3	3	Yes	29	16	61.4	216.8	0.20	0.34	114	Yes
$ 2,233,440	3.5	3.5	Yes	27	16	59.3	276.1	0.22	0.33	124	Yes
$ 2,564,352	4	4	Yes	22	14	55.3	331.4	0.23	0.31	129	Yes
$ 2,703,024	4.5	4.5	Yes	20	13	46.5	377.9	0.23	0.26	140	Yes
$ 2,842,128	5	5	Yes	17	12	42.8	420.7	0.23	0.24	148	Yes
$ 3,402,432	5.5	5.5	Yes	16	12	38.7	459.4	0.23	0.21	135	Yes
$ 3,754,512	6	6	Yes	14	11	39.1	498.5	0.23	0.22	133	Yes
$ 4,106,592	6.5	6.5	Yes	12	10	41.9	540.4	0.23	0.23	132	Yes
$ 4,250,016	7	7	Yes	7	7	42.9	583.3	0.23	0.24	137	Yes
$ 4,717,872	7.5	7.5	Yes	5	5	41.1	624.4	0.23	0.23	132	Yes
$ 5,185,728	8	8	Yes	3	3	33.5	657.9	0.23	0.19	127	No
$ 2,842,128	5	1.5-7.25	Yes	13	2		517.2	0.29		182	Yes

Overall Noise, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	35	18	0.0	0.0	0.00	0.00	0	No
$ 1,631,664	1	1	No	35	18	20.1	20.1	0.06	0.06	12	No
$ 1,631,664	1.5	1.5	No	35	18	24.7	44.8	0.08	0.14	27	No
$ 1,631,664	2	2	No	34	18	41.7	86.5	0.12	0.23	53	No
$ 1,767,312	2.5	2.5	Yes	34	18	49.3	135.8	0.15	0.27	77	No
$ 1,902,960	3	3	Yes	33	18	49.2	185.1	0.17	0.27	97	No
$ 2,233,440	3.5	3.5	Yes	31	18	47.4	232.4	0.18	0.26	104	No
$ 2,564,352	4	4	Yes	28	17	41.9	274.3	0.19	0.23	107	No
$ 2,703,024	4.5	4.5	Yes	27	17	40.3	314.6	0.19	0.22	116	No
$ 2,842,128	5	5	Yes	24	15	49.4	364.0	0.20	0.27	128	Yes
$ 3,402,432	5.5	5.5	Yes	17	12	69.0	432.9	0.22	0.38	127	Yes
$ 3,754,512	6	6	Yes	15	11	57.3	490.2	0.23	0.32	131	Yes
$ 4,106,592	6.5	6.5	Yes	14	11	43.2	533.4	0.23	0.24	130	Yes
$ 4,250,016	7	7	Yes	11	10	43.8	577.3	0.23	0.24	136	Yes
$ 4,717,872	7.5	7.5	Yes	8	7	42.3	619.6	0.23	0.24	131	Yes
$ 5,185,728	8	8	Yes	5	5	34.2	653.8	0.23	0.19	126	No
$ 2,842,128	5	1.5-7.25	Yes	14	2		509.9	0.28		179	Yes

Notes

For this sub-catchment, the noise barrier considered starts at Track Chainage 27.64 km and ends at Track Chainage 28 km (360 m). The analysis indicates a conventional barrier targeting wheel-rail noise would be feasible, reasonable and optimise cost-effectiveness. It would also benefit overall noise. A barrier is therefore recommended at this location.

To be considered cost-effective in an absolute sense, a barrier must provide at least 100 dB benefit per $1M, for either wheel/rail noise or overall noise. Cost-effectiveness is also checked to confirm the TNBA and MBVA are both > 0.2 dB per m^2.

A barrier highlighted in green achieves the minimum benefit requirements and maximises the "dB per $1M". This barrier is taken to be the "acoustic optimum" barrier height. This barrier is recommended only if it is cost-effective and higher than the "target" height.

A barrier highlighted in blue achieves the noise goals at all triggered receiver points. This barrier is taken to be the "target" barrier height. The "target" barrier height is recommended only if it is cost-effective, meets the minimum benefit requirements and is higher than the "acoustic optimum" height.

Wheel Rail Sources Only, Low Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	16	8	0.0	0.0	0.00	0.00	0	No
$ 858,048	1.25	0.5	No	16	8	3.1	3.1	0.02	0.02	4	No
$ 858,048	1.5	0.75	No	15	8	3.2	6.3	0.03	0.08	7	No
$ 860,928	1.75	1	No	14	8	4.7	11.1	0.04	0.12	13	No

Wheel Rail Sources Only, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	16	8	0.0	0.0	0.00	0.00	0	No
$ 725,184	1	1	No	16	8	1.4	1.4	0.01	0.01	2	No
$ 725,184	1.5	1.5	No	16	8	1.5	3.0	0.01	0.02	4	No
$ 725,184	2	2	No	14	7	3.6	6.5	0.02	0.04	9	No
$ 785,472	2.5	2.5	No	14	7	5.7	12.2	0.03	0.07	16	No
$ 845,760	3	3	No	13	6	7.2	19.5	0.04	0.09	23	No
$ 992,640	3.5	3.5	Yes	12	6	7.8	27.2	0.05	0.10	27	No
$ 1,139,712	4	4	Yes	12	6	8.1	35.3	0.06	0.10	31	No
$ 1,201,344	4.5	4.5	Yes	11	5	7.5	42.8	0.06	0.09	36	No
$ 1,263,168	5	5	No	11	5	8.3	51.1	0.06	0.10	40	No
$ 1,512,192	5.5	5.5	No	10	5	7.2	58.3	0.07	0.09	39	No
$ 1,668,672	6	6	No	9	4	7.2	65.5	0.07	0.09	39	No
$ 1,825,152	6.5	6.5	No	9	4	6.3	71.8	0.07	0.08	39	No
$ 1,888,896	7	7	No	7	2	5.9	77.7	0.07	0.07	41	No
$ 2,096,832	7.5	7.5	No	7	2	5.4	83.1	0.07	0.07	40	No
$ 2,304,768	8	8	No	5	1	5.4	88.5	0.07	0.07	38	No

Overall Noise, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	16	8	0.0	0.0	0.00	0.00	0	No
$ 725,184	1	1	No	16	8	0.4	0.4	0.00	0.00	1	No
$ 725,184	1.5	1.5	No	16	8	0.5	0.9	0.00	0.01	1	No
$ 725,184	2	2	No	16	8	1.0	1.9	0.01	0.01	3	No
$ 785,472	2.5	2.5	No	16	8	1.5	3.3	0.01	0.02	4	No
$ 845,760	3	3	No	16	8	1.9	5.2	0.01	0.02	6	No
$ 992,640	3.5	3.5	No	16	8	2.7	7.9	0.01	0.03	8	No
$ 1,139,712	4	4	No	16	8	3.5	11.4	0.02	0.04	10	No
$ 1,201,344	4.5	4.5	No	16	8	4.8	16.2	0.02	0.06	14	No
$ 1,263,168	5	5	No	16	8	6.0	22.2	0.03	0.07	18	No
$ 1,512,192	5.5	5.5	No	16	8	8.7	30.9	0.04	0.11	20	No
$ 1,668,672	6	6	No	16	8	8.5	39.4	0.04	0.11	24	No
$ 1,825,152	6.5	6.5	No	16	8	8.2	47.6	0.05	0.10	26	No
$ 1,888,896	7	7	No	16	8	8.1	55.7	0.05	0.10	29	No
$ 2,096,832	7.5	7.5	No	16	8	6.6	62.3	0.05	0.08	30	No
$ 2,304,768	8	8	No	16	8	6.6	68.9	0.05	0.08	30	No

Notes

For this sub-catchment, the noise barrier considered starts at Track Chainage 28.14 km and ends at Track Chainage 28.3 km (160 m). The analysis indicates that a barrier at this location would not be cost-effective. Therefore, a barrier is not recommended at this location.

To be considered cost-effective in an absolute sense, a barrier must provide at least 100 dB benefit per $1M, for either wheel/rail noise or overall noise. Cost-effectiveness is also checked to confirm the TNBA and MBVA are both > 0.2 dB per m^2.

A barrier highlighted in green achieves the minimum benefit requirements and maximises the "dB per $1M". This barrier is taken to be the "acoustic optimum" barrier height. This barrier is recommended only if it is cost-effective and higher than the "target" height.

A barrier highlighted in blue achieves the noise goals at all triggered receiver points. This barrier is taken to be the "target" barrier height. The "target" barrier height is recommended only if it is cost-effective, meets the minimum benefit requirements and is higher than the "acoustic optimum" height.

Wheel Rail Sources Only, Low Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	8	4	0.0	0.0	0.00	0.00	0	No
$ 1,876,980	1.25	0.5	Yes	2	0	172.1	172.1	0.39	0.39	92	Yes
$ 1,876,980	1.5	0.75	Yes	1	0	12.6	184.7	0.35	0.14	98	No
$ 1,883,280	1.75	1	Yes	1	0	8.6	193.4	0.32	0.10	103	No

Wheel Rail Sources Only, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	8	4	0.0	0.0	0.00	0.00	0	No
$ 1,586,340	1	1	No	4	0	95.4	95.4	0.27	0.27	60	No
$ 1,586,340	1.5	1.5	Yes	3	0	55.3	150.7	0.29	0.32	95	Yes
$ 1,586,340	2	2	Yes	2	0	34.0	184.7	0.26	0.19	116	No
$ 1,718,220	2.5	2.5	Yes	1	0	18.2	202.9	0.23	0.10	118	No
$ 1,850,100	3	3	Yes	0	0	11.8	214.8	0.20	0.07	116	No
$ 2,171,400	3.5	3.5	Yes	0	0	4.9	219.7	0.18	0.03	101	No
$ 2,493,120	4	4	Yes	0	0	3.0	222.7	0.16	0.02	89	No
$ 2,627,940	4.5	4.5	Yes	0	0	1.5	224.2	0.14	0.01	85	No
$ 2,763,180	5	5	Yes	0	0	1.0	225.1	0.13	0.01	81	No
$ 3,307,920	5.5	5.5	Yes	0	0	0.0	225.1	0.12	0.00	68	No
$ 3,650,220	6	6	Yes	0	0	0.0	225.1	0.11	0.00	62	No
$ 3,992,520	6.5	6.5	Yes	0	0	0.0	225.1	0.10	0.00	56	No
$ 4,131,960	7	7	Yes	0	0	0.0	225.1	0.09	0.00	54	No
$ 4,586,820	7.5	7.5	Yes	0	0	0.0	225.1	0.09	0.00	49	No
$ 5,041,680	8	8	Yes	0	0	0.0	225.1	0.08	0.00	45	No

Overall Noise, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	28	10	0.0	0.0	0.00	0.00	0	No
$ 1,586,340	1	1	No	27	10	46.9	46.9	0.13	0.13	30	No
$ 1,586,340	1.5	1.5	No	26	10	38.2	85.2	0.16	0.22	54	No
$ 1,586,340	2	2	No	25	10	42.4	127.5	0.18	0.24	80	No
$ 1,718,220	2.5	2.5	No	23	10	43.8	171.3	0.20	0.25	100	No
$ 1,850,100	3	3	Yes	20	9	49.4	220.8	0.21	0.28	119	Yes
$ 2,171,400	3.5	3.5	Yes	17	8	55.8	276.6	0.23	0.32	127	Yes
$ 2,493,120	4	4	Yes	11	3	68.7	345.3	0.25	0.39	139	Yes
$ 2,627,940	4.5	4.5	Yes	5	1	69.7	415.0	0.26	0.40	158	Yes
$ 2,763,180	5	5	Yes	3	0	61.7	476.7	0.27	0.35	173	Yes
$ 3,307,920	5.5	5.5	Yes	2	0	31.1	507.8	0.26	0.18	154	No
$ 3,650,220	6	6	Yes	2	0	10.0	517.8	0.25	0.06	142	No
$ 3,992,520	6.5	6.5	Yes	2	0	3.8	521.6	0.23	0.02	131	No
$ 4,131,960	7	7	Yes	2	0	1.3	523.0	0.21	0.01	127	No
$ 4,586,820	7.5	7.5	Yes	2	0	0.5	523.4	0.20	0.00	114	No
$ 5,041,680	8	8	Yes	2	0	0.5	523.9	0.19	0.00	104	No

Notes

For this sub-catchment, the noise barrier considered starts at Track Chainage 28.05 km and ends at Track Chainage 28.4 km (350 m). The analysis indicates a conventional barrier targeting overall noise would be feasible, reasonable and optimise cost-effectiveness. A barrier is therefore recommended this location.

To be considered cost-effective in an absolute sense, a barrier must provide at least 100 dB benefit per $1M, for either wheel/rail noise or overall noise. Cost-effectiveness is also checked to confirm the TNBA and MBVA are both > 0.2 dB per m^2.

A barrier highlighted in green achieves the minimum benefit requirements and maximises the "dB per $1M". This barrier is taken to be the "acoustic optimum" barrier height. This barrier is recommended only if it is cost-effective and higher than the "target" height.

A barrier highlighted in blue achieves the noise goals at all triggered receiver points. This barrier is taken to be the "target" barrier height. The "target" barrier height is recommended only if it is cost-effective, meets the minimum benefit requirements and is higher than the "acoustic optimum" height.

Wheel Rail Sources Only, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	3	3	0.0	0.0	0.00	0.00	0	No
$ 1,359,720	1	1	Yes	0	0	39.8	39.8	0.13	0.13	29	No
$ 1,359,720	1.5	1.5	Yes	0	0	5.8	45.6	0.10	0.04	34	No
$ 1,359,720	2	2	Yes	0	0	0.0	45.6	0.08	0.00	34	No
$ 1,472,760	2.5	2.5	Yes	0	0	0.0	45.6	0.06	0.00	31	No

Overall Noise, Conventional Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	4	4	0.0	0.0	0.00	0.00	0	No
$ 1,359,720	1	1	No	4	4	7.4	7.4	0.02	0.02	5	No
$ 1,359,720	1.5	1.5	No	4	4	1.9	9.3	0.02	0.01	7	No
$ 1,359,720	2	2	No	4	4	1.1	10.4	0.02	0.01	8	No
$ 1,472,760	2.5	2.5	No	4	4	1.0	11.4	0.02	0.01	8	No

Notes

For this sub-catchment, the noise barrier considered starts at Track Chainage 28.8 km and ends at Track Chainage 29.1 km (300 m). The analysis indicates that a barrier at this location would not be cost-effective. Therefore, a barrier is not recommended at this location.

To be considered cost-effective in an absolute sense, a barrier must provide at least 100 dB benefit per $1M, for either wheel/rail noise or overall noise. Cost-effectiveness is also checked to confirm the TNBA and MBVA are both > 0.2 dB per m^2.

A barrier highlighted in green achieves the minimum benefit requirements and maximises the "dB per $1M". This barrier is taken to be the "acoustic optimum" barrier height. This barrier is recommended only if it is cost-effective and higher than the "target" height.

A barrier highlighted in blue achieves the noise goals at all triggered receiver points. This barrier is taken to be the "target" barrier height. The "target" barrier height is recommended only if it is cost-effective, meets the minimum benefit requirements and is higher than the "acoustic optimum" height.

Wheel Rail Sources Only, Low Barriers

Cost	Height Above Ground (m)	Nominal Height (m)	Minimum benefit?	Total Points above Goal	Triggered Points above Goal	MBV	TNB	TNBA	MBVA	dB per $1M	Check Barrier
0	0	0	No	2	1	0.0	0.0	0.00	0.00	0	No
$ 2,413,260	1.25	0.5	Yes	0	0	31.4	31.4	0.06	0.06	13	No
$ 2,413,260	1.5	0.75	Yes	0	0	11.3	42.7	0.06	0.10	18	No
$ 2,421,360	1.75	1	Yes	0	0	5.0	47.7	0.06	0.04	20	No

Notes

For this sub-catchment, the noise barrier considered starts at Track Chainage 28.8 km and ends at Track Chainage 29.25 km (450 m). The analysis indicates that a barrier at this location would not be cost-effective. Therefore, a barrier is not recommended at this location.

To be considered cost-effective in an absolute sense, a barrier must provide at least 100 dB benefit per $1M, for either wheel/rail noise or overall noise. Cost-effectiveness is also checked to confirm the TNBA and MBVA are both > 0.2 dB per m^2.

A barrier highlighted in green achieves the minimum benefit requirements and maximises the "dB per $1M". This barrier is taken to be the "acoustic optimum" barrier height. This barrier is recommended only if it is cost-effective and higher than the "target" height.

A barrier highlighted in blue achieves the noise goals at all triggered receiver points. This barrier is taken to be the "target" barrier height. The "target" barrier height is recommended only if it is cost-effective, meets the minimum benefit requirements and is higher than the "acoustic optimum" height.

Appendix F Mitigated case noise prediction tables

Mitigated Individual Receiver Noise Model Results IGANRIP (including safety factor on train numbers)					IGANRIP RESULTS WITH RECOMMENDED MITIGATION 2026 after opening (with safety factor)									Change due to Mitigation			Was this location triggered without mitigation?
					LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passeng	Total	Freight	Passeng	Total	Freight	Passeng	Total	LAeq Day	LAeq Nigh	LAmax	
NCA01	DN	1 5 Ray Rd	G	Pl of Worship	55	49	56	56	44	56	83	75	83				YES
NCA01	DN	1 5 Ray Rd	1	Pl of Worship	56	51	57	57	47	57	83	76	83				NO
NCA01	DN	74 Rawson St	2	Residential	63	58	64	64	54	65	90	83	90				NO
NCA01	DN	74 Rawson St	3	Residential	63	59	64	64	54	65	90	83	90				YES
NCA01	DN	74 Rawson St	4	Residential	63	59	64	64	55	65	90	83	90				YES
NCA01	DN	74 Rawson St	5	Residential	63	59	64	64	55	65	91	83	91				NO
NCA01	DN	74 Rawson St	6	Residential	63	59	64	64	54	65	91	83	91				YES
NCA01	DN	74 Rawson St	7	Residential	63	59	64	64	55	65	91	83	91				YES
NCA01	DN	74 Rawson St	2	Residential	63	58	64	64	54	65	90	83	90				NO
NCA01	DN	74 Rawson St	3	Residential	63	59	64	64	54	65	90	83	90				NO
NCA01	DN	74 Rawson St	4	Residential	63	59	64	64	55	65	90	83	90				NO
NCA01	DN	74 Rawson St	5	Residential	63	59	64	64	55	65	91	83	91				NO
NCA01	DN	74 Rawson St	6	Residential	63	59	64	64	54	65	91	83	91				NO
NCA01	DN	74 Rawson St	7	Residential	63	59	64	64	55	65	91	83	91				NO
NCA01	DN	74 Rawson St	2	Residential	63	58	64	64	54	65	90	83	90				NO
NCA01	DN	74 Rawson St	3	Residential	63	59	64	64	54	65	90	83	90				NO
NCA01	DN	74 Rawson St	4	Residential	63	59	64	64	55	65	90	83	90				NO
NCA01	DN	74 Rawson St	5	Residential	63	59	64	64	55	65	91	83	91				NO
NCA01	DN	74 Rawson St	6	Residential	63	59	64	64	54	65	91	83	91				NO
NCA01	DN	74 Rawson St	7	Residential	63	59	64	64	55	65	91	83	91				NO
NCA01	DN	7 Ray Rd	G	Residential	53	46	54	55	42	55	81	72	81				NO
NCA01	DN	7 Ray Rd	1	Residential	54	48	55	55	44	56	82	73	82				NO
NCA01	DN	7 Ray Rd	2	Residential	55	50	56	56	46	57	82	74	82				NO
NCA01	DN	9 Ray Rd	G	Residential	54	47	55	55	42	55	81	73	81				NO
NCA01	DN	9 Ray Rd	1	Residential	54	48	55	55	44	56	81	73	81				NO
NCA01	DN	9 Ray Rd	2	Residential	54	49	56	56	45	56	81	73	81				NO
NCA01	DN	13 15 Ray Rd	G	Residential	54	47	55	55	43	55	81	73	81				NO
NCA01	DN	13 15 Ray Rd	1	Residential	54	48	55	55	44	56	81	73	81				NO
NCA01	DN	13 15 Ray Rd	2	Residential	55	50	56	56	46	57	81	73	81				NO
NCA01	DN	17 19 Ray Rd	G	Residential	53	46	54	54	42	54	80	72	80				NO
NCA01	DN	17 19 Ray Rd	1	Residential	54	48	55	55	44	56	80	73	80				NO
NCA01	DN	17 19 Ray Rd	2	Residential	55	50	56	56	46	56	80	73	80				NO
NCA01	DN	21 Ray Rd	G	Residential	52	46	53	53	41	53	79	71	79				NO
NCA01	DN	21 Ray Rd	1	Residential	54	48	55	55	44	55	81	72	81				NO
NCA01	DN	21 Ray Rd	2	Residential	54	49	55	55	45	56	80	72	80				NO
NCA01	DN	6 Ray Rd	G	Residential	56	46	56	57	41	57	83	74	83				NO
NCA01	DN	6 Ray Rd	1	Residential	56	48	57	58	43	58	83	75	83				NO
NCA01	DN	6 Ray Rd	2	Residential	57	50	58	58	45	58	84	75	84				NO
NCA01	DN	6 Ray Rd	G	Residential	56	46	56	57	41	57	83	74	83				NO
NCA01	DN	6 Ray Rd	1	Residential	56	48	57	58	43	58	83	75	83				NO
NCA01	DN	6 Ray Rd	2	Residential	57	50	58	58	45	58	84	75	84				NO
NCA01	DN	2 4 Edensor St	G	Residential	56	48	57	57	43	58	83	74	83				NO
NCA01	DN	2 4 Edensor St	1	Residential	57	49	57	58	45	58	83	75	83				NO
NCA01	DN	2 4 Edensor St	2	Residential	57	51	58	58	47	59	83	75	83				NO
NCA01	DN	2 4 Edensor St	G	Residential	56	48	57	57	43	58	83	74	83				NO
NCA01	DN	2 4 Edensor St	1	Residential	57	49	57	58	45	58	83	75	83				NO
NCA01	DN	2 4 Edensor St	2	Residential	57	51	58	58	47	59	83	75	83				NO
NCA01	UP	9 Oxford St	G	Other	60	55	61	62	51	62	89	80	89				NO
NCA01	UP	9 Oxford St	1	Other	61	57	62	62	53	63	89	83	89				NO
NCA01	UP	29 Oxford St	G	Educational	56	52	57	57	48	58	84	78	84				NO
NCA01	UP	29 Oxford St	1	Educational	56	53	58	58	49	58	84	79	84				NO
NCA01	UP	29 Oxford St	2	Educational	57	53	59	59	49	59	84	80	84				NO
NCA01	UP	31 Oxford St	G	Educational	61	59	63	63	55	64	87	85	87				NO
NCA01	UP	31 Oxford St	1	Educational	61	59	64	63	55	64	87	85	87				NO
NCA01	UP	31 Oxford St	G	Educational	61	59	63	63	55	64	87	85	87				NO
NCA01	UP	31 Oxford St	1	Educational	61	59	64	63	55	64	87	85	87				NO
NCA01	UP	31 Oxford St	G	Pl of Worship	61	59	63	63	55	64	87	85	87				NO
NCA01	UP	31 Oxford St	1	Pl of Worship	61	59	64	63	55	64	87	85	87				NO
NCA01	UP	31 Oxford St	2	Pl of Worship	56	51	57	57	47	57	83	76	83				NO
NCA01	UP	2 4 Chester St	G	Residential	52	50	54	54	46	54	80	76	80				NO
NCA01	UP	2 4 Chester St	1	Residential	52	50	54	54	46	55	80	76	80				NO
NCA01	UP	2 4 Chester St	G	Residential	52	50	54	54	46	54	80	76	80				NO
NCA01	UP	2 4 Chester St	1	Residential	52	50	54	54	46	55	80	76	80				NO
NCA01	UP	1 3 Oxford St	G	Residential	60	53	60	61	49	62	87	79	87				NO
NCA01	UP	1 3 Oxford St	1	Residential	60	55	61	62	51	62	87	81	87				NO
NCA01	UP	1 3 Oxford St	2	Residential	60	55	61	62	51	62	87	81	87				NO
NCA01	UP	1 3 Oxford St	3	Residential	60	55	61	62	51	62	87	81	87				NO
NCA01	UP	1 3 Oxford St	G	Residential	60	53	60	61	49	62	87	79	87				NO
NCA01	UP	1 3 Oxford St	1	Residential	60	55	61	62	51	62	87	81	87				NO
NCA01	UP	1 3 Oxford St	2	Residential	60	55	61	62	51	62	87	81	87				NO
NCA01	UP	1 3 Oxford St	3	Residential	60	55	61	62	51	62	87	81	87				NO

Mitigated Individual Receiver Noise Model Results IGANRIP (including safety factor on train numbers)					IGANRIP RESULTS WITH RECOMMENDED MITIGATION 2026 after opening (with safety factor)									Change due to Mitigation			Was this location triggered without mitigation?
					LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passeng	Total	Freight	Passeng	Total	Freight	Passeng	Total	LAeq Day	LAeq Nigh	LAmax	
NCA02	DN	34 40 Edensor St	G	Residential	57	51	58	58	47	58	82	76	82				NO
NCA02	DN	34 40 Edensor St	1	Residential	57	53	59	59	49	59	82	76	82				NO
NCA02	DN	34 40 Edensor St	2	Residential	58	54	59	59	50	60	82	78	82				NO
NCA02	DN	34 40 Edensor St	3	Residential	58	55	60	60	51	60	82	79	82				NO
NCA02	DN	6 Edensor St	G	Residential	56	48	57	57	43	58	83	74	83				NO
NCA02	DN	6 Edensor St	1	Residential	57	49	57	58	45	58	83	75	83				NO
NCA02	DN	6 Edensor St	2	Residential	57	51	58	58	47	59	84	75	84				NO
NCA02	DN	6 Edensor St	3	Residential	58	53	59	59	49	59	84	76	84				NO
NCA02	DN	10 Edensor St	G	Residential	56	48	57	57	43	58	83	74	83				NO
NCA02	DN	10 Edensor St	1	Residential	57	49	57	58	45	58	84	74	84				NO
NCA02	DN	10 Edensor St	2	Residential	57	51	58	58	46	59	84	75	84				NO
NCA02	DN	10 Edensor St	3	Residential	58	53	59	59	48	59	84	76	84				NO
NCA02	DN	14 Edensor St	G	Residential	56	48	57	57	43	57	84	74	84				NO
NCA02	DN	14 Edensor St	1	Residential	57	49	57	58	45	58	84	75	84				NO
NCA02	DN	14 Edensor St	2	Residential	57	51	58	58	46	59	84	76	84				NO
NCA02	DN	14 Edensor St	3	Residential	58	53	59	59	49	59	84	76	84				NO
NCA02	DN	18 Edensor St	G	Residential	56	48	57	57	43	57	84	72	84				NO
NCA02	DN	18 Edensor St	1	Residential	56	49	57	58	45	58	84	73	84				NO
NCA02	DN	18 Edensor St	2	Residential	57	50	58	58	46	58	84	75	84				NO
NCA02	DN	18 Edensor St	3	Residential	57	52	58	59	48	59	84	75	84				NO
NCA02	DN	18 Edensor St	G	Residential	56	48	57	57	43	57	84	72	84				NO
NCA02	DN	18 Edensor St	1	Residential	56	49	57	58	45	58	84	73	84				NO
NCA02	DN	18 Edensor St	2	Residential	57	50	58	58	46	58	84	75	84				NO
NCA02	DN	18 Edensor St	3	Residential	57	52	58	59	48	59	84	75	84				NO
NCA02	DN	24 32 Edensor St	G	Residential	56	49	57	58	45	58	83	74	83				NO
NCA02	DN	24 32 Edensor St	1	Residential	57	50	58	58	46	58	83	74	83				NO
NCA02	DN	24 32 Edensor St	2	Residential	57	52	58	59	48	59	83	76	83				NO
NCA02	DN	24 32 Edensor St	3	Residential	58	54	59	59	50	60	83	77	83				NO
NCA02	DN	24 32 Edensor St	G	Residential	56	49	57	58	45	58	83	74	83				NO
NCA02	DN	24 32 Edensor St	1	Residential	57	50	58	58	46	58	83	74	83				NO
NCA02	DN	24 32 Edensor St	2	Residential	57	52	58	59	48	59	83	76	83				NO
NCA02	DN	24 32 Edensor St	3	Residential	58	54	59	59	50	60	83	77	83				NO
NCA02	DN	34 40 Edensor St	G	Residential	57	51	58	58	47	58	82	76	82				NO
NCA02	DN	34 40 Edensor St	1	Residential	57	53	59	59	49	59	82	76	82				NO
NCA02	DN	34 40 Edensor St	2	Residential	58	54	59	59	50	60	82	78	82				NO
NCA02	DN	34 40 Edensor St	3	Residential	58	55	60	60	51	60	82	79	82				NO
NCA02	DN	1 Kandy Av	G	Residential	58	50	59	59	46	59	86	79	86				NO
NCA02	DN	1 Kandy Av	1	Residential	58	52	59	60	48	60	86	80	86				NO
NCA02	DN	1 Kandy Av	2	Residential	59	54	60	60	50	61	86	80	86				NO
NCA02	DN	1 Kandy Av	G	Residential	58	50	59	59	46	59	86	79	86				NO
NCA02	DN	1 Kandy Av	1	Residential	58	52	59	60	48	60	86	80	86				NO
NCA02	DN	1 Kandy Av	2	Residential	59	54	60	60	50	61	86	80	86				NO
NCA02	DN	2 Kandy Av	G	Residential	58	52	59	59	48	59	85	78	85				NO
NCA02	DN	3 Kandy Av	G	Residential	56	52	57	57	48	58	84	78	84				NO
NCA02	DN	3 Kandy Av	1	Residential	58	55	60	59	51	60	85	80	85				NO
NCA02	DN	3 Kandy Av	2	Residential	58	56	60	60	52	61	83	80	83				NO
NCA02	DN	3 Kandy Av	3	Residential	59	56	61	60	52	61	83	81	83				NO
NCA02	DN	3 Kandy Av	G	Residential	56	52	57	57	48	58	84	78	84				NO
NCA02	DN	3 Kandy Av	1	Residential	58	55	60	59	51	60	85	80	85				NO
NCA02	DN	3 Kandy Av	2	Residential	58	56	60	60	52	61	83	80	83				NO
NCA02	DN	3 Kandy Av	3	Residential	59	56	61	60	52	61	83	81	83				NO
NCA02	DN	3 Kandy Av	G	Residential	56	52	57	57	48	58	84	78	84				NO
NCA02	DN	3 Kandy Av	1	Residential	58	55	60	59	51	60	85	80	85				NO
NCA02	DN	3 Kandy Av	2	Residential	58	56	60	60	52	61	83	80	83				NO
NCA02	DN	3 Kandy Av	3	Residential	59	56	61	60	52	61	83	81	83				NO
NCA02	DN	3 Kandy Av	G	Residential	56	52	57	57	48	58	84	78	84				NO
NCA02	DN	3 Kandy Av	1	Residential	58	55	60	59	51	60	85	80	85				NO
NCA02	DN	3 Kandy Av	2	Residential	58	56	60	60	52	61	83	80	83				NO
NCA02	DN	3 Kandy Av	3	Residential	59	56	61	60	52	61	83	81	83				NO
NCA02	DN	3 Kandy Av	G	Residential	56	52	57	57	48	58	84	78	84				NO
NCA02	DN	3 Kandy Av	1	Residential	58	55	60	59	51	60	85	80	85				NO
NCA02	DN	3 Kandy Av	2	Residential	58	56	60	60	52	61	83	80	83				NO
NCA02	DN	3 Kandy Av	G	Residential	56	52	57	57	48	58	84	78	84				NO
NCA02	DN	3 Kandy Av	1	Residential	58	55	60	59	51	60	85	80	85				NO
NCA02	DN	3 Kandy Av	2	Residential	58	56	60	60	52	61	83	80	83				NO
NCA02	DN	3 Kandy Av	G	Residential	56	52	57	57	48	58	84	78	84				NO
NCA02	DN	3 Kandy Av	1	Residential	58	55	60	59	51	60	85	80	85				NO
NCA02	DN	3 Kandy Av	2	Residential	58	56	60	60	52	61	83	80	83				NO
NCA02	DN	4 Kandy Av	G	Residential	56	51	57	57	46	57	83	75	83				NO
NCA02	DN	6 Kandy Av	G	Residential	55	49	56	56	45	57	84	75	84				NO
NCA02	DN	6 Kandy Av	G	Residential	55	49	56	56	45	57	84	75	84				NO
NCA02	DN	6 Kandy Av	G	Residential	55	49	56	56	45	57	84	75	84				NO
NCA02	DN	8 Kandy Av	G	Residential	53	50	55	55	46	55	80	74	80				NO
NCA02	DN	8 Kandy Av	1	Residential	56	53	58	58	49	58	81	78	81				NO
NCA02	DN	4A Kandy Av	G	Residential	57	49	57	58	45	58	84	75	84				NO
NCA02	DN	8A Kandy Av	G	Residential	54	47	55	55	43	55	83	75	83				NO
NCA02	DN	8A Kandy Av	1	Residential	56	51	57	57	46	57	83	75	83				NO
NCA02	UP	36 Cambridge St	G	Residential	61	59	63	63	56	63	86	85	86				NO
NCA02	UP	36 Cambridge St	1	Residential	61	60	63	63	56	64	86	85	86				NO
NCA02	UP	36 Cambridge St	2	Residential	61	60	63	63	56	64	86	85	86				NO
NCA02	UP	38 Cambridge St	G	Residential	61	59	63	62	55	63	86	85	86				NO
NCA02	UP	38 Cambridge St	1	Residential	61	60	63	63	56	64	86	85	86				NO
NCA02	UP	38 Cambridge St	2	Residential	61	60	63	63	56	64	86	85	86				NO
NCA02	UP	40 Cambridge St	G	Residential	60	59	63	62	55	63	86	85	86				NO
NCA02	UP	40 Cambridge St	1	Residential	61	60	63	63	56	64	86	85	86				NO
NCA02	UP	40 Cambridge St	2	Residential	61	60	63	63	56	64	86	85	86				NO
NCA02	UP	42 Cambridge St	G	Residential	61	59	63	63	55	64	87	85	87				NO
NCA02	UP	42 Cambridge St	1	Residential	61	60	64	63	56	64	87	85	87				NO
NCA02	UP	42 Cambridge St	2	Residential	61	60	64	63	56	64	87	85	87				NO
NCA02	UP	46 Cambridge St	G	Residential	62	60	64	64	56	64	88	86	88				NO
NCA02	UP	46 Cambridge St	1	Residential	62	60	64	64	56	64	88	86	88				NO
NCA02	UP	46 Cambridge St	2	Residential	62	60	64	64	56	64	88	86	88				NO
NCA02	UP	46 Cambridge St	3	Residential	62	60	64	64	56	64	88	85	88				NO
NCA02	UP	46 Cambridge St	G	Residential	62	60	64	64	56	64	88	86	88				NO
NCA02	UP	46 Cambridge St	1	Residential	62	60	64	64	56	64	88	86	88				NO
NCA02	UP	46 Cambridge St	2	Residential	62	60	64	64	56	64	88	86	88				NO
NCA02	UP	46 Cambridge St	3	Residential	62	60	64	64	56	64	88	85	88				NO
NCA02	UP	50 54 Cambridge St	G	Residential	62	60	64	64	56	65	88	86	88				NO
NCA02	UP	50 54 Cambridge St	1	Residential	62	61	65	64	57	65	88	86	88				NO
NCA02	UP	50 54 Cambridge St	G	Residential	62	60	64	64	56	65	88	86	88				NO
NCA02	UP	50 54 Cambridge St	1	Residential	62	61	65	64	57	65	88	86	88				NO
NCA02	UP	50 54 Cambridge St	G	Residential	62	60	64	64	56	65	88	86	88				NO
NCA02	UP	50 54 Cambridge St	1	Residential	62	61	65	64	57	65	88	86	88				NO
NCA02	UP	56 Cambridge St	G	Residential	60	59	63	62	55	63	88	85	88				NO
NCA02	UP	1 3 Chester St	G	Residential	46	44	48	48	40	49	72	67	72				NO
NCA02	UP	1 3 Chester St	1	Residential	47	45	49	49	41	50	73	68	73				NO
NCA02	UP	1 3 Chester St	2	Residential	50	47	51	51	43	52	74	69	74				NO
NCA02	UP	1 3 Chester St	G	Residential	46	44	48	48	40	49	72	67	72				NO
NCA02	UP	1 3 Chester St	1	Residential	47	45	49	49	41	50	73	68	73				NO

Mitigated Individual Receiver Noise Model Results IGANRIP (including safety factor on train numbers)					IGANRIP RESULTS WITH RECOMMENDED MITIGATION 2026 after opening (with safety factor)									Change due to Mitigation			Was this location triggered without mitigation?
					LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passeng	Total	Freight	Passeng	Total	Freight	Passeng	Total	LAeq Day	LAeq Nigh	LAmax	
NCA02	UP	1 3 Chester St	2	Residential	50	47	51	51	43	52	74	69	74				NO
NCA02	UP	5 Chester St	G	Residential	50	48	52	52	44	52	79	73	79				NO
NCA02	UP	5 Chester St	1	Residential	50	48	52	52	44	53	78	73	78				NO
NCA02	UP	5 Chester St	2	Residential	52	49	54	54	45	54	80	74	80				NO
NCA02	UP	5 Chester St	G	Residential	50	48	52	52	44	52	79	73	79				NO
NCA02	UP	5 Chester St	1	Residential	50	48	52	52	44	53	78	73	78				NO
NCA02	UP	5 Chester St	2	Residential	52	49	54	54	45	54	80	74	80				NO
NCA02	UP	30 34 Chester St	G	Residential	61	59	63	63	55	63	86	84	86				NO
NCA02	UP	30 34 Chester St	1	Residential	61	59	63	63	55	63	86	84	86				NO
NCA02	UP	30 34 Chester St	2	Residential	61	59	63	63	55	63	86	84	86				NO
NCA02	UP	30 34 Chester St	G	Residential	61	59	63	63	55	63	86	84	86				NO
NCA02	UP	30 34 Chester St	1	Residential	61	59	63	63	55	63	86	84	86				NO
NCA02	UP	30 34 Chester St	2	Residential	61	59	63	63	55	63	86	84	86				NO
NCA02	UP	30 34 Chester St	G	Residential	61	59	63	63	55	63	86	84	86				NO
NCA02	UP	30 34 Chester St	1	Residential	61	59	63	63	55	63	86	84	86				NO
NCA02	UP	30 34 Chester St	2	Residential	61	59	63	63	55	63	86	84	86				NO
NCA02	UP	30 34 Chester St	G	Residential	61	59	63	63	55	63	86	84	86				NO
NCA02	UP	30 34 Chester St	1	Residential	61	59	63	63	55	63	86	84	86				NO
NCA02	UP	30 34 Chester St	2	Residential	61	59	63	63	55	63	86	84	86				NO
NCA02	UP	40 Cambridge St	G	Residential	60	59	63	62	55	63	86	85	86				NO
NCA02	UP	40 Cambridge St	1	Residential	61	60	63	63	56	64	86	85	86				NO
NCA02	UP	40 Cambridge St	2	Residential	61	60	63	63	56	64	86	85	86				NO
NCA02	UP	9 Derby St	G	Residential	50	47	52	52	43	52	76	70	76				NO
NCA02	UP	11 Derby St	G	Residential	55	52	57	56	48	57	83	78	83				NO
NCA02	UP	11 Derby St	1	Residential	56	54	58	58	50	59	84	80	84				NO
NCA02	UP	15 Derby St	G	Residential	50	48	52	52	44	53	77	73	77				NO
NCA02	UP	15 Derby St	1	Residential	54	50	55	55	46	56	82	75	82				NO
NCA02	UP	16 Derby St	G	Residential	53	50	54	54	46	55	83	77	83				NO
NCA02	UP	16 Derby St	1	Residential	54	52	56	56	48	56	83	79	83				NO
NCA02	UP	17 19 Derby St	G	Residential	62	61	64	64	57	65	90	87	90				NO
NCA02	UP	17 19 Derby St	1	Residential	62	61	65	64	57	65	90	87	90				NO
NCA02	UP	17 19 Derby St	G	Residential	62	61	64	64	57	65	90	87	90				NO
NCA02	UP	17 19 Derby St	1	Residential	62	61	65	64	57	65	90	87	90				NO
NCA02	UP	17 19 Derby St	G	Residential	62	61	64	64	57	65	90	87	90				NO
NCA02	UP	17 19 Derby St	1	Residential	62	61	65	64	57	65	90	87	90				NO
NCA02	UP	17 19 Derby St	G	Residential	62	61	64	64	57	65	90	87	90				NO
NCA02	UP	17 19 Derby St	1	Residential	62	61	65	64	57	65	90	87	90				NO
NCA02	UP	17 19 Derby St	G	Residential	62	61	64	64	57	65	90	87	90				NO
NCA02	UP	17 19 Derby St	1	Residential	62	61	65	64	57	65	90	87	90				NO
NCA02	UP	17 19 Derby St	G	Residential	62	61	64	64	57	65	90	87	90				NO
NCA02	UP	17 19 Derby St	1	Residential	62	61	65	64	57	65	90	87	90				NO
NCA02	UP	18 Derby St	G	Residential	56	54	58	58	49	58	82	78	82				NO
NCA02	UP	18 Derby St	1	Residential	57	55	59	59	51	59	84	79	84				NO
NCA02	UP	20 Derby St	G	Residential	56	54	58	58	50	59	83	79	83				NO
NCA02	UP	21 Derby St	G	Residential	61	60	63	63	55	64	88	86	88				NO
NCA02	UP	21 Derby St	1	Residential	62	60	64	64	56	64	88	87	88				NO
NCA02	UP	4/23 Derby St (1)	G	Residential	61	59	63	63	55	63	88	86	88				YES
NCA02	UP	4/23 Derby St (1)	1	Residential	61	60	64	63	56	64	88	86	88				NO
NCA02	UP	4/23 Derby St (2)	G	Residential	61	60	63	63	56	64	87	87	87				NO
NCA02	UP	4/23 Derby St (2)	1	Residential	62	60	64	64	56	64	87	87	87				NO
NCA02	UP	24A Derby St	G	Residential	58	56	60	60	52	61	84	82	84				NO
NCA02	UP	24A Derby St	1	Residential	59	57	61	61	53	61	84	83	84				NO
NCA02	UP	26 Derby St	G	Residential	58	56	60	60	52	61	84	82	84				YES
NCA02	UP	22A Derby St	G	Residential	57	55	59	59	51	59	84	81	84				NO
NCA02	UP	24 Derby St	G	Residential	58	56	60	60	52	60	84	82	84				NO
NCA02	UP	24 Derby St	1	Residential	58	56	60	60	52	61	84	82	84				NO
NCA02	UP	2A Somerset St	G	Residential	54	52	56	56	48	57	81	79	81				NO
NCA02	UP	1 Surrey St	G	Residential	62	60	64	64	56	65	88	85	88				NO
NCA02	UP	1 Surrey St	1	Residential	62	60	64	64	56	65	88	85	88				NO
NCA02	UP	2 Surrey St	G	Residential	49	47	51	51	43	52	78	72	78				NO
NCA02	UP	2 Surrey St	1	Residential	51	48	53	53	44	53	78	73	78				NO
NCA02	UP	2 Surrey St	2	Residential	53	49	55	54	46	55	79	74	79				NO
NCA02	UP	2A Surrey St	G	Residential	62	60	64	64	56	64	87	85	87				NO
NCA02	UP	2A Surrey St	1	Residential	62	60	64	64	56	64	87	85	87				NO
NCA02	UP	2A Surrey St	2	Residential	62	60	64	63	56	64	87	85	87				NO

Mitigated Individual Receiver Noise Model Results IGANRIP (including safety factor on train numbers)					IGANRIP RESULTS WITH RECOMMENDED MITIGATION 2026 after opening (with safety factor)									Change due to Mitigation			Was this location triggered without mitigation?
					LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passeng	Total	Freight	Passeng	Total	Freight	Passeng	Total	LAeq Day	LAeq Nigh	LAmax	
NCA03	DN	9 Old Beecroft Rd	G	Residential	53	50	55	55	46	56	82	77	82				NO
NCA03	DN	11 Old Beecroft Rd	G	Residential	55	51	57	57	47	57	85	79	85				NO
NCA03	DN	11 Old Beecroft Rd	1	Residential	56	53	58	58	49	58	85	80	85				NO
NCA03	DN	15 Old Beecroft Rd	G	Residential	56	52	58	58	48	58	87	79	87				NO
NCA03	DN	17 Old Beecroft Rd	G	Residential	58	55	60	60	51	61	87	82	87				YES
NCA03	DN	17 Old Beecroft Rd	1	Residential	59	56	61	61	52	62	87	83	87				YES
NCA03	DN	19 Old Beecroft Rd	G	Residential	60	55	61	61	51	62	88	82	88				YES
NCA03	DN	19 Old Beecroft Rd	1	Residential	60	57	62	62	53	63	88	83	88				YES
NCA03	DN	21 Old Beecroft Rd	G	Residential	60	55	61	61	51	62	88	81	88				YES
NCA03	DN	23 Old Beecroft Rd	G	Residential	60	54	61	62	50	62	89	78	89				YES
NCA03	DN	25 Old Beecroft Rd	G	Residential	61	56	62	62	52	63	90	80	90				YES
NCA03	DN	27 Old Beecroft Rd	G	Residential	59	55	61	61	50	61	88	81	88				YES
NCA03	DN	29 Old Beecroft Rd	G	Residential	61	57	62	62	53	63	90	83	90				YES
NCA03	DN	29 Old Beecroft Rd	1	Residential	61	58	63	63	54	64	90	84	90				YES
NCA03	DN	33 Old Beecroft Rd	G	Residential	60	56	62	62	52	62	89	83	89				YES
NCA03	DN	33 Old Beecroft Rd	1	Residential	61	57	62	62	53	63	89	83	89				YES
NCA03	DN	25A Old Beecroft Rd	G	Residential	61	56	62	62	52	63	89	82	89				YES
NCA03	DN	31 Old Beecroft Rd	G	Residential	60	56	62	62	52	62	89	83	89				YES
NCA03	DN	82 The Crescent	G	Residential	60	56	62	62	52	62	89	84	89				YES
NCA03	DN	84 The Crescent	G	Residential	60	56	62	62	52	62	89	83	89				YES
NCA03	DN	86 The Crescent	G	Residential	60	56	62	62	52	62	89	84	89				YES
NCA03	DN	86 The Crescent	G	Residential	60	56	62	62	52	62	89	84	89				NO
NCA03	DN	88 The Crescent	G	Residential	58	54	60	60	50	61	88	82	88				YES
NCA03	DN	88 The Crescent	G	Residential	58	54	60	60	50	61	88	82	88				NO
NCA03	DN	90 The Crescent	G	Residential	57	53	58	59	49	59	86	80	86				NO
NCA03	DN	90 The Crescent	1	Residential	58	53	59	59	49	60	86	80	86				NO
NCA03	DN	90 The Crescent	G	Residential	57	53	58	59	49	59	86	80	86				NO
NCA03	DN	90 The Crescent	1	Residential	58	53	59	59	49	60	86	80	86				NO
NCA03	DN	92 The Crescent	G	Residential	56	51	57	57	47	58	84	78	84				NO
NCA03	DN	94 The Crescent	G	Residential	54	50	56	56	46	57	83	77	83				NO
NCA03	DN	94 The Crescent	1	Residential	56	52	57	58	48	58	84	78	84				NO
NCA03	DN	94 The Crescent	G	Residential	54	50	56	56	46	57	83	77	83				NO
NCA03	DN	94 The Crescent	1	Residential	56	52	57	58	48	58	84	78	84				NO
NCA03	DN	96 The Crescent	G	Residential	56	52	57	58	48	58	85	78	85				NO
NCA03	DN	96 The Crescent	1	Residential	57	53	59	59	49	59	86	80	86				NO
NCA03	DN	98 The Crescent	G	Residential	54	49	55	55	45	56	84	77	84				NO
NCA03	DN	100 The Crescent	G	Residential	57	53	59	59	49	59	87	81	87				NO
NCA03	DN	102 The Crescent	G	Residential	58	55	60	60	51	61	88	82	88				YES
NCA03	DN	102 The Crescent	1	Residential	59	56	61	61	52	61	89	83	89				YES
NCA03	DN	104 The Crescent	G	Residential	59	55	60	60	51	61	88	82	88				YES
NCA03	DN	104 The Crescent	1	Residential	60	57	62	62	53	62	89	84	89				YES
NCA03	DN	106 The Crescent	G	Residential	58	54	60	60	50	60	87	81	87				YES
NCA03	DN	106 The Crescent	1	Residential	60	57	61	62	53	62	88	83	88				YES
NCA03	DN	108 The Crescent	G	Residential	59	55	61	61	51	61	88	83	88				YES
NCA03	DN	108 The Crescent	1	Residential	60	57	62	62	53	62	88	83	88				YES
NCA03	DN	76 The Crescent	G	Residential	60	57	62	62	53	63	89	84	89				YES
NCA03	DN	76 The Crescent	G	Residential	60	57	62	62	53	63	89	84	89				NO
NCA03	DN	78 The Crescent	G	Residential	59	56	61	61	52	62	88	83	88				YES
NCA03	DN	78 The Crescent	G	Residential	59	56	61	61	52	62	88	83	88				YES
NCA03	DN	80 The Crescent	G	Residential	60	56	61	61	52	62	88	83	88				YES
NCA03	DN	80 The Crescent	1	Residential	60	57	62	62	53	63	88	84	88				YES
NCA03	DN	80 The Crescent	G	Residential	60	56	61	61	52	62	88	83	88				YES
NCA03	DN	80 The Crescent	1	Residential	60	57	62	62	53	63	88	84	88				YES
NCA03	UP	2 Sutherland Rd	G	Residential	58	53	59	60	49	60	86	83	86				NO
NCA03	UP	3 Sutherland Rd	G	Residential	58	55	60	60	51	61	85	82	85				NO
NCA03	UP	3 Sutherland Rd	1	Residential	59	57	61	61	53	62	85	84	85				NO
NCA03	UP	5 Sutherland Rd	G	Residential	58	55	60	60	51	61	86	83	86				NO
NCA03	UP	5 Sutherland Rd	1	Residential	59	57	61	61	53	62	85	84	85				NO
NCA03	UP	9 Sutherland Rd	G	Residential	59	56	61	61	52	61	87	84	87				NO
NCA03	UP	9 Sutherland Rd	1	Residential	60	57	62	61	53	62	86	85	86				NO
NCA03	UP	11 Sutherland Rd	G	Residential	52	48	53	54	44	54	81	77	81				NO
NCA03	UP	11 Sutherland Rd	G	Residential	52	48	53	54	44	54	81	77	81				NO
NCA03	UP	15 Sutherland Rd	G	Residential	48	45	50	50	41	50	74	71	74				NO
NCA03	UP	17 Sutherland Rd	G	Residential	58	54	60	60	50	61	88	81	88				NO
NCA03	UP	19 Sutherland Rd	G	Residential	59	54	60	61	49	61	87	79	87				NO
NCA03	UP	19 Sutherland Rd	1	Residential	60	57	62	62	53	63	87	84	87				NO
NCA03	UP	21 Sutherland Rd	G	Residential	50	47	52	52	43	52	74	69	74				NO
NCA03	UP	21 Sutherland Rd	1	Residential	54	51	56	56	47	57	79	76	79				NO
NCA03	UP	35 Sutherland Rd	G	Residential	57	52	58	59	48	60	88	80	88				NO
NCA03	UP	35 Sutherland Rd	1	Residential	59	54	60	61	50	61	89	82	89				NO
NCA03	UP	35 Sutherland Rd	G	Residential	57	52	58	59	48	60	88	80	88				NO
NCA03	UP	35 Sutherland Rd	1	Residential	59	54	60	61	50	61	89	82	89				NO
NCA03	UP	37 Sutherland Rd	G	Residential	57	52	58	59	48	60	87	80	87				NO
NCA03	UP	37 Sutherland Rd	G	Residential	57	52	58	59	48	60	87	80	87				NO
NCA03	UP	51 57 Sutherland Rd	G	Residential	51	48	52	53	44	53	74	72	74				NO
NCA03	UP	51 57 Sutherland Rd	1	Residential	53	50	55	55	46	56	78	74	78				NO
NCA03	UP	59 Sutherland Rd	G	Residential	47	44	49	49	40	49	69	65	69				NO
NCA03	UP	59 Sutherland Rd	1	Residential	51	47	52	53	43	53	76	70	76				NO
NCA03	UP	61 Sutherland Rd	G	Residential	58	55	60	60	51	61	87	82	87				NO
NCA03	UP	61 Sutherland Rd	1	Residential	59	56	61	61	52	62	88	83	88				NO
NCA03	UP	61 Sutherland Rd	G	Residential	58	55	60	60	51	61	87	82	87				NO
NCA03	UP	61 Sutherland Rd	1	Residential	59	56	61	61	52	62	88	83	88				NO
NCA03	UP	11A Sutherland Rd	G	Residential	58	55	60	60	51	60	86	83	86				NO
NCA03	UP	11A Sutherland Rd	G	Residential	58	55	60	60	51	60	86	83	86				NO
NCA03	UP	25 Sutherland Rd	G	Residential	57	53	58	59	49	59	84	79	84				NO
NCA03	UP	25 Sutherland Rd	G	Residential	57	53	58	59	49	59	84	79	84				NO
NCA03	UP	25 Sutherland Rd	G	Residential	57	53	58	59	49	59	84	79	84				NO
NCA03	UP	25 Sutherland Rd	G	Residential	57	53	58	59	49	59	84	79	84				NO
NCA03	UP	33 Sutherland Rd	G	Residential	53	50	55	55	46	56	83	78	83				NO
NCA03	UP	33 Sutherland Rd	G	Residential	53	50	55	55	46	56	83	78	83				NO

Mitigated Individual Receiver Noise Model Results IGANRIP (including safety factor on train numbers)					IGANRIP RESULTS WITH RECOMMENDED MITIGATION 2026 after opening (with safety factor)									Change due to Mitigation			Was this location triggered without mitigation?
					LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passeng	Total	Freight	Passeng	Total	Freight	Passeng	Total	LAeq Day	LAeq Nigh	LAmax	
NCA04	DN	125 Beecroft Rd	G	Residential	55	52	57	57	48	58	81	77	81	0.4	0.4	7.5	NO
NCA04	DN	125 Beecroft Rd	1	Residential	58	55	60	60	51	61	84	79	84	0.4	0.5	7.9	YES
NCA04	DN	127 Beecroft Rd	G	Residential	57	54	59	59	50	59	86	78	86	0.2	0.2	2.1	NO
NCA04	DN	127 Beecroft Rd	G	Residential	57	54	59	59	50	59	86	78	86	0.2	0.2	2.1	YES
NCA04	DN	129 Beecroft Rd	G	Residential	55	51	56	57	48	57	84	76	84	0.2	0.2	0.4	NO
NCA04	DN	131 Beecroft Rd	G	Residential	55	52	57	57	48	57	83	75	83	0.5	0.5	5.1	NO
NCA04	DN	133 Beecroft Rd	G	Residential	54	50	55	55	47	56	82	75	82	0.2	0.3	2.9	NO
NCA04	DN	22 Cheltenham Rd	G	Residential	58	54	59	60	49	60	86	82	86				NO
NCA04	DN	22 Cheltenham Rd	1	Residential	60	56	61	62	52	62	88	85	88				YES
NCA04	DN	24 Cheltenham Rd	G	Residential	55	51	56	57	47	57	83	81	83				NO
NCA04	DN	24 Cheltenham Rd	1	Residential	56	52	57	58	48	58	84	81	84				NO
NCA04	DN	26 Cheltenham Rd	G	Residential	52	48	54	54	44	55	80	77	80				NO
NCA04	DN	44 Cheltenham Rd	G	Residential	51	47	53	53	43	54	76	72	76	0.3	0.3	3.1	NO
NCA04	DN	44 Cheltenham Rd	1	Residential	53	50	55	55	45	56	79	76	79	0.2	0.2	0.2	NO
NCA04	DN	46 Cheltenham Rd	G	Residential	50	46	52	52	42	53	78	73	78	0.4	0.3	0.7	NO
NCA04	DN	48 Cheltenham Rd	G	Residential	50	45	51	52	41	52	79	74	79	0.4	0.4		NO
NCA04	DN	48 Cheltenham Rd	1	Residential	52	48	53	54	43	55	82	76	82	0.3	0.2		NO
NCA03	DN	1 Lyne Rd	G	Residential	53	50	55	55	46	56	82	77	82				NO
NCA04	DN	2 Murray Rd	G	Residential	58	53	60	60	49	61	86	77	86	0.1	0.1		YES
NCA04	DN	2 Murray Rd	1	Residential	59	55	61	61	51	62	87	79	87	0.1	0.1		YES
NCA04	DN	4 Murray Rd	G	Residential	51	46	52	53	42	53	80	73	80				NO
NCA04	DN	6 Murray Rd	G	Residential	52	47	53	53	43	54	76	69	76	0.4	0.5	7.5	NO
NCA04	DN	6 Murray Rd	1	Residential	53	49	55	55	45	56	78	71	78	0.7	0.8	7.9	NO
NCA04	DN	50 The Crescent	G	Residential	60	56	62	62	52	63	90	86	90				NO
NCA04	DN	50 The Crescent	1	Residential	61	57	62	63	52	63	90	86	90				NO
NCA04	DN	52 The Crescent	G	Residential	61	57	62	63	53	63	90	87	90				NO
NCA04	DN	54 The Crescent	G	Residential	62	59	64	64	54	65	92	88	92				YES
NCA04	DN	56 The Crescent	G	Residential	63	59	64	64	54	65	92	87	92				YES
NCA04	DN	58 The Crescent	G	Residential	62	58	64	64	53	65	91	86	91				YES
NCA04	DN	4 The Crescent	G	Residential	63	60	65	65	57	65	90	84	90	0.2	0.2	2.6	NO
NCA04	DN	6 The Crescent	G	Residential	62	60	64	64	56	65	90	83	90	0.2	0.2	2.4	NO
NCA04	DN	8 The Crescent	G	Residential	61	59	63	63	55	64	89	82	89	0.2	0.2	1.3	YES
NCA04	DN	12 The Crescent	G	Residential	61	58	63	63	54	63	89	83	89	0.2	0.2	0.5	YES
NCA04	DN	10 The Crescent	G	Residential	61	58	63	63	54	63	89	82	89	0.2	0.2	2.5	YES
NCA04	DN	14 The Crescent	G	Residential	59	56	61	61	52	61	88	82	88	0.1	0.1		NO
NCA04	DN	14 The Crescent	1	Residential	61	58	62	62	54	63	88	83	88	0.1	0.2		YES
NCA04	DN	16 The Crescent	G	Residential	62	58	63	63	54	64	90	85	90				YES
NCA04	DN	16 The Crescent	1	Residential	62	59	64	64	55	64	90	85	90				YES
NCA04	DN	18 The Crescent	G	Residential	61	58	63	63	54	63	90	84	90		0.1		YES
NCA04	DN	20 The Crescent	G	Residential	61	58	63	63	54	63	91	85	91	0.1	0.1		YES
NCA04	DN	20 The Crescent	1	Residential	61	58	63	63	54	64	91	85	91	0.1	0.1		YES
NCA04	DN	22 The Crescent	G	Residential	59	55	61	61	51	61	89	82	89	0.2	0.2		YES
NCA04	DN	24 The Crescent	G	Residential	60	54	61	61	50	62	89	80	89	0.1	0.1		YES
NCA04	DN	24 The Crescent	1	Residential	61	56	62	62	52	63	90	82	90	0.1	0.1		YES
NCA04	DN	26 The Crescent	G	Residential	60	57	61	61	53	62	88	84	88				YES
NCA04	DN	28 The Crescent	G	Residential	59	56	61	61	52	61	87	83	87				YES
NCA04	DN	30 The Crescent	G	Residential	56	53	58	58	49	58	84	80	84				NO
NCA04	DN	30 The Crescent	1	Residential	57	54	59	59	50	59	84	81	84	0.1	0.1		NO
NCA04	DN	32 The Crescent	G	Residential	61	58	63	63	54	63	89	85	89				YES
NCA04	DN	32 The Crescent	1	Residential	61	58	63	63	54	63	89	85	89				YES
NCA04	DN	14A The Crescent	G	Residential	62	59	63	63	55	64	90	85	90				YES
NCA04	DN	16A The Crescent	G	Residential	53	50	55	55	46	55	82	76	82	0.2	0.2	1.0	NO
NCA04	DN	16A The Crescent	1	Residential	56	52	57	57	48	58	84	77	84	0.3	0.4	2.8	NO
NCA04	DN	24A The Crescent	G	Residential	59	54	60	61	50	61	87	77	87	0.2	0.2		YES
NCA04	DN	24B The Crescent	G	Residential	58	54	59	60	50	60	87	80	87	0.2	0.2		NO
NCA04	DN	24B The Crescent	G	Residential	58	54	59	60	50	60	87	80	87	0.2	0.2		NO
NCA04	DN	2 The Crescent	G	Residential	62	60	64	64	56	64	90	85	90	0.2	0.2		NO
NCA04	DN	28 The Promenade	G	Residential	53	50	55	55	46	56	79	74	79	0.3	0.3	3.4	NO
NCA04	DN	28 The Promenade	G	Residential	53	50	55	55	46	56	79	74	79	0.3	0.3	3.4	NO
NCA04	DN	121 Beecroft Rd	G	Residential	60	58	62	62	54	63	88	82	88	0.3	0.3	5.3	NO
NCA04	DN	121 Beecroft Rd	1	Residential	61	59	63	63	55	64	88	83	88	0.3	0.4	6.9	NO
NCA04	DN	123 Beecroft Rd	G	Residential	59	56	61	61	52	61	86	81	86	0.4	0.4	7.4	NO
NCA04	DN	125 Beecroft Rd	G	Residential	55	52	57	57	48	58	81	77	81	0.4	0.4	7.5	NO
NCA04	UP	16 Cheltenham Rd	G	Residential	54	50	55	56	45	56	81	77	81				NO
NCA04	UP	16 Cheltenham Rd	G	Residential	54	50	55	56	45	56	81	77	81				NO
NCA04	UP	27 Cheltenham Rd	G	Residential	52	47	53	54	43	54	79	72	79				NO
NCA04	UP	27 Cheltenham Rd	1	Residential	54	49	55	56	45	56	81	76	81				NO
NCA04	UP	23 Chorley Av	G	Residential	47	44	49	49	40	49	70	67	70	0.3	0.3	7.5	NO
NCA04	UP	23 Chorley Av	1	Residential	50	46	51	51	42	52	73	70	73	0.3	0.4	7.8	NO
NCA04	UP	25 Chorley Av	G	Residential	55	52	57	57	48	57	81	76	81	0.1		0.2	NO
NCA04	UP	25 Chorley Av	1	Residential	57	53	58	58	49	59	83	77	83	0.1	0.1		NO
NCA04	UP	26 Chorley Av	G	Residential	50	47	52	52	43	52	74	71	74	0.3	0.3	5.8	NO
NCA04	UP	26 Chorley Av	1	Residential	53	50	55	55	46	56	77	73	77	0.2	0.2	5.6	NO
NCA04	UP	1 Cobran Rd	G	Residential	58	52	59	59	48	60	87	77	87				NO
NCA04	UP	1 Cobran Rd	1	Residential	61	56	62	63	51	63	88	80	88				YES
NCA04	UP	3 Cobran Rd	G	Residential	56	52	58	58	48	59	84	78	84				NO
NCA04	UP	3 Cobran Rd	1	Residential	58	53	59	59	49	60	84	79	84				NO
NCA04	UP	3 Cobran Rd	G	Residential	56	52	58	58	48	59	84	78	84				NO
NCA04	UP	3 Cobran Rd	1	Residential	58	53	59	59	49	60	84	79	84				NO
NCA04	UP	4 Cobran Rd	G	Residential	50	47	52	52	42	52	78	74	78				NO
NCA04	UP	4 Cobran Rd	1	Residential	54	50	56	56	46	57	83	77	83				NO
NCA04	UP	5 Cobran Rd	G	Residential	56	52	57	58	48	58	83	78	83				NO
NCA04	UP	5 Cobran Rd	1	Residential	56	52	58	58	48	58	83	78	83				NO
NCA04	UP	5 Cobran Rd	G	Residential	56	52	57	58	48	58	83	78	83				NO
NCA04	UP	5 Cobran Rd	1	Residential	56	52	58	58	48	58	83	78	83				NO
NCA04	UP	7 Cobran Rd	G	Residential	54	50	56	56	46	57	81	75	81				NO
NCA04	UP	2B Sutherland Rd	G	Residential	58	55	60	61	51	61	87	83	87				NO
NCA04	UP	2B Sutherland Rd	1	Residential	59	56	61	61	52	62	87	84	87				NO
NCA04	UP	2D Cobran Rd	G	Residential	54	45	54	55	41	56	84	70	84				NO
NCA04	UP	2D Cobran Rd	1	Residential	57	52	58	59	48	59	84	78	84				NO
NCA04	UP	2D Cobran Rd	G	Residential	54	45	54	55	41	56	84	70	84				NO
NCA04	UP	2D Cobran Rd	1	Residential	57	52	58	59	48	59	84	78	84				NO
NCA04	UP	1 Day Rd	G	Residential	50	44	51	52	40	52	79	72	79				NO
NCA04	UP	1 Day Rd	1	Residential	52	47	53	54	43	54	80	74	80				NO
NCA04	UP	2 Day Rd	G	Residential	61	57	62	63	52	63	89	85	89				NO
NCA04	UP	4 Day Rd	G	Residential	57	53	58	59	49	59	84	82	84				NO
NCA04	UP	4 Day Rd	1	Residential	57	54	59	59	50	60	84	82	84				NO
NCA04	UP	6 Day Rd	G	Residential	53	50	55	56	46	56	81	78	81				NO
NCA04	UP	6 Day Rd	1	Residential	54	51	56	56	47	57	81	79	81				NO
NCA04	UP	1 Glenelg Pl	G	Residential	54	50	55	56	46	56	82	72	82	0.2	0.2	2.4	NO
NCA04	UP	1 Glenelg Pl	1	Residential	56	53	58	58	49	59	83	76	83	0.2	0.2	5.4	NO
NCA04	UP	1 Kethel Rd	G	Residential	59	53	60	61	49	61	88	82	88				NO
NCA04	UP	3 Kethel Rd	G	Residential	56	52	57	58	48	58	86	82	86				NO
NCA04	UP	24 Sutherland Rd	G	Residential	55	51	56	57	47	57	80	75	80				NO
NCA04	UP	26 Sutherland Rd	G	Residential	53	50	55	55	46	55	76	73	76	0.1	0.1	5.7	NO
NCA04	UP	26 Sutherland Rd	G	Residential	53	50	55	55	46	55	76	73	76	0.1	0.1	5.7	NO
NCA04	UP	28 Sutherland Rd	G	Residential	58	55	60	59	51	60	85	82	85				NO
NCA04	UP	28 Sutherland Rd	G	Residential	58	55	60	59	51	60	85	82	85				NO
NCA04	UP	28 Sutherland Rd	1	Residential	54	49	55	55	45	56	77	73	77	0.1	0.2	2.4	NO

Mitigated Individual Receiver Noise Model Results IGANRIP (including safety factor on train numbers)					IGANRIP RESULTS WITH RECOMMENDED MITIGATION 2026 after opening (with safety factor)									Change due to Mitigation			Was this location triggered without mitigation?
					LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passeng	Total	Freight	Passeng	Total	Freight	Passeng	Total	LAeq Day	LAeq Nigh	LAmax	
NCA04	UP	30 Sutherland Rd	G	Residential	59	57	61	61	53	62	87	85	87				NO
NCA04	UP	32 Sutherland Rd	G	Residential	60	58	62	62	54	63	87	86	87				NO
NCA04	UP	34 Sutherland Rd	G	Residential	58	56	60	60	52	61	86	83	86				NO
NCA04	UP	38 Sutherland Rd	G	Residential	59	55	61	61	52	62	87	84	87				NO
NCA04	UP	44 Sutherland Rd	G	Residential	59	56	61	61	52	62	88	84	88				NO
NCA04	UP	44 Sutherland Rd	G	Residential	59	56	61	61	52	62	88	84	88				NO
NCA04	UP	46 Sutherland Rd	G	Residential	57	54	59	59	50	59	85	81	85				NO
NCA04	UP	46 Sutherland Rd	G	Residential	57	54	59	59	50	59	85	81	85				NO
NCA04	UP	46 Sutherland Rd	1	Residential	58	54	59	59	50	60	86	81	86				NO
NCA04	UP	50 Sutherland Rd	G	Residential	56	53	58	58	49	59	84	79	84				NO
NCA04	UP	52 Sutherland Rd	G	Residential	56	53	58	58	49	59	83	78	83				NO
NCA04	UP	54 Sutherland Rd	G	Residential	55	51	57	57	47	57	80	75	80				NO
NCA04	UP	56 Sutherland Rd	G	Residential	54	50	56	56	46	56	82	75	82				NO
NCA04	UP	58 Sutherland Rd	G	Residential	54	50	56	56	46	57	82	71	82				NO
NCA04	UP	58 Sutherland Rd	1	Residential	58	53	59	60	49	60	86	75	86				NO
NCA04	UP	60 Sutherland Rd	G	Residential	60	56	61	61	52	62	88	82	88				NO
NCA04	UP	60 Sutherland Rd	1	Residential	61	57	62	63	53	63	88	83	88				NO
NCA04	UP	62 Sutherland Rd	G	Residential	59	56	61	61	52	62	87	82	87				NO
NCA04	UP	64 Sutherland Rd	G	Residential	58	54	60	60	51	61	87	82	87				NO
NCA04	UP	68 Sutherland Rd	G	Residential	60	56	61	62	52	62	88	83	88	0.1			NO
NCA04	UP	72 Sutherland Rd	G	Residential	61	58	63	63	54	63	87	82	87		0.1	1.9	NO
NCA04	UP	74 Sutherland Rd	G	Residential	59	56	61	61	52	62	86	79	86				NO
NCA04	UP	76 Sutherland Rd	G	Residential	59	55	61	61	51	61	86	79	86				NO
NCA04	UP	78 Sutherland Rd	G	Residential	61	58	63	63	55	64	87	83	87	0.1	0.1	3.2	NO
NCA04	UP	60B Sutherland Rd	G	Residential	54	52	56	56	48	56	82	78	82	0.1	0.1	0.9	NO
NCA04	UP	60B Sutherland Rd	1	Residential	55	53	58	57	49	58	82	78	82	0.1	0.1	3.9	NO
NCA04	UP	62B Sutherland Rd	G	Residential	57	55	59	59	51	60	86	81	86				NO
NCA04	UP	62B Sutherland Rd	1	Residential	58	56	60	60	52	61	86	82	86			0.7	NO
NCA04	UP	64A Sutherland Rd	G	Residential	56	53	58	58	49	59	84	80	84			0.3	NO
NCA04	UP	64A Sutherland Rd	1	Residential	58	56	60	60	52	61	84	81	84	0.1	0.1	2.8	NO
NCA04	UP	66A Sutherland Rd	G	Residential	58	54	59	60	50	60	86	80	86				NO
NCA04	UP	2 Sutherland Rd	G	Residential	58	53	59	60	49	60	86	83	86				YES
NCA04	UP	2 Sutherland Rd	1	Residential	60	56	62	62	52	62	87	81	87				NO
NCA04	UP	2 Sutherland Rd	G	Residential	58	53	59	60	49	60	86	83	86				NO
NCA04	UP	2 Sutherland Rd	1	Residential	60	56	62	62	52	62	87	81	87				NO
NCA04	UP	4 Sutherland Rd	G	Residential	57	52	58	59	47	60	86	81	86				NO
NCA04	UP	6 Sutherland Rd	G	Residential	58	53	59	60	49	60	86	81	86				NO
NCA04	UP	8 Sutherland Rd	G	Residential	59	54	60	61	49	61	86	80	86				NO
NCA04	UP	10 Sutherland Rd	G	Residential	59	55	61	61	51	62	87	82	87				NO
NCA04	UP	12 Sutherland Rd	G	Residential	59	56	61	62	52	62	87	84	87				NO
NCA04	UP	14 Sutherland Rd	G	Residential	59	56	61	61	52	62	87	85	87				NO
NCA04	UP	14 Sutherland Rd	1	Residential	60	57	62	62	53	63	87	85	87				NO
NCA04	UP	16 Sutherland Rd	G	Residential	60	57	62	62	53	63	88	86	88				NO
NCA04	UP	16 Sutherland Rd	1	Residential	60	57	62	62	53	63	88	85	88				NO
NCA04	UP	18 Sutherland Rd	G	Residential	59	56	61	61	52	62	87	85	87				NO
NCA04	UP	20 Sutherland Rd	G	Residential	56	52	57	58	48	58	83	79	83				NO
NCA04	UP	20 Sutherland Rd	G	Residential	56	52	57	58	48	58	83	79	83				NO
NCA04	UP	20 Sutherland Rd	G	Residential	56	52	57	58	48	58	83	79	83				NO
NCA04	UP	20 Sutherland Rd	G	Residential	56	52	57	58	48	58	83	79	83				NO
NCA04	UP	22 Sutherland Rd	G	Residential	55	50	56	57	46	57	82	73	82	0.1			NO
NCA04	UP	12A Sutherland Rd	G	Residential	55	51	57	57	47	58	81	78	81				NO
NCA04	UP	2A Sutherland Rd	G	Residential	54	49	55	56	44	56	84	78	84				NO
NCA04	UP	2A Sutherland Rd	G	Residential	54	49	55	56	44	56	84	78	84				NO
NCA04	UP	4A Sutherland Rd	G	Residential	58	53	60	61	49	61	87	82	87				NO

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					LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passeng	Total	Freight	Passeng	Total	Freight	Passeng	Total	LAeq Day	LAeq Nigh	LAmax	
NCA05	DN	111 Beecroft Rd	G	Other	66	62	68	68	58	69	95	92	95	0.6	0.7	8.1	NO
NCA05	DN	1 The Crescent	G	Active Recreation	66	63	68	68	59	68	95	91	95	0.5	0.7	7.9	NO
NCA05	DN	90 96 Beecroft Rd	G	Educational	62	59	64	65	55	65	92	87	92	0.6	0.7	7.9	NO
NCA05	DN	Cheltenham Scout Hall	G	Other	72	69	74	74	65	74	104	100	104				YES
NCA05	DN	90 96 Beecroft Rd	G	Educational	62	59	64	65	55	65	92	87	92	0.6	0.7	7.9	NO
NCA05	DN	Cheltenham Scout Hall	G	Other	72	69	74	74	65	74	104	100	104				YES
NCA05	DN	90 96 Beecroft Rd	G	Educational	62	59	64	65	55	65	92	87	92	0.6	0.7	7.9	NO
NCA05	DN	90 96 Beecroft Rd	1	Educational	63	60	65	65	56	65	92	88	92	0.6	0.7	7.9	NO
NCA05	DN	90 96 Beecroft Rd	G	Educational	62	59	64	65	55	65	92	87	92	0.6	0.7	7.9	NO
NCA05	DN	90 96 Beecroft Rd	1	Educational	63	60	65	65	56	65	92	88	92	0.6	0.7	7.9	NO
NCA05	DN	90 96 Beecroft Rd	2	Educational	60	56	62	62	52	62	89	87	89	0.6	0.7	8.0	NO
NCA05	DN	90 96 Beecroft Rd	G	Educational	62	59	64	65	55	65	92	87	92	0.6	0.7	7.9	NO
NCA05	DN	90 96 Beecroft Rd	1	Educational	63	60	65	65	56	65	92	88	92	0.6	0.7	7.9	NO
NCA05	DN	90 96 Beecroft Rd	2	Educational	60	56	62	62	52	62	89	87	89	0.6	0.7	8.0	NO
NCA05	DN	102 104 Beecroft Rd	G	Residential	62	60	64	64	56	65	92	86	92	0.6	0.7	8.0	NO
NCA05	DN	102 104 Beecroft Rd	1	Residential	63	60	64	65	56	65	92	86	92	0.5	0.7	8.0	NO
NCA05	DN	106 Beecroft Rd	G	Residential	63	60	65	65	56	65	92	86	92	0.6	0.8	7.9	YES
NCA05	DN	106 Beecroft Rd	1	Residential	63	60	65	65	56	66	92	86	92	0.6	0.8	8.1	YES
NCA05	DN	108 Beecroft Rd	G	Residential	63	60	65	65	56	65	92	87	92	0.5	0.7	8.0	YES
NCA05	DN	108 Beecroft Rd	1	Residential	63	60	65	65	56	65	92	87	92	0.6	0.7	8.0	YES
NCA05	DN	110 Beecroft Rd	G	Residential	63	60	65	65	56	66	92	87	92	0.6	0.7	8.0	YES
NCA05	DN	112 Beecroft Rd	G	Residential	63	60	64	65	56	65	92	86	92	0.5	0.7	8.0	YES
NCA05	DN	114 Beecroft Rd	G	Residential	62	59	64	64	55	64	91	85	91	0.5	0.7	7.9	YES
NCA05	DN	115 Beecroft Rd	G	Residential	63	61	65	65	57	66	92	88	92	0.5	0.6	7.9	YES
NCA05	DN	116 Beecroft Rd	G	Residential	61	58	63	63	54	63	89	84	89	0.5	0.7	7.8	YES
NCA05	DN	118 Beecroft Rd	G	Residential	61	58	63	63	54	64	90	85	90	0.5	0.7	8.0	YES
NCA05	DN	2D The Crescent	G	Residential	63	60	65	65	56	65	91	86	91	0.4	0.6	7.8	YES
NCA05	DN	2C The Crescent	G	Residential	61	59	63	63	55	64	88	83	88	0.3	0.4	7.5	YES
NCA05	DN	2B The Crescent	G	Residential	60	58	62	62	54	63	87	81	87	0.3	0.3	6.9	NO
NCA05	UP	136 Copeland Rd	G	Residential	65	61	66	67	57	67	94	91	94	0.6	0.7	8.1	NO
NCA05	UP	138 Copeland Rd	G	Residential	62	59	63	64	55	64	91	88	91	0.6	0.7	8.0	NO
NCA05	UP	140 Copeland Rd	G	Residential	59	56	60	61	52	61	88	85	88	0.5	0.7	7.9	NO
NCA05	UP	144 Copeland Rd	G	Residential	58	56	60	60	52	61	88	85	88	0.6	0.8	8.0	YES
NCA05	UP	144 Copeland Rd	1	Residential	59	56	61	61	52	62	88	85	88	0.6	0.8	8.0	NO
NCA05	UP	80 Sutherland Rd	G	Residential	60	58	62	62	54	63	87	83	87	0.1	0.1	3.4	NO
NCA05	UP	84 Sutherland Rd	G	Residential	64	62	66	66	58	67	94	91	94	0.5	0.7	7.9	NO
NCA05	UP	84 Sutherland Rd	1	Residential	65	63	67	67	59	68	95	92	95	0.5	0.7	7.9	NO
NCA05	UP	86 Sutherland Rd	G	Residential	63	61	65	66	58	66	94	90	94	0.5	0.7	8.0	NO
NCA05	UP	88 Sutherland Rd	G	Residential	65	62	67	67	58	67	95	91	95	0.6	0.7	8.0	NO
NCA05	UP	88 Sutherland Rd	1	Residential	66	63	68	68	59	68	95	92	95	0.6	0.8	8.0	NO
NCA05	UP	90 Sutherland Rd	G	Residential	66	63	67	68	59	68	95	92	95	0.6	0.7	8.0	NO
NCA05	UP	92 Sutherland Rd	G	Residential	65	62	67	67	58	68	95	92	95	0.6	0.7	8.0	NO
NCA05	UP	92 Sutherland Rd	1	Residential	66	63	68	68	59	69	96	93	96	0.6	0.8	8.0	NO

Mitigated Individual Receiver Noise Model Results IGANRIP (including safety factor on train numbers)					IGANRIP RESULTS WITH RECOMMENDED MITIGATION 2026 after opening (with safety factor)									Change due to Mitigation			Was this location triggered without mitigation?
					LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passeng	Total	Freight	Passeng	Total	Freight	Passeng	Total	LAeq Day	LAeq Nigh	LAmax	
NCA06	DN	23 Wongala Cres	G	Residential	63	58	64	65	54	65	91	88	91	0.9	1.1	8.7	NO
NCA06	DN	25 Wongala Cres	G	Residential	62	57	63	64	53	64	90	87	90	0.8	0.9	8.5	NO
NCA06	UP	2 Malton Rd	G	Residential	63	58	64	65	54	65	91	88	91	1.9	2.1	10.9	YES
NCA06	UP	2 Malton Rd	1	Residential	64	60	65	66	55	66	91	91	91	1.8	2.2	11.1	NO
NCA06	UP	94 Sutherland Rd	G	Residential	62	58	64	64	54	65	91	87	91	1.1	1.4	9.4	YES
NCA06	UP	139 Copeland Rd	G	Residential	53	50	55	55	46	56	82	75	82	0.6	0.8	8.0	NO
NCA06	UP	1 Malton Rd	G	Residential	54	49	55	56	45	57	81	76	81	0.6	0.7	8.1	NO
NCA06	UP	4 Malton Rd	G	Residential	57	52	58	58	47	59	84	83	84	2.9	3.2	11.7	YES
NCA06	UP	6 Malton Rd	G	Residential	48	44	50	50	40	51	76	70	76	0.8	0.7	8.0	NO
NCA06	UP	6 Malton Rd	1	Residential	50	45	51	52	41	52	77	71	77	0.7	0.7	8.1	NO
NCA06	UP	100A Sutherland	G	Residential	57	50	58	59	46	59	86	80	86	5.9	6.1	14.6	YES
NCA06	UP	96 Sutherland Rd	G	Residential	60	54	61	62	49	62	88	83	88	4.4	4.8	14.6	YES
NCA06	UP	98A Sutherland Rd	G	Residential	59	52	60	61	48	61	87	83	87	5.3	5.7	15.9	YES
NCA06	UP	100 Sutherland Rd	G	Residential	59	52	59	61	47	61	87	82	87	6.1	6.4	15.8	YES
NCA06	UP	100 Sutherland Rd	1	Residential	60	53	61	62	49	62	87	83	87	5.9	6.2	16.5	YES
NCA06	UP	102 Sutherland Rd	G	Residential	58	51	58	60	46	60	87	81	87	6.2	6.4	15.2	YES
NCA06	UP	94B Sutherland Rd	G	Residential	60	53	60	62	49	62	87	83	87	3.4	3.7	13.6	YES
NCA06	UP	94B Sutherland Rd	1	Residential	61	55	62	63	50	63	88	84	88	2.8	3.1	12.7	YES
NCA06	UP	94A Sutherland Rd	G	Residential	61	56	62	63	52	63	89	83	89	1.9	2.2	11.0	NO
NCA06	UP	104 Sutherland Rd	G	Residential	59	52	60	61	48	61	87	81	87	6.1	6.3	16.4	YES
NCA06	UP	106 Sutherland Rd	G	Residential	63	58	64	65	53	65	90	88	90	3.1	3.4	12.9	YES
NCA06	UP	104A Sutherland Rd	G	Residential	60	53	61	62	49	62	87	82	87	6.1	6.4	16.7	YES
NCA06	UP	1 Wandeen Av	G	Residential	64	59	65	66	54	66	91	88	91	3.5	3.8	13.1	YES
NCA06	UP	1 Wandeen Av	G	Residential	64	59	65	66	54	66	91	88	91	3.5	3.8	13.1	YES
NCA06	UP	2 Wandeen Av	G	Residential	61	54	62	63	50	63	88	83	88	5.6	5.9	16.2	YES
NCA06	UP	2 Wandeen Av	G	Residential	61	54	62	63	50	63	88	83	88	5.6	5.9	16.2	YES
NCA06	UP	2 Wandeen Av	1	Residential	61	56	63	63	52	64	89	84	89	4.6	4.9	14.8	YES
NCA06	UP	3 Wandeen Av	G	Residential	58	52	59	60	48	61	85	83	85	5.0	5.3	15.5	YES
NCA06	UP	5 Wandeen Av	G	Residential	57	52	58	59	48	59	84	81	84	4.2	4.6	14.6	YES
NCA06	UP	2A Wandeen Av	G	Residential	53	48	55	55	44	56	82	79	82	3.0	3.3	11.8	NO
NCA06	UP	2A Wandeen Av	1	Residential	55	50	56	57	46	58	84	81	84	2.6	3.0	11.6	YES

Mitigated Individual Receiver Noise Model Results IGANRIP (including safety factor on train numbers)					IGANRIP RESULTS WITH RECOMMENDED MITIGATION 2026 after opening (with safety factor)									Change due to Mitigation			Was this location triggered without mitigation?
					LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passeng	Total	Freight	Passeng	Total	Freight	Passeng	Total	LAeq Day	LAeq Nigh	LAmax	
NCA07	DN	45 Wongala Cres	G	Educational	58	55	60	60	61	63	88	88	88	3.4	0.7	10.9	NO
NCA07	DN	39 41 Wongala Cres	G	Educational	58	55	59	59	60	63	87	87	87	1.4	1.1	9.2	NO
NCA07	DN	2 Albert Rd	G	Residential	59	56	61	61	62	64	88	88	88	6.5	4.0	14.4	YES
NCA07	DN	2 Albert Rd	1	Residential	62	59	64	64	65	67	92	92	92	5.1	2.5	12.5	YES
NCA07	DN	4 Albert Rd	G	Residential	54	51	56	56	57	59	83	83	83	4.8	2.3	12.4	YES
NCA07	DN	4 Albert Rd	1	Residential	56	53	58	58	59	61	86	86	86	3.3	0.6	10.3	YES
NCA07	DN	6 Albert Rd	G	Residential	56	53	57	57	58	61	85	85	85	6.6	4.0	14.3	YES
NCA07	DN	6 Albert Rd	1	Residential	57	54	59	59	60	62	86	86	86	5.7	3.1	13.4	YES
NCA07	DN	3 Boundary Rd	G	Residential	60	59	63	61	64	66	89	89	89		2.5	0.1	NO
NCA07	DN	8 Chapman Av	G	Residential	52	48	53	53	54	57	81	81	81	0.6	1.9	8.0	NO
NCA07	DN	10 Chapman Av	G	Residential	55	50	56	56	57	59	83	83	83	0.5	1.9	8.1	NO
NCA07	DN	10A Chapman Av	G	Residential	51	48	53	52	54	56	79	79	79	0.5	2.0	8.0	NO
NCA07	DN	24 Lilla Rd	G	Residential	53	47	54	54	55	57	81	81	81	10.5	7.9	18.5	NO
NCA07	DN	26 Lilla Rd	G	Residential	52	48	54	53	55	57	80	80	80	8.5	5.9	17.0	NO
NCA07	DN	28 Lilla Rd	G	Residential	54	50	55	55	56	59	82	82	82	12.8	10.2	20.9	YES
NCA07	DN	1 Sherwood Cl	G	Residential	50	47	52	51	53	55	78	78	78	11.5	9.0	18.7	NO
NCA07	DN	2 Sherwood Cl	G	Residential	51	47	52	52	53	56	79	79	79	12.2	9.6	20.1	NO
NCA07	DN	2 Sherwood Cl	1	Residential	52	48	54	53	55	57	80	80	80	13.0	10.4	21.5	YES
NCA07	DN	121 Wongala Cres	G	Residential	58	55	59	59	60	63	86	86	86	1.2	1.3	8.9	NO
NCA07	DN	123 Wongala Cres	G	Residential	58	56	60	60	61	63	84	84	84	0.4	2.1	7.5	NO
NCA07	DN	125 Wongala Cres	G	Residential	58	56	60	59	61	63	86	86	86		2.5		NO
NCA07	DN	125 Wongala Cres	1	Residential	59	58	61	60	62	64	87	87	87	0.1	2.6		NO
NCA07	DN	127 Wongala Cres	G	Residential	57	55	59	58	60	62	86	86	86	0.1	2.3		NO
NCA07	DN	29 Wongala Cres	G	Residential	58	54	59	59	60	63	87	87	87	0.9	1.5	8.6	NO
NCA07	DN	31 Wongala Cres	G	Residential	56	52	57	57	58	61	84	84	84	0.9	1.5	8.7	NO
NCA07	DN	33 Wongala Cres	G	Residential	55	52	57	56	58	60	83	83	83	0.7	1.8	8.2	NO
NCA07	DN	35 Wongala Cres	G	Residential	57	54	59	59	60	62	86	86	86	0.6	1.9	8.2	NO
NCA07	DN	37 Wongala Cres	G	Residential	55	52	57	57	48	58	85	77	85	1.0	1.0	8.0	NO
NCA07	DN	47 Wongala Cres	G	Residential	55	53	57	57	58	61	85	85	85	4.3	1.8	12.1	YES
NCA07	DN	47 Wongala Cres	1	Residential	57	54	59	59	60	62	86	86	86	4.4	1.8	12.1	YES
NCA07	DN	49 Wongala Cres	G	Residential	58	55	60	60	61	63	87	87	87	5.7	3.2	13.2	YES
NCA07	DN	49 Wongala Cres	1	Residential	59	56	61	61	62	65	89	89	89	5.1	2.5	12.4	YES
NCA07	DN	51 Wongala Cres	G	Residential	58	55	60	60	61	63	87	87	87	6.4	3.9	14.1	NO
NCA07	DN	53 Wongala Cres	G	Residential	56	53	58	58	59	62	86	86	86	8.7	6.1	16.5	NO
NCA07	DN	55 Wongala Cres	G	Residential	55	52	56	56	57	60	84	84	84	11.0	8.4	18.9	NO
NCA07	DN	57 Wongala Cres	G	Residential	53	50	54	54	55	58	81	81	81	13.3	10.7	21.3	YES
NCA07	DN	59 Wongala Cres	G	Residential	51	48	53	52	54	56	80	80	80	13.7	11.2	21.6	YES
NCA07	DN	61 Wongala Cres	G	Residential	51	48	52	52	53	56	80	80	80	14.4	11.8	22.1	YES
NCA07	DN	63 Wongala Cres	G	Residential	51	48	53	53	54	57	80	80	80	13.8	11.3	21.7	YES
NCA07	DN	65 Wongala Cres	G	Residential	52	49	54	53	55	57	81	81	81	13.0	10.5	21.2	YES
NCA07	DN	65 Wongala Cres	1	Residential	55	51	56	56	57	60	83	83	83	11.4	8.9	19.7	YES
NCA07	DN	75 Wongala Cres	G	Residential	55	52	56	56	57	60	83	83	83	8.0	5.5	16.4	YES
NCA07	DN	75 Wongala Cres	1	Residential	56	53	58	58	59	61	85	85	85	7.5	4.9	15.5	YES
NCA07	DN	77 Wongala Cres	G	Residential	52	49	54	54	55	57	80	80	80	8.0	5.5	15.8	YES
NCA07	DN	77 Wongala Cres	1	Residential	55	52	57	57	58	60	83	83	83	7.5	4.9	15.8	YES
NCA07	DN	79 Wongala Cres	G	Residential	52	49	53	53	54	57	80	80	80	13.9	11.4	21.9	YES
NCA07	DN	79 Wongala Cres	1	Residential	54	51	56	55	57	59	82	82	82	12.1	9.5	20.5	YES
NCA07	DN	81 Wongala Cres	G	Residential	50	47	52	51	53	55	78	78	78	13.5	10.8	20.1	NO
NCA07	DN	81 Wongala Cres	1	Residential	52	48	53	53	54	57	80	80	80	14.2	11.7	22.0	YES
NCA07	DN	89 Wongala Cres	G	Residential	54	50	56	55	56	59	81	81	81	13.0	10.5	21.7	YES
NCA07	DN	89 Wongala Cres	1	Residential	56	53	58	58	59	61	84	84	84	11.0	8.4	19.8	YES
NCA07	DN	89 Wongala Cres	2	Residential	59	55	60	60	61	64	86	86	86	8.8	6.1	17.2	YES
NCA07	DN	93 Wongala Cres	G	Residential	56	51	57	56	58	60	82	82	82	11.0	8.4	20.0	YES
NCA07	DN	97 Wongala Cres	G	Residential	57	50	58	59	46	59	87	76	87	10.2	9.9	15.4	NO
NCA07	DN	95 Wongala Cres	G	Residential	59	52	59	60	48	60	86	81	86	8.0	7.8	15.7	YES
NCA07	DN	99 Wongala Cres	G	Residential	53	48	54	53	55	57	81	81	81	13.8	11.3	21.8	YES
NCA07	DN	107 Wongala Cres	G	Residential	56	51	57	57	58	60	83	83	83	8.6	6.1	17.2	NO
NCA07	DN	107 Wongala Cres	1	Residential	58	54	60	59	61	63	86	86	86	6.6	4.1	15.0	NO
NCA07	DN	105 Wongala Cres	G	Residential	55	50	56	55	57	59	82	82	82	10.4	7.9	18.5	YES
NCA07	DN	109 Wongala Cres	G	Residential	58	55	60	59	61	63	87	87	87	5.5	3.0	13.1	NO
NCA07	DN	109 Wongala Cres	1	Residential	60	57	61	61	62	65	89	89	89	4.5	2.0	11.6	NO
NCA07	DN	111 Wongala Cres	G	Residential	57	54	59	59	60	62	87	87	87	4.8	2.2	12.2	NO
NCA07	DN	113 115 Wongala Cres	G	Residential	58	56	60	60	61	63	88	88	88	2.9	0.3	10.1	YES
NCA07	DN	113 115 Wongala Cres	1	Residential	59	56	61	60	62	64	89	89	89	2.7	0.2	9.9	NO
NCA07	DN	27A Wongala Cres	G	Residential	61	56	62	63	52	63	89	86	89	0.8	0.9	8.4	NO
NCA07	DN	71 73 Wongala Cres	G	Residential	56	53	58	58	59	61	85	85	85	9.6	7.0	17.7	YES
NCA07	DN	71 73 Wongala Cres	1	Residential	58	55	60	60	61	63	87	87	87	8.2	5.6	16.1	YES
NCA07	DN	67 Wongala Cres	G	Residential	53	50	55	55	56	59	83	83	83	12.2	9.5	19.7	YES
NCA07	DN	67 Wongala Cres	1	Residential	56	53	58	58	59	62	86	86	86	9.7	7.1	16.8	YES
NCA07	DN	67A Wongala Cres	G	Residential	55	51	56	56	57	60	84	84	84	9.7	7.2	17.2	NO
NCA07	DN	67A Wongala Cres	1	Residential	58	55	60	60	61	63	88	88	88	7.6	5.0	14.9	YES
NCA07	DN	101 103 Wongala Cres	G	Residential	52	48	54	53	55	57	81	81	81	12.8	10.4	20.8	YES
NCA07	UP	1 Tristania Way	G	Residential	63	60	65	65	56	65	92	88	92	1.0	1.2	8.5	NO
NCA07	UP	3 Tristania Way	G	Residential	56	54	58	58	50	59	86	82	86	0.6	0.8	8.0	NO
NCA07	UP	5 Cassia Grove	G	Residential	60	57	62	62	53	63	89	86	89	1.2	1.4	8.8	NO
NCA07	UP	7 Cassia Grove	G	Residential	55	51	56	57	47	57	80	77	80	1.3	1.2	8.5	NO
NCA07	UP	7 Cassia Grove	1	Residential	58	54	59	60	50	60	83	80	83	1.7	1.6	9.7	YES
NCA07	UP	8 Cassia Grove	G	Residential	52	49	53	54	45	54	80	73	80	0.6	0.8	8.1	NO
NCA07	UP	8 Cassia Grove	1	Residential	53	50	55	55	46	56	81	75	81	0.8	0.8	8.3	NO
NCA07	UP	9 Cassia Grove	G	Residential	55	49	56	56	45	57	82	72	82	3.3	2.7	3.3	NO
NCA07	UP	10 Cassia Grove	G	Residential	51	47	52	53	43	53	78	73	78	1.1	1.1	8.3	NO
NCA07	UP	11 Cassia Grove	G	Residential	53	47	54	55	43	55	80	70	80	5.9	5.2	4.4	NO
NCA07	UP	12 Cassia Grove	G	Residential	46	44	48	48	40	49	73	65	73	1.0	1.0	8.1	NO
NCA07	UP	12 Cassia Grove	1	Residential	49	45	50	51	41	51	74	67	74	0.9	0.9	8.1	NO
NCA07	UP	14 Cassia Grove	G	Residential	49	46	51	51	42	52	75	67	75	3.3	3.0	7.6	NO
NCA07	UP	14 Cassia Grove	1	Residential	53	47	54	54	43	55	78	69	78	3.4	2.9	6.9	NO
NCA07	UP	15 Cassia Grove	G	Residential	52	46	53	54	42	54	80	69	80	7.7	6.8	5.9	NO
NCA07	UP	6 Clement Cl	G	Residential	50	44	51	52	40	52	80	68	80	10.4	9.6	7.0	YES
NCA07	UP	6 Clement Cl	1	Residential	52	45	53	54	41	54	82	69	82	9.4	8.4	5.4	NO
NCA07	UP	8 Clement Cl	G	Residential	48	44	50	50	40	51	75	67	75	6.5	6.1	7.5	NO
NCA07	UP	8 Clement Cl	1	Residential	51	46	52	53	42	53	78	67	78	5.5	5.0	5.0	NO
NCA07	UP	10 Clement Cl	G	Residential	47	43	49	49	39	50	75	65	75	6.9	6.4	7.5	NO
NCA07	UP	10 Clement Cl	1	Residential	50	44	51	52	40	52	78	66	78	5.6	5.0	4.5	NO
NCA07	UP	1 Garrett Rd	G	Residential	55	50	56	57	46	57	83	78	83	0.8	0.9	8.5	NO
NCA07	UP	1 Garrett Rd	1	Residential	57	53	59	59	49	60	86	81	86	1.0	1.2	9.0	YES
NCA07	UP	1 Narena Cl	G	Residential	60	59	63	63	55	63	91	88	91	0.5	0.7	8.0	NO
NCA07	UP	2 Narena Cl	G	Residential	62	58	63	64	54	64	90	84	90	0.6	0.7	8.1	YES
NCA07	UP	2 Narena Cl	1	Residential	64	61	66	66	57	66	93	88	93	0.6	0.8	8.1	YES
NCA07	UP	3 Narena Cl	G	Residential	54	51	56	56	47	57	82	77	82	0.4	0.5	7.9	NO
NCA07	UP	4 Narena Cl	G	Residential	58	54	60	60	50	61	86	83	86	0.4	0.5	8.0	NO
NCA07	UP	4 Narena Cl	1	Residential	61	58	63	63	54	64	90	87	90	0.5	0.7	8.0	NO
NCA07	UP	6 Narena Cl	G	Residential	57	54	59	59	50	59	86	83	86	0.5	0.6	8.0	NO
NCA07	UP	2 Tristania Way	G	Residential	62	60	64	64	56	65	92	89	92	0.5	0.7	8.0	NO
NCA07	UP	2 Tristania Way	1	Residential	63	61	65	65	57	66	93	90	93	0.6	0.8	8.1	NO
NCA07	UP	110 112 Sutherland Rd	G	Residential	58	54	59	60	50	60	87	82	87	0.7	0.7	8.1	NO
NCA07	UP	114 Sutherland Rd	G	Residential	54	50	55	56	46	56	82	74	82	0.5	0.7	8.1	NO
NCA07	UP	116 Sutherland Rd	G	Residential	55	52	57	58	48	58	84	78	84	0.6	0.7	8.1	NO
NCA07	UP	118 Sutherland Rd	G	Residential	53	50	55	55	46	56	82	74	82	0.5	0.6	8.1	NO
NCA07	UP	120A Sutherland Rd	G	Residential	58	55	59	60	51	60	86	82	86	0.6	0.7	8.1	YES

Mitigated Individual Receiver Noise Model Results IGANRIP (including safety factor on train numbers)					IGANRIP RESULTS WITH RECOMMENDED MITIGATION 2026 after opening (with safety factor)									Change due to Mitigation			Was this location triggered without mitigation?
					LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passeng	Total	Freight	Passeng	Total	Freight	Passeng	Total	LAeq Day	LAeq Nigh	LAmax	
NCA07	UP	120 Sutherland Rd	G	Residential	53	50	55	55	46	56	82	75	82	0.6	0.7	8.1	NO
NCA07	UP	120 Sutherland Rd	1	Residential	56	53	58	58	49	59	84	77	84	0.7	0.8	8.2	NO
NCA07	UP	120 Sutherland Rd	G	Residential	53	50	55	55	46	56	82	75	82	0.6	0.7	8.1	NO
NCA07	UP	124 Sutherland Rd	G	Residential	61	58	62	63	54	63	89	86	89	0.6	0.8	8.1	NO
NCA07	UP	126 Sutherland Rd	G	Residential	63	60	64	65	56	65	92	89	92	0.6	0.8	8.1	NO
NCA07	UP	128 Sutherland Rd	G	Residential	63	61	65	66	57	66	93	90	93	0.5	0.8	8.1	YES
NCA07	UP	132 Sutherland Rd	G	Residential	60	56	61	62	52	62	89	86	89	0.5	0.6	8.1	NO
NCA07	UP	134 Sutherland Rd	G	Residential	63	60	65	65	57	66	93	90	93	0.5	0.7	8.0	NO
NCA07	UP	136 Sutherland Rd	G	Residential	62	60	64	65	56	65	92	89	92	0.5	0.7	7.9	NO
NCA07	UP	112A Sutherland Rd	G	Residential	57	53	58	59	48	59	85	79	85	0.5	0.6	8.1	NO
NCA07	UP	112A Sutherland Rd	1	Residential	59	55	61	61	51	61	87	82	87	0.6	0.7	8.2	NO
NCA07	UP	122 Sutherland Rd	G	Residential	57	54	59	59	50	60	86	81	86	0.5	0.7	8.0	NO
NCA07	UP	122 Sutherland Rd	1	Residential	60	57	62	62	53	63	89	85	89	0.6	0.7	8.0	YES
NCA07	UP	122B Sutherland Rd	G	Residential	56	53	58	58	49	59	85	79	85	0.5	0.6	7.9	NO
NCA07	UP	122A Sutherland Rd	G	Residential	55	52	57	57	48	58	84	80	84	0.5	0.6	7.9	NO
NCA07	UP	5 Tristania Way	G	Residential	51	46	52	53	42	53	77	72	77	1.4	1.3	8.3	NO
NCA07	UP	7 Tristania Way	G	Residential	52	49	54	54	45	54	80	77	80	0.7	0.9	8.0	NO

Mitigated Individual Receiver Noise Model Results IGANRIP (including safety factor on train numbers)					IGANRIP RESULTS WITH RECOMMENDED MITIGATION 2026 after opening (with safety factor)									Change due to Mitigation			Was this location triggered without mitigation?
					LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passeng	Total	Freight	Passeng	Total	Freight	Passeng	Total	LAeq Day	LAeq Nigh	LAmax	
NCA08	DN	72 Yarrara Rd	1	Residential	65	61	66	67	57	67	94	91	94				YES
NCA08	DN	74 Yarrara Rd	1	Residential	65	61	66	67	57	67	94	91	94				YES
NCA08	DN	78 Yarrara Rd	1	Residential	64	61	66	66	56	66	94	90	94				YES
NCA08	DN	5 City View Rd	G	Residential	62	59	63	63	54	64	91	85	91	0.2	0.2		NO
NCA08	DN	5 City View Rd	1	Residential	62	59	64	64	55	64	91	86	91	0.2	0.1		NO
NCA08	DN	5 City View Rd	2	Residential	62	60	64	64	55	65	91	86	91	0.2	0.1		NO
NCA08	DN	5 City View Rd	3	Residential	62	60	64	64	56	65	91	86	91	0.1	0.1		YES
NCA08	DN	5 City View Rd	4	Residential	62	60	64	64	56	65	91	86	91	0.1			NO
NCA08	DN	5 City View Rd	5	Residential	62	60	64	64	56	65	91	86	91				NO
NCA08	DN	5 City View Rd	6	Residential	62	60	64	64	56	65	90	86	90				NO
NCA08	DN	5 City View Rd	7	Residential	62	60	64	64	55	65	90	85	90				NO
NCA08	DN	5 City View Rd	G	Residential	62	59	63	63	54	64	91	85	91	0.2	0.2		YES
NCA08	DN	5 City View Rd	1	Residential	62	59	64	64	55	64	91	86	91	0.2	0.1		YES
NCA08	DN	5 City View Rd	2	Residential	62	60	64	64	55	65	91	86	91	0.2	0.1		YES
NCA08	DN	5 City View Rd	3	Residential	62	60	64	64	56	65	91	86	91	0.1	0.1		YES
NCA08	DN	5 City View Rd	4	Residential	62	60	64	64	56	65	91	86	91	0.1			YES
NCA08	DN	5 City View Rd	5	Residential	62	60	64	64	56	65	91	86	91				YES
NCA08	DN	5 City View Rd	6	Residential	62	60	64	64	56	65	90	86	90				YES
NCA08	DN	5 City View Rd	7	Residential	62	60	64	64	55	65	90	85	90				NO
NCA08	DN	94 Yarrara Rd	1	Residential	62	59	64	64	54	65	91	88	91				YES
NCA08	UP	27 Azalea Grove	G	Residential	50	45	51	52	41	52	81	68	81	10.7	10.3	7.2	YES
NCA08	UP	27 Azalea Grove	1	Residential	52	46	53	54	42	55	84	69	84	10.0	9.0	4.0	YES
NCA08	UP	32 Azalea Grove	G	Residential	45	41	47	48	37	48	77	63	77	7.6	7.0	4.1	NO
NCA08	UP	32 Azalea Grove	1	Residential	47	42	48	49	38	49	79	64	79	6.9	6.3	2.6	NO
NCA08	UP	34 Azalea Grove	G	Residential	47	43	49	50	39	50	78	65	78	8.6	8.1	4.8	NO
NCA08	UP	34 Azalea Grove	1	Residential	49	44	50	51	40	51	79	65	79	8.1	7.3	3.5	NO
NCA08	UP	36 Azalea Grove	G	Residential	49	44	50	51	40	51	79	66	79	9.2	8.6	6.5	NO
NCA08	UP	36 Azalea Grove	1	Residential	50	44	51	53	40	53	82	67	82	8.7	7.8	4.2	YES
NCA08	UP	38 Azalea Grove	G	Residential	48	45	50	50	41	51	76	69	76	11.6	12.0	14.8	NO
NCA08	UP	14 Binomea Pl	G	Residential	50	44	51	53	40	53	80	65	80	6.7	5.8	3.1	NO
NCA08	UP	15 Binomea Pl	G	Residential	45	41	46	47	37	47	76	64	76	7.3	6.9	6.1	NO
NCA08	UP	15 Binomea Pl	1	Residential	47	42	48	49	38	49	77	65	77	6.4	5.9	4.5	NO
NCA08	UP	16 Binomea Pl	G	Residential	47	42	49	50	38	50	78	65	78	8.8	8.2	6.5	NO
NCA08	UP	17 Binomea Pl	G	Residential	47	41	48	49	37	49	79	65	79	8.9	8.2	5.4	NO
NCA08	UP	17 Binomea Pl	1	Residential	48	42	49	51	38	51	81	66	81	8.1	7.3	3.7	NO
NCA08	UP	19 Binomea Pl	G	Residential	46	42	48	48	38	49	76	66	76	9.2	8.9	9.1	NO
NCA08	UP	19 Binomea Pl	1	Residential	48	43	49	50	39	50	79	67	79	8.8	8.2	6.5	NO
NCA08	UP	21 Binomea Pl	G	Residential	48	45	50	50	41	50	76	70	76	11.4	12.0	15.4	NO
NCA08	UP	21 Binomea Pl	1	Residential	49	46	51	51	42	52	79	71	79	13.2	13.2	12.8	YES
NCA08	UP	1/18 20 Binomea Pl	G	Residential	50	45	51	52	41	52	80	71	80	13.4	13.1	11.7	YES
NCA08	UP	1/18 20 Binomea Pl	1	Residential	53	47	54	55	43	55	85	72	85	12.3	11.3	7.6	NO
NCA08	UP	2/18 20 Binomea Pl	G	Residential	50	46	52	52	42	53	80	71	80	13.4	12.9	12.2	NO
NCA08	UP	2/18 20 Binomea Pl	1	Residential	55	48	56	57	44	57	86	72	86	10.0	9.2	6.2	NO
NCA08	UP	3/18 20 Binomea Pl	G	Residential	46	43	47	48	38	48	74	68	74	10.7	11.1	15.2	NO
NCA08	UP	3/18 20 Binomea Pl	1	Residential	48	44	49	50	40	50	76	69	76	11.2	11.1	13.0	NO
NCA08	UP	4/18 20 Binomea Pl	G	Residential	49	44	50	52	40	52	82	67	82	9.6	8.9	5.8	YES
NCA08	UP	4/18 20 Binomea Pl	1	Residential	51	45	52	53	41	54	83	68	83	8.8	7.8	4.2	NO
NCA08	UP	1 Clement Cl	G	Residential	48	43	49	50	39	50	79	64	79	7.1	6.5	3.1	NO
NCA08	UP	1 Clement Cl	1	Residential	49	43	50	52	39	52	80	65	80	6.4	5.5	1.8	NO
NCA08	UP	3 Clement Cl	G	Residential	46	42	48	48	38	49	75	63	75	5.9	5.6	4.1	NO
NCA08	UP	3 Clement Cl	1	Residential	48	42	49	50	38	50	77	64	77	5.6	5.1	2.8	NO
NCA08	UP	4 Clement Cl	G	Residential	49	44	50	51	40	51	79	68	79	10.6	10.2	8.4	YES
NCA08	UP	4 Clement Cl	1	Residential	51	45	52	53	41	53	82	69	82	10.2	9.3	5.5	YES
NCA08	UP	1A Hampden Rd	G	Residential	55	51	57	57	47	58	82	76	82	1.2	1.2	0.9	NO
NCA08	UP	1A Hampden Rd	1	Residential	57	53	59	59	49	59	83	79	83	0.9	0.9	1.4	NO
NCA08	UP	2A Hampden Rd	G	Residential	53	50	55	55	46	56	81	73	81	8.9	8.8	11.6	NO
NCA08	UP	2A Hampden Rd	1	Residential	57	53	58	59	49	59	84	77	84	7.6	7.4	9.2	NO
NCA08	UP	2B Hampden Rd	G	Residential	49	46	51	51	42	52	74	68	74	7.6	7.8	13.5	NO
NCA08	UP	2B Hampden Rd	1	Residential	55	51	56	56	47	57	81	73	81	5.2	5.3	7.9	YES
NCA08	UP	2C Hampden Rd	G	Residential	50	45	51	52	41	52	80	68	80	9.2	8.9	9.2	NO
NCA08	UP	2C Hampden Rd	1	Residential	53	47	54	55	43	55	83	70	83	7.0	6.6	6.4	NO
NCA08	UP	2 Hampden Rd	G	Residential	49	46	51	51	42	52	74	69	74	3.3	3.6	9.6	NO
NCA08	UP	2 Hampden Rd	1	Residential	52	49	54	54	45	54	77	70	77	3.8	4.1	9.9	NO
NCA08	UP	381 Pennant Hills Rd	G	Residential	48	44	49	50	40	50	73	68	73	0.6	0.6	1.7	NO
NCA08	UP	381 Pennant Hills Rd	1	Residential	50	46	52	52	42	52	75	70	75	0.6	0.6	3.2	NO
NCA08	UP	381 Pennant Hills Rd	G	Residential	48	44	49	50	40	50	73	68	73	0.6	0.6	1.7	NO
NCA08	UP	381 Pennant Hills Rd	1	Residential	50	46	52	52	42	52	75	70	75	0.6	0.6	3.2	NO
NCA08	UP	381 Pennant Hills Rd	G	Residential	48	44	49	50	40	50	73	68	73	0.6	0.6	1.7	NO
NCA08	UP	381 Pennant Hills Rd	1	Residential	50	46	52	52	42	52	75	70	75	0.6	0.6	3.2	NO
NCA08	UP	381 Pennant Hills Rd	G	Residential	48	44	49	50	40	50	73	68	73	0.6	0.6	1.7	NO
NCA08	UP	381 Pennant Hills Rd	1	Residential	50	46	52	52	42	52	75	70	75	0.6	0.6	3.2	NO
NCA08	UP	381 Pennant Hills Rd	G	Residential	48	44	49	50	40	50	73	68	73	0.6	0.6	1.7	NO
NCA08	UP	381 Pennant Hills Rd	1	Residential	50	46	52	52	42	52	75	70	75	0.6	0.6	3.2	NO

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NCA09	DN	70 Yarrara Rd	G	Other	63	59	64	64	54	65	92	87	92				YES
NCA09	DN	70 Yarrara Rd	G	Other	63	59	64	64	54	65	92	87	92				YES
NCA09	DN	52 54 Yarrara Rd	G	Active Recreation	62	57	63	63	53	64	90	86	90				NO
NCA09	DN	52 54 Yarrara Rd	G	Active Recreation	62	57	63	63	53	64	90	86	90				NO
NCA09	DN	1 3 Stevens St	G	Residential	63	60	64	64	55	65	91	86	91				YES
NCA09	DN	26 Yarrara Rd	G	Residential	62	59	64	64	54	64	90	85	90				YES
NCA09	DN	28 Yarrara Rd	G	Residential	62	58	63	63	53	64	89	85	89				YES
NCA09	DN	56 Yarrara Rd	G	Residential	63	58	64	64	54	64	90	87	90				YES
NCA09	DN	58 Yarrara Rd	G	Residential	62	58	64	64	54	64	91	87	91				YES

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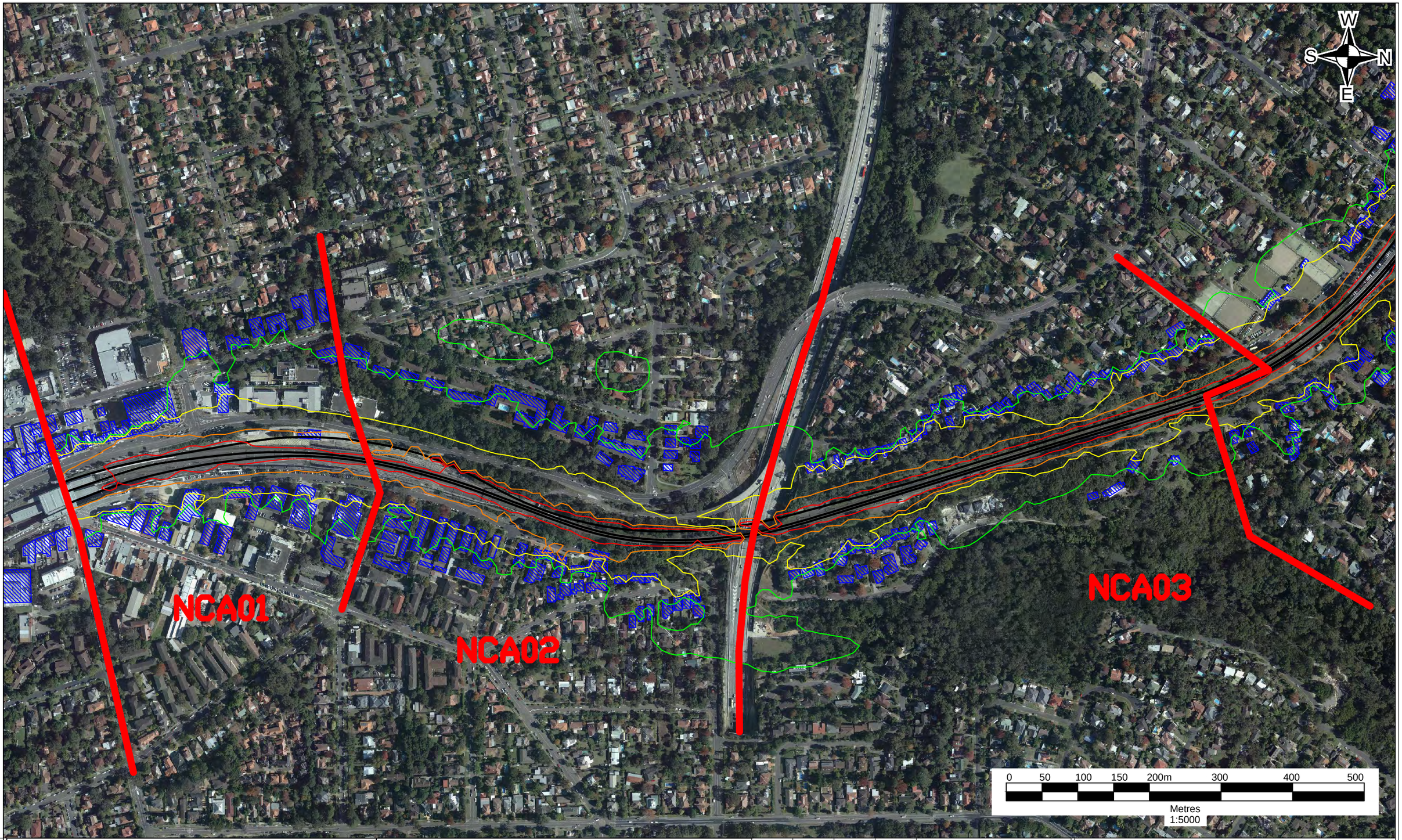
					LAeq Day			LAeq Night			LAmax						
NCA	Side	Address	Level	Description	Freight	Passeng	Total	Freight	Passeng	Total	Freight	Passeng	Total	LAeq Day	LAeq Nigh	LAmax	
NCA10	DN	1 Fulbourne Av	G	Educational	62	58	63	63	53	64	92	87	92				YES
NCA10	DN	1 Fulbourne Av	G	Educational	62	58	63	63	53	64	92	87	92				YES
NCA10	DN	2 Stevens St	G	Residential	62	59	64	64	55	64	91	86	91				YES
NCA10	DN	4 Yarrara Rd	G	Residential	57	54	59	58	49	59	83	81	83				NO
NCA10	DN	6 Yarrara Rd	G	Residential	56	53	58	57	48	58	82	79	82				NO
NCA10	DN	8 Yarrara Rd	G	Residential	56	53	58	57	48	58	82	79	82				NO
NCA10	DN	12 Yarrara Rd	G	Residential	57	53	59	58	48	59	88	78	88				YES
NCA10	DN	12 Yarrara Rd	G	Residential	57	53	59	58	48	59	88	78	88				YES
NCA10	DN	14 Yarrara Rd	G	Residential	59	56	61	61	52	61	89	82	89				YES
NCA10	DN	16 Yarrara Rd	G	Residential	60	57	61	61	52	61	90	83	90				YES
NCA10	DN	18 Yarrara Rd	G	Residential	60	57	61	61	52	62	89	84	89				YES
NCA10	DN	22 Yarrara Rd	G	Residential	59	57	61	60	53	61	88	84	88				YES
NCA10	DN	24 Yarrara Rd	G	Residential	61	60	64	63	55	64	90	87	90				NO
NCA10	DN	24 Yarrara Rd	G	Residential	61	60	64	63	55	64	90	87	90				YES
NCA10	DN	2 Yarrara Rd	G	Pl of Worship	56	54	58	58	49	58	85	82	85				YES
NCA10	DN	2 Yarrara Rd	1	Pl of Worship	58	56	60	59	51	60	86	84	86				YES
NCA10	DN	10 Yarrara Rd	G	Pl of Worship	57	54	59	59	49	59	85	77	85				YES
NCA10	UP	311 Pennant Hills Rd	G	Pl of Worship	51	47	53	52	43	53	79	75	79				NO
NCA10	UP	311 Pennant Hills Rd	G	Pl of Worship	51	47	53	52	43	53	79	75	79				NO
NCA10	UP	2A2 Paling St	G	Residential	50	46	52	51	41	52	79	72	79				NO
NCA10	UP	2A2 Paling St	1	Residential	54	48	55	55	43	55	84	74	84				NO
NCA10	UP	2A2 Paling St	2	Residential	56	50	57	57	45	57	86	76	86				NO
NCA10	UP	294 296 Pennant Hills Rd	G	Residential	63	63	66	65	59	66	92	91	92				NO
NCA10	UP	294 296 Pennant Hills Rd	1	Residential	64	64	67	66	59	66	92	92	92				NO
NCA10	UP	294 296 Pennant Hills Rd	2	Residential	64	64	67	65	59	66	92	92	92				NO
NCA10	UP	298 312 Pennant Hills Rd	G	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	1	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	2	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	G	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	1	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	2	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	G	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	1	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	2	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	G	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	1	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	2	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	G	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	1	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	2	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	G	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	1	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	2	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	G	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	1	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	298 312 Pennant Hills Rd	2	Residential	63	63	66	65	58	66	91	91	91				NO
NCA10	UP	305 Pennant Hills Rd	G	Residential	53	49	55	54	44	55	84	78	84				NO
NCA10	UP	305 Pennant Hills Rd	1	Residential	55	51	56	56	46	56	84	80	84				NO
NCA10	UP	307 Pennant Hills Rd	G	Residential	50	46	52	51	42	52	78	74	78				NO
NCA10	UP	307 Pennant Hills Rd	G	Residential	50	46	52	51	42	52	78	74	78				NO
NCA10	UP	2A1 Paling St	G	Residential	50	46	52	51	41	52	79	73	79				NO
NCA10	UP	2A1 Paling St	1	Residential	54	48	55	55	43	56	85	75	85				NO
NCA10	UP	2A1 Paling St	2	Residential	57	50	58	58	46	58	87	77	87				NO
NCA10	UP	2A1 Paling St	G	Residential	50	46	52	51	41	52	79	73	79				NO
NCA10	UP	2A1 Paling St	1	Residential	54	48	55	55	43	56	85	75	85				NO
NCA10	UP	2A1 Paling St	2	Residential	57	50	58	58	46	58	87	77	87				NO
NCA10	UP	313 315a Pennant Hills Rd	G	Residential	46	44	48	48	40	48	74	72	74				NO
NCA10	UP	313 315a Pennant Hills Rd	1	Residential	50	46	51	51	42	51	79	74	79				NO
NCA10	UP	313 315a Pennant Hills Rd	2	Residential	53	48	54	54	44	54	83	75	83				NO
NCA10	UP	313 315a Pennant Hills Rd	G	Residential	46	44	48	48	40	48	74	72	74				NO
NCA10	UP	313 315a Pennant Hills Rd	1	Residential	50	46	51	51	42	51	79	74	79				NO
NCA10	UP	313 315a Pennant Hills Rd	2	Residential	53	48	54	54	44	54	83	75	83				NO
NCA10	UP	313 315a Pennant Hills Rd	G	Residential	46	44	48	48	40	48	74	72	74				NO
NCA10	UP	313 315a Pennant Hills Rd	1	Residential	50	46	51	51	42	51	79	74	79				NO
NCA10	UP	313 315a Pennant Hills Rd	2	Residential	53	48	54	54	44	54	83	75	83				NO
NCA10	UP	313 315b Pennant Hills Rd	G	Residential	44	42	46	45	38	46	71	70	71				NO
NCA10	UP	2A3 Paling St	G	Residential	49	44	50	50	40	51	78	71	78				NO

Appendix G Mitigated case noise contours



NOTES

* IGANRIP 2026 with safety factor and recommended noise mitigation measures
* Noise contour grid spacing: 10m
* Noise contour height above ground: 1.5m

LEGEND

- Rail Track
- 55dBA LAeq(15hr)
- 60 dBA LAeq(15hr)
- 65 dBA LAeq(15hr)
- 70 dBA LAeq(15hr)
- Modelled Building
- Conventional Noise Wall
- Low Barrier, Close to Near Track

Revision	Drawn By	Chkd By	Date	Comments
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2026 Daytime Noise Contours (With Project)

Date		Drawing Number	Revision
16/07/14	#	**610.13080-20140716-001**	**0**
Scale	#		
A3			

Operational - 20140716-001.dwg

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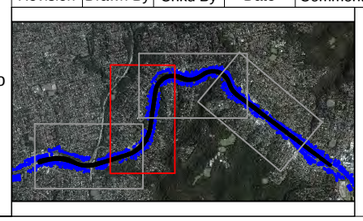
Revision	Drawn By	Chkd By	Date	Comments
0	DS	CW	16/07/14	



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Date	Drawing Number	Revision
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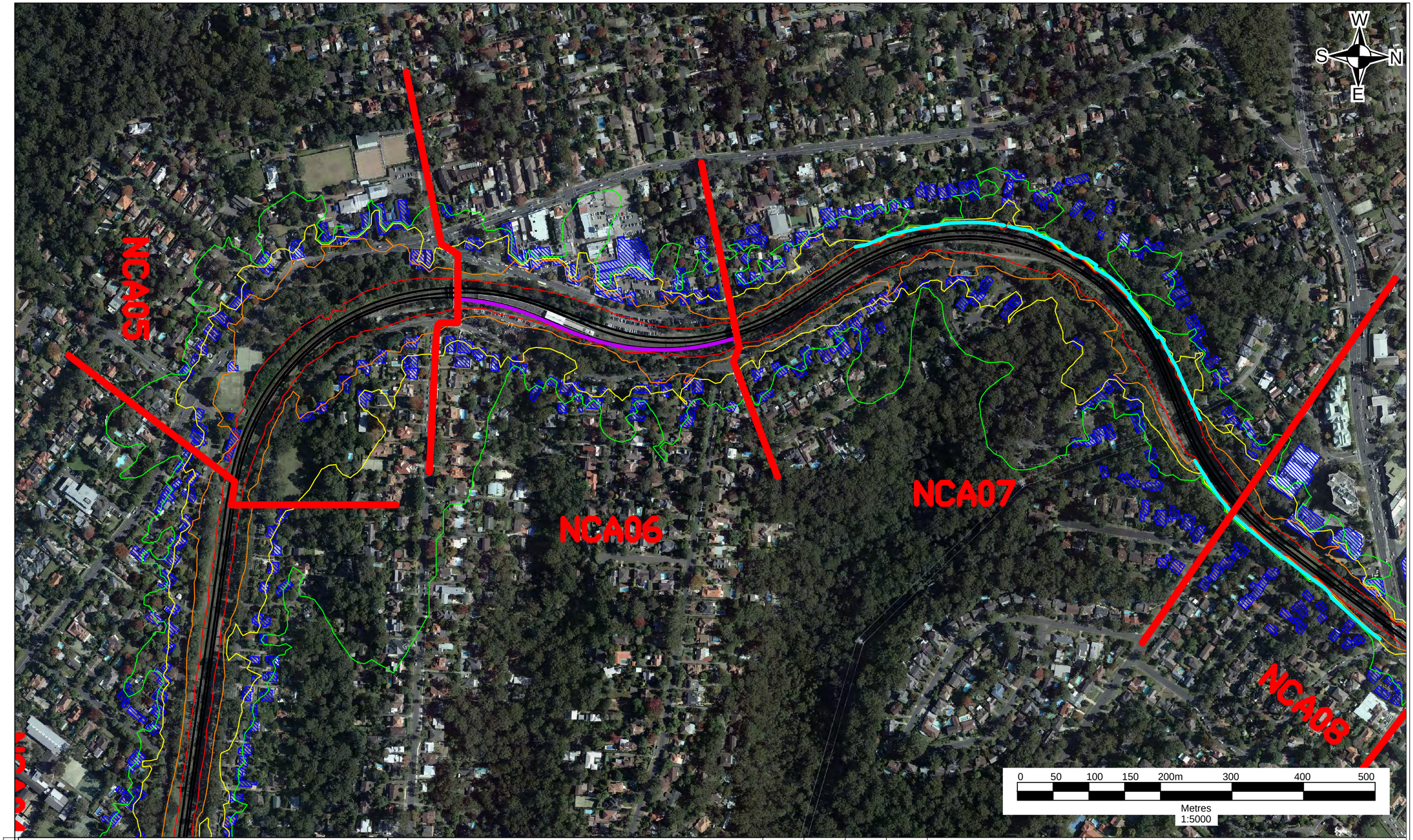
Scale: A3 #

Operational - 20140716-001.dwg



NOTES

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LEGEND

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- 60 dBA LAeq(15hr)
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- 70 dBA LAeq(15hr)
- Modelled Building
- Conventional Noise Wall
- Low Barrier, Close to Near Track

Revision	Drawn By	Chkd By	Date	Comments
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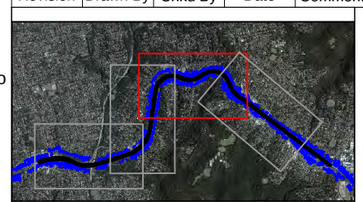

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Date		Drawing Number	Revision
16/07/14	#	**610.13080-20140716-003**	**0**

Scale	
A3	#

Operational - 20140716-001.dwg

NOTES

* IGANRIP 2026 with safety factor and recommended noise mitigation measures
* Noise contour grid spacing: 10m
* Noise contour height above ground: 1.5m

LEGEND

- Rail Track
- 55dBA LAeq(15hr)
- 60 dBA LAeq(15hr)
- 65 dBA LAeq(15hr)
- 70 dBA LAeq(15hr)
- Modelled Building
- Conventional Noise Wall
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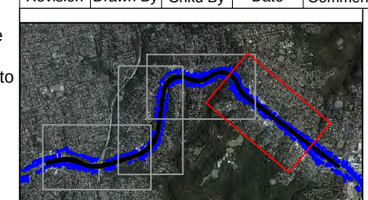
Revision	Drawn By	Chkd By	Date	Comments
0	DS	CW	16/07/14	



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Date		Drawing Number	Revision
16/07/14	#	**610.13080-20140716-004**	**0**

Scale: A3 #

Operational - 20140716-001.dwg

Operational - 20140716-001.dwg

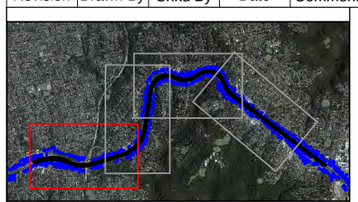
NOTES

* IGANRIP 2026 with safety factor and recommended noise mitigation measures
* Noise contour grid spacing: 10m
* Noise contour height above ground: 1.5m

LEGEND

- Rail Track
- 55dBA LAeq(9hr)
- 60 dBA LAeq(9hr)
- 65 dBA LAeq(9hr)
- 70 dBA LAeq(9hr)
- Modelled Building
- Conventional Noise Wall
- Low Barrier, Close to Near Track

Revision	Drawn By	Chkd By	Date	Comments
0	DS	CW	16/07/14	



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2026 Night-time Noise Contours (With Project)

Date		Drawing Number	Revision
16/07/14	#	**610.13080-20140716-005**	**0**

Scale
A3 #

NOTES

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* Noise contour grid spacing: 10m
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LEGEND

- Rail Track
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- 70 dBA LAeq(9hr)
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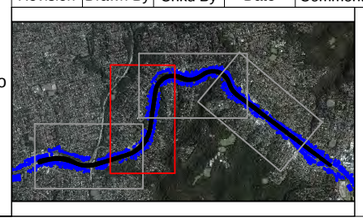
Revision	Drawn By	Chkd By	Date	Comments
0	DS	CW	16/07/14	



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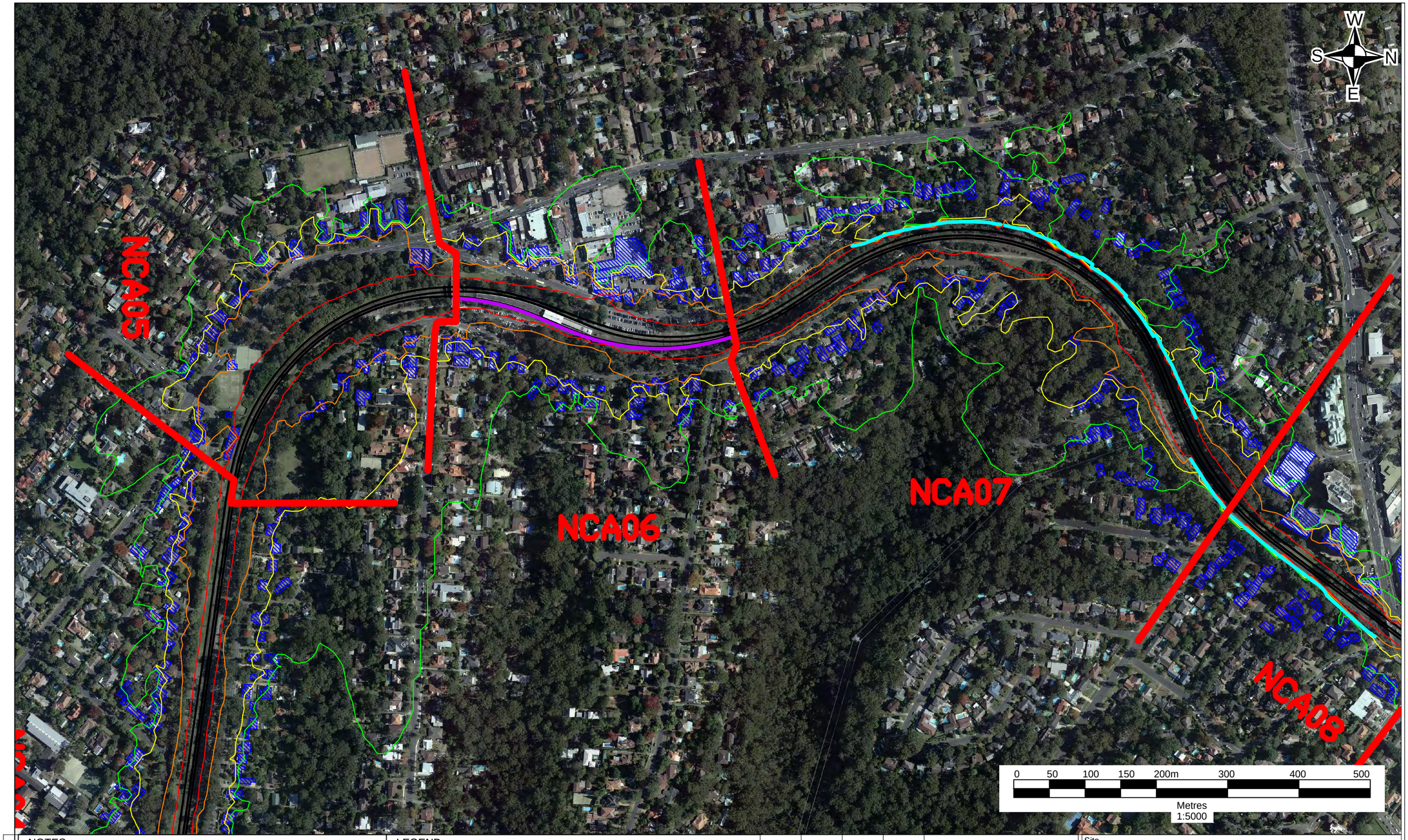
2026 Night-time Noise Contours (With Project)

Date	Drawing Number	Revision
16/07/14 #	610.13080-20140716-006	0

Scale
A3 #

Operational - 20140716-001.dwg



NOTES

* IGANRIP 2026 with safety factor and recommended noise mitigation measures
* Noise contour grid spacing: 10m
* Noise contour height above ground: 1.5m

LEGEND

- Rail Track
- 55dBA LAeq(9hr)
- 60 dBA LAeq(9hr)
- 65 dBA LAeq(9hr)
- 70 dBA LAeq(9hr)
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Revision	Drawn By	Chkd By	Date	Comments
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Date: 16/07/14 #

Scale: A3 #

Drawing Number: **610.13080-20140716-007**

Revision: **0**

Operational - 20140716-001.dwg

NOTES

* IGANRIP 2026 with safety factor and recommended noise mitigation measures
* Noise contour grid spacing: 10m
* Noise contour height above ground: 1.5m

LEGEND

- Rail Track
- 55dBA LAeq(9hr)
- 60 dBA LAeq(9hr)
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Revision	Drawn By	Chkd By	Date	Comments
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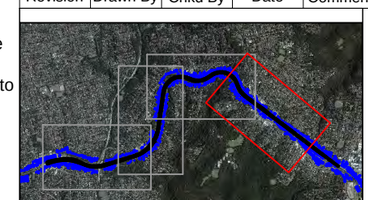

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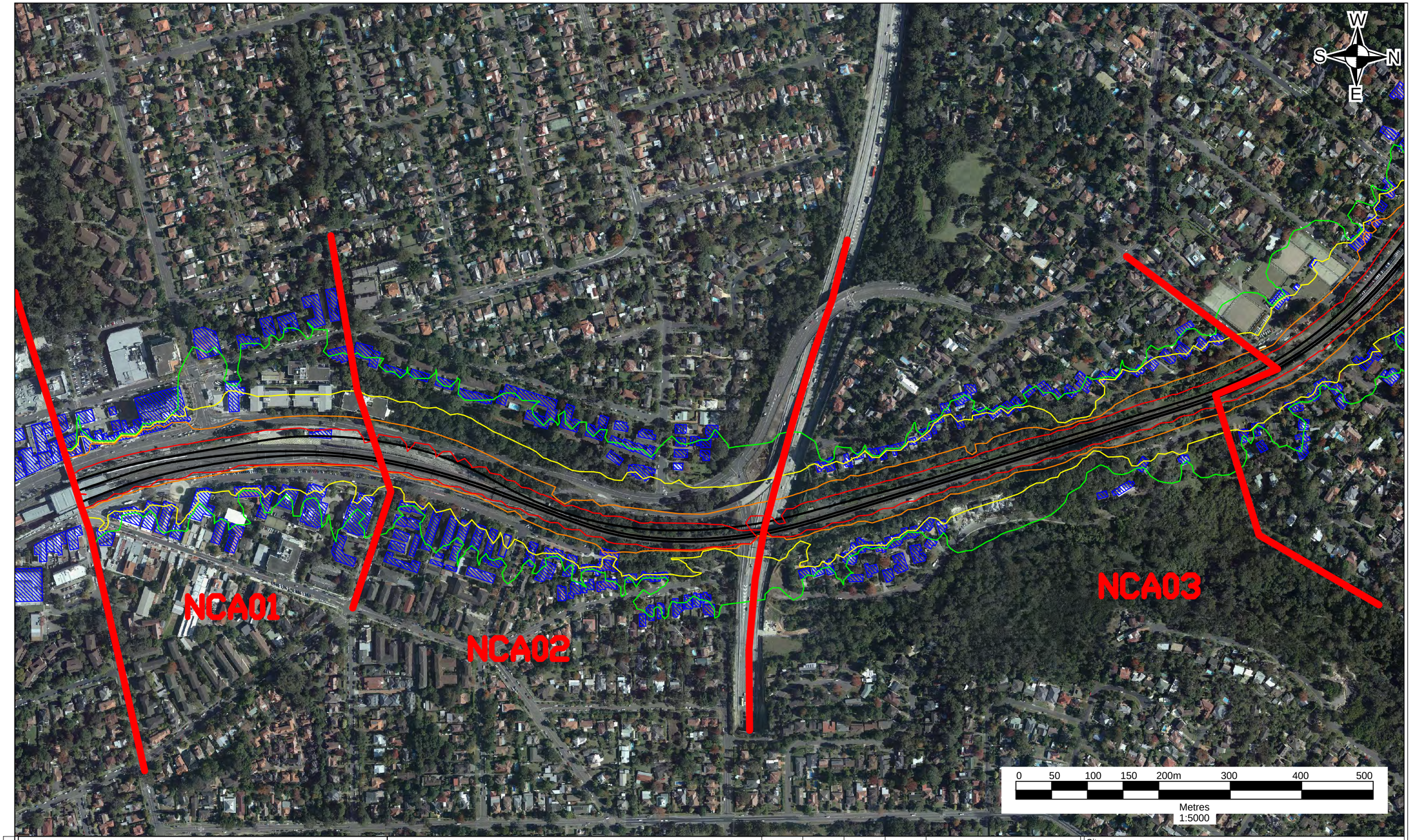
Date: 16/07/14 #

Drawing Number: **610.13080-20140716-008**

Revision: **0**

Scale: A3 #

Operational - 20140716-001.dwg



Operational - 20140716-001.dwg

NOTES

* IGANRIP 2026 with safety factor and recommended noise mitigation measures
* Noise contour grid spacing: 10m
* Noise contour height above ground: 1.5m

LEGEND

- Rail Track
- 80dBA LAmax
- 85 dBA LAmax
- 90 dBA LAmax
- 95 dBA LAmax
- Modelled Building
- Conventional Noise Wall
- Low Barrier, Close to Near Track

Revision	Drawn By	Chkd By	Date	Comments
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2026 Maximum Noise Contours (With Project)

Date
16/07/14 #

Drawing Number
610.13080-20140716-0019

Revision
0

Scale
A3 #

NOTES

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LEGEND

- Rail Track
- 80 dBA LAmax
- 85 dBA LAmax
- 90 dBA LAmax
- 95 dBA LAmax
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- Conventional Noise Wall
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Revision	Drawn By	Chkd By	Date	Comments
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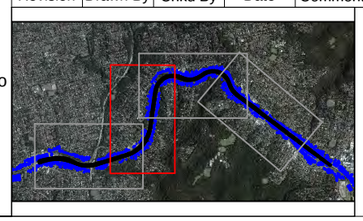

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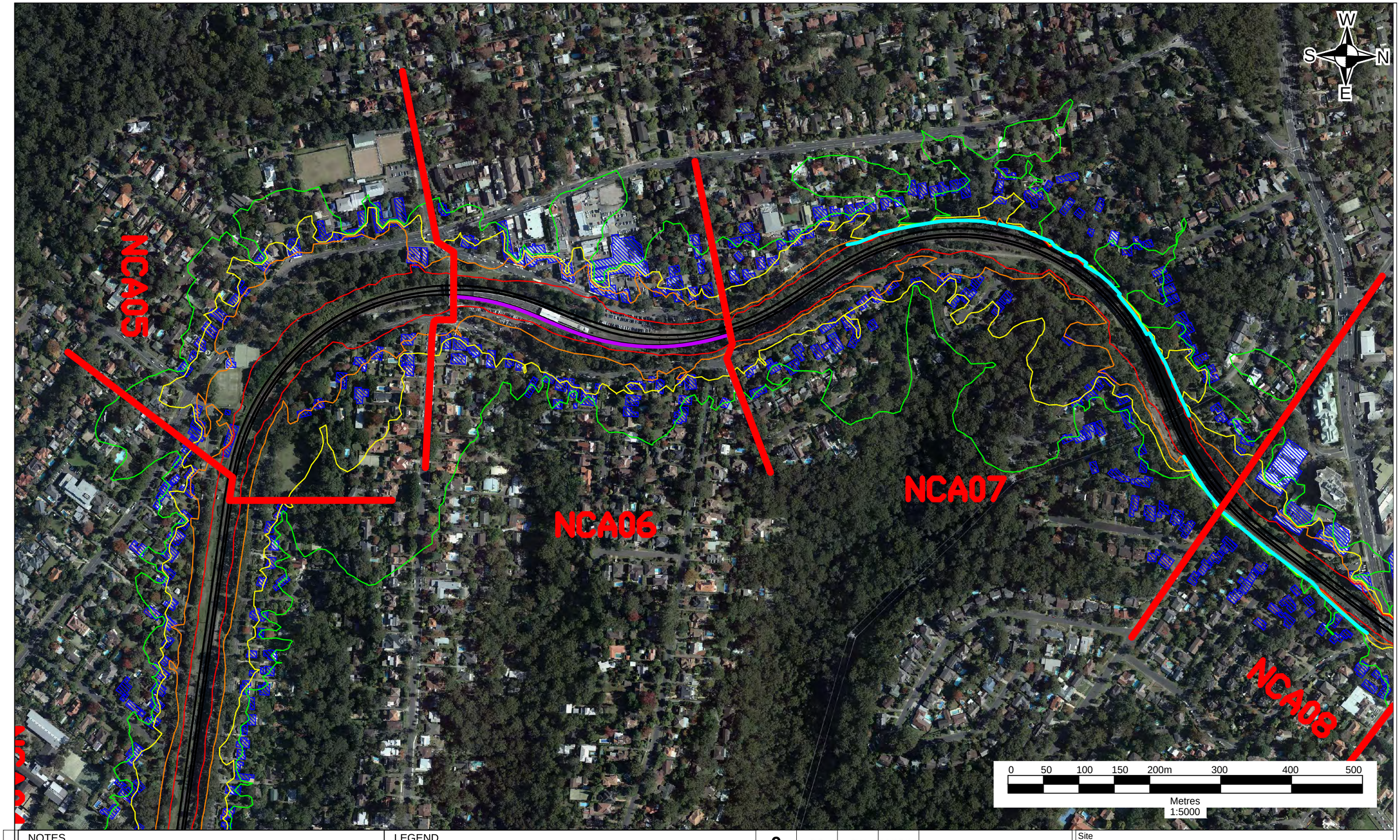
Date	Drawing Number	Revision
16/07/14 #	**610.13080-20140716-010**	**0**

Scale: A3 #

Operational - 20140716-001.dwg



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Revision	Drawn By	Chkd By	Date	Comments
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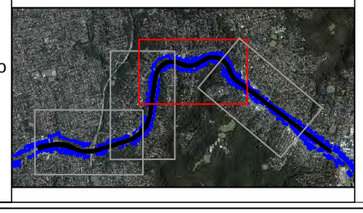

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Date		Drawing Number	Revision
16/07/14	#	610.13080-20140716-011	0
Scale	#		
A3			

Operational - 20140716-001.dwg

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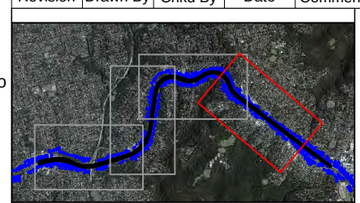

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Date	Drawing Number	Revision
16/07/14 #	**610.13080-20140716-012**	**0**

Scale: A3 #

Operational - 20140716-001.dwg

Appendix H Community consultation – feedback and responses

Appendix H

Table of Contents

The Community feedback and responses provided in this appendix have been grouped into 8 distinct categories, these are:

1. Feedback regarding the proposed noise barrier along Wongala Crescent (Beecroft and Pennant Hills)
2. Feedback regarding the proposed noise barrier south of Pennant Hills Road Bridge, Pennant Hills
3. Feedback regarding the proposed noise barrier along Sutherland Road, Beecroft
4. Feedback regarding 'red dot' properties not behind a proposed noise barrier (those identified as triggering mitigation without the application of the safety factor not benefiting from a noise barrier)
5. Feedback regarding 'yellow dot' properties not behind a proposed noise barrier (those identified as triggering mitigation but only with the application of the safety factor not benefiting from a noise barrier)
6. Other feedback
7. Feedback from Government agencies
8. Feedback from the approximately 120 residents that attended the 2 community information drop in sessions

Issue	Community comment/ suggestion	Responses
1 - Feedback regarding the proposed noise barrier along Wongala Crescent (Beecroft and Pennant Hills)		
Support	Attended the community information session Saturday 31 May and it was explained by the project staff that a 5m high noise barrier is the most cost effective option to reduce noise level - as such we think it should be built.	ETTT appreciates the time all residents have taken to review and understand the proposal, attending the information sessions, and providing feedback.
	Good idea in general.	
	I would appreciate this as I will be very affected by the noise.	
	I am fully supportive of the noise wall along Wongala Cres and would be willing to be consulted on design and architectural treatment of the walls.	
	We both strongly support the installation of 5m high conventional barriers as proposed in the review (page 14)	
	Supports conventional noise barrier	
	Better	
	In favour	

Issue	Community comment/ suggestion	Responses
Qualified support	Our residence is two storeys. A 5m high wall will not eliminate noise from upper level, and my opinion, only marginally reduce noise at ground level.	The predicted noise impacts from the operation of the third track were assessed for each floor of each property. Mitigation measures were assessed on: · Likely noise level reduction they would provide · The benefits they could provide to the wider network · How they align with community feedback received to date · How quickly they can be implemented and the noise benefits realised · Engineering feasibility · Cost of implementation · Environmental impacts. In response to community feedback the ETTT Project has investigating the option of optimising the noise barrier height for the barrier along Wongala Crescent to vary along its length to topography. As a result of this the noise barrier will vary in height from 2.5m at the top of cuttings up to 7.5m at the 'low points' at the bottom of gullies. Typical noise reductions from conventional height noise barriers (5m) are in the order of 5 dB to over 10 dB, depending on the location of the source, the receiver location and the height of the noise barrier. This is more than the anticipated decibel increase predicted as a result of the operation of the ETTT Project along this part of Wongala Crescent. (typically between 2.0 and 2.9 decibels).
	I support the construction of the conventional noise walls - however concerned that 5m height was chosen on cost, rather than mitigation provided.	
	I am very pleased to learn that you will install noise barriers at 5m height but question why not 6m. My house is a single story slab which sits above the garage so my house is approximately level with train height which would really benefit from 6m, whereas some of my neighbours are little lower and 5m or even 4.5m would perhaps be as effective for them. Rather than a blanket 5m have you considered designing a variable height between 4.5-6m to meet the range of local topographical variances?	
	A 5m or smaller noise barrier will likely not exceed the window height of many homes along NCA07 Down. Therefore if 5m or lower noise barriers are selected house modifications should be offered to those properties identified as being triggered by the safety factor. It is unreasonable to exclude properties in NCA07 Down from home modifications based on the installation of a 5m high barrier, when the most effective treatment would be the 7m barrier, particularly when there is no guarantee that the barriers will be constructed.	
	I support the construction of noise walls however I believe they are needed in more areas.	Noise barriers are only proposed at locations that meet all of the following criteria: • at properties that are predicted to exceed EPA guideline trigger levels as a result of the project • where such properties are clustered closely together in groups of three or more • where noticeable benefits are predicted due to the noise barrier • where the barrier will be cost effective, and feasible from an engineering perspective Consultation about appearance of the proposed noise barriers will be undertaken with the directly affected property owners, Sydney Trains and Hornsby Council. This will include those properties directly adjacent to the proposed noise barriers or those that will have a direct line of sight to the noise barriers. Findings from this consultation will become an addendum to the approved Urban Design and Landscape Plan.
	As expressed in my previous submissions and comments on Urban Design Plan, they (noise walls) should be constructed in other areas, including adjacent to Beecroft Station/ Village/ Playground in particular.	
	The barrier starts in front of the adjacent property, as I understand your monitoring process determined that our property wouldn't be disadvantaged by an increase in noise levels as part of NCA07 Up.	Development of the ONVR started with identification of impacts from various noise sources taking into consideration the project's detailed design, natural topography, shielding and absorption effects from buildings. An acoustic model was then created to determine the predicted impacts on nearby properties in 2026 (ten years after operations commence) without any mitigation measures in place. These results were then compared against the EPA guideline noise trigger levels to determine which properties will require consideration of mitigation. Properties that trigger the EPA guidelines are marked with red dots and properties that trigger the guidelines with the application of the safety factor on predicted train numbers are marked with yellow dots.

Issue	Community comment/ suggestion	Responses
Object	I strongly object to construction of a sound wall in front of my place. I am supportive of current rail improvements, do not find train noise annoying and quite like being able to look across the line to a bush outlook and passing trains.	The ETTT Project has to comply with the Conditions of Approval and the EPA Guidelines which require installation of identified feasible and reasonable mitigation measures before the track is operational in mid 2016. If overwhelming support from the directly adjacent community members indicated that they would prefer to leave the existing vegetation intact instead of building a noise barrier, the ETTT would have considered approaching the Department of Planning and Environment (DP&E) to seek agreement not to install this barrier. However at this stage the Project has received mostly support from local residents for the installation of a noise barrier at Wongala Crescent.
	Not all acoustic and railway engineers agree sound walls are effective. A wall seems a blunt instrument to solve a complex problem.	A number of noise mitigation methods were assessed as part of the ONVR process including source controls (which reduce the noise at its origin i.e. track lubrication to mitigate rail /wheel contact noise), path controls (where a solid object such as a barrier alters the direction of noise) and 'at property' treatments (such as glass upgrades to windows and doors). It is generally agreed that source controls are the most reasonable and feasible means of mitigation as they provide the largest benefit for the most amount of residents / stakeholders. For this reason, track lubricators will be placed in targeted areas along the length of the Project. In areas where additional mitigation is required, the Project will install noise barriers if they are deemed cost effective in comparison to the benefit they provide or property treatments where noise barriers cannot be provided. Mitigation measures were assessed on: • Likely noise level reduction they would provide • The benefits they could provide to the wider network • How they align with community feedback received to date • How quickly they can be implemented and the noise benefits realised • Engineering feasibility • Cost of implementation • Environmental impacts
Vegetation/ visual amenity	Installation of the barrier opposite my house would result in further removal of EEC Blue Gum forest. I disagree with the lack of remediation of the remaining EEC Blue Gum forest onsite. Planting of some offsets elsewhere, with no guarantee that those offsets would be Blue Gum forest, is clearly inadequate. Indeed, the installation of the barrier may be blocked for this reason. If it goes ahead, the remaining EEC should be remediated at the state government's expense.	Unfortunately the ETTT Project requires vegetation removal to build the third track and proposed noise barriers. Vegetation removal is only undertaken where required. If a tree can be trimmed or lopped instead of removed, this will be undertaken. Unfortunately, replanting is not possible in some areas due to restrictions on the proximity of full size trees (or future height potential) to the rail track. This is a restriction stipulated by Sydney Trains for safety reasons. ETTT is committed to planting vegetation at stations, community precincts and a number of areas inside and outside of corridor as per the Urban Design and Landscaping Plan. The final plan, including outcomes of community consultation, is available at www.transport.nsw.gov.au. Proposed noise barrier heights have been chosen by considering a number of performance factors including likely noise level reductions. A low height barrier provides noise mitigation from the wheel interface only whereas a conventional height barrier also provides mitigation from the exhaust and engines. Low height noise barriers are being
	It's a pity that more vegetation clearing is required but they can be replanted (as part of the project).	
	After review of the 264 page document, it appears that the proposed 5m barrier would provide the maximum noise mitigation given the cost, but no consideration has been given to restore the bushy outlook of the area.	
	The removal of further vegetation and the environmental impact suggested for the barrier would seem unnecessary given the amount of vegetation and excavation already carried out.	
	In order for a 5m barrier to "work" in terms of appearance, aesthetics and restoring wildlife to the area, consideration must be given to suitable landscaping and planting of vegetation that would prevent the 5m barrier from being an eyesore.	

Issue	Community comment/ suggestion	Responses
	Whilst we do not want a 5m eyesore in front of our property, I do not see any plans for planting or vegetation screening in front of our property that is now quite exposed to the visual and noise issues of the trains. Would you please advise what the proposed solution is to mitigate the exposed visual and noise issues that are now clearly impacting our property, our health, and social wellbeing?	used where possible, however some locations, for example Wongala Crescent, require a conventional height barrier to achieve a sufficient noise reduction. The ETTT Project recognises that conventional height noise barrier can have the potential for overshadowing, loss of open aspect, potential for vandalism, and visual impacts. There are a number of treatments that can be applied to improve the visual amenity of noise barriers and ensure they are in keeping with the local landscape. Consultation about appearance of the proposed noise barriers and replanting options will be undertaken with the directly affected property owners as well as Sydney Trains and Hornsby Shire Council. This will include those properties directly adjacent to the proposed noise barriers or those that will have a direct line of sight to the noise barriers. The noise barrier consultation will be focused around the urban design of the noise barriers, and landscaping options, and its findings will become an addendum to the approved Urban Design and Landscape Plan. The Urban Design and Landscaping Plan (UDLP) recognises the importance of using design elements to deter graffiti artists. Transport for NSW has prepared a biodiversity offset strategy to mitigate the residual impacts of the ETTT proposal. The Biodiversity offsets are well progressed with significant areas of Blue Gum High Forest and Sydney Turpentine Ironbark Forest being investigated in the Hornsby and Hills Shire Council areas to offset the clearing impacts of the project. These areas and the offset strategy being developed will ensure the identified areas will be managed in perpetuity, making a significant contribution to the long term extent and condition of these Endangered Ecological Communities.
	A colour and pattern to blend in with what little trees are left would be best for this proposed noise wall.	
	Yes agree it needs to be done and should be aesthetically pleasing e.g. earth tone colour to blend into surrounding environment. Any clearing of vegetation should be replaced and adequate plant screening provided.	
	Minimum removal of vegetation and trees.	
	Noise walls look dog ugly, regardless of artistic or architectural embellishment. I appreciate the wall is a genuine attempt to comply with residents concerns and legal obligations, but I would rather live with train noise than look at a monolithic, ugly wall in front of my house.	
	We propose the planting of native shrubs (ie plants which are much taller than native grasses) in front of the barrier. These shrubs will soften the barrier and help restore the visual appeal of the verge.	
	People living on the western side of Wongala will certainly be concerned about the effectiveness of the noise barriers but probably also about their appearance.	
	ETTT have a formidable task to design the high barriers particularly from Beecroft Station to Albert Road. Shielding vegetation would surely help appearance and reduce the incidence of graffiti if the walls and vegetation can be installed without having to destroy even more significant vegetation and ecologically endangered communities. It is ironic that much of the vegetation within the rail corridor and immediately outside the corridor consists of the worst weeds in Hornsby Shire including a number of noxious weeds which should by law be removed by City Rail/ State Rail.	
	I confirm that the noise impact will be negligible in my residential location so the visual prominence of the 5m high barriers along Wongala Crescent and their impact on the general ambience of the centre of Beecroft will be my main concern. This will be shared by many of the residents of Beecroft and Cheltenham.	
	A 5m barrier from opposite Sherwood Close to opposite Boundary Road will be a massive eyesore for the local residents other than at the Boundary Road end. This is a 'no win' situation for many residents with impossible rail noise on the one hand and the barrier eyesore, a target for graffiti artists, on the other. The barriers have a visual environmental impact on a large number of residents in the area over and above those living on Wongala Crescent. We want to know (a) what the trade-offs are with a lower barrier and (b) what plans you have to mitigate the horrors of the barrier and the graffiti threat.	
	One of the most concerning aspects of the noise mitigation measures proposed in the ONVR is the proposal to erect approximately 1km of 5m high noise barriers along the rail corridor between Beecroft and Pennant Hills railway stations. This will require clearing of all vegetation within a 6m width of the noise barriers- which the ONVR concedes is most of the remaining vegetation. This vegetation is a part of the Critically Endangered Blue Gum High Forest Ecological Community, which has already been locally decimated due to construction of the Third Track. Less than 4.5% of the original extent of Blue Gum High Forest remains in the world and as a consequence, any further removal, especially in the vicinity of the Third Track would represent an unacceptable and irreplaceable loss of biodiversity and a contiguous habitat corridor. The promise to offset the loss of this endangered ecological community offsite fails to recognise the unique role of mature vegetation (many many decades old), which cannot simply be replaced instantly through plantings elsewhere. Also, the physical location of Blue Gum High Forest along the rail corridor provides an important continuous corridor for the movement of native species between larger reserves- removal of which will further fragment and isolate populations of already threatened species leading to loss of genetic diversity and increased long-term vulnerability.	

Issue	Community comment/ suggestion	Responses
	In addition to the unacceptable ecological impacts that clearing to erect 5m high noise barriers will have, there are also overwhelming impacts this construction will have on visual amenity and the urban landscape. Vandalism is a key community concern and even before the new retaining walls along the Third Track have been completed, there is already extensive graffiti lining the barely started retaining walls along the rail corridor, which is currently being further vandalised on a weekly basis (or more frequent). This is in stark contrast to the beautiful Blue Gum High forest vista that lined the rail corridor only a year ago. Adding in 1km of 5m high noise barriers will not only provide an even larger canvas for graffiti vandals in full sight of residential properties, but also will inevitably further degenerate visual amenity along the rail corridor itself- something deeply valued by the broader community at large as well as residents in the immediate vicinity, such as my family and myself.	
	There is no exact information on the placement of the proposed 5m sound barriers and their possible impact on the narrow Heritage Listed High Bluegum Forest strip in Wongala Crescent. Pennant Hills. The aerial map leaves this unclear. Also there will need to be measures to prevent graffiti from being applied to them, as has already happened on the shot-creted wall between Wongala Crescent. North and Boundary Road. East.	
Graffiti	Secluded nature of Wongala Crescent is attractive to illegal dumpers. Graffiti artists will have a field day! The have already tagged the cutting wall Chapman Avenue.	The design principles for the treatment of walls and cuts have attempted to provide a framework for the management of graffiti removal. At this time, Sydney Trains' approach

Issue	Community comment/ suggestion	Responses
	The proposed wall will attract graffiti, illegally involve removal of protected native trees, reduce property values and degrade bush land integrity.	to removal is to paint over the graffiti. Therefore the following design elements have been incorporated: • In the vicinity of stations, anti-graffiti joints have been provided at 2.5m above ground level and 2.5m down from the top of cuts and walls to provide an edge for Sydney Trains to paint to when removing graffiti. This will present a tidy 'squared patch' at completion rather than an uneven set of brush strokes • Simplicity of walls and cut colours will improve the likelihood of colour matching • Planting in front of walls where access is available to reduce the effectiveness of graffiti. An anti-graffiti coating will be provided to hard surfaces in public areas. In these areas good access is available for maintenance staff to remove graffiti rather than to paint over it. However, an anti-graffiti coating is not being applied within the corridor as requested by members of the community. This is due to the need to use high pressure water blast to remove graffiti on top of an anti-graffiti coating. This is impractical within the rail corridor where access for equipment is extremely limited. Therefore painting using a similar colour to the substrate has been found by the Sydney Trains corridor maintainers to be the preferred and more effective solution. The potential for the noise barriers to be affected by Graffiti will be addressed in the options presented during the upcoming consultation on urban design and landscaping. Please refer to the section above for responses on issues raised regarding vegetation removal. There is no evidence that the ETTT Project would result in a reduction in property values. Future movements in the value of a property are difficult to predict as they are subject to many variables including: specific attributes of the property, capital improvements, demand and supply factors and other changes in the wider property market. As the rail corridor has been continuously in use for over 120 years and the ETTT Project is consistent with the existing land uses and operations within the rail corridor, It is unlikely that the proposal by itself would result in a noticeable change in property value. The ETTT Project will not consider any compensation claims for alleged loss of property value as a result of the project.
Footpath	The dirt footpath alongside creek connecting Beecroft and Pennant Hills side of Wongala Crescent should be upgraded to be a proper pedestrian strip given its high usage, with adequate lighting and level footing. This needs to be considered and acted upon at the time the barrier is constructed and possibly creating a safety concern.	As part of the ETTT Project, sufficient infrastructure to facilitate future construction by Council of a shared pedestrian / bicycle path will be built alongside the new retaining wall supporting the new third track. The shared path would be 'cantilevered' (supported) from the retaining wall structure in order to minimise vegetation impacts. The path will not be installed as part of the ETTT project.
Additional mitigation requests: • More noise barriers • Higher noise barriers • More property treatments • Include safety factor in property	70dBA is described as "loud radio or television" (ref pg 4; appendix doc). I can tell you, the current sound of rail noise is far louder than our TV. We cannot hear the TV while freight trains go past. And our TV room is at the back of the house. The noise levels in NCA07 Down are attributed in the report to be the result of curve squeal. Assuming the night noise level is only 70dBA; Could you sleep at night with 70 dBA curve squeal? Equivalent to a sudden loud TV pointed at your head? 14 times a night? Do you really believe in that circumstance that home mod ification is not justified?	EPA Guidelines used in the ONVR are based around two key noise parameters: 'average' noise (LAeq) and 'maximum' noise (LAmax). A property may be predicted to exceed trigger levels associated with either of these parameters. The ONVR describes the difference in 'average' and 'maximum' noise levels (refer section 1.2). The ONVR assesses and proposes to treat exceedances associated with either; however most predicted exceedances due to the ETTT Project are for average noise levels. The ETTT Project is not predicted to increase existing maximum noise levels sufficiently to exceed EPA Guideline trigger levels. Most predicted exceedances due to the ETTT Project are in relation to night-time average noise levels, which need to increase by 2dB or more to exceed EPA Guideline trigger levels.
	We will be unable to sleep, hear the TV, hold a conversation or work from home from day one.	

Issue	Community comment/ suggestion	Responses
treatments	"42 properties triggered by the safety factor which are not proposed to be eligible for property treatment. For these 42 properties further assessment will be carried regarding their eligibility for property treatment, if post-operation validation measurements indicate that freight traffic is increasing at a faster rate than predicted in the NSFC business case. " (ref. pg 64 & 66) This is simply not good enough. There is no guarantee that the recommended barrier will be installed (7m for best acoustic result, or 5m as recommended in the report). It is unreasonable to expect residents to "live with" up to (likely over) 70dB at night and 104 LAmax while waiting for the State government to decide if the freight traffic justifies it sometime in the unspecified future. I seriously doubt it will take until 2026 for the freight rail line to reach capacity with our growing population, road transport problems and costs, and economy growth. Request for treatment of properties in NCA07 Down to be included now.	The ONVR was prepared by the ETTT Alliance using specialist acoustic consultants. The report was prepared in consultation with the NSW Environment Protection Authority (EPA) and Hornsby Shire Council. Development of the ONVR started with identification of impacts from various noise sources taking into consideration the project's detailed design, natural topography, shielding and absorption effects from buildings. A rigorous acoustic model was then created to determine the predicted impacts on nearby properties ten years after operations commence in 2026 without any mitigation measures in place. These results were then compared against existing noise levels to determine which properties will require consideration of mitigation using the EPA guideline noise trigger levels. An independent review of the ONVR was also completed by a third party acoustic specialist consultant endorsed by the Department of Planning and Environment to ensure that the noise impacts and proposed mitigation measures were determined in accordance with the EPA guidelines and the Conditions of Approval (CoA). For these reasons, ETTT has determined that the model used to verify the acoustic levels in the ONVR is accurate and reliable. On completion of the project, noise and vibration compliance monitoring (to confirm the predictions of the noise assessment and mitigation measures in the ONVR) will be undertaken, one year, five years and ten years after completion. If the assessment indicates that noise and vibration objectives have not been met, further mitigation measures will be investigated/ implemented in consultation with affected property owners. Under the EPA's guidelines, the ETTT project is required to assess and mitigate impacts of the new third track and associated infrastructure only - not existing noise issues. However, the CoA requires the ETTT Project to develop and implement a Source Noise Monitoring Plan (SNMP) prior to operation and in consultation with the EPA to help identify noisy freight locomotives and rolling stock operating on all tracks. This may help to address existing noise issues. SNMP is discussed in chapter 14 of the ONVR. Transport for NSW also has a program of works underway to reduce existing rail noise. The program of works includes: • Working with freight operators to improve the design and maintenance of their rolling stock to reduce wheel squeal and locomotive noise • Installing modern electronic lubricators throughout the Beecroft and Cheltenham area • Using dedicated maintenance teams to ensure the lubricators are always fully operational • Working with Sydney Trains to improve track maintenance practices.
	On Wongala Crescent, from Sherwood Close to Brecks Way, it will be essential to install the 7m noise barrier to avoid increased noise well above the current levels that will be produced by the increased frequency of freight trains along this most steep & most curved section of the ETTT. Therefore the 7m noise barrier plus house modifications should be offered. If anything less than the 7m barrier is installed in NCA07 Down, then all houses identified as triggering the safety factor should also be offered home modifications to compensate.	
	The third track will be significantly closer, and being the dedicated freight line will concentrate noise to houses along Wongala Crescent from Sherwood Close to Brecks Way on this western side of the track (NCA07 Down). In particular, my home is only 64 metres from the existing western most track. Therefore the 7m noise barrier plus house modifications should be offered.	
	Wongala Crescent – *(suggest)* matching noise wall height to topography to optimise.	
	Consideration should also be given to upgrading the track lubricators on NCA07 Down. The noise levels from wheel squeal since clearing of the vegetation and excavation of the cutting commenced, has reached unbearable levels at NCA07 Up.	
	Makes absolutely no sense. I would ask that this is reassessed and I would like to have a detailed explanation as to how your team reached its conclusion. Models as we know are based on assumptions and you can get a variety of results based on different assumptions!	
	I would welcome you at anytime to conduct a site survey or further monitoring at my property to assess my comments.	
	I would like my house assessed for this as I am close to the third track and my lounge room is high - on a level with the track opposite.	

Issue	Community comment/ suggestion	Responses
	At present the noise is already excessive (e.g. we have to raise our voices at times, pause the TV or turn it up and down when a train passes through and also sleeping is difficult). We expect the third track will make the situation even worse. As such we require a specific house inspection and plan to remediate this noise impact to our property e.g. we expect things such as new window and door seals and glass upgrades will be required. A further point to note would be that these studies need to occur when noise is at its greatest which of present occurs in the evening i.e. after 10pm approximately.	Transport for NSW has also installed a temporary noise monitoring station at Beecroft that captures the noise from passing trains. This noise monitoring station will be made permanent as part of the ETTT Project and data will be made publicly available once operation of the ETTT Project commences. It is recognised that many locations in the project area already experience high existing rail noise levels. In some cases, these locations with the highest existing rail noise impacts do not trigger consideration of mitigation as a result of the ETTT project. Programs are being developed to address acute existing rail noise impacts in parallel with the ETTT project – these are described in Section 8.12 of the ONVR. The ETTT draft ONVR committed to building a 5m conventional noise barrier along part of Wongala Crescent, Pennant Hills. After conducting a cost/benefit analysis, the project extended the length of the noise barrier along Wongala Crescent to also include properties at the northern end of Wongala Crescent that trigger the EPA guidelines with the application the safety factor. In response to community feedback, the ETTT Project has investigated the option of optimising the noise barrier height for the barrier along Wongala Crescent to vary along the length due to different topography. As a result of this the noise barrier will vary in height from 2.5m at the top of cuttings up to 7.5m in the valleys. Typical noise reductions from conventional height noise barriers (5m) are in the order of 5 dB to over 10 dB, depending on the location of the source, the receiver location and the height of the noise barrier. This is more than the anticipated decibel increase predicted as a result of the operation of the ETTT Project along this part of Wongala Crescent. (typically between 2.0 and 2.9 decibels).
	I live at *[number withheld for privacy reasons]* Wongala Crescent, Pennant Hills and I note that my house is not listed in Yellow Dot category (property predicted to exceed IGANRIP noise trigger levels only with safety factor). My house sits between *[numbers withheld for privacy reasons]*, it is closer to the railway line than *[number withheld for privacy reasons]* by approx 5 m and is at the same distance from the line as *[number withheld for privacy reasons]*. This makes no sense to me. It looks as there has not been a common sense "does this really make sense" assessment to whatever the model produced. I live in a line of houses left and right which have been assessed yellow yet I sit isolated.	Future noise levels at this property are not predicted to reach requirements for noise mitigation as set out in the guidelines (RING/ IGANRIP). However, a noise barrier is being constructed along Wongala Crescent that will mitigate noise for all properties that are behind the noise barrier including this property at *[number withheld for privacy reasons]*.
Noise reflection from proposed barriers	I am a resident of Sutherland Rd, Beecroft. The purpose of my email is to object to the proposed 5m noise barrier on the west side of the track (Wongala Crescent). I feel this would have a negative impact to the properties on Sutherland Road as additional noise would be reflected away from the barriers at Wongala Crescent towards Sutherland Road properties. Your communication also notes 5m barriers would have a high impact to vegetation. The impact to the environment as a result of the project needs to be prioritised. There has already been too much vegetation unnecessarily destroyed. Replacing vegetation with unsightly 5m barriers is unacceptable.	Section 8.6 has been updated to better describe how noise reflection has been assessed in the modelling process. In summary, the assessment identified that the noise level increase would be negligible since the reflected noise would be shielded by the train itself for receivers on the opposite side of the track. The addition of absorptive treatments to the noise barrier would not provide a noticeable noise benefit to sensitive receivers.
	The noise barriers that are proposed for the western side of the railway at Beecroft, will there be a bounce back effect creating more noise to the properties on the eastern side of the track. These are the people that are affected 24 hours a day.	

Issue	Community comment/ suggestion	Responses
2 - Feedback regarding the proposed noise barrier south of Pennant Hills Road Bridge, Pennant Hills		
Support	We agree that the 5m high noise barrier should be installed to reduce some of the noise levels of the passing freight trains. We agree also that this barrier will not reduce 100% of the noise generated by the trains. *[Address withheld for privacy reasons]* is a 2 storey house with internal wall estimation at least 5m.	A noise barrier cannot eliminate 100% of noise however it is expected to decrease noise by 5-10 decibels. A conventional noise barrier works best when it is located close to either the source or the receiver. ETTT will be installing a 5 metre conventional height noise barrier along the eastern side of the rail corridor south of Hampden Road will help to mitigate freight train noise sources including exhaust, engines, rolling noise, curve squeal, flanging noise and brake noise. The assessment in Appendix E in the ONVR shows that increasing the height of the proposed noise barrier above 5m is not cost effective when compared to the predicted noise reduction benefits.
	Will the 5m high wall be calculated 5m from the ground level of the train tracks or will it follow the service pathway which leads to Hampden Road? And if it follows the pathway up Hampden Road, will be 5m all the way up or will the height of the wall reduce as it heads towards Hampden Road because if it is 5m at the top of the service pathway, it will be a major eyesore and reduce sunlight for our property. But if it does not then I am afraid that the noise barrier will serve no purpose for our property.	The barrier will be 5m ground level at the location of installation, rather than a fixed 5m above the track. This barrier is proposed to run part way up the service road towards Hampton Road, but not all the way. The cutting itself acts as a noise barrier, significantly reducing the benefit of a barrier higher up this cutting.
	I support construction of the 5m high barrier and would prefer it be extended by 100m to the south	Noise barriers are only considered at locations where properties that are predicted to exceed EPA guideline trigger levels as a result of the project, are clustered closely together and noise reduction benefits can be maximised. Once these properties were identified, various mitigation measures, including noise barriers were assessed to determine the benefits they might provide. Where noticeable benefits are predicted, noise barriers were assessed for acoustic and cost effectiveness. The noise barrier cannot be extended by 100 m further to the south as there are insufficient properties in this location predicted to exceed trigger levels.
	Up to residents on eastern side of railway line - I have no objection (barrier south of Pennant Hills)	Acknowledged
	Supports conventional noise barrier	
	Best - providing a barrier 5m above track level	
	In favour	
Request for property treatment in addition to noise barrier	*[Address withheld for privacy reasons]* should be included in the at property noise treatment as we are one of the properties closest to the train line. As I type this I can clearly hear the construction going on the track. Our bedrooms are all located on the second storey and our master bedroom and ensuite have windows facing out towards the track. Without a secondary line of noise prevention (the first being the barrier), this would make our sleep unbearable. Question: Will many of the freight trains run throughout the night? If so, quality of living will certainly diminishes with interrupted sleep without proper window and seal insulation.	This property will receive some noise mitigation benefit from the noise barrier that is being proposed nearby, but is not eligible for property treatment under the EPA guidelines. Freight trains will continue to operate at night. Without the project, freight services are anticipated to increase to an average of 32 per day (both directions combined) over a 24-hour period, by 2026. The EIS predicted that the ETTT Project would increase this figure to 44 (both directions combined), ie an additional 12 trains per day. Of these additional 12 trains, 9 are predicted to run during the day (between 7am and 10pm) and 3 are predicted to run at night (between 10pm and 7am).
Noise reflection from proposed barriers	While I have been verbally assured that noise 'bounce' from the new proposed barrier further south on the western side of the rail corridor has been factored in to all calculations, I can see no evidence of this in the data presented.	Section 8.6 has been updated to better describe how noise reflection has been assessed in the modelling process. In summary, the assessment identified that the noise level increase would be negligible since the reflected noise would be shielded by the train itself for receivers on the opposite side of the track. The addition of absorptive treatments to the noise barrier would not provide a noticeable noise benefit to sensitive receivers.
	Because of the position of these properties the proposed barriers will have a negative impact by bouncing sound directly back down the rail corridor.	
Other comments	2A and 2B Hampton Road are incorrectly labelled – 2A should be labelled 2B, with 2A being the battle axe block.	We apologise for this error – this has now been corrected in the updated maps.

Issue	Community comment/ suggestion	Responses
	Query in relation to the proposed location of the noise barrier and where it starts / ends.	The exact location where the barrier commences will be identified as part of the detailed design. Consultation about appearance of the proposed noise barriers will be undertaken with the directly affected property owners, Sydney Trains and Hornsby Shire Council. This will include those properties directly adjacent to the proposed noise barriers and those that will have a direct line of sight to the noise barriers. Findings from this consultation will become an addendum to the approved Urban Design and Landscape Plan.
Vegetation	South of Pennant Hills Train Station - A 5m high noise barrier requiring the removal of further vegetation including established trees and an ecologically endangered community. Although this is shown to be within the rail corridor this structure will effectively destroy the Blue Gum High Forest in the area and with it a contiguous habitat corridor. The proposed compensating offsite replacement is effectively adding insult to injury as far as the local community is concerned. It is apparent the NSW Government could not give a damn about this issue.	Unfortunately the ETTT Project requires vegetation removal to build the third track and proposed noise barriers. Vegetation removal is only undertaken where required. If a tree can be trimmed or lopped instead of removed, this will be undertaken. Unfortunately, replanting is not possible in the same location due to restrictions on the proximity of full size trees (or future height potential) to the rail track. This is a restriction stipulated by Sydney Trains for safety reasons. ETTT is committed to planting vegetation at stations and a number of areas beside the track and community precincts as per the Urban Design and Landscaping Package. The final plan, including outcomes of community consultation, is available at www.transport.nsw.gov.au. There are a number of treatments that can be applied to improve the visual amenity of noise barriers and ensure they are in keeping with the local landscape. Consultation about appearance of the proposed noise barriers and replanting options will be undertaken with the directly affected property owners as well as Sydney Trains and Hornsby Shire Council. This will include those properties directly adjacent to the proposed noise barriers or those that will have a direct line of sight to the noise barriers. The noise barrier consultation will be focused around the urban design of the noise barriers, and landscaping options, and its findings will become an addendum to the approved Urban Design and Landscape Plan. The Urban Design and Landscaping Plan (UDLP) recognises the importance of using design elements to deter graffiti artists. Transport for NSW has prepared a biodiversity offset strategy to mitigate the residual impacts of the ETTT proposal. The Biodiversity offsets are well progressed with significant areas of Blue Gum High Forest and Sydney Turpentine Ironbark Forest being investigated in the Hornsby and Hills Shire Council areas to offset the clearing impacts of the project. These areas and the offset strategy being developed will ensure the identified areas will be managed in perpetuity, making a significant contribution to the long term extent and condition of these Endangered Ecological Communities.
	One of the most concerning aspects of the noise mitigation measures proposed in the ONVR is the proposal to erect approximately 1km of 5m high noise barriers along the rail corridor between Beecroft and Pennant Hills railway stations. This will require clearing of all vegetation within a 6m width of the noise barriers- which the ONVR concedes is most of the remaining vegetation. This vegetation is a part of the Critically Endangered Blue Gum High Forest Ecological Community, which has already been locally decimated due to construction of the Third Track. Less than 4.5% of the original extent of Blue Gum High Forest remains in the world and as a consequence, any further removal, especially in the vicinity of the Third Track would represent an unacceptable and irreplaceable loss of biodiversity and a contiguous habitat corridor. The promise to offset the loss of this endangered ecological community offsite fails to recognise the unique role of mature vegetation (many many decades old), which cannot simply be replaced instantly through plantings elsewhere. Also, the physical location of Blue Gum High Forest along the rail corridor provides an important continuous corridor for the movement of native species between larger reserves- removal of which will further fragment and isolate populations of already threatened species leading to loss of genetic diversity and increased long-term vulnerability.	
3 - Feedback regarding the proposed noise barrier along Sutherland Road, Beecroft		
Prefer conventional barrier instead	Believe conventional barrier is better for sound/noise reduction; suggest to change from low height to conventional.	Noise barriers are most effective when they can be located close to either the source or the receiver. In situations where the dominant source is the wheel/rail interface (such as on the Beecroft curves), and where properties mostly sit lower than the track, a low-height noise barrier constructed close to the wheel/rail noise source can provide noticeable noise reduction. One of the considerations in assessing whether a noise barrier will be reasonable and feasible is whether a noticeable noise reduction will occur. In the case of the low-height barrier proposed at Beecroft, this is confirmed as shown in Appendix E (NCA06 Up) of the ONVR document. Low height noise barriers will not attenuate diesel exhaust or engine noise and are targeted at mitigating noise sources located towards the bottom of the train near the
	Would prefer this (conventional height barrier), at least from the Copeland Road Bridge and Chapmen Avenue Bridge. The current green strip east of the line will hide the barrier.	
	Noise at that level is unbearable. It is not predicted to go down at all as a result of the installation of the noise barrier, and I predict if a 2.5m or 2m barrier is installed it will funnel noise directly at my house and far exceed the 1.6 dB increase attributable to the ETTT.	
	I am concerned that these will have little effect - particularly on diesel exhaust noise and carriages	

Issue	Community comment/ suggestion	Responses
	The wheel squeal is deafening on all parts of the proposed ETTT. Low height barriers will have little or no impacts and locomotive engine noise and stinking exhaust pollution are major issues.	wheel/rail interface – this is the dominant noise source at this location. The model predicts the low-height barrier to provide a benefit of 8 dB to 10 dB for receivers located 1.5 - 3.5m above top of rail.
Noise reflection	While this barrier may be of some help to the school it may also have the affect of bouncing the noise back down the rail corridor directing onto the properties on The Crescent between Murray Road and Kirkham Street (tennis courts). No noise mitigation has been offered to us in this position.	The ONVR includes a recommendation that a noise absorptive material is provided on the track side of the low-height barrier. This is to prevent noise reflecting off the low-height barrier. The exact specification of the absorptive material will be determined during the detailed engineering design process.
Property treatments – in addition	It is necessary to complete 'at property' noise treatment to reduce the noise level.	A number of noise mitigation methods were assessed as part of the ONVR process including source controls (which reduce the noise at its origin i.e. track lubrication to mitigate rail /wheel contact noise), path controls (where a solid object such as a barrier alters the direction of noise) and 'at property' treatments (such as glass upgrades to windows and doors). It is generally agreed that source controls are the most reasonable and feasible means of mitigation as they provide the largest benefit for the most amount of residents / stakeholders. For this reason, track lubricators will be placed along the length of the Project. In areas where additional mitigation is required, the Project will install noise barriers if they are deemed cost effective in comparison to the benefit they provide or property treatments where noise barriers cannot be provided. Property treatments will not be provided to properties behind this noise barrier as tall properties behind the barrier will benefit from some noise mitigation. Direct consultation with 40 properties identified in the ONVR as requiring property treatments, but are not behind a noise barriers will be undertaken once the ONVR has been approved by DP&E. Details of treatments will be confirmed after an inspection and assessment of an individual property. On other projects, mitigation has typically included items such as provision of fresh air ventilation (to allow windows to be closed), upgrades to window and door seals and window glass upgrades. Specific treatment measures will depend upon factors like the level of predicted noise impact, type of construction of the property and orientation to the rail line. It is possible that the inspection will determine some properties as not eligible for property treatment due to all appropriate mitigation measures having already been implemented.
Visual amenity	I feel that the suggested noise barriers are an eye sore. I feel that tax payers should not have to pay for these ugly structures when offending companies are making profits and not making repairs to their trains and rolling stock.	There are a number of treatments that can be applied to improve the visual amenity of noise barriers and ensure they are in keeping with the local landscape. Consultation about appearance of the proposed noise barriers will be undertaken with the directly affected property owners, Sydney Trains and Hornsby Shire Council. This will include those properties directly adjacent to the proposed noise barriers or those that will have a direct line of sight to the noise barriers. The noise barrier consultation will be focused around the urban design of the noise barriers and its findings will become an addendum to the approved Urban Design and Landscape Plan. ETTT is required by the EPA to develop and implement a Source Noise Monitoring Plan (SNMP) to help identify noise freight locomotives and rolling stock operating on all tracks. This may help to address existing noise issues mentioned. The SNMP is discussed in chapter 14 in the ONVR.
Support	I do appreciate that we are being kept informed.	Acknowledged
	Not in my backyard - up to options of more local residents	
	Good	
	In favour	

Issue	Community comment/ suggestion	Responses
4 - Feedback regarding 'red dot' properties		
Seeking noise barrier instead	Precisely opposite our house (*[number withheld for privacy reasons]* Yarrara Road) is the location where a number of freight trains will regularly stop, waiting for passenger trains to pass before the main line ahead is clear for them to proceed. (That is recognized in your review) At this particular point there will be considerable full power START UP NOISE as between 2 to 5 diesel electric locomotives need full power to start from a complete stop, commencing to haul their full load up hill. That particular concentration of sound has not been measured in your study, as no freight trains presently stop at this location, and re-start here. Based upon available information from Pacific National and Aurizon, the start-up maximum noise level from 1 locomotive is 89 db, 2 locomotives 91db and 4 locomotives 94 db. (A 5 loco freight train was logged on 01/06/14, but that is exceptional) That very high noise level requires serious abatement measures to be taken at this specific location, alongside the regularly stopped multiple diesel-electric locomotive - that will then be fully powered right here, at the very northern end of the ETTT. As this is a particularly significant stop-start up point in the ETTT, we recommend that a relatively short 5m sound barrier be erected there is order to achieve an adequate level of noise abatement from the diesel-electric locomotives that will regularly be stopped at the northernmost point of the ETTT, just before re-joining the main line. For noise abatement we have proposed a 5m barrier to reduce transmission of the powerful start-up noise from the 2-5 diesel locomotives, when they begin their haul after waiting for the line to clear.	To manage start-up noise drivers are trained to progressively increase power rather than go to a high notch setting immediately. The locomotives are likely to be in Notch 6 (Med-High) after approximately four car lengths. Within the noise model, it is assumed that locomotives would be held at signals during daytime only and for up to 15 minutes each time. The effect on the daytime LAeq from locomotives starting-up has been assessed as being unlikely to result in a noticeable increase in daytime LAeq . In terms of LAmax, the noise model already models locomotives at high notch during the daytime and night-time and there would therefore be no change to LAmax. Therefore a noise wall is not proposed near Yarrara Road, Pennant Hills. At the various additional locations at which noise barriers have been requested, barriers are assessed as not being cost effective and have therefore been discounted. Property treatment is proposed instead. The only three extents of barrier found to be cost effective occur on the Beecroft curves where the significant benefits available of mitigating wheel squeal noise outweigh the predicted barrier costs.
	From Pennant Hills Station to the Wells Street Bridge - Although this section is flat and straight compared to the 'southern' section this section is where the freight trains will be held up pending crossover to the main line a short distance from the Wells Street Bridge. We question whether any consideration has been given the noise and vibration generated by a 5 diesel locomotive / 1500m freight train, with a third of its length still on the up slope of Beecroft, as it revs up to crossover to the main line?	
	As has been done on large sections of the M7 and M2, there should be high barriers and plantings next to these barriers right along the rail corridor. This would eliminate individual house mitigation costs and the expensive use of air conditioners.	
	No barrier has yet been included at the key location where the new third track will end and merge into the single track that then continues northwards to Newcastle.	
	There is no barrier at the location of merge into third track. A lot of trees have been cut to provide for space for the infrastructure there needs to be replaced and a 5m barrier must be constructed to reduce the visual impact on the road.	
	Extreme disappointment that the upgraded line between Pennant Hills and Thornleigh Stations will not attract any sound management and mitigation. 1/2 this section is in a cutting, the southern end nearest Pennant Hills Station is on a build up viaduct and the sound projected extremely from this area.	

Issue	Community comment/ suggestion	Responses
Turnout noise	There is also a set of points at this location and this has been complained about due to the hammer and anvil 'CLAP CLAP' that sounds 64 times each time a train passes. This can be heard several miles away and close by is extremely loud. The roaring of triple head goods trains as they come up this hill from Beecroft only abates with the loco's passing into the cutting, clearly making a huge difference to the noise.	The turnout (set of points) just north of Pennant Hills Station will be removed as part of the ETTT Project. The turnout just to the south of Thornleigh will be retained (replaced to facilitate higher-speed running by trains returning to the main line from the new third track). At Cheltenham there is an existing crossover between the two tracks, just to the north of the M2 motorway. Trains running on the new third track will effectively 'bypass' this existing crossover and therefore those trains will no longer create the 'clap-clap' noise associated with the existing crossover. The ONVR has considered all of the above situations.
Earthworks	Noise levels at the above and surrounding properties (near The Crescent, Beecroft) have already increased enormously because of the removal of huge amounts of solid sandstone and vegetation.	Investigations into the ground conditions during construction at this location (north of the M2 motorway along the rear of some properties facing Old Beecroft Road and at the southern end of The Crescent) found that the earth behind the cutting was softer than previous surveys indicated. To provide a safe and stable cutting next to the new third track, the height of the mound was required to be reduced. To reinstate the mound to its previous height (after the cutting work has been completed) would require the mound to be widened at its base to provide a safe and stable slope. Widening the base of the mound would impact a drain gully next to the mound, resulting in potential flood impacts. This was not modelled within the original ONVR, however the model has now been updated based on actual excavation levels. This resulted in an additional six properties predicted to exceed trigger levels at this location. These properties are now assessed as eligible for property treatment and are shown on the updated maps with a red dot. Other cutting widening have been considered in the ONVR noise model. To reduce noise impacts, a barrier should be solid to interrupt the path of the noise. Along the ETTT rail corridor, the trees and vegetation do not act as a solid barrier and have little, to no, measurable impact on noise impacts.
Property treatment	Double glazing to windows, sound insulation for roof space.	Direct consultation with the 40 property owners identified in the updated ONVR will be undertaken once the ONVR is approved by DP&E. Details of treatments, if appropriate, will be confirmed following an inspection and assessment of the individual property. ETTT will investigate the use of property treatment such as provision of fresh air ventilation (to allow windows to be closed), upgrades to window and door seals and window glass upgrades which have typically been used on other rail projects. Specific treatment measures will depend upon factors like the level of predicted noise impact, type of construction of the property and orientation to the rail line. It is possible that the inspection will determine some properties as not appropriate for property treatment as all appropriate mitigation measures have already been implemented.
	Would like to ensure I get property treatment when the time comes to arrange this.	
	In favour.	
	Thank you for your offer to apply 'at-property' noise treatments to our residence. We look forward to hearing from you further on this in due course.	
	In favour of 'at property' noise treatment .	
	We propose treatment of windows on the southern side of the house, that is most affected by noise from freight trains. That would involve sound proofing two hopper windows in our bedroom and one double hung window in the family room.	
	These seem to be only offered to a select few properties and will have minimal benefits. Double glazing creates the need to air condition homes which is expensive and environmentally unsound.	
	This is required for upgrade to windows and door seals and glass upgrades including provision of fresh air.	
	Not clear what can be done for older style windows and what treatment will be provided. Reglazing is minimal. Upgrading glass or installing exterior window shutters would be most appropriate.	
	Would like more detail information on noise treatment, how would air ventilation operate - natural or powered. Resealing and reglazing windows. Would like to discuss the upgrade to glass and exterior window shutters.	

Issue	Community comment/ suggestion	Responses
Consultation	The hall is “predicted to exceed IGANRIP noise trigger levels WITHOUT safety factor” and has been identified for potential noise abatement (Red dot on photo on Part 1 of the report, in Table 53 on page 64 of Part 2 of the report – other sensitive). Notification of the hall’s inclusion in the list of buildings to be assessed for noise abatement was sent to the owner of the land - Transport NSW. No notification was sent to the building owner, Scouts NSW or the building users (Beecroft Cheltenham Scout Group and Beecroft Guides). A safety barrier wall is to be built between the hall and the third rail. Details of the wall (height/offset from the hall etc.) have not been provided.	A safety deflection wall, starting approximately 2m south and extending approximately 2m north will be installed to ensure safety of the hall. This should assist with a reduction in noise inside the hall. Consultation with the landowner and building owner will be undertaken in regard to the deflection wall and any further mitigation measures.
Property classification	The property at 1 Fulbourne Avenue, Pennant Hills is a preschool and residential property. Currently, it is zoned on ONVR as only preschool. As a residential property, noise and vibration issues will be concern after business hours. Noise treatment for both preschool and residential house needs to be addressed.	This has been noted. At-property treatment will be undertaken in consultation with the property owner.
Other	Stakeholder received CD with aerial view of how residents will be impacted - his house was not shown.	Contact made directly with stakeholder and clarification made. ETTT apologies for any confusion and the maps have been updated in this version.
5 - Feedback regarding ‘yellow dot’ properties		
Safety factor	Majority of the wheel squeal occurs at NCA07 Down due to the two turns and steep ascent to Pennant Hills Station. Therefore all homes which trigger the safety factor should be included in home modifications.	Where no barrier is proposed, property treatment will only be offered for properties that are predicted to exceed the EPA guideline trigger levels without inclusion of the safety factor. The safety factor models a hypothetical faster increase in freight traffic than currently forecast.. On completion of the project, noise and vibration compliance

Issue	Community comment/ suggestion	Responses

	Request for safety factor to be included when considering home modifications. Reassessment of *[number withheld for privacy reasons]* Wongala Crescent requested. It is believed that initial testing was inadequate and property treatment is requested for the following reasons:
	• The safety factor MUST be included in consideration of which properties to receive home modifications. I hereby formally request assessment for home modifications.
	• I hereby formally request re-assessment of the noise impacts at my property *[number withheld for privacy reasons]* Wongala Crescent - as I believe the trigger for additional mitigation will be hit at my property without safety factor applied; that inadequate noise testing stations were applied in NCA07 Down - the noisiest section of the corridor; amongst other reasons outlined.
	• Please advise when I can expect to be contacted by an engineer or building surveyor to the property to assess its condition and confirm eligibility for property treatment.
	• Want property treatment because:
	  • My catchment NCA07 Down has the highest predicted residential noise impacts at 104 LAmax - this is equivalent to double the sound of a construction site with pneumatic hammering. (ref pg 4; appendix doc).
	  • Acoustic data collection points in NCA07 Down were inadequate to accurately assess the current & potential noise impact of the freight trains on the properties in the loudest section of the ETTT. I predict it is even higher than 104 LAmax now.
	  • In NCA07 Down, noise levels at night in 2026 are predicted to be up to 70 dBA, with increases due to the project of between 2.0 and 2.9 dB. This is an extreme underestimation.
		monitoring (to confirm the predictions of the noise assessment and mitigation measures in the ONVR) will be undertaken, one year, five years and ten years after completion. If the assessment indicates that noise and vibration objectives have not been met, further mitigation measures will be investigated/ implemented in consultation with affected property owners. There is no justification to carry out additional property treatment for 'yellow dot' properties prior to project completion, as current forecasts indicate freight traffic levels will not reach those simulated by the safety factor. Property treatment can be carried out at any time in the future if further exceedances are identified, whereas noise barriers require a civil construction team to be in place and are therefore proposed to be implemented prior to project completion.

	My property is "predicted to exceed IGANRIP noise trigger levels ONLY WITH safety factor". The report notes that my property is in one of the "locations where the trigger levels are predicted to be exceeded and hence where consideration of mitigation is required". If I understand correctly, that means that I will be adversely affected if the new ETTT reaches capacity of train movements in 2026, or sooner, rather than 2028. The report says "properties with yellow-colour dots are not predicted to exceed trigger levels unless the safety factor is included". The safety factor MUST be included for all homes in NCA07 which records the highest predicted noise impacts.	
	Proposed barrier lengths have included the safety factor. Why not individual property treatments? This is inconsistent. Individual property treatments must also be considered including safety factor in NCA07 Down. (ref. pg 65)	
	I do not accept the explanation about my exclusion with regard to the Yellow Dot category. It appears to be an erroneous output of your modelling and I want it reviewed.	
Property treatments	Where investigations reveal above acceptable noise up to individual residents in the area concerned.	Acknowledged
	Supportive	

Issue	Community comment/ suggestion	Responses
	I am opposed to these measures - they are ineffective in addressing the loss of amenity in the area.	A number of noise mitigation methods were assessed as part of the ONVR process including source controls (which reduce the noise at its origin i.e. track lubrication to mitigate rail /wheel contact noise), path controls (where a solid object such as a barrier alters the direction of noise) and 'at property' treatments (such as glass upgrades to windows and doors). It is generally agreed that source controls are the preferred means of mitigation as they provide the largest benefit for the most amount of residents/stakeholders. For this reason, track lubricators (first preference mitigation measure) will be placed along the length of the Project. In areas where additional mitigation is required, the Project will install noise barriers (second preference mitigation measure) or property treatments (third preference mitigation measure) where noise barriers are not cost effective).
Additional mitigation requests	The mound of soil and trees in front of the resident's property blocking the track has been removed and now the noise is constant, unbearable and excessive. We are eye level with the line we could not even see a train before. Stakeholder would like to know why the noise barriers will not be re-instated in front of her property. We have been left out. We need a barrier now. I came to the information session in the hope of getting my message across about the urgent need my family and I have of getting a noise barrier. We are not satisfied with the engineers explanation about this noise level forecasts. We are suffering this noise now. I have been consistent in contacting the ETTT Project Manager to get my message across we need a barrier now.	Investigations into the ground conditions during construction at this location (north of the M2 motorway along the rear of some properties facing Old Beecroft Road and at the southern end of The Crescent) found that the earth behind the cutting was softer than previous surveys indicated. To provide a safe and stable cutting next to the new third track, the height of the mound was required to be reduced. To reinstate the mound to its previous height (after the cutting work has been completed) would require the mound to be widened at its base to provide a safe and stable slope. Widening the base of the mound would impact a drain gully next to the mound, resulting in potential flood impacts. This was not modelled within the original ONVR, however the model has now been updated based on actual excavation levels. This resulted in an additional six properties predicted to exceed trigger levels at this location including this property. These properties are now assessed as eligible for property treatment and are shown on the updated maps with a red dot. The ETTT Project will contact these property owners to explain what the change in identification means for them directly. The noise barrier cost effectiveness assessment has also been reassessed and has confirmed a barrier at this location is still not cost effective when compared with the predicted noise reduction benefits.
	Stakeholder would like noise wall as noise is already bad and believes it will be much worse when 3rd track is in operation especially now trees and dirt have been removed. Stakeholder would like noise wall as noise is already bad and believes it will be much worse when 3rd track is in operation especially now trees and dirt have been removed. Expressed concerns that home is not receiving property treatment but would prefer that a noise wall be installed in the area.	Development of the ONVR started with identification of impacts from various noise sources taking into consideration the project's detailed design, natural topography, shielding and absorption effects from buildings. An acoustic model was then created to determine the predicted impacts on nearby properties in 2026 (ten years after operations commence) without any mitigation measures in place. These results were then compared against the EPA guideline noise trigger levels to determine which properties will require consideration of mitigation. Properties that trigger the EPA guidelines are marked with red dots and properties that trigger the guidelines with the application of the safety factor on predicted train numbers are marked with yellow dots. An independent review of the ONVR was completed by a third party acoustic specialist consultant to ensure that the noise impacts and proposed mitigation measures were determined in accordance with the EPA guidelines and the Conditions of Approval (CoA). A number of noise mitigation methods were assessed as part of the ONVR process including source controls (which reduce the noise at its origin i.e. track lubrication to mitigate rail /wheel contact noise), path controls (where a solid object such as a barrier alters the direction of noise) and 'at property' treatments (such as glass upgrades to windows and doors). It is generally agreed that source controls are the preferred means of mitigation as they provide the largest benefit for the most amount of residents/stakeholders. For this reason,
	High barriers for noise abatement - no other options are realistic, feasible or acceptable. Need to be along the whole corridor - as a solution for the potential danger for residents' health. If ETTT sincerely accepted duty of care to affected residents or respected the health of affected residents, this project would/ should never have been implemented. As an acceptance of the disastrous ill effects of ETTT on residents, with its increasing noise, already above WHO standards, the only way to claw back some integrity is to install high sound barriers in green colour along the full length of the corridor.	
	A noise wall is mandatory along The Crescent at Cheltenham along between Beecroft and Epping. The base of the 5m high barrier needs to be at track level so reusing some of the excavated earth seems like a good idea.	
	It makes no sense not to have a conventional barrier at least 5 m high running from the scout hall to the end of the village green. The train noise has increased of late and especially around 3am. Since the trees have gone the noise is louder. The goods trains make the most noise and as time goes on I am concerned what effect noise will have on property values. I am told that the trees held back little noise and it seems louder now because we can see the trains. That is not the case. Please consider a conventional barrier	

Issue	Community comment/ suggestion	Responses
	Required.	track lubricators (first preference mitigation measure) will be placed along the length of the Project. In areas where additional mitigation is required, the Project will install noise barriers (second preference mitigation measure) or property treatments (third preference mitigation measure where noise barriers are not cost effective). Noise barriers along The Crescent were assessed as not cost effective as detailed in Appendix E. There is no evidence that the ETTT Project would result in a reduction in property values. Future movements in the value of a property are difficult to predict as they are subject to many variables including: specific attributes of the property, capital improvements, demand and supply factors and other changes in the wider property market. As the rail corridor has been continuously in use for over 120 years and the ETTT Project is consistent with the existing land uses and operations within the rail corridor, It is unlikely that the proposal by itself would result in a noticeable change in property value. The ETTT Project will not consider any compensation claims for alleged loss of property value as a result of the project. The ETTT Project will not consider any compensation claims for alleged loss of property value as a result of the project.
Freight noise	(Stakeholder experiences) sleepless nights with good trains going through and the screeching of brakes and loud carriages.	Under the EPA's guidelines, the ETTT project is required to assess and mitigate impacts of the new third track and associated infrastructure only - not existing noise issues. Track lubrication will be installed as part of the strategy to address operational noise associated with the new track. The existing noise issues will be referred to the Freight and Regional Development branch of Transport for NSW, for their review.
	My understanding is that once ETTT is completed, although freight trains may increase in numbers, that freight trains will not need to run during the night - is this correct?	Freight trains will continue to operate at night. Without the project, freight services are anticipated to increase to an average of 32 per day (both directions combined) over a 24-hour period, by 2026. The EIS predicted that the ETTT Project would increase this figure to 44 (both directions combined), ie an additional 12 trains per day. Of these additional 12 trains, 9 are predicted to run during the day (between 7am and 10pm) and 3 are predicted to run at night (between 10pm and 7am).
	It would be useful to review the way that trains are deployed in order to assist in noise reduction including restricting the usage of multiple engine arrangements where one engine is used to pull several engines uphill. This creates excess noise between Epping and Pennant Hills (steep section). This could be single to Hornsby and then coupled. Additionally the braking of trains downhill from Pennant Hills to Epping should be prevented, allowing trains to run through unimpeded. Nosier trains need to be identified and run during the week at daytime.	Unfortunately it is not economical for freight trains to have to stop and add / remove engines. Furthermore the uphill grade from Devlins Creek to Pennant Hills is one of the steepest on the Main North Line and therefore is where multiple engines are most needed. Downhill it is absolutely essential that freight trains are braked in order to prevent over-speeding and derailment. Without brakes a freight train would quickly run out of control on this steep downhill grade. One of the outputs from the ONVR process will be a technical report detailing the potential benefits of targeting high-noise locomotives, for example using time-of-day restrictions. Any regulatory implications would however be beyond of the ability of the ETTT Project to influence.
Noise bounce from barrier	I live on eastern side of railway. Currently rail squeal and general engine is shocking. My concern is that a carrier on the western side may bounce additional noise back to the eastern side.	Section 8.6 has been updated to better describe how noise reflection has been assessed in the modelling process. In summary, the assessment identified that the noise level increase would be negligible since the reflected noise would be shielded by the train itself for receivers on the opposite side of the track. The addition of absorptive treatments to the noise barrier would not provide a noticeable noise benefit to sensitive receivers.

Issue	Community comment/ suggestion	Responses
Construction impacts	Currently the dust being created by the building of ETTT is enormous. Our cars, house and house windows are requiring frequent washing. Are we able to receive any financial compensation for this?	The ETTT Project takes various measures to mitigate dust emission from the construction site in line with the Environment Protection Licence, these include: • use of water carts to wet down areas, • use of high pressure water sprays that are either standalone or attached to excavation equipment such as the surface profiler, • use of water additives to improve wet-ability of the water delivered through the sprays, • use of sweeper/vacuum suction trucks to clean up any debris off the local roads, • the surface miner which has left site temporarily but will be back also has a large vacuum suction machine which collects dust that is generated. We would encourage community members to contact the ETTT team at the time you are experiencing any dust impacts so the matter can be investigated at the time and mitigated.
Property treatment	Any at property treatment must include: 1) vibration mitigation 2) under floor noise insulation 3) ceiling noise insulation 4) secondary glazing and 5) high fences for each property	Direct consultation with the 40 property owners identified in the ONVR will be undertaken once the ONVR is approved by DP&E. Details of treatments, if appropriate, will be confirmed following an inspection and assessment of the individual property. ETTT will investigate the use of property treatment such as provision of fresh air ventilation (to allow windows to be closed), upgrades to window and door seals and window glass upgrades which have typically been used on other rail projects. Specific treatment measures will depend upon factors like the level of predicted noise impact, type of construction of the property and orientation to the rail line. It is possible that the inspection will determine some properties as not appropriate for property treatment as all appropriate mitigation measures have already been implemented. The ONVR has determined that operational vibration trigger levels are not expected to be exceeded as a result of the project.
Noise modelling	Your random, ill conceived, fantasy modelling is laughable.	Development of the ONVR started with identification of impacts from various noise sources taking into consideration the project's detailed design, natural topography, shielding and absorption effects from buildings. An acoustic model was then created to determine the predicted impacts on nearby properties in 2026 (ten years after operations commence) without any mitigation measures in place. These results were then compared against the EPA guideline noise trigger levels to determine which properties will require consideration of mitigation. Properties that trigger the EPA guidelines are marked with red dots and properties that trigger the guidelines with the application of the safety factor on predicted train numbers are marked with yellow dots. An independent review of the ONVR was completed by a third party acoustic specialist consultant to ensure that the noise impacts and proposed mitigation measures were determined in accordance with the EPA guidelines and the Conditions of Approval (CoA).

Issue	Community comment/ suggestion	Responses
Project feedback	Do not take this feedback as a mere 'tick the box' for your flawed 'community consultation' ruse. Why a government department in league with Leightons, would take a serious noise problem from freight trains, and plan to worsen it, to the current extent, with expectations of even worse impact, is worthy of 'negligence of duty of care' and recklessness.	The ONVR was released for public display and was also sent to directly affected property owners. All feedback received during the public exhibition of the ONVR has been considered and reviewed by the ETTT Project team. Where possible suggestions have been adopted and this document updated. For more details of the consideration and adoption of feedback received please refer to Section 10.4 of the ONVR. It is very important to note that as the proposed mitigation measures were developed based on mandated guidelines and cost effectiveness considerations, there was limited scope to alter the proposed measures. Feedback that conflicts with guidelines / standards and items that go outside the outlined assessment process and associated science could not be implemented.
6 – Other feedback		
Issue	**Community comment/ suggestion**	**Responses**
Health	Human cost such as health hazards caused by high noise levels, damages can never be repaired.	Changes to government legislation are outside the scope of the ETTT Project. The CoA required both the EPA's current noise guideline, the Rail Infrastructure Noise Guidelines (RING) and its predecessor the Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects (IGANRIP) to be modelled, and for the most stringent to be used. More information about the guidelines is available at www.epa.nsw.gov.au. In addition to using the more stringent of the EPA guidelines, the CoA require the ONVR to include an assessment of the impact of a greater number of freight trains than current estimates indicate will operate (safety factor).
	Surely with the current adverse levels which exceed World Health Standards the Government should be legislating to compel them to change.	
	The noise level at times is excruciating resulting in lack of sleep resulting in anxiety. This problem will obviously be far worse when the number of trains reach its peak.	
	Even with all of the double glazing and insulation, the noise of the trains at night, with no other background noise, still exceeds WHO recommendations for night time noise/sleep interruption levels.	
	We are not confident that any of the discussions with freight companies will resolve any of the noise problems promised unless legislation is passed to restrict locomotives from exceeding noise and pollution levels which are far in excess of World Health Organisation recommendations which, for a country that purports to be leading the world in most areas, is falling further behind third world requirements. It is not in the freight companies' interest to do so unless financial penalties are enforced. There must be some ruling that restricts the noisier freight trains from moving through suburban areas, particularly at night. We would be interested in seeing an assessment that monitors the impact on more of the community and mitigation that truly resolves the issues of that impact on residents' sleep, health and general enjoyment of their hard earned family homes.	
	Air Quality - While recognizing that Air Quality is not part of this Review we raise this subject again on behalf of residents living close to the third track, regular Pennant Hills station users and the users of facilities close to Yarrara Road including the Child Care Centre at the corner of Yarrara Road and Fulbourne Avenue. During the EIS process we raised this issue claiming that the EIS's air quality conclusion that there would be no degradation of the air quality was considered incredible. We received the typical bureaucratic response advising us of the air dispersal modelling and the predictions that air quality would be below the relevant criteria. If it is good enough to monitor noise and vibration impacts at years 1, 5 and 10 then why not Air Quality? Diesel emissions are a known to be carcinogenic and we submit that the increasing numbers of freight trains and the specific Pennant Hills station and the Yarrara Road holding bay circumstances represent an increased the health risk that should not be ignored.	The EIS confirmed that operation of the ETTT Project is not anticipated to have an adverse impact on the existing air environment.
Freight noise: · Wheel squeal	We do very occasionally experience newer freight trains passing from time to time and the noise reduction is easy to detect.	Acknowledged

Issue	Community comment/ suggestion	Responses
· Maintenance · Existing noise	We also support the requirement for rail lubricators on the third track and all of the other measures proposed to mitigate noise associated with the operation of the third track.	
	The assessment of rail squeal appears appropriate	
	ONVR is a concern to us as our property almost adjoins railway property at its rear, and is unprotected against rail noise. We accept the rationality of increasing rail freight in and out of Sydney. We therefore accept the inevitability of increased freight traffic on the Northern line, directly affecting us. We also acknowledge that, as buyers of a property adjacent to a rail corridor, we have always experienced a degree of rail noise, and should reasonably expect its continuation in the future.	Legislation is beyond the influence of the ETTT Project. The ETTT Project will however install new lubricators on the tracks, noise barriers and individual property treatments to manage the noise impacts of the trains running along the railway line. The ETTT Project is required to develop and implement a Source Noise Monitoring Plan to help identify noise freight locomotives and rolling stock operating on all tracks. This may help to address existing noise issues. Transport for NSW also has a program of works underway to reduce existing rail noise. The program of works includes: • Working with freight operators to improve the design and maintenance of their rolling stock to reduce wheel squeal and locomotive noise • Installing modern electronic lubricators throughout the Beecroft and Cheltenham area • Using dedicated maintenance teams to ensure the lubricators are always fully operational • Working with Sydney Trains to improve track maintenance practices. Transport for NSW has also installed a temporary noise monitoring station at Beecroft that captures the noise from passing trains. This noise monitoring station will be made permanent as part of the ETTT Project, and data will be made publicly available once operation of the ETTT Project commences. The ONVR is not intended or required to address existing noise generated by freight trains.
	I am dismayed by the comment that the NSW Government is working with freight operators to reduce the level of noise/diesel emissions caused by their locomotives and freight rolling stock.	
	The shrieking and screeching of the wagon truck wheels in the main objectionable and intolerable noise factor.	
	Observation of passing freight trucks reveals that only about one in seven emanate an intolerable shrieking noise.	
	Suggestion - Investigate the reason for intolerable screeching of some train carriages and silence of others, truck loading does not appear to be the cause. Wheel alignment or tracking alignments are at fault damaged by the heavy loads.	There is published research that curve squeal is worsened by replacing wooden sleepers with concrete sleepers. It is hypothesised that one reason for this may be a change in the lateral stiffness / receptance of the track. If this is the case, there is a potential for composite sleepers or alternative sleeper designs to have a benefit in reducing curve squeal. The research required to investigate this and understand the root causes would take several years. The outputs would be available too late for implementation on the ETTT project. Investigations of composite sleepers are ongoing as part of longer term noise mitigation projects (see Section 8.11.2) Under the EPA's guidelines, the ETTT project is required to assess and mitigate impacts of the new third track and associated infrastructure only - not existing noise issues however Transport for NSW recognises that noise and emissions from freight trains is an issue of significant concern for the community. In response to community concerns over the impact that freight rail noise has on the community, Transport for NSW is working with the Department of Planning and Environment, the EPA, and NSW Health to deliver a comprehensive approach to managing its impacts. A Strategic Noise Action Plan was developed in 2012 to address and manage freight rail noise and is a key task in the NSW Freight and Ports Strategy. A primary objective of the Plan is to reduce noise at source, in particular curve noise. Some of the measures Transport for NSW and its partners are implementing to reduce curve noise include: • Installing electronic gauge face lubricators on curves that are noise hot spots. Lubrication systems have been installed at seven sites between Epping and Newcastle.
	Faulty trucks must be taken out of service until fixed.	
	The opportunity to install composite sleepers on this new construction has been mentioned many times, but we are still told there needs to be more research. In fact there are research figures dating back to 2005-6 in the UK. In Japan, there are 1.5 million in current use and they are laying 90,000/year. In the US they are being used for both Class 1 (high tonnage) lines and passenger lines, and they claim, after extensive field testing, that they will maintain performance for up to 50 years. In Germany there are 35,000km of railway track using composite sleepers. The University of Southern Queensland, Toowoomba has been doing detailed research on fibre composite materials since the late 90s, including railway sleepers. ARTC, in 2007 installed fibre composite transoms and sleepers on a steel railway bridge. Monitoring was done by Austrak PTY Ltd and verified that expectations were met. The SEPP (Infrastructure) 2007(Clause 87, p75) specifies consideration for child care centres for both noise and vibration impacts. This new rail track has been designated not to be a new structure, as passenger trains will also use it, with the result that, the use of composite sleepers and extra rubber cushioning between rail and sleeper has been dismissed out of hand. The brochure refers to Transport for NSW's program to reduce existing rail noise (a) what are the plans to keep the 'ETTT' public informed on the progress of this program? (b) the possible use of Green Sleepers, raised by the Trust many months ago, seems to have been dropped. May we please have a report explaining why this is so including what studies have been undertaken, or international references examined?	

Issue	Community comment/ suggestion	Responses
	Our problems with the lack of noise mitigation around the valley now are as follows: • We will be woken more often during the night with the increase in frequency of the trains • We will not be able to leave windows and doors open for fresh air without being impacted by the noise from multiple freight trains every hour, making it difficult to have a peaceful family meal, discussion or watch television etc • Our energy bills will rise enormously because we will have to use air conditioning to cool the house instead of cool breezes • The echoing of the noise around the valley means that we will not be able to enjoy our outdoor entertaining area with the increase in the number of trains per hour at the level of noise proposed.	• Installing noise monitoring equipment at sites with upgraded lubrication systems. • Providing operators with information on the performance of their rolling stock on curves, including data on angle of attack and noise. Assisting operators to analyse this data to identify wagon classes with poor performance and to identify measures to improve performance. • Continuing research on the effect of all factors on curve noise, including wagon design and maintenance; lubrication systems; track system design; track and wheel profiles and rail grinding. • Disseminating the results of research and trials through presentations, technical papers and consultation with industry. Transport for NSW has also installed a temporary noise monitoring station at Beecroft that captures the noise from passing trains. This noise monitoring station will be made permanent as part of the ETTT Project and data will be made publicly available once operation of the ETTT Project commences. Further concerns about current guidelines or locomotive noise enforecment can be addressed to the NSW EPA by calling 131 555 or emailing info@environment.nsw.gov.au Following consideration of an Environmental Impact Statement and the Submissions Report, the NSW Minister for Planning and Infrastructure approved the project in July 2013 under Part 5.1 of the Environmental Planning and Assessment Act 1979.
	The squealing of the wheels and the noise from the diesel engine are certainly well above acceptable levels.	
	I am extremely concerned that the above mentioned report only attempts to manage the impact of noise through noise barriers, property treatment and track lubricators but does not mention any measures to minimise the noise from the poorly maintained freight trains which are the major source. The owners of this rolling stock seem to get away with an obvious poor maintenance program.	
	The properly maintained commuter carriages seem to glide relatively quietly through the area this review is focusing on; however the obviously poorly maintained freight trains (which I believe are privately owned) can be heard screeching through our suburb from kilometres away. This review fails to address this issue which is the primary source of disruptive noise, what measures are being taken to specifically improve and police the proper maintenance of the freight companies.	
	Train operation issues - some trains just need to be maintained better so they run more quietly	
	What is being done for wheel squeal?	
	I was very disappointed to note also that, in contrast to these well-documented plans, there was very little information about plans to deal with the generation of noise from rolling-stock.	
	I have noticed for some time now that the freight trains are getting louder. I am not sure if it is due to plants and trees being removed but something needs be done and residents who are dealing with the same noise levels and should have someone out to see for themselves that the noise is becoming a joke. They are getting that loud that i have trouble sleeping and can be heard sometime before they even past my place. Most of the time i have my front door and windows shut as i cannot even hear the TV not to mention how the place shakes. I believe something should be done to compensate people like myself suffering from this terrible noise and squealing of wheels which is a constant thing. Whatever it is, something needs to be done.	
	I am given to understand that the reason such cooperation is not mandatory is that the EPA does not have jurisdiction over noise impact of rolling stock. Again, I seek your advice on whom to contact and discuss how this gap in regulation could be addressed. If regulated, the matter of both wheel squeal as well as locomotive noise (roaring) can be addressed more effectively.	

Issue	Community comment/ suggestion	Responses
	After many years of participating in the community action group the message we continue to get from the government is that we just don't count and no amount of evidence we provide to refute any of the studies used to justify and approve the ETTT project is ever considered (or even addressed). The minister continues to ignore our requests to address our concerns and it is a forgone conclusion that no matter what we say the project is already approved to proceed and all the EIS and other studies are being tailored to fit the desired outcome of a 3rd track being built, increasing the freight train traffic significantly yet without addressing any of the issues that currently exist regarding their operation (e.g. noise and pollution). freight noise)	
	At approximately 1:50am today a large freight train heading north passed my house and the wheel squeal was extremely loud (when I went outside to look at the size of the train the noise was so bad and unbearable I had to cover my ears to prevent damage to my hearing) and lasted for several minutes both on approach and as it continued north. In stark contrast another large freight train also heading north passed at approximately 1:57am, however it was virtually silent - noting that as it approached the bend in the track opposite my house there was no wheel squeal until it rounded the bend, but even then the squeal was minimal and well within acceptable limits. I observed both trains and they appeared very similar in size. It would be greatly appreciated if someone could further investigate these to identify the freight operators and the nature of the trains themselves (ie their age and condition) as I feel this will greatly assist in determining the actual cause of the noise (as discussed I truly believe it is directly related to the up keep of the rolling stock) and action in order to reduce the noise generated by the wheel squeal. I would appreciate feedback on the findings and action plans etc.	
	As residents who live in Copeland Road East Beecroft, we face the direction of the track which is around 500m from our property with no structures between our house and the railway. Over the last 12 months we have spent over $40,000 replacing every window and door in our house with double glazed windows, have insulated the ceilings and walls with noise reducing insulation and closed off the chimney and removed the fireplace just so that we are able to sleep for most of the night with the noise from the (four engine) diesel trains labouring up the line and their squealing wheels that last for over 3 minutes at a time waking us less often. We are still woken of a night by some of these trains and they are just going to increase – in short, we have done everything in our power to reduce the effect of the noise and, like most residents in this area, have taken on responsibility for this ourselves and not waited for handouts.	
	The recent six-page ONVR colour brochure devotes only a brief paragraph to rolling-stock noise where it limply refers to "working with freight operators to improve the design and maintenance of their rolling stock to reduce wheel squeal and locomotive noise". During my visit to the ONVR display this morning, I was able to question two of the officials in charge of the display about this timid response to the issue of rolling-stock noise. The answers I received were alarming. I was informed that the freight operators were required, under the terms of their licence to use the rail network, to comply with relevant noise-level standards prescribed by the NSW Environment Protection Authority. But I was then informed that neither the EPA nor the rail authority (nor anyone else) will be charged with the responsibility of monitoring and enforcing those standards. Surely this can't be correct. Would you please let me know what noise-level standards will apply to the freight operators' rolling stock and how compliance with those standards will be monitored and enforced.	

Issue	Community comment/ suggestion	Responses
	We are relying on 'promises' of 'discussion' with industry to improve locomotive noise but these discussions are not transparent or openly reported to the public in a way that gives the community any confidence in the propriety of these industry-government agreements. Many of these engines will be on the road for decades to come.	
	Also is there any progress in enforcing compliance to noise and air pollution standards that everyone else is forced to comply with (i.e. cars, trucks etc)? Just seems totally futile to say that the big bonus of the ETTT is taking trucks off the road when every single freight train creates up to 200 times more air borne pollution that a single truck. Again there are some very new looking trains that are very quiet and clean - we just want to see the same compliance standards applied as exist for vehicles registered for the road. It's not really much to ask, yet speaks volumes by its absence.	
Construction noise	I work AND study from home. Since work commenced, we have been subjected to constant noise and track work in excess of the 90-100Db range and we have been offered respite from the noise once, for one night only. We are unable to have our doors or windows open during the warm weather (actually we are not able to have the doors or windows open at all!) because of the noise and have to keep the house closed up which leads to a greater social and health impact upon us. We are unable to invite people around, as the noise and constant drilling coupled with heavy trucks and machinery constantly travelling back and forward along our street, makes it impossible for social interaction. We suffer from sleep deprivation which leads to moodiness and irritability especially when heavy machinery is being dropped off at 4am in the morning, as our property is between the two access gates on Wongala Crescent (NCA07). Watching TV is almost impossible as we have to have the volume up so loud, it is not a relaxing or enjoyable experience nor is studying for my tertiary degree with the constant hammering day in and day out. I have to study in a room towards the back of the house with all the doors shut AND I have to wear headphones to block out the noise.	Respite and alternative accommodation for impacts from construction works is offered in line with the requirements of the Transport for NSW Construction Noise Strategy which is available on the Transport forn NSW website.
Lubricators	Are there any dates determined for when the track lubrication is to be implemented i.e. before completion of the project? Wheel squeal is our main concern and we have complained on multiple over the past few years to the ETTT complaint lines. Each time we get a disappointing follow up call that the freight operator was approached regarding the complaint, to which they responded each time that the exact carriage causing the noise had to be identified and no action is ever taken. We have repeatedly noted it is virtually every carriage of the noisy freight trains however no action is ever taken. As discussed it must be noted that similar sized trains make virtually no noise so it is obvious there is poorly maintained and or older rolling stock that is responsible. Can we expect the freight operators to continue to NOT be held accountable for their rolling stock creating noise that is 3 to 4 times the World Health Organisation's recommended maximum noise level (above which it is detrimental to human health and in particular childhood development)?	Gauge face lubrication has been used for many years to minimise wear on rails and wheels. Recent advances in lubrication technology have made positive impacts in reducing rail noise, particularly wheel squeal through rail curves. One of the project's Conditions of Approval requires the installation of track lubricators as part of the strategy to address operational noise associated with the new track. Modern lubrication technology uses remote performance monitoring to ensure the units are always working correctly, and use specifically designed rail greases. The grease is applied to the side of the rail and is picked up by passing wheels and distributed along the curve. Modern electronic lubricators have already been installed on the existing tracks and will be installed on the new track before it opens. Once the new track becomes operational, further noise testing will be conducted to confirm the effectiveness of lubrication in reducing wheel squeal.
	In your brochure it states that gauge face lubrication has been used for many years. Why was this "technology" not introduced all those years ago on this section of the track? I would like to know exactly how the lubrication system works and how it is maintained. You also say that modern electronic lubricators have been installed on the existing tracks. If this is the case then I would suggest that they are not working.	The Proof of Concept (PoC) project utilised state of the art wayside lubrication for railway systems. This includes modern electronic lubricators, as shown in , and lubricants developed specifically for noise suppression on railway curves. The utility of a combination of electronic lubricators and specific lubrication products has been proven in the USA and elsewhere. The electronic lubricators were also equipped with an internet

Issue	Community comment/ suggestion	Responses
	Noise Mitigation. We have yet to have confirmed the status and effectiveness of the Strategic Noise Action Plan from Transport for NSW. We understand that measures could be introduced to reduce noise by lubricating the tracks and requiring greater maintenance of locomotives and wagons. BCCT has been informed that the wheel squeal was due to the long wagons on the tight curves and the engine noise due to old and poorly maintained locomotives. BCCT has also been informed that lubrication trials have not been successful.	based remote monitoring system to ensure peak performance. The placement, set-up and performance of the units have been reviewed by rail lubrication experts to optimise their performance. A Strategic Noise Action Plan was developed in 2012 to address and manage freight rail noise and is a key task in the NSW Freight and Ports Strategy. A primary objective of the Plan is to reduce noise at source, in particular curve noise. Some of the measures Transport for NSW and its partners are implementing to reduce curve noise include: • Installing electronic gauge face lubricators on curves that are noise hot spots. Lubrication systems have been installed at seven sites between Epping and Newcastle. • Installing noise monitoring equipment at sites with upgraded lubrication systems. • Providing operators with information on the performance of their rolling stock on curves, including data on angle of attack and noise. Assisting operators to analyse this data to identify wagon classes with poor performance and to identify measures to improve performance. • Continuing research on the effect of all factors on curve noise, including wagon design and maintenance; lubrication systems; track system design; track and wheel profiles and rail grinding. • Disseminating the results of research and trials through presentations, technical papers and consultation with industry. Transport for NSW has also installed a temporary noise monitoring station at Beecroft that captures the noise from passing trains. This noise monitoring station will be made permanent as part of the ETTT Project and data will be made publicly available once operation of the ETTT Project commences.
Noise monitoring	I note that the closest noise monitoring station to my property was at validation points 7 and 13. Neither are on the bend which is the sharpest and steepest on the corridor (opposite my house at *[address withheld for privacy reasons]).*	Noise monitoring stations were set up at regular intervals to provide an 'on the ground' validation of the computer generated acoustic model. The natural topography of the land was an important factor considered by the model along with detailed design (ie changes to topography as a result of the project), shielding and absorption effects from buildings. It is very important to understand that ALL noise levels for properties in the ONVR are predictions, not measurements. Measurements were only undertaken to validate the model, not to make predictions at individual properties. This ensurs we predict noise levels in 2016 and 2026 and allows us to fully take into account the impact of increased traffic levels. Carrying out more measurements would simply provide additional validation of the model predictions. These model predictions show that many properties already exceed recommended noise levels, however it is only those properties that are also predicted to increase these levels by more than 2dBa, that exceed EPA Guideline trigger levels and therefore trigger consideration of mitigation. Under the EPA's guidelines, the ETTT project is required to assess and mitigate impacts of the new third track and associated infrastructure only - not existing noise issues. However, the CoA requires the ETTT Project to develop and implement a Source Noise Monitoring Plan to help identify noisy freight locomotives and
	We were unable to receive an indication whether noise had been monitored in our end of the street (*[address withheld for privacy reasons* Copeland Road, Beecroft). Although properties nearest to the railway line have been monitored, we do not think that those who are impacted by noise reverberating around and across the valley have been considered. We feel that the proposed treatment at the site of the noise is not enough to stop it from echoing across the valley and will further interrupt our sleep.	
	My property is approximately on the same level as the tracks and right on the sharp bend near Copeland Rd. Therefore any noise measurements taken at these locations don't accurately represent the extreme noise caused by the wheel squeal on the bend where I live. As we have already discussed it is very apparent that the locations selected are very strategic and totally benefit the project in that they are NOT representative. I could accept if locations of maximum and minimum exposure were selected, however sadly this is not the case.	
	Effect of Changes on Noise Levels. As the noise assessments used by ETTTA to identify affected properties were conducted before work to remove rock, soil and vegetation, they are clearly inadequate. Real measurements need to be conducted once the corridor before the third track is constructed. All residents affected must be offered the most effective noise and vibration remediation available.	

Issue	Community comment/ suggestion	Responses
	We should add that even the present noise level at our property is higher than that recorded in your study. For 2 days your noise logger was located at the porch of our neighbour's house, [*number withheld for privacy reasons]* Yarrara Road. This is the only house in our alignment that has a 1.65m solid brick wall blocking the direct line between your noise logger and the railway line.	rolling stock operating on all tracks.
	It is absolutely imperative that continuous noise monitoring takes place and offending trains be repaired or discarded. Companies who re-offend should be fined or/and trains taken off tracks until they comply. I do appreciate that results from the noise monitoring station will be available on a public website although I will believe it when I see it. Noise and compliance monitoring is an absolute necessity and should be acted on more often than the 1,5 and 10 years after completion as you have suggested. These noise results should not be averaged over all trains that travel through the area.	On completion of the project, noise and vibration compliance monitoring (to confirm the predictions of the noise assessment and mitigation measures in the ONVR) will be undertaken, one year, five years and ten years after completion. If the assessment indicates that noise and vibration objectives have not been met, further mitigation measures will be investigated/ implemented in consultation with affected property owners. In addition to this the ETTT Project is required to develop and implement a Source Noise Monitoring Plan to help identify noise freight locomotives and rolling stock operating on all tracks. This may help to address existing noise issues. Transport for NSW also has a program of works underway to reduce existing rail noise. The program of works includes: • Working with freight operators to improve the design and maintenance of their rolling stock to reduce wheel squeal and locomotive noise • Installing modern electronic lubricators throughout the Beecroft and Cheltenham area • Using dedicated maintenance teams to ensure the lubricators are always fully operational • Working with Sydney Trains to improve track maintenance practices. Transport for NSW has also installed a temporary noise monitoring station at Beecroft that captures the noise from passing trains. This noise monitoring station will be made permanent as part of the ETTT Project and data will be made publicly available once operation of the ETTT Project commences. Predicted noise levels have been calculated using an acoustic model taking into account detailed design, natural topography, shielding and absorption effects from buildings. Noise levels were then verified with 'on the ground' measurements at various properties along the rail to ensure accuracy of the model. Nearby sensitive receivers were included in the modelling however noise levels were only found to trigger mitigation requirements for some properties adjacent to the new third track. It is not necessary to monitor noise at each individual property to ensure the model's accuracy and it is not possible to measure noise levels before the track is built or from traffic levels that have not yet occurred (2026 figures are required). Therefore a model is the only way to predict noise levels. The model predicts very high noise levels at some properties, but the ETTT Project is required to assess and mitigate impacts of the new third track and associated infrastructure only - not existing noise issues.
	Would like to be consulted with on this report and assessment - noise monitoring should take place my property.	
	Would you please take this note as a strong request to examine this section of the line more carefully for noise	
	As a result it is disappointing for me personally (and my family) as my experience has not been at all considered or quantified with measurement, they have conveniently taken measurements on straight sections and where the tracks are well below in a cutting. I assure you the noise is significantly higher at my location. What makes matters worse is that there is a noise monitoring station (as described to me by other Transport staff in response to our complaints re wheel squeal) directly opposite my house, however it has never operated (conveniently) for some unknown reason - are you able to provide further information regarding this facility?	
	My first concern is regarding the ambient noise surveys taken in September 2011 - the selection of the locations are questionable, given that the ones either side of my property are quite a long way from the sharp curve near Copeland Rd, and also neither is directly level with the tracks - the tracks are way down in a cutting way below *[address withheld for privacy reasons]* Wongala and to a lesser degree *[address withheld for privacy reasons]* The Crescent.	
	The May 2014 ONVR Information Brochure refers to noise and vibration monitoring : (a) where will the monitoring stations be located? (b) the brochure refers monitoring in years 1, 5 and 10. Why wouldn't the monitoring commence in year 0 allowing for the impact of the third track to be measured in years 1, 5 and 10?	Two types of monitoring have / will be carried out: 1) Monitoring to validate the operational noise model. This model has already been carried out. Locations at which monitoring was carried out can be reviewed in the ONVR plan found in the section that starts on page 26. 2) Monitoring will also take place at 1, 5 and 10 years to ensure accuracy of the model. This is the requirement stipulated by the Department of Planning and Environment. Locations for this monitoring will be proposed closer to the time the monitoring is due to take place.
Property value	If I can prove loss of capital property value due to the wall, will compensation be payable? Est 5-10% loss of value on $1.5 m	There is no evidence that the ETTT Project would result in a reduction in property values. Future movements in the value of a property are difficult to predict as they are subject

Issue	Community comment/ suggestion	Responses
	Without modifications, my house value will certainly decrease due to increased noise above the level which even your engineers estimate to be an extremely high 104 decibels, and likely more, if the 2 or 2.5m noise barrier is installed.	to many variables including: specific attributes of the property, capital improvements, demand and supply factors and other changes in the wider property market. As the rail corridor has been continuously in use for over 120 years and the ETTT Project is consistent with the existing land uses and operations within the rail corridor, It is unlikely that the proposal by itself would result in a noticeable change in property value.The ETTT Project will not consider any compensation claims for alleged loss of property value as a result of the project.
Vibration	Vibrations will increase and affect houses - should have noise reduction measures put in place.	The ONVR has determined that operational vibration trigger levels are not expected to be exceeded as a result of the project. Therefore no vibration mitigation measures are proposed. The ONVR recommends a combination of source controls at targeted areas within the rail corridor, noise barriers and at-property treatment for some houses close to the rail corridor. The measures proposed to mitigate operational noise associated with the project area: - Installation of a noise barriers - At-property treatment of 40 properties along the corridor - Installation of rail lubricators on the new track
	This has been dismissed totally as not being expected to exceed the present levels, despite many more freight trains going through closer to receivers. These include Arden Preschool and the Childcare Centre next door, in Wongala Cr., Beecoft. (It is noted that the sound barrier stops just short of these.) Another Childcare Centre on the corner of Yarrara Rd and Fulbourne Ave Pennant Hills is impacted by both noise and vibration and will get relief from neither. As well they will have freight trains idling in the third track waiting to enter the main line. These preschoolers will be put down for their afternoon nap when there are a greater percentage of freight trains going through in the middle of the day. Vibration is known to have an effect on hearing, especially in the young.	
	Noise from freight trains will hopefully come under legislation in the future, but vibration will be harder to manage and maybe never will be. For this reason this problem should not be brushed aside. It needs to be addressed now.	
	HSC refers to the State Environmental Planning Policy (Infrastructure) 2007 which contains provisions relating to the "Impact of rail noise or vibration on non-rail development" including "a building for residential use." Therefore it requires contact with Railcorp to confirm the construction standards required in order to withstand vibration that are likely to be imposed for a dwelling-house adjacent to the rail corridor.	Yes, this requirement applies to all new construction from 2007 onwards and is intended to ensure that new residential properties take into account noise and vibration from rail operations nearby.
	The homes between the crest and the creek in Wongala Cr Pennant Hills are on a slope of between 1: 5 and 1:6 on ground which was stated in the EIS Soil Characteristics Report (p267) to "present a mass movement hazard" and "are highly erosional". According to the Construction information, on the last bend up the Beecroft Bank, the rock changes from the more stable sandstone to Wianamatta Shale. This made the construction vibration less of a problem, but not the operational vibration.	The ONVR has identified that no vibration mitigation is required in order to comply with relevant Standards and Guidelines.
Noise barriers	I'm particularly interested in the proposed noise barriers in the ONVR. It appears that there will be no noise barrier at Epping, near Kandy Avenue. This is of very high concern to me because: • The rail noise before the ETTT project commenced was already quite loud and I appreciate the ETTT and freight operators going "above and beyond" to improve it. • However, when the ETTT commenced, the trees providing a natural noise barrier along Beecroft Rd were removed. • The noise level since then has been unacceptable, but I thought it was only during construction and operational noise would be reduced later. • Now I realise there will be no replacement of the trees or any other noise barrier.	Development of the ONVR started with identification of impacts from various noise sources taking into consideration the project's detailed design, natural topography, shielding and absorption effects from buildings. An acoustic model was then created to determine the predicted impacts on nearby properties in 2026 (ten years after operations commence) without any mitigation measures in place. These results were then compared against the EPA guideline noise trigger levels to determine which properties will require consideration of mitigation. Properties that trigger the EPA guidelines are marked with red dots and properties that trigger the guidelines with the application of the safety factor on predicted train numbers are marked with yellow dots. An independent review of the ONVR was completed by a third party acoustic specialist
	I am certain that a noise barrier would give very noticeable benefits with high acoustic effectiveness. I don't know how you calculate cost-effectiveness! Please, please, please put a noise barrier on Beecroft Rd near Kandy Avenue and across the M2.	

Issue	Community comment/ suggestion	Responses
	Proposed Noise Barriers. A 1m high wall 350m long will be built between Copeland and Chapman on the eastern side to reduce wheel squeal. On the western side along Wongala to Pennant Hills, a 5m high wall will be built. A shorter 5m wall will be built on the eastern side south of Pennant Hills Rd. There are no noise barriers proposed either side of the track south of Copeland Rd, yet these areas are known to be greatly affected. No details have been given as to the type and construction of these noise walls. Unless state of the art absorption materials are used, the noise walls could create a reverberation chamber, extending the impact on the community.	consultant to ensure that the noise impacts and proposed mitigation measures were determined in accordance with the EPA guidelines and the Conditions of Approval (CoA). A number of noise mitigation methods were assessed as part of the ONVR process including source controls (which reduce the noise at its origin i.e. track lubrication to mitigate rail /wheel contact noise), path controls (where a solid object such as a barrier alters the direction of noise) and 'at property' treatments (such as glass upgrades to windows and doors). It is generally agreed that source controls are the preferred means of mitigation as they provide the largest benefit for the most amount of residents/stakeholders. For this reason, track lubricators (first preference mitigation measure) will be placed along the length of the Project. In areas where additional mitigation is required, the Project will install noise barriers (second preference mitigation measure) or property treatments (third preference mitigation measure where noise barriers are not cost effective). Noise barriers near Kandy Avenue, Epping were not deemed cost effective. To reduce noise impacts, a barrier should be solid to interrupt the path of the noise. Along the ETTT rail corridor, the trees and vegetation do not act as a solid barrier and have little, to no, measurable impact on noise impacts. Under the EPA's guidelines, the ETTT project is required to assess and mitigate impacts of the new third track and associated infrastructure only - not existing noise issues.
	Inadequacy of Proposed Noise Barriers. At least 80 properties along the corridor are currently noise affected and are 5dB above the average noise at night but did not meet the 2dB increase. 45 of these will benefit from the noise barriers, if properly constructed but the rest will receive no mitigation measures. 35 will not and these are currently well above the acceptable noise levels BCCT considers that effective noise absorbing barriers should be built the entire length of the track from Beecroft to the M2 bridge.	
	Your project map shows areas in various colours which indicate where noise mitigation barriers are to be situated. I would strongly advocate that there needs to be noise barriers installed along the whole length of the track, not just at the points that you have indicated on your project map. The barriers don't necessarily need to all at the same height, but an additional survey needs to be taken, not only from residences adjacent to the track, but also residences which are within at least two hundred metres away.	Noise barriers are only considered at locations where multiple closely grouped properties are predicted to exceed EPA guideline trigger levels as a result of the project. Once these properties were identified, various mitigation measures including noise barriers were assessed to calculate what benefits they might provide. If noticeable benefits are predicted, the noise barriers are assessed for acoustic and cost effectiveness.
	This might be a tricky situation, based on your acoustic modelling and noise assessment criteria. Our unit is one of multiple (48 just in our complex, plus a neighbouring apartment block and some houses) closely grouped properties, but I presume it is not one of the 33 identified, as we have not been consulted directly. Some of the units do not actually face the railway, but the noise is still extremely loud because: • The very large, flat brick walls reflect the noise directly into the opposite units • The building is on a hill and high (4-5 floors) and there are no other buildings or trees in the air space between the property and the railway (which is also high) • Thus, there is nothing blocking the transmission path between railway noise source and property.	The predicted noise levels were assessed at this property. These predictions are outlined in Appendix D, which is contained in Part 2 of the ONVR document. A link to the ONVR is included for your reference. Predictions were undertaken for the ground level, first level, second level and third level, respectively. The calculations indicated that the predicted levels of noise at this location would not exceed the relevant trigger levels, hence noise mitigation was not considered.

Issue	Community comment/ suggestion	Responses
	The communication also pays particular attention to the fact that this project only addresses issues that do not already exist. The above two issues are directly as a result of the project and need to be accounted for by the project. Proposal Instead of the proposed 5m barrier on Wongala Crescent, I propose the construction of low height barriers on both Wongala Crescent and Sutherland Road sides of the track. I feel this would have low impact to vegetation and also address any additional wheel squeal resulting from the project. Installation on just one side is not acceptable as it will reflect additional noise to the side without barriers.	It is true that under the EPA's guidelines, the ETTT project is required to assess and mitigate impacts of the new third track and associated infrastructure only - not existing noise issues. Noise barriers are only considered at locations where multiple closely grouped properties are predicted to exceed EPA guideline trigger levels as a result of the project. Once these properties were identified, various mitigation measures including low and conventional height noise barriers were assessed to calculate what benefits they might provide. If noticeable benefits are predicted, the noise barriers are assessed for acoustic and cost effectiveness. Section 8.6 has been updated to better describe how noise reflection has been assessed in the modelling process. In summary, the assessment identified that the noise level increase would be negligible since the reflected noise would be shielded by the train itself for receivers on the opposite side of the track. The addition of absorptive treatments to the noise barrier would not provide a noticeable noise benefit to sensitive receivers. Low height barriers were considered along Wongala Crescent and on other parts of Sutherland Road. Low height barriers are only predicted to be effective where neighbouring properties are generally lower than the track, and where wheel squeal is the dominant source of noise (ie on sharp curves only). Added to the fact that noise barriers were only considered where multiple closely grouped properties are predicted to exceed guideline trigger levels, no further locations were identified for low-height barriers. Along Wongala Crescent, for example, properties are mostly at or above track level. Along Sutherland Road no other instances of multiple closely grouped triggered properties were identified.
	Rather than installing conventional 5m high noise barriers along the rail corridor between Beecroft and Pennant Hills railway stations, other alternative noise mitigation measures would be more suitable. This includes low-height noise barriers which are closer to the track and do not require clearing of further vegetation. Although these may be less effective for noise mitigation, there needs to be a balance between the negative impacts of noise and the negative impacts of noise-mitigation measures. Much deeper community engagement and consultation is required to really understand community concerns regarding noise and conventional noise barriers. The residents of many properties not deemed to be above noise trigger levels will be just as exposed to the visual, ecological and broader impacts of 5m high noise walls and the impact of these measures on their lives and values should not simply be brushed aside.	The ETTT Project has to comply with the Conditions of Approval which require installation of identified feasible and reasonable mitigation measures before the track is operational in mid 2016. If overwhelming support from the directly adjacent community members indicated that they would prefer to leave the existing vegetation intact instead of building a noise barrier, the ETTT would have considered approaching the Department of Planning and Environment (DP&E) to seek agreement not to install this barrier. At this stage the Project has received mostly support from local residents for the installation of a noise wall at Wongala Crescent. The ONVR was released for public display and feedback from directly affected property owners on the noise and vibration mitigation measures. Community consultation regarding the appearance of proposed noise barriers and replanting will also be undertaken. Noise barrier consultation will be focused around the urban design of the noise barriers and findings will become an addendum to the already approved Urban Design and Landscape Plan. Graffiti and weed removal is undertaken on a regular basis as part of Sydney Trains' maintenance program.
Specific queries	From what distance from the track have the noise mitigation measures been assessed?	Within the noise model, point receiver calculations have been undertaken for all sensitive receivers up to two rows of houses back from the railway corridor. Noise contour mapping was also undertaken to confirm that all sensitive receivers with predicted noise levels above the overall noise trigger levels were included in the point receiver calculations, regardless of their distance from the track.

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	From Pennant Hills Station to the Wells Street Bridge - The Stevens Street East housing precinct, 75 units wedged between the rail line and Pennant Hills Road (ref. NCA10) has no trigger spots Red or Yellow. These dwellings are closer to the track than many properties on the eastern side of the track in Beecroft that have been spotted. This anomaly needs to be explained. The validation point (V14) for this area is located at the Steven Street East road between the housing precinct and the neighbouring services precinct. Why wasn't the validation point positioned mid-way along the housing precinct boundary with the rail corridor?	It is very important to understand that ALL noise levels for properties in the ONVR are predictions, not measurements. Measurements were only undertaken to validate the model, not to make predictions at individual properties. Carrying out more measurements would simply provide additional validation of the model predictions. These model predictions show that many properties already exceed recommended noise levels, however it is only those properties that are also predicted to increase these levels by a 2 dBa, that exceed EPA Guideline trigger levels and therefore trigger consideration of mitigation. Properties that already exceed nominated levels but for which the ETTT Project is not predicted to cause a sufficient increase in those levels, have not been considered for noise mitigation. Regarding NCA10, Table 23 in the ONVR indicates that the LAeq(night-time) noise levels increase by 1 dB (2016 prior to 2026 with teh safety factor) and LAmax noise levels remain the same. Whilst the noise levels in Table 23 (also refer Appendix D) are above the noise trigger levels (because of their close proximity to the track), the overall increase at this location is not above the 2 dB increase trigger level (for LAeq) or the 3 dB increase trigger level (for LAmax) as a result of the operation of the ETTT Project. Validation noise measurements are undertaken within publically accessible areas wherever possible, rather than on private property. In this case, the reference location at Stephen Street East is considered representative of the noise levels expected in the adjacent residential area.
	From Pennant Hills Station to the Wells Street Bridge - There is a child care centre at the corner of Yarrara Road and Fulbourne Avenue. What consideration has this centre received pursuant to SEPP (Infrastructure) 2007 relative to both noise and vibration?	This centre has been identified in the ONVR as meeting the requirements for noise mitigation. The ETTT Project will liaise directly with the centre owners regarding this. The Infrastructure SEPP works the other way around, that is, it requires those parties building new dwellings from 2007 onwards to ensure that such properties are built with appropriate noise and vibration mitigation measures in place, considering the presence of a railway nearby.

Issue	Community comment/ suggestion	Responses
Acutely affected properties	ONVR Section 8.12 Proposed Individual Property Treatments states: Although the ETTT Project's CoA do not require this, an assessment was made of which properties are predicted to be 'acutely affected' before and after the project. 'Acutely affected' refers to those properties at which LAeq noise levels (ie average noise levels) are predicted to exceed guideline target levels by 5dB(A) or more. That is, regardless of any increase due to the project, the noise levels are predicted to be 5dB(A) higher than IGANRIP / RING target levels. The *[number withheld for privacy reasons]* and *[number withheld for privacy reasons]* Sutherland Road properties are clearly 'acutely affected' LA eq Night results more than 5 in excess of the trigger level. *[number withheld for privacy reasons]* Sutherland road and the surrounding properties should be considered immediately for Individual Property Treatment on the following grounds: • The ONVR noise modelling indicates the properties to be materially on or above the noise trigger levels. • The ONVR criteria show the properties to be 'acutely affected'.	Under the EPA's guidelines, the ETTT project is required to assess and mitigate impacts of the new third track and associated infrastructure only - not existing noise issues. Unfortunately *[number withheld for privacy reasons]* and *[number withheld for privacy reasons]* Sutherland Road do not meet the requirements for mitigation under the ONVR in reference to the current standards (IGANRIP/RING). However, the CoA requires the ETTT Project to develop and implement a Source Noise Monitoring Plan to help identify noisy freight locomotives and rolling stock operating on all tracks. This may help to address existing noise issues. Transport for NSW has a program of works underway to reduce existing rail noise. The program of works includes: • Working with freight operators to improve the design and maintenance of their rolling stock to reduce wheel squeal and locomotive noise • Installing modern electronic lubricators throughout the Beecroft and Cheltenham area • Using dedicated maintenance teams to ensure the lubricators are always fully operational • Working with Sydney Trains to improve track maintenance practices. Transport for NSW has also installed a temporary noise monitoring station at Beecroft that captures the noise from passing trains. This noise monitoring station will be made permanent as part of the ETTT Project and data will be made publicly available once operation of the ETTT Project commences. It is recognised that many locations in the project area already experience high existing rail noise levels. In some cases, these locations with the highest existing rail noise impacts do not trigger consideration of mitigation as a result of the ETTT Project. Programs are being developed to address acute existing rail noise impacts in parallel with the ETTT project – these are described in Section 8.12 of the ONVR.
Adjacent properties	From Pennant Hills Station to the Wells Street Bridge - Similar to the 'southern' section there are gaps in the spotted properties that need to be explained. There is also a Yellow dot exception within a row of Red dots which makes sense only to the computer model. As stated above we submit that all properties along Yarrara Road should be treated the same.	In several areas, there are two or more adjacent properties where one receiver has a red coloured dot (eligible for mitigation without the application of the safety factor), and the adjacent receiver may have a yellow dot (eligible for mitigation only with the application of the safety factor), or no dot at all. In these circumstances, there may be little or no

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	Determination of Noise Affected Properties. ETTTA was required to assess noise affected properties using either the old IGANRIP or new lower RING guidelines, whichever gave the greater results. RING identified only 7 properties and IGANRIP 47. These 47 are denoted by a red dot. By projecting the no. of freight trains from 44/day to capacity 48/day, a total of 131 properties were identified. The additional 84 properties were given a yellow dot. It is inconceivable that some houses received a red dot, others yellow and some adjacent houses no dot. This pattern seems random and is inexplicable. This assessment was based on a mathematical model in which properties had to exceed 60dB(A) average at night with the projected average noise level increase >2dB(A). Thus many properties which currently exceed 60dB(A) average but did not meet the >2dB(A) increase were excluded. This includes properties in Sutherland Rd south of Copeland Rd. Properties further away from the rail corridor, such as those from Copeland Rd East which back onto Booth Park, which will clearly be affected by noise but were not included in the assessment. These predictions are based on averages, not the spikes which cause unacceptable sleep disturbance and adverse health outcomes.	difference in the overall noise levels, however the change in noise levels as a result of the project may be slightly below or above the relevant noise increase trigger level. In the extreme example, one property may have a predicted LAeq noise level increase of 1.9 dB as a result of the project (with no coloured dot) and the adjacent receiver may have a predicted LAeq noise level increase of 2.0 dB (with a yellow or red dot). In the latter case, mitigation measures would be considered for the property with the yellow or red dot. The noise modelling results are therefore very sensitive to small changes in the noise level increase as a result of the project. Some of these factors are described below: • **Noise transmission path:** Small differences in the noise transmission path between the railway corridor and adjacent residences can influence the change in noise level as a result of the project. Where the track is located in a cutting, the relative influence of locomotive engine/exhaust noise and wheel/rail noise from freight wagons and electric passenger trains changes. As the ETTT alignment traverses undulating terrain for the majority of the alignment small changes in the noise transmission paths between adjacent receivers can explain why one property is slightly below or above the noise increase trigger level. • **Height of Sensitive Receiver:** The relative height of a receiver compared to neighbouring properties alters the noise transmission path and may therefore alter the change in noise levels as a result of the project. **Change in operating conditions:** Within the noise model, the speed of trains, the engine notch settings, the presence of curves and other track features alter the relative contribution of the noise sources at various locations throughout the project area. In some areas where these parameters are changing, the noise level increase as a result of the project may be different for adjacent receivers. These changes may therefore alter the change in noise levels as a result of the project. On completion of the project, noise and vibration compliance monitoring (to confirm the predictions of the noise assessment and mitigation measures in the ONVR) will be undertaken, one year, five years and ten years after completion. If the assessment indicates that noise and vibration objectives have not been met, further mitigation measures will be investigated/ implemented in consultation with affected property owners.
	South of Pennant Hills Train Station - The properties along the section of Wongala Crescent are generally shown with Yellow dots meaning trigger points are reached only when the safety factor is considered. There are properties to the south of the track with Red dots shown meaning trigger points are reached before considering the safety factor. How can this be when the Wongala properties are closer to the third track than those marked with the Red dots?	Please note that a noise barrier is being constructed along Wongala Crescent that will mitigate noise for all properties that are behind the noise barrier. No properties behind the proposed noise barrier will be eligible for any property treatment, regardless of whether they are identified as a red dot, yellow dot or no dot. The maps in Part 1 of the ONVR have been modified by adding shading to show this more clearly. Please refer to the above information for an explanation on how it is possible that adjacent properties do not have the same noise predictions.
	A few properties along Wongala Crescent have neither coloured dots, for example, numbers *[numbers withheld for privacy reasons]*. How can this possibly be so? We can anticipate the answer that this is what the modelling showed but it makes no sense. We want to know exactly what disadvantage these properties suffer because of their unreasonable omission. In fact we question whether properties built on an incline will be prone to more vibration damage than properties built on the flat. At the very least we submit that all properties along this stretch of Wongala Crescent should be treated equally. Who will explain the inequity when two neighbours are treated differently?	

Issue	Community comment/ suggestion	Responses
Modelling	As residents directly affected by noise from current freight and passenger train movements as well as future freight train movements upon completion of the Third Track, myself and my family are well aware of the future noise impacts that the operation of trains along the Third Track will have. Despite living in the heavily noise-impacted Catchment Area 7 (identified in the ONVR), I find it appalling that the broader impacts of some of the noise mitigation measures have not been adequately addressed in the ONVR.	An Operational Noise and Vibration Review (ONVR) has been prepared to assess noise and vibration impacts that will arise from the operation of the new Epping to Thornleigh Third Track (ETTT) along the entire corridor. The report includes the proposed measures to mitigate the noise and vibration impacts including noise barriers, at-property treatment and track lubrication. The ONVR has been prepared by specialist acoustic consultants in consultation with the NSW Environment Protection Authority (EPA) and Hornsby Shire Council.
	Other than the three houses at the northern end of the catchment (NCA 07), no noise mitigation is planned for NCA 07 Up, beyond the existing track lubrication system. Comparing the results of the modelling to the trigger levels above, the following is noted. 1. All three residences fail; only marginally, to meet the increased noise level criteria ie LA eq Night increase of 1.6 versus trigger level of 2. 2. All three residences trigger the LA Max Threshold even after allowing for the rail lubrication mitigation. *[number withheld for privacy reasons]* Sutherland Road and *[number withheld for privacy reasons]* Sutherland Road exceed the trigger level by 7 and 8 respectively. All the noise modelling and the trigger levels are all expressed in even dB(A), eg 2 dB(A) not 2.0 dB(A). It could be argued therefore that the modelled noise increases should be stated in the same way in which case 1.6 would be rounded to 2 and the trigger level therefore is reached.	Unfortunately the ETTT Project does not have the ability to alter the EPA Guidelines mandated within the project's Conditions of Approval. Predicted noise level increases are presented to one decimal place, as also required by the CoA, in Appendix D. If the predicted average noise level increase at a property does not equal or exceed 2.0 (or 3.0 in the case of maximum noise level) then that property is not predicted to exceed Guideline trigger levels.
	The lack of any barrier to rail noise is highlighted in the noise contour diagrams, eg the following is an extract from the maximum noise contour diagram on page 171 of 173 of the ONVR appendices. The impact of the access road and the line of sight to the railway lines is clearly shown. The bedrooms of *[number withheld for privacy reasons]* Sutherland Road are located on the road facing side and are therefore subjected to the higher levels of noise than compared to the rest of the house as an average.	

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	Independent Noise Assessment Commissioned by BCCT. Measurement and analysis conducted at *[number withheld for privacy reasons]* Sutherland Road over an 8 day period showed that maximum noise levels due to traffic were under 71dB(A), suburban trains were between 71 and 80dB(A) and freight trains exceeded 80dB(A). This property was assessed by ETTTA as not affected. The impact of rail noise on sleep was assessed in our study. It concluded that existing rail noise would cause some 2-3 awakenings on top of the accepted 1 awakening for other reasons. Any increase in train movements (suburban or freight) would increase the number of awakenings, resulting in an adverse effect on sleep and health. The proposed amplification with the increase in freight trains should be assessed on this basis, with any increase adding to an already unacceptable situation.	Under the EPA's guidelines, the ETTT project is required to assess and mitigate impacts of the new third track and associated infrastructure only - not existing noise issues. Number of predicted awakenings is not a criterion within the EPA Guidelines and is therefore not considered in the determination of noise mitigation measures for ETTT Project impacts. The potential for sleep disturbance was included as part of the Cheltenham and Pennant Hills Station assessments, with screening levels based on the NSW Industrial Noise Policy Application Notes (refer Section 4.4). The assessments concluded that there were potential exceedances of the screening levels, however these were due to the noise from car doors closing, and therefore consistent with the current range of maximum noise levels experienced. The predicted maximum levels at residential receivers remain below the level that would be expected to cause awakening reactions and noise from car parking activities is considered to be consistent with the current noise impacts. For this reason, sleep disturbance impacts are not expected as a result of the works at stations. In terms of train noise, sleep disturbance trigger levels and/or criteria are not included in IGANRIP or RING, however some guidance is provided (ie sleep disturbance is influenced by the number of noisy events at night, the level above the background, etc). The EPA policies note that the night-time trigger levels are lower than for the daytime in order to reduce the effects of sleep disturbance. The potential subjective impacts of increased freight movements (particularly during the night-time) was considered in depth as part of the assessment and formed part of the comprehensive evaluation of potential mitigation measures. The report acknowledges that the number of freight train events at night is proposed to increase over time. Without mitigation measures, this would potentially increase the number of awakenings. However, in areas where noise barriers and track lubrication systems are proposed, the maximum noise levels are predicted to reduce as a result of the ETTT project. In other areas, the potential subjective impacts of freight trains will be addressed via the longer term strategies referred to in Section 8.11, which includes several measures aimed at reducing freight train noise levels in the longer term.
Consultation	Inadequacy of Operational Noise and Vibration Review. This review document was only given to the red and yellow dot properties. Requests by residents and by the BCCT to give it a wider distribution were rejected by ETTTA. Vibration was not included. The questions merely asked for feedback on decisions which have been already made, namely: • Low height barrier between approx. Copeland Rd and Chapman Ave along eastern • Side. Conventional barrier 5m high along part of Wongala Cres to Pennant Hills on western side • Conventional barrier 5m high along eastern side south of Pennant Hills • 'At Property' noise treatments	The ETTT Project's Conditions of Approval require the ONVR to include a consultation strategy to seek feedback from directly affected property owners on the noise and vibration mitigation measure. The ETTT took an expanded approach to this and prepared the draft ONVR document that was put on public exhibition from 26 May to 16 June to seek feedback from the wider community. The consultation strategy included: • Distribution of a 6-page ONVR newsletter (attached) to approximately 5,700 properties living along the rail corridor between Epping and Thornleigh outlining that: o the document is available for review, o what the requirements are o explaining what the proposed mitigation measures are, o inviting residents to attend 2 drop in sessions to speak with our acoustic and vibration specialists and the project team
	Stakeholder lives near the bridge at Copeland Rd and is not happy with the lack of consultation regarding the ONVR.	
	Could you please let me know what the next steps are as part of this review?	

Issue	Community comment/ suggestion	Responses
	The lack of real interest in community opinion is evident through the posters placed at railway stations, which fail to state the broader public can comment on the proposal and provide submission details regarding the ONVR. Leaflets outlining the ONVR were only circulated to the letterboxes of a limited number of residences around the rail corridor. Genuine community consultation rather than procedural tokenism is required if there is a real desire to consult the community, as is the intention of the Environmental Planning and Assessment Act (1979), through which the ETTT has been assessed.	o the newsletter was also emailed to our email distribution list and hard copies left at the libraries • Placing posters at the Epping, Cheltenham, Beecroft, Pennant Hills and Thornleigh train stations advising the ONVR is out for community consultation and when the community information drop in sessions are • Placing advertisements in The Northern District Times and the Hornsby Advocate advising the ONVR is out for community consultation and when the community information drop in sessions are • Created a section on the project website titled 'Operational Noise and Vibration Review' where the ONVR document, ONVR newsletter , ONVR FAQ and various other ONVR information posters are available to view (http://www.transport.nsw.gov.au/projects-northern-sydney-freight-corridor-program/epping-thornleigh-third-track/current-works) • Placing hard copies of the ONVR at Epping Library, Cheltenham Recreation Club and Pennant Hills Library for residents to view • Holding 2 community information drop in sessions on Saturday 30 May and Wednesday 4 June (with approximately over 120 people in attendance) where we had acoustic and vibration specialists available to answer questions/concerns etc • Briefing DP&E, EPA, Hornsby Shire Council staff and Councillors, Beecroft Cheltenham Civic Trust and Pennant Hills District Civic Trust about the draft ONVR. • Sending specific letters to the 131 directly affected property owners identified in the ONVR as triggering mitigation requirements (with or without the application of a safety factor) to explain why they were identified, what the proposed measure is and inviting them to attend the drop in sessions. Also included with this letter was a CD copy of the ONVR document and a feedback form where they can provide direct feedback on the mitigation measure proposed for their property. During the public exhibition period, the ETTT Project team received 54 detailed written submissions; 31 from property owners who were sent a specific letter and another 23 from residents not identified in the ONVR as triggering consideration of mitigation (with or without the application of a safety factor). All submissions from community members have been reviewed, considered and responded to as part of the updated ONVR.
Property treatment	The document states that 33 properties are proposed to receive property treatment. The remaining 14 are proposed to receive mitigation using noise barriers". It is apparent from the accompanying map that our property (*[number withheld for privacy reasons]* Old Beecroft Road) will not be one of the favoured 14. Could you please advise whether it is one of the 33 intended to receive property treatment.	Investigations into the ground conditions during construction at this location (north of the M2 motorway along the rear of some properties facing Old Beecroft Road and at the southern end of The Crescent) found that the earth behind the cutting was softer than previous surveys indicated. To provide a safe and stable cutting next to the new third track, the height of the mound was required to be reduced.

Issue	Community comment/ suggestion	Responses
	This submission is made in respect of *[number withheld for privacy reasons* Old Beecroft Road, it could be regarded in some sense as a collective submission by the four properties *[numbers withheld for privacy reasons]* Old Beecroft Road, and probably others - impacted by the removal of the mound that sheltered properties from the rail activities. Previously existing earth wall that provided a valuable noise barrier for a number of properties affected by the ETTT project has been demolished during the project works. The practicalities of its restoration are discussed. Restoration appears not only fair and reasonable, but also feasible, and possibly at negative cost to the ETTT project. Prior to the commencement of the ETTT, our property was partially screened from rail noise by earthworks constructed as part of a rail upgrade in the 1980s. The works consisted of an earth wall, constructed atop a natural sandstone ledge. The height of the wall, relative to the tracks, might have been about 5 metres. The situation is illustrated in Figure 1 at the end of this submission. With the additional of vegetation to a height of a metre or so, the result was that only the roof (about the top metre or so) of a passing train was visible from our residence. This provided substantial mitigation of noise. The current situation, after partial completion of ETTT works, is that: • The earth wall mentioned in Section 4 has been removed; • The sandstone ledge on which it was constructed has also been demolished and removed; • The land at the western boundary of the rail corridor is now only marginally higher than the track level (previously several metres higher); • The entirety of passing trains, the track and its ballast are now visible (c.f. the prior situation described in Section 4); • As a consequence, rail noise has increased very substantially; • Even with the growth of scrub vegetation over time, the noise screening will fall considerably short of the prior situation (Section 4). We now experience considerably increased noise from the lower areas of the vehicles, e.g. contact with expansion gaps (see Section 2), flange squeal, brake squeal, etc. Propose a earth wall and extend northward as far as *[numbers withheld for privacy reasons]* Old Beecroft Road - this will need to be at least a height of 5m to obscure the wheels of rolling stock as seen from the vantage point of the dwellings to screen noise effectively. As there is a corridor of approx 30m between the existing track and the western boundary of the rail corridor - this seems ample for the construction of the earth wall. Propose a earth wall and extend northward as far as *[numbers withheld for privacy reasons]* Old Beecroft Road - this will need to be at least a height of 5m to obscure the wheels of rolling stock as seen from the vantage point of the dwellings to screen noise effectively. As there is a corridor of approx 30m between the existing track and the western boundary of the rail corridor - this seems ample for the construction of the earth wall.	To reinstate the mound to its previous height (after the cutting work has been completed) would require the mound to be widened at its base to provide a safe and stable slope. Widening the base of the mound would impact a drain gully next to the mound, resulting in potential flood impacts. This was not modelled within the original ONVR, however the model has now been updated based on actual excavation levels. This resulted in an additional six properties predicted to exceed trigger levels at this location. These properties are now assessed as eligible for property treatment and are shown on the updated maps with a red dot. Noise barriers are only considered at locations where noise reduction benefits can be maximised. These are where properties that are predicted to exceed EPA guideline trigger levels as a result of the project are clustered closely together. Once these properties were identified, various mitigation measures, including noise barriers were assessed to determine the benefits they might provide. Where noticeable benefits are predicted, noise barriers were assessed for acoustic and cost effectiveness. A noise barrier behind Old Beecroft Road is not deemed cost effective.

Issue	Community comment/ suggestion	Responses
	There appear to be a couple of possibilities for the accommodation of the culvert together with an earth wall extended - (a) The culvert could retain its present gradient to its junction point at the rear of *[numbers withheld for privacy reasons]* Old Beecroft Road along the western face of the proposed extended earth wall, provided that it then drained toward the track beneath the wall. (b) In the presence of an extended wall, it might be convenient to effect a minor re-positioning the culvert to continue along the eastern face to its junction point, eliminating the present need for the dog-leg at the rear of No. *[numbers withheld for privacy reasons]*. It need hardly be said that the re-cycling of earth and rock excavated from nearby sites for the purpose of extension of the earth wall in the manner proposed would effect savings by eliminating the need for transport of that material off-site.	
Industry standards / legislation	Which agency / authority is responsible for working with rail operators to ensure they cooperate and take substantive steps in a time bound manner to solve for the noise at source? I understand the single biggest issue is that the wheel assembly, which is meant to rotate slightly around a vertical axis to help with turning, is often found to be jammed. I believe there is a pilot program in place to improve this and track impact. But I also understand that cooperating with this line of thinking is not mandated by regulation, so I am concerned that it may falter at any stage. I would like to know who in government leads and coordinates this, so that I may stay connected with them and keep myself informed of the progress.	Changes to government legislation are outside the scope of the ETTT Project, including the methodologies used to measure average noise from passing trains. The CoA required both the EPA's current noise guideline, the Rail Infrastructure Noise Guidelines (RING) and its predecessor the Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects (IGANRIP) to be modelled, and for the most stringent to be used. More information about the guidelines is available at www.epa.nsw.gov.au. In addition to using the more stringent of the EPA guidelines, the CoA require the ONVR to include an assessment of the impact of a greater number of freight trains than current estimates indicate will operate (safety factor). This has resulted in a greater number of properties being considered for noise mitigation.
	The practice of averaging of noise from trains, some of which are 1.5km long, does not take into account the instances of over 100dB received regularly in dwellings adjacent to the line. Our frontage will be about 20m from the new track (still undefined). An overseas visitor thought we had rail lines behind as well as in front, because she saw the reflection on the back windows. This was before the opening to the track had destroyed the foliage in front of us, ie. we are level with the lines and very close. There are inconsistencies in the noise readings for the projection of operational noise, which are obvious to the residents actually on site. The exception of *[number withheld for privacy reasons]* Wongala Cr in the IGANRIP results, with *[number withheld for privacy reasons]* included doesn't make sense. There are houses on the other side of the track in Clement Close named, which are much further away from the line and the bend at the top of the Beecroft Bank. We have been told that the noise readings and predictions took place in Beecroft.	It is very important to understand that ALL noise levels for properties in the ONVR are predictions, not measurements. Measurements were undertaken at targeted areas along the length of the project to validate the model, not to make predictions at individual properties. Within the noise model, freight trains are modelled as follows for the existing and future noise modelling scenarios: • Existing situation – 60m of locomotives plus 750m of wagons • Future situation – 70m of locomotives plus 1,100m of wagons Averaging of noise levels is only undertaken for the LAeq(daytime) and LAeq(night-time) noise assessment parameters. For the LAmax noise calculations, the full train length is used, with the highest LAmax noise level being determined for the worst-case position of the train. Carrying out more measurements would simply provide additional validation of the model predictions. These model predictions show that many properties already exceed recommended noise levels, however it is only those properties that are also predicted to *increase* these levels by a sufficient amount, that exceed EPA Guideline trigger levels and therefore trigger consideration of mitigation. Properties that already exceed nominated levels but for which the ETTT Project is not predicted to cause a sufficient increase in those levels, have not been considered for noise mitigation.

Issue	Community comment/ suggestion	Responses
	Why IGANRIP is Not Applicable in This Situation. BCCT has confirmation from an independent noise consultant that IGANRIP is more applicable to standard situations which are mainly suburban passenger trains or a mix of suburban and freight trains where the main noise is from locomotives. This is not applicable to Beecroft/Cheltenham. Because of the tight curves, and the fact that the track at night is mainly used for freight, wheel squeal causes very high noise level short duration events as wagons are passing. For a 1500m train residents could expect 2 minutes of this noise which is much higher than the locomotive noise. This methodology also 'discounts' existing noise impacts and fails to consider the local conditions.	The Conditions of Approval (CoA) issued by the NSW Department of Planning and Environment required both the EPA's Rail Infrastructure Noise Guidelines (RING) and the Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects (IGANRIP) to be assessed, and for the most stringent to be used. (RING replaced IGANRIP in 2013). The ETTT Project will use IGANRIP as it is the more stringent of the two guidelines. In addition the Conditions of Approval require a re-examination of curve squeal and consideration of subjective factors and noise characteristics including wheel squeal. These requirements have been addressed in the ONVR. The ETTT Project cannot change government legislation which requires these guidelines to be followed. Under the EPA's guidelines, the ETTT project is required to assess and mitigate impacts of the new third track and associated infrastructure only - not existing noise issues. Within the noise model, the below listed adjustments to the standard noise levels (on straight track) are included in the noise model predictions for the small radius Beecroft curves. For a 1,500m long train travelling at a speed of 40km/h, the passby time is a little over 2 minutes. On the basis of the below adjustments, a 21 dB addition would be applicable to the maximum level and a 9 dB addition would be applicable to the average level (this increase is applied for the full time period of the passby). On the basis of the Sydney Trains (previously RailCorp) report, the ONVR noise modelling includes the following allowances for localised increases in noise emission around the Beecroft curves in the unmitigated case prior to lubrication: • +5 dB passenger L_{AE} • +14 dB passenger L_{Amax} • +9 dB freight L_{AE} • +21 dB freight L_{Amax}
Visual amenity/vegetation	I am a resident living on northern side of Beecroft Road next to Murray Road, which is equidistant from both Beecroft and Cheltenham stations. The distance from the track and Beecroft Road at this point is about three hundred metres. Currently the noise being made by the freight trains, especially in the evening, is dreadful. I know that it has been like this for many years, but with the removal of vegetation along the track the noise has increased immeasurably. I should suggest that the noise is certainly above RPA guidelines.	To reduce noise impacts, a barrier should be solid to interrupt the path of the noise. Along the ETTT rail corridor, the trees and vegetation do not act as a solid barrier and have little, to no, measurable impact on noise impacts.

Issue	Community comment/ suggestion	Responses
Cost effectiveness	How are noise mitigation measures assessed? Could we please have an explanation of the bullet point “cost of implementation”? Is it envisaged that some residents will miss out on mitigation because their’s is too expensive? Could you provide some examples where this might be the case? What alternative compensation measures are envisaged?	A number of noise mitigation methods were assessed as part of the ONVR process including source controls (which reduce the noise at its origin i.e. track lubrication to mitigate rail /wheel contact noise), path controls (where a solid object such as a barrier alters the direction of noise) and ‘at property’ treatments (such as glass upgrades to windows and doors). It is generally agreed that source controls are the most reasonable and feasible means of mitigation as they provide the largest benefit for the most amount of residents / stakeholders. For this reason, track lubricators will be placed along the length of the Project. In areas where additional mitigation is required, the Project will install noise barriers if they are deemed cost effective in comparison to the benefit they provide or property treatments where noise barriers cannot be provided. The primary approach to cost effectiveness analysis is based directly on the ratio of the cost of the barrier to the benefit provided to all properties behind the barrier. Cost effectiveness is outlined in Section 8.3 of the ONVR. For properties that trigger the consideration of mitigation where the construction of a noise barrier is not cost effective or not feasible from an engineering perspective, at-property treatment will be considered in consultation with the property owner. Direct consultation with 40 properties identified in the ONVR as requiring property treatments, but are not behind a noise barriers will be undertaken once the ONVR has been approved by DP&E. Details of treatments will be confirmed after an inspection and assessment of an individual property. On other projects, mitigation has typically included items such as provision of fresh air ventilation (to allow windows to be closed), upgrades to window and door seals and window glass upgrades. Specific treatment measures will depend upon factors like the level of predicted noise impact, type of construction of the property and orientation to the rail line. It is possible that the inspection will determine some properties as not eligible for property treatment due to all appropriate mitigation measures having already been implemented. Acknowledged
Construction impacts	The dust that has covered our house and settles inside, means that we are constantly cleaning. Washing gets a layer of dust on it after an hour or so hanging on the line, so we have to wash our clothes a second time and use the dryer.	The ONVR seeks to consult the community about mitigation measures proposed as a result of operation of the third track and not construction related concerns. It is best to raise construction concerns with a member of the ETTT community relations team at the time of occurrence so issues can be investigated and action taken as required. If you have not already done so, please contact the team on 1800 684 490 or at Projects@transport.nsw.gov.au. At-property noise mitigation measures are only provided for operational noise and not construction noise. For information on how ETTT Project mitigates construction noise, dust and other impacts please refer to the ETTT Construction Environmental Management Plan and its sub plans available on the project website at
	I suggest that noise monitoring be carried out from our property while work is being conducted and consideration given to providing double glazing and noise sealers around the doors and/or windows on our property. I understand that there are many houses affected by the ETTT, but as residents in a high impact zone and working from home, we get no respite whatsoever.	

Issue	Community comment/ suggestion	Responses
	Impacts Following Current Work by ETTTA. BCCT has been approached by residents who are experiencing major noise and vibration issues following the removal of rock, soil and vegetation along the corridor. The removal of a high mound and vegetation at the southern end of The Crescent has resulted in greatly increased noise and vibration to houses in this area. Prior to its removal, only muffled sounds were heard. Now all train noise is heard ar a disturbing level and houses are suffering damage due to vibration. Plans clearly show this mound was to remain and residents had been assured by ETTTA that this mound would not be removed. It is clearly still shown in plans, yet it has been removed. Is this a case of ad hoc planning? These residents want the mound replaced. Another has requested that a noise barrier be installed but despite some 30m of land available, he has been informed that there is insufficient land to build one. If this is because some of the adjacent land belongs to Council, surely some arrangement can be made between ETTTA and Council. This resident is seeking an assessment of this situation by a qualified independent engineer. Increased noise and vibration are also being experienced in The Crescent near Murray Rd since the removal of rock. One must question the level of planning which went into the construction of the third track and the attention to local conditions and resident impact.	To reinstate the mound to its previous height (after the cutting work has been completed) would require the mound to be widened at its base to provide a safe and stable slope. Widening the base of the mound would impact a drain gully next to the mound, resulting in potential flood impacts. This was not modelled within the original ONVR, however the model has now been updated based on actual excavation levels. This resulted in an additional six properties predicted to exceed trigger levels at this location. These properties are now assessed as eligible for property treatment and are shown on the updated maps with a red dot. Noise barriers are only considered at locations where noise reduction benefits can be maximised. These are where properties that are predicted to exceed EPA guideline trigger levels as a result of the project are clustered closely together. Once these properties were identified, various mitigation measures, including noise barriers were assessed to determine the benefits they might provide. Where noticeable benefits are predicted, noise barriers were assessed for acoustic and cost effectiveness. A noise barrier behind Old Beecroft Road is not deemed cost effective. Should any resident experience concerning noise and/or vibration impacts from construction works they should immediately contact the ETTT team to discuss the situation. The team can be contacted on 1800 864 490 or Projects@transport.nsw.gov.au
Property treatments	Treatment of Houses. The only houses to be offered treatment are the red dot properties which are not behind a proposed noise barrier wall. This amounts to 33 of the Red dot properties (14 are behind noise barriers). This treatment might include double glazing, sealing of doors and windows. This fails to consider noise in the gardens and outside the house which will reduce residential amenity. Some 84 yellow dot properties, although identified as noise affected, will not qualify for treatment unless the number of trains exceeds the current predictions. They will be assessed in 1, 5 and 10 years and there is no indication as to what remediation measures will be offered to them.	A number of noise mitigation methods were assessed as part of the ONVR process including source controls (which reduce the noise at its origin i.e. track lubrication to mitigate rail /wheel contact noise), path controls (where a solid object such as a barrier alters the direction of noise) and ‘at property’ treatments (such as glass upgrades to windows and doors). It is generally agreed that source controls are the most reasonable and feasible means of mitigation as they provide the largest benefit for the most amount of residents / stakeholders. For this reason, track lubricators will be placed along the length of the Project. In areas where additional mitigation is required, the Project will install noise barriers if they are deemed cost effective in comparison to the benefit they provide or property treatments where noise barriers cannot be provided. Property treatments will not be provided to properties behind this noise barrier as all properties behind the barrier will benefit from some noise mitigation, including in outdoor areas. Unfortunately noise barriers are not cost effective or possible from an engineering perspective at all locations, therefore property treatment for red dot properties not treated with a noise barrier is proposed. Direct consultation with 40 properties identified in the ONVR as requiring property treatments, but are not behind a noise barriers will be undertaken once the ONVR has been approved by DP&E. Details of treatments will be confirmed after an inspection and assessment of an individual property. On other projects, mitigation has typically included items such as provision of fresh air ventilation (to allow windows to be closed), upgrades to window and door seals and window glass upgrades. Specific treatment measures will depend upon factors like the level of predicted noise impact, type of construction of the property and orientation to the rail line. It is possible that the inspection will determine some properties as not eligible for property treatment due to all appropriate mitigation measures having already been implemented.

Issue	Community comment/ suggestion	Responses
Noise reflection from barrier	Reflected noise is a significant consideration when designing noise barriers. For example the NSW Government RMS document Acoustic principles of noise wall design in NSW has a whole section discussing it and how to manage it. The ONVR does not appear to take reflected noise into account. It is not listed in the “negative effects” of noise barriers. The cost benefit assessment is made purely on the benefits experienced on the other side of the barrier to the noise source. The noise modelling results for NCA07 Up do not appear to take into account the impact of reflected noise. A noise barrier erected on the Down (western side) will reflect noise to the Up (eastern side). Instead the noise modelling results with mitigation show a decrease due to taking into account the Rail Lubrication which is already in place. There is a diagram in submission showing this concern.	Section 8.6 has been updated to better describe how noise reflection has been assessed in the modelling process. In summary, the assessment identified that the noise level increase would be negligible since the reflected noise would be shielded by the train itself for receivers on the opposite side of the track. The addition of absorptive treatments to the noise barrier would not provide a noticeable noise benefit to sensitive receivers.
	The ONVR noise modelling does not taking into account the reflected noise of the proposed noise barrier.	
	The low-height noise barriers being installed at some places, while useful, are perhaps not going to installed opposite my house at *[number withheld for privacy reasons]* Sutherland Road - what would I need to do to ensure that this section is also covered? In addition, the opposite wall in this section is quite high due to the lay of the land - what is being done to ensure the concrete covering of the opposite wall absorbs sound, rather than reflect it back towards the eastern side?	
Other	It is noted that the document dated Sept. 2012 stated that "The Epping to Thornleigh Third Track proposal involves the construction of approximately six kilometres of NEW Track between Epping and Thornleigh.... The new track will separate freight and passenger services along the steep incline between Epping and Thornleigh" This would have changed the whole construction and operational modus operandi. It was later designated not to be new infrastructure as Intercity and Country Link passenger trains would use it.	An additional track within an existing corridor is not categorised as a ‘new’ rail line under the EPA guidlines. A ‘new’ rail line refers to an area where rail lines are constructed in an area that previously had no previous rail alignment or infrastructure. Examples of projects to which the new rail line criteria would apply are the ‘greenfield’ components of the South West Rail Link and North West Rail Link, which will create new rail lines along alignments that currently do not contain a rail line. Therefore there has never been any intention to categorise the ETTT Project as a ‘new’ rail line under the EPA Guidelines. Given there are two existing tracks, addition of a third track is clearly an upgrade of an existing rail line rather than construction of a new rail line..
	Last week I attended the information day at Beecroft Community Centre and was pleased to receive good information on how the localised lubrication method is providing some encouraging data. I was also given to understand that work is being done with rail operators to drive improved maintenance of wagons, and that was encouraging too.	Thank you – feedback acknowledged
	Also as discussed my next door neighbour *[number withheld for privacy reasons]* Copeland Rd was contacted by ETTT regarding vibrations and photos were taken of their house to monitor cracking from vibrations. My house is closer to the tracks, so why have we not been afforded the same courtesy? Can you please have the appropriate group perform the same actions on my house for monitoring? Also on what criteria was the decision not to monitor my house based? This is deeply concerning.	In general, all buildings and structures within a plan distance of 25 metres from the edge of the construction work and within 50m of the western side of the corridor (where most of the construction work is occurring) were offered a pre construction property condition survey. Heritage listed buildings within 75 metres from the edge of the works were also offered the pre construction survey. The surveys were undertaken as a precautionary measure as our works are not expected to cause vibration levels that could result in damage to houses. Offering pre construction property condition surveys to properties adjacent to major construction projects is standard practice and is not an indication that the property will be damaged during construction. The 25 metre buffer from the edge of works almost excluded all properties on the eastern side of the corridor as bulk of our works is on the western side however we made an exception to properties immediately adjacent to the train stations where we offered the pre construction surveys to the first row of adjacent properties which at Beecroft Station went as far south as *[number withheld for privacy reasons]* Copeland Road.

Issue	Community comment/ suggestion	Responses
	This morning I attended the display of the ONVR at the Beecroft Community Centre. I was pleased to note that it is planned to install noise barriers along various sections of the rail corridor, to carry out at-property treatment to some 33 properties along the corridor and to install rail lubricators on the new track.	Thank you – feedback acknowledged
7 - Feedback from Government agencies		
Agency	**Community comment/ suggestion**	**Responses**
HORNSBY SHIRE COUNCIL	The noise modelling assumptions appear satisfactory. The noise validation shows consistent trends. The source noise levels and the speed profiles are detailed and appear consistent with a rail line of this type. Compared to the EIS, comprehensive noise mitigation strategies have been considered in the ONVR.	Acknowledged
	A comprehensive noise monitoring strategy has been developed that can identify noisy trains.	
	Noise Goal - In Section 5.5 - Noise Modelling Method, it is noted that the safety factor referred to in the Conditions of Approval (CoA) is a response to the sensitivity of the noise modelling predictions to the overall train numbers. It is also noted that the magnitude of the safety factor to be applied is not defined in the CoA. Council supports the approach taken in the ONVR to calculate the safety factor via the noise increase due to the project under IGANRIP rather than RING. IGANRIP calculates the difference between the forecast 2016 no build scenario (average train numbers) and the capacity 2026 build scenario (average train numbers) and is the more conservative approach. For the RING assessment the safety factor is calculated from the difference between the forecast 2026 no build scenario (maximum trying numbers on any one day) and the capacity 2026 build scenario (maximum trying numbers on any one day).	
	Hornsby Council acknowledges the need for the installation of noise monitoring stations to assess the impact of this project through time and offers its assistance in the establishment of such stations.	
	Noise barriers are considered in detail and the reasonable and feasible assessment of noise barriers is appropriate.	
	Council notes that the ETTT project only needs to mitigate the impacts of the new third track and associated infrastructure, and is not required to address existing noise impacts. The document acknowledges that many properties are already in excess of trigger values of 65 LAeq(15h), 60LAeq(9h) and 85Lamax, but as the project is only addressing impacts attributed to the upgrade these properties currently impacted by rail corridor noise, particularly those that exceed acute noise levels (exceed trigger levels by 5 dB), should be addressed by the NSW State Government. To this end, Council requests that the State Government implement noise mitigation measures as part of the current project as this would be the most efficient way to address the existing problem. This approach would not be dissimilar to RMS's approach in dealing with acute noise levels.	Under the EPA's guidelines, the ETTT project is required to assess and mitigate impacts of the new third track and associated infrastructure only - not existing noise issues. However, the CoA requires the ETTT Project to develop and implement a Source Noise Monitoring Plan to help identify noisy freight locomotives and rolling stock operating on all tracks. This may help to address existing noise issues. Transport for NSW has a program of works underway to reduce existing rail noise. The program of works includes: • Working with freight operators to improve the design and maintenance of their rolling stock to reduce wheel squeal and locomotive noise • Installing modern electronic lubricators throughout the Beecroft and

Issue	Community comment/ suggestion	Responses
	The importance of the future maintenance of train lines and rolling stock is reflected in Section 5.6.4 - Train Source Noise Levels - where it is identified on Page 25 that wheel defects are relatively common in the existing fleet but that these defects can be fixed through re-profiling. The ONVR does not address the issue of ongoing maintenance to achieve the desired noise impacts and Council suggests this be considered as part of any approval.	Cheltenham area • Using dedicated maintenance teams to ensure the lubricators are always fully operational • Working with Sydney Trains to improve track maintenance practices. Transport for NSW has also installed a temporary noise monitoring station at Beecroft that captures the noise from passing trains. This noise monitoring station will be made permanent as part of the ETTT Project and data will be made publicly available once operation of the ETTT Project commences. It is recognised that many locations in the project area already experience high existing rail noise levels. In some cases, these locations with the highest existing rail noise impacts do not trigger consideration of mitigation as a result of the ETTT project. Programs are being developed to address acute existing rail noise impacts in parallel with the ETTT project – these are described in Section 8.12 of the ONVR. On completion of the project, noise and vibration compliance monitoring (to confirm the predictions of the noise assessment and mitigation measures in the ONVR) will be undertaken, one year, five years and ten years after completion. If the assessment indicates that noise and vibration objectives have not been met, further mitigation measures will be investigated/ implemented in consultation with affected property owners.
	Treatment for NCA06 - Council requests clarification for the recommended 'low' barrier for NCA06 as a 5m barrier would appear to be equally cost effective.	Noise barriers are most effective when they can be located close to either the source or the receiver. In situations where the dominant source is the wheel/rail interface (such as on the Beecroft curves), and where properties mostly sit lower than the track, a low-height noise barrier constructed close to the wheel/rail noise source can provide noticeable noise reduction. One of the considerations in assessing whether a noise barrier will be reasonable and feasible is whether a noticeable noise reduction will occur. In the case of the low-height barrier proposed at Beecroft, this is confirmed as shown in Appendix E (NCA06 Up) of the ONVR document. The proposed 'low height' noise barrier, located in NCA06, has been proposed for several reasons. Typically the houses are well below track level in this location; therefore a lower barrier will shield properties from wheel squeal and general freight noise cost effectively. Additionally, there is reduced vegetation clearance required for a low height barrier. A higher barrier was considered and a height of 3m was found to be optimal for such a barrier. However, the cost effectiveness of a 3m barrier was still found to be less than that of a low barrier when compared to the noise reduction benefits. Low height noise barriers will not attenuate diesel exhaust or engine noise and are targeted at mitigating noise sources located towards the bottom of the train near the wheel/rail interface – this is the dominant noise source at this location.
	Landscape treatments - Council requests that it be consulted prior to any work being undertaken on the construction of noise barriers, or associated landscape treatments, which are located on Council, owned or managed lands. This should be reflected in any approvals.	There are a number of treatments that can be applied to improve the visual amenity of noise barriers and ensure they are in keeping with the local landscape. Consultation about appearance of the proposed noise barriers and replanting options will be undertaken with the directly affected property owners as well as Sydney Trains and Hornsby Shire Council. This will include those properties directly adjacent to the proposed noise barriers or those that will have a direct line of sight to the noise barriers. The noise barrier consultation will be focused around the urban design of the noise barriers, and landscaping options, and its findings will become an addendum to the approved Urban Design and Landscape Plan.

Issue	Community comment/ suggestion	Responses
	Proposed noise mitigation measures in the ONVR have significantly increased compared to what was indicated in the EIS	The Environmental Impact Statement outlined that the use of noise walls was not considered to be an effective noise mitigation measure for the project and the concept design evolved on this basis. However the ONVR has been prepared in line with the more stringent requirements included in the Conditions of Approval, which require the ETTT Project to reconsider higher curve squeal levels and the 'safety factor' on train numbers.
	Non-residential receivers - Section 3.2.11 (Page 16) Summary of Noise and Vibration Sensitive Receivers, Table 2 lists individual non-residential receivers identified within the project area. Some of these identified non-residential receivers would appear to be receiving noise mitigation works while others, such as the Beecroft Scout Hall, are not. Council requests that this list of properties be re-examined with a view to providing noise mitigation works for all of them.	Section 5.9.5 Predicted Noise Impacts NCA05 states that even without the safety factor, consideration of mitigation would be triggered at the Scout Hall. We note that Table 53 in Section 8.12 Proposed Individual Property Treatments shows that one (1) other sensitive receiver is identified in NCA06, however it does not specify that this is the Scout Hall. We have corrected this in the updated ONVR. Arbitrary addition of further properties for property treatment is beyond the requirements of the relevant guidelines and the scope of the ETTT Project.
	Notes the project proposes treatments only at locations where noise levels are exceeded by the project without the addition of a safety factor and where noise barriers are a reasonable and feasible mitigation measure. Consequently 89 properties are to be treated and an additional 42 properties that would have been triggered by the addition of the safety factor will not be treated at this time. Treatments for the 42 properties would only occur if future compliance measures indicate that freight train numbers had grown faster than anticipated. Whilst Council understands that the detailed noise model is sensitive to small changes, it prefers the adoption of a cautious approach and for these dwellings to be treated during the current project. The approach presented in the ONVR should only be adopted on the basis of clear performance indicators presenting how this would be judged. There are no such measures presented in the ONVR therefore a process for establishing these measures will need to be reflected in any approval.	The ETTT Project acknowledges that Council prefers that properties identified as triggering consideration of mitigation under the safety factor but not being treated by a noise wall should be treated as part of this project. Where no barrier is proposed, property treatment will only be offered for properties that are predicted to exceed guideline trigger levels without inclusion of the safety factor. As the safety factor models a hypothetical faster increase in freight traffic than currently forecast, this can be monitored following project completion. If as a result of monitoring scheduled at one, five and 10 years after project completion it is found that noise levels are higher than predicted, additional property treatment will be considered at the time. There is no justification to carry out additional property treatment for 'yellow dot' properties prior to project completion, as current forecasts indicate freight traffic levels will not reach those simulated by the safety factor.
	Independent Verifier Report - Council requests that the 'Independent Verifier Report' be made public prior to any approval.	The 'Independent Verifier Report' will be made publicly available on the website alongside the ONVR, following DP&E approval of the document.
NSW HEALTH	The ONVR indicates that areas adjoining the proposed project will be impacted by increased noise levels from train movements as a result of the project. Train noise is comprised of noise from different sources including low frequency noise from locomotive engine exhausts, rail wheel noise from flanging and wheel squeal caused by braking and tracks with small radius curves, and bunching.	Acknowledged

Issue	Community comment/ suggestion	Responses
	Path Control Measures - low profile barriers The noise generated by wheel squeal is of particular concern to the local community. Therefore the use of low profile acoustic barriers targeting wheel/ rail noise may be particularly relevant for the current project. In section 8.5.1 Low-Height Noise Barrier Modelling the ONVR states that; 'Overall, the model predictions for low-height barriers were found to match the expected attenuation from previous SLR studies and the literature of a benefit of 8dB to 10dB for a 1m barrier above top of rail, at receivers 1.5m to 3.5m above top of rail'. NSW Health notes that the installation of low profile barriers along the track has been considered by the ONVR and analysed in terms of cost effectiveness. The ONVR would benefit from including further detail of how the Total Noise Benefit (TNB) for wheel/ rail noise was calculated for low profile barriers and how this relates to the above estimated benefit	Appendix E provides details of calculated noise benefit for noise barriers in each catchment. For conventional barriers, the total noise benefit is calculated in two separate ways and both are presented: including for wheel / rail noise only; and for all noise including exhaust noise. For low-height barriers, no benefit is obtained for exhaust noise given the low height of the barrier; therefore Appendix E only includes calculations for wheel / rail noise benefits. Any barrier, whether low height or conventional, is only considered in areas where multiple closely grouped properties are predicted to exceed trigger levels. Low height barriers were found only to be cost effective in areas that also satisfied both of the following criteria: • At the location under consideration wheel squeal is the dominant noise source, ie on a sharp surve; and • Where properties are generally lower than the track Therefore other than the approximate 360m extent of low height barrier proposed along the eastern side of the corridor at Beecroft, no further locations of low height barrier were predicted to be cost effective. (One further extent of low height barrier south of the Pennant Hills Road bridge would be cost effective, but not as cost effective as a 5m conventional barrier, which has therefore been proposed.) A number of properties along straight sections of track, for example along The Crescent at Cheltenham, were predicted not to benefit significantly from a low height barrier. This is because wheel / rail noise (squeal) is not the dominant noise source at these locations.
	To mitigate project noise impacts on areas adjoining the track a number of measures were identified including ongoing research and development of a track lubrication system, installation of acoustic barriers, individual property treatments, and ongoing dialogue with industry participants to encourage upgrading and maintenance of existing locomotive exhaust systems and rolling stock.	Under the EPA's guidelines, the ETTT project is required to assess and mitigate impacts of the new third track and associated infrastructure only - not existing noise issues. However, the CoA requires the ETTT Project to develop and implement a Source Noise Monitoring Plan to help identify noisy freight locomotives and rolling stock operating on all tracks. This may help to address existing noise issues. Transport for NSW has a program of works underway to reduce existing rail noise. The program of works includes: • Working with freight operators to improve the design and maintenance of their rolling stock to reduce wheel squeal and locomotive noise • Installing modern electronic lubricators throughout the Beecroft and Cheltenham area • Using dedicated maintenance teams to ensure the lubricators are always fully operational • Working with Sydney Trains to improve track maintenance practices. Transport for NSW has also installed a temporary noise monitoring station at Beecroft that captures the noise from passing trains. This noise monitoring station will be made permanent as part of the ETTT Project and data will be made publicly available once operation of the ETTT Project commences. It is recognised that many locations in the project area already experience high existing rail noise levels. In some cases, these locations with the highest existing rail noise impacts do not trigger consideration of mitigation as a result of the ETTT project. Programs are being developed to address acute existing rail noise impacts in parallel with the ETTT project – these are described in Section 8.12 of the ONVR.

Issue	Community comment/ suggestion	Responses
	Mitigation at Source - NSW Health supports the view that source control of noise is preferable to pathway controls with receiver controls being the least preferable strategy. Measures such as those described in sections 8.11.3 Measures Targeting High-Noise Locomotives, 8.11.2 Research into Curve Squeal Mitigation by Track Design Measures and 8.11.4 Measures Targeting High Noise Wagons (Wheel Flats and Squeal) have the potential to benefit both the local community for this project and other communities affected by rail noise. The installation of project specific source controls such as track lubrication units have been highlighted by the report. In order for the effectiveness of this measure to be fully realised ongoing monitoring, maintenance and refinement will need to be undertaken.	A number of noise mitigation methods were assessed as part of the ONVR process including source controls (which reduce the noise at its origin i.e. track lubrication to mitigate rail /wheel contact noise), path controls (where a solid object such as a barrier alters the direction of noise) and 'at property' treatments (such as glass upgrades to windows and doors). It is generally agreed that source controls are the most reasonable and feasible means of mitigation as they provide the largest benefit for the most amount of residents / stakeholders. For this reason, track lubricators will be placed along the length of the Project. In areas where additional mitigation is required, the Project will install noise barriers if they are deemed cost effective in comparison to the benefit they provide or property treatments where noise barriers cannot be provided. Property treatments will not be provided to properties behind this noise barrier as tall properties behind the barrier will benefit from some noise mitigation. Direct consultation with 40 properties identified in the ONVR as requiring property treatments, but are not behind a noise barriers will be undertaken once the ONVR has been approved by DP&E. Details of treatments will be confirmed after an inspection and assessment of an individual property. On other projects, mitigation has typically included items such as provision of fresh air ventilation (to allow windows to be closed), upgrades to window and door seals and window glass upgrades. Specific treatment measures will depend upon factors like the level of predicted noise impact, type of construction of the property and orientation to the rail line. It is possible that the inspection will determine some properties as not eligible for property treatment due to all appropriate mitigation measures having already been implemented.
	Receiver Controls - Property treatment to mitigate adverse noise impacts is the least preferable strategy. Nonetheless, in circumstances where the use of source and pathway controls is not 'reasonable and feasible' or does not achieve noise goals this option should be provided to affected receivers.	
EPA	The ONVR describes modelled LAmax source levels as being normally distributed with a standard deviation (sigma) of 2.5 dB and stated that this resulted "in a Lamax,95% noise level 4 dB higher than the mean" (p24). This appears to be a mistake as the 95 percentile level should be 2 x sigma greater than the mean, or 5 dB in this case.	As described in the report, the noise modelling was based on the source noise levels in Table 12. The text relating to normally distributed levels with a standard deviation of 2.5dB and associated Monte Carlo simulation is provided for discussion purposes only. The outcome of the this additional analysis confirms that the modelling based on the levels in Table 12 results in a small over-prediction of the maximum levels and a negligible difference in the noise increase component. For a Normal Distribution, 95% of the values lie within +/- 2 standard deviations of the mean (ie between the 2.5% and 97.5% values). However, the 95% level is not the same as this. The 95% value is represented by the cumulative percentage, which is approximately 1.6 standard deviations above the mean (refer In More Detail section-)
	The ONVR uses a Monte Carlo simulation to determine average LAmax95% levels (p24). This should be explained.	The Monte Carlo Analysis has been used only as a check on the noise level increase calculations, in response to a comment received from NSW Health during the document's development. The outcome is that there is a negligible change compared with modelling based on the values in Table 12 on which the detailed calculations in the report were made. The Monte Carlo parameters are described in the text.
	Grade and curve diagrams used to determine appropriate notch settings should be referenced - they appear to be generally consistent with the Rail Access Corporation (1999) Infrastructure Engineering Manual Curve and Gradient Diagrams Volume 1.	These are now referenced in section 5.6.5

Issue	Community comment/ suggestion	Responses
	The need for treatment of receivers will be re-assessed by monitoring following construction (p49). This will mean that monitoring will need to be ongoing for a significant length of time beyond construction. Additionally, some references to that monitoring imply that further mitigation will be applied based on traffic growth, rather than noise levels (p66). Mitigation at receivers not identified for mitigation in ONVR should be based on noise levels rather than traffic flow.	Compliance monitoring is also described on Page 6, Condition F2 on Page 9 and Section 13 (starting on Page 72). The noise increase component is determined on the basis of the actual traffic growth and the overall noise levels are determined in the basis of measurement. If the traffic growth (with safety factor) does not eventuate, then the 2dB noise increase will not be triggered as a result of the project. References to traffic growth in this context are only made inasmuch as these would likely manifest themselves as higher noise levels.
	It is not clear what lateral extent (distance from the track) was modelled, but from the maps it appears that generally only the nearest sensitive building was included. The spatial extent of the model should be clarified.	Within the noise model, point receiver calculations have been undertaken for all sensitive receivers up to two rows of houses back from the railway corridor. Noise contour mapping was also undertaken to confirm that all sensitive receivers with predicted noise levels above the overall noise trigger levels were included in the point receiver calculations.
	Some potential mitigation measures appear to have been duplicated (p45), for example rail grinding appears in both measure 9 and measure 35, and measures 48 and 49 appear to be identical.	Acknowledged - this was a result of the brainstorming session approach
	Some mitigation measures which were not shortlisted (p46 to 48) due to a requirement for more research could be retrofitted at a later date, for example as part of the Strategic Noise Action Plan. Short listing appears to have been undertaken qualitatively without any quantitative estimates of cost/benefit.	All such measures are beyond the control of the ETTT project, however may be implemented at a later date
	Gauge widening is assessed as a potential mitigation measure over the long term, as the potential benefit for the ETTT is currently unclear. Gauge widening is commonly used in Australian mixed-use rail systems, evinced by the ARTC Engineering Code of Practice for Track Geometry (2014) which states that 'gauge widening may be necessary for design curves of less than 200 metres radius'. It is acknowledged that the likely acoustic benefit of gauge widening may be difficult to determine, but it is not entirely clear why some form of trial or investigation could not be incorporated into this project.	There are no curves of 200m or less in the vicinity of Beecroft. The Beecroft curves are around 300m radius, for which it would be unusual to apply gauge widening. However should future gauge widening trials demonstrate usefulness at 300m radius, this could be implemented at a later date at Beecroft.
	Barrier assessments are presented in the ONVR as both dB reduction per $1 million and dB reduction per metre squared. The ONVR states (p50) that the dB/m2 method was used to 'confirm that reasonable and feasible barrier are not ruled out on the basis of an excessive cost estimate', however it appears that rather any barrier which was assessed as providing less than 100dB/$1million was ruled out regardless of the dB/m2 benefit.	The tables in Appendix E provide a summary of the noise barrier assessment tables. In all cases where barriers have been proposed the dB/m2 values are greater than 0.2 and the benefit is greater than 100dB/$1M. There are no examples where the dB/m2 noise benefit is greater than 0.2 and a noise barrier is not proposed.
	To be addressed: In some cases, it is not clear why a specified barrier height was chosen in the ONVR, for example at NCA06 Up a design height of 5m was chosen although the dB/$1million benefit was higher for a 3m high barrier (p58)	Barriers were chosen based on the peak in the dB/$1M curve. For NCA06 Up, a low height barrier was chosen (not a 3m or 5m conventional barrier) as this provided the maximum cost effectiveness in dB/$1m.
	A 5m barrier was chosen for NCA07 Down Sub Catchment B to 'maximise overall cost effectiveness by targeting the wheel rail source' (p59). It appears from the data presented that overall cost-effectiveness is actually maximised at this location with a 7m barrier.	Based on community feedback, the proposed wall height has been matched to the topography, which involved increasing its height at some locations to 7.5 m. At other locations its proposed height was reduced in acknowledgement of the significant shielding benefit from the rock cuttings.
	Swing nose crossings are proposed to be investigated at a number of locations (p65). It is not clear why the feasibility and reasonability has not been assessed in the ONVR so that swing nose crossings are installed where appropriate. RING (p24) suggests that turnouts should be given a 'high priority' due to annoying characteristics.	Investigation of swing nose crossing installation is highly technical and will take a significant period of time to carry out. Installation of swing nose crossings will have impacts on a number of other systems including electrical power, signalling, track design, mechanical design maintenance, provision of spare parts for unique items, and operational reliability. The ETTT Project is currently working through a comprehensive process in consultation with the Assets Standards Authority to determine the feasibility and reasonableness of swing nose crossings for the ETTT Project, given the above impacts. This process is unable to be completed within the timeframe of the ONVR study, but the project team would be happy to keep EPA updated on progress.

Issue	Community comment/ suggestion	Responses
	Mitigation measures should be installed prior to the installation of sleepers and rail where practical (p71), so that they can provide some acoustic benefit during construction.	The ETTT Project's intention is to comply with the Condition of Approval that requires noise and vibration mitigation measures to be completed prior to operation. The design and consultation processes involved mean it is unlikely that noise barriers can be installed very long before this. Property treatment negotiations will commence following approval of the ONVR by DP&E, and it would be preferable to complete as many property treatments as early as possible. A variety of mitigation measures will be used to minimise construction noise impacts. Where possible, noise barriers will be installed as early as possible.
	To be addressed: In Appendix E (barrier assessment), the difference between 'height above ground' and 'nominal height' is not explained in the ONVR. Is nominal height the height above the top of rail?	For low height barriers, the nominal height is the height above rail level. For conventional barriers, the nominal height is the height above ground level. This is outlined in Appendix E.
	The following points were noted by EPA: • The ONVR predicts exceedances of both the RING and IGANRIP criteria. The ONVR considers the need for noise mitigation requirements in comparison to the RING as it allows for non-project related increases in rail traffic volumes over time to be included in the future predicted noise levels. • For estimates of future (2026) freight traffic volumes, the ONVR applies a 'safety factor' whereby the 'maximum' freight traffic volumes are based on the line capacity rather than forecast freight volumes. The ONVR therefore provides a conservative estimate of future impacts. • All freight and CPT services in the down direction (uphill, heading away from Sydney) were assumed to travel on the new third track, and all other services on the existing tracks (p28) • Idling locomotives were included only in the daytime post-build scenarios (p28). This is conservative and may lead to a slight over-prediction of the impact of idling locomotives in the daytime. • Modifications appear to have been included in the model to account for higher than expected measured impacts from curve squeal and turnouts (p29) • Model results were compared to measured results from both freight and passenger rail sources, and the model typically over-predicted current rail noise impacts (p30-31) • Model results with the 'safety factor' resulted in nomination of 131 residences for consideration of noise mitigation under IGANRIP (p32) but at-receiver mitigation is proposed only at residences affected by exceedances of criteria without application of the 'safety factor' (p49) following at-source (eg track lubrication) and pathway mitigation (e.g. barriers). This is reasonable given the approval required ongoing monitoring and re-assessment. • Increases in Laeq(night) rail noise up to 3.9dB were predicted (p35) • Any alternative wheel or rail profiles or materials would need to be extensively tested prior to use, and are not likely to be reasonably implemented in this particular project (p48). This is because of the significant impact which altering these parameters may have on the safety and reliability of the rail transport system.	Acknowledged

Issue	Community comment/ suggestion	Responses
8 - Feedback from some of the residents that attended the 2 community information drop in sessions		
Freight noise	Make engines quieter - limit the low frequency noise at source	Under the EPA's guidelines, the ETTT project is required to assess and mitigate impacts of the new third track and associated infrastructure only - not existing noise issues. However, the CoA requires the ETTT Project to develop and implement a Source Noise Monitoring Plan to help identify noisy freight locomotives and rolling stock operating on all tracks. This may help to address existing noise issues. Transport for NSW has a program of works underway to reduce existing rail noise. The program of works includes: • Working with freight operators to improve the design and maintenance of their rolling stock to reduce wheel squeal and locomotive noise • Installing modern electronic lubricators throughout the Beecroft and Cheltenham area • Using dedicated maintenance teams to ensure the lubricators are always fully operational • Working with Sydney Trains to improve track maintenance practices. Transport for NSW has also installed a temporary noise monitoring station at Beecroft that captures the noise from passing trains. This noise monitoring station will be made permanent as part of the ETTT Project and data will be made publicly available once operation of the ETTT Project commences. It is recognised that many locations in the project area already experience high existing rail noise levels. In some cases, these locations with the highest existing rail noise impacts do not trigger consideration of mitigation as a result of the ETTT project. Programs are being developed to address acute existing rail noise impacts in parallel with the ETTT project – these are described in Section 8.12 of the ONVR.
	Freight trains are the issue not commuter trains	
	Existing noise is an issue	Under the EPA's guidelines, the ETTT project is required to assess and mitigate impacts of the new third track and associated infrastructure only - not existing noise issues. However, the CoA requires the ETTT Project to develop and implement a Source Noise Monitoring Plan to help identify noisy freight locomotives and rolling stock operating on all tracks. This may help to address existing noise issues.
	Concerned about moving additional freight through the area	Freight trains will continue to operate at night. Without the project, freight services are anticipated to increase to an average of 32 per day (both directions combined) over a 24-hour period, by 2026. The EIS predicted that the ETTT Project would increase this figure to 44 (both directions combined), ie an additional 12 trains per day. Of these additional 12 trains, 9 are predicted to run during the day (between 7am and 10pm) and 3 are predicted to run at night (between 10pm and 7am).
Visual amenity/vegetation	I would like to understand the process for the urban design of the proposed noise walls.	The ETTT Project regrets the requirement for vegetation removal to build the third track and proposed noise barriers. Vegetation removal is only undertaken where required. If a

Issue	Community comment/ suggestion	Responses
	The newsletters refer to noise additional vegetation needing to be removed to accommodate the walls. I don't believe this to be the case. The walls can be constructed from within the corridor; it may be more difficult because of the sequencing chosen by TfNSW. The walls should have been constructed (wherever possible) prior to construction commencing. Tree removal as a result of the noise barriers.	tree can be trimmed or lopped instead of removed, this will be undertaken. Unfortunately, replanting is not possible in the same location due to restrictions on the proximity of full size trees (or future height potential) to the rail track. This is a restriction stipulated by Sydney Trains for safety reasons. ETTT is committed to planting vegetation at stations and a number of areas beside the track and community precincts as per the Urban Design and Landscaping Package. The final plan, including outcomes of community consultation, is available at www.transport.nsw.gov.au. There are a number of treatments that can be applied to improve the visual amenity of noise barriers and ensure they are in keeping with the local landscape. Consultation about appearance of the proposed noise barriers and replanting options will be undertaken with the directly affected property owners as well as Sydney Trains and Hornsby Shire Council. This will include those properties directly adjacent to the proposed noise barriers or those that will have a direct line of sight to the noise barriers. The noise barrier consultation will be focused around the urban design of the noise barriers, and landscaping options, and its findings will become an addendum to the approved Urban Design and Landscape Plan. The Urban Design and Landscaping Plan (UDLP) recognises the importance of using design elements to deter graffiti artists.
	There are noxious weeds in the rail corridor that need to be removed. By law they should be cleaned up and council should be enforcing this.	Weeds within the rail corridor will be removed if they are within areas affected by construction works. Rehabilitation works involving weed control and planting of native vegetation would be undertaken at completion of construction by qualified bush regeneration contractors. Long-term maintenance will be carried out by the corridor maintainer, Sydney Trains.
	Visual amenity at the end of Kandy Ave needs to be reviewed - replanting/ noise monitoring	The proposed revegetation works near Kandy Avenue are outlined in the ETTT project's urban Design and Landscape Plan which is available on the project website. As outlined in the ONVR document, no properties are identified as triggering the requirement for noise mitigation due to the operation of the third track (in line with the EPA guidelines) and as such no mitigation measures have been proposed.
Noise barriers	Why was a 5m chosen for the wall height? I would like to understand the effect of noise wall height on the noise expected outside my house. My house is elevated above the track and 5m high wall is unlikely to mitigate any noise emanating from the loco exhaust. Can the noise modelling for differing noise wall heights be made available?	The noise modelling for differing wall heights is available in Appendix E of the ONVR. The predicted noise impacts from the operation of the third track were assessed for each floor of each property. Cost considerations are an important part of the evaluation when assessing noise mitigation. The draft ONVR outlined that a 5 metre noise barrier was the

Issue	Community comment/ suggestion	Responses
	My property is two storey so the 5m wall will not be high enough to reduce the noise for the top level of the house	most cost effective option to reduce overall noise however the project used a multi-criteria analysis when selecting mitigation options which also included: - Likely noise level reduction they would provide - The benefits they could provide to the wider network - How they align with community feedback received to date - How quickly they can be implemented and the noise benefits realised - Engineering feasibility - Environmental impacts. In response to community feedback the ETTT Project has investigating the option of optimising the noise barrier height for the barrier along Wongala Crescent to vary along its length to topography. As a result of this the noise barrier will vary in height from 2.5m at the top of cuttings up to 7.5m at the 'low points' at the bottom of gullies. Typical noise reductions from conventional height noise barriers (5m) are in the order of 5 dB to over 10 dB, depending on the location of the source, the receiver location and the height of the noise barrier. This is more than the anticipated decibel increase predicted as a result of the operation of the ETTT Project along this part of Wongala Crescent. (typically between 2.0 and 2.9 decibels).
	What if the noise barriers/property treatment doesn't work?	On completion of the project, noise and vibration compliance monitoring (to confirm the predictions of the noise assessment and mitigation measures in the ONVR) will be undertaken, one year, five years and ten years after completion. If the assessment indicates that noise and vibration objectives have not been met, further mitigation measures will be investigated/ implemented in consultation with affected property owners.
Modelling	Current noise modelling (although within guidelines) is inadequate to capture what is actually happening. Low frequency noise from engines is the most persuasive & obstructive noise source it's impact extending much further than modelling suggests. So something is wrong with guidelines (for modelling)	Unfortunately the ETTT Project cannot influence what guidelines are required to be complied with, or the content of the guidelines. Development of the ONVR started with identification of impacts from various noise sources taking into consideration the project's detailed design, natural topography,
	How the modelling process worked	

Issue	Community comment/ suggestion	Responses
	The Crescent generally - desire for noise barrier. Rejection of value for money argument.	shielding and absorption effects from buildings. An acoustic model was then created to determine the predicted impacts on nearby properties in 2026 (ten years after operations commence) without any mitigation measures in place. These results were then compared against the EPA guideline noise trigger levels to determine which properties will require consideration of mitigation. Properties that trigger the EPA guidelines are marked with red dots and properties that trigger the guidelines with the application of the safety factor on predicted train numbers are marked with yellow dots. An independent review of the ONVR was completed by a third party acoustic specialist consultant to ensure that the noise impacts and proposed mitigation measures were determined in accordance with the EPA guidelines and the Conditions of Approval (CoA). A number of noise mitigation methods were assessed as part of the ONVR process including source controls (which reduce the noise at its origin i.e. track lubrication to mitigate rail /wheel contact noise), path controls (where a solid object such as a barrier alters the direction of noise) and 'at property' treatments (such as glass upgrades to windows and doors). It is generally agreed that source controls are the preferred means of mitigation as they provide the largest benefit for the most amount of residents/stakeholders. For this reason, track lubricators (first preference mitigation measure) will be placed along the length of the Project. In areas where additional mitigation is required, the Project will install noise barriers (second preference mitigation measure) or property treatments (third preference mitigation measure where noise barriers are not cost effective). Noise barriers along The Crescent were not deemed cost effective.
	Why is my neighbour getting property treatment and I am not?	In several areas, there are two or more adjacent properties where one receiver has a red

Issue	Community comment/ suggestion	Responses
	Why is 58 The Crescent yellow and 54 & 56 red? Same distance to the rail line if not closer?	coloured dot, and the adjacent receiver may have a yellow dot, or no dot at all. In these circumstances, there may be little or no difference in the overall noise levels, however the change in noise levels as a result of the project may be slightly below or above the relevant noise increase trigger level. In the extreme example, one property may have a predicted LAeq noise level increase of 1.9 dB as a result of the project (with no coloured dot) and the adjacent receiver may have a predicted LAeq noise level increase of 2.0 dB (with a yellow or red dot). In the latter case, mitigation measures would be considered for the property with the yellow or red dot. The noise modelling results are therefore very sensitive to small changes in the noise level increase as a result of the project. Some of these factors are described below: • **Noise transmission path:** Small differences in the noise transmission path between the railway corridor and adjacent residences can influence the change in noise level as a result of the project. Where the track is located in a cutting, the relative influence of locomotive engine/exhaust noise and wheel/rail noise from freight wagons and electric passenger trains changes. As the ETTT alignment traverses undulating terrain for the majority of the alignment small changes in the noise transmission paths between adjacent receivers can explain why one property is slightly below or above the noise increase trigger level. • **Height of Sensitive Receiver:** The relative height of a receiver compared to neighbouring properties is analogous to a change in the noise transmission path and may therefore alter the change in noise levels as a result of the project. • **Change in operating conditions:** Within the noise model, the speed of trains, the engine notch settings, the presence of curves and other track features alter the relative contribution of the noise sources at various locations throughout the project area. In some areas where these parameters are changing, the noise level increase as a result of the project may be different for adjacent receivers. These changes may therefore alter the change in noise levels as a result of the project.
Health	Concerned about health impacts from the loud noise associated with extra Freight and dust/ pollution	Transport for NSW recognises that noise and emissions from freight trains is an issue of significant concern for the community. In response to community concerns over the impact that freight rail noise has on the community, Transport for NSW is working with the Department of Planning and Environment, the EPA, and NSW Health to deliver a comprehensive approach to managing its impacts. A Strategic Noise Action Plan was developed in 2012 to address and manage freight rail noise and is a key task in the NSW Freight and Ports Strategy. A primary objective of the Plan is to reduce noise at source, in particular curve noise. Some of the measures Transport for NSW and its partners are implementing to reduce curve noise include: • Installing electronic gauge face lubricators on curves that are noise hot spots. Lubrication systems have been installed at seven sites between Epping and Newcastle. • Installing noise monitoring equipment at sites with upgraded lubrication systems. • Providing operators with information on the performance of their rolling stock on curves, including data on angle of attack and noise. Assisting operators to analyse this data to identify wagon classes with poor performance and to identify measures to improve performance. • Continuing research on the effect of all factors on curve noise, including wagon design and maintenance; lubrication systems; track system design; track and wheel profiles and rail grinding. • Disseminating the results of research and trials through presentations, technical papers and face-to-face meetings with industry.

Issue	Community comment/ suggestion	Responses

Consultation	Inadequate consultation	The ETTT Project's Conditions of Approval require the ONVR to include a consultation strategy to seek feedback from directly affected property owners on the noise and vibration mitigation measure. The ETTT took an expanded approach to this and prepared the draft ONVR document that was put on public exhibition from 26 May to 16 June to seek feedback from the wider community. The consultation strategy included:
		• Distribution of a 6-page ONVR newsletter (attached) to approximately 5, 700 properties living along the rail corridor between Epping and Thornleigh outlining that:
		  • the document is available for review,
		  • what the requirements are
		  • explaining what the proposed mitigation measures are,
		  • inviting residents to attend 2 drop in sessions to speak with our acoustic and vibration specialists and the project team
		  • the newsletter was also emailed to our email distribution list and hard copies left at the libraries
		• Placing posters at the Epping, Cheltenham, Beecroft, Pennant Hills and Thornleigh train stations advising the ONVR is out for community consultation and when the community information drop in sessions are
		• Placing advertisements in The Northern District Times and the Hornsby Advocate advising the ONVR is out for community consultation and when the community information drop in sessions are
		• Created a section on the project website titled 'Operational Noise and Vibration Review' where the ONVR document, ONVR newsletter , ONVR FAQ and various other ONVR information posters are available to view (http://www.transport.nsw.gov.au/projects-northern-sydney-freight-corridor-program/epping-thornleigh-third-track/current-works)
		• Placing hard copies of the ONVR at Epping Library, Cheltenham Recreation Club and Pennant Hills Library for residents to view
		• Holding 2 community information drop in sessions on Saturday 30 May and Wednesday 4 June (with approximately over 120 people in attendance) where we had acoustic and vibration specialists available to answer questions/concerns etc
		• Briefing DP&E, EPA, Hornsby Shire Council staff and Councillors, Beecroft Cheltenham Civic Trust and Pennant Hills District Civic Trust about the draft ONVR.
		• Sending specific letters to the 131 directly affected property owners identified in the ONVR as triggering mitigation requirements (with or without the application of a safety factor) to explain why they were identified, what the proposed measure is and inviting them to attend the drop in sessions. Also included with this letter was a CD copy of the ONVR document and a feedback form where they can provide direct feedback on the mitigation measure proposed for their property.
		
		During the public exhibition period, the ETTT Project team received 54 detailed written submissions; 31 from property owners who were sent a specific letter and another 23 from residents not identified in the ONVR as triggering consideration of mitigation (with or without the application of a safety factor). All submissions from community members have been reviewed, considered and responded to as part of the updated ONVR.

Other	Bush care volunteers use nesting boxes	Acknowledged
	Live in a unit overlooking the rail tracks at 5 City View and haven't received a letter showing I would trigger the safety factor?	Letters to 5 City View Pennant Hills were distributed via the strata managers while the ONVR newsletter was also distributed to the letterboxes of 5 City View Road.
	2-4 Edensor & adjacent building: removal of commercial buildings by NWRL. For referral.	The absence of these buildings is reflected in the model. However the model does not attribute removal of the building to the ETTT Project, as they were removed for a different project.

Issue	Community comment/ suggestion	Responses
	Noise and traffic control of construction/ infrastructure works in vicinity of a) Cheltenham Station & b) Local Road e.g. Old Beecroft Road has been poor to dangerous. Not enough planning has gone into kiss&drop/ pick up facilities at the station & the mix (in particular) of school kids and heavy trucks is bad. Although there has been consideration for traffic control around the station (although not enough Road space) in streets like Old Beecroft Road, which are distant from the main site & supervisors, there is no control and it is being used as a major haul-road. ETTT trucks & tankers still also use this street to turn around.	The ETTT Projects takes the safety of its workers and neighbours seriously. All traffic movements on site are undertaken in line with the approved Traffic Management and Access Plan which was developed in consultation with Hornsby Shire Council and RMS. This document is also available on the project website at http://www.transport.nsw.gov.au/Projects-Northern-Sydney-Freight-Corridor-Program/epping-thornleigh-third-track. Additional measures have been implemented at Cheltenham Station during the afternoon school peak period which include: • No truck-and-trailer and float truck movements between 2:45pm and 3:15 on school days • Installation of barriers on Sutherland Road to demark the pedestrian path • Painting and installation of more signage on platform 1 • Placement of 2 ETTT workers on Platform 1 to assist the station master in managing the peak school period from 2:45pm to 3:30pm.
	Construction issues (dust, noise, night work, tree removal etc)	The ETTT Project is delivering the project in line with the various requirements outlined in the EIS, Submissions Report, EPL, and Conditions of Approval. Mitigation measures to address construction related issues such as dust, vibration, noise, traffic etc are outlined in the ETTT Projects Construction Environment Management Plan (CEMP) and its various sub plans which are all available on the project website at http://www.transport.nsw.gov.au/Projects-Northern-Sydney-Freight-Corridor-Program/epping-thornleigh-third-track.
	Residents would like to see the earth mound located in the corridor between the M2 Bridge and Cut 2 returned/ not moved away. When the mound is built up they believe it provides a shield to some of the noise. OPTION could be to build up the area to be revegetated to a higher level.	Investigations into the ground conditions during construction at this location (north of the M2 motorway along the rear of some properties facing Old Beecroft Road and at the southern end of The Crescent) found that the earth behind the cutting was softer than previous surveys indicated. To provide a safe and stable cutting next to the new third track, the height of the mound was required to be reduced. To reinstate the mound to its previous height (after the cutting work has been completed) would require the mound to be widened at its base to provide a safe and stable slope. Widening the base of the mound would impact a drain gully next to the mound, resulting in potential flood impacts. This was not modelled within the original ONVR, however the model has now been updated based on actual excavation levels. This resulted in an additional six properties predicted to exceed trigger levels at this location. These properties are now assessed as eligible for property treatment and are shown on the updated maps with a red dot. Unfortunately no space exists to build a higher mound within the rail corridor.
	Concerned about the drop of property value that could potentially occur as a result of the third track development	There is no evidence that the ETTT Project would result in a reduction in property values. Future movements in the value of a property are difficult to predict as they are subject to many variables including: specific attributes of the property, capital improvements, demand and supply factors and other changes in the wider property market. As the rail corridor has been continuously in use for over 120 years and the ETTT Project is consistent with the existing land uses and operations within the rail corridor, It is unlikely that the proposal by itself would result in a noticeable change in property value.The ETTT Project will not consider any compensation claims for alleged loss of property value as a result of the project.

Issue	Community comment/ suggestion	Responses
	What exactly will be carried on the third track?	The Epping to Thornleigh Third Track (ETTT) Project involves construction of six kilometres of new and upgraded track within the rail corridor between Epping and Thornleigh stations on the western side of the existing tracks. The new (third) track will separate northbound freight from all-stops passenger train movements along the steep incline between Epping and Thornleigh. This will help provide additional capacity for northbound (interstate container) freight trains, particularly during the daytime when passenger trains currently have priority. Therefore, the main traffic to use the third track is expected to be diesel passenger trains; non-stop electric passenger trains (eg Newcastle and Wyong services) and most northbound freight trains.
	What are the safety procedures for accidents - very interested in this	Safety procedures for accidents on the new third track will be unchanged from current procedures for the existing network. The new third track will be owned, operated and maintained by the same state agencies that own, operate and maintain the existing network.