Mount Piper to Wallerawang Transmission Line Upgrade

Technical Report 10 – Noise and Vibration Impact Assessment

Transgrid

August 2025

→ **The Power of Commitment**

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The Power of Commitment

Acknowledgement of Country

Transgrid and GHD acknowledge Aboriginal and Torres Strait Islander peoples as the Traditional Custodians of the land, water and sky throughout Australia on which we do business. We recognise their strength, diversity, resilience and deep connections to Country. We pay our respects to Elders of the past, present and future, as they hold the memories, knowledges and spirit of Australia. Transgrid and GHD are committed to learning from Aboriginal and Torres Strait Islander peoples in the work we do.

Executive summary

The project

Transgrid proposes to deliver approximately eight kilometres (km) of new 330 kilovolt (kV) transmission line and double circuit transmission structures between the Mount Piper and Wallerawang 330 kV substations (the project). The project would incorporate sections of an existing, single-circuit 132 kV transmission line, where the two transmission lines would share a widened easement and transmission structures. The project is located within the Central West region of NSW within the Lithgow Local Government Area (Lithgow LGA).

The project is identified in the NSW Network Infrastructure Strategy (EnergyCo, 2023) and also supports the key tenets of the NSW Electricity Infrastructure Roadmap (DPIE, 2020). The Roadmap identifies that the expansion of renewable generation must be accompanied by increased transmission capacity to transfer power from Renewable Energy Zones (REZ) in inland NSW to key demand centres. The Mount Piper to Wallerawang Transmission Line Upgrade Project would provide the additional capacity required to reliably transmit power from the Central West Orana REZ to the Greater Sydney region.

Purpose of this report

This report has been prepared as part of the Environmental Impact Statement (EIS) for the project. The EIS supports an application for approval of the project in accordance with Division 5.2 of the *Environmental Planning and Assessment Act 1979* (NSW).

This report assesses the potential noise and vibration impacts of the project in accordance with the environmental assessment requirements of the Secretary of the Department of Planning, Housing and Infrastructure (the SEARs).

Existing environment

The study area surrounding the project consists of a mix of rural, industrial and residential land uses. A portion of the new transmission line and associated easement traverses the Gardens of Stone State Conservation Area (SCA) along the alignment of an existing transmission line and easement.

Noise and vibration sensitive receivers within the study area include both scattered rural residences and residential areas within the Wallerawang and Lidsdale urban areas. The nearest residential receivers are located approximately 60 metres (m) from the project footprint at Duncan Street, Lidsdale.

Background noise levels were determined through long-term, unattended noise monitoring in accordance with the Noise Policy for Industry (EPA, 2017) at two locations that were considered representative of the noise environment. At both monitoring locations, background noise levels were lower than the minimum levels outlined in the Noise Policy for Industry (NPfI). The NPfI minimum levels adopted for the assessment (35 dBA for the daytime, and 30 dBA for both the evening and nighttime periods) were used to establish construction noise management levels (CNMLs) and the project-specific noise trigger levels (PNTLs) relevant for the operational phase.

Methodology

The assessment of construction and operational noise impacts was undertaken in line with the applicable guidelines as follows:

- The Interim Construction Noise Guideline (ICNG; DECC, 2009) for the assessment of construction noise and vibration. Standard mitigation measures are presented in the ICNG, while additional mitigation measures and the associated approach to implementation is based on the Construction Noise and Vibration Guideline (Roads) (CNVG; TfNSW, 2024).
- The NPfI for the assessment of operational noise impacts (including from maintenance activities) and establishment of noise trigger levels (EPA, 2017).
- The Road Noise Policy (DECCW, 2011) for the assessment of road traffic noise impacts during both construction and operation.
- The CNVG (TfNSW, 2024) for the assessment of construction vibration impacts and identifying relevant safe working distances to comply with the human comfort and cosmetic damage criteria.

A number of construction scenarios were developed for computer modelling of potential noise impacts:

– Site establishment (CS01)
– Construction compounds (CS02)
– Access track upgrades (CS03)
– Vegetation clearing (CS04)
– Earthworks and civil works (CS05)
– Structure footing construction - impact piling (CS06)
– Structure footing construction - bored piling (CS06B)
– Structure assembly and erection (CS07)
– Stringing transmission line (CS08)
– Demobilisation / rehabilitation (CS09).

These scenarios were modelled assuming a reasonable, worst-case where the loudest plant items operate simultaneously, and at the worst-case location for each separate receiver within that scenario's footprint. The noise model outputs therefore provide a conservative assessment for the purpose of informing the noise mitigation measures required to minimise potential impacts at noise sensitive receivers. Actual construction noise levels are expected to be lower than the values predicted, for the majority of the time during each construction scenario.

Construction hours

The recommended standard construction hours in the ICNG (DECC, 2009) are from:

– 7 am to 6 pm Monday to Friday
– 8 am to 1 pm Saturday.

The proposed project construction hours include the ICNG standard construction hours, plus the following out of hours (OOHW) construction periods for which approval is sought:

– OOHW Period 1 Day:
  - 7 am to 8 am Saturday (only for construction tasks that would not exceed CNMLs)
  - 1 pm to 6 pm Saturday
  - 8 am to 6 pm Sunday
– OOHW Period 1 Evening:
  - 6 pm to 7 pm Monday to Friday (use of construction compounds only)
– OOHW Period 2 Night:
  - 7 am to 8 am Sunday (only for construction tasks that would not exceed CNMLs).

Key reasons for the need to undertake work in the OOHW periods listed above are that:

– works in proximity to transmission lines must be completed under outage for worker safety
– works must be completed efficiently as scheduled outages are of a limited duration due to network security and reliability constraints.

Additionally, construction work may be required in OOHW Period 1 Evening or Period 2 Night (6 pm to 7 am Monday to Saturday and to 8 am on Sunday) for the following reasons:

– outage recalls by the network operator
– work within rail corridor shutdown periods scheduled by the rail operator
– to comply with road closure licence requirements from the local road authority.

This construction work would be limited to transmission structure assembly, transmission line stringing and associated use of construction compounds. This is expected to be infrequent and of a duration of less than three nights but could impact receivers on more than one occasion.

Work outside of the recommended ICNG standard construction hours will be managed under a Construction Noise and Vibration Management Plan (CNVMP) and an OOHW protocol.

Construction noise impacts

The potential noise impacts from the project have been assessed against the proposed project construction hours and the ICNG Construction Noise Management Levels (CNML) for daytime, evening and nighttime periods.

Noise levels were predicted for nine construction scenarios with the results compared against CNMLs. Noise levels vary with construction intensity and location relative to residential and non-residential receivers. The implementation of feasible and reasonable noise mitigation measures is required to mitigate and minimise potential impacts.

During standard construction hours

- The construction activity with the greatest predicted extent of impact is transmission structure footing construction where impact piling is used (CS06), with 450 residential receivers at Duncan Street, Wolgan Road, Karawatha Drive and Brays Lane experiencing exceedances of the CNML, and 15 residential receivers experiencing highly intrusive noise levels (exceed CNML by over 20 dBA). An exceedance of the CNML by 7 dBA is predicted at one commercial receiver (COM0021).
- Worst case noise levels during impact piling (CS06) would be approximately three days at each sensitive receiver, from work at the nearest transmission structure. Exceedances of the CNML would also be experienced on average for about four weeks, with at most eight weeks from works at multiple transmission structures.
- The use of bored piling (CS06B) would impact a lower number of sensitive receivers compared to impact piling, with 167 residential receivers predicted to experience highly intrusive noise levels, primarily at Duncan Street, Lidsdale. An exceedance of 1 dBA is predicted at one commercial receiver (COM0021).
- A number of other construction scenarios including site establishment (CS01), earthworks and civil works (CS05), structure assembly and erection (CS07) and stringing the transmission line (CS08) are predicted to result in highly intrusive noise levels (more than 20 dBA above the CNML) at up to seven receivers at Duncan Street, Lidsdale. Impacts in this range are anticipated to last up to two weeks per scenario from works occurring at the nearest location to a given sensitive receiver.
- Access track upgrades (CS03) and vegetation clearing (CS04) are predicted to result in highly intrusive levels at up to 11 residential receivers clustered around Duncan Street, Lidsdale and up to eight receivers at the intersection of Castlereagh Highway and Karawatha Drive. Impacts in this range are anticipated to last from a few days and potentially up to two weeks per scenario while works are being undertaken at the nearest locations to a given sensitive receiver.

Highly noise affected levels during standard construction hours (greater than 75 dBA)

- Five residential receivers in the vicinity of Karawatha Drive are predicted to experience exceedances of the 75 dBA highly noise affected level by up to 7 dBA for access track upgrades (CS03) and vegetation clearing (CS04), for a period of about one week for any one individual receiver.
- Structure footing construction with impact piling (CS06) is predicted to result in exceedances of the 75 dBA highly noise affected level by 2 dB at two receivers located at Duncan Street, Lidsdale. Highly noise affected impacts at this location are expected to be limited to a three day period, for works undertaken at the closest structure. As works move to the next transmission structure, noise levels are expected to decrease. No exceedances of the highly noise affected level are predicted for structure footing construction where bored piling (CS06B) is utilised.
- One receiver at Duncan Street, Lidsdale is predicted to experience an exceedance of the 75 dBA highly noise affected level by 1 dB during demobilisation and rehabilitation (CS09). This impact would be from construction work at the nearest location to the residential receiver for a period of about one week.

OOHW period 1 day (Saturdays 7 am to 8 am and 1 pm to 6 pm, Sundays and public holidays 8 am to 6 pm)

- Structure footing construction with impact piling (CS06) is predicted to result in exceedances of the CNMLs at about 939 residential receivers. Of these, 17 residential receivers would experience highly intrusive noise levels (greater than 25 dBA above the CNML) and the majority of impacted residential receivers occur in the vicinity of Duncan Street, Lidsdale. Worst case impacts at each residential receiver would be short term, about three days, from works at the nearest transmission structure to the residential receiver.
- Exceedances for impact piling (CS06) could occur across a period that includes up to 10 weekends with an average of six weekends per receiver as the work location approaches a receiver and then moves away. Impacts would be avoided to the extent possible by use of bored piling and scheduling of piling activities in less sensitive periods.

– A number of other scenarios including site establishment (CS01), earthworks and civil works (CS05), structure assembly and erection (CS07) and stringing the transmission line (CS08) have predicted highly intrusive impacts (more than 25 dBA above the OOHW day CNML) at up to seven receivers at Duncan Street, Lidsdale. Impacts in this range are anticipated to last a few days and potentially up to three weekends per scenario while works are undertaken at the structures or work area nearest to a given sensitive receiver.
– Access track upgrades (CS03) and vegetation clearing (CS04) are predicted to result in highly intrusive noise levels at 17 and 21 sensitive receivers, respectively. Of these impacted sensitive receivers, up to 11 residential receivers are clustered around Duncan Street, Lidsdale and up to seven receivers at the intersection of Castlereagh Highway and Karawatha Drive. Impacts in this range are anticipated to last from a few days and potentially up to three weekends per scenario while works are being undertaken at the nearest locations to a given sensitive receiver.

OOHW period 1 evening (Monday to Saturday 6 pm to 10 pm) and period 2 night (Monday to Saturday 10 pm to 7 am, Sundays and public holidays 6 pm to 8 am)

– The following scenarios are expected to require some works during the OOHW Period 1 Evening and Period 2 Night:
  - CS02 – Construction compounds
  - CS07 – Structure assembly and erection
  - CS08 – Stringing transmission line.
– For the above scenarios, the majority of predicted noise levels are no more than 15 dBA above the OOHW evening or night CNMLs.
– Highly intrusive noise (greater than 25 dBA above the CNML) is infrequent across the scenarios with stringing transmission line (CS08) affecting 11 receivers at Duncan Street, Lidsdale and structure assembly and erection (CS07) affecting seven of these same receivers at Duncan Street, Lidsdale.
– Any highly intrusive noise impact works (greater than 25 dBA above the CNML) would only be required for short durations of up to three consecutive evenings and nights.
– The need for work during the OOHW Period 1 Evening and Period 2 Night would be required in the event of an outage recall but is not expected for all scheduled outages. Some receivers may be impacted by more than one outage recall.

Sleep disturbance

The screening assessment conducted identified potential for sleep disturbance impacts where construction activities take place during the night (10 pm to 7 am). Due to the potential for sleep disturbance, a detailed assessment would be undertaken as part of the CNVMP once further details of night time construction locations, timing and methods are known.

Construction vibration impacts

Minimum distances (buffers) from the CNVG were used to identify sensitive receivers and locations potentially subject to cosmetic damage and/or human comfort impacts resulting from construction-generated vibration.

The potential duration of vibration impacts for any single construction scenario is expected to be short at potentially impacted receivers (about one or two weeks per scenario for a given receiver). Potential vibration impacts would occur only where vibration-generating equipment operates at locations nearby to sensitive receivers and structures.

Two sheds located on a residential property were identified within the CNVG minimum distances for cosmetic damage when vibration-intensive equipment are used to construct access tracks (CS03).

The heritage-listed Wallerawang rail bridges over the Coxs River is the only heritage structure which has been identified within the CNVG minimum working distances for vibratory rolling, excavation and impact piling. As part of the CNVMP, vibration mitigation measures will include investigation into alternative construction methods and equipment, undertaking pre- and post-construction condition survey, if required, and vibration monitoring to avoid and reduce the risk of cosmetic damage.

Potential human comfort vibration impacts were identified where receivers are within the following CNVG minimum working distances:

– Seven sensitive receivers within 100 m of access track works (CS03).
– Three sensitive receivers within 100 m of earthworks and civil works (CS05).

The CNVG minimum working distances are indicative and would vary depending on the particular items of plant used and local geotechnical conditions. The minimum working distances are also based on assumed continuous vibration sources. However, for most construction activities, vibration emissions would be intermittent and for this reason, higher vibration levels occurring over shorter periods may be acceptable in relation to human comfort and perception.

Construction traffic noise impacts

No noise impacts were identified in relation to construction traffic use of the Castlereagh Highway. There is however potential for construction traffic noise impacts to occur during the use of local roads to access the site. The local roads of Boulder Road, Karawatha Drive, Brays Lane and Main Street would experience increased traffic noise ranging between 2.3 dB LAeq to 20.7 dB LAeq above existing levels for both day and night-time periods. Potentially impacted receivers are described below with reference to buffer distances that represent the distance up to which the traffic noise levels exceed the daytime and nighttime criteria for local roads:

– One sensitive receiver identified within the buffer distance for Boulder Road during the daytime (7 am to 10 pm) and the nighttime (10 pm to 7 am) traffic noise assessment periods.
– Two sensitive receivers identified within the buffer distance for Karawatha Drive during the daytime and six sensitive receivers during the nighttime period, with the majority of these receivers near the intersection with Castlereagh Highway.
– Five sensitive receivers within the buffer distance for Brays Lane during the nighttime with these receivers located at Duncan Street closest to the intersection of Brays Lane and the Castlereagh Highway.
– Twenty sensitive receivers within the buffer distance for Main Street during the nighttime with these receivers located at Duncan Street and Wolgan Road, Lidsdale.

Any construction activities and associated road use that may occur during the nighttime would be infrequent and no longer than three consecutive nights. Construction traffic noise mitigation measures are identified for these locations.

Operational noise assessment

The operation of high voltage transmission lines generates audible noise known as corona discharge which is more prominent during weather conditions comprising rain, mist or fog. The corona noise assessment was conducted based on computer modelling and no measurements were undertaken of corona noise from existing transmission lines in the study area.

While no exceedance of the operational noise criteria was identified during fair weather conditions, the modelling predicted that 23 receivers on Duncan Street, Wolgan Road and Skelly Road would exceed the evening and night time criteria by up to 9 dBA during light rain weather conditions. Fourteen of these 23 receivers are predicted to experience exceedances of the criteria by up to 6 dBA under existing conditions. The project would therefore result in an increase of around 3 dBA at an additional nine receivers.

Modelling predicts that seven receivers on Duncan Street and one in Brays Lane would exceed the day time criteria by up to 4 dBA during light rain weather conditions. The modelling for the existing transmission lines shows there are no exceedances of the day PNTL criteria at these residential sensitive receivers and therefore the above mentioned impacts are attributed to the project.

Compliance monitoring within six months of commencement of operation is proposed to confirm modelled noise levels. If monitoring indicates exceedances of the corona noise criteria by the project, consultation will be undertaken with landowners of the affected residences to identify and agree an approach for feasible and reasonable mitigation.

Routine maintenance of the transmission line would include aerial and ground inspections, reactive repairs as needed, and vegetation management. The works would be infrequent and primarily during the daytime periods and therefore noise impacts are expected to be minimal.

Cumulative impacts

Cumulative noise impacts with other nearby major projects are possible where construction works are conducted either simultaneously or consecutively with the project. Cumulative operational noise impacts are possible in rare cases where sensitive receivers are impacted by corona noise from the project and also operational noise exceedances from other projects.

Potential cumulative noise impacts during construction are expected for the nearby Wallerawang, Great Western and Pinecrest BESS projects, which may overlap with the project and impact on the same sensitive receivers within the Lidsdale and Wallerawang areas. The duration of construction noise impact in these areas may be extended if works are undertaken consecutively with another project.

During the operational phase, cumulative noise impacts are expected to be minimal in most instances. Cumulative operational noise impacts from the Great Western BESS and the corona noise from this project may exceed the noise criteria at one residential receiver located on Brays Lane under specific atmospheric conditions, however the corona noise contribution would be mostly due to existing transmission lines, with a negligible contribution from the project in this location. Potential cumulative operational noise from the Pinecrest BESS is also possible due to the BESS being located within the project footprint for this project.

Recommended construction mitigation measures

Feasible and reasonable noise mitigation measures and extensive community consultation are recommended to reduce potential construction noise and vibration impacts identified in this assessment. A CNVMP will be prepared and implemented to outline feasible and reasonable measures to mitigate construction noise and vibration impacts. Subsequent to the implementation of the specified noise mitigation measures, construction noise levels may still exceed the noise limits during standard and OOHW construction hours at the most affected sensitive receptors. Additional noise mitigation measures such as notifications, respite offers and verification of noise impact levels (e.g. noise monitoring) are recommended to reduce impacts for the most-affected sensitive receptors. Additionally, as part of the CNVMP, vibration mitigation measures will include investigation into alternative construction methods and equipment for work proposed near the heritage-listed ‘Wallerawang rail bridges over the Coxs River’ structure, undertaking pre- and post-construction conditions surveys if minimum working distances cannot be achieved, and vibration monitoring to avoid and reduce the risk of cosmetic damage. These additional noise and vibration mitigation measures are based on the framework detailed in the CNVG (TfNSW, 2024).

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Key terms, acronyms and abbreviations

Term	Description
A weighting	The frequency weightings used in sound level measurements are often related to the response of the human ear so that the meter better responds to what you actually hear.
ABL	Assessment Background Levels. The background noise levels for an individual period (day/evening/night) within an individual 24-hour period.
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
AVTG	*Assessing Vibration: A Technical Guideline* (DEC, 2006)
AWS	Automated Weather Station
Background noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the L_{90} descriptor.
CNML	Construction Noise Management Level
CNVG	*Construction Noise and Vibration Guideline (Roads)* (TfNSW, 2024)
CNVMP	Construction Noise and Vibration Management Plan
CNVS	*Construction Noise and Vibration Strategy* (TfNSW, 2019)
Construction footprint	The area that would be directly disturbed (such as by clearing, earthworks, erection of transmission structures and associated activities) to construct the transmission line within the project footprint.
CoRTN	*Calculation of Road Traffic Noise* (Department of Transport, Welsh Office, 1988)
CWO REZ	Central West Orana Renewable Energy Zone
dB	Decibel is the unit used for expressing the sound pressure level (SPL) or power level (SWL) in acoustics.
dBA	Decibel expressed with the frequency weighting filter used to measure ‘A-weighted’ sound pressure levels, which conforms approximately to the human ear response, as our hearing is less sensitive at low and high frequencies. The dBZ value is the unweighted sound pressure level.
DCCEEW	NSW Department of Climate Change, Energy, the Environment, and Water. Formerly Department of Environment and Climate Change (DECC) and Department of Environment, Climate Change and Water (DECCW).
DIN	German National Organization for Standardization
DPE	Department of Planning and Environment
DPIE	Department of Planning, Industry, and Environment
DPHI	Department of Planning, Housing and Infrastructure
Easement	A legal property right attached to a parcel of land that enables the use of an identified part of the land by a third party other than the owner. For transmission lines, an easement defines the corridor area where the lines are located and that allows access, construction and maintenance work to take place. The easements for the 330 kV transmission lines would typically be 60 metres wide. The easement grants a right of access and for construction, maintenance and operation of the transmission line and other operational assets. For the project, some easements may overlap with existing easements such that the final easement width for the new easement would be narrower than 60 m (e.g. where paralleling the existing transmission line north of the Wallerawang 330 kV substation) and in other areas it may be wider to accommodate diverging transmission lines (e.g. in the area south of the Mount Piper 330 kV substation).
EIS	Environmental Impact Statement

Term	Description
EPA	NSW Environment Protection Authority
Extended construction hours	Proposed extended construction hours for the project include: – Saturdays 1 pm to 6 pm – Sundays 7 am to 6 pm. At times, additional work outside standard and extended construction hours is also anticipated to be required due to network outage constraints, however would be avoided where possible.
Feasible and reasonable measures	Feasibility relates to engineering considerations and what is practical to build. reasonableness relates to the application of judgement in arriving at a decision. For more information refer to the definition in the *Noise Policy for Industry* (EPA, 2017).
Footprint	See 'construction footprint'
GHD	GHD Pty Ltd
Hazard tree	A hazard tree is defined as a tree or part of tree that if it were to fall would infringe on the vegetation clearance requirements at maximum conductor sag of the transmission lines.
HDD	Horizontal Directional Drilling
Hz	Hertz
ICNG	*Interim Construction Noise Guideline* (DECC, 2009)
ISO	International Organization for Standardization
kg	kilograms
km	kilometre
km/h	kilometres per hour
$L_{Aeq,period}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
$L_{A90, period}$	The A-weighted sound pressure level that is exceeded for 90% of the time over which a given sound is measured. This is considered to represent the background noise, e.g. $L_{A90,15min}$.
L_{AFmax}	The absolute maximum noise level in a noise sample. Measured using fast 'F' time weighting.
LGA	Local Government Area
Low frequency	Noise containing major components in the low-frequency range (10 hertz [Hz] to 160 Hz) of the frequency spectrum.
Low impact noise activities	Defined as: Construction activities that cause $L_{Aeq,15min}$ noise levels of no more than 5 dBA above the rating background level at any residence in accordance with the ICNG.
m	metre
m/s	metres per second
Maximum noise event	The loudest event or events within a given period of time. This is generally described using the L_{max} descriptor.
Meteorological conditions (adverse)	Wind and temperature inversion conditions
Most-affected location	Location(s) that experience (or will likely experience) the greatest noise impact from the construction works under consideration. In determining these locations, existing background noise levels, noise source location(s), distance and any shielding between the construction works (or proposed works) and the residences and other sensitive land uses need to be considered.
NCA	Noise Catchment Areas
NML	Noise Management Level
NPfI	*Noise Policy for Industry* (EPA, 2017)
NSW	New South Wales

Term	Description
NVIA	Noise and Vibration Impact Assessment
OOHW	Out of hours works
Operational easement	The permanent easement that would be established to facilitate ongoing access and maintenance.
Outage recall or recall	Where a scheduled outage has commenced, but transmission network capacity issues are identified by Transgrid, therefore requiring the transmission line to be re-energised at short notice to meet network demands.
POEO Act	*Protection of the Environment Operations Act 1997*
Project noise trigger level (PNTL)	Target noise levels for a particular noise generating facility. They are based on the most stringent of the intrusive criteria or amenity criteria. Which of the two criteria is the most stringent is determined by measuring the level and nature of existing noise in the area surrounding the actual or propose noise generating facility.
PPV	Peak particle velocity is the maximum vector sum of three orthogonal time-synchronized velocity components regardless of whether these component maxima occurred simultaneously.
Project	Construction and operation of the transmission line between Mount Piper and Wallerawang existing power substations, comprising approximately 8 km of new transmission line and transmission structures, associated easements and access tracks.
Project footprint	The area that would be directly disturbed by construction of the project.
RBL	Rating Background Level, the overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period.
REZ	Renewable Energy Zone
RNP	*Road Noise Policy* (DECCW, 2011)
SCA	State Conservation Area
Scheduled outage	A period of time when electricity is not being supplied along an electricity cable. This type of outage is planned in advance during periods considered unlikely to place pressure on the wider transmission network.
SEARs	Secretary's Environmental Assessment Requirements
SWL	Sound Power Level
Sensitive receiver	A location with the potential to be affected by noise or vibration from construction or operation of the project: this may include a dwelling, school, hospital, office or public recreational area. Where the terms receivers is used in this report this refers to sensitive receivers.
Standard hours	Recommended standard hours for construction work are defined in the *Interim Construction Noise Guideline* (DECC, 2009) as: – Monday to Friday 7 am to 6 pm – Saturday 8am to 1 pm – no work on Sundays or public holidays. The relevant authority (consent, determining or regulatory) may impose more or less stringent construction hours.
Study area	For the purpose of the noise and vibration assessment the study area has been defined as a three-kilometre buffer around the construction footprint.
Temperature inversion	An atmospheric condition in which temperature increases with height above the ground.
TLDM-MNB	Transgrid Transmission Line Design Manual – Major New Build (Rev 2)
Tonal noise	Tonal noise contains one or more prominent tones (i.e. distinct frequency components), and is normally regarded as more offensive than ‘broad band’ noise.
VDV	Vibration dose value - As defined in BS6472 – 2008, VDV is given by the fourth root of the integral of the fourth power of the frequency weighted acceleration.

1. Introduction

1.1 Background

The Commonwealth and NSW governments have both established targets to achieve net-zero emissions by 2050. Achieving these targets requires low emissions technologies to be deployed at scale across all sectors of the economy, including the electricity generation sector, currently Australia’s largest source of greenhouse gas emissions.

The NSW Transmission Infrastructure Strategy (DPE, 2018) aims to engage the private sector to invest in priority energy infrastructure projects, which can deliver low-cost, clean and reliable energy to consumers.

As part of the Transmission Infrastructure Strategy, the NSW Government has developed a plan to establish five Renewable Energy Zones (REZs) to increase renewable energy generation, reduce carbon emissions, and help deliver lower wholesale electricity costs to consumers. The Central-West Orana REZ (CWO REZ), being the first REZ established, is planned to generate at least 4.5 gigawatt by the late-2020s.

The NSW Government’s Electricity Infrastructure Roadmap (DPIE, 2020) identifies that the expansion of renewable generation must be accompanied by increased transmission capacity to transfer power from REZs in inland NSW to key demand centres. Interest in new energy generation projects in the CWO REZ is forecasted to exceed the existing transmission network capacity in several locations. The existing infrastructure located between the Mount Piper 550/330 kilovolt (kV) substation (Mount Piper 330 kV substation) and the Wallerawang 330/132 kV substation (Wallerawang 330 kV substation) has been identified in the NSW Network Infrastructure Strategy (EnergyCo, 2023) as requiring upgrades. The Mount Piper to Wallerawang Transmission Line Upgrade Project (the project) would provide the additional capacity required to reliably transmit power from the CWO REZ to the Greater Sydney region.

1.2 Location

The project is located within the Central West region of NSW within the Lithgow City Council Local Government Area (LGA). It is located approximately 14 kilometres (km) north-west of Lithgow situated on the western fringes of the Blue Mountains (Figure 1.1).

The area that is to be directly affected by the construction and operation of the project, is referred to as the project footprint and is shown in Figure 1.1. The project footprint is approximately 86.5 hectares in size and is generally bounded by the following:

– Castlereagh Highway to the north
– Former Wallerawang Power Station site to the east
– Gardens of Stone State Conservation Area (SCA) to the south
– Mount Piper Power Station to the north-west.

Land uses within and adjacent to the project footprint include:

– electricity generation at Mount Piper Power Station
– electricity transmission, including the Mount Piper and Wallerawang 330 kV substations, and associated transmission lines
– mining activities, with several Centennial Coal operations including the former Ivanhoe Coal Mine and Springvale Coal Services overlapping the project footprint
– agriculture, primarily livestock grazing
– conservation, notably the Gardens of Stone SCA
– state and local road reserves including the Castlereagh Highway, Boulder Road and Brays Lane
– rail corridors including the Main Western Rail Line and a disused railway line near Brays Lane.

A mixture land uses are proposed at the former Wallerawang Power Station site. This may include commercial and industrial land use. Development of a Battery Energy Storage System is also proposed by others at the site.

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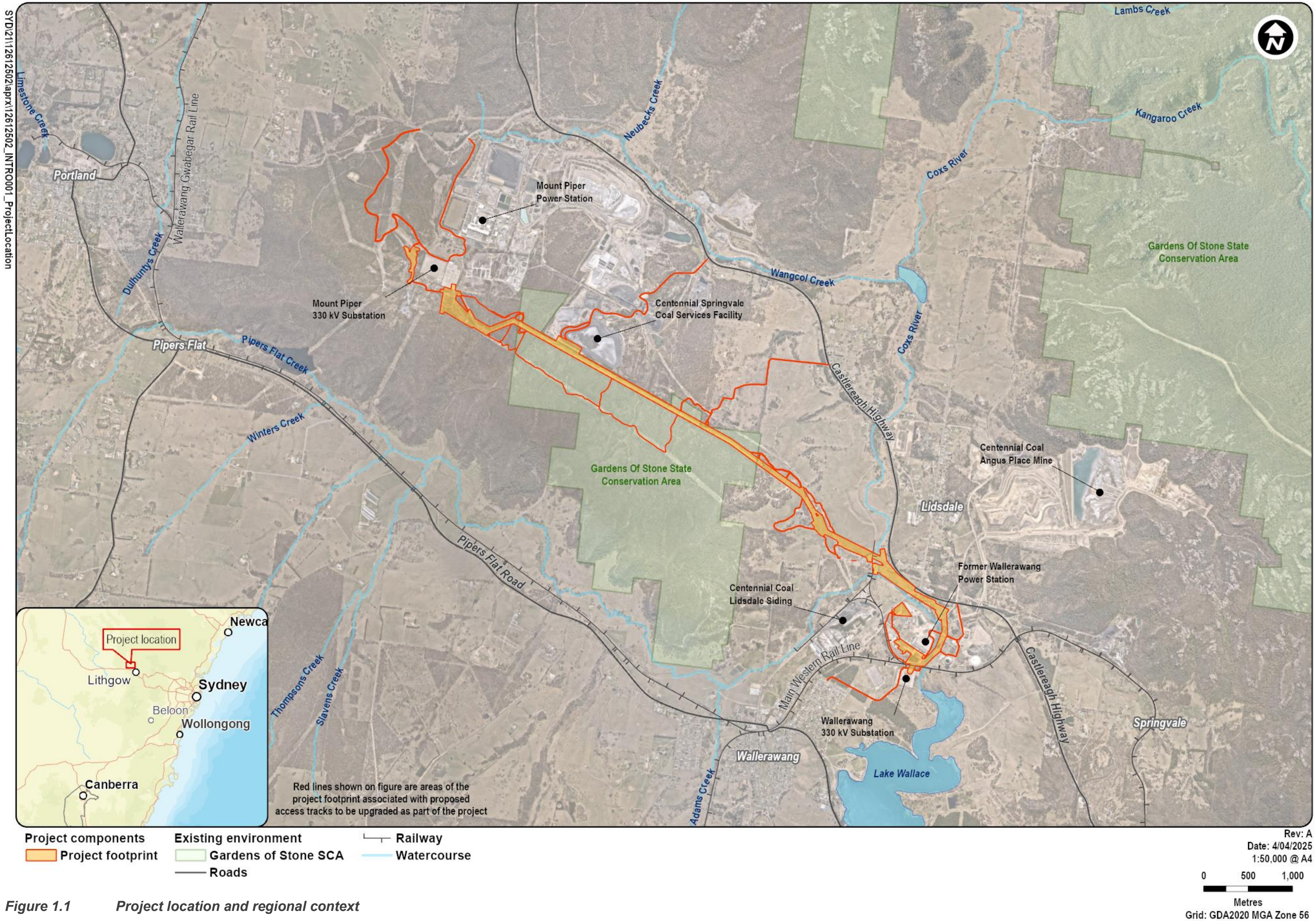


Figure 1.1 *Project location and regional context*

1.3 The project

The project would involve construction and operation of approximately 8 km of new 330 kV transmission line between the Mount Piper and Wallerawang 330 kV substations as shown in Figure 1.2. The project would also include the replacement of transmission structures, partial adjustment of existing transmission lines, permanent and temporary access tracks, construction compounds and laydown areas.

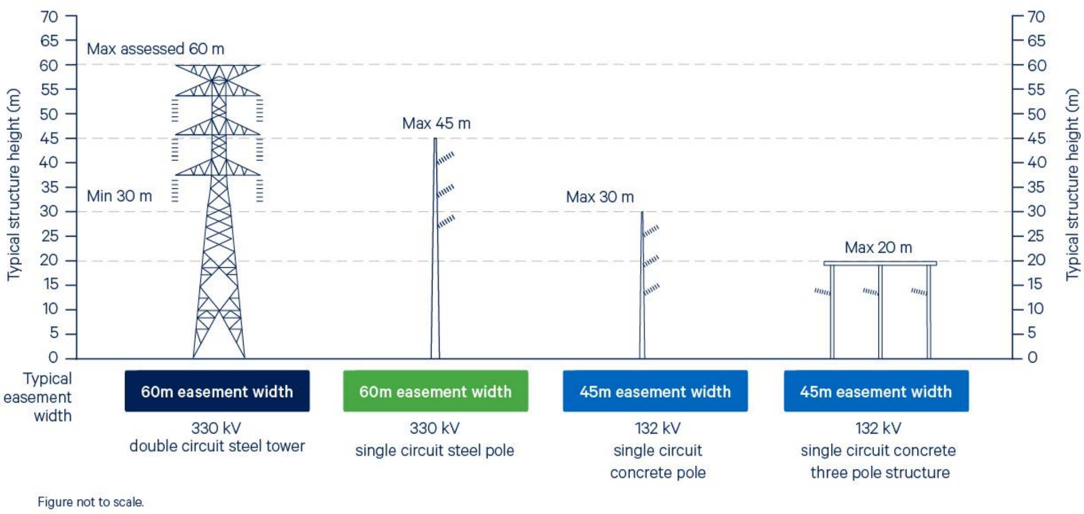
Figure 1.2 outlines the key features of the project. The description of the project in Table 1.1 is based on the current concept design. Further detail is provided in Chapter 3 of the Environmental Impact Statement (EIS). The project will continue to be refined as part of detailed design.

Table 1.1 The project

<table>
<tr><th>Feature</th><th>Description</th></tr>
<tr><td colspan="2">Design</td></tr>
<tr><td>Transmission line and easement</td><td>Approximately 8 km of new 330 kV transmission line between the existing Mount Piper 330 kV and Wallerawang 330 kV substations that would include (from north-west to south-east):

widening of approximately 0.5 km of existing easements in the vicinity of the Mount Piper 330 kV substation by up to 40 metres (m) to accommodate the new 330 kV transmission line and adjustments to existing 132 kV and 330 kV transmission lines
widening of the existing 132 kV easement from 45 m to 60 m for 4.8 km to accommodate double circuit transmission structures for the existing 132 kV transmission line and the new 330 kV transmission line
installation of two 132 kV pole structures where the existing 132 kV transmission line is restrung onto the new double circuit transmission structures
construction of 1.2 km of new 330 kV transmission line from the existing 132 kV transmission line south-east to the intersection of Main Street and the Castlereagh Highway on a 60 m easement
construction of 1.5 km of new 330 kV transmission line on a 40 m easement running parallel to existing 330 kV transmission lines for approximately 1.1 km and then diverging and widening to 60 m for the remaining 0.4 km to the Wallerawang 330 kV substation.

The standard easement widths for 132 kV and 330 kV transmission lines are 45 m and 60 m respectively. However, easements may vary in width where multiple transmission lines converge/ diverge or where they overlap with an existing easement.</td></tr>
<tr><td>Transmission structures</td><td>Transmission structures for the project include approximately 28 new steel lattice towers and four steel and/or concrete pole structures. Transmission structures would range in height from approximately 14 to up to 60 m, however these heights would be subject to detailed design. The image below presents an indicative illustration of the types of structures proposed for the project and their maximum heights.



The steel transmission structures would generally be spaced between 100 m to 550 m apart and the pole structures about 30 m to 50 m apart.

New conductors, earth wires and optical ground wire (OPGW) would be installed on the new transmission structures for the new 330 kV and existing 132 kV lines.</td></tr>
</table>

Feature	Description
	Local adjustment of existing transmission structures would be required in the vicinity of the Mount Piper 330 kV substation to minimise crossover of transmission lines. Redundant transmission structures, including the gantry immediately north of the Main Western Rail Line, would be removed and recycled, where possible.
Construction	
Program	Construction of the project would commence once all necessary approvals are obtained. It is anticipated that construction would commence in late 2026. Construction would be undertaken in stages over a period of approximately 20 months. The key activities and their indicative durations shown in the below table.

Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Site establishment																				
Civil works																				
Assembly of structures																				
Testing and commissioning																				
De-mobilisation																				

Feature	Description
Construction methodology	Construction of the project would include: – site establishment including vegetation removal, construction compound establishment, access track construction and upgrade – removal of existing transmission structures where required – civil works involving earthworks and establishment of construction benches for each transmission structure, and establishment of brake and winch sites – construction of footings and foundation work for the new transmission structures – assembly and erection of new transmission structures – stringing of conductors.
Construction hours	The proposed construction working hours for the project are 7 am to 7 pm Monday to Sunday. Out-of-hours construction work will likely be required between 7 pm to 7 am Monday to Sunday and public holidays, to align with scheduled outages. Justification for the out-of-hours works includes: – proximity to live transmission lines requiring the work to be completed under a scheduled outage for network and personnel and contractor safety – the need to complete works within a limited time window to meet a timeframe to re-energise the transmission line to avoid disruption to customers – minimising disruptions to the use of the Main Western Rail Line during stringing.
Construction workforce	Expected to peak at about 150 personnel and contractor, with an average workforce of about 60 personnel and contractor.
Construction compounds and laydown areas	A total of three construction compounds would support the construction of the project. One would be located at the western end of the project near the Mount Piper 330 kV substation and two located at the eastern end of the project within the former Wallerawang Power Station site. The locations of these compounds are shown in Figure 1.2. Laydown of materials (e.g. poles, cable drums, other large equipment, etc.) would also occur at specified locations along the easement within the project footprint, particularly at transmission structure locations.
Access	To facilitate efficient construction access, the following is required: – upgrading and widening of approximately 25 km of existing access tracks to at least 6 m, with some sections widened up to 10 m due to local topography – construction of approximately 2 km of new 6 m wide access tracks. In addition to those tracks, approximately 4 km of existing track would be used only by light vehicles. The light vehicle tracks may require minor repairs (for example, filling potholes), but would not be graded or widened. The project footprint would be accessed from public roads at 13 access points, with the majority of these being existing property access points.

Feature	Description
	Existing access tracks would be used in preference to new tracks wherever possible. Access track upgrades and widening would include required drainage. Access points and access tracks established for the construction of the project that are not required for future operation and maintenance activities would be returned to pre-project conditions, subject to agreement with landowners.
Utility adjustments and infrastructure crossings	The new transmission line would need to cross the following utilities and infrastructure: – water pipeline operated by WaterNSW – distribution lines operated by Endeavour Energy – rail signal power supply – council drainage and other assets – public roads at Brays Lane and Main Street – rail lines at the Main Western Rail Line and the disused rail line travelling north of Brays Lane. It is not currently anticipated that the project would require the adjustment of any nearby utilities. Further investigations and consultation with asset owners would be undertaken during detailed design.
Vegetation clearing	The project would require vegetation removal for a number of activities including but not limited to building new access tracks and widening existing ones, establishment of construction compounds, laydown areas, and brake and winch sites, construction of the transmission structures, and establishing and maintaining the Vegetation Clearance Requirement (VCR) for the transmission lines. Vegetation clearing would be undertaken either with the use of machinery or manually, where it is unsafe to operate machinery, or when access is limited. Root balls would be retained where possible. Clearing methods would be determined with consideration to vegetation type or structure, slope and terrain, and environmental and ecological constraints. Removed vegetation, which is weed free, would be mulched for beneficial reuse, where appropriate. Areas cleared for construction, that are not needed for operation of the project, would be rehabilitated to a stable and weed free condition.
Testing and commissioning	Testing and structure checks would form part of the final construction and installation work. These activities would ensure the project has been installed in accordance with the design and statutory standards and is safe to proceed to commissioning which would include, but not be limited to: – transmission line cut-in and connection to the electrical network – protection, control and metering checks – high voltage equipment operation and energisation – post commissioning testing and verification.
Demobilisation and rehabilitation	Upon completion of the construction works, all construction equipment, temporary fencing and waste would be removed. All disturbed areas would be rehabilitated to a stable, weed-free condition, unless designated as a permanent access track. This would include spreading topsoil, cleared and stockpiled at the beginning of construction, across the disturbed area to stabilise it to a state where natural regrowth can occur.
Operation	
Design life	About 50 years.
Maintenance	All project infrastructure would require regular maintenance to maintain serviceability and maximise its operational life. Maintenance activities would include: – transmission structure monitoring – annual aerial inspection – routine vegetation management on the easement and in the hazard tree zone – access tracks would be maintained in a trafficable condition. Should any irregularities be identified following routine inspections, a work crew would be dispatched from existing Transgrid maintenance depots to rectify any defects found. Periodic inspection and maintenance work would be managed by Transgrid as part of existing operations, with no additional staff requirements.

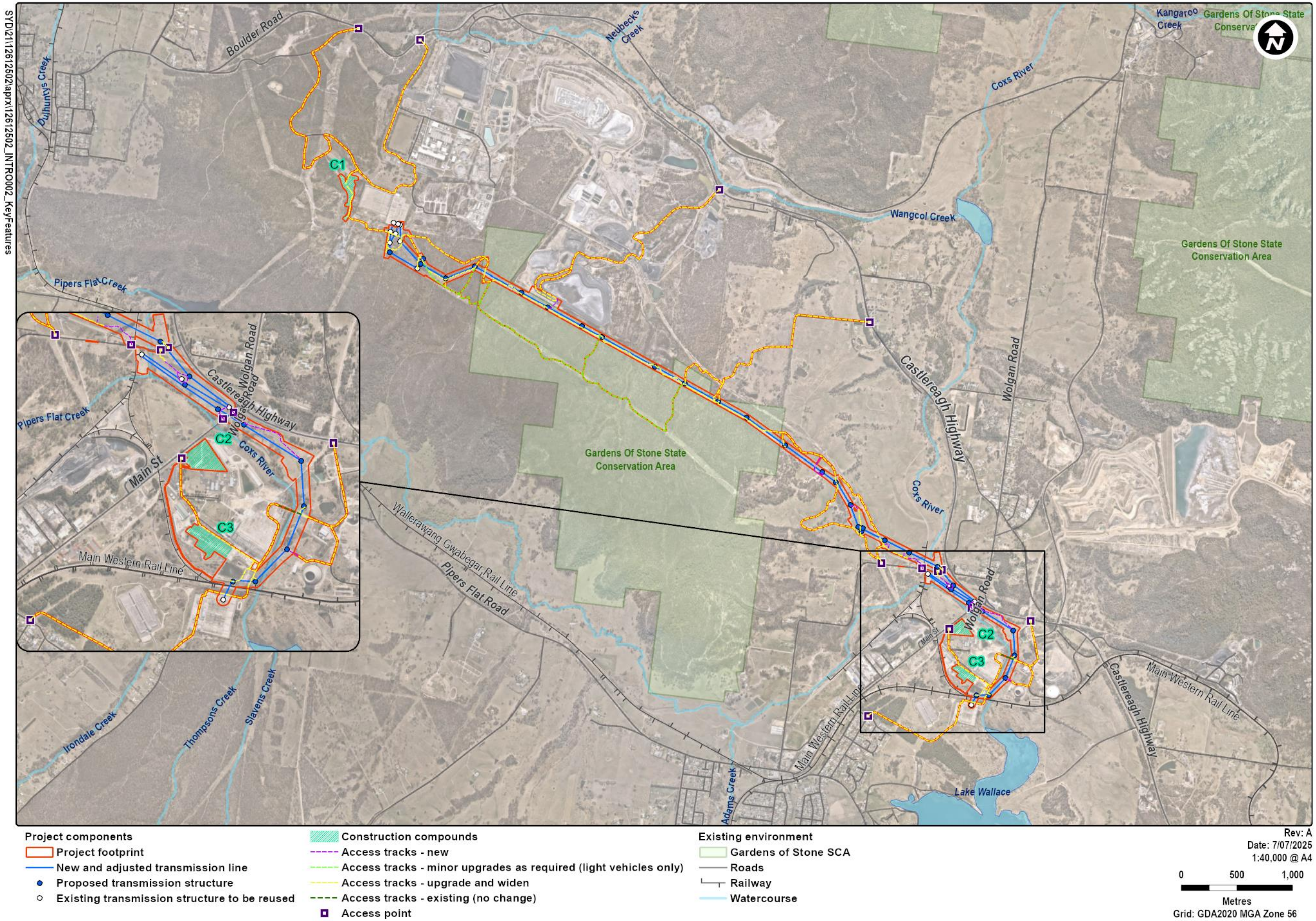


Figure 1.2 Key features of the project

1.4 Environmental assessment requirements

This noise and vibration impact assessment has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) which were issued on 22 May 2025. Table 1.2 outlines the requirements relevant to this assessment.

Table 1.2 Relevant SEARs

Requirements	Where addressed in this report
Noise	
Including an assessment of the construction noise impacts of the project in accordance with the Interim Construction Noise Guideline (ICNG), blasting impacts, cumulative noise impacts (considering other developments in the area), and operational noise impacts in accordance with the NSW Noise Policy for Industry (2017), including corona noise; and	Section 6.1 Construction noise Section 6.4 Operational impacts (includes corona noise) Section 6.5 Cumulative impacts No blasting proposed for the project
Provide details of measures to mitigate and / or manage potential impacts.	Section 7

1.5 Purpose and structure of this report

This report has been prepared by GHD Pty Ltd (GHD) as part of the Environmental Impact Statement (EIS) for the project.

The purpose of this report is to assess potential noise and vibration issues from the construction and operation of the project, and where required, identify feasible and reasonable mitigation and management measures. This report:

- addresses the relevant SEARs as outlined in Table 1.2
- describes the existing environment with respect to noise
- assesses the impacts of construction and operating the project with respect to noise and vibration
- recommends measures to mitigate and manage the impacts identified.

The report is structured as follows:

- Section 1 – outlines the key elements of the project, relevant SEARs requirements, and the purpose of this report (this section)
- Section 2 – describes the legislation, policy and guidelines relevant to the assessment including presentation of criteria for construction noise, construction vibration, operational noise and traffic noise
- Section 3 – provides a description of the proposed construction hours including out of hours work, the proposed construction activities and the proposed operational activities associated with the project
- Section 4 – describes the study area, approach to noise monitoring and methodology implemented in this assessment
- Section 5 – describes the existing noise environment and the results of noise monitoring
- Section 6 – examines the potential noise and vibration impacts during construction and operation (including maintenance) of the project including potential cumulative impacts
- Section 7 – recommends measures to mitigate and manage the potential impacts identified
- Section 8 – summarises the key findings of the assessment.

1.6 Scope and limitations

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on:

- Conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

– Assumptions made by GHD described in this report (refer sections 4.3, 4.4, 4.5, 4.6, 0 and 6.4 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.
– Information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including noise and vibration levels) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

GHD has prepared this report on the basis of information provided by Transgrid and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Legislation, policy and relevant guidelines including criteria

2.1 Legislative and policy context to the assessment

The relevant guidelines for this report are listed in Table 2.1. The assessment criteria and methodology for the assessment, developed in accordance with these guidelines, are provided in the following sections.

Table 2.1 Noise and vibration assessment guidelines

Guidelines and regulations	Relevance to the assessment
The Protection of the Environment Operations Act 1997 (NSW) (POEO Act) *Protection of the Environment Operations (Noise Control) Regulation 2008*	The POEO Act, in conjunction with Regulation (Noise Control) establishes the legal framework for noise control in NSW.
Assessing Vibration: a technical guideline (DEC, 2006) (AVTG) *BS 5228.2 – 2009, Code of Practice Part 2 Vibration for noise and vibration on construction and open sites – Part 2: Vibration* (British Standards, 2009) (BS 5228.2 – 2009)	Assessment of human comfort vibration impacts to sensitive receivers during construction.
Interim Construction Noise Guideline (DECC, 2009) (ICNG)	Assessment of construction noise impacts to sensitive receivers, including noise management levels (NMLs) and sleep disturbance.
Construction Noise and Vibration Guideline (Roads) (TfNSW, 2024) (CNVG)	Assessment of construction noise impacts to sensitive receivers and approaches to mitigating impacts, including: – perception categories based on the difference between the predicted noise levels and the NMLs – guidance on management measures for reducing impacts of construction noise and vibration – guidance on source, path and receiver mitigation measures during the project's construction phase – guidance on management of residual noise and vibration impacts and the approach to managing impacts from out of hours works (OOHW) during the project's construction phase (after reasonable and feasible mitigation measures have been implemented).
Noise Policy for Industry (EPA, 2017) (NPfI)	Assessment of operational noise impacts (including from corona noise and maintenance activities) and establishing noise trigger levels.
NSW Road Noise Policy (DECCW, 2011) (RNP)	Assessment of road traffic noise impacts during construction and operation.
German Standard DIN 4150-3: Structural Vibration – effects of vibration on structures (German Standards, 2016) (DIN 4150-3)	Determining relevant criteria for cosmetic damage to vibration sensitive structures of heritage significance (if structure is found to be unsound) and buried pipework/utilities.
The Air Navigation (Aircraft Noise) Regulation 2018	Regulates noise emissions from aircraft in Australia, including from remote piloted aircraft (drones).

2.2 Construction noise management levels

Table 2 in the ICNG provides recommended Construction Noise Management Levels (CNML) for residences, which are established by using the rating background noise level (RBL) as detailed in Table 2.2. The NMLs for other sensitive land uses are also provided in the ICNG and are reproduced in Table 2.3.

Table 2.2 Residential CNMLs (ICNG, 2009)

Time of day	CNML, $L_{Aeq,15\ min}$	Application notes
Standard hours	Noise affected: RBL + 10 dBA	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq,15\ min}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as provide contact details.
	Highly noise affected: 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: – times identified by the community when they are less sensitive to noise (such as before and after school, or mid-morning or mid-afternoon for works near residences) – if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside standard hours	Noise affected: RBL + 5 dBA	A strong justification would typically be required for works outside the standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable measures have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community.

Table 2.3 NMLs at non-residential sensitive land uses (ICNG, 2009)

Land use	Construction NML $L_{Aeq,15min}$
Classrooms at schools and other educational institutions	Internal noise level of 45 dBA
Places of worship	Internal noise level of 45 dBA
Active recreation area	External noise level of 65 dBA
Passive recreation areas	External noise level of 60 dBA
Industrial premises	External noise level of 75 dBA
Commercial premises	External noise level of 70 dBA

The noise affected and highly noise affected CNMLs in the ICNG are not strict limits, rather they represent levels that, if exceeded, would require management measures including:

– reasonable and feasible work practices
– contact with the residences to inform them of the nature of works to be carried out, the expected noise levels and durations, and contact details.

Management measures should be aimed at reducing noise levels at the impacted sensitive receivers. However, it may not be reasonable and feasible to reduce noise levels to below the CNMLs. Where it is predicted that noise affected CNMLs would be exceeded following mitigation, additional noise management measures can be used to address the residual impacts.

2.2.1 Project specific construction noise management levels

Project specific CNMLs have been identified based on the results of noise monitoring, observations and the presence and proximity to existing noise sources in the study area (this process is further described in section 4.2). Two noise catchment areas (NCAs) (see Figure 4.1 in section 4.1) were identified as being representative of suburban areas (NCA1) and rural areas (NCA2) in the study area. The project specific CNMLs established for sensitive receivers in the study area are summarised in Table 2.4.

Table 2.4 Project specific CNMLs (NPfI, 2017)

Sensitive receiver type		CNML $L_{Aeq,15min}$ (dBA)				
		Standard hours		Outside Standard hours		
		Noise affected	Highly noise affected	Day	Evening	Night
Residential	NCA1	45	75	40	35	35
	NCA2	45	75	40	35	35
Educational institutes		External noise level of 55 dBA (when in use)[1]				
Places of worship		External noise level of 55 dBA (when in use)[1]				
Active recreation		65 dBA (when in use)				
Passive recreation		60 dBA (when in use)				
Industrial		75 dBA (when in use)				
Commercial (also including temporary accommodation)		70 dBA (when in use)				

Note: 1. Based on 10 dB attenuation through an open window to achieve an internal level of 45 dBA.

2.2.2 Construction noise perception categories

To assess the potential construction-related noise impacts to sensitive receivers within the study area, the approach from the CNVG has been adopted. A perception category is assigned to each receiver based on the difference between predicted noise levels and the CNML. The noise perception categories from the CNVG are outlined in Table 2.5.

Table 2.5 Construction noise perception categories (CNVG, 2024)

Noise perception category	Noise level range above CNML			
	Standard hours	Outside standard hours – day	Outside standard hours – evening	Outside standard hours – night
Noticeable	Not applicable	1 dBA to 5 dBA above CNML		
Clearly audible	1 dBA to 10 dBA above CNML	5 dBA to 15 dBA above CNML		
Moderately intrusive	10 dBA to 20 dBA above CNML	15 dBA to 25 dBA above CNML		
Highly intrusive	More than 20 dBA above CNML	More than 25 dBA above CNML		

A comparison of typical noise levels is provided in Figure 2.1 for reference. The perception of noise is strongly influenced by people’s environment. A noise level that is perceived as loud in one situation may appear quiet in another.

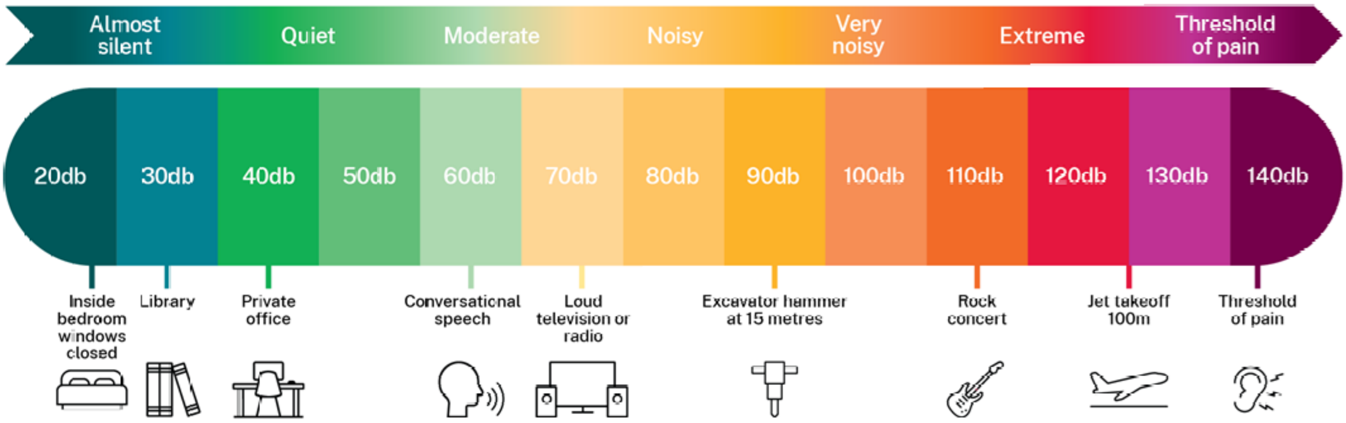


Figure 2.1 Noise level comparisons

2.3 Construction sleep disturbance

The ICNG recommends assessing maximum noise level events where construction works are planned to extend over more than two consecutive nights. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages as a result of maximum noise level events. As the ICNG does not provide a specific methodology to assess sleep disturbance, the screening assessment methodology provided in the NPfI has been adopted.

The NPfI states that where the project exceeds the following screening noise trigger levels at a residential location, a detailed maximum noise level event assessment should be undertaken:

– $L_{Aeq,15min}$ 40 dBA or the prevailing RBL plus 5 dB, whichever is the greater, and/or
– L_{AFmax} 52 dBA or the prevailing RBL plus 15 dB, whichever is the greater.

The detailed assessment covers the predicted maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the number of times this happens during the night time period.

2.4 Road traffic noise criteria – construction and operation

The RNP provides traffic noise criteria for residential sensitive receivers in the vicinity of existing arterial and local roads. The criteria (reproduced in Table 2.6) are applied to operational and construction traffic on public roads to identify potential road traffic noise impacts and the requirement for reasonable and feasible mitigation measures.

Table 2.6 Road traffic noise criteria (RNP, 2011)

Road category	Type of development	Day 7 am to 10 pm	Night 10 pm to 7 am
Freeway/arterial/ sub-arterial roads	Existing residence affected by additional traffic on arterial roads generated by land use developments	60 $L_{Aeq,15hr}$	55 $L_{Aeq,9hr}$
Local roads	Existing residences affect by noise from new local road corridors Existing residence affected by additional traffic on local roads generated by land use developments	55 $L_{Aeq,1hr}$	50 $L_{Aeq,1hr}$

Additionally, the RNP application notes state that *"for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level as a result of the development should be limited to 2 dB above that of the noise level without the development. This limit applies wherever the noise level without the development is within 2 dB of, or exceeds, the relevant day or night criterion."*

Therefore, if the road traffic noise increase is within 2 dBA of current levels during construction or operation of the project, then the objectives of the RNP are met and no specific mitigation measures are required, regardless of whether values presented in Table 2.6 are exceeded.

2.5 Construction vibration criteria

2.5.1 Human comfort

Vibration is assessed based on the criteria in AVTG. *BS6472: Guide to Evaluation of Human Exposure to Vibration in Buildings* (1 Hz to 80 Hz) (British Standards, 2008) (BS6472-1:2008) is recognised by the guideline as the preferred standard for assessing the 'human comfort criteria'.

Intermittent vibration is assessed using the vibration dose value. Acceptable values of vibration dose are presented in Table 2.7 for residential sensitive receivers.

While the assessment of response to vibration in BS6472-1:2008 is based on vibration dose value and weighted acceleration. For construction related vibration, it is considered more appropriate to provide guidance in terms of a Peak Particle Velocity (PPV), since this parameter is likely to be more routinely measured based on the more usual concern over potential building damage.

Humans are capable of detecting vibration at levels that are well below those causing risk of damage to a building. The degrees of perception for humans are suggested by the vibration level categories given in BS 5228.2 – 2009, as shown in Table 2.8.

Table 2.7 Acceptable PPV Values for Human Comfort (BS6472-2008)

Receiver type	Period[1]	Intermittent vibration dose value (m/s$^{1.75}$)	
		Preferred value	Maximum value
Residential	Day	0.2	0.4
	Night	0.13	0.26
Note 1: Day is between 7 am and 10 pm and night is between 10 pm and 7 am			

Table 2.8 Guidance on effect of vibration levels for human comfort (BS5228.2 – 2009)

Vibration level	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration. frequencies associated with construction.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration at this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure.

2.5.2 Cosmetic and structural damage

The CNVG refers to British Standard *BS 7385-2:1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground-borne vibration* (BS 7385-2:1993). The guidance from this standard is used by the CNVG to develop minimum safe working distances for typical construction plant used on projects in NSW, which are reproduced in section 4.4. The cosmetic damage criteria for standard structures that forms a basis for the minimum working distances is summarised in Table 2.9.

Table 2.9 Cosmetic damage criteria – standard structures (BS 7385-2:1993)

Line	Type of building	PPV in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

While the CNVG minimum working distances apply to typical light-framed residential structures, additional guidance is needed to reduce risk of damage to heritage structures and other potentially vibration sensitive structures not sufficiently covered by BS 7385-2:1993. Guideline values attained from reference to German Standard DIN 4150-3:2016 are commonly used in NSW to identify and manage the potential ground vibration impacts in these cases. DIN 4150-3:2016 guideline values for structural vibration are reproduced in Table 2.10.

Table 2.10 Guideline values for short term vibration on structures (DIN 4150-3, 2016)

Type of structure	Guideline values for velocity (mm/s)		
	1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz[1]
Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50
Dwellings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20
Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (e.g. listed buildings under preservation order)	3	3 to 8	8 to 10

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

2.5.3 Guidelines for buried pipework and services

The British Standard *BS 7385-2:1993 Evaluation and measurement for vibration in buildings* (BS7385-2:1993) notes that structures below ground are known to sustain higher levels of vibration and are very resistant to damage unless in very poor condition.

Guideline values for vibration to evaluate the effects of vibration on buried pipework is provided in German Standard DIN 4150-3. These values are reproduced in Table 2.11.

Table 2.11 Guideline values for vibration effects on buried pipework (DIN 4150-3, 2016)

Line	Pipe material	Guideline values for vibration velocity measured on the pipe
1	Steel (including welded pipes)	100 mm/s
2	Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80 mm/s
3	Masonry, plastic	50 mm/s

In general, compliance with the guideline values for structural damage in Table 2.10 would result in compliance with the guideline values for buried pipework in Table 2.11.

2.6 Operational noise criteria

The NPfI provides guidance on the assessment of operational noise impacts. The guideline includes both intrusive and amenity criteria that are designed to protect sensitive receivers from noise significantly louder than background level, and to limit the total noise level from all sources near a receiver.

The NPfI noise criteria are planning levels and are not mandatory limits required by legislation. However, the noise criteria assist regulatory authorities to establish licensing or approval conditions. Where noise criteria are predicted to be exceeded, feasible and reasonable noise mitigation strategies should be considered. In circumstances where noise criteria cannot be achieved, negotiation is required between the regulatory authority to evaluate the economic, social and environmental costs and benefits of the development against the noise impacts. The regulatory authority then sets statutory compliance levels that reflect the achievable and agreed noise limits from the development.

The NPfI includes guidance for setting project specific noise trigger levels (PNTLs) based on the lower of amenity and intrusiveness based targets, which are further discussed in sections 2.6.1 and 2.6.2.

2.6.1 Project intrusiveness noise levels

The intrusiveness noise levels apply over 15 minutes in any period (day, evening, or night) and aim to control the relative audibility of operational noise compared to the background level at residential sensitive receivers.

The intrusiveness noise level is determined by a 5 dB addition to the RBL with a minimum intrusiveness noise level of:

– 40 dBA during the day
– 35 dBA during the evening and night.

The intrusiveness noise levels are only applicable to residential sensitive receivers.

2.6.2 Project amenity noise levels

The amenity noise level limits the total level of extraneous noise for all receiver types and is assessed over the entire assessment period (day, evening, or night). The recommended amenity noise level represents the total noise from all relevant industrial sources at a receiver location. The project specific amenity noise level target in the NPfI is set at 5 dBA below the recommended amenity noise level to provide protection against potential cumulative impacts from existing or future sources. Section 6.5 outlined the projects considered as part of the cumulative assessment and provide an assessment of cumulative operational noise impacts.

Residential receiver areas are characterised into 'urban', 'suburban', 'rural' or other categories based on land uses and the existing level of noise from industrial activity and road traffic. As defined by the NPfI 'noise amenity area' classification, the residential sensitive receivers situated within Wallerawang are classified as suburban and all other sensitive receivers for the project are classified as rural residential.

The amenity noise levels for the sensitive receivers applicable to the project are summarised in Table 2.12.

Table 2.12 Amenity noise levels for sensitive receivers

Receiver type	Assessment period	Amenity noise level $L_{Aeq, period}$ (dBA)
Residential – Suburban	Day	55
	Evening	45
	Night	40
Residential – Rural	Day	50
	Evening	45
	Night	40
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	When in use	5 dBA above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School classroom – Internal	Nosiest 1-hour period when in use	35
Place of worship – Internal	When in use	40
Passive recreation	When in use	50
Active recreation	When in use	55
Commercial premises	When in use	65
Industrial premises	When in use	70

2.6.3 Project noise trigger levels

A summary of the PNTL for residences in the study area are provided in Table 2.13, while Table 2.14 provides the PNTLs for non-residential sensitive receivers. Values presented in **bold** are the lower of the intrusiveness noise level and project amenity noise level.

Table 2.13 PNTLs for residential sensitive receivers

NCA	Assessment period	Intrusiveness noise level $L_{Aeq,15\ min}$ (dBA)	Project amenity noise level $L_{Aeq,15\ min}$ (dBA)[1,2]	PNTL $L_{Aeq,15\ min}$ (dBA)
NCA1 (Suburban)	Day	**40**	53	40
	Evening	**35**	43	35
	Night	**35**	38	35
NCA2 (Rural)	Day	**40**	48	40
	Evening	**35**	43	35
	Night	**35**	38	35

Notes: 1. The project amenity noise levels have been calculated by subtracting 5 dBA from the recommended amenity noise levels.
2. The NPfI recommends a 3 dBA addition to the $L_{Aeq,period}$ noise level to convert the amenity noise level to a $L_{Aeq,15\ min}$

Table 2.14 PNTLs for non-residential sensitive receivers

Type		Time of day	PNTL $L_{Aeq,15\ min}$ (dBA)[1]
Temporary accommodation (e.g. hotels and motels)	NCA1 (Suburban)	Day	58
		Evening	48
		Night	43
	NCA2 (Rural)	Day	53
		Evening	48
		Night	43
Educational institute		Noisiest 1-hour period when in use	43[2]
Places of worship		When in use	48[2]
Passive recreation areas		When in use	48
Active recreation areas		When in use	53
Commercial premises		When in use	63
Industrial premises		When in use	68

Notes: 1. The project amenity noise levels have been calculated by subtracting 5 dBA from the recommended amenity noise and applying a 3 dBA addition to the $L_{Aeq,period}$ noise level to convert the amenity noise level to a $L_{Aeq,15\ min}$.
2. Based on a 10 dB attenuation through an open window to achieve an internal level of 35 dBA for classrooms and 40 dBA for places of worship.

2.6.4 Audible corona noise criteria

The TLDM-MNB states that transmission line audible noise shall not show worse performance than 50 dBA at the edge of the transmission line easement in L_{50} wet conditions.

In addition to the performance criteria provided, audible corona noise should comply with the PNTLs for residential and non-residential sensitive receivers presented in section 2.6.3.

2.7 Aircraft noise regulation

Multi-rotor unmanned drones may be used for stringing purposes. The use of drones in line stringing and other maintenance activities is typically faster than traditional construction methods and serves to reduce the duration of potential noise impacts at sensitive receivers.

The Air Navigation (Aircraft Noise) Regulation 2018 (Aircraft Noise Regulation) made under the *Air Navigation Act 1920* regulates noise emissions from aircraft in Australia, including from remote piloted aircraft (drones). The Aircraft Noise Regulation requires that any aircraft or drone must not engage in air navigation unless it has a noise certificate issued for the aircraft or where the aircraft has the relevant approvals.

While drone activities are not regulated under the *Protection of the Environment Operations Act 1997* (POEO Act) in NSW, it is considered reasonable to manage potential impacts to sensitive receivers from drone noise during construction using the same approach as other construction activities. Drones have been included in the construction scenario noise sources for line stringing activities and assessed as part of this scenario (Scenario CS08, refer to section 4.3.1) against the project's construction noise criteria.

A qualitative assessment and discussion on the use of drones for operational maintenance activities has been undertaken and is provided in section 6.4.1.

3. Works description

3.1 Construction hours

3.1.1 Standard construction hours

The ICNG provides guidance for the assessment and management of construction noise. The guideline recommends standard hours for construction activities as follows:

– 7 am to 6 pm Monday to Friday
– 8 am to 1 pm Saturday
– no work on Sundays or public holidays.

Figure 3.1 shows the ICNG standard construction hours and periods outside of standard hours, also referred to as out of hours work (OOHW) periods.

3.1.2 Proposed project working hours

The proposed project construction hours would be from 7 am to 6 pm Monday to Sunday and use of the construction compounds from 6 pm to 7 pm Monday to Friday (Figure 3.1). This work includes work outside of the ICNG standard construction hours, as described in section 3.1.3.

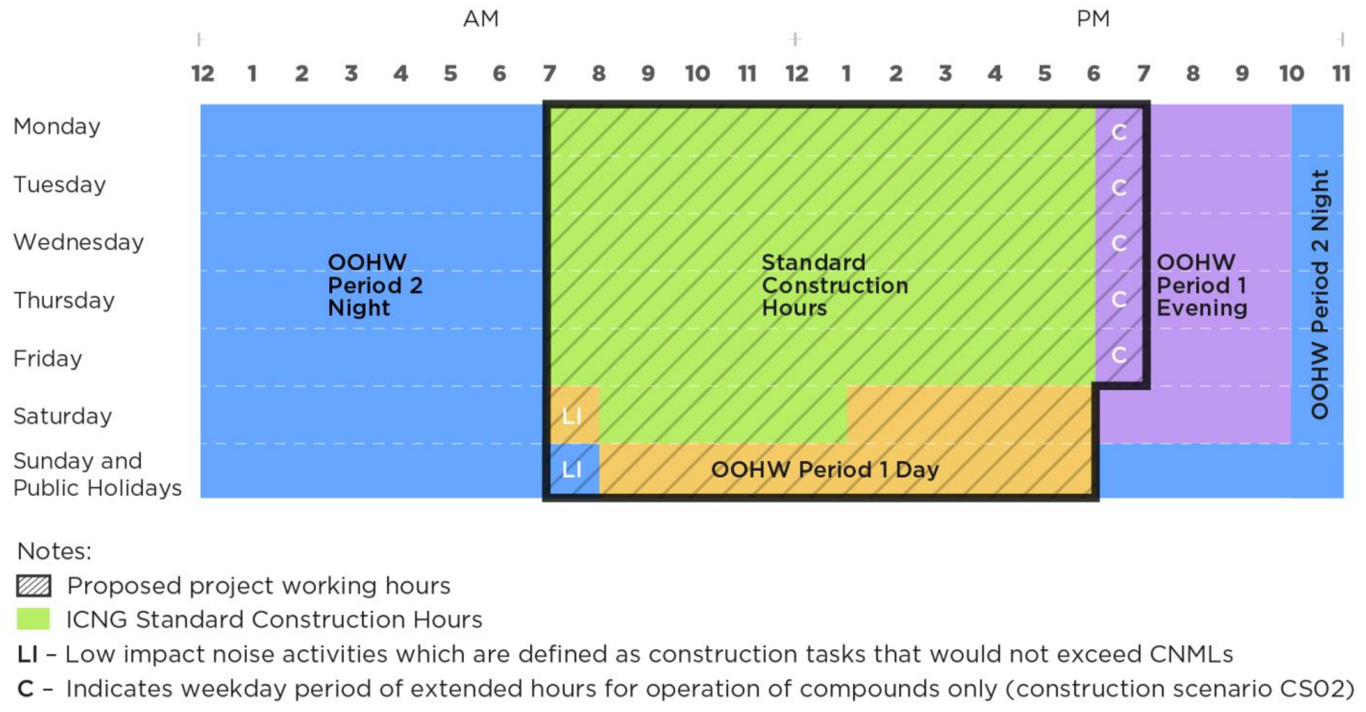


Figure 3.1 Proposed project construction hours

3.1.3 Out of hours work

3.1.3.1 OOHW during proposed project construction hours

As part of the proposed project construction hours, work would be undertaken during the following OOHW periods:

– OOHW Period 1 Day:
  - 7 am to 8 am Saturday (only for construction tasks that would not exceed CNMLs)
  - 1 pm to 6 pm Saturday
  - 8 am to 6 pm Sunday

– OOHW Period 1 Evening:
  - 6 pm to 7 pm Monday to Friday (use of construction compounds only)
– OOHW Period 2 Night:
  - 7 am to 8 am Sunday (only for construction tasks that would not exceed CNMLs).

Key reasons for the need to undertake work in the OOHW periods listed above are that:

– works in proximity to transmission lines must be completed under outage for worker safety
– these works must be completed efficiently as scheduled outages are of a limited duration due to network security and reliability constraints.

Compounds would also be used during weekday afternoons from 6 pm to 7 pm following the completion of construction work at 6 pm. Vehicle movement and cleaning and storage of vehicles and equipment would be the key activities anticipated at the compounds during this period. On weekends, construction work would end earlier and compound use would cease at 6 pm.

Work between 7 am and 8 am on Saturday and Sunday would be limited to construction tasks that are predicted not to exceed the CNMLs. These are construction activities that occur in locations that result in $L_{Aeq,15min}$ noise levels of no more than 5 dBA above the rating background level at any residence. These works have been termed “low noise impact activities”. The type of work permissible would vary depending on the distance from the work area to the nearest receiver and would be outlined in the Noise and Vibration Management Plan.

3.1.3.2 Construction work during Period 1 Evening and Period 2 Night

The primary reason for work during the OOHW Period 1 Evening and Period 2 Night would be an outage recall. This is where a scheduled outage is recalled to maintain electricity supply and network stability in response to unexpected network demands.

When an outage is recalled, work currently underway would need to be completed within a designated timeframe to reinstate power along the existing transmission lines. The timeframe available to reinstate power would be confirmed at the time of the recall, however it would generally be less than three days in duration. Due to this short duration, construction work would need to be undertaken during Period 1 Evening and Period 2 Night to ensure the transmission line can be re-energised within the designated timeframe.

There are two other reasons why work may be required during Period 1 Evening and Period 2 Night:

– to work within shutdown periods for the Main Western Rail Line, as scheduled by the rail operator
– to comply with partial or full local road closure requirements at Brays Lane and/or Main Street, as agreed with Lithgow City Council.

Work during Period 1 Evening and Period 2 Night would be limited to transmission structure assembly, transmission line stringing, and associated use of construction compounds.

3.1.3.3 OOHW Summary

Overall, the need for OOHW would be programmed on the following principles:

– Works would be scheduled to avoid OOHW in Period 1 Evening and Period 2 Night where possible and would generally be undertaken during proposed project construction hours.
– Works would be sequenced such that works during OOHW Period 1 Day would occur in areas of lesser impact where possible. For instance, where there are fewer sensitive receivers at the Mount Piper end of the project compared to the Wallerawang end of the project in the vicinity of the Lidsdale and Wallerawang townships.

The necessary OOHW would occur in accordance with a project specific Noise and Vibration Management Plan that is inclusive of an out-of-hours protocol. Noise mitigation measures for OOHW impacts are provided in section 7.

3.2 Construction activities

Construction of the project is planned to occur progressively and concurrently in multiple locations. A summary of the construction activities is provided in Table 3.1. For the purposes of assessing noise impacts, these activities have been further divided into construction scenarios CS01 to CS09 (see section 4.3.1) based on equipment, location and timing. No blasting is proposed as part of the construction works.

Table 3.1 Construction activities

Activity	Construction scenario	Description *(modelled scenarios in brackets)*
Site establishment	Site establishment (CS01)	Installation of environmental controls, including site demarcation, sediment fencing and exclusion zone signage Establishment of construction compounds Relocation of any existing services or utilities if/as required
	Construction compounds (CS02)	Operation of construction compounds to support site establishment works
	Access track upgrades (CS03)	Upgrade of existing tracks, creating new access tracks (if required) and stabilisation of these tracks required for construction access Constructing temporary waterway crossings (where required)
	Vegetation clearing (CS04)	Clearing of vegetation identified for removal within compound areas and for new access tracks and where access track widening is to occur
Civil works	Construction compounds (CS02)	Operation of construction compounds to support civil works
	Earthworks & civil works (CS05)	Earthworks and establishment of construction benches for each transmission structure
	Structure footing construction (Impact piling) (CS06) Structure footing construction (Bored piling) (CS06B)	Construction of footings and foundation works for new transmission structures which can include boring, excavation, steel fabrication, and concrete pours
Assembly of structures	Construction compounds (CS02)	Operation of construction compounds to support assembly of structures Delivery of materials, structural elements and conductors
	Structure assembly and erection (CS07)	Delivery of materials, structural elements and conductors Assembly and erection of transmission structures including fittings and insulators using crane(s) and elevated work platforms Replacement and adjustment to transmission structures and transmission lines that feed into the substations to avoid crossovers
	Stringing transmission line (CS08)	Setup of facilities and equipment adjacent to the transmission structures to pull the conductors from drums in sections Stringing of conductors and overhead earth wires for protection against lightning strikes and for telecommunications Installing earthing conductors
Testing and commissioning	N/A	Testing the functionality of the new and adjusted transmissions lines Testing would occur progressively as sections of lines are completed and reconnected to the network
Demobilisation	Construction compounds (CS02)	Operation of construction compounds to support demobilisation activities
	Demobilisation/ rehabilitation (CS09)	Removal of temporary buildings and structures Site restoration and stabilisation of construction benches, including removal of environmental controls Stabilisation of permanent access tracks and maintenance for ongoing use Removal of any temporary waterway or railway crossings

3.3 Operational activities

The transmission line, easement and associated access tracks would require regular and routine maintenance, including:

- Regular inspection and maintenance:
  - An annual light detection and ranging (LiDAR) survey is conducted as part of bushfire prevention measures. The LiDAR data is collected using a helicopter. This survey is part of the existing maintenance operations for the existing 330kV (TL70 and TL71) and 132 kV (TL94E) transmission lines and would continue for this project.
  - An annual inspection of the transmission line is conducted by helicopter. This inspection is part of the existing maintenance operations for the existing 330kV (TL70 and TL71) and 132 kV (TL94E) transmission lines and would continue for this project.
  - A detailed inspection of each structure is undertaken on a six-year cycle. This is generally done using a drone. However, if a drone cannot be used, maintenance personnel will climb the structure to complete the inspection.
  - Management of vegetation within the transmission line easement, hazard tree zone and on access tracks would be conducted every four to six years, based on growth rates expected in the region.
- Reactive maintenance:
  - Maintenance of transmission lines would be conducted in response to issues identified during routine inspections. This typically involves maintenance personnel using light vehicles, an elevated work platform and a medium sized truck to rectify any defects found during routine inspections. Generally, this occurs within the same maintenance cycles as the routine infrastructure inspection.
- Vegetation management:
  - If hazard trees are identified during the LiDAR survey, an arborist would visit to inspect the condition of the trees and determine if they need to be trimmed or removed.
- Access track maintenance:
  - Access track maintenance would be undertaken on an as-needed basis following routine inspections which identify potential or existing access risks.

4. Methodology

4.1 Study area

The noise and vibration study area is defined as a 3 km buffer of the project footprint and is shown in Figure 4.1. The noise and vibration study area represents the extent of all sensitive receivers potentially impacted by noise and vibration resulting from the project.

4.1.1 Noise catchment areas

The study area was divided into two Noise Catchment Areas (NCAs) based on the types of sensitive receivers and the acoustic environments:

- NCA1 contains suburban residential land uses within Wallerawang and includes non-residential sensitive receivers such as the Wallerawang Bowling Club, Saint Thomas’s Church and the Wallerawang Library.
- NCA2 contains rural residential land uses and contains the majority of the study area outside of Wallerawang.
- The NCAs for the project are shown in Figure 4.1.

4.1.2 Noise sensitive receivers

Noise sensitive receivers are defined based on the type of occupancy and the activities performed on the land. Noise sensitive receivers include (where relevant) both existing and proposed:

- private residences
- classrooms at schools and other educational institutes
- hospitals wards and operating theatres
- places of worship
- community centres
- passive recreational areas such as parks and reserves
- active recreational areas such as sporting fields, golf courses.

The nearest residences are located approximately 60 metres (m) from the project footprint at Duncan Street, Lidsdale in NCA2. The nearest non-residential sensitive receivers and approximate distances to the project footprint include:

- place of worship at Main Street, Wallerawang (60 m)
- commercial premises at Wolgan Road, Lidsdale (60 m)
- industrial premises at Main Street, Wallerawang (160 m)
- temporary accommodation at Main Street, Wallerawang (400 m)
- active recreation area at Brays Lane, Wallerawang (540 m)
- passive recreation area at Lake Wallace (950 m)
- community facility at Main Street, Wallerawang (1,360 m)
- education facility at Barton Avenue, Wallerawang (1,650 m).

Identified sensitive receivers are shown in Figure 4.1, with detailed mapping provided in Appendix B including receivers unique identifiers.

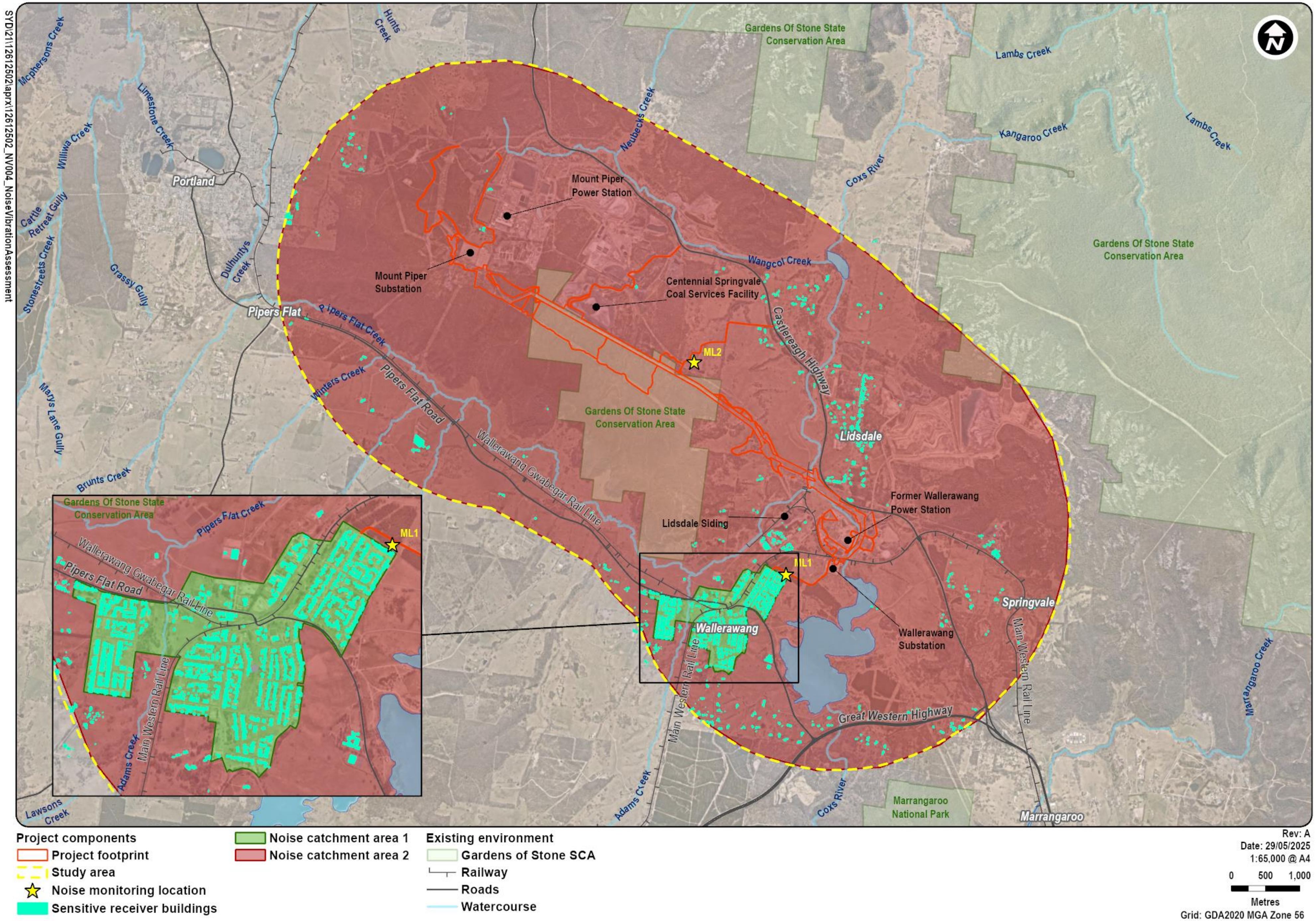


Figure 4.1 Study area for the assessment

4.2 Noise monitoring

Noise monitoring was conducted in December 2023 to quantify the existing noise environment and identify existing noise sources in the vicinity of the project. The results of noise monitoring were used to inform the applicable noise criteria for the project's construction and operational phases (results provided in Appendix A and discussed further in section 5.1).

The methodology for the noise monitoring program included:

– A review of the study area and details of the project description with consideration to nearby noise sensitive receiver areas.
– Identification of potentially suitable locations for noise monitoring with consideration to the requirements of the NPfI and ICNG. This was conducted using desktop methods such as reviewing aerial imagery, NSW planning maps and other available digital imagery sources for the key purposes of:
  - obtaining background noise levels for the purposes of setting noise criteria for construction and operational project phases
  - identifying existing noise sources typically present in the study area.
– Noise monitoring using two Rion NL52 Type 1 environmental noise loggers. All noise loggers were programmed to accumulate L_{A90}, L_{A10} and L_{Aeq} noise descriptors continuously while logging. Details of the noise monitoring equipment, monitoring locations, proximity to the project and dates of monitoring are provided in Table 4.1. All monitoring activities were undertaken with consideration of the specifications outlined in *Australian Standard AS1055: 2018 Description and Measurement of Environmental Noise* (AS1055: 2018).
– A field check of the equipment using a sound level calibrator prior to commencement of monitoring. At the completion of the measurements, the meter was re-checked to ensure the sensitivity of the noise monitoring equipment had not varied. The noise loggers were found to be within the acceptable tolerance of ± 1 dBA as per AS1055: 2018.
– Download and analysis of the data collected by the loggers, with any invalid data removed. Invalid data generally refers to periods of time where average wind speeds were greater than 5 m/s at ground level (extrapolated from 10 m weather station data), or when rainfall occurred in accordance with AS1055: 2018. Meteorological data was sourced from the Bureau of Meteorology's Marrangaroo (Defence) weather station (number 063308) located approximately 5.8 km south-east of the project footprint.

Table 4.1 Noise monitoring locations

ID, location, dates (deployment & retrieval)	Distance from easement (approximate)	Equipment details	Equipment settings	Site photo
ML1 (NCA1) 2 Blaxland St, Wallerawang NSW 2845 13:30, Friday 1/12/2023 to 13:00, Tuesday 12/12/2023	720 m (about 50 m north of dwelling)	Rion NL 52 Type 1 SN: 131629	A-weighted Fast time response 15 minute intervals Calibrator model: SVAN SV30A Calibrator SN: 29030 Pre calibration: 93.6 dB Post calibration: 93.8 dB Pre and post calibration variation: 0.2 dB	

ID, location, dates (deployment & retrieval)	Distance from easement (approximate)	Equipment details	Equipment settings	Site photo
ML2 (NC2) 1411 Castlereagh Hwy, Wallerawang NSW 2845 14:30, Friday 1/12/2023 to 13:30, Tuesday 12/12/2023	245 m (About 40 m south of dwelling)	Rion NL 52 Type 1 SN: 131632	A-weighted Fast time response 15 minute intervals Pre calibration: 94.0 dB Post calibration: 94.1 dB Pre and post calibration variation: 0.1 dB	

4.3 Construction noise assessment methodology

4.3.1 Construction equipment and assessment scenarios

The anticipated plant and equipment to be used during the construction of the project is shown in Table 4.2 with corresponding sound power levels (SWLs). The SWLs of equipment have been primarily sourced from the following documents:

– *AS 2436:2010 - Guide to Noise Control on Construction, Maintenance and Demolition Site* (Australian Standard, 2010)
– *Construction Noise and Vibration Strategy* (CNVS) (TfNSW, 2019)
– CNVG (TfNSW 2024)
– Technical Paper 10 – Noise and Vibration Impact Assessment (WSP, 2021) accompanying the EnergyConnect (NSW – Eastern Section) EIS
– Snowy 2.0 Transmission Connection Project Noise and Vibration Assessment (Jacobs, 2020)
– *BS 5228-1:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites – Part 1: Noise* (British Standard, 2014).

Noise frequency spectra for input to noise models was obtained from the above references where available or adopted from source data for similar or equivalent equipment. Where multiple values or ranges of SWLs exist for a given equipment item, representative SWLs were selected from those ranges. Due to the potential variability of SWLs for equipment deployed to site, noise measurement prior to or during initial works is recommended for key noise generating items, in particular where OOHW activities are proposed.

Table 4.2 Construction plant sound power levels

Construction equipment	Data source / notes	Adopted SWL, dBA
Bobcat	AS2436, BS5228	105
Bulldozers	CNVG 2024, BS5228	114
Chainsaws	CNVG 2024, *The comparison of vibro-acoustic impact of chainsaws with electric and combustion drives,* Wojciech R., et.al	113
Concrete agitator trucks	AS2436, BS5228	110
Concrete vibrator	AS2436, BS5228	103
Drilling rigs	AS2436, BS5228	116
Drones	EnergyConnect (NSW – Eastern Section) Technical Paper 10 - Noise and Vibration Impact Assessment	103
Elevated work platform	AS2436, BS5228	105
Excavators (various sizes)	AS2436, BS5228	113

Construction equipment	Data source / notes	Adopted SWL, dBA
Generators	CNVG 2024, BS5228	103
Graders	AS2436, BS5228	113
HIAB trucks	AS2436, BS5228	110
Mobile cranes (up to 400 tonnes)	AS2436, BS5228	107
Mulcher	CNVG 2024, GHD database	116
Piling rigs (assumed impact piling) [1]	AS2436 (for L_{AFmax}), BS5228 (L_{Aeq} for one cycle, includes +5dB modifying factor penalty)	126
Plate compactor	AS2437, BS5228	113
Rollers	CNVG 2024, BS5228	108
Skid steer/positrack loaders	AS2436, BS5228	105
Slashers and other clearing equipment	AS2436, BS5228	108
Telehandlers	BS5228, EnergyConnect (NSW – Eastern Section) | Technical Paper 10 – Noise and Vibration Impact Assessment (WSP, 2021)	107
Winches, pullers, and tensioners	BS5228	108
Trucks	BS5228, Snowy 2.0 Transmission Connection Project Noise and Vibration Assessment (Jacobs, 2020)	107
Hand tools (grinders/drills/welding)	AS2436, BS5228	102
Excavator with hammer [1]	AS2436, BS5228	123

Note: 1. Includes a 5 dB penalty for impulsive characteristics.

Several construction modelling scenarios have been developed based on the proposed construction activities. An overview of the construction scenarios is shown in Table 4.3, which includes the respective sites where the activities would take place, corresponding total SWL and the details of potential for OOHW.

As discussed in section 2.7, drones have been included in the construction scenario noise sources for line stringing activities (Scenario CS08, refer to Table 4.3), with sound power levels based on *EnergyConnect (NSW – Eastern Section)* | *Technical Paper 10 - Noise and Vibration Impact Assessment* (WSP, 2021).

To evaluate the potential for sleep disturbance, a screening assessment has been undertaken that assumes a 10 dB increase for L_{AFmax} SWLs relative to the L_{Aeq} based values presented in Table 4.2. This is an estimate of the typical difference between L_{AFmax} and L_{Aeq} noise associated with general construction noise activities.

The ICNG lists a number of activities that have proven to be particularly annoying to sensitive receivers. The ICNG recommends applying a 5 dB penalty to the noise levels for these activities if undertaken. A 5 dB penalty is included in SWLs of the rock breaker and impact piling rig in Table 4.2 in accordance with the ICNG.

Locations of construction activities are presented on noise contour figures in Appendix C (Standard hours), Appendix D (OOHW Day) and Appendix E (OOHW Evening/Night).

Table 4.3 Construction scenarios

Activity	Scenario ID	Scenario SWL, dBA	Estimated total scenario duration	Construction hours
Site establishment	CS01	118	4 months	Proposed project construction hours
Construction compounds	CS02	118	24 months	Proposed project construction hours Weekday evenings (OOHW period 1) to support other construction scenarios: CS07, CS08 Evening and night (OOHW period 1 and 2) to support construction scenarios CS07 and CS08

Activity	Scenario ID	Scenario SWL, dBA	Estimated total scenario duration	Construction hours
Access track upgrades	CS03	123	2 months	Proposed project construction hours
Vegetation clearing	CS04	123	2 weeks	Proposed project construction hours
Earthworks & civil works	CS05	122	6 months	Proposed project construction hours
Structure footing construction (Impact piling)	CS06	127	7 months (about 3 days per transmission structure)	Proposed project construction hours
Structure footing construction (Bored piling)	CS06B	121	7 months (about 3 days per transmission structure)	Proposed project construction hours
Structure assembly and erection	CS07	116	7 months (about 1 week estimated per structure)	Proposed project construction hours Evening and night (OOHW period 1 and 2)
Stringing transmission line	CS08	117	7 months	Proposed project construction hours Evening and night (OOHW period 1 and 2)
Demobilisation / rehabilitation	CS09	124	3 months	Proposed project construction hours

4.3.2 Noise modelling methodology

Noise modelling was undertaken using CadnaA v2025 noise modelling software to predict the effects of construction noise generated by the proposed works.

The scenarios in Table 4.3 were modelled assuming a reasonable, worst-case where the loudest plant items operate simultaneously at a single location of greatest noise impact within the construction scenario footprint (construction scenario footprints and resulting noise contours are shown for each assessment period in Appendix C (Standard hours), Appendix D (OOHW Day) and Appendix E (OOHW Evening/Night).

All construction scenarios are considered to be conservatively modelled. General parameters used in the model are listed in Table 4.4.

Table 4.4 Construction noise modelling parameters

Input/assumption	Description
Prediction algorithm	ISO 9613-2 2024 as implemented in Datakustik CadnaA 2025
Weather conditions	Based on an average temperature of 10°C and an average humidity of 70 per cent
Meteorological conditions	A moderate temperature inversion or downwind meteorological conditions is considered in the ISO 9613-2 2024 prediction algorithm
Construction noise prediction method	Combined sound power from representative equipment for each scenario/activity predicted to occur at worst-case location within the corresponding scenario footprint
Model inputs	
Topography	Simplified point-cloud surface based on the Digital Elevation Model (DEM) 1 & 2 m Grid of Australia
Receiver height	1.5 m above ground level
Ground absorption	G=0.75, assumed a mostly soft ground for all areas G=0, for Lake Wallace based on aerial imagery
Foliage	Foliage between the transmission line and sensitive receivers has not been considered

4.4 Construction vibration assessment methodology

The method for the assessment of construction vibration included:

– Identifying safe working distances to comply with the human comfort and cosmetic damage criteria. These buffer distances have been adopted from the CNVG (TfNSW, 2024).
– Identifying minimum working distances for vibratory intensive equipment (shown in Table 4.5). The key vibration generating equipment associated with project construction are rollers and piling rigs (bored or impact).
– Identifying sensitive receivers within the minimum working distances for consideration of management measures.

Table 4.5 Minimum working distances – standard dwellings (CNVG)

Equipment	Minimum working distance	
	Cosmetic damage (BS 7385)	Human comfort (OH&E Vibration Guideline)
Vibratory roller (1-2 tonnes)	5 m	15 m to 20 m
Vibratory roller (2-4 tonnes)	6 m	20 m
Vibratory roller (4-6 tonnes)	12 m	40 m
Vibratory roller (7-13 tonnes)	15 m	100 m
Vibratory roller (13-18 tonnes)	20 m	100 m
Vibratory roller (>18 tonnes)	25 m	100 m
Small hydraulic hammer 300 kg (5-12t excavator)	2 m	7 m
Medium hydraulic hammer 900 kg (12-18t excavator)	7 m	23 m
Large hydraulic hammer 1600 kg (18-34t excavator)	22 m	73 m
Piling rig - vibratory (sheet piles)	2 m to 20 m	20 m
Piling rig – bored (≤ 800 mm)	2 m (nominal)	4 m
Piling rig – hammer (12 t down force)	15 m	50 m
Jackhammer (handheld)	1 m (nominal)	Avoid contact with structure

With consideration to the information provided in Table 4.5 this assessment assumes that up to a >18 tonne vibratory roller, medium hydraulic hammer and impact or bored piling may be used during construction.

Additional minimum working distances specific to heritage items and other potentially vibration sensitive structures, not sufficiently covered by BS 7385-2:1993, are provided in Table 4.6 derived from DIN4150-3:2016 guideline values and using inversely proportional distance propagation relationship.

Table 4.6 Minimum working distances – heritage structures

Activity	Minimum working distance – heritage structures
	Heritage building/structure DIN 4150-3 criteria (3.0 mm/s)
Roller	24 m
15 tonne vibratory roller	35 m
Dozer	15 m
Backhoe	3 m
Excavator with hammer	24 m
Piling (impact)	180 m
Piling (bored)[1]	35 m

Note: 1. Based on levels derived from BS 5228-2. *Bored piling through stones or other obstruction*.

Construction vibration buffers are provided in Appendix F and discussed further in section 6.2.

Although the assessment focusses on potential impacts to sensitive receivers, there are non-sensitive receiver structures within this study area relating to power infrastructure and heavy industry. Examples include, Mount Piper Power Station, existing Transgrid substations and the site of the former Wallerawang Power Station. These non-sensitive receiver structures may exist within the recommended minimum working distances. The potential for vibration impacts would be assessed during detailed design and construction planning and appropriate mitigation identified if required.

4.5 Road traffic noise assessment methodology

4.5.1 Proposed construction traffic routes

Access to each transmission structure and construction compound would be required during construction. Three construction compounds are proposed at the following locations (see Figure 1.2):

- Compound 1 (C1) – adjacent to the Mount Piper 330 kV/500 kV substation
- Compound 2 (C2) – located east of Main Street adjacent to the entrance to the former Wallerawang Power Station site
- Compound 3 (C3) – located within the former Wallerawang Power Station site.

The key access points to the construction work areas from public roads would include (see Figure 1.2):

- main access point at Mount Piper Power Station site and access point from Frankfort Road
- access point from Heel Street
- access points from Brays Lane
- access points from Main Street
- access points from Karawatha Drive
- access points off the Castlereagh Highway south of Main Street.

4.5.2 Existing traffic volumes

Existing traffic volumes at key locations were established by traffic counts during 30 October 2024, for the following roads:

- Boulder Road / Castlereagh Highway
- Karawatha Drive / Castlereagh Highway
- Brays Lane / Castlereagh Highway
- Main Street / Castlereagh Highway.

The surveys collected turning movement counts categorised into the following vehicle classes:

- Light vehicles (Austroads class 1-2)
- Trucks (Austroads class 3-5)
- Heavy trucks (Austroads class 6-12).

Surveys were conducted during a weekday, with data collected at 15-minute intervals for the following periods in order to capture anticipated peak hours:

- AM survey period (6 to 9 am)
- PM survey period (3.30 to 6.30 pm).

To enable assessment of 15hr (day) and 9hr (night) traffic volumes needed for the noise assessment, traffic data at the Castlereagh Highway was obtained for 2012 as the most recent data available from the Transport for NSW website (TfNSW, 2025). The relationship between peak hour and daily volumes from the 2012 data was used to identify conversion factors. These factors were then applied to the October 2024 survey peak-hour traffic counts to provide an estimate of daily 2024 volumes.

A summary of the assumed existing traffic volumes on the key access roads is provided in Table 4.7.

Table 4.7 Existing traffic volumes, key construction access roads

Road	Posted speed	Vehicles per hour AM peak	AM heavy vehicle percent	Vehicles per hour PM peak	PM heavy vehicle percent	Day (15hr) number of vehicles	Night (9hr) number of vehicles	15hr/9hr heavy vehicle percent
Castlereagh Highway north of Boulder Road	100	129	12.6%	223	19.4%	1870	328	16.0%
Boulder Road	60	200	3.2%	167	9.6%	2041	358	6.4%
Castlereagh Highway north of Karawatha Drive	100	312	7.6%	357	7.6%	3649	640	7.6%
Karawatha Drive	60	3	0.0%	2	0.0%	30	5	0.0%
Castlereagh Highway north of Brays Lane	100	313	7.4%	370	7.8%	3713	651	7.6%
Brays Lane	50	2	0.0%	6	33.3%	44	8	16.7%
Castlereagh Highway north of Main Street	80	305	7.1%	370	8.5%	3662	642	7.8%
Main Street	50	186	6.4%	158	4.7%	1913	335	5.5%
Castlereagh Highway south of Main Street	100	373	7.8%	447	8.2%	4460	782	8.0%

4.5.3 Construction traffic generation

Construction traffic would be required to transfer construction personnel and contractors to the work sites, deliver goods and move plant and equipment.

A summary of the assumed construction traffic generated plus existing traffic volumes on the key access roads is provided in Table 4.8. These volumes are based on peak-hour estimates calculated by the Technical Report 8 - Traffic and Transport Assessment. The conversion factors derived from 2012 traffic data were used to estimate daily (15 hr / 9 hr) volumes for the Castlereagh Highway. Local roads were evaluated for peak-hour only, consistent with the RNP criteria.

Table 4.8 Construction plus existing traffic volumes, key construction access roads

Road	Posted speed	Vehicles per hour AM peak	AM heavy vehicle percent	Vehicles per hour PM peak	PM heavy vehicle percent	Day (15hr) number of vehicles	Night (9hr) number of vehicles	15hr/9hr heavy vehicle percent
Castlereagh Highway north of Boulder Road	100	134	13.6%	228	19.9%	1925	337	16.7%
Boulder Road	60	281	9.4%	212	16.6%	Not relevant for local road		
Castlereagh Highway north of Karawatha Drive	100	368	10.8%	392	11.5%	4164	730	11.1%
Karawatha Drive	60	53	37.6%	52	38.4%	Not relevant for local road		
Castlereagh Highway north of Brays Lane	100	340	10.1%	372	7.8%	3894	683	9.0%
Brays Lane	50	52	38.3%	57	38.3%	Not relevant for local road		
Castlereagh Highway north of Main Street	80	345	9.2%	395	10.5%	4030	706	9.8%

Road	Posted speed	Vehicles per hour AM peak	AM heavy vehicle percent	Vehicles per hour PM peak	PM heavy vehicle percent	Day (15hr) number of vehicles	Night (9hr) number of vehicles	15hr/9hr heavy vehicle percent
Main Street	50	266	12.0%	209	13.2%	Not relevant for local road		
Castlereagh Highway south of Main Street	100	418	11.3%	492	11.1%	4954	868	11.2%

4.5.4 Prediction methodology

The construction road traffic noise assessment considers existing and proposed traffic generation on public roads, percentage of heavy vehicles, time periods, speeds and road surface types in the calculations. Traffic noise levels were calculated using the Transport for NSW Construction Noise Estimator, which is based on the Calculation of Road Traffic Noise (CoRTN). As the Construction Noise Estimator assumes flat terrain, this construction traffic noise assessment is considered conservative.

The parameters used in the noise predictions are summarised in Table 4.9.

Table 4.9 Noise prediction algorithm parameters CoRTN

Variable	Parameter used
Calculation method	TFNSW construction noise estimator - CoRTN
Traffic speeds	Refer to Table 4.7
Pavement surface	Assumed 14 mm chip-seal
Ground type	Rural

Predicted traffic noise impacts are presented in section 6.3.

4.6 Operational noise assessment

4.6.1 Corona noise

The operation of high voltage transmission lines has the potential to generate audible noise. This audible noise is known as corona discharge and is primarily caused from the ionisation of air in a small region around the conductors, that results in the emission of a broadband hum or crackling noise. This phenomenon is driven by the conductor’s surface voltage gradient (SVG) and accumulation of pollution and water droplets on the conductor surface. Corona discharges are more prominent during weather conditions with rain, mist or fog.

The audible noise is typically characterised by a tonal component at 100 Hz. The potential for corona noise applies to both the project transmission lines and the existing transmission lines in the study area.

Aurecon Australasia Pty Ltd (Aurecon) has prepared the Mount Piper to Wallerawang Corona Noise Report (Aurecon, 2025) for the project. The report provides predicted levels of audible noise and radio interference from the project and forms the basis of the audible corona noise assessment presented in this report. Audible corona noise levels from the project are assessed against the operational PNTLs presented in section 2.6.3. The Corona Noise Report (Aurecon, 2025) is provided in Appendix H. Radio interference is not considered in this report with these impacts considered as part of Technical report 9 – Hazard and Risk Assessment.

Transmission structure geometry

The minimum conductor heights for the existing and proposed transmission lines have been assumed in modelling to determine audible noise from the line, as the lowest conductor height represents the minimum separation distance from conductors and receivers. Details of the transmission lines and structures are presented in the Corona Noise Report (Aurecon, 2025).

Modelled scenarios

The Corona Noise Report (Appendix H) models a total of five scenarios to conduct different site-specific assessments for different spans of the transmission line. The scenarios are summarised below:

– Scenario 1: Transmission structures 3C to 8C, typical 100m easements consist of the new 330kV transmission structures with left hand side 330kV circuit 7G, running in parallel with the existing double circuit 330kV 70/71 transmission line.
– Scenario 2: Site specific assessment of span between transmission structures 9D and 10D to the nearest receiver.
– Scenario 3: Site specific assessment of 330kV to 132kV line crossing at span between transmission structures 12D and 13D.
– Scenario 4: Transmission structures 13D to 27D within a typical 60m easements consisting of the standalone new 330kV transmission line and structures with left hand side 330kV circuit 71 and right hand side 132kV circuit 94E. Scenario 4 also is considered to be a conservative assessment of section of the easement at 1C to 3C and 10D to 13D as these sections are single circuit lines while this scenario assesses double circuit lines.
– Scenario 5: site specific assessment of parallel line section at the span between 27D and 28D.

The areas covered by each corona noise scenario are shown in Figure 3-1 in Appendix H (Corona noise report).

Modelling methodology

The audible noise assessment in the Corona Noise Report was undertaken using the EPRI semi-empirical calculation method. The modelling was completed using SES EnviroPlus with the following parameters:

– The assessment was completed at 1.8 m as the average ear height of the normal standing position of the general public.
– The lowest conductor height was used in the assessment.
– A line voltage equal to the system highest voltage of 10% above normal and the rated line loading was applied for the calculations.
– The modelling assumes flat terrain and does not consider local topography.
– L_{50} (Light Rain) is simulated at a rain rate of 0.75mm/h.

The assessment of audible noise during rain is based on the most commonly used calculation methods (Chartier and Stearns, 1981; EPRI, 1982), which refer to the median value (L_{50} exceedance level) during periods of measurable rainfall. Transgrid has adopted this approach in the TLDM-MNB.

While transmission lines generate higher levels of audible corona noise in heavy rain compared to light rain, the overall ambient noise level is also higher during heavy rainfall. Since heavy rain provides more acoustic masking to corona noise, it is more relevant to examine L_{50} rain conditions and L_{50} represents the worst-case scenario for assessing audible noise impacts on sensitive receivers.

Each scenario accounts for different shield wire conductor cases, phase conductor cases, transmission structure arrangements, voltages and currents. Additionally, the calculated maximum surface voltage gradients of the proposed twin olive conductor bundles have been considered in each scenario. The full modelling inputs, including the calculated maximum surface voltage gradients, are provided in Section 3.2 of the Corona Noise Report provided in Appendix H.

4.6.2 Operational traffic generation

During the operational phase of the project, access to the easement would be required monthly for one or two vehicles for a period of two years after commissioning. Following this, access to the easement would reduce to a level that represents similar access requirements to the existing 132 kV transmission line, that being one or two vehicles on an infrequent basis.

During operation there is a risk of an increase of vehicle movements being required to attend to emergency situations or where maintenance works are considered to be greater in scale. This increase is not expected to differ from the potential movements already required for the existing 132 kV transmission line in such situations.

4.7 Cumulative impacts

4.7.1 Construction

Cumulative noise impacts may occur due to extended exposure to construction noise when multiple nearby construction projects are sequential or temporarily overlapping. Alternatively, cumulative impacts may be due to concurrent nearby construction projects causing an increase in the overall construction noise level. Management of project construction noise and vibration impacts (see section 7.2) would reduce the potential for cumulative noise and vibration impacts.

To assess potential for cumulative construction noise or vibration impacts, the considered projects outlined in section 6.5.1 were reviewed using publicly available information such as environmental impact statements and project websites. Where shared noise or vibration sensitive receivers were identified with the project, additional review of project timelines and/or predicted noise or vibration levels was undertaken where available to quantify the potential impacts. As a worst-case assessment, projects were assumed to overlap if project timelines were not available.

4.7.2 Operation

Project specific noise criteria based on the NPfI are designed to reduce the risk of cumulative noise where multiple noise generating commercial or industrial premises are located in close proximity to a shared set of noise sensitive receivers. While the likelihood of significant cumulative noise impacts during operation is low, a review was conducted of the predicted operational noise levels obtained from EIS or other environmental assessments, where this information was publicly available for the projects considered.

The assessment of cumulative impacts is provided in section 6.5.

5. Existing noise environment

The existing noise environment within the study area is characterised by vegetated areas, heavy industry (power generation, transmission and mining), rural and suburban development, with typical associated noise sources expected. Traffic noise is expected to dominate in the vicinity of the Castlereagh Highway and Great Western Highway. Other key existing noise sources include:

– rail operations on the Main Western Rail Line at the southern end of the project footprint
– Lidsdale coal siding operations
– overland conveyers operating between Lidsdale Siding, Springvale Coal Mine and Mount Piper Power Station
– Springvale Coal Mine
– existing electricity infrastructure including transmission lines and substations.

Noise sensitive receivers near to the project within the study area are outlined in section 4.1.2 and consist primarily of clustered residences in the towns of Wallerawang and Lidsdale, with scattered rural residences across the remainder of the study area. Receiver locations and their unique identifiers in the context of the project are provided in Appendix B.

5.1 Noise monitoring results

As described in section 4.2, long-term unattended noise monitoring was undertaken at two locations in close proximity to sensitive receivers that were considered to be representative of the noise environment of the study area. Monitoring was conducted to quantify and characterise the existing ambient noise levels at the monitoring locations (see Figure 4.1).

A summary of the calculated background RBL and Assessment Background Level (ABL) (day, evening and night) noise levels and ambient L_{Aeq} (day, evening and night) noise levels at the two unattended logger locations is provided in Table 5.1 and Table 5.2. Data potentially influenced by adverse weather conditions was removed. Periods where one or more hours has been excluded are shown in red. Sufficient data was captured under reasonable weather conditions such that the results have been considered acceptable for the purpose of assessment.

Daily noise monitoring charts for sites ML1 and ML2 are presented in Appendix A.

Table 5.1 Site ML1 (NCA1, Suburban) unattended noise monitoring results, RBL & ABL background and L_{Aeq} ambient, dBA

Date	Background noise levels			Ambient L_{Aeq} noise levels		
	Day (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night (10 pm to 7 am)	Day (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night (10 pm to 7 am)[1]
Friday-1-Dec-23	34.0	29.8	28.8	51.0	49.9	50.3
Saturday-2-Dec-23	30.8	28.6	28.6	48.7	47.3	45.6
Sunday-3-Dec-23	31.5	35.8	32.1	53.1	50.5	46.7
Monday-4-Dec-23	36.9	39.7	41.5	53.8	51.4	50.5
Tuesday-5-Dec-23	40.8	30.7	34.4	52.4	47.2	42.4
Wednesday-6-Dec-23	34.2	28.7	31.2	54.2	47.7	41.6
Thursday-7-Dec-23	30.0	25.3	26.5	48.0	46.2	39.9
Friday-8-Dec-23	33.9	30.7	31.0	52.7	44.2	42.7
Saturday-9-Dec-23	33.9	28.3	26.3	47.1	43.5	41.6
Sunday-10-Dec-23	29.6	27.7	22.2	52.2	44.8	39.0
Monday-11-Dec-23	29.2	29.8	22.8	49.6	45.5	38.7
Tuesday-12-Dec-23	31.4	-	-	55.1	-	-
RBL	**32.7**	**29.8**	**28.8**	-	-	-
$L_{Aeq(period)}$	**-**	**-**	**-**	**52.1**	**47.8**	**45.5**

Note: Shaded cells indicates one or more hours of data from this period was removed due to adverse weather conditions. Remaining data is considered suitable.

Table 5.2 Site ML2 (NCA2, Rural) unattended noise monitoring results, ABL & RBL background and L_{Aeq} ambient, dBA

Date	Background LA90 noise levels			Ambient LAeq noise levels		
	Day (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night (10 pm to 7 am)	Day (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night (10 pm to 7 am)[1]
Friday-1-Dec-23	45.5	46.2	46.0	48.3	49.4	51.2
Saturday-2-Dec-23	44.7	45.6	40.0	47.7	49.2	49.6
Sunday-3-Dec-23	45.1	45.5	45.2	49.6	48.7	48.2
Monday-4-Dec-23	27.6	44.2	46.3	45.3	48.6	48.7
Tuesday-5-Dec-23	34.6	46.1	48.3	47.2	49.5	50.0
Wednesday-6-Dec-23	39.6	45.4	41.3	48.1	47.2	48.1
Thursday-7-Dec-23	26.6	45.9	36.6	41.8	48.4	48.3
Friday-8-Dec-23	43.4	44.8	41.4	46.8	48.7	48.8
Saturday-9-Dec-23	34.5	44.3	30.1	47.1	47.9	47.5
Sunday-10-Dec-23	41.4	45.2	23.6	45.7	47.4	42.6
Monday-11-Dec-23	41.3	29.2	24.3	46.2	41.0	37.2
Tuesday-12-Dec-23	30.8	-	-	47.2	-	-
RBL	**40.5**	**45.4**	**41.3**	**-**	**-**	**-**
$L_{Aeq(period)}$	**-**	**-**	**-**	**47.1**	**48.2**	**48.3**

Note: Shaded cells indicates one or more hours of data from this period was removed due to adverse weather conditions. Remaining data is considered suitable.

At monitoring location ML1, the measured daytime RBL is below 35 dBA, which is the minimum RBL during the daytime period provided in the NPfI (see Table 5.3). ML1 RBLs are also below the minimum of 30 dBA for evening and nighttime periods.

At monitoring location ML2, the overall measured background noise levels were found to be influenced by the nearby coal conveyor approximately 135 m to the south of the monitoring location. 15-minute interval statistical noise descriptors (see Appendix A, descriptors L_{A10}, L_{Aeq}, L_{A90}) indicate the presence of a relatively continuous noise source with some intervening periods where noise levels return to levels typical of a rural environment. When the continuous source was present, levels were measured to be marginally higher during nighttime periods than daytime, potentially due to increased intensity of operation or enhanced night time environmental noise propagation effects during the survey period. On further review of the noise data, the conveyor was identified to be operational for a majority of the survey period. However, it is understood that this operation is variable throughout the year, with many days where it is not operational. Periods where the conveyor was not operating (see results in Table 5.2 for Monday 4 December 2023 and Thursday 7 December 2023) indicate daytime RBLs that are below the NPfI minimums. Therefore, it is considered appropriate to also adopt the minimum RBLs for ML2.

Project specific RBLs adopted for the assessment with consideration to survey measurement data and NPfI minimums are presented in Table 5.3.

Table 5.3 Project specific RBLs adopted for the assessment

Time of day	ML1 and ML2 adopted RBL (dBA)
Day	35
Evening	30
Night	30

6. Impact assessment

6.1 Construction noise assessment

6.1.1 Predicted construction noise levels

Construction noise levels were predicted at noise sensitive receivers for the nine different construction scenarios described in Table 4.3. The predicted noise levels were compared against the adopted CNMLs (refer Table 2.4) to establish the extent of potential exceedances during and outside of the standard hours. The anticipated impacts of the standard hours and OOHW construction activities are summarised in Table 6.1 and Table 6.2 respectively. Not all construction scenarios in Table 6.2 are expected to occur during OOHW periods (see section 4.3.1). Therefore, the modelling results shown are for the assessment periods relevant for each scenario.

A significant majority of the identified noise sensitive receivers are in the towns of Wallerawang and Lidsdale, situated at the south-eastern end of the study area. Proposed transmission structures in the vicinity of these clustered sensitive receivers are numbered from 1C to 16D. Outside of the towns, sensitive receivers are generally widely spaced, situated on larger agricultural properties, and typically have larger separation distance to the project footprint. Transmission structures in this part of the study area are numbered from 17D to 33A and are associated with generally lower predicted construction noise levels and numbers of potentially noise impacted sensitive receivers.

Works that are proposed for the periods of 7 am to 8 am Saturday and Sunday would only occur where they are predicted to result in no impacts at noise sensitive receivers and therefore have not been included in Table 6.2. The nature and locations of these works would be confirmed by additional construction noise modelling to be conducted as part of the Construction Noise and Vibration Management Plan (CNVMP).

Construction noise contours and at-receiver noise levels relative to standard hours CNMLs are provided in Appendix C. Figures showing predicted noise levels relative to OOHW day and OOHW evening/night CNMLs are provided in Appendix D and Appendix E respectively. Predicted $L_{Aeq,15min}$ construction noise levels at each identified sensitive receiver within the study area are included in Appendix G.

Table 6.1 Number of impacted residential sensitive receivers and level of impact during standard hours – construction

	Noise level above CNMLs[1]	Site establishment	Construction compounds	Access track upgrades	Vegetation clearing	Earthworks & civil works	Structure footing construction (Impact Piling)	Structure footing construction (Bored Piling)	Structure assembly and erection	Stringing transmission line	Demobilisation / rehabilitation
		CS01	CS02	CS03	CS04	CS05	CS06	CS06B	CS07	CS08	CS09
Highest predicted noise level (dBA)		68	54	82	82	72	77	71	66	69	76
Standard hours – (CNML of 45 dBA)											
Total number of exceedances		76	36	272	259	193	450	167	32	68	260
Number of residential sensitive receivers per perception category.	1 to 10 dBA	59	36	224	210	168	396	143	21	49	228
	10 to 20 dBA	14	0	36	30	18	39	19	9	16	20
	>20 dBA	3	0	12	19	7	15	5	2	3	12
Number of residential sensitive receivers above Highly Affected Level (>75dBA)		0	0	5	5	0	2	0	0	0	1

Note: 1. These categories are established in section 2.2.2, Table 2.5.

Table 6.2 Number of impacted sensitive receivers and level of impact during OOHW – construction

	Noise level above CNMLs[1]	Site establishment	Construction compounds	Access track upgrades	Vegetation clearing	Earthworks & civil works	Structure footing construction (Impact Piling)	Structure footing construction (Bored Piling)	Structure assembly and erection	Stringing transmission line	Demobilisation / rehabilitation
		CS01	**CS02**	**CS03**	**CS04**	**CS05**	**CS06**	**CS06B**	**CS07**	**CS08**	**CS09**
Outside of standard hours – Period 1 Day (CNML of 40 dBA)											
Total number of exceedances		235	175	530	514	379	939	334	167	213	552
Number of sensitive receivers per perception category	1 to 5 dBA	119	125	231	221	167	383	141	125	116	250
	5 to 15 dBA	96	50	244	236	185	475	168	29	75	270
	15 to 25 dBA	17	0	38	36	19	64	18	11	18	18
	>25 dBA	3	0	17	21	8	17	7	2	4	14
Outside of standard hours – Period 1 Evening / Period 2 Night (CNML of 35 dBA)											
Total number of exceedances		-	*386*	-	-	-	-	-	*334*	*444*	-
Number of sensitive receivers per perception category	1 to 5 dBA	-	*190*	-	-	-	-	-	*139*	*209*	-
	5 to 15 dBA	-	*176*	-	-	-	-	-	*170*	*206*	-
	15 to 25 dBA	-	*20*	-	-	-	-	-	*18*	*18*	-
	>25 dBA	-	*0*	-	-	-	-	-	*7*	*11*	-

Notes: 1. These categories are established in section 2.2.2, Table 2.5.
2. Shaded cells indicate works to be conducted during an outage recall only and would otherwise be avoided where possible.

6.1.2 Summary of construction noise impacts

Noise impacts are predicted for residential and non-residential sensitive receivers during the project's construction phase. The following provides additional context to the results and discussion presented in this section:

– The noise impact for a given scenario would vary in proportion to the construction intensity.
– Predictions assume equipment operating at the worst-case position within the construction scenario footprint, which is considered unlikely to occur. Typically, construction equipment would be spread over a wider area, resulting in lower noise levels than those presented in this worst-case assessment.
– For scenarios other than construction compounds (CS02), impacts at any given receiver would occur for short periods of time for each scenario as work would progress from one transmission structure location to the next, along the project footprint, and a moving work front would progress for access track construction or upgrades.
– The duration of impacts at any individual receiver is based on the number of construction activities with potential to impact a receiver and their distance from the receiver.

The results provided in the following sections represent the upper limits of construction noise levels for each scenario and typical construction noise levels and associated impacts are expected to be lower.

Recommended noise and vibration mitigation measures (section 7.2) would be implemented where feasible and reasonable. Prior to works commencing, potentially impacted residential sensitive receivers would be notified of the nature of the work, expected noise levels, proposed mitigation measures and duration of the work.

Standard construction hours – noise affected levels

The upper range noise levels at residential sensitive receivers (highly intrusive or greater than 20 dB over the CNML) are restricted to the areas located around Duncan Street, Lidsdale and the Karawatha Drive intersection with the Castlereagh Highway, and would occur when works are occurring at locations nearby to the receivers.

Upper range noise impacts due to access track upgrades (CS03) and vegetation clearing (CS04) are clustered around Karawatha Drive (up to eight receivers, see

Figure 6.1) and around Brays Lane/Duncan Street (up to 11 receivers, see Figure 6.2). Impacts at any individual receiver from these activities are expected to occur for about one week while access track works occur at these locations.

The construction activity with the greatest extent of impact across the duration of the project is predicted to be transmission structure footing construction where impact piling is required (CS06), with piling expected to take place over a period of about three days at each transmission structure. Some sensitive receivers may experience exceedances during standard construction hours for up to eight weeks, with an average of four weeks per receiver as works progress along the easement, for example, approaching and then moving away from the receiver.

Most piling is expected to be undertaken using bored piling methods, which are typically quieter than impact piling methods. Locations of each piling type are not known at this stage and would be subject to detailed design and construction planning activities. Noise predictions for bored piling are included in the results for construction scenario CS06B.

Where impact piling is required (CS06), it is predicted that 450 residential sensitive receivers would experience exceedances of the standard hours CNML. Predicted levels exceed the standard hours CNML by greater than 20 dBA and therefore are considered highly intrusive at up to 15 residential sensitive receivers including:

– 13 receivers located on Duncan Street and Wolgan Road, Lidsdale (see Figure 6.2)

one receiver located on Karawatha Drive, Wallerawang (see

– Figure 6.1)

one receiver on located on Brays Lane, Wallerawang (see

– Figure 6.1).

For scenario CS06 (impact piling) one commercial receiver (COM0021 - Astron Lidsdale) is predicted to be subject to exceedance of up to 7 dBA above the CNML.

Where bored piling methods are used (CS06B), the number of impacts during standard hours is predicted to reduce to167 residential sensitive receivers, with exceedances of the standard hours CNML of up to 26 dBA at the worst affected receivers. Noise impacts for bored piling (CS06B) are considered highly intrusive (greater than 20 dBA above the CNML) at up to five residential sensitive receivers, all located at Duncan Street, Lidsdale.

For non-residential receivers, the CNML exceedance at COM0021 is reduced to 1 dB over the CNML when bored piling is used instead of impact piling methods.

Vegetation clearing (CS04) results in the greatest number of sensitive receivers precited to be subject to highly intrusive impacts (19 receivers). These additional impacts are in the vicinity of Karawatha Drive and the Castlereagh Highway (see

Figure 6.1). The potential impacts would be short term as the work front would progress along the transmission line or access tracks.

A summary of the predicted exceedances resulting in highly intrusive noise is shown in

Figure 6.1 and Figure 6.2. Construction noise prediction contours for standard hours for all sensitive receivers are provided in Appendix C. These figures show the predicted noise level categories at each potentially impacted sensitive receiver location.

Standard construction hours – highly noise affected levels (greater than 75 dBA)

Five residential sensitive receivers in the area of Karawatha Drive (see

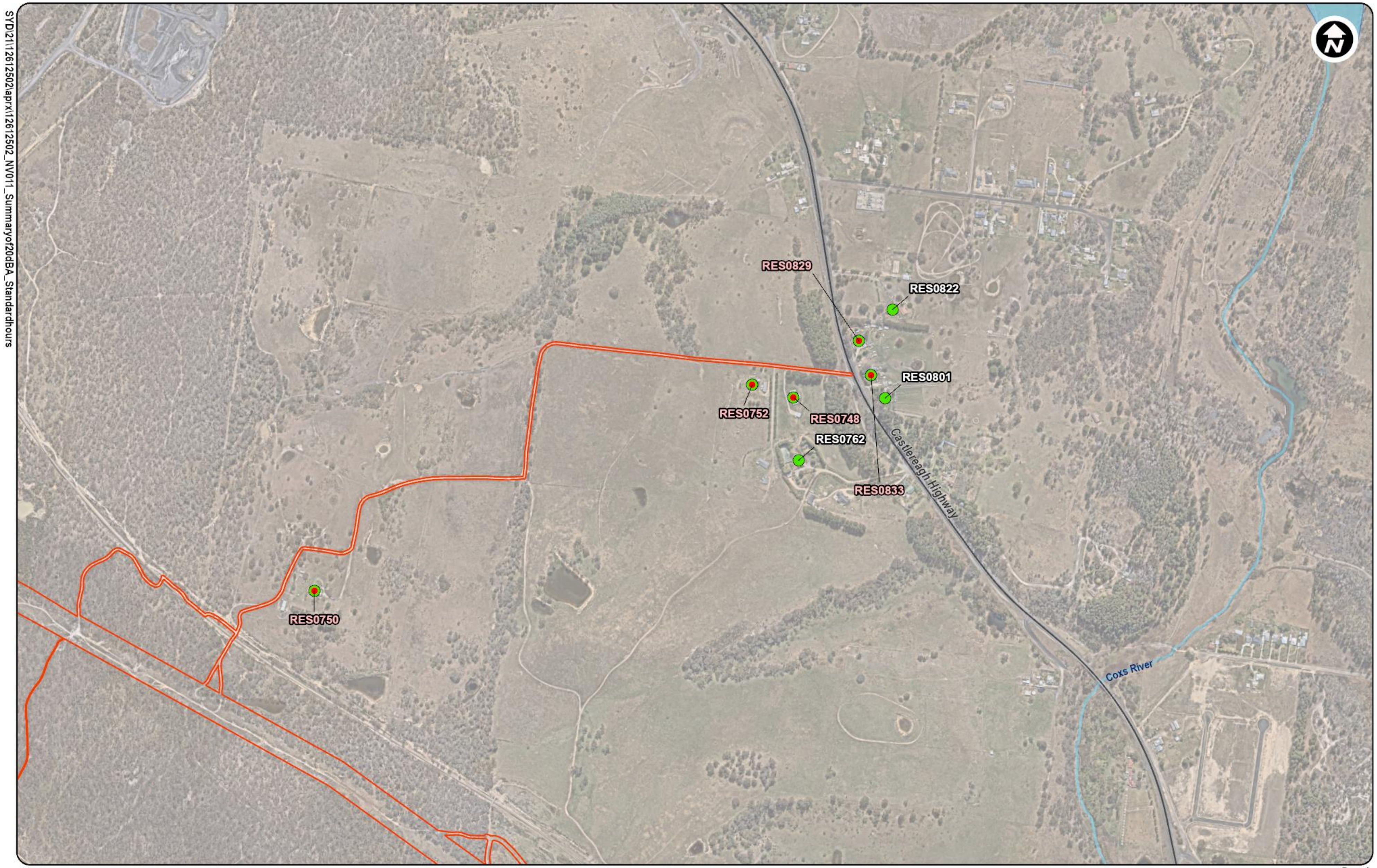
Figure 6.1) are predicted to experience exceedances of the 75 dBA highly noise affected level by up to 7 dBA at the worst affected sensitive receivers for access track upgrades (CS03) and vegetation clearing (CS04). This is primarily due to the proximity of the proposed access track works and associated vegetation clearing to some residences. These impacts are expected to be of short duration (about one week) while the works occur in the vicinity of any individual receiver.

Where impact piling methods are used (CS06) the two nearest residential sensitive receivers to the works at Duncan Street, Lidsdale (see Figure 6.2). are predicted to exceed the 75 dBA highly affected noise level by up to 2 dB. These levels are expected to be short in duration (about three days per transmission structure) and would decrease as the works move along the transmission line to other transmission structure footing locations. Where bored piling methods are used (CS06B) no exceedances of the highly affected level are predicted.

During demobilisation and rehabilitation (CS09) one receiver at Duncan Street, Lidsdale may be subject to an exceedance of 1 dB over the 75 dBA highly affected noise level. However, this only applies when works occur at the nearest construction areas to this residential receiver for an estimated period of about one week.

Receiver locations subject to predicted exceedances of the highly noise affected level across all construction scenarios are shown in

Figure 6.1 and Figure 6.2. Construction noise prediction contours for standard hours for all sensitive receivers and each construction scenario are provided in Appendix C.



Project components

Project footprint

Receivers exceeding standard hours CNML by >20 dBA $L_{Aeq(15mins)}$

Receivers exceeding standard hours Highly Noise Affected >75dBA $L_{Aeq(15mins)}$

Roads

Watercourse

Rev: A
Date: 31/07/2025
1:10,000 @ A4

0 500 1,000
Metres

Grid: GDA2020 MGA Zone 56

Figure 6.1 Summary of >20dBA exceedances of standard hours CNML and highly noise affected CNMLs – map 1

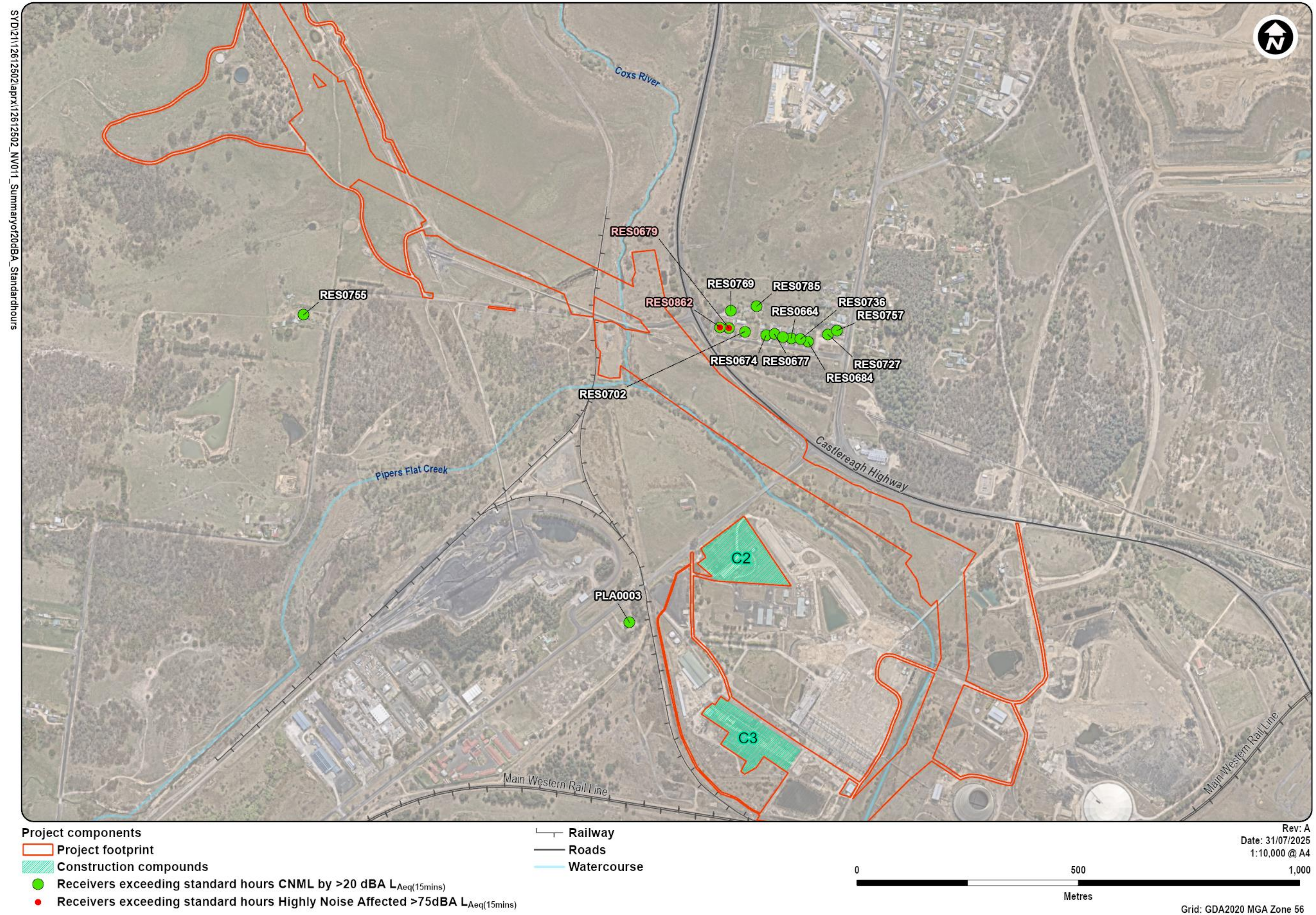


Figure 6.2 Summary of >20dBA exceedances of standard hours CNML and highly noise affected CNMLs – map 2

Out of hours works – day period

The impacts outlined in this section related to works occurring during the OOHW Period 1 Day on Saturday and Sundays as shown in Figure 3.1.

The majority of predicted OOHW day CNML exceedances for each of the scenarios fall within the ranges of 1 to 5 dBA and 5 to 15 dBA above the OOHW day CNML.

Where construction hours are proposed that include OOHW Period 1 Day, the structure footing construction - impact piling (CS06) scenario has the highest predicted number of 939 potentially impacted residential sensitive receivers.

Structure assembly and erection (CS07) is the scenario with the lowest number of 167 impacted sensitive receivers during OOHW period 1 Day. The majority of these impacted sensitive receivers (125 of the 167 receivers) have predicted noise levels in the noticeable range of 1 dBA to 5 dBA above the OOHW day CNML. Exceedances at the remaining receivers include:

– clearly audible (5 dBA to 15 dBA above the OOHW day CNML) – 29 receivers
– moderately intrusive (15 dBA to 25 dBA above the OOHW day CNML) – 11 receivers
– highly intrusive (greater than 25 dBA above the OOHW day CNML) – two receivers.

Impacts at any individual receiver would occur across a period of up to one week per structure. Combined impacts across multiple structures for a given receiver may occur across a period of up to four months duration, while average duration of impact is expected to be about six weeks.

Exceedances of the OOHW day CNML by more than 25 dBA would be unlikely across all scenarios, with the highest being in:

– structure footing construction (CS06) – 17 sensitive receivers mostly located around Duncan Street, Lidsdale, see Figure 6.3
– access track upgrades (CS03) – 17 sensitive receivers
– vegetation clearing (CS04) – 21 sensitive receivers.

The duration of individual sensitive receiver impacts over 25 dBA when structure footing construction (CS06) work occurs would be about three days. The duration of impacts for OOHW day CNML exceedances in the range of 1 to 25 dBA for CS06, would be for up to 10 weekends with an average duration of six weekends per receiver.

Alternative methods for structure footing construction would be adopted to the extent possible by using bored piling methods (CS06B), rather than impact piling methods. This would reduce highly intrusive noise level impacts over 25 dBA of the CNML to 7 sensitive receivers. Piling activities would also be scheduled in less sensitive periods where practicable.

Exceedances of OOHW day period CNMLs from access track upgrades (CS03) and vegetation clearing (CS04) are expected to occur over a period one to three weekends for any individual receiver.

Noise levels for operation of construction compounds (CS02) are not predicted to exceed the OOHW day CNML by more than 15 dBA. Noise levels in the noticeable range (1 to 5 dBA above the OOHW day CNML) are predicted for 125 receivers, while 50 receivers are predicted to be impacted by noise in the clearly audible range (5 to 15 dBA above the OOHW day CNML).

The numbers of sensitive receivers impacted and level of impact for each construction scenario is provided in Table 6.2. Construction noise prediction contours for OOHW period 1 Day are included in Appendix D. These figures also show the predicted CNML exceedance categories at each potentially impacted sensitive receiver location.

Out of hours work – Period 1 Evening and Period 2 Night

The impacts outlined in this section relate to works occurring during the OOHW Period 1 Evening and Period 2 Night on all days of the week as shown in Figure 3.1. The CNML (refer to section 2.2.1) and perception categories (refer to section 2.2.2) are consistent during OOHW Period 1 Evening and Period 2 Night.

Construction work during OOHW Period 1 Evening and Period 2 Night may be required for the following reasons:

- outage recalls by the network operator
- work within rail corridor shutdown periods scheduled by the rail operator
- to comply with road closure licence requirements from the local road authority.

This would only involve the following scenarios:

- CS02 – Construction compounds (as support for CS07 and CS08)
- CS07 – Structure assembly and erection
- CS08 – Stringing transmission line.

Most predicted noise levels for each of the scenarios fall within the ranges of 1 to 5 dBA (noticeable) and 5 to 15 dBA (clearly audible) above the OOHW evening or night CNMLs.

Highly intrusive noise, where exceedances of the OOHW evening or night periods CNML are more than 25 dBA would be relatively rare across all scenarios. Highly intrusive noise is only predicted for scenarios stringing transmission line (CS08) (11 receivers), structure assembly and erection (CS07) (7 receivers) for OOHW Period 1 Evening or Period 2 Night. These are located at Duncan Street, Lidsdale, and are shown in Figure 6.3.

Structure assembly and erection (CS07) is the scenario with the lowest number of CNML exceedances (334 receivers) for the OOHW evening or night periods. Transmission line stringing (CS08) works are predicted to have the highest number of predicted CNML exceedances (444 receivers) during the OOHW evening or night periods. Predicted exceedances of the evening and night CNMLs would be infrequent and could occur for up to three consecutive nights.

It is possible that some receivers may not be subject to any works during the OOHW Period 1 Evening and Period 2 Night. However, it is also possible that some sensitive receivers could be impacted multiple times. The risk of impacts on multiple occasions is greater where transmission structures are closer together. Noise impacts would decrease with an increase in separation distance between receiver and construction location.

Predicted noise levels for the operation of construction compounds (CS02) indicate no highly intrusive impacts (greater than 25 dBA above the OOHW evening/night CNML). Predicted noise levels at 190 and 176 receivers are predicted to be in the range of 1 to 5 dBA and 5 to 15 dBA, respectively, above the OOHW evening/night CNML, with these impacts predominantly located in the Lidsdale and Wallerawang urban areas. Predicted noise levels at 20 receivers are predicted to be in the range of 15 to 25 dBA above the OOHW evening/night CNML, with these all located in Lidsdale in the vicinity of Duncan Street.

The numbers of sensitive receivers impacted and level of impact for each construction scenario are presented in Table 6.2. Figures showing construction noise prediction contours for the OOHW evening and night periods are in Appendix E. These figures also show the predicted CNML exceedance categories at each potentially impacted sensitive receiver location.

6.1.3 Sleep disturbance assessment

Sleep disturbance is assessed for the night time period (10 pm to 7 am Monday to Saturday and 10 pm to 8 am Sunday and public holidays). Sleep disturbance noise impacts have been considered through a maximum noise level (L_{AFmax}) assessment for relevant scenarios:

- CS02 – Construction compounds
- CS07 – Structure assembly and erection
- CS08 – Stringing transmission line.

Typically maximum (L_{AFmax}) noise levels used in the assessment of sleep disturbance are around 5 dB to 10 dB greater than the $L_{Aeq(15\ min)}$ noise levels for construction activities used in the previous sections. Refer to the glossary for definitions of L_{AFmax} and L_{Aeq}.

As discussed in section 3.1.3, project construction works are proposed to be undertaken during the proposed project construction hours, with work during evening and night periods only where necessary. In some instances, work during the night time period (10 pm to 7 am Monday to Saturday and 10 pm to 8 am Sunday and public holidays) may be required in key locations where works are in proximity to other road or rail infrastructure or due to an outage recall due to transmission network constraints. A sleep disturbance screening assessment has been carried out for relevant construction scenarios and locations. This informs the noise mitigation and management measures in section 7.2 should works be required during the night period.

There is the potential for sleep disturbance impacts, with consideration to the NPfI screening levels, if construction activities occur during the night time period. Potential exceedances of these criteria are provided in Table 6.3.

Impacts identified in this assessment would typically not occur concurrently and the maximum level of impact presented in Table 6.3 represents the worst-case scenario where works are at the point closest to each receiver.

Due to the numbers of potential sleep disturbance impacts, verification of sleep disturbance impacts as identified by this assessment is to be undertaken as part of the CNVMP once further detail of the need for night time construction and the locations, timing, and methods are known. The CNVMP will also include procedures for confirming and verifying noise impact levels and the mitigation measures to be adopted should night work be required. The approach to mitigation is discussed in section 7.

Table 6.3 Construction noise - Sleep disturbance screening assessment

Sleep disturbance assessment	Site establishment	Construction compounds	Access track upgrades	Vegetation clearing	Earthworks & civil works	Structure footing construction (Impact Piling)	Structure footing construction (Bored Piling)	Structure assembly and erection	Stringing transmission line	Demobilisation / rehabilitation
	CS01	CS02	CS03	CS04	CS05	CS06	CS06B	CS07	CS08	CS09
NPfI screening criteria of 52 dBA L_{AFmax}										
Total number of exceedances	-	112	-	-	-	-	-	95	167	-
Maximum predicted exceedance, (dBA L_{AFmax})	-	12	-	-	-	-	-	24	27	-

Note: Not all construction scenarios are expected to be undertaken during the night time period (10:00 pm to 7:00 am). If night time works are required during construction, a detailed assessment would be undertaken for each activity and mitigation measures identified to manage impacts.

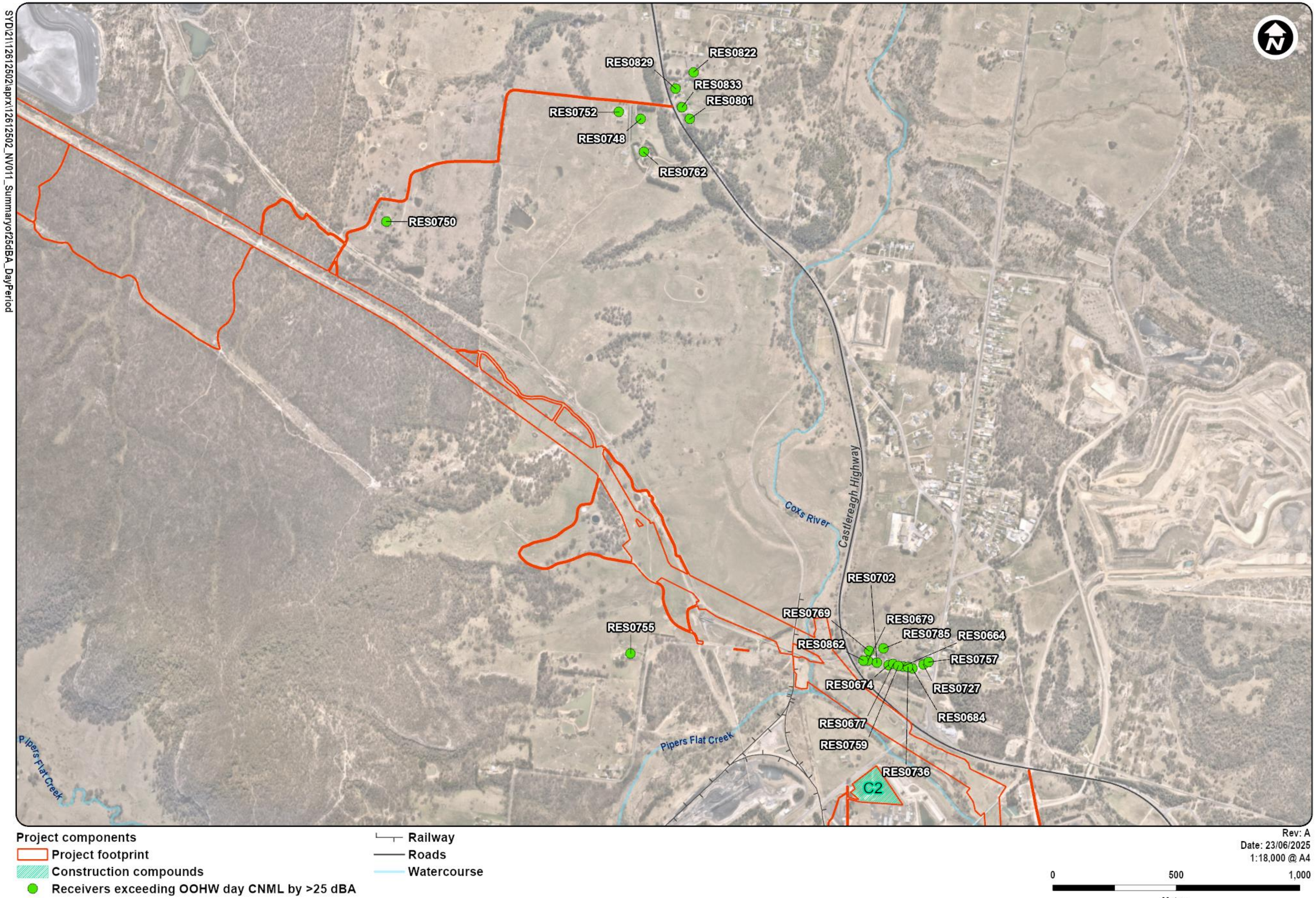
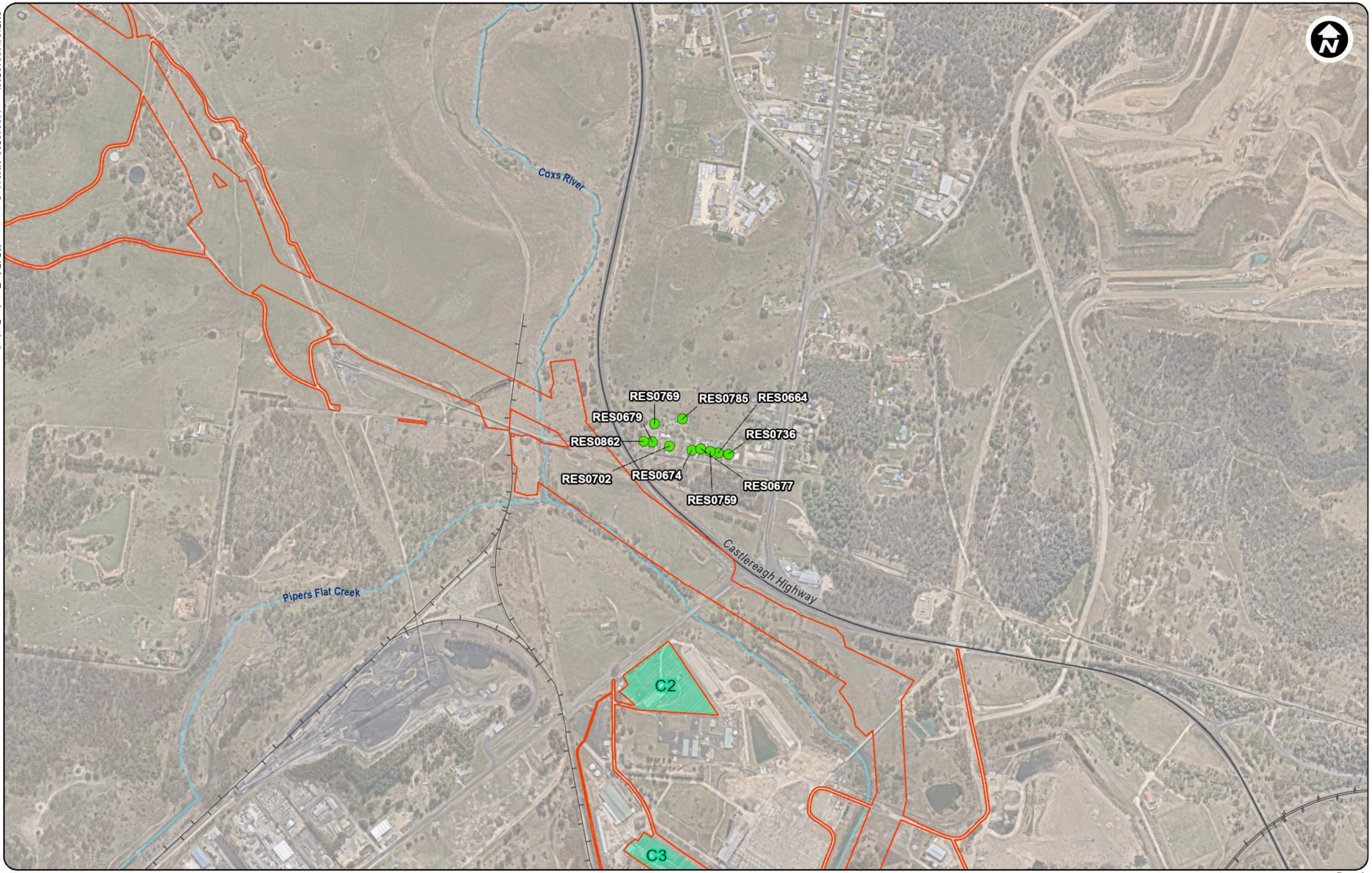


Figure 6.3 Summary of >25dBA exceedances of OOHW day CNML – day period

SYD\2\1\12612502\aprx\12612502_NV011_Summaryof25dBA_EveningPeriod



Project components
Project footprint
Construction compounds
Receivers exceeding OOHW evening/night CNML by >25 dBA

Railway
Roads
Watercourse

Rev: A
Date: 23/06/2025
1:10,000 @ A4

0 500 1,000
Metres

Grid: GDA2020 MGA Zone 56

Figure 6.4 Summary of >25dBA exceedances of OOHW evening/night CNML –evening/ night period

6.2 Construction vibration assessment

Construction scenarios involving potential vibration generating activities and equipment causing vibration are as follows:

– CS03 Access track construction – Vibratory rollers
– CS05 Earthworks – Vibratory rollers
– CS06 Structure footing construction – Piling (impact)
– CS09 Demobilisation / rehabilitation – Excavator with hammer.

The minimum working distances presented in this assessment are indicative and would vary depending on the particular item of plant and local geotechnical conditions. In some instances it may be possible to conduct works within buffer distances where propagated vibration levels are demonstrated through on-site testing or other reliable means to be lower than assumed.

6.2.1 Structures within minimum working distances – cosmetic damage

The buffer distances provided in the CNVG and based on BS 7385 are considered applicable at a building's foundation and are intended for light-framed residential type structures (standard dwellings). Construction vibration buffers for standard structures (non-heritage items) are provided in Appendix F for representative scenarios.

For the purposes of this assessment, non-dwelling structures such as educational facilities and places of worship, or other structures such as residential or rural sheds, are assumed to have equivalent construction to standard dwellings.

Table 6.4 outlines the number of identified structures that are within the minimum working distances for cosmetic damage.

Table 6.4 Number of structures within minimum working distances – cosmetic damage

Activity / equipment and minimum working distance	Cosmetic damage – structures within CNVG minimum distances			
	CS03 Access track upgrades	**CS05 Earthworks & civil works**	**CS06 Structure footing construction**	**CS09 Demobilisation / rehabilitation**
Vibratory roller (>18 tonne) *(25 m buffer)*	2 structures (both at property of receiver ID RES0750)	0 structures	equipment not used	equipment not used
Excavator with Medium hammer *(7 m buffer)*	equipment not used	equipment not used	equipment not used	0 structures
Piling (impact) *(15 m buffer)*	equipment not used	equipment not used	0 structures	equipment not used

In summary, two structures were identified within cosmetic damage vibration buffers associated with access track works (CS03). Based on aerial imagery and site visits these structures are sheds at receiver property RES0750.

6.2.2 Heritage structures within minimum working distances

Review of heritage structures and their proximity to the project footprint was undertaken where vibration intensive equipment is proposed. Nearby heritage items and their relative distances from these activities are presented in Table 6.5. These items were identified in the Technical Report 6 - Historic Heritage Assessment prepared for the project. Where impacts are identified (as indicated by shaded cells), mitigation measures are presented in section 7.

Table 6.5 Heritage structures - proximity to vibration generating construction activities

Item name	Location and proximity to the project footprint	Assessment of whether heritage structure is within minimum working distance		
		Vibratory roller (35 m buffer) Distance to item (m)	Excavator with medium hammer (24 m buffer) Distance to item (m)	Piling (impact) (180 m buffer) Distance to item (m)
Wallerawang rail bridges over Coxs River	Within the project footprint. Located at the crossing of the Coxs River.	**Yes** 6 m	**Yes** 0 m	**Yes** 6 m
St John the Evangelist Church	Heritage curtilage located 29 m west of the project footprint. The church structure is located 50 m from the project footprint (an access track) and 515 m from the nearest proposed transmission line structure 7C Located on Main Street, Wallerawang.	No 50 m	No 50 m	No 438 m
Old Wallerawang School House (former National School)	Heritage curtilage within the project footprint. School house is about 185 m south-west of the project footprint (including the proposed transmission line easement) and about 84 m north-west of compound site 2. Located on the corner of Main Street and Castlereagh Highway, Wallerawang.	No 84 m	No 185 m	No 200 m
Wallerawang Railway Station and yard group	Approximately 128 m northwest of the project footprint. Located on Main Street, Wallerawang	No 869 m	No 869	No > 1 km
Former Wallerawang Public School and Residence	Approximately 289 m west of the project footprint. Located on Main Street, Wallerawang.	No 392	No 392	No 640
The Cottage	Approximately 132 m east of the project footprint. Located on Skelly Road, Lidsdale.	No 168	No 132	No 268
Braemai	Heritage curtilage approximately 161 m north-east of the project footprint, with heritage structure about 290 m from project footprint. Located on Wolgan Road, Lidsdale.	No 168	No 161	No 290
Meadowside	Approximately 275 m north-east of the project footprint. Located on Wolgan Road, Lidsdale.	No 312	No 275	No 323
Uniting Church	Approximately 365 m north-east of the project footprint. Located on Wolgan Road, Lidsdale.	No 402	No 365	No 413
Lidsdale House	Approximately 102 m east of the project footprint. Located on Castlereagh Highway.	No 102	No > 1 km	No > 1 km
House opposite Lidsdale House	Approximately 248 m east of the project footprint. Located on Castlereagh Highway.	No 249	No > 1 km	No > 1 km

As outlined in Table 6.5, the Wallerawang rail bridges over Coxs River is the only heritage listed structure which has been identified within the heritage structure minimum working distances for vibratory rolling, excavator with hammer and impact piling.

Mitigation measures to reduce the risk of damage to heritage structures as a result of construction vibration are presented in section 7.

6.2.3 Sensitive receivers within minimum working distances – human comfort

The CNVG minimum distances are based on assumed continuous vibration, however for most construction activities, vibration emissions are intermittent in nature and for this reason, higher vibration levels, occurring over shorter periods, may be acceptable in relation to human comfort and perception. Vibration mitigation measures relating to human comfort impacts are provided in section 7.

Sensitive receiver distances to the proposed construction scenario boundaries were calculated to allow identification of sensitive receivers within the CNVG minimum working distances for human comfort. Table 6.6 outlines the number of identified sensitive receivers for key vibration generating equipment and scenarios. The identified locations are also presented in Figure 6.5.

Table 6.6 Number of receivers within minimum working distances – human comfort

Activity / equipment and minimum working distance	Human comfort – Sensitive receivers within CNVG minimum distances			
	CS03 Access track upgrades	CS05 Earthworks & civil works	CS06 Structure footing construction	CS09 Demobilisation / rehabilitation
Vibratory roller *(100 m buffer)*	7 receivers: RES0833, RES0752 RES0748, RES0750 RES0829, RES0801 COM0021	3 receivers: COM0021 RES0862 RES0679	equipment not used	equipment not used
Excavator with Medium hammer *(23 m buffer)*	equipment not used	equipment not used	equipment not used	0 receivers
Piling (impact) *(50 m buffer)*	equipment not used	equipment not used	0 receivers	equipment not used

In summary:

– Seven sensitive receivers were identified within the 100 m minimum distance for human comfort in relation to CS03 (access track works). These include six residences located near to Karawatha Drive, with five clustered around the intersection of Karawatha Drive and the Castlereagh Highway. One commercial receiver was identified (Astron Lidsdale).
– Three sensitive receivers were identified within the 100 m minimum distance for human comfort in relation to CS05 (earthworks and civil works). These include two dwellings at Duncan Street Lidsdale and one commercial receiver (Astron Lidsdale).
– No sensitive receivers were identified within the 50 m minimum distance for human comfort in relation to CS06 (structure footing construction).
– No sensitive receivers were identified within the 23 m minimum distance for human comfort in relation to CS09 (demobilisation / rehabilitation).

Due to the potential for human comfort vibration impacts at these sensitive receivers, environmental management measures are recommended in section 7.2 for the project. Construction minimum working distances and sensitive receiver locations for both structural damage and human comfort impacts are provided in Appendix F for representative scenarios.

6.2.4 Buried pipework

The WaterNSW Fish River Pipeline crosses the project in multiple locations as shown in Figure 6.6 to Figure 6.9. Transgrid has engaged with Water NSW regarding the proposed construction works in the vicinity of the pipeline (access track upgrades) and would continue to consult during construction planning to minimise any potential impacts. Transgrid would ensure protection of utility assets would be implemented as needed in consultation with the asset owners

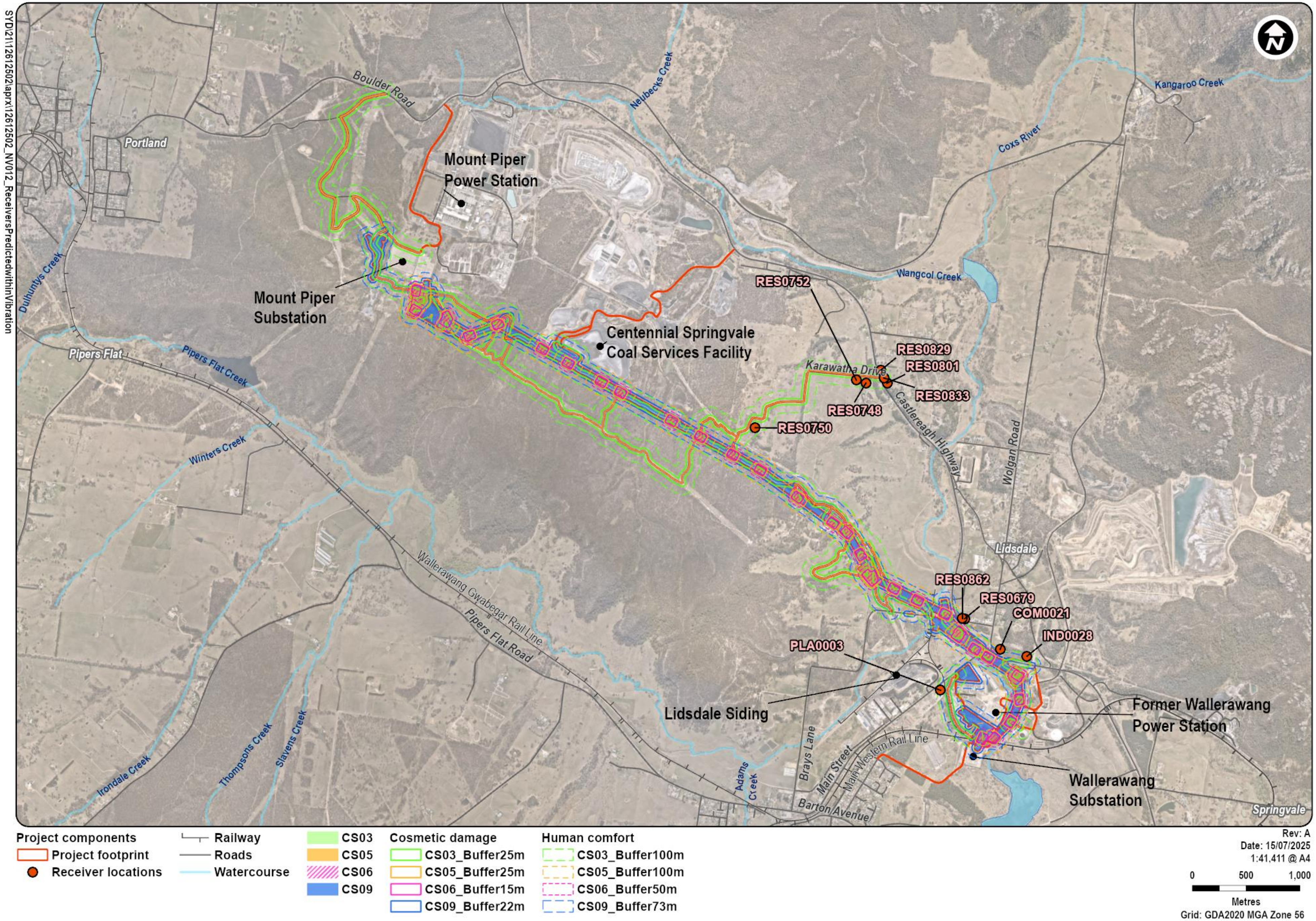


Figure 6.5 Receivers predicted within minimum working distances

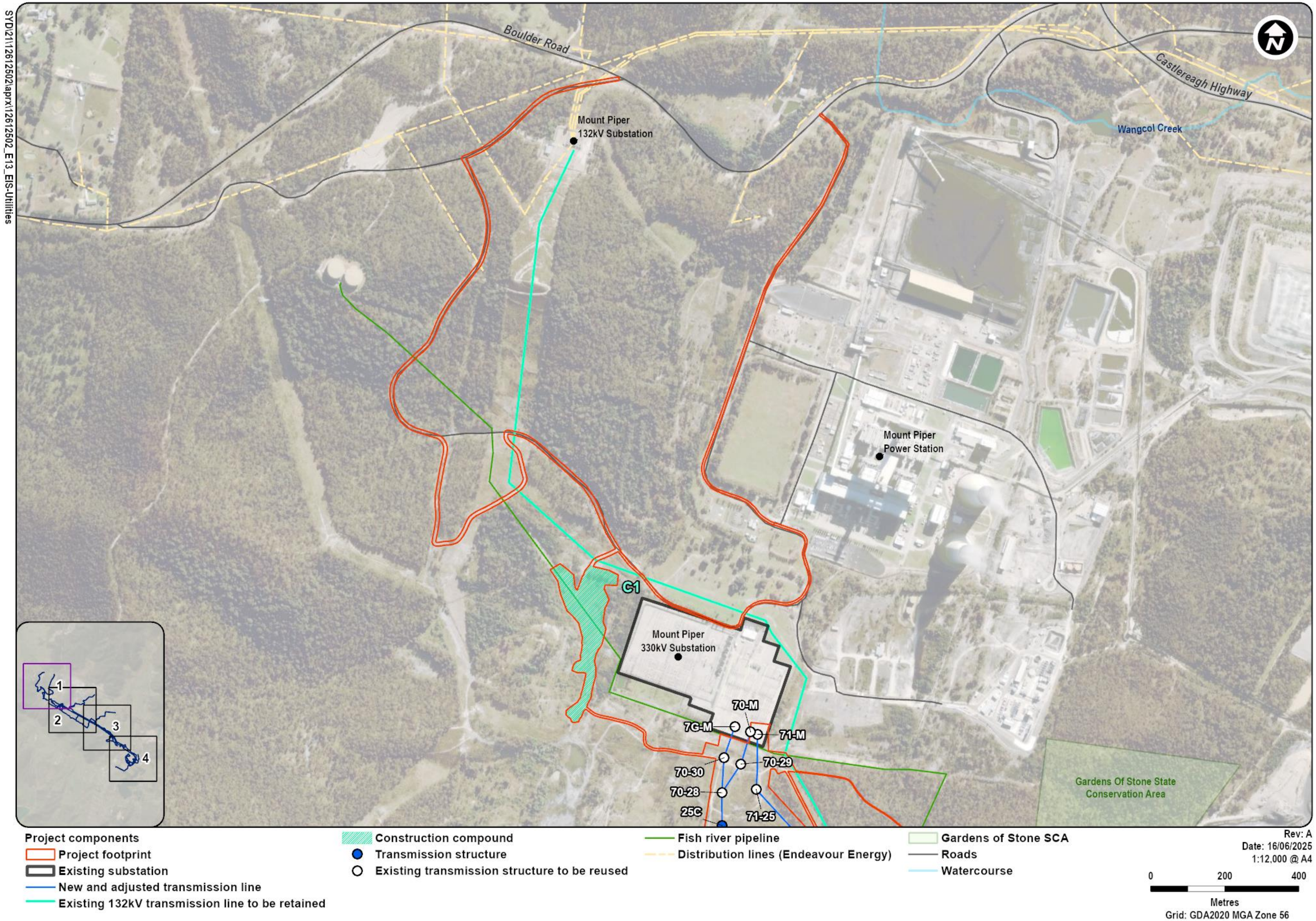


Figure 6.6 *Location of WaterNSW's Fish River Pipeline – map 1*

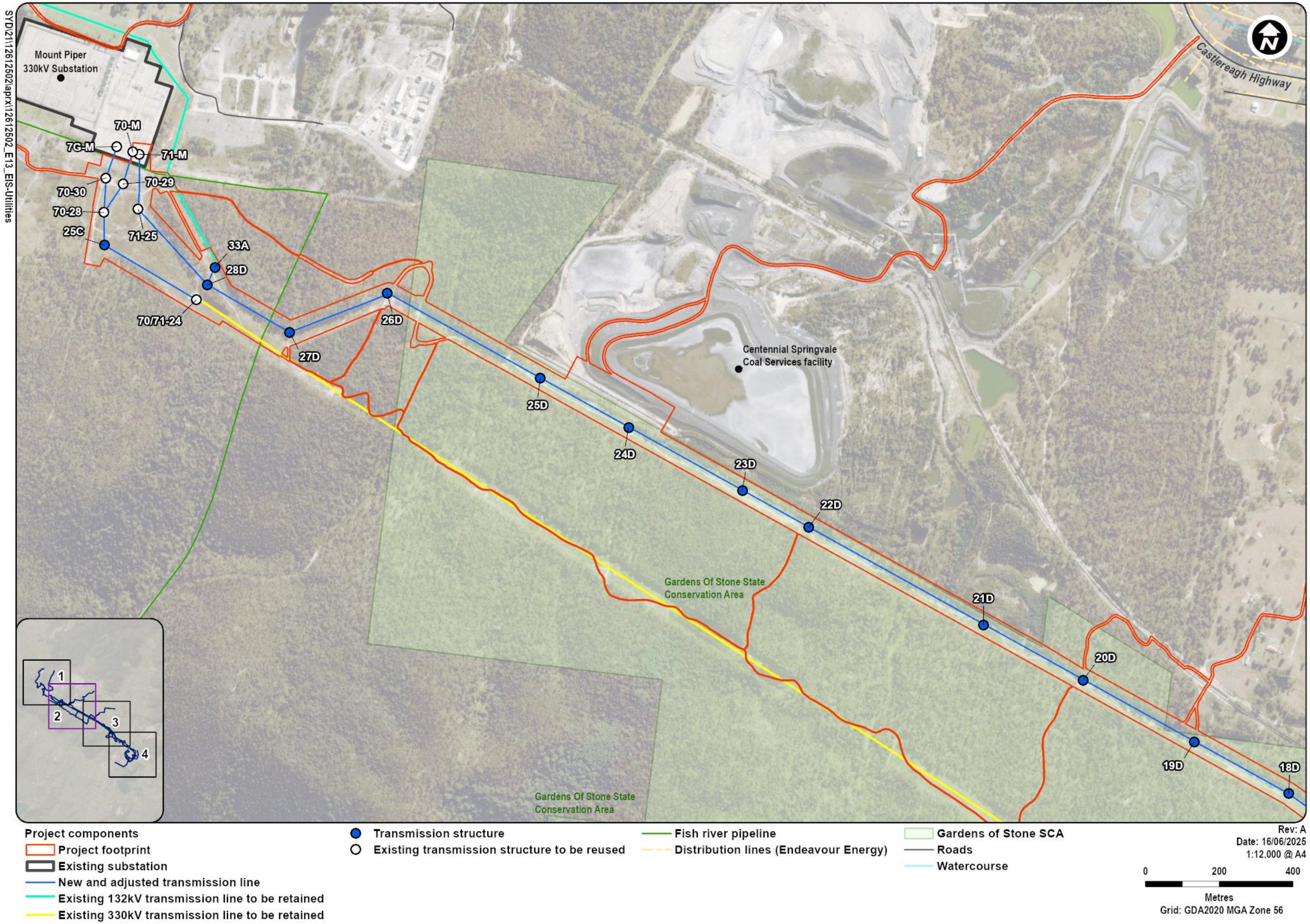


Figure 6.7 Location of WaterNSW's Fish River Pipeline – map 2

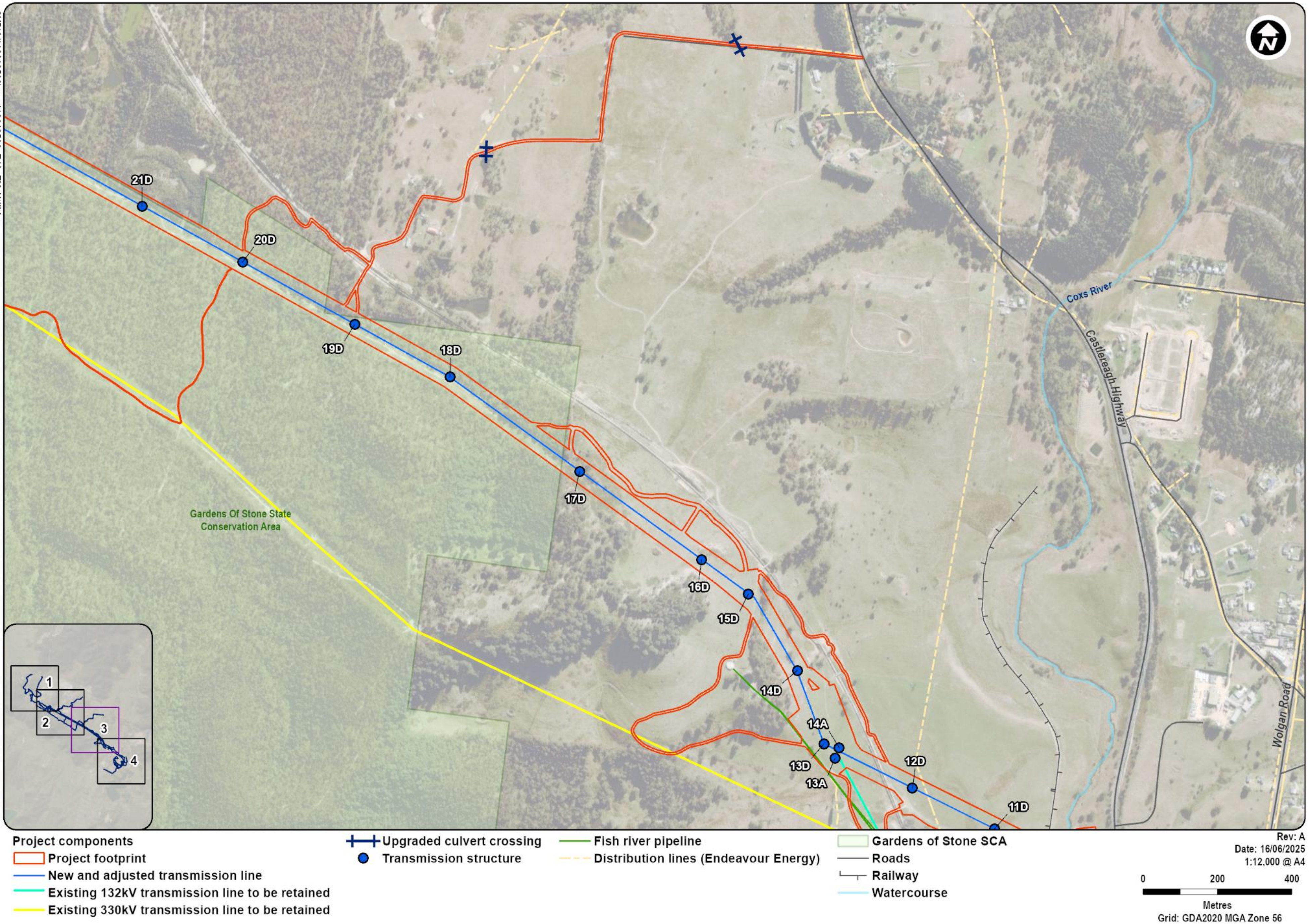


Figure 6.8 Location of WaterNSW's Fish River Pipeline – map 3

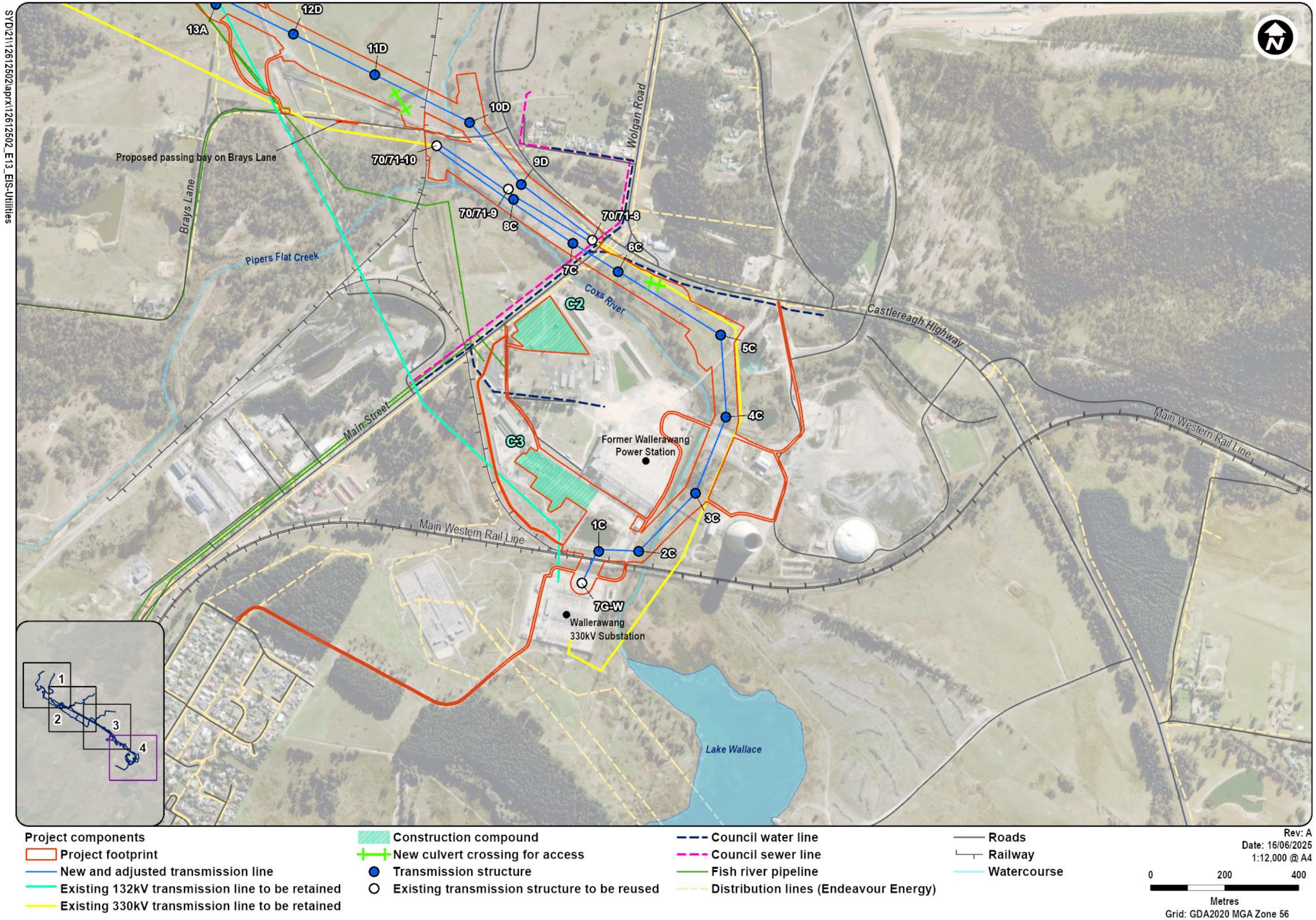


Figure 6.9 Location of WaterNSW's Fish River Pipeline – map 4

6.2.5 Construction vibration impacts on mine workings

The Mount Piper to Wallerawang Transmission Line – Mine Subsidence Assessment (SMEC, 2024) identified that historical mine workings are present in the vicinity of proposed transmission tower structure locations 23D to 25D. While the risk of encountering historical mine workings or risk of subsidence was assessed as very low (SMEC, 2024), it is recommended that further geotechnical investigations and consultation with mine operators is undertaken to consider the potential impacts from ground vibrations produced by equipment during construction.

6.3 Construction traffic assessment

Potential impacts due to construction traffic on local roads have been assessed using the approach presented in section 4.5. A summary of the results is presented below in Table 6.7, which shows the following information:

- The road proposed to be used by construction traffic during the project works.
- The road type (arterial or local road).
- The relevant assessment period based on the road type. Assessment periods for arterial roads are 15 hr (day, 7 am to 10 pm) and 9 hr (night, 10 pm to 7 am). The assessment period for local roads is the worst-case 1-hour period, typically peak hour during either the day or night time.
- The change in noise level is due to the additional construction traffic, relative to the predicted existing traffic noise levels.
- Criteria for local roads are 55 dB $L_{Aeq(1hr)}$ day and 50 dB $L_{Aeq(1hr)}$ night. Criteria for arterial roads are 60 dB $L_{Aeq(15hr)}$ day and 55 dB $L_{Aeq(9hr)}$ night.
- An increase in traffic noise levels due to additional generated traffic (during project construction) of less than 2 dB is considered acceptable even where the overall criteria are already exceeded by existing traffic noise levels.

The assessment results undertaken using the Transport for NSW Construction Noise Estimator tool are provided in Table 6.7.

Table 6.7 Construction traffic assessment

Road	Road type	L_{Aeq} Assessment period	Change in noise levels due to construction traffic dB $L_{Aeq\ (period)}$		Criteria dB $L_{Aeq\ (period)}$		Is the change >2 dB?	
			Day	Night	Day	Night	Day	Night
Castlereagh Highway north of Boulder Road	Arterial	15 hr (day) 9 hr (night)	0.2	0.2	60	55	No	No
Boulder Road	Local road	1 hr day/night	2.3	2.9	55	50	**Yes**	**Yes**
Castlereagh HWY north of Karawatha Drive	Arterial	15 hr (day) 9 hr (night)	1.1	1.1	60	55	No	No
Karawatha Drive	Local road	1 hr day/night	20.1	18.3	55	50	**Yes**	**Yes**
Castlereagh Highway north of Brays Lane	Arterial	15 hr (day) 9 hr (night)	0.4	0.4	60	55	No	No
Brays Lane	Local road	1 hr day/night	10.0	20.7	55	50	**Yes**	**Yes**
Castlereagh Highway north of Main Street	Arterial	15 hr (day) 9 hr (night))	0.8	0.8	60	55	No	No
Main Street	Local road	1 hr day/night	3.2	2.8	55	50	**Yes**	**Yes**
Castlereagh Highway south of Main Street	Arterial	15 hr (day) 9 hr (night)	0.9	0.9	60	55	No	No

No construction traffic impacts were identified in relation to the Castlereagh Highway as increases are less than 2 dB. There is potential for noise impacts from construction traffic at nearby sensitive receivers on Boulder Road, Karawatha Drive, Brays Lane and Main Street categorised as 'local roads', which are proposed to be used for site access.

To aid in identification of potentially impacted noise sensitive receivers, buffer distances were calculated. The buffer represents the distance up to which the traffic noise levels from the local road exceed the criteria presented in Table 6.7. The number of sensitive receivers potentially affected by construction traffic noise (sensitive receivers identified within these buffer distances) and potentially affected by construction traffic noise are summarised in Table 6.8.

Table 6.8 Construction traffic noise - number of potentially impacted residential receivers near local roads

Road used for construction traffic	Buffer distance, Day (metres)	Buffer distance, Night (metres)	Number of receivers within buffer distance, Day	Number of receivers within buffer distance, Night	Location of receivers within buffer distance
Boulder Road	140	474	1	1	Boulder Road
Karawatha Drive	72	246	2	6	Karawatha Drive and around the intersection with Castlereagh Highway
Brays Lane	71	223	0	5	Duncan Street
Main Street	110	435	0	20	Duncan Street Wolgan Road

The sensitive receivers within the construction traffic noise buffer distances are shown in Figure 6.10. These receivers are predicted to exceed the local road traffic noise criteria of 55 dB $L_{Aeq(1hr)}$ day or 50 dB $L_{Aeq(1hr)}$ night, and are subject to predicted increases for the adjacent local road of greater than 2 dB as presented in Table 6.7.

As potential construction traffic noise impacts are predicted, mitigation measures have been recommended in section 7.2.

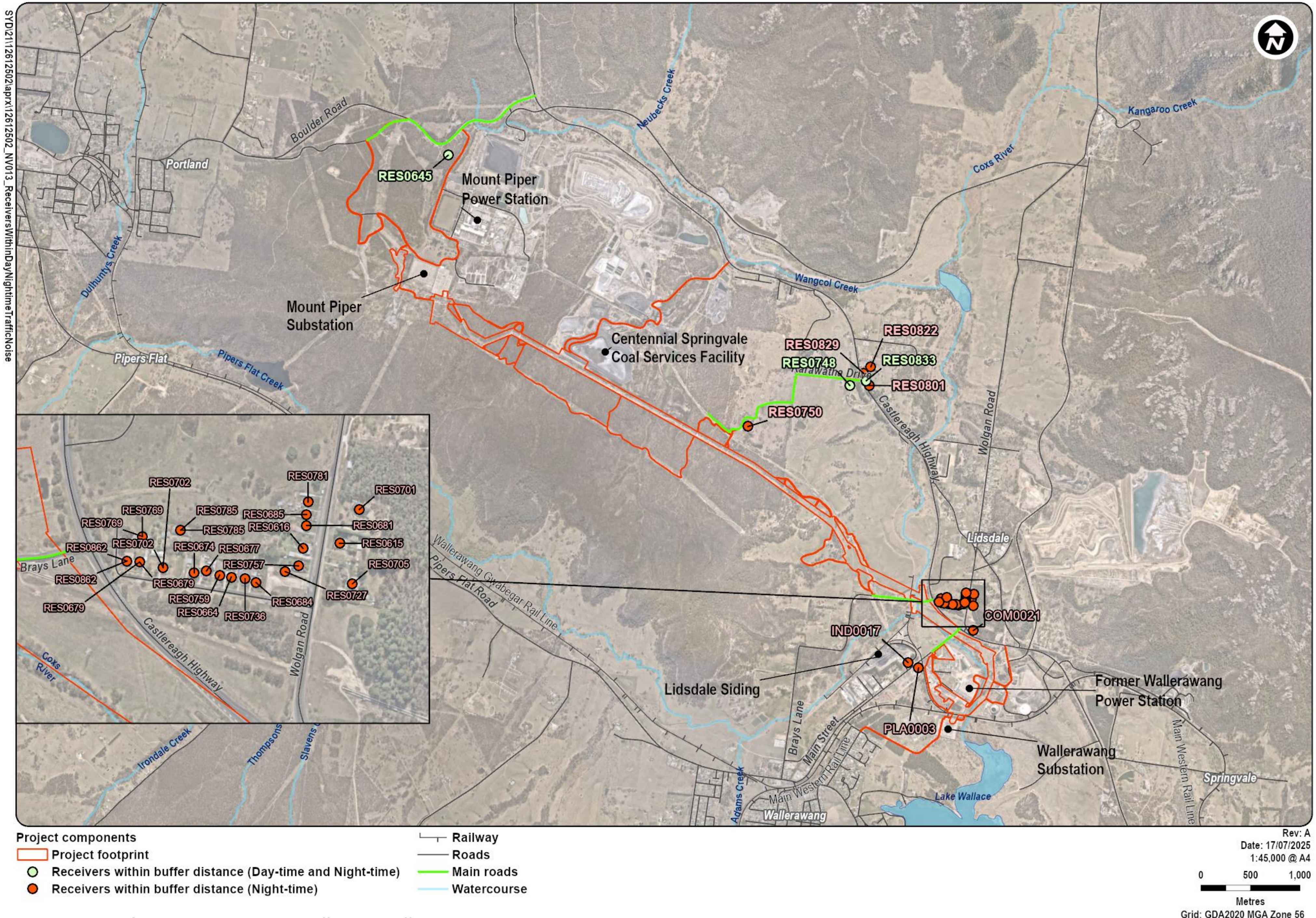


Figure 6.10 *Sensitive receivers within traffic noise buffers*

6.4 Operational impacts

6.4.1 Maintenance activities, emergency works and drone use

Transmission line maintenance and emergency works would be undertaken on an as-needs basis. Such works would not involve a significant change to activities already conducted in relation to the existing transmission line infrastructure (TL 94 & TL 70/71).

Where potential noise generating works are proposed in response to a particular maintenance or emergency need, potential impacts would be managed in accordance with Transgrid's existing environmental noise management procedures. This would include communication with relevant stakeholders and potentially impacted noise sensitive receivers.

Drones would be used for detailed inspections of each transmission line structure and for any maintenance requiring stringing of conductors (refer to section 3.3). Their use would be limited to daytime hours for practical, safety and amenity reasons. Drones to be used during maintenance would hold the relevant noise certificate and approvals as required by the Aircraft Noise Regulation. As these works are infrequent and proposed to occur during the daytime, impacts are expected to be minimal.

Road traffic volumes associated with operation and maintenance of the project would be low and therefore the risk of noise impacts due to operational traffic operating on public roads is considered to be negligible.

6.4.2 Corona noise impacts

The Corona Noise Report (Aurecon, 2025) (attached as Appendix H to this report) assesses the impact of audible noise and radio interference from the project and has been used to inform this assessment.

Figure 6.11 below provides noise contours for audible corona noise at L_{50} (light rain) weather conditions. Residential sensitive receivers are outside of the 35 dBA noise contour line presented in the Corona Noise Report (Aurecon 2025) for most of the alignment, with exception of those near Duncan Street, Wolgan Road and Skelly Road which are shown within the inset on Figure 6.11. This contour represents the evening and nighttime PNTL of 35 dBA L_{Aeq} for the project.

Based on the modelling, 23 residential sensitive receivers would be within the 35 dBA L_{50} weather conditions noise contour (evening/night PNTL) and subject to predicted corona noise of up to 44 dBA representing a 9 dB exceedance of the evening/night PNTL at the worst affected receiver. Modelling of the existing transmission line corona noise indicates that 14 receivers may already be subject to noise levels of up to 6 dB above the evening/night PNTL during light rain due to the existing transmission lines. The project would therefore result in exceedances at an additional nine receivers due to an increase in corona noise of around 3 dBA compared to the existing situation. These nine additional receivers are RES0681, RES0685, RES0616, RES0615, RES0728, RES0701, RES0705, RES0781 and RES0863.

Based on the modelling, approximately eight residential sensitive receivers would be within the 40 dBA noise contour (day PNTL) for L_{50} weather conditions when the project is operational, with the worst affected receiver experiencing an exceedance of 4 dBA. These receivers are RES0674, RES0677, RES0679, RES0702, RES0755, RES0759, RES0769 and RES0862. The modelling for the existing transmission lines shows there are no exceedances of the day PNTL criteria at residential sensitive receivers.

During periods of fair weather, corona noise is predicted to be lower than 30 dBA at the nearest residential sensitive receivers to the transmission line, and therefore complies with the operational noise PNTLs for day, evening and night periods under these atmospheric conditions.

The Corona Noise Report (see Appendix H) presented results for seven transmission line segments based on the scenarios presented in section 4.6.1, denoted by transmission structure locations. The predicted noise levels for each segment are summarised in Table 6.9. Predicted L_{50} noise levels for the existing and proposed transmission lines are highlighted in the table where they exceed the day, evening or night PNTL.

Table 6.9 Audible noise assessment results (cumulative noise from existing and proposed lines) (Aurecon, Corona Noise Report March 2025)

From structure No.	To structure No.	Max AN at nearest receiver (Fair weather)	Max AN at easement edge (L_{50})	Max AN at nearest receiver (L_{50}) for existing and proposed
1C	3C	<30 dBA	48 dBA	30 dBA
3C	8C/9D	<30 dBA	48 dBA	44 dBA
8C/9D	10D	<30 dBA	48 dBA	43 dBA
10D	12D	<30 dBA	48 dBA	<30 dBA
12D	13D	<30 dBA	48 dBA	32 dBA
13D	27D	<30 dBA	46 dBA	34 dBA
27D	28D	<30 dBA	48 dBA	<30 dBA

Note: Highlighted cell values indicate predicted exceedance of PNTL.

6.5 Cumulative impacts

6.5.1 Projects considered

Section 21.2 of the EIS outlines the methodology for the assessment of cumulative impacts including the methods for identifying what projects have been considered as part of the issue-specific cumulative impact assessments for the project. The assessment has been undertaken in accordance with the Cumulative Impact Assessment Guidelines for State Significant Projects (DPIE, 2022).

The following 10 projects within 20 km of the project footprint were identified for consideration as part of the cumulative impact assessment and are shown in Figure 6.12.

- Wallerawang Battery Energy Storage System
- Mount Piper Battery Energy Storage System
- Great Western Battery Energy Storage System
- Pinecrest Battery Energy Storage System
- Lake Lyell Pumped Hydro Energy Storage
- Ben Bullen Wind Farm
- Sunny Corner Wind Farm
- Wallerawang Power Station Ash Dam
- Wallerawang residential subdivision (DA226/22)
- Wallerawang Station upgrades.

6.5.2 Assessment of cumulative impacts

Table 6.10 summarises the assessment of the potential for cumulative noise and vibration impacts for the project and the projects listed in section 6.5.1. The assessment considers the potential for cumulative construction and operational impacts. Additional detailed assessment is provided following Table 6.10 for cumulative impacts associated with the Wallerawang, Mount Piper and Great Western BESS projects.

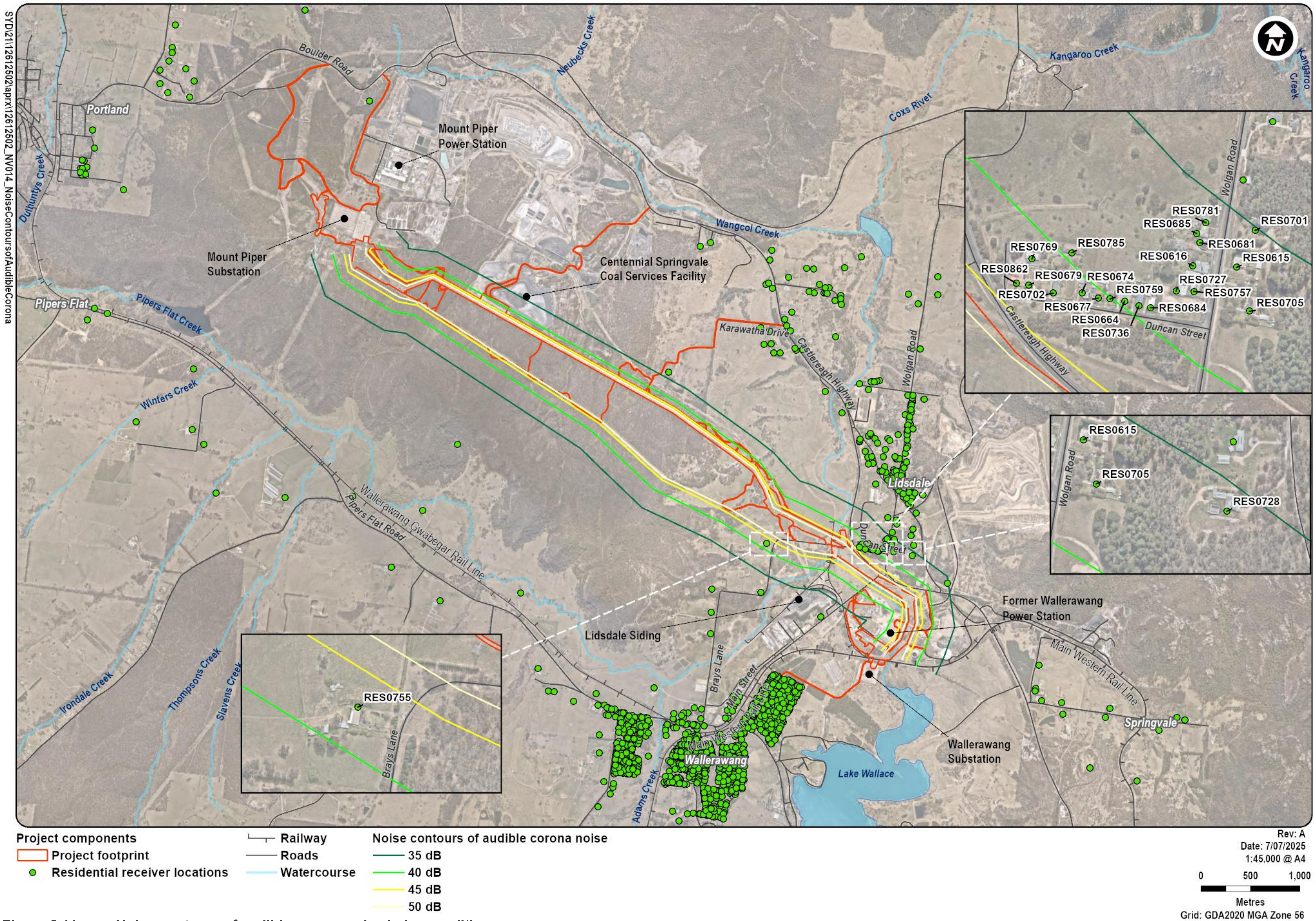


Figure 6.11 Noise contours of audible corona noise in L_{50} conditions

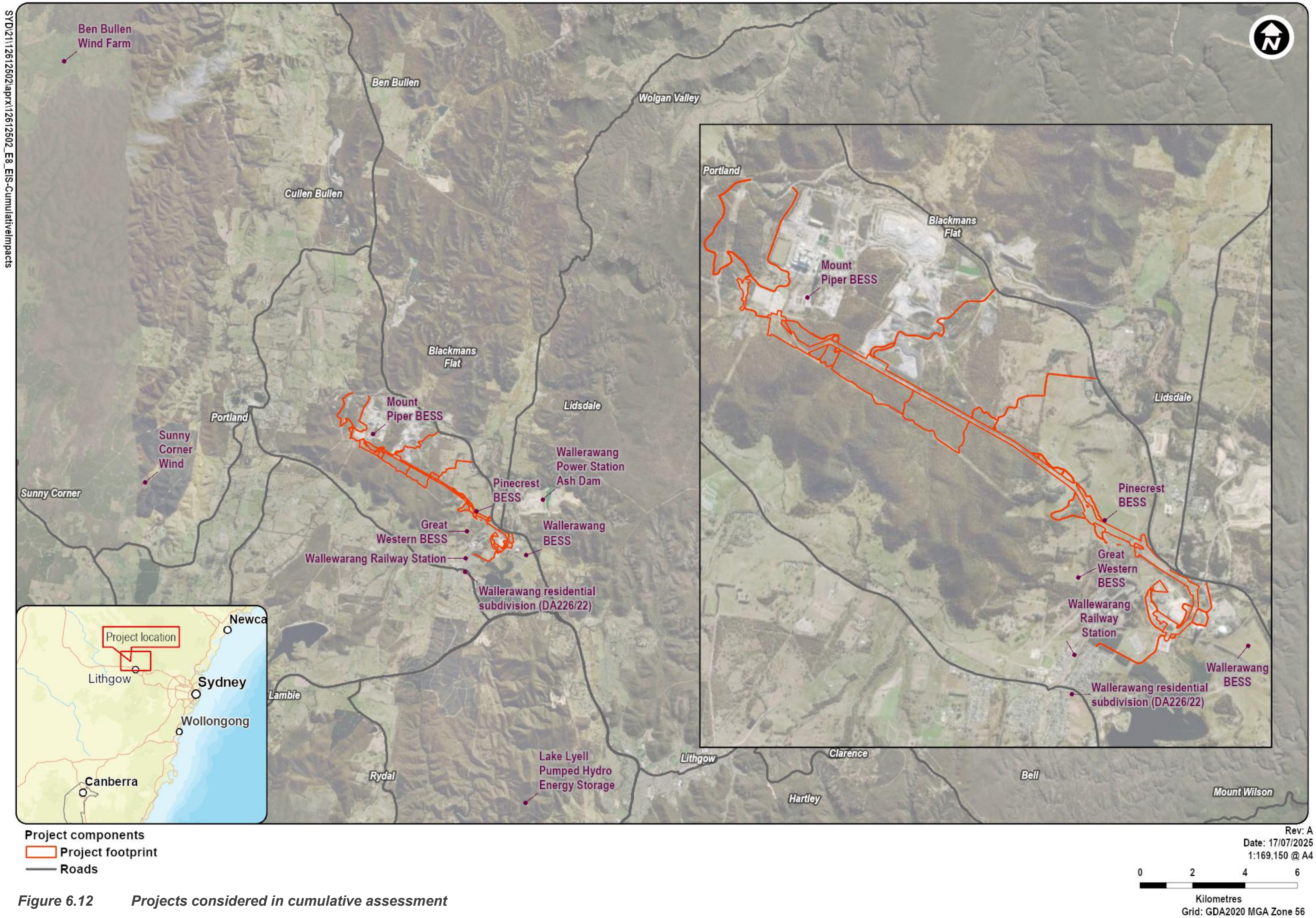


Figure 6.12 Projects considered in cumulative assessment

Table 6.10 Potential cumulative impacts of relevant future projects

Relevant future project	Scope	Approximate location	Status/timeframe/ operational period	Potential for cumulative impact
Wallerawang BESS	Design changes to optimise the layout of the approved Wallerawang BESS (500 MW and 1,000 MWh of battery storage capacity)	500 m east of the project footprint	Approved 4/8/2022 Current modification at response to submissions stages Construction period of 1 to 2 years, expected to commence from 2025, construction does not appear to have commenced Operational period unchanged	Cumulative construction noise from the Mount Piper to Wallerawang Transmission Line project may increase overall construction noise levels at noise-sensitive receivers near Wallerawang BESS by 0 to 14 dBA if works occur concurrently. Based on operational noise levels presented in the modification noise assessment report for the Wallerawang BESS (GHD, 2024) cumulative operational noise impacts are not anticipated with the project. See detailed assessment below.
Mount Piper BESS	Development of a grid-scale BESS with a capacity of up to 500 MW	Immediately north of the project footprint	Approved 15/11/2024 Construction period of 18-24 months expected to commence from mid-2026 at the earliest Potentially operational by 2027/2028 and would operate for about 20 years	Cumulative construction and operational noise impacts are not anticipated should works be undertaken simultaneously or consecutively with the project. See detailed assessment below.
Great Western BESS	Development of a 500 MW / 1,000 MWh BESS and associated infrastructure	300 m west of the project footprint	Approved 2/11/2023 Project has not yet commenced construction and construction start date is not known however is expected to occur over 12-14 months The BESS is intended to have an operational life of up to 20 years	There is potential for cumulative construction noise impacts with the project should works occur simultaneously or consecutively, with the Great Western BESS construction, therefore works conducted in the vicinity of the Wallerawang and Lidsdale townships should consider cumulative noise impacts in the approach to mitigation. There is potential during operation for cumulative noise exceeding the project’s specific criteria at one residential receiver (233 Brays Lane). It is noted that this would only occur when atmospheric conditions are favourable to corona noise emissions and the contribution from this project to this cumulative impact would be negligible. See detailed assessment below.

Relevant future project	Scope	Approximate location	Status/timeframe/ operational period	Potential for cumulative impact
Pinecrest BESS	Development of 500 MW battery storage capacity and 1,000 MWh of storage with (2-hour duration) connecting to the grid via underground cabling	Layout shown in scoping report is located within project footprint, with Transgrid undertaking ongoing consultation with Banpu Energy regarding positioning of the site.	Scoping report prepared with SEARs not yet issued EIS is expected to be submitted in early 2026 Construction period of 18 months commencing in late 2026 if approved. Operations proposed to start in 2028	Currently no construction or operational noise assessment for Pinecrest BESS is available, however considering the location and proximity to the project and shared noise sensitive receivers cumulative operational and construction noise and vibration impacts are likely due to the potential simultaneous construction periods in 2026. These cumulative impacts are most likely at receivers nearby to the proposed located on Brays Lane and at Duncan Street, Lidsdale. Consideration of cumulative impacts is recommended to be further reviewed once the Pinecrest BESS EIS has been prepared and further details of the BESS are available .
Lake Lyell Pumped Hydro Energy Storage	Development of the Lake Lyell Pumped Hydro Energy Storage Scheme (that will provide between 300 to 350 MW of electricity generating capacity for up to 8 hours during peak demand	10 km south of the project footprint	EIS in preparation Technical design expected to conclude in 2025. Construction expected commence in late 2026 and to take four years with operation commencing in 2029	Due to the distance between the projects, cumulative noise and vibration impacts during construction or operation are not considered likely.
Ben Bullen Wind Farm	Construction of approximately 64 wind turbine generators, a BESS and ancillary infrastructure	20 km north-west of the project footprint	EIS in preparation Construction in 2028 for 18-24 months Operational life of 35 years+	Due to the distance between the projects, cumulative noise and vibration impacts during construction or operation are not considered likely.
Sunny Corner Wind Farm	Construction of approximately 80 wind turbine generators, a BESS and ancillary infrastructure	6 km west of the project footprint	EIS in preparation Construction in 2030 for 36 months Operational life of 30 years	Due to the distance between the projects, cumulative noise and vibration impacts during construction or operation are not considered likely.
Wallerawang Power Station Ash Dam	Use of part of the lands lying north of the Castlereagh Highway that were once used by the former Wallerawang Power Station as coal ash dam repositories	Immediately north of the project footprint	Approved 13/10/2023 The modification proposes an additional ten years for the importation of capping material	Assessment of operation and construction of the Wallerawang Power Station Ash Dam was conducted and presented in Stage 2 Kerosene Vale Ash Repository Technical Report 5 – Noise and Vibration Impact Assessment (Parsons Brinckerhoff, 2008) (Ash Dam NVIA).

Relevant future project	Scope	Approximate location	Status/timeframe/ operational period	Potential for cumulative impact
				Construction: Construction phase works are assumed to have been completed due to the age of the project (2008) and the predicted 4 to 26 week construction period, therefore cumulative construction noise impacts are not predicted with the project. **Operation:** Predicted operational noise levels of between 38 to 49 dBA L_{Aeq} were presented in the Ash Dam NVIA for sensitive receivers near to the Ash Dam project, with impacts focused around Skelly Road, Neubeck Street and Wolgan Road. At receivers shared with the project, operational noise levels were predicted to be between 20 to 35 dBA L_{Aeq}, within the Ash Dam's noise goals and lower than the project's PNTLs. In instances of simultaneous operation of the Ash Dam and occurrence of corona noise from the project, cumulative noise levels are not anticipated to exceed the cumulative allowances of the relevant amenity noise level from the NPfI, therefore cumulative impacts are not anticipated with the project.
Wallerawang residential subdivision (DA226/22)	Torrens Subdivision – 1 Lot into 54 Residential Allotments, 4 New Roads, 2 lots for drainage and public reserve Allotment	19 Barton Avenue Wallerawang 2 km south-west of the project footprint	Currently being re-exhibited till 13 June 2025	Due to the distance between the projects, cumulative noise and vibration impacts during construction or operation are not considered likely.
Wallerawang Railway Station upgrade	Works to upgrade the existing station, closed in 1989, so that passenger services can be restated.	850 m southwest of project footprint	Project has been announced on Transport for NSW website Early enabling works will be carried out from March to August 2025 Once the design is finalised, construction will commence later in 2025, with re-opening of the station planned for late 2026	At this stage there is no publicly available information on the nature of the proposed construction works associated with the Wallerawang Railway Station upgrade, however it is possible that the required activities and equipment may result in cumulative construction noise impacts with the project should works occur simultaneously or consecutively. Further consultation with Transport for NSW will be required to confirm if such impacts are likely.

Wallerawang BESS

Construction

Cumulative construction noise impacts are likely to occur at sensitive receivers within the overlapping area of impact from the Wallerawang BESS and the project. This may be due to concurrent or sequential works. Concurrent cumulative impacts may occur in the case where the works are undertaken at the same time on each site, resulting in an overall higher construction noise level at affected sensitive receivers. Sequential cumulative construction noise impacts refer to the combined effects of noise from multiple construction projects occurring one after another, without significant breaks in between. This can lead to prolonged duration of noise exposure for nearby sensitive receivers.

The Wallerawang BESS noise assessment (Resonate, 2022) states that OOHW is not proposed for the works, therefore cumulative impacts during construction are only relevant for standard construction hours.

The following cumulative impact assessment for construction noise is based on the predicted construction noise levels presented in the Wallerawang BESS noise assessment report (Resonate, 2022)

Sensitive receivers to the east of the BESS have predicted construction noise exceedances of up to 21 dBA above the BESS CNML for standard construction hours. BESS construction predicted noise levels are between 48 dBA to 70 dBA at 4 Millers Road (the worst affected receiver). Cumulative construction noise from the project may increase the overall construction noise levels relative to BESS predicted construction noise levels by between 0 to 6 dBA at receivers east of the BESS if works were to occur concurrently.

Sensitive receivers to the west of the BESS and south of the project in Wallerawang township are predicted to have construction noise exceedances of up to 14 dBA above the BESS CNML for standard construction hours and BESS construction predicted noise levels are between 44 to 56 dBA at 2 Blaxland Street (the worst affected receiver). Cumulative construction noise from the project may increase the overall construction noise levels relative to BESS predicted construction noise levels by between 0 to 14 dBA at receivers west of the BESS if works were to occur concurrently.

Operation

Operational noise from the project and Wallerawang BESS are not anticipated to exceed cumulative noise allowances specified in the NPfI. Wallerawang BESS noise assessment report (Resonate, 2022) identified operational noise levels of around 35 dBA at Wallerawang township. Operational corona noise from the project in this area is predicted to have negligible influence on cumulative noise levels. At Lidsdale, where corona noise due to the project is predicted to be between 40 to 45 dBA under L_{50} conditions, cumulative noise from BESS operation is expected to contribute less than 1 dB at the worst affected receivers. It should also be noted that conditions where BESS noise levels are loudest (hot weather) are unlikely to occur simultaneously with conditions favourable to corona noise which is most likely to occur during light rain or drizzle. Therefore, cumulative operational noise impacts are not anticipated.

In addition to the 2022 Resonate assessment, an update was prepared in the Wallerawang BESS Modification Noise Assessment (GHD, 2024), which identified noise levels generally lower than the 2022 Resonate assessment by as much as 12 dB at the worst affected receivers. It is assumed that this assessment supersedes the earlier 2022 Resonate results.

Mount Piper BESS

Construction

The Mount Piper BESS EIS noise assessment (Aurecon, 2024) identified that construction noise impacts were predicted to not exceed the standard and OOHW criteria at nearby noise sensitive receivers. The predicted construction noise levels were also found to at least 10 dBA lower than the CNMLs and therefore cumulative impacts are not anticipated should works be undertaken simultaneously or consecutively with the project.

Operation

The Mount Piper BESS EIS noise assessment (Aurecon, 2024) presents predicted operational noise levels that are lower than the respective project specific noise criteria. The project is also not predicted to exceed NPfI criteria at shared noise sensitive receivers. Therefore, cumulative operation impacts with the project are not anticipated with regards to the NPfI operational noise criteria.

Great Western BESS

Construction

An EIS noise assessment for Great Western BESS (AECOM, 2022) predicted construction noise levels at sensitive receivers near to the Great Western BESS. The assessment states that construction activities are proposed for daytime periods over a period of 12 months to completion. Impacts exceeding the CNMLs are predicted for the worst case construction scenarios at up to 92 residential receivers in total. This includes 86 receivers with predicted exceedances in the range 1 to 10 dB, five receivers with predicted exceedances in the range 11 to 20 dB and one receiver with a predicted exceedance of greater than 20 dB above the CNML. Noise impacts associated with the BESS construction are generally at residential receivers within the Lidsdale and Wallerawang townships.

Due to the potential for construction noise impacts associated with the Great Western BESS over the BESS 12-month construction period, there is potential for cumulative construction noise impacts with the project should works occur simultaneously or consecutively. The construction start date for the Great Western BESS is not currently known, however there is potential for construction periods to partially or completely overlap with the Project for a duration of up to 12 months. Therefore works conducted in the vicinity of the Wallerawang and Lidsdale townships should review any updated construction scheduling of the Great Western BESS and consider cumulative noise impacts in the approach to mitigation where relevant.

Operation

The Great Western BESS noise assessment (AECOM, 2022) predicted potential operational noise impacts exceeding the NPfI criteria by up to 2 dB during the daytime period and up to 4 dB during the evening and night periods at the worst affected sensitive receivers, which are located on Brays Lane, Wallerawang. One residential receiver (233 Brays Lane) has the potential for cumulative noise exceeding the project specific criteria in cases where atmospheric conditions are favourable to corona noise emission. It is noted that the proposed mitigation measures for operational noise from the Great Western BESS involve at-property treatment of 233 Brays Lane and this has the potential to sufficiently mitigate the potential cumulative noise impacts from the BESS and the project combined, providing the cumulative levels from corona noise are also considered in the mitigation treatments.

7. Mitigation and management of impacts

7.1 Approach to mitigation and management

The ICNG identifies that, due to the nature of construction, it is inevitable that noise impacts may arise where construction occurs near sensitive receivers. The assessment identified the following key noise and vibration impacts:

- Exceedances of the CNMLs for all construction activities during standard hours and OOHW day, evening and nighttime.
- Some activities that may need to occur during the nighttime, although infrequent, have the potential for sleep disturbance impacts.
- Cosmetic damage and human comfort vibration impacts at structures and sensitive receivers.
- Sensitive receivers along local roads used for site access may experience temporary noise levels above the road traffic noise criteria as a result of traffic movements associated with the project.
- Potential for cumulative construction noise impacts should the project be constructed simultaneously with other major projects.

Measures are recommended in section 7.2 to minimise and manage the identified impacts, including preparation and implementation of the following:

- An OOHW protocol for construction work that would occur outside of standard construction hours, including any infrequent night work.
- Actions to reduce noise impacts from construction traffic.
- Measures to engage with potentially affected receivers including a complaints mechanism.
- Proactive communication with proponents of other major developments to minimise risk of cumulative construction noise impacts.

A CNVMP will also be developed as part of the overarching Construction Environmental Management Plan (CEMP) for the project. The CNVMP will include verification of the construction noise levels and vibration impacts predicted by this assessment for each of the proposed construction scenarios. The CNVMP will also consider any changes to construction methodology and equipment identified by the construction contractor. The CNVMP will also describe how the potential noise and vibration impacts are to be managed for the duration of project construction. Further details of CNVMP requirements are provided in Table 7.1.

7.2 Recommended mitigation measures

The project specific mitigation measures in Table 7.1 are recommended to reduce the potential construction noise and vibration impacts. Subsequent to the incorporation of the noise mitigation measures, construction noise levels may still exceed the CNMLs during standard and OOHW hours at the most-affected sensitive receptors.

Table 7.1 Project specific construction noise and vibration mitigation measures

Impact /issue	Mitigation measures	Timing
Construction noise and vibration management	A CNVMP will be developed in consultation with NSW EPA and implemented as part of the CEMP. The CNVMP will generally follow the approach outlined in the Interim Construction Noise Guideline (DECC, 2009) and include: – identification of sensitive receivers, including sensitive threatened fauna and their nearby habitats in consultation with a qualified ecologist, and heritage structures (i.e. Wallerawang Rail Bridges over Coxs River (SHR #01064), the St John the Evangelist Church (SHR #01702, LEP#I112) and Braemai (LEP #I193)) – an updated construction noise and vibration assessment based on final construction staging, compound locations and details, selected equipment types and proposed OOHW periods – all potentially high noise and vibration generating activities associated with the construction of the project	Prior to construction

Impact /issue	Mitigation measures	Timing
	– standard and additional mitigation measures to manage identified impacts as required in accordance with the CNVG, including safe working distances when working near heritage structures to avoid vibration damage – a monitoring program to assess performance against relevant noise and vibration criteria – arrangements for consultation with affected neighbours and sensitive receivers where exceedances are predicted of NMLs, including notification and complaint handling procedures – details of the process and actions to be taken in the event of non-compliance with noise and vibration criteria.	
Construction noise (source controls)	As part of development of the detailed design and construction methodology, all reasonable and feasible mitigation measures will be considered, confirmed and implemented, in line with the Interim Construction Noise Guideline (DECC, 2009), to minimise construction noise impacts and to avoid exceedances of the applicable noise management levels at adjacent sensitive receivers, where practicable. Measures that may achieve this outcome may include, but not limited to the following: – portable temporary noise screens will be erected adjacent to stationary or long term static noise sources, or noise generating items, where reasonable and feasible – spotters, “smart” reversing alarms, or broadband reversing alarms will be used in place of traditional tonal beeper reversing alarms, particularly on equipment where reversing alarms are frequently in use such as rollers, loaders or compactors – noise source controls, such as the use of residential class mufflers, will be used reduce noise from all plant including cranes, excavators and trucks – the offset distance between noisy plant items and sensitive receivers will be maximised, where reasonable and feasible – machinery will be operated in a manner which reduces maximum noise level events such as shaking excavator buckets, dropping materials into trucks from a, height or steel on steel contact – construction plant and equipment will be turned off when not in use.	Detailed design and construction
Construction noise (administrative controls)	Opportunities to reduce exceedances of the applicable construction noise management levels through the implementation of administrative controls will be examined, confirmed and implemented where reasonable and feasible in line with the Interim Construction Noise Guideline (DECC, 2009). Controls to be considered will include, but not limited to the following: – environmental awareness training and inductions for site personnel will include noise mitigation techniques/measures to be implemented when on site and accessing the site – plant and equipment will be selected based on noise emission levels. This will include the consideration of alternative piling and stringing methods, such as the use of bored piling methods and drones for stringing. – noise-intensive works will be limited to less sensitive construction hours (i.e. away from early morning and late afternoon periods) as far as practicable, when working in the vicinity of sensitive receivers – plant and equipment will be well maintained to ensure that excessive noise is not generated – noise level predictions for works undertaken outside standard working hours will confirmed and verified in accordance with the ICNG by the construction contractors. This will consider implementation of additional construction noise mitigation measures outlined in section 7.2.1.	Detailed design and construction
Construction compounds	Where reasonable and feasible, measures will be taken to minimise noise emissions from construction compounds using the following principles: – The layout of the construction compounds C2 and C3 will be planned so that primary noise sources are at a maximum distance from residences, with solid structures (sheds, containers, etc.) placed between residences and noise sources (and as close to the noise sources as is practical). – Enclosures will be used to shield fixed noise sources such as pumps, compressors, fans, screens (where practicable). – Site topography will be considered when situating plant to block line of sight where possible.	Construction

Impact /issue	Mitigation measures	Timing
OOHW works	A project-specific OOHW protocol will be developed to define the process for considering, approving and managing OOHW. The protocol will include provisions to: – confirm and verify proposed noise level impacts for specific work activities proposed outside standard construction hours, including the potential for sleep disturbance impacts. – confirm and verify the potentially affected sensitive receivers and the standard and additional mitigation measures that will be applied to such receivers. – additional mitigation measures will be applied to affected sensitive receivers impacted by sleep disturbance for more than two consecutive nights. – notify and engage with potentially noise affected receivers about upcoming work outside standard construction hours and address any associated complaints – identify appropriate respite for noise affected receivers (where required). – proactively communicate and engage with affected receivers.	Detailed design and construction
Construction vibration	Where vibration intensive activities are planned within vibration minimum working distances (including for sensitive or heritage structures and buried infrastructure), reasonable and feasible mitigation measures will be implemented. These measures will include, and not be limited to: – pre- and post-construction condition surveys of vibration sensitive receivers within the recommended safe working distances prior to construction works – alternative construction methods and equipment with lower source vibration levels will be investigated and implemented, where feasible – schedule the use of vibration-sensitive equipment during the least sensitive times of the day – sequence operations to avoid or minimise concurrent vibration intensive activities – vibration monitoring will be carried out at the start of work to determine actual vibration levels at the receiver – work will cease if the monitoring indicates vibration levels are likely to, or do, exceed the relevant criteria. – where potential vibration impacts relate to buried infrastructure, consultation will be undertaken with asset owners. Where vibration intensive activities are proposed in the vicinity of historical mine workings (including but not limited to transmission tower locations 23D to 25D), geotechnical investigations and consultation with mine operators will be undertaken to consider the potential impacts associated with ground vibration during construction.	Construction
Construction traffic noise	Management of construction traffic noise on local roads will be included in the CNVMP. The CNVMP will consider the following controls: – scheduling and routing of construction traffic to minimise impacts using the following principles: • more even distribution of traffic movements across the various access roads during the daytime period to reduce the peak 1-hr period traffic noise levels • scheduling of movements at less-sensitive times for impacted receivers. – implementing temporary construction traffic speed limits on access roads in the vicinity of potentially impacted noise sensitive receivers.	Construction
Cumulative construction noise	Where cumulative construction noise impacts are likely at sensitive receivers, coordination with other proponents will occur to minimise the cumulative construction noise impacts. This should involve: – scheduling of noise or vibration-generating construction activities to minimise the duration or level of impact – combined approach to mitigation where considered reasonable and feasible such as a temporary noise barrier that may provide mitigation for more than one project – consideration of cumulative noise levels in compliance monitoring – community consultation, notification and complaints handling are to include consideration of cumulative impacts.	Construction

Impact /issue	Mitigation measures	Timing
Aerial noise – drone use	Management measures will be implemented to minimise drone noise at sensitive receivers where practicable and appropriate. Measures will include (but are not limited to) consultation with nearby sensitive receivers on upcoming work involving drones including scheduled dates, locations, indicative hours and a description of the proposed works.	Construction Operation
Corona noise	For each residence where potential operational noise levels from the project are predicted to exceed the noise criteria, monitoring is required to confirm actual operational noise levels. Monitoring will be carried out: – within six months of the project's commencement of operation – to respond to a request of the landowner within two (2) years after the project's commencement of operation. The noise monitoring will occur during weather/atmospheric conditions conducive to generating the corona effect. For residences where the monitoring identifies corona discharge levels above 35 dB(A) $L_{Aeq,15min}$ at the most affected point of the residence, consultation will be undertaken with the landowner of the affected residence to identify feasible and reasonable measures. Once measures have been agreed with the landowner, these will be implemented within 12 months.	Start of operation
Corona noise – cumulative impact	Consultation and co-ordination with nearby proponents, including proponents of the Great Western BESS, to minimise cumulative at-property impacts from audible corona noise.	Prior to start of operation

7.2.1 Additional mitigation measures

After applying the standard ICNG mitigation measures for construction, including source and administrative controls outlined above, additional mitigation measures detailed in Table 7.2 should be considered if residual noise impacts remain. Table 7.2 lists non-project-specific measures that can be implemented if residual construction noise levels continue to exceed CNMLs, following the implementation of standard noise mitigation measures. A description of the additional mitigation measures is detailed in Table 7.3.

Table 7.2 Additional construction noise mitigation measures

Noise perception category[1]	CNML	CNML Noise level exceedance	Additional mitigation(s)[2, 3]
All hours			
75 dBA or greater[5]			N, V, PC, RO, DR
Standard Hours: Mon-Fri (7 am – 6 pm), Sat (8am – 1pm), Sun/Pub Hol (Nil)			
Noticeable	45	0	-
Clearly Audible		1 to 10	-
Moderately Intrusive		10 to 20	N, V
Highly Intrusive		> 20	N, V
OOHW Period 1 Day: Sat (7 am – 8 am and 1 pm – 6 pm), Sun/Pub Hol (8 am – 6 pm)			
Noticeable	40	< 5	-
Clearly Audible		5 to 15	N, V
Moderately Intrusive		15 to 25	N, V
Highly Intrusive		> 25	N, V, RO, DR
OOHW Period 1 Evening / Period 2 Night:[4] Mon-Sat (6 pm – 10 pm) / Mon-Sat (10 pm – 7 am), Sun/Pub Hol (6 pm – 8 am)			
Noticeable	35	< 5	N
Clearly Audible		5 to 15	N, V
Moderately Intrusive		15 to 25	N, V, SN, RO, DR
Highly Intrusive		> 25	N, V, SN, RO, DR, AA

Notes: 1. Noise perception is described in section 2.2.2.

2. N = Notification, V = Verification, PC = Phone Calls, RO = Respite Offers, DR = Duration Respite, SN = Specific Notifications, AA = Alternative Accommodation
3. Additional mitigation measures may be amended following consultation with affected receivers. This will be captured within the CNVMP.
4. Additional mitigation measures noted would not apply to proposed compound use Mon-Fri 6 pm – 7 pm.
5. Highly affected sensitive receivers

Table 7.3 Description of additional mitigation measures identified

Additional mitigation measure	Description
Notification (N) (letterbox drop or equivalent)	Letterbox drop for receivers within affected areas or targeted notification to certain receivers. Notifications are to include duration of work activity, proposed start date, duration and hours of use, and contact telephone number. Notification will be sent a minimum of seven calendar days prior to the start of works.
Verification (V)	Monitoring is proposed to review actual measured noise impacts against noise predictions. Noise management levels and management measures would be reviewed in response to monitoring results.
Phone Calls (PC)	Phone calls detailing relevant information made to identified/affected stakeholders. Phone calls provide affected receivers with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs.
Respite Offers (RO)	Respite offers should be considered where there are high-noise and vibration-generating activities near identified receivers. As a guide, work should be carried out in continuous blocks that do not exceed three hours each with a minimum respite period of one hour between each block. The actual duration of each block of work and respite should be flexible to accommodate the usage of, and amenity at, nearby receivers. The purpose is to provide receivers with respite from an ongoing impact.
Duration Respite (DR)	Duration Respite (DR) is offered when works are unable to comply with RO. Where it can be strongly justified it may be beneficial to increase the work duration (number of evenings or nights worked) so that the project can be completed more quickly. This allows for the schedule to condense OOHW into blocks to reduce the overall works duration.
Specific Notifications (SN)	Specific notifications are letterbox dropped (or equivalent) to identified receivers a minimum of seven calendar days ahead of construction activities that are likely to exceed the applicable noise objectives. The specific notification provides additional information when relevant and informative to more highly affected receivers than covered in general letterbox drops. This form of communication is used to support periodic notifications, or to advise of unscheduled works.
Alternative Accommodation (AA)	Could be considered for receivers predicted to experience noise levels exceeding the night CNML by more than 25 dBA. Note that night work (if required) would be very infrequent and last for no more than three consecutive nights.

8. Conclusion

The noise and vibration assessment has identified the potential for temporary exceedances of the project's construction noise management levels from the eight construction scenarios assessed. Predictive modelling of audible corona noise for the operational phase has identified a small number of potentially impacted residential receivers under specific atmospheric conditions. The key findings and conclusions of the noise and vibration assessment are described below.

Construction noise impacts

Potential construction noise exceedances are predicted for the majority of construction scenarios with exceedances at their greatest when works are proposed to be undertaken outside of ICNG standard construction hours. The following key impacts are identified during each of the periods:

– Standard construction hours:
  - The construction activity with the greatest predicted extent of impact is transmission structure footing construction where impact piling is required (CS06), with 450 residential receivers experiencing exceedances of the CNML, and 15 residential sensitive receivers experiencing highly intrusive noise levels (exceed CNML by over 20 dBA). The greatest impacts would occur at residential sensitive receivers at Duncan Street, Wolgan Road, Karawatha Drive, and Brays Lane. One commercial receiver (COM0021) is predicted to be subject to exceedance of the CNML by 7 dBA.
  - Worst case noise levels during impact piling (CS06) would be approximately three days at each sensitive receiver, from work at the nearest transmission structure. Exceedances of the CNML would also be experienced for about four weeks on average, with at most eight weeks from works at multiple transmission structures.
  - Where bored piling (CS06B) can be used as an alternative piling method, this would have a lower number of impacted receivers compared to impact piling (CS06). Bored piling would result in 167 residential sensitive receivers impacted by highly intrusive noise levels, primarily at Duncan Street, Lidsdale.
  - Other scenarios (site establishment (CS01), earthworks and civil works (CS05), structure assembly and erection (CS07) and stringing the transmission line (CS08)) show highly intrusive (more than 20 dBA above the CNML) impacts at up to seven receivers at Duncan Street, Lidsdale, while access track upgrades (CS03) and vegetation clearing (CS04) would also result in impacts near Karawatha Drive. These impacts are anticipated to last up to two weeks per scenario from works occurring at the nearest location to a given sensitive receiver.
  - Five residential receivers in the area of Karawatha Drive are predicted to experience exceedances of the highly noise affected level (greater than 75 dB) due to access track upgrades (CS03) and vegetation clearing (CS04) activities for a period of about one week for any one individual receiver. One receiver in Duncan Street, Lidsdale, is also predicted to experience exceedances of the highly noise affected level for the demobilisation and rehabilitation works (CS09) for a period of about one week.

– Out of hours works day (Saturdays 7 am to 8 am and 1 pm to 6 pm, Sundays and public holidays 8 am to 6 pm):
  - Structure footing construction with impact piling (CS06) is predicted to result in exceedances of the CNMLs at about 939 residential receivers, with 17 experiencing highly intrusive noise (greater than 25 dBA above the CNML), primarily in Duncan Street, Lidsdale. The worst impacts would occur for up to three days, from works at the nearest transmission structure. Noise level exceedances of the CNML could occur across a period that includes up to 10 weekends, with an average of six weekends at each receiver as the work location approaches and then moves away from the receiver. Efforts will be made to minimise these impacts by using bored piling methods and scheduling piling during less sensitive times.
  - Several scenarios, including site establishment (CS01), earthworks (CS05), structure assembly (CS07), and transmission line stringing (CS08), are expected to cause significant noise impacts (more than 25 dBA above the OOHW day CNML) at up to seven receivers on Duncan Street, Lidsdale. Impacts in this range are anticipated to last a few days and potentially up to three weekends per scenario while works are undertaken at the structures or work area nearest to a given sensitive receiver.

- Access track upgrades (CS03) and vegetation clearing (CS04) are predicted to result in highly intrusive noise levels at 17 and 21 sensitive receivers, respectively. Of these impacted sensitive receivers, up to 11 residential receivers occur on Duncan Street, Lidsdale and up to seven receivers occur at the intersection of Castlereagh Highway and Karawatha Drive. Impacts in this range are anticipated to last from a few days and potentially up to three weekends per scenario while works are being undertaken at the nearest locations to a given sensitive receiver.

– Out of hours works evening (Monday to Saturday 6 pm to 10 pm) and night periods (Monday to Saturday 10 pm to 7 am, Sundays and public holidays 6 pm to 8 am):
  - The three scenarios of construction compound (CS02), structure assembly and erection (CS07) and stringing transmission line (CS08) are proposed during OOHW Period 1 Evening and Period 2 Night. The primary reason for construction during these periods would be an outage recall required as a result of constraints elsewhere on the transmission network. Works during these periods would also be required due to requirements for working within an active rail corridor or where partial or full closures of local roads are required.
  - Exceedances of the OOHW evening and night CNML are predicted to occur for the following scenarios:
    – Construction compounds (CS02) – 386 residential receivers
    – Structure assembly and erection (CS07) – 334 residential receivers
    – Stringing transmission lines (CS08) – 444 residential receivers.
  - For these scenarios, most predicted noise exceedance levels are within 15 dBA above the OOHW evening or night CNMLs. Highly intrusive noise (greater than 25 dBA above CNML) would be relatively rare and limited to the stringing transmission line scenario (CS08) affecting 11 receivers at Duncan Street Lidsdale and structure assembly and erection scenario (CS07) affecting seven of those same receivers. Any highly intrusive noise impact works (greater than 25 dBA above CNML) would only be required for short durations of up to three consecutive evenings and nights.

Construction vibration impacts

Due to the relative isolation of the project from nearby sensitive receivers, potential construction vibration impacts are considered to be limited to a small number of receivers as follows:

– Two sheds located on a residential property at Karawatha Drive are within the CNVG minimum distance for cosmetic damage during access track upgrades (CS03).

– The heritage listed Wallerawang rail bridges over the Coxs River is within the CNVG minimum working distances for vibratory rolling, excavation and piling.

– Human comfort impacts at the following:
  - Seven sensitive receivers are within 100 m of access track works (CS03).
  - Three sensitive receivers are within 100 m of earthworks and civil works (CS05).

Potential vibration impacts outlined above would be avoided and mitigated through various methods including but not limited to selection of construction methods to minimise vibration impact and monitoring of vibration during construction.

Construction traffic noise impacts

With regards to construction traffic noise impacts, construction traffic on the Castlereagh Highway should not significantly increase noise levels. Sensitive receivers located on Boulder Road, Karawatha Drive (including around Castlereagh Highway intersection), Duncan Street and Wolgan Road within the buffer distances roads used for construction traffic (Boulder Road, Karawatha Drive, Brays Lane and Main Street) may experience road traffic noise levels above the road traffic noise criteria during construction. Traffic noise impacts for movements along Brays Lane and Main Street would only be experienced during the night period at sensitive residential receivers in Duncan Street and Wolgan Road.

Operational corona noise

Predictive modelling of operational corona noise indicates that there may be a small number of potentially impacted residential receivers under specific atmospheric conditions. Other operational activities including routine inspections and maintenance will be infrequent and primarily during daytime periods and therefore impacts are expected to be minimal.

No sensitive receivers are expected to exceed the operational noise criteria during fair weather. During light rain weather conditions the following exceedances of the day and evening and night time criteria would be experienced:

– Night time: 23 sensitive receivers located in Duncan Street and Wolgan Road. Fourteen of these receivers are predicted to experience exceedances of the criteria by up to about 6 dBA under existing conditions and therefore project results in an increase of around 3 dBA at an additional nine receivers.
– Day time: seven receivers on Duncan Street and one in Brays Lane with no existing exceedances predicted and therefore impacts are attributed to the project.

Recommended mitigation and management

Reasonable and feasible noise mitigation measures are recommended to reduce potential construction noise and vibration impacts identified in this assessment. These measures would be implemented through a construction noise and vibration management plan (CNVMP). At a minimum, the plan will include an out of hours work protocol requiring consultation with impacted residential sensitive receivers, measures to consider alternative piling methods and scheduling of piling work during less sensitive times. As part of the CNVMP, vibration mitigation measures will include investigation into alternative construction methods and equipment for work proposed near the heritage-listed 'Wallerawang rail bridges over the Coxs River' structure, undertaking pre- and post-construction condition surveys if minimum working distances cannot be achieved, and vibration monitoring to avoid and reduce the risk of damage.

9. References

AECOM. (2022). *Great Western BESS Noise Assessment.*

ANZECC. (1990). *Australian and New Zealand Environment Council - Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration .*

Aurecon. (2024). *Mount Piper BESS EIS noise assessment.*

Aurecon. (2025). *Mount Piper to Wallerawang Corona Noise Report.*

Australian Standard. (2010). *AS2436 - Guide to Noise Control on Construction, Maintenance and Demolition Site.*

British Standards. (2008). *BS6472: Guide to Evaluation of Human Exposure to Vibration in Buildings.*

British Standards. (2009). *BS5228-2 – 2009, Code of Practice Part 2 Vibration for noise and vibration on construction and open sites – Part 2: Vibration.*

British Standards. (2014). *BS5228-1:2009+A1:2014, Code of Practice for noise and vibration control on construction and open sites - Part 1: Noise.*

DEC. (2006). *Assessing Vibration: a technical guideline.*

DECC. (2009). *Interim Construction Noise Guideline.*

DECCW. (2011). *NSW Road Noise Policy.*

Department of Transport, Welsh Office. (1988). *Calculation of Road Traffic Noise (CoRTN).*

EPA. (2017). *Noise Policy for Industry.*

German Standards. (2016). *DIN 4150-3 Vibrations in buildings – Part 3: Effects on structures.*

GHD. (2024). *Wallerawang BESS Modification Noise Assessment.*

Jacobs. (2020). *Snowy 2.0 Transmission Connection Project Noise and Vibration Assessment.*

Parsons Brinckerhoff. (2008). *Stage 2 Kerosene Vale Ash Repository Technical Report 5 – Noise and Vibration Impact Assessment .*

Resonate. (2022). *The Wallerawang BESS noise assessment .*

SMEC. (2024). *Mount Piper to Wallerawang Transmission Line – Mine Subsidence Assessment .*

TfNSW. (2019). *Construction Noise and Vibration Strategy.*

TfNSW. (2024). *Construction Noise and Vibration Guideline (Roads).*

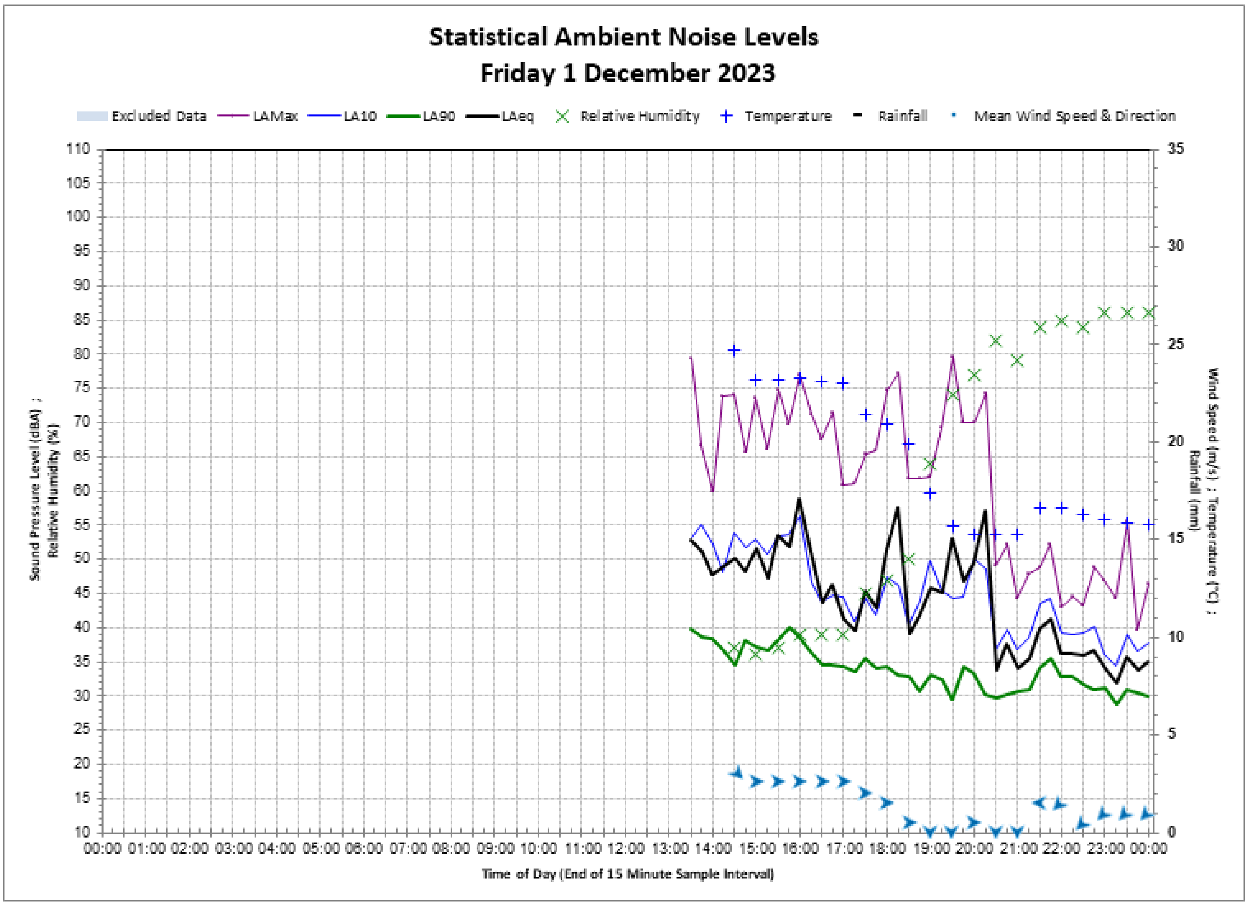
WSP. (2021). *EnergyConnect Technical Paper 10 - Noise and Vibration Impact Assessment.*

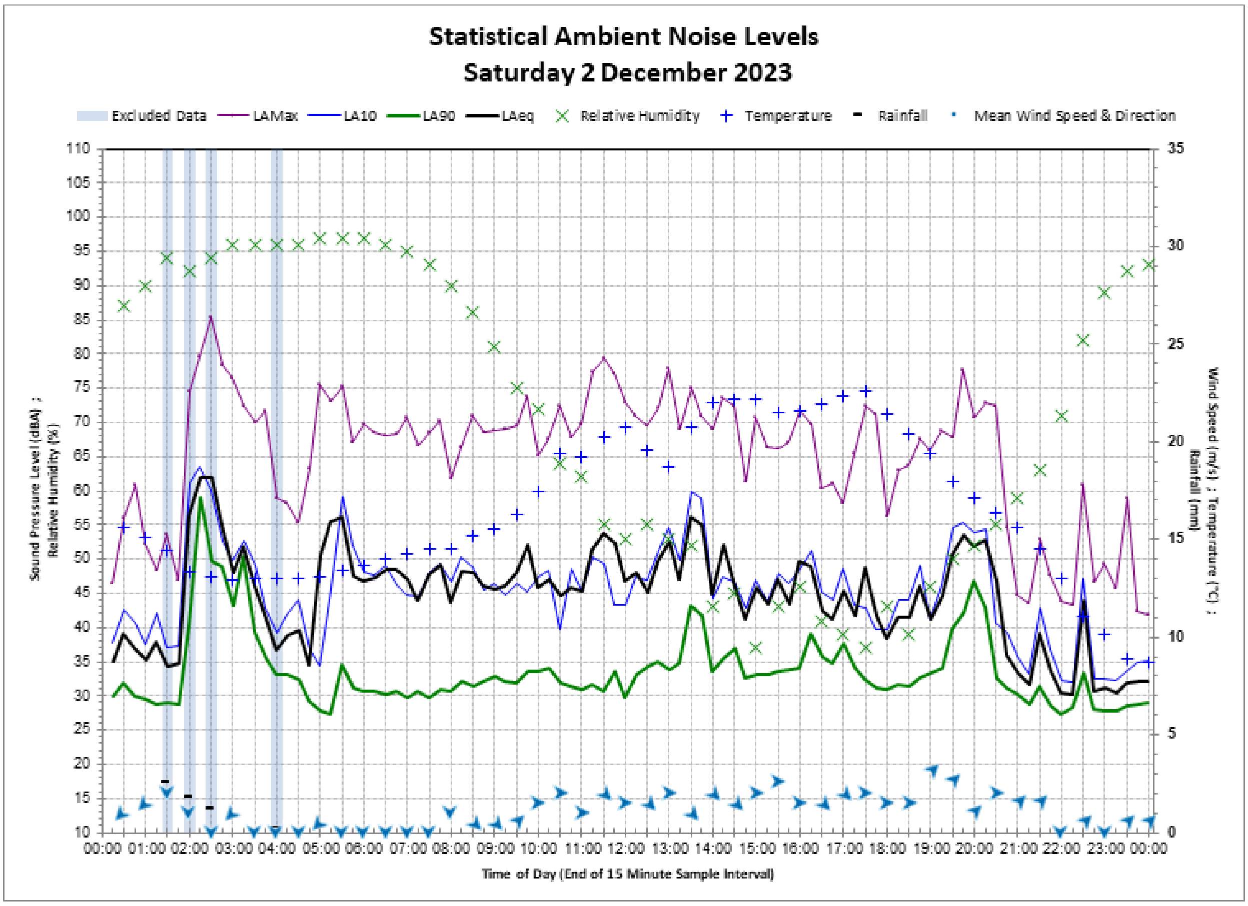
Appendices

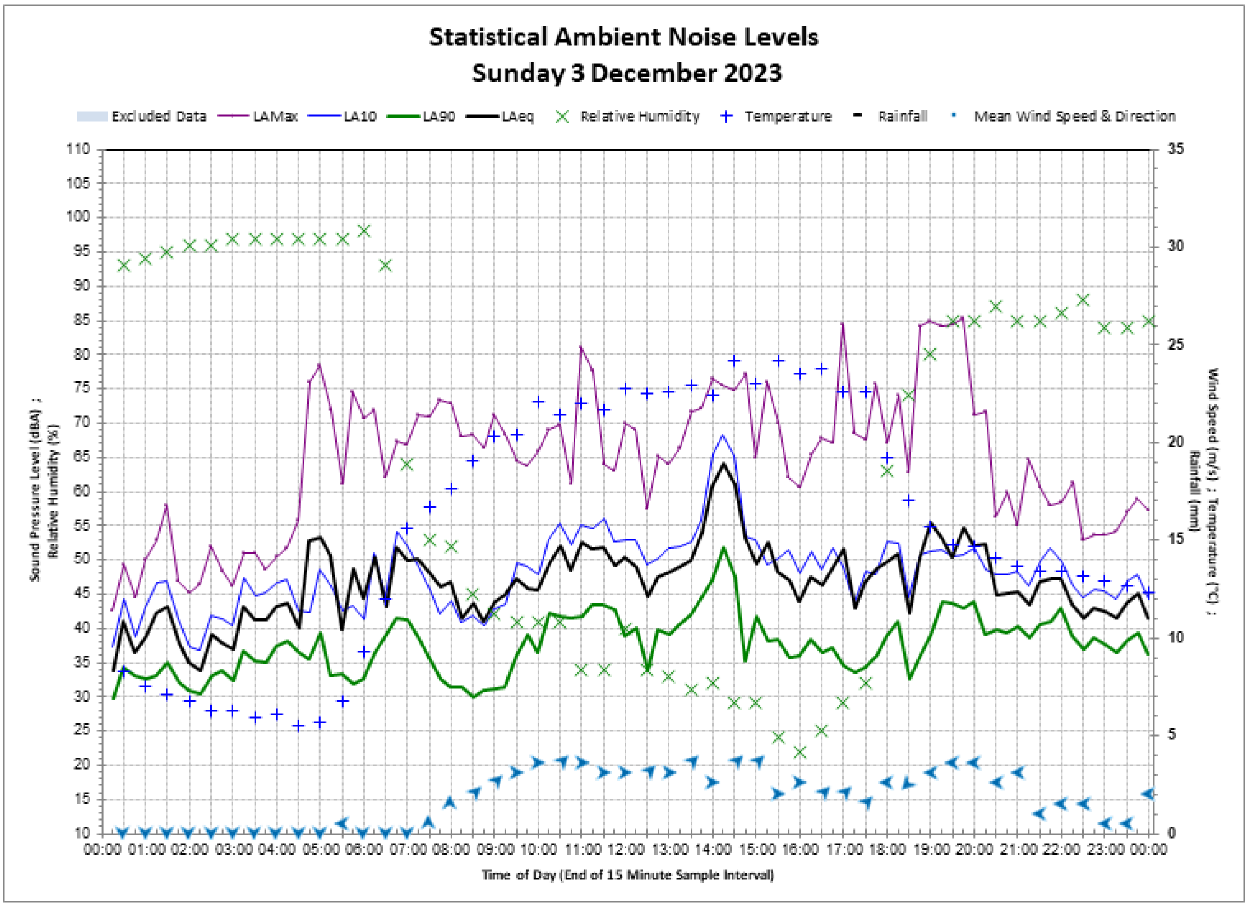
Appendix A

Daily noise monitoring charts

Monitoring location ML1



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LA90
LAeq
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Temperature
Rainfall
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Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
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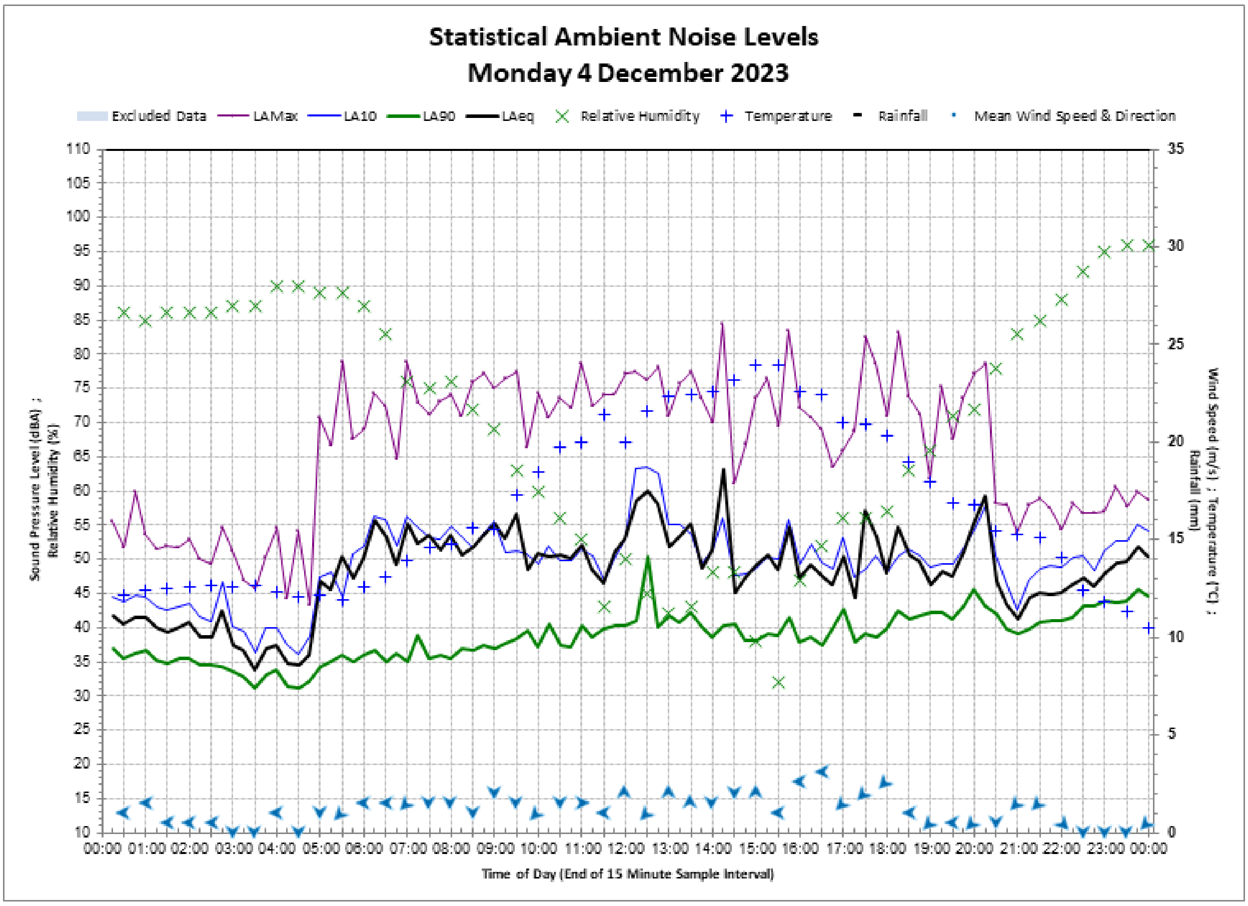
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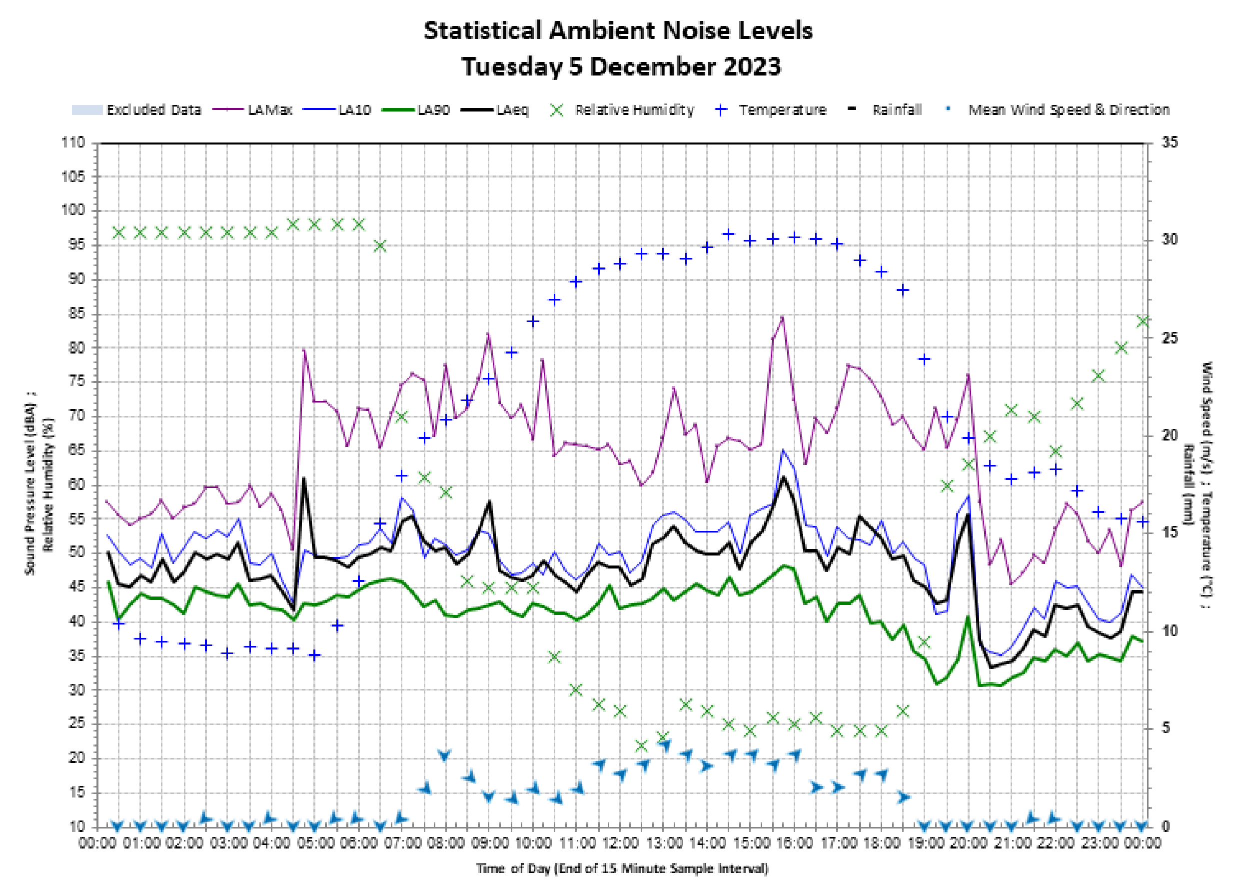
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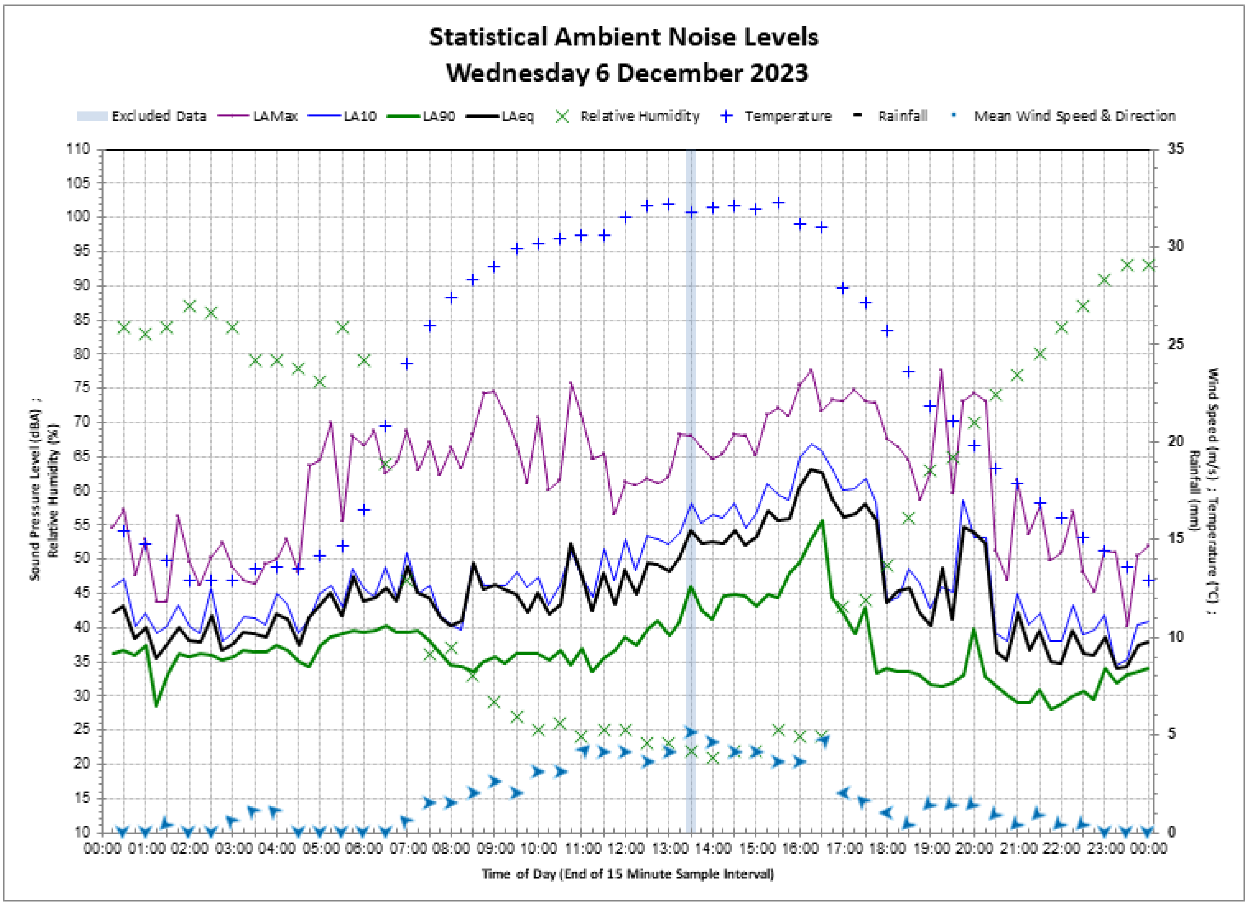
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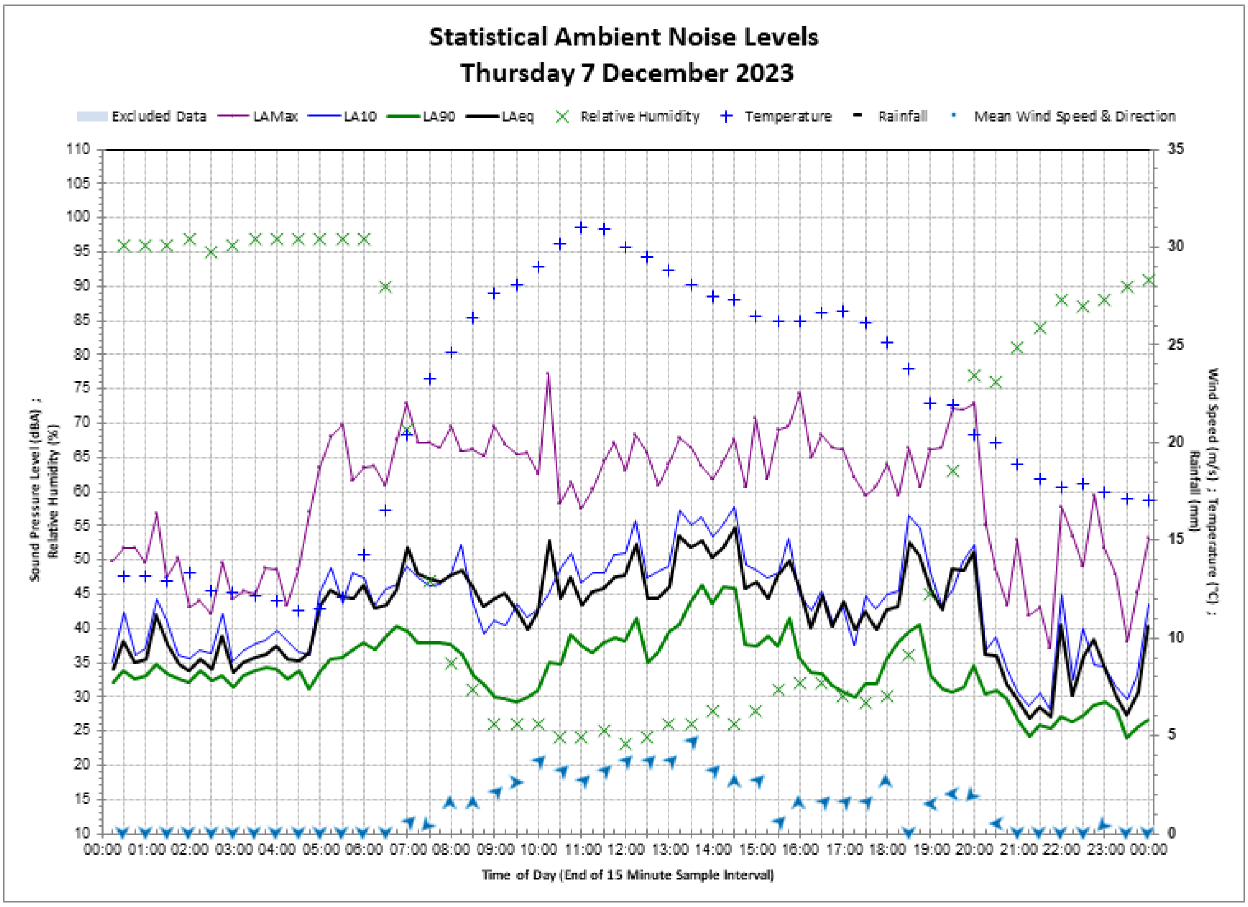
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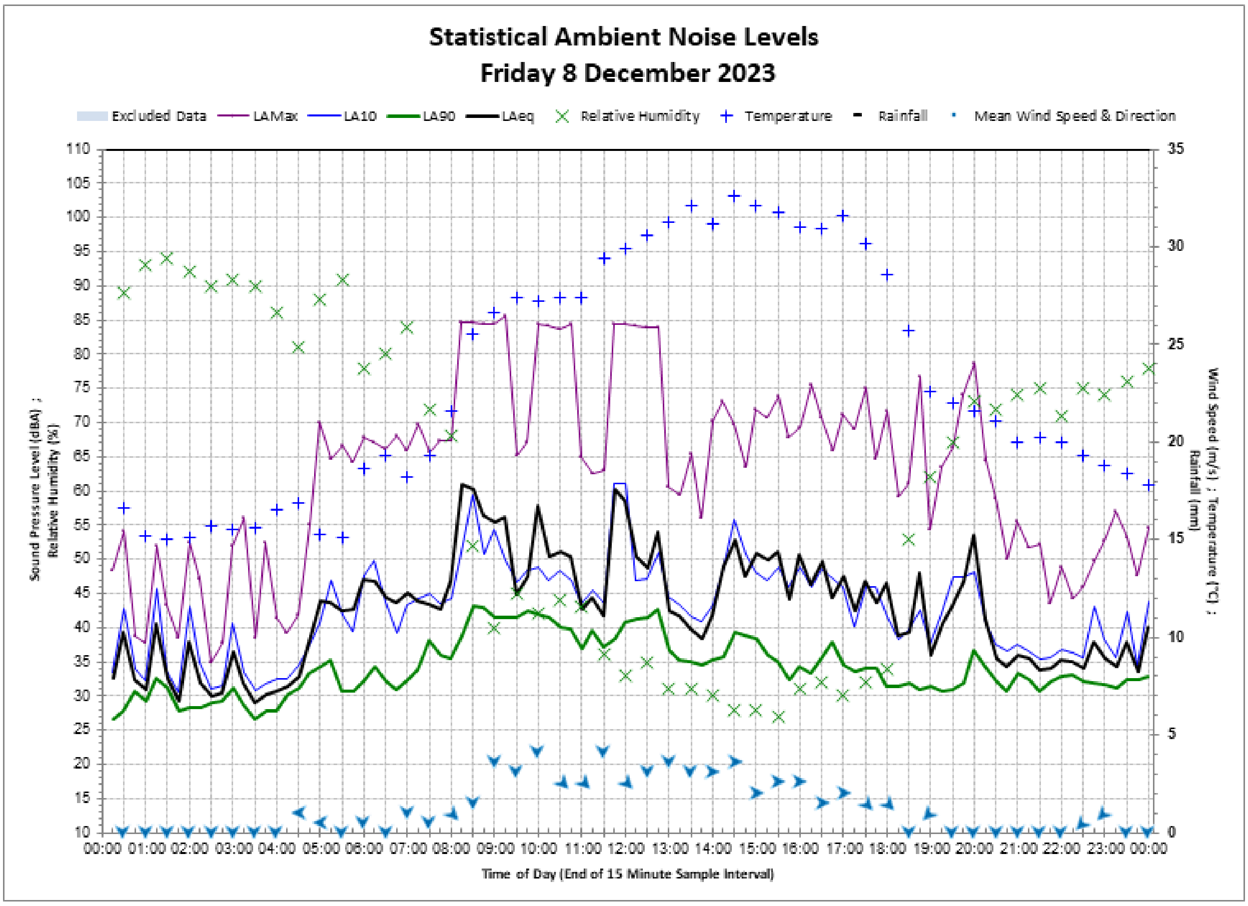
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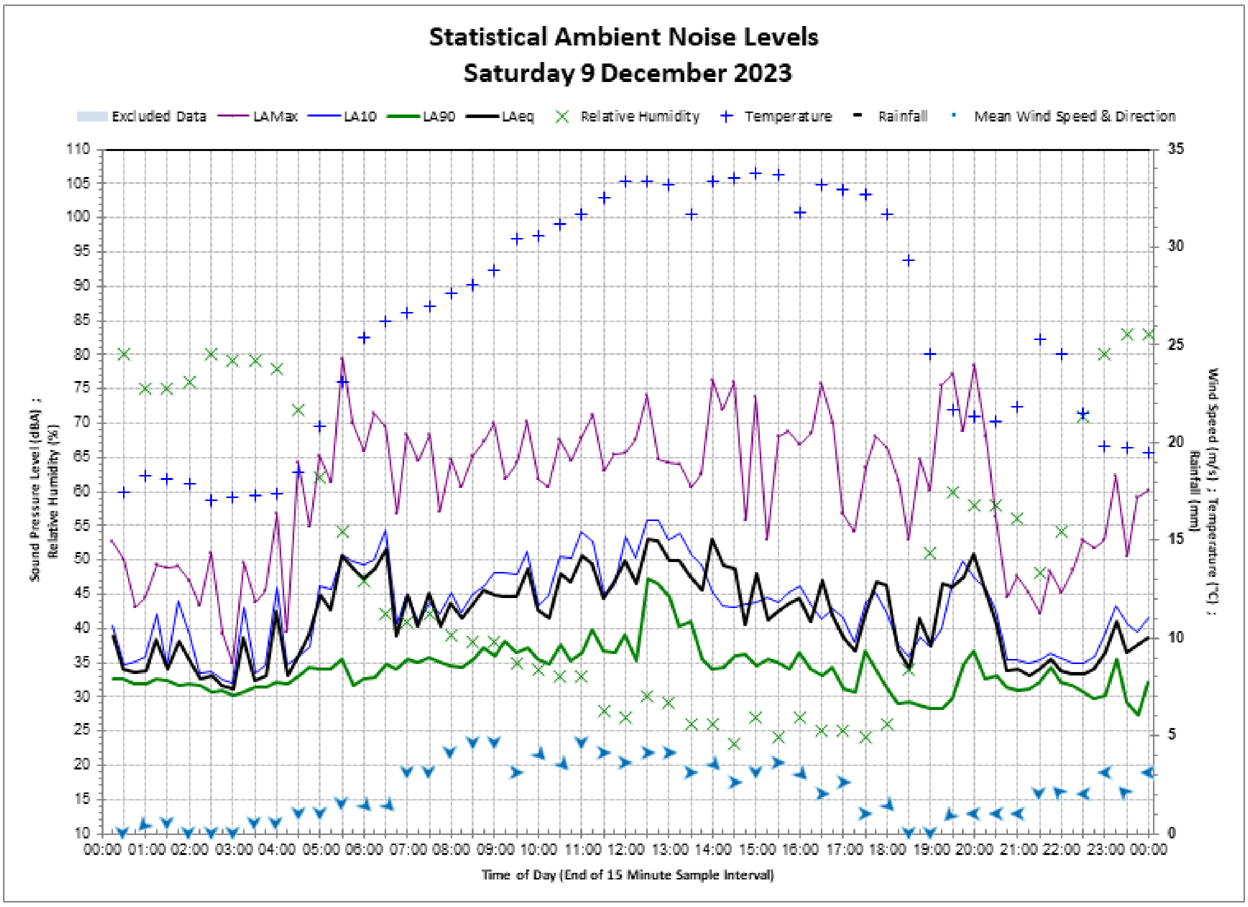
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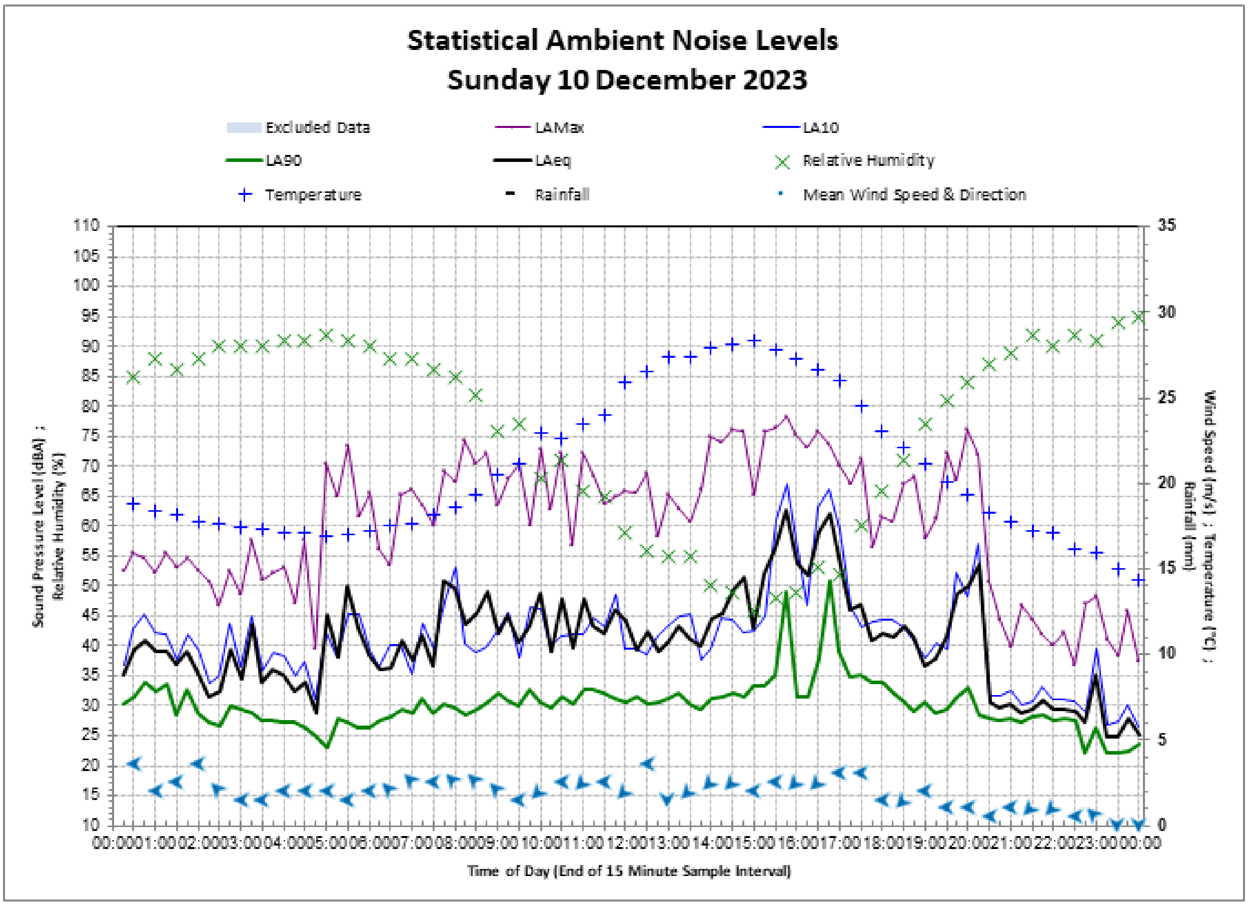
Time of Day (End of 15 Minute Sample Interval)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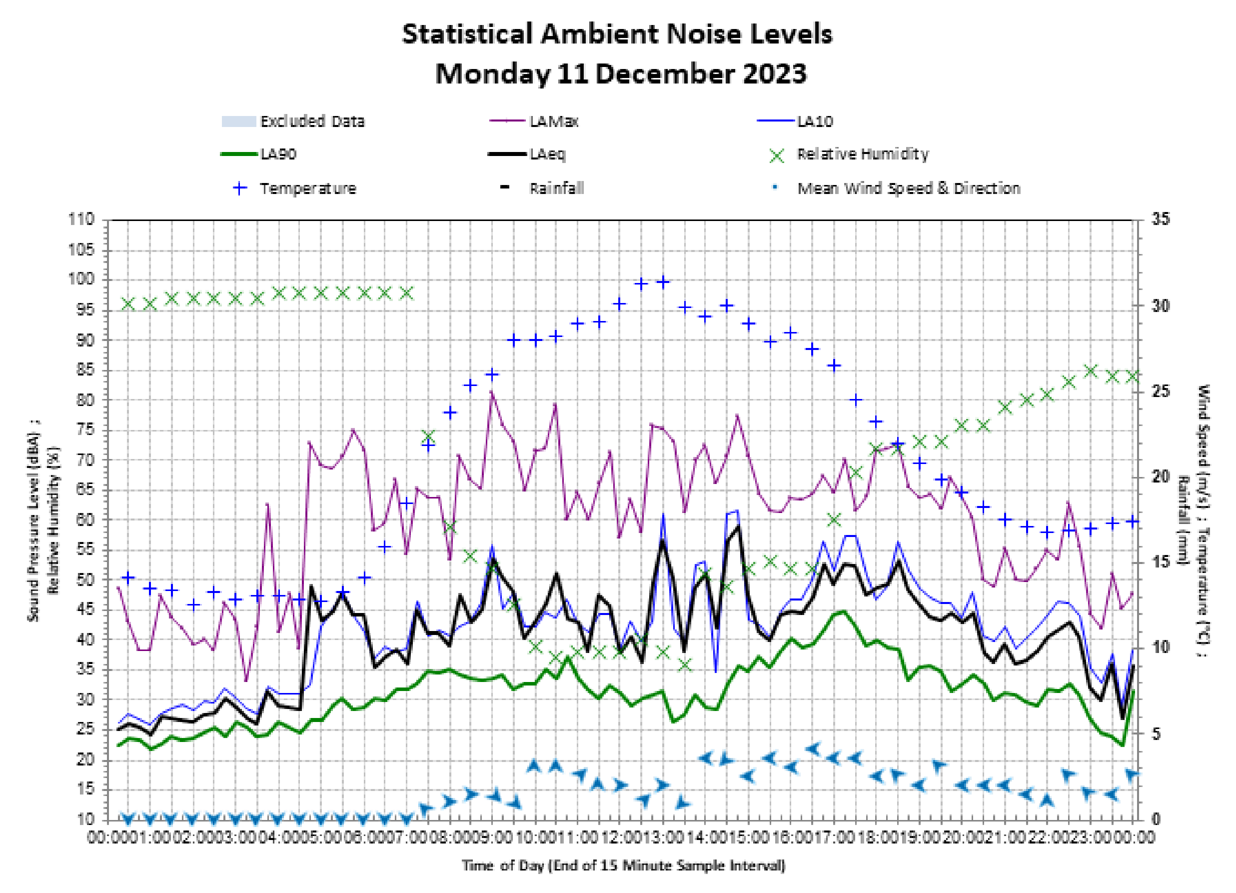

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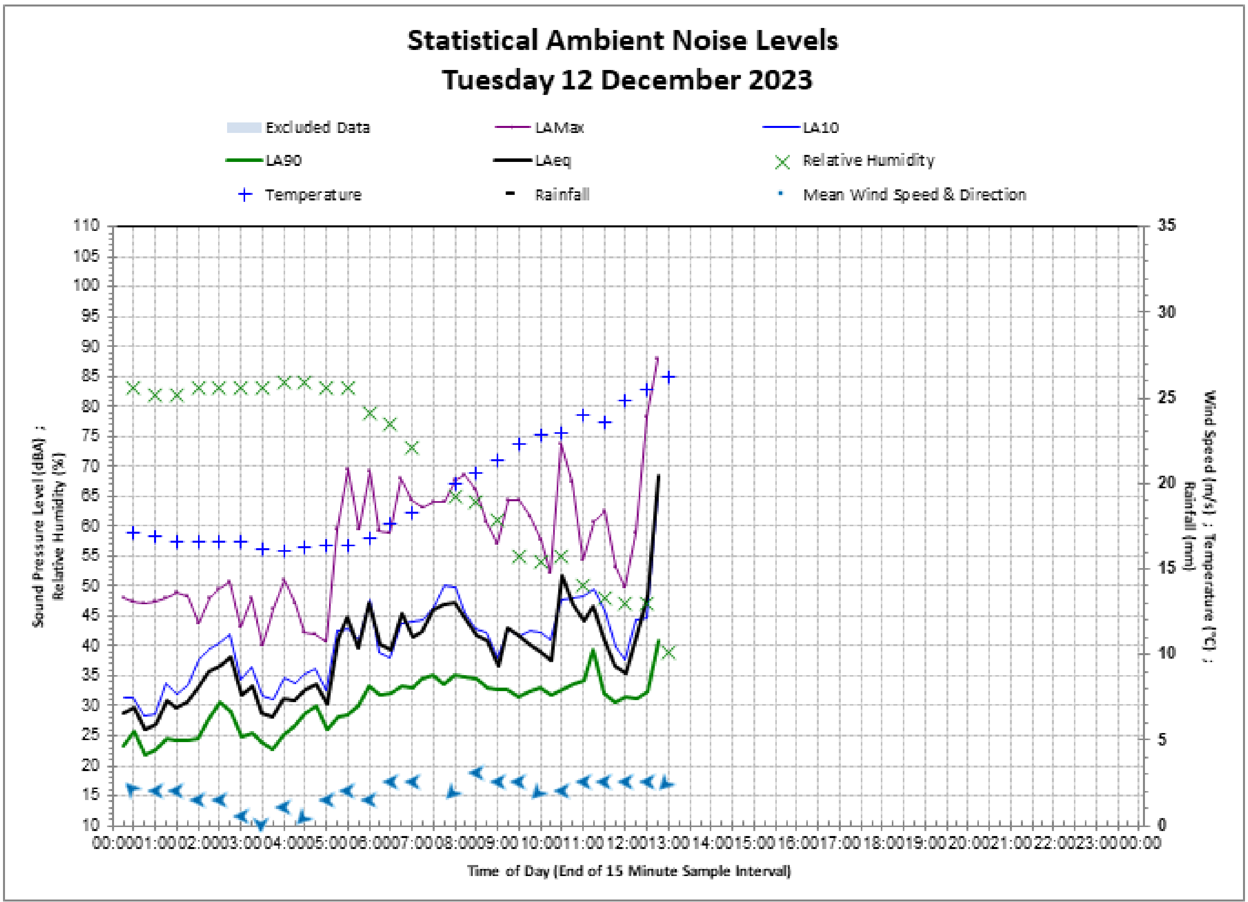

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Temperature
Rainfall
Mean Wind Speed & Direction
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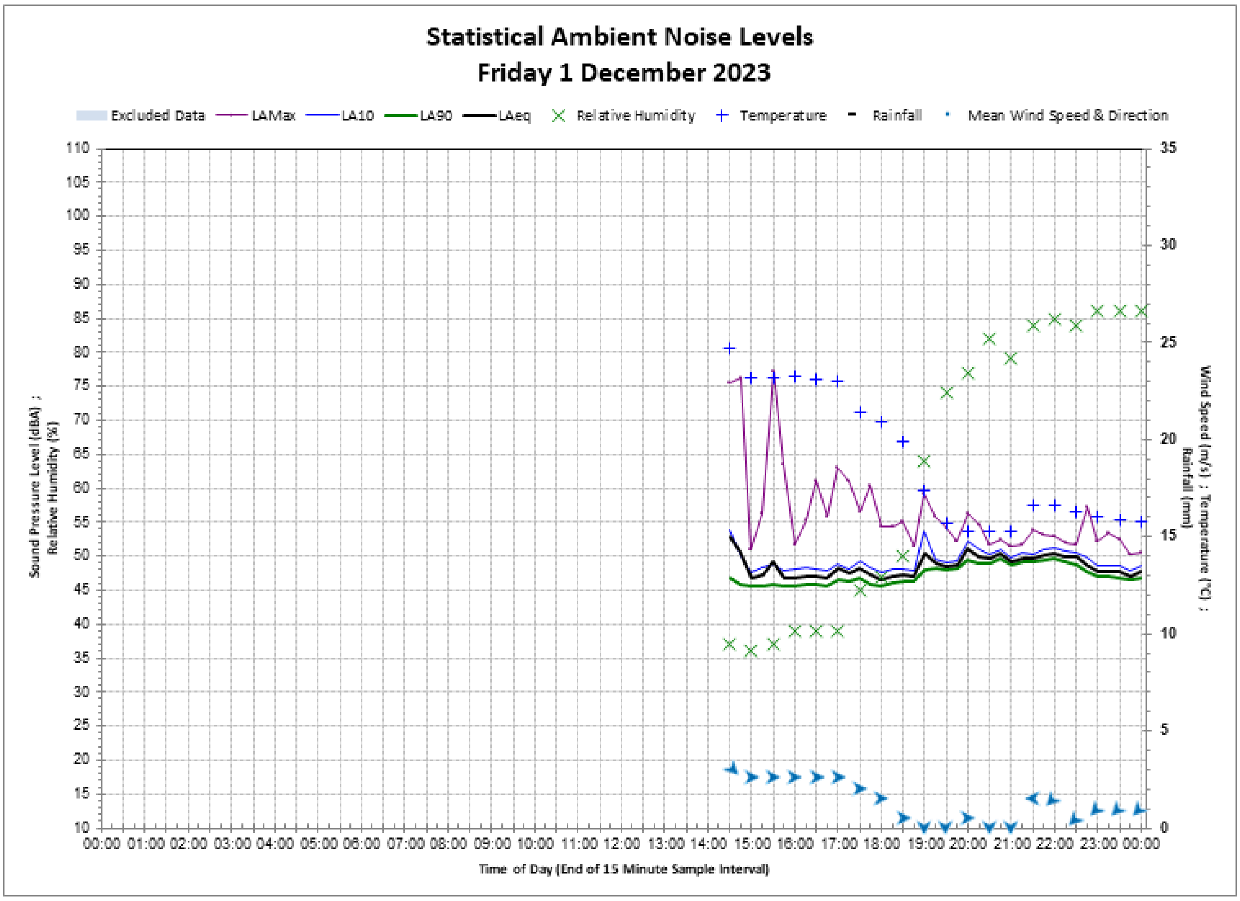
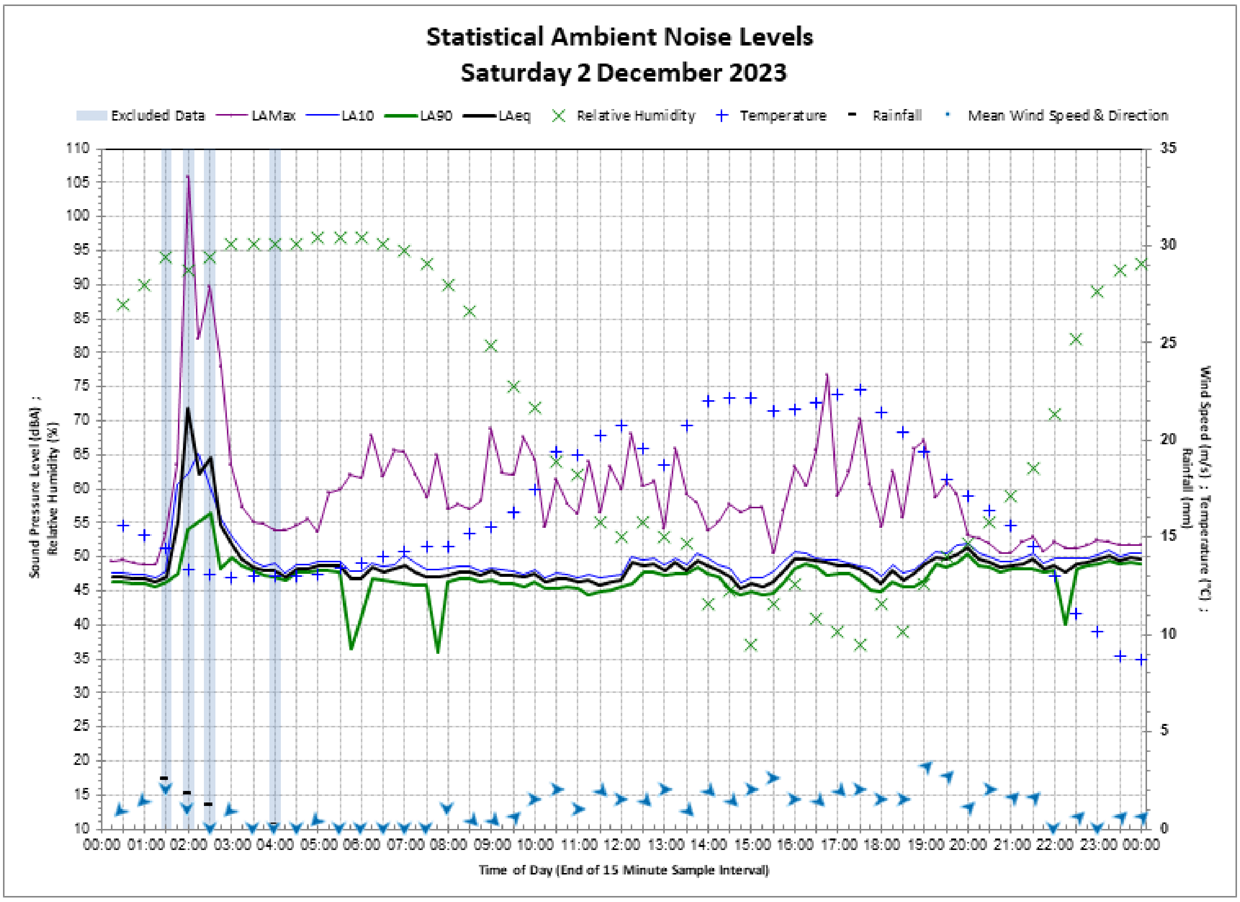
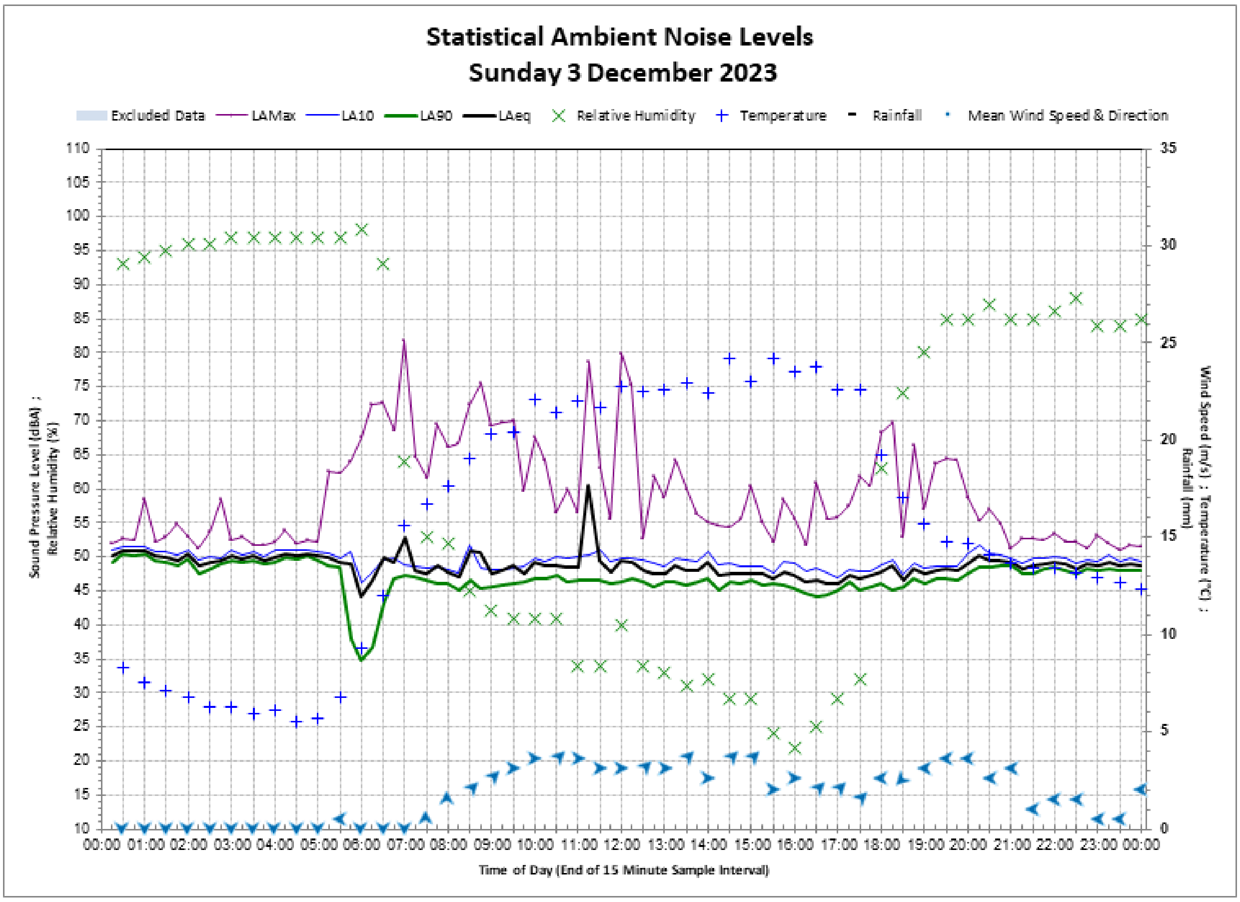
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)

Monitoring location ML2



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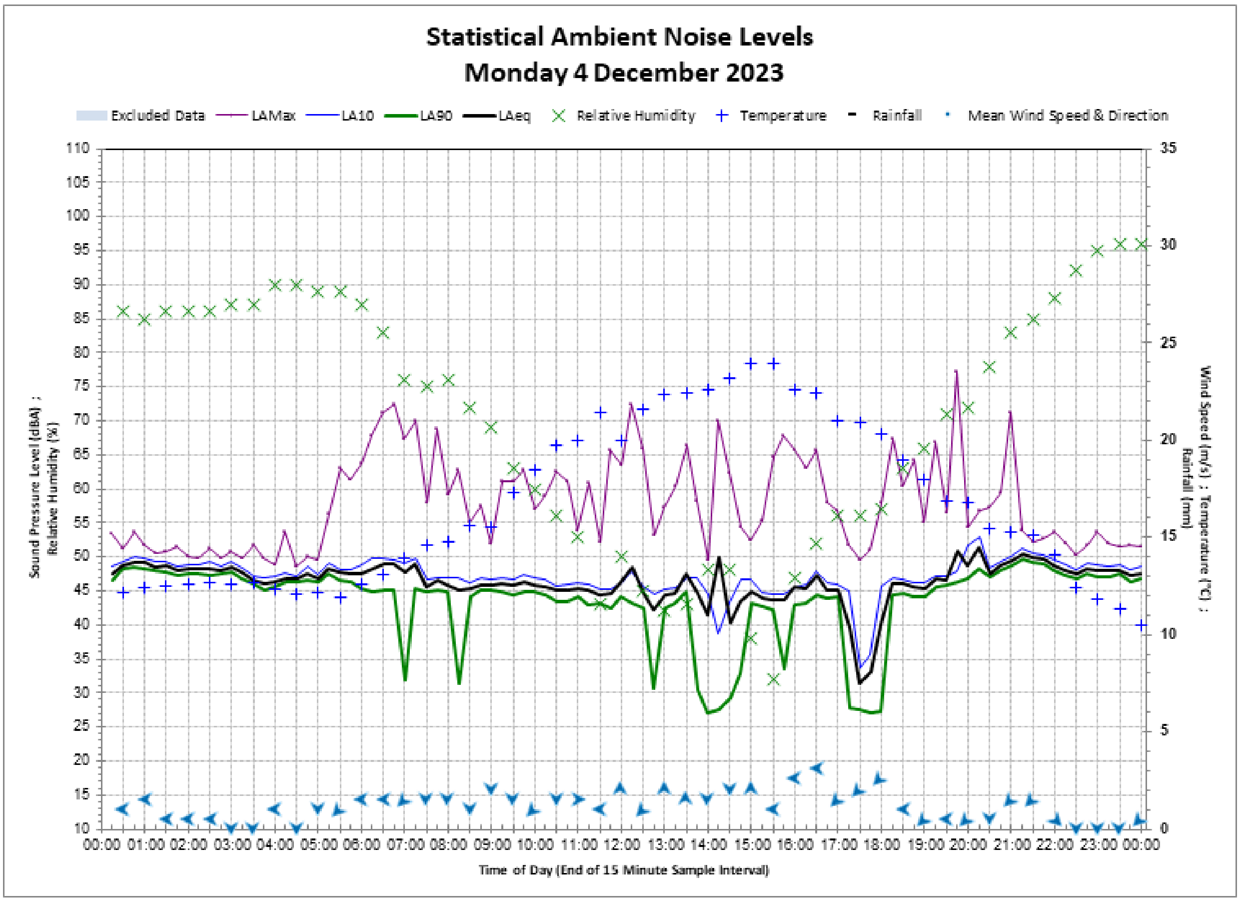
Time of Day (End of 15 Minute Sample Interval)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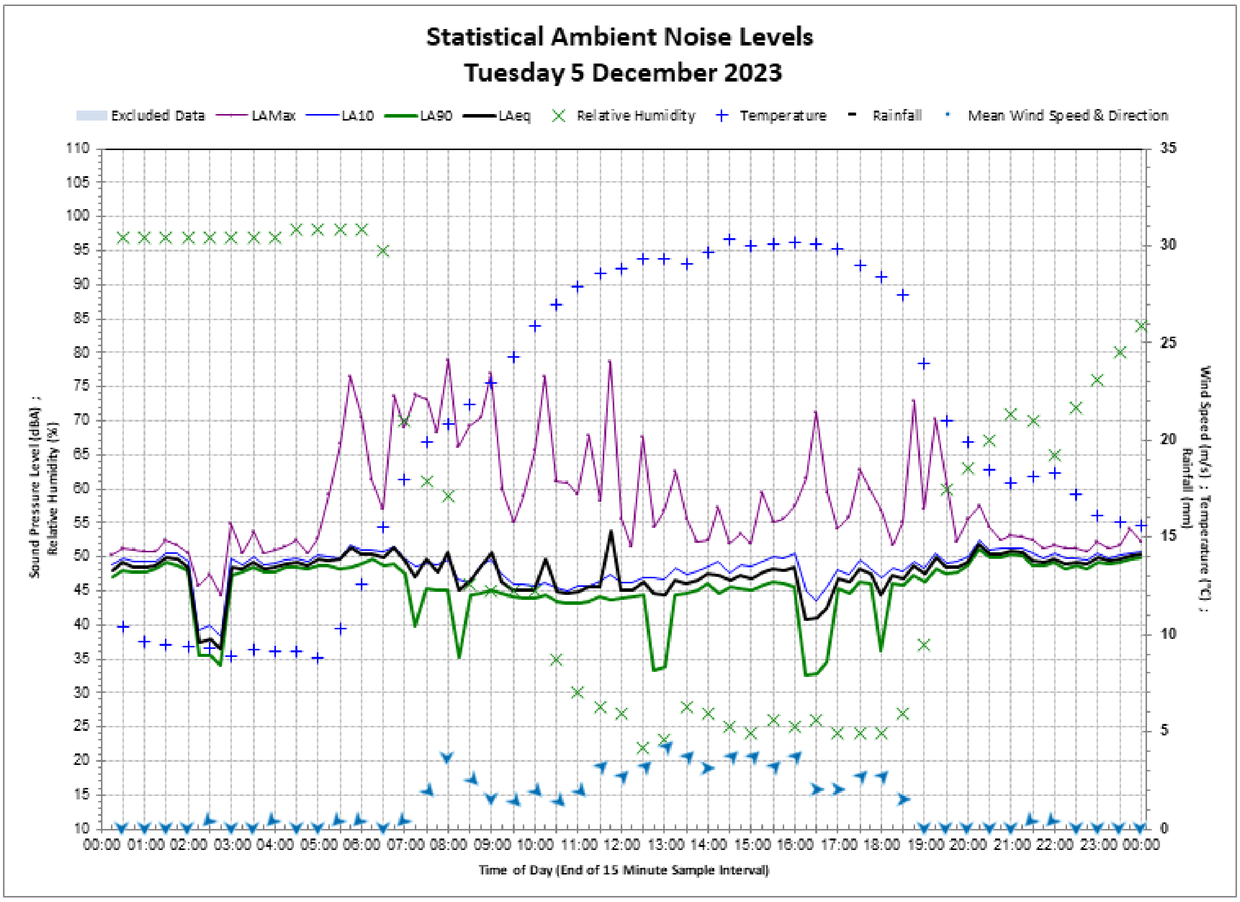
Time of Day (End of 15 Minute Sample Interval)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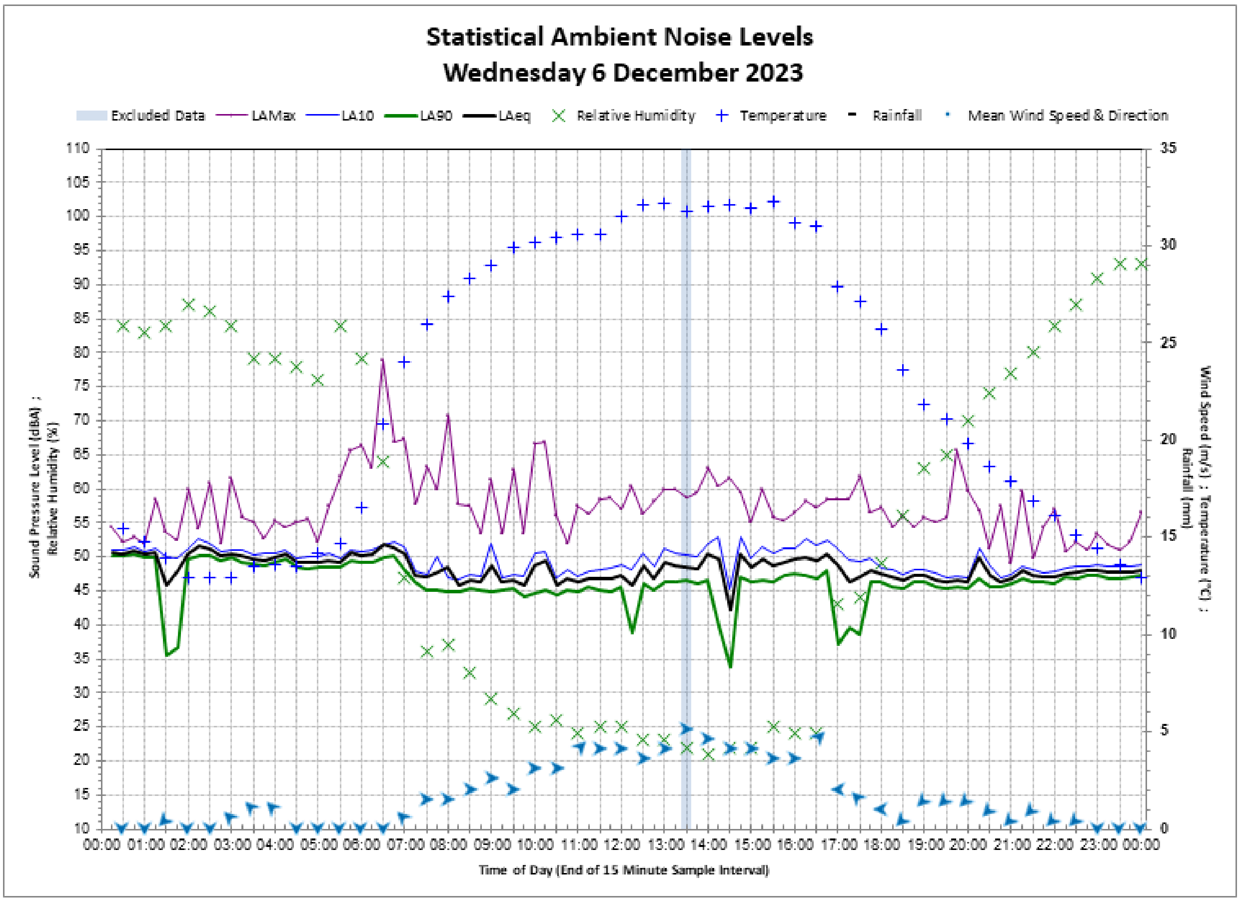
Time of Day (End of 15 Minute Sample Interval)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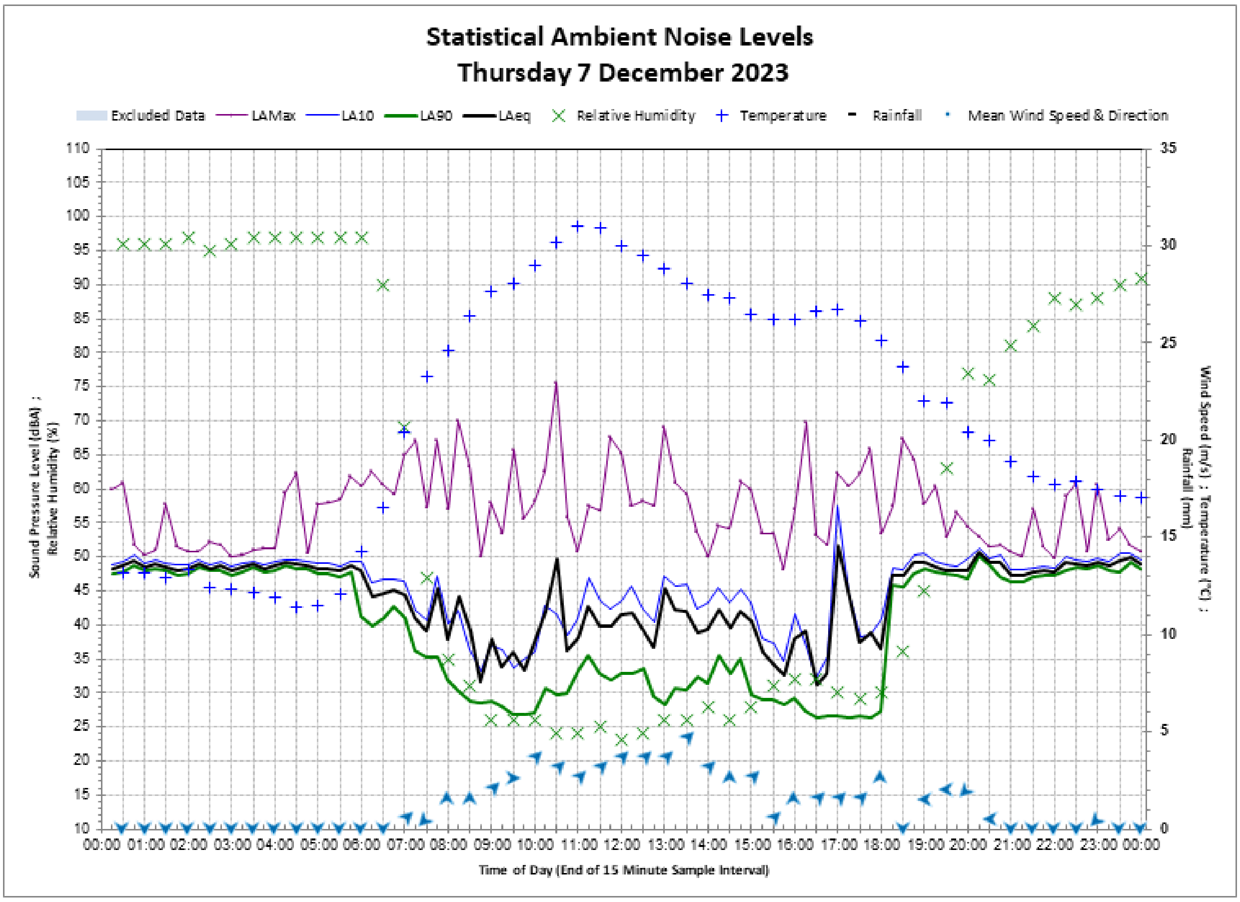
Time of Day (End of 15 Minute Sample Interval)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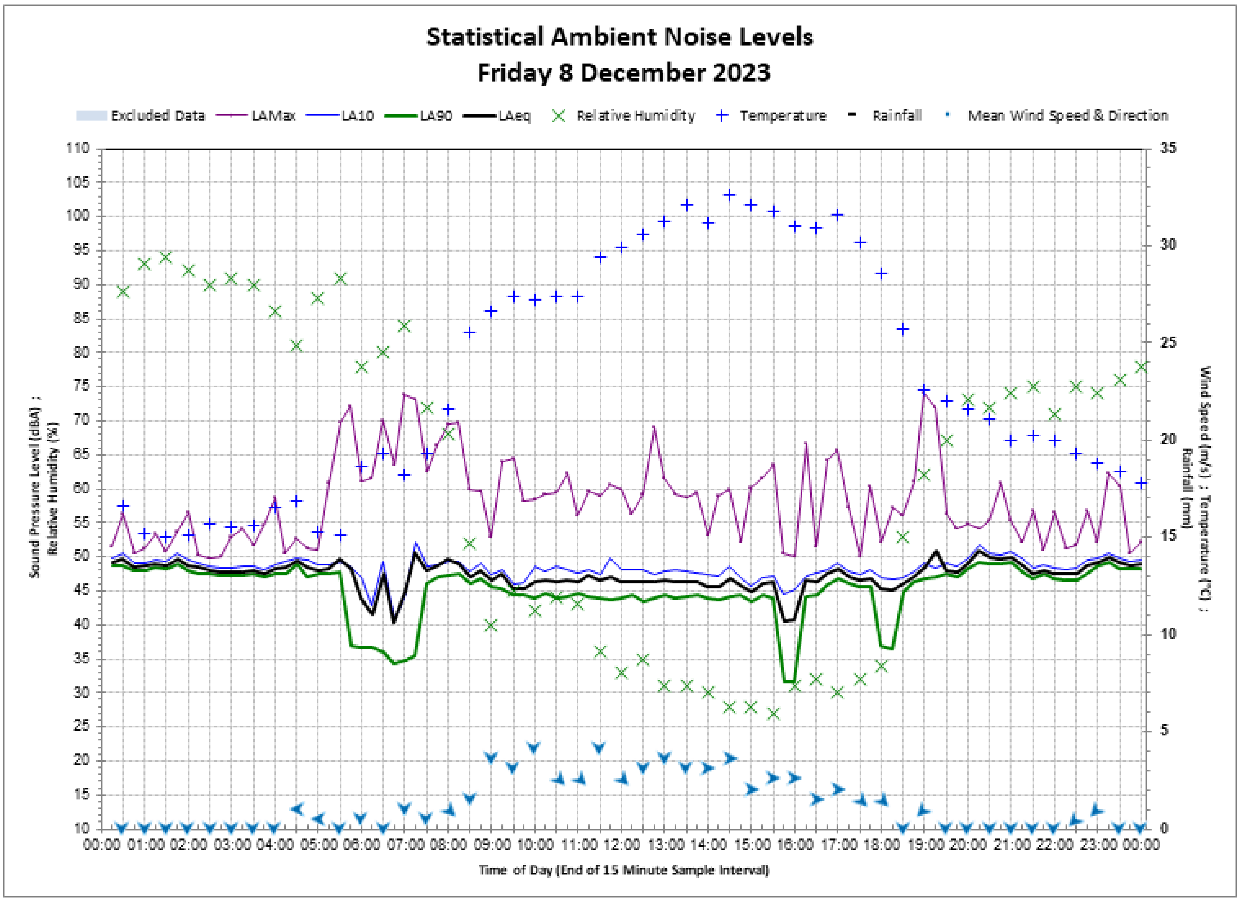
Time of Day (End of 15 Minute Sample Interval)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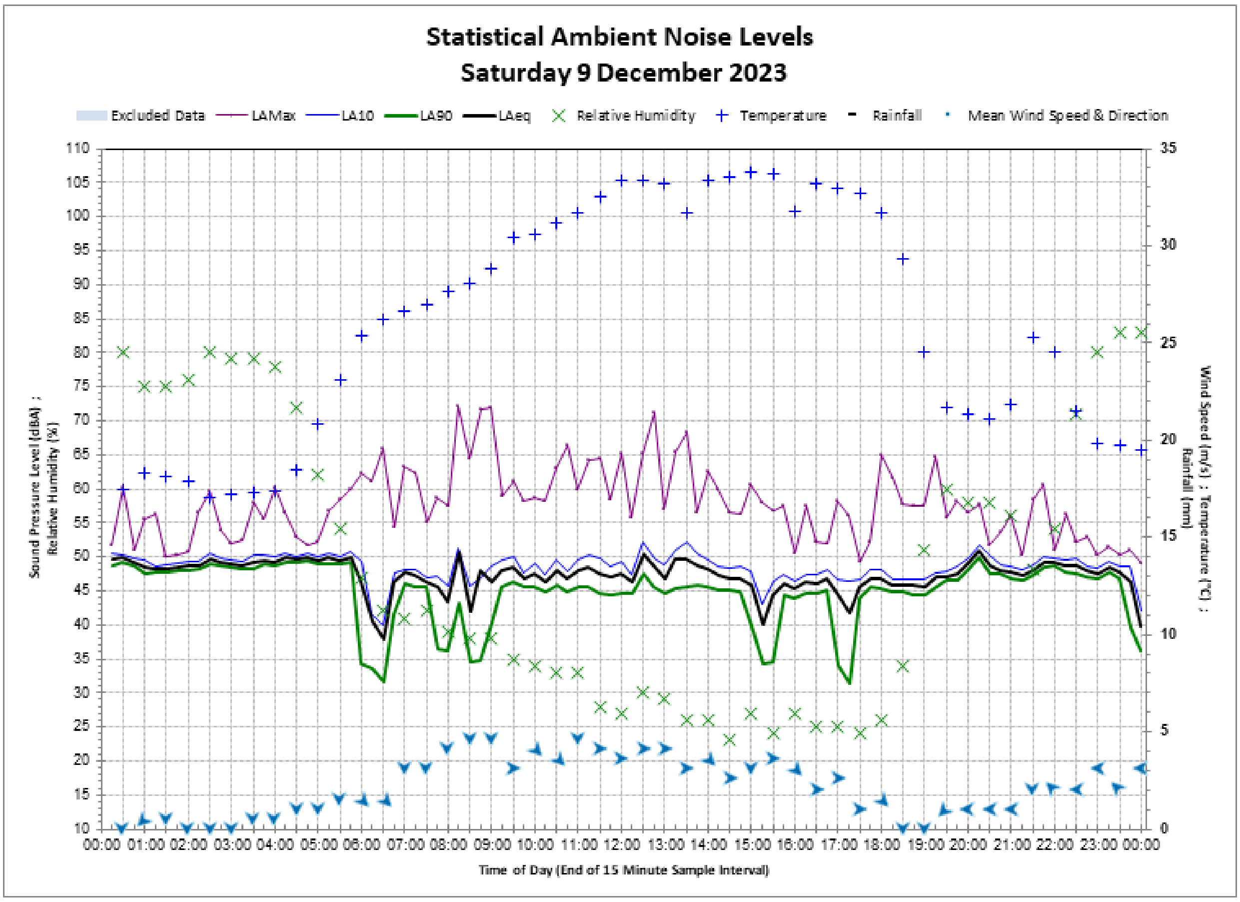
Time of Day (End of 15 Minute Sample Interval)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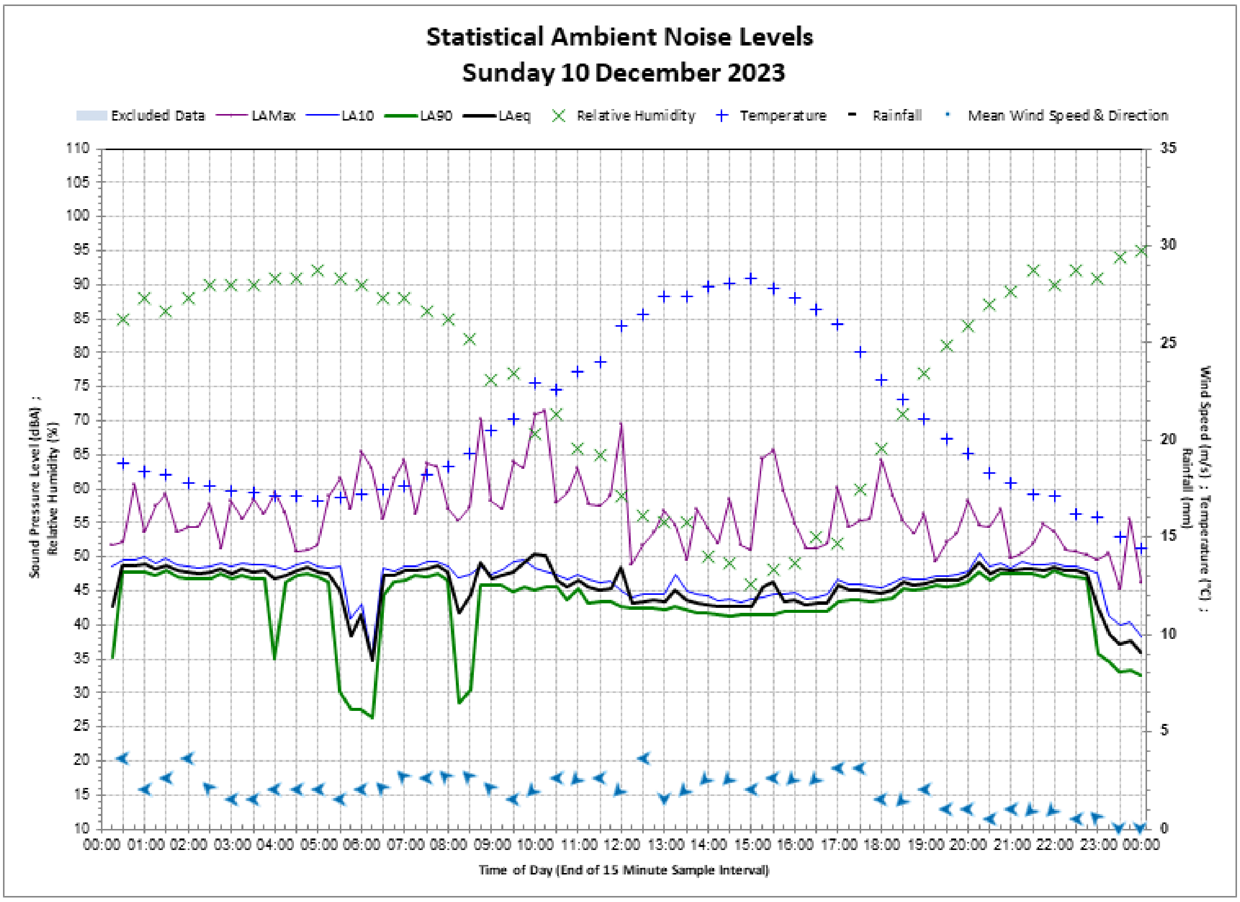
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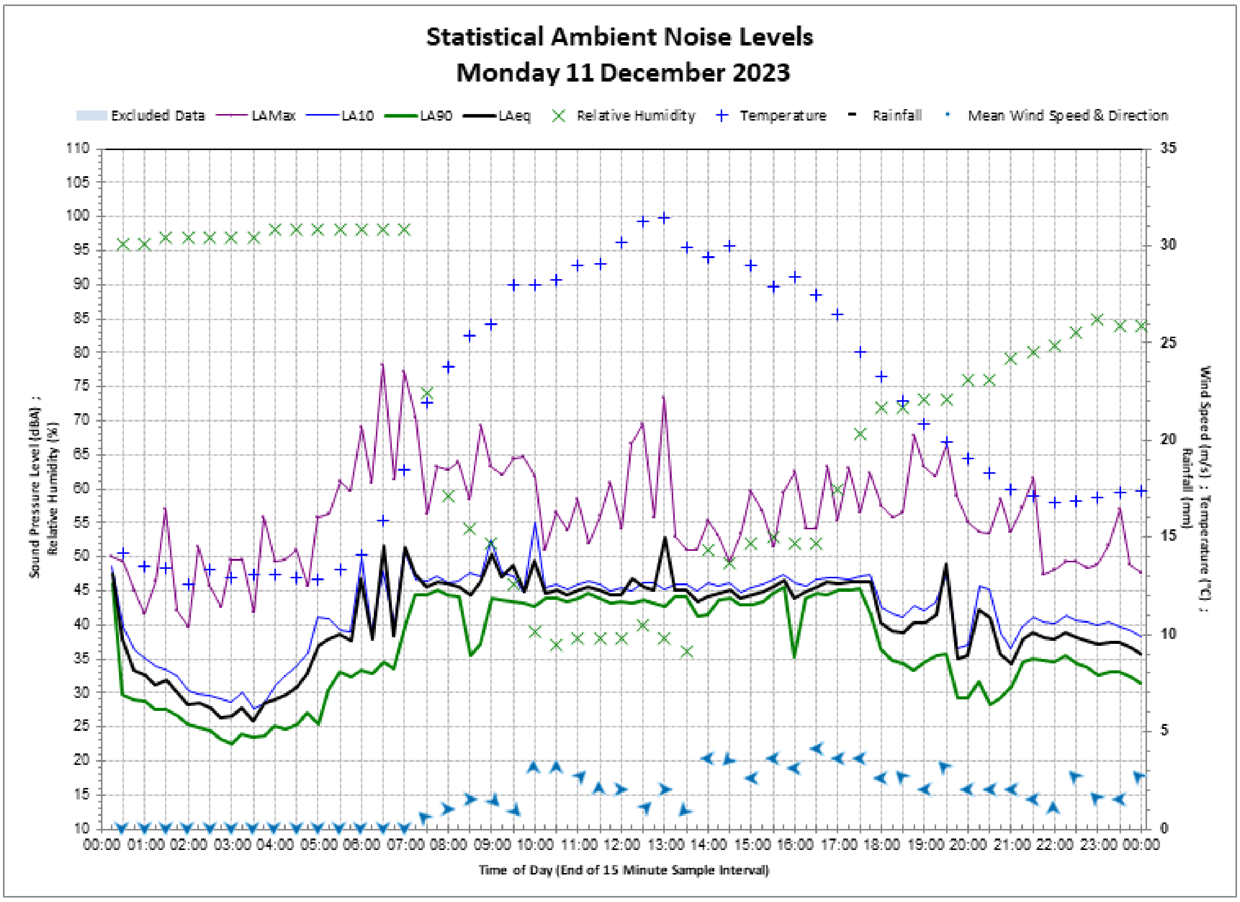

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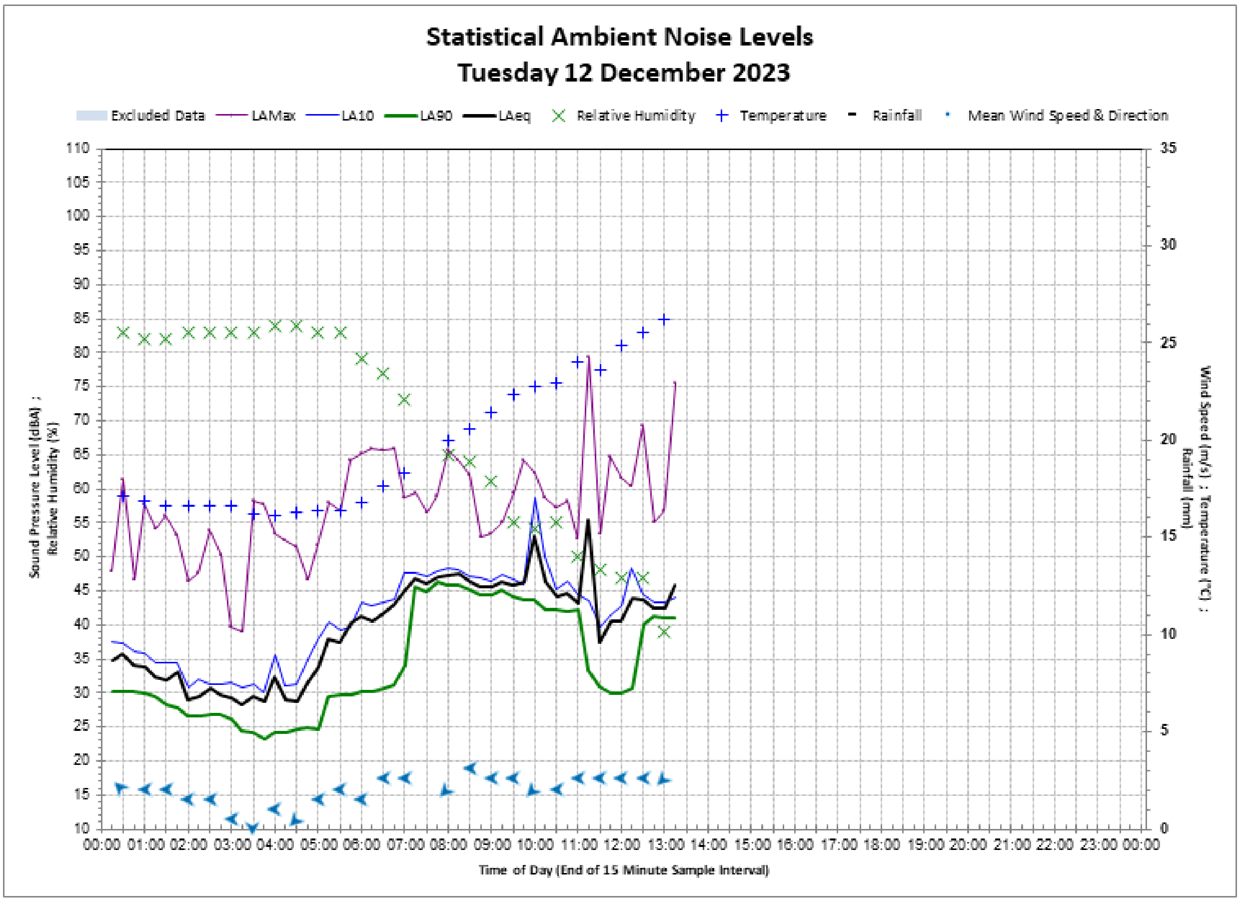

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Rainfall
Mean Wind Speed & Direction
Sound Pressure Level (dBA) ; Relative Humidity (%)
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)

Appendix B

Noise sensitive receivers

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads

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1:3,000 @ A4

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Metres
Grid: GDA2020 MGA Zone 56

Sensitive receivers — Roads

Rev: A
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Metres
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SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

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Sensitive receivers — Roads

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Sensitive receivers — Roads

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Grid: GDA2020 MGA Zone 56

Sensitive receivers
Roads

Rev: A
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Metres
Grid: GDA2020 MGA Zone 56

Project components
Project footprint
Sensitive receivers
Roads

Rev: A
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Metres
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SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

● Sensitive receivers —— Roads

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SYD21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Project components
Project footprint
Sensitive receivers
Roads

Rev: A
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Sensitive receivers
Roads
Watercourse

Rev: A
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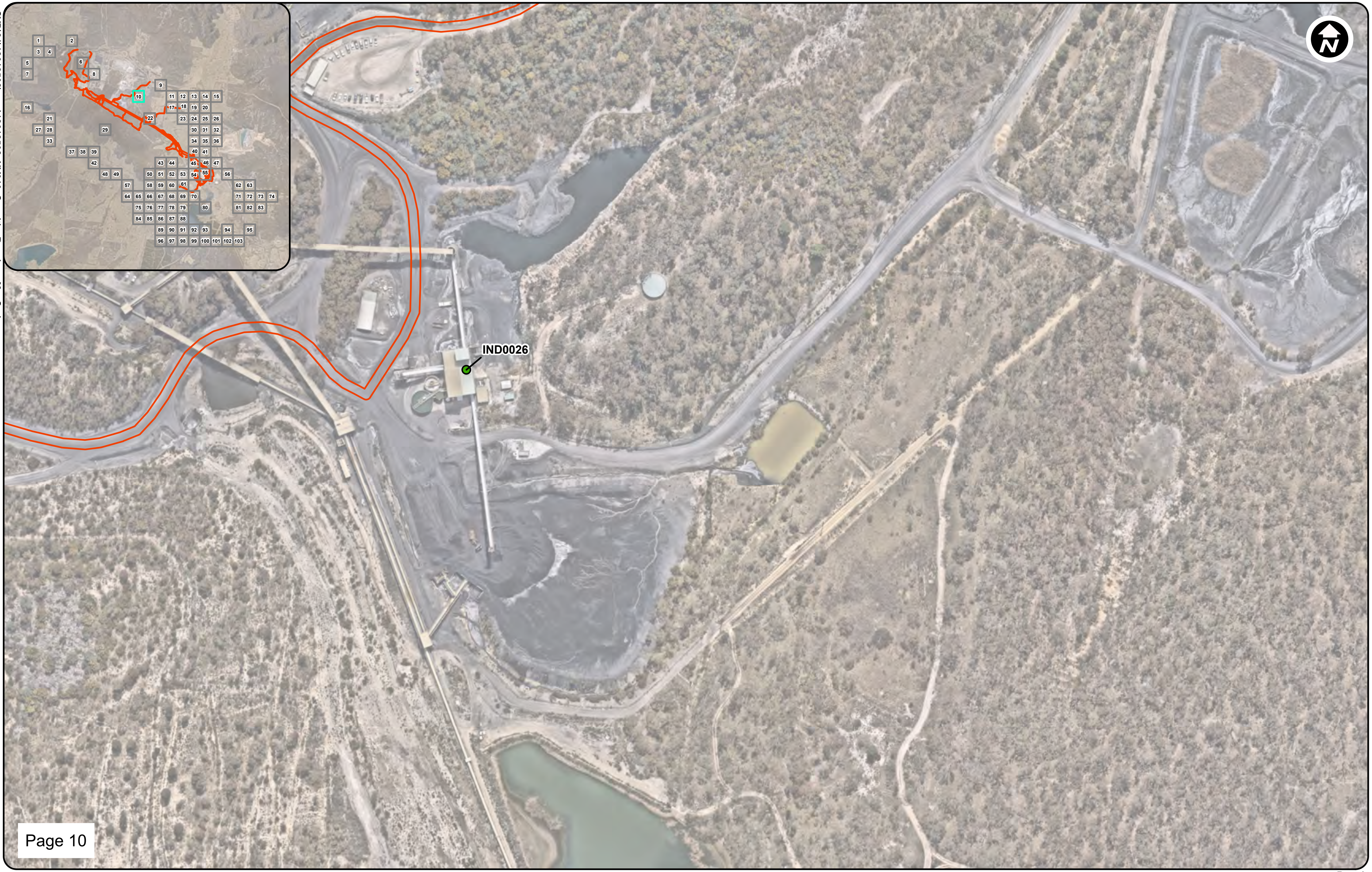

Project components

Project footprint

Sensitive receivers

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Sensitive receivers
Roads

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Sensitive receivers — Roads

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SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads
Watercourse

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Sensitive receivers
Roads
Watercourse

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Sensitive receivers
Railway
Roads
Watercourse

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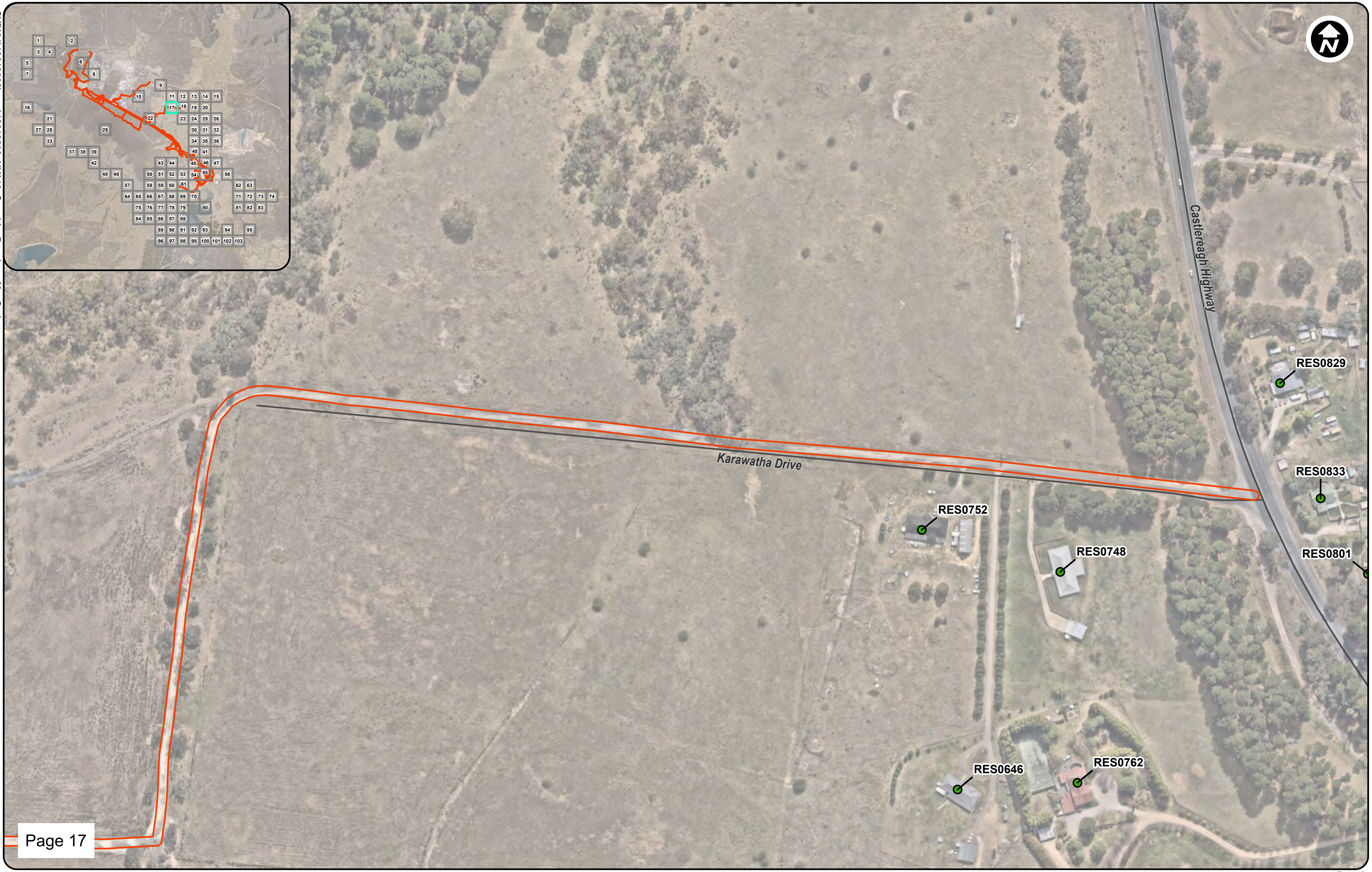

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Project components
Project footprint
Sensitive receivers
Roads

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Project components
Project footprint
Sensitive receivers
Roads

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Sensitive receivers
Roads
Watercourse

Rev: A
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SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

● Sensitive receivers
Roads
Watercourse

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Sensitive receivers
Railway
Roads
Watercourse

Rev: A
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Metres
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Project components
Project footprint
Sensitive receivers

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SYDD21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers

Roads

Watercourse

Rev: A

Date: 17/07/2025

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Metres

Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads
Watercourse

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SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads
Watercourse

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SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads

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SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries
Winters Creek
RES1055
RES1054
Irondale Road
Page 27
Sensitive receivers
Roads
Watercourse
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Metres
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SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads
Watercourse

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SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers

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Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

Sensitive receivers — Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\2\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers — Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

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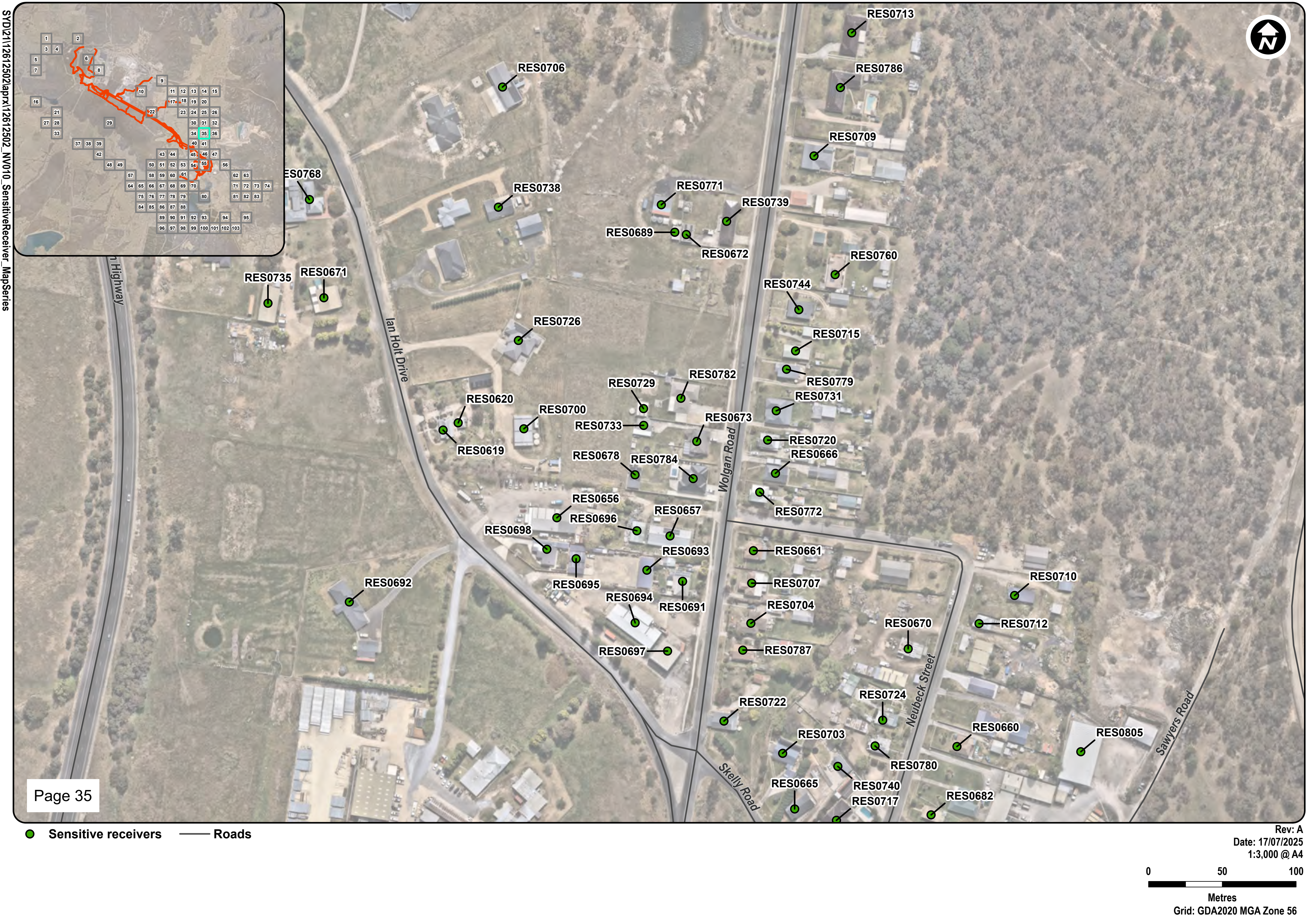
Metres
Grid: GDA2020 MGA Zone 56


SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries
Page 35
RES0713
RES0786
RES0709
RES0706
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RES0771
RES0739
RES0689
RES0672
RES0760
RES0735
RES0671
RES0744
RES0726
RES0715
RES0779
RES0782
RES0729
RES0731
RES0620
RES0700
RES0733
RES0673
RES0619
RES0720
RES0666
RES0678
RES0784
RES0772
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RES0696
RES0657
RES0698
RES0661
RES0693
RES0707
RES0710
RES0692
RES0695
RES0694
RES0691
RES0704
RES0670
RES0712
RES0697
RES0787
RES0724
RES0722
RES0660
RES0805
RES0703
RES0780
RES0665
RES0740
RES0717
RES0682
Ian Holt Drive
Wolgan Road
Neubeck Street
Sawyers Road
Skelly Road
Highway
Sensitive receivers
Roads
Rev: A
Date: 17/07/2025
1:3,000 @ A4
0
50
100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

- Sensitive receivers
- Roads
- Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Railway
Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4
0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Railway
Roads
Watercourse

Rev: A
Date: 17/07/2025
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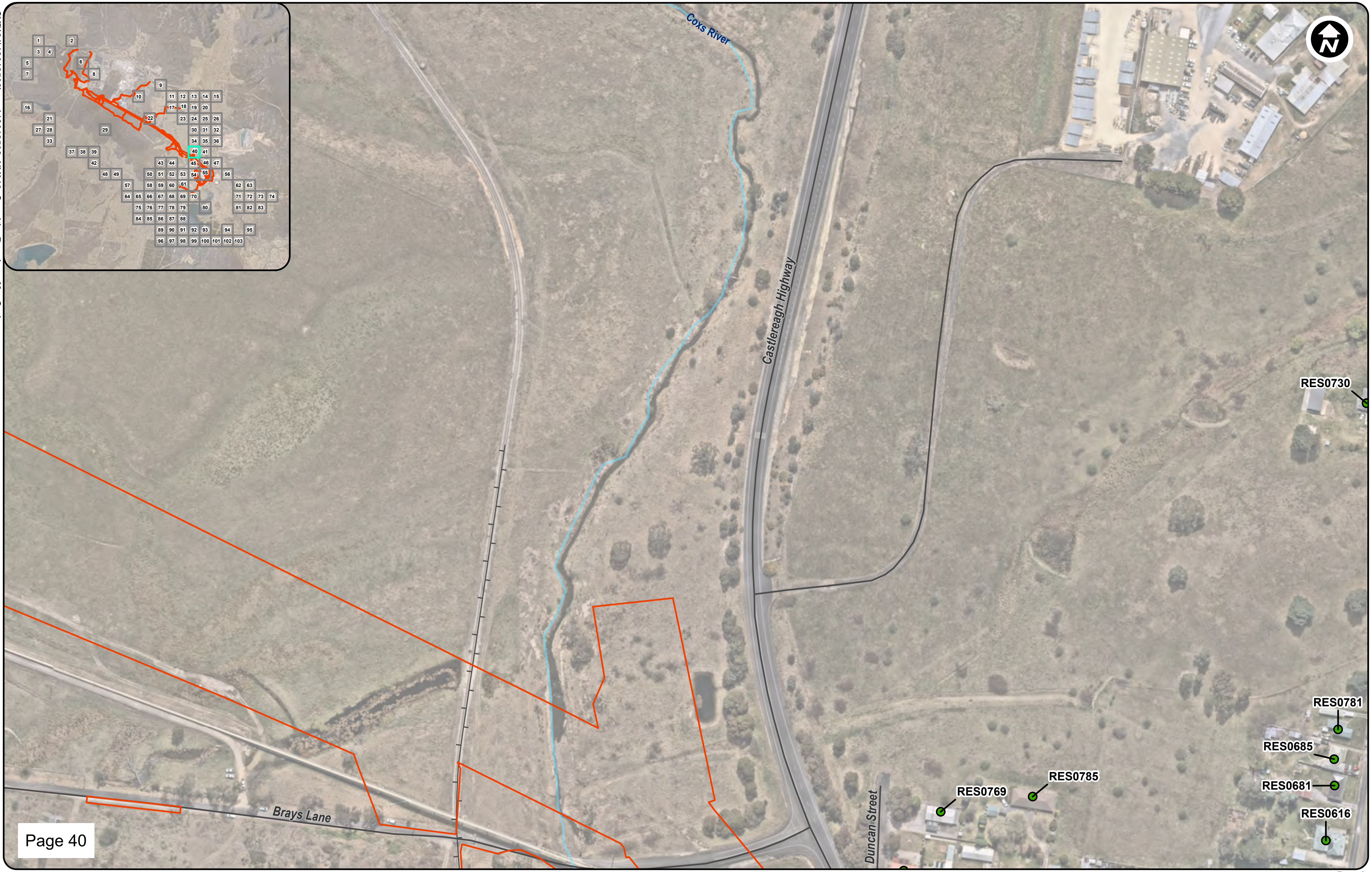
Metres
Grid: GDA2020 MGA Zone 56



Project components
Project footprint
Sensitive receivers
Railway
Roads
Watercourse

Rev: A
Date: 17/07/2025
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0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers — Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD2\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers

Railway

Roads

Rev: A
Date: 17/07/2025
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0 50 100

Metres

Grid: GDA2020 MGA Zone 56

Sensitive receivers
Roads

Rev: A
Date: 17/07/2025
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Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads
Watercourse

Rev: A
Date: 17/07/2025
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0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

SYDD21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Project components
- Project footprint
- Sensitive receivers
- Railway
- Roads
- Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Project components

Project footprint

Sensitive receivers

Roads

Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

Project components
Project footprint
Sensitive receivers
Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56


SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries
RES1049
Pipers Flat Road
Willow Vale Road
Page 48
Sensitive receivers
Railway
Roads
Rev: A
Date: 17/07/2025
1:3,000 @ A4
0
50
100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Railway
Roads
Watercourse

Rev: A
Date: 17/07/2025
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0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\2112612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

Sensitive receivers
Railway
Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4
0 50 100
Metres
Grid: GDA2020 MGA Zone 56

Sensitive receivers
Railway
Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Project components

Project footprint

Sensitive receivers

Railway

Roads

Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Project components
Project footprint
Sensitive receivers
Railway
Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Railway
Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries
Page 57
RES1048
RES1047
RES1046
Pipers Flat Road
Old Pipers Flat Road
Wallerawang Gwabegar Rail Line
Pipers Flat Creek
Sensitive receivers
Railway
Roads
Watercourse
Rev: A
Date: 17/07/2025
1:3,000 @ A4
0
50
100
Metres
Grid: GDA2020 MGA Zone 56

SYD21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Railway
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers

Roads

Watercourse

Rev: A
Date: 17/07/2025
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0 50 100

Metres

Grid: GDA2020 MGA Zone 56

Project components

- Project footprint
- Sensitive receivers

- Railway
- Roads
- Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

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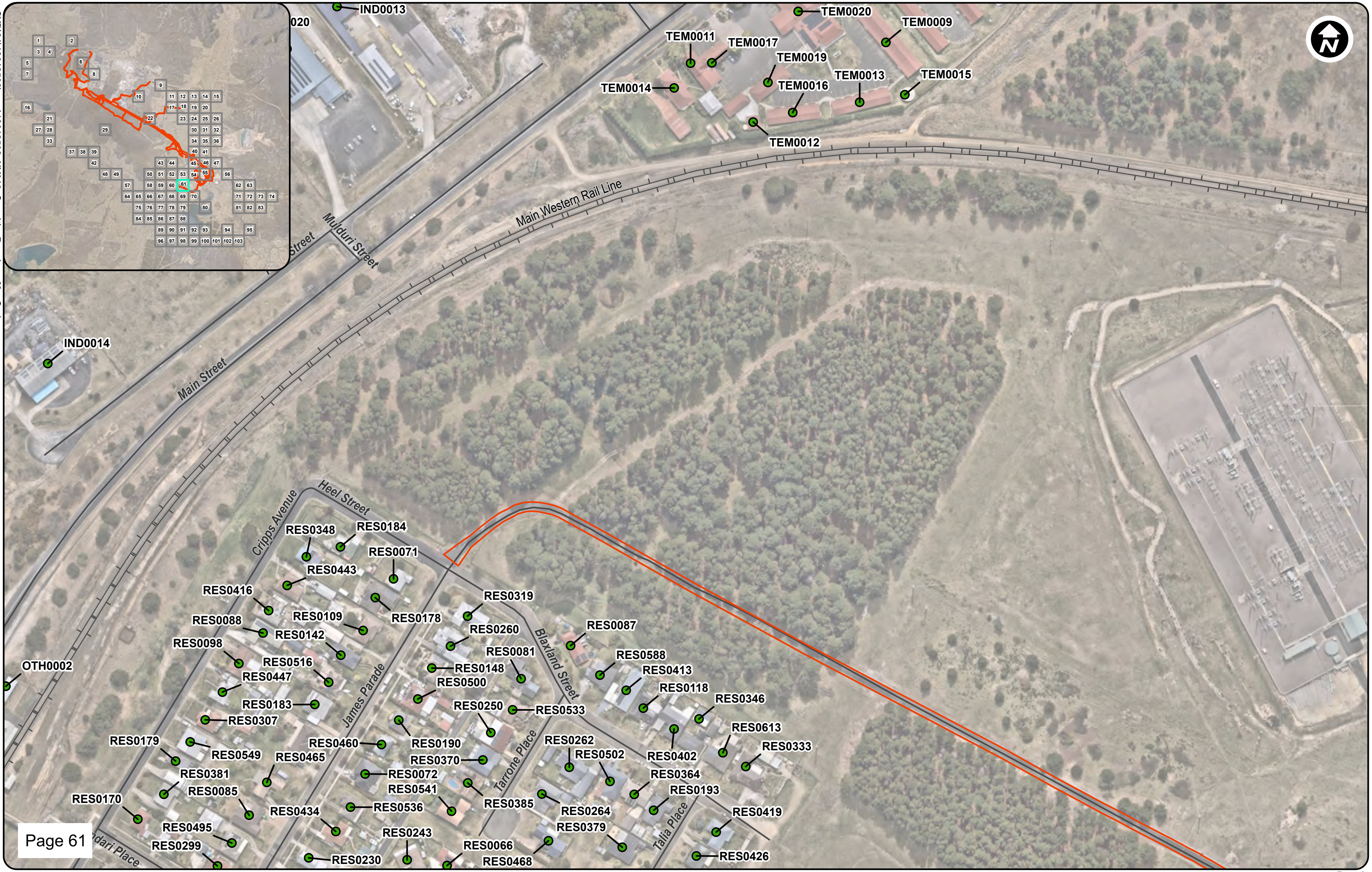

Project components

Project footprint

Sensitive receivers

Railway

Roads

Rev: A
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1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Railway
Roads

Rev: A
Date: 17/07/2025
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0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers

Railway

Roads

Rev: A
Date: 17/07/2025
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0 50 100
Metres
Grid: GDA2020 MGA Zone 56

● Sensitive receivers —— Roads

Rev: A
Date: 17/07/2025
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Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Railway
Roads

Rev: A
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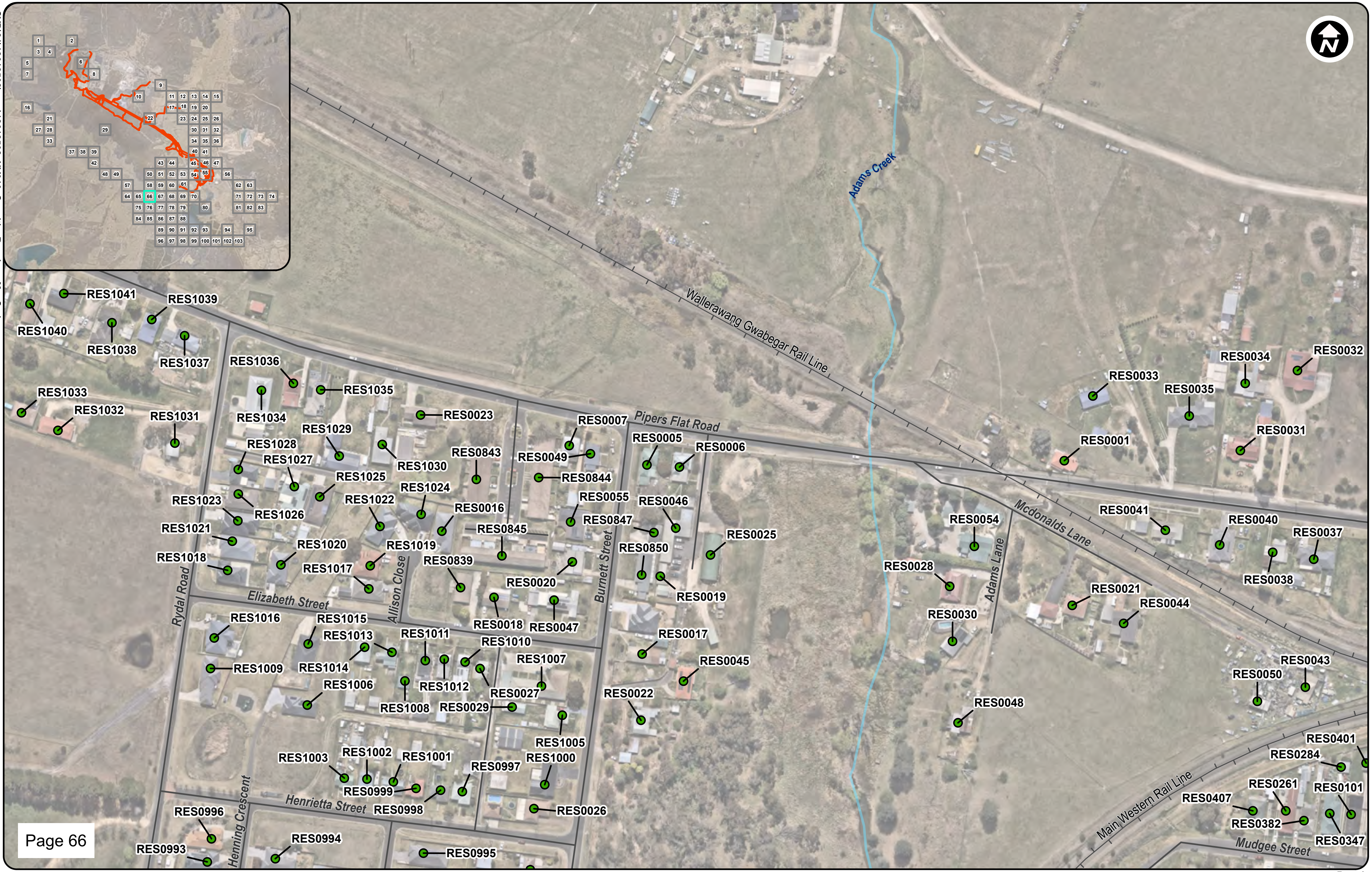
Metres
Grid: GDA2020 MGA Zone 56

SYD21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries



Sensitive receivers
Railway
Roads
Watercourse

Rev: A
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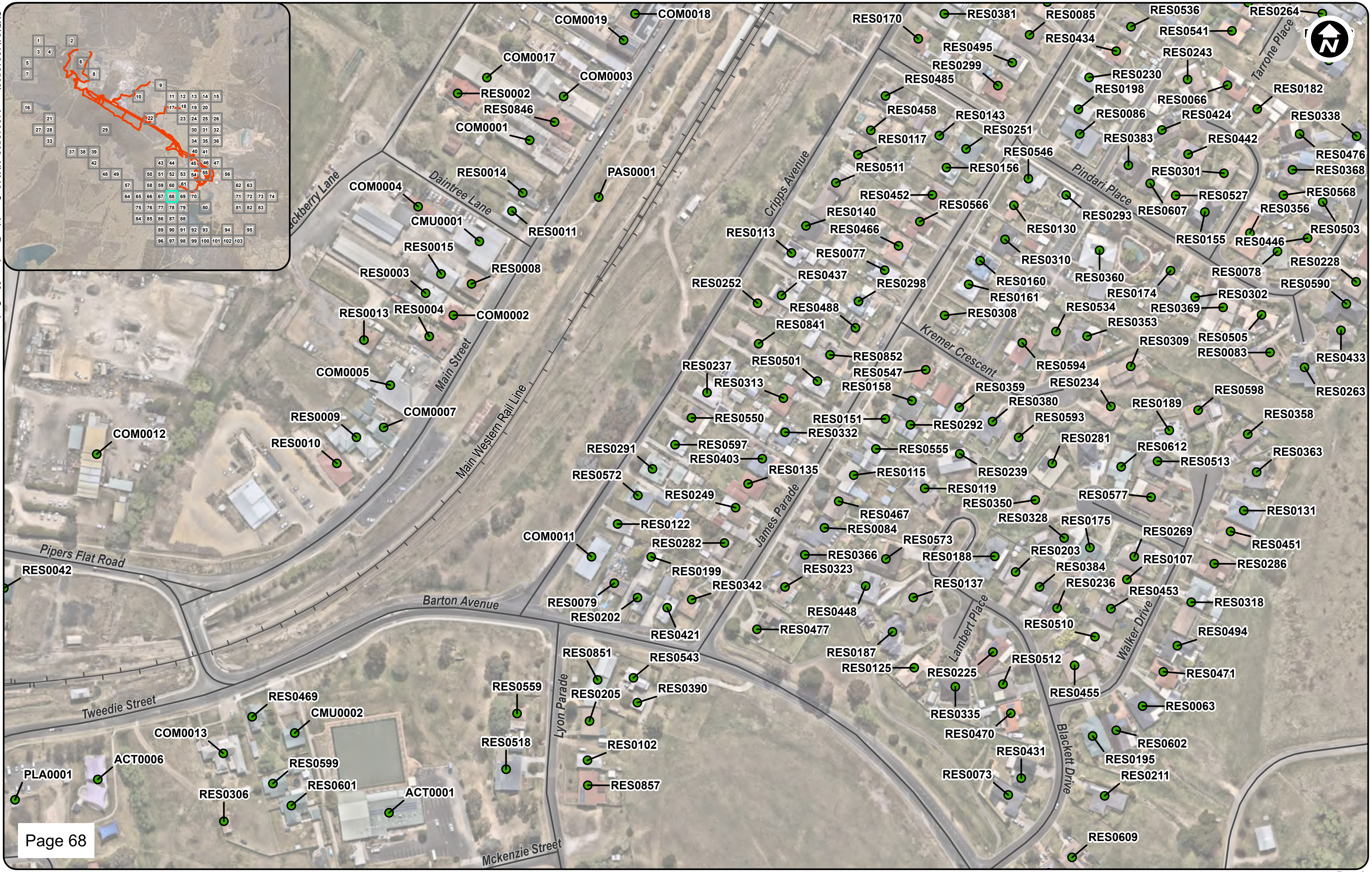
0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Railway
Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56



SYD2112612502aprx112612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Railway
Roads

Rev: A
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1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD2112612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Project components
Project footprint
Sensitive receivers
Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Project components
Project footprint
Sensitive receivers

Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

Sensitive receivers
Roads

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Rev: A
Date: 17/07/2025
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0 50 100
Metres
Grid: GDA2020 MGA Zone 56

Sensitive receivers
Railway
Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4
0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Railway
Roads

Rev: A
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1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

● Sensitive receivers — Roads

Rev: A
Date: 17/07/2025
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0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers — Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

- Sensitive receivers
- Railway
- Roads
- Watercourse

Rev: A
Date: 17/07/2025
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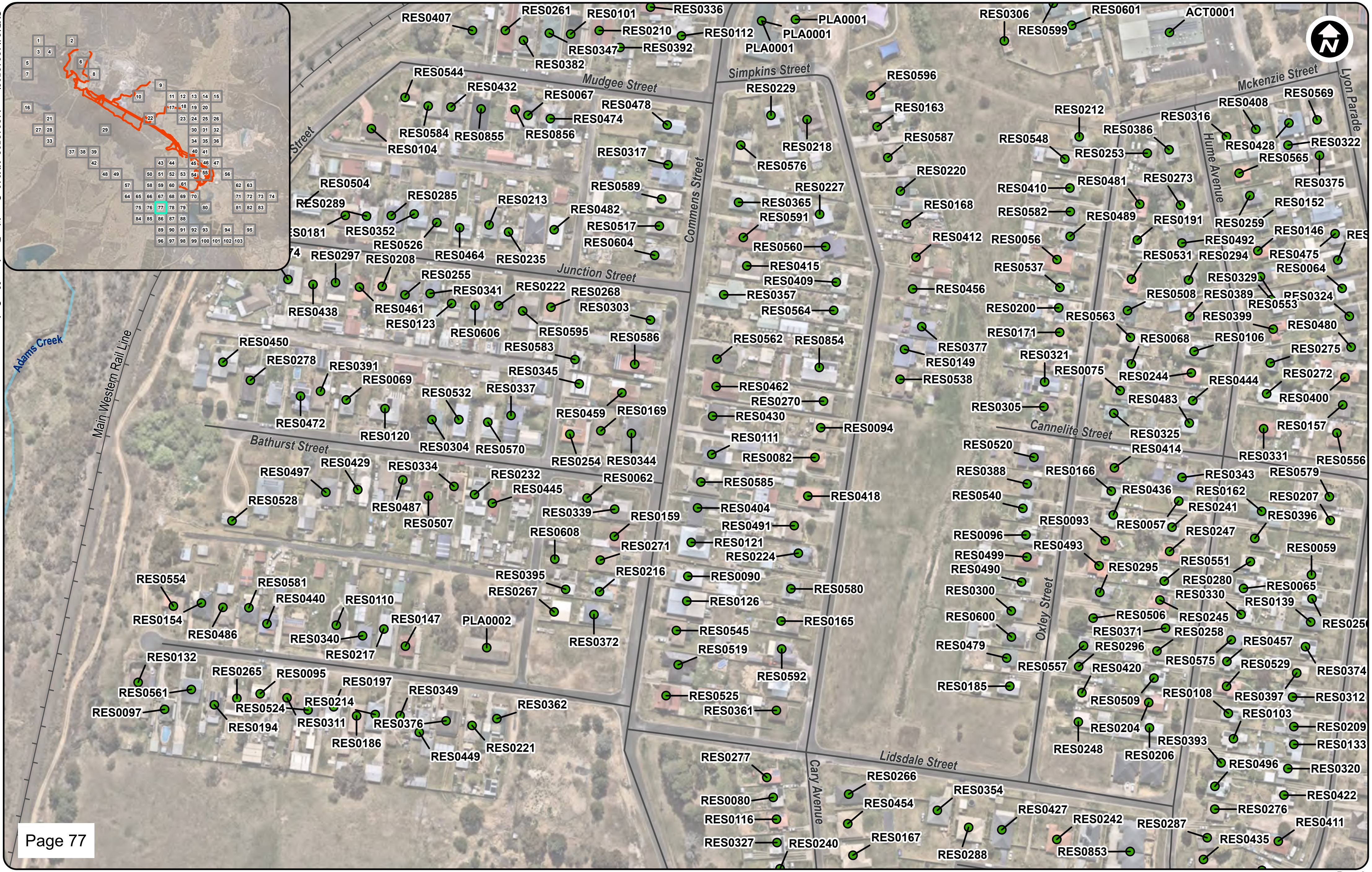
0 50 100
Metres
Grid: GDA2020 MGA Zone 56



SYD2112612502aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Railway
Roads
Watercourse

Rev: A
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1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYDZ1\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers — Roads

Rev: A
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Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads
Watercourse

Rev: A
Date: 17/07/2025
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Metres
Grid: GDA2020 MGA Zone 56

Sensitive receivers
Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

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Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

● Sensitive receivers —— Roads

Rev: A
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Metres
Grid: GDA2020 MGA Zone 56

SYD21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Railway
Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

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Metres
Grid: GDA2020 MGA Zone 56

Sensitive receivers
Railway

Rev: A
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Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

- Sensitive receivers
- Railway
- Roads
- Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers

Railway

Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100

Metres

Grid: GDA2020 MGA Zone 56

SYD21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers — Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

● Sensitive receivers
Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

● Sensitive receivers — Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

Sensitive receivers — Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

Sensitive receivers — Roads

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

Sensitive receivers
Railway
Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

Sensitive receivers
Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

Sensitive receivers
Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers — Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Sensitive receivers
Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

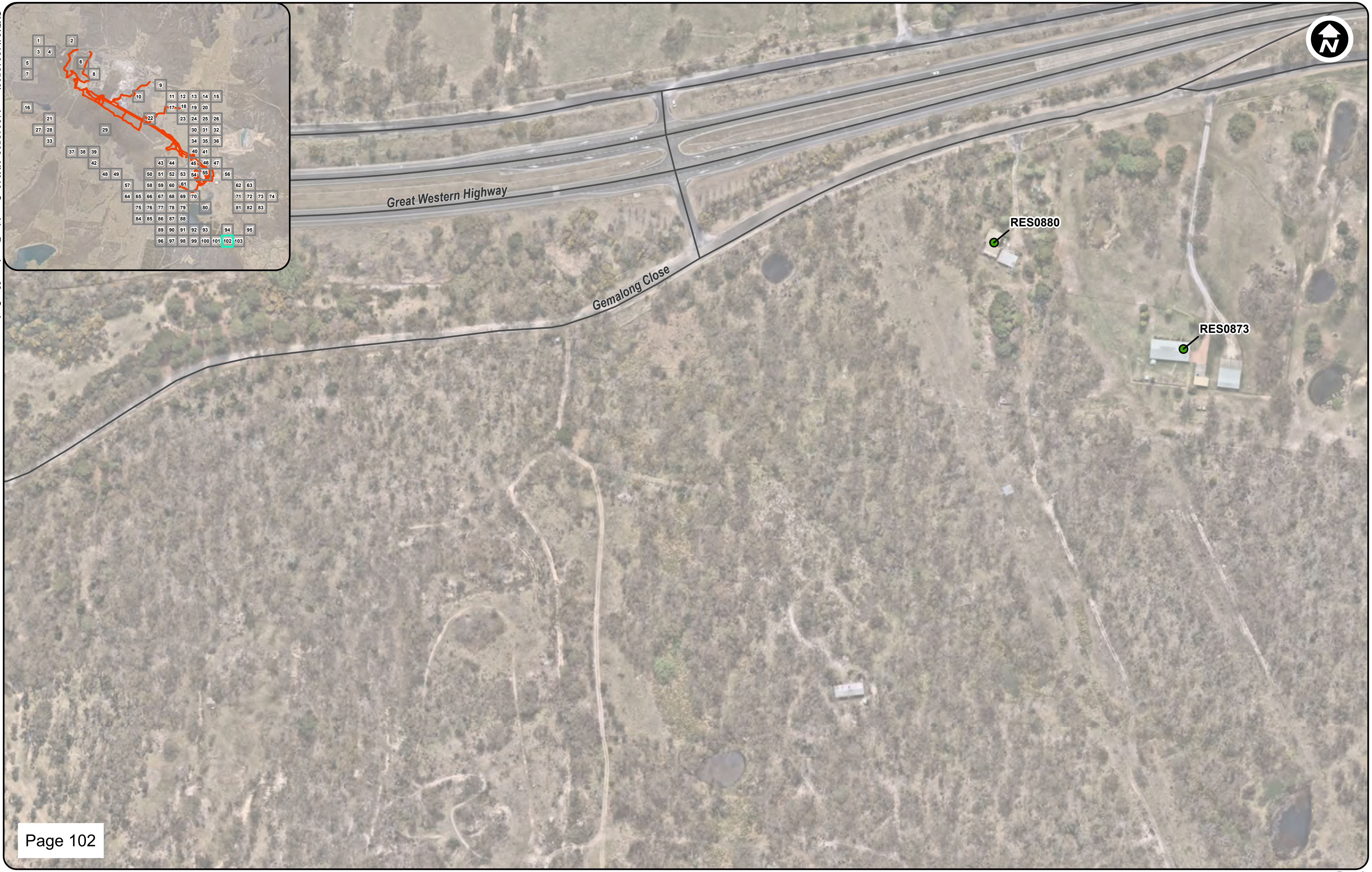
Sensitive receivers
Roads
Watercourse

Rev: A
Date: 17/07/2025
1:3,000 @ A4
0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries


SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries
Great Western Highway
Gemalong Close
RES0869
RES0866
RES0865
RES0864
Page 101
Sensitive receivers
Roads
Rev: A
Date: 17/07/2025
1:3,000 @ A4
0
50
100
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries



● Sensitive receivers —— Roads

Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

● Sensitive receivers — Roads

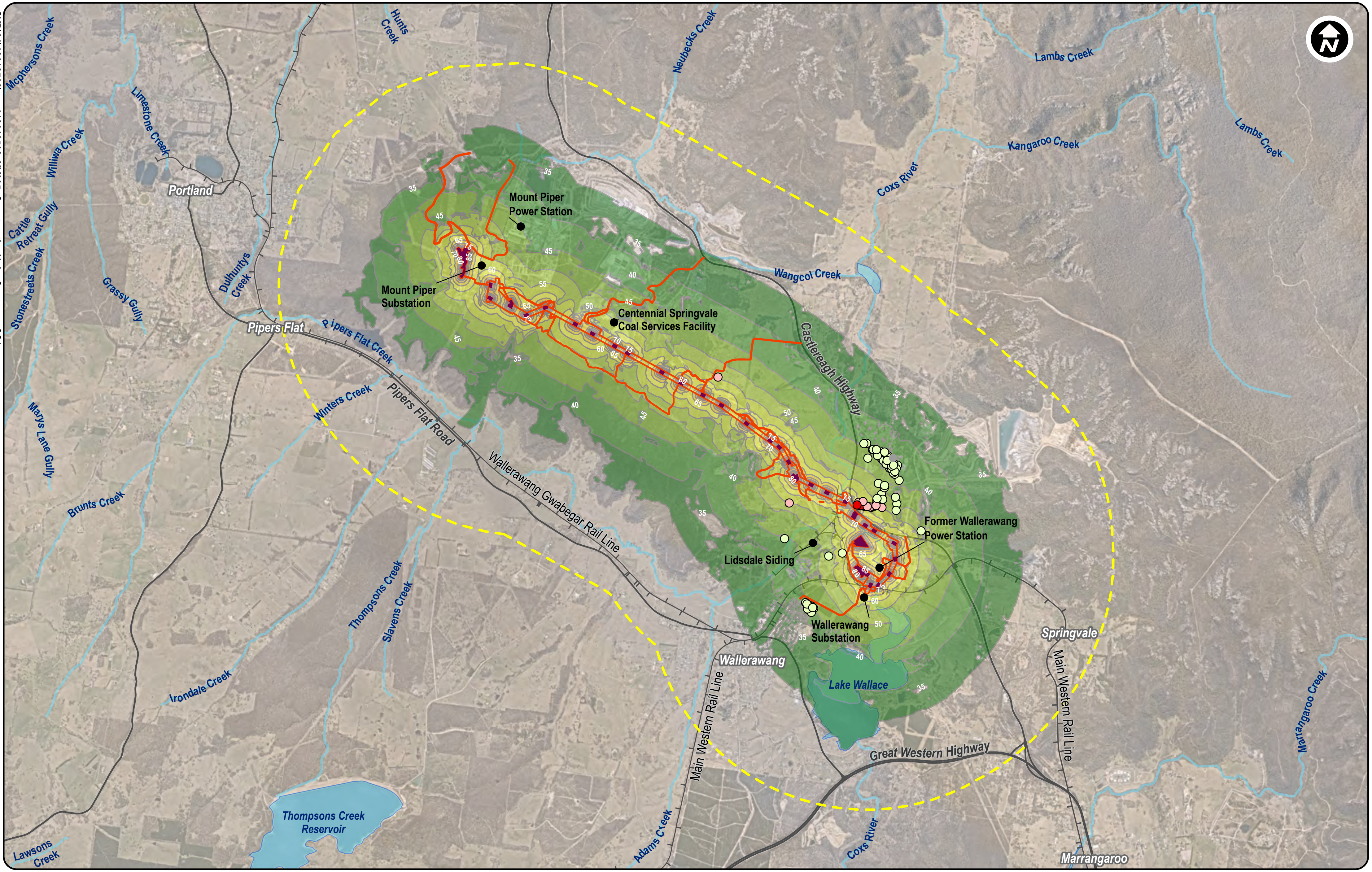
Rev: A
Date: 17/07/2025
1:3,000 @ A4

0 50 100
Metres
Grid: GDA2020 MGA Zone 56

SYD21\12612502\aprx\12612502_NV010_SensitiveReceiver_MapSeries

Appendix C

Construction noise contours – standard hours



SYD\21\12612502\aprx\12612502_NV005_ConstructionNoiseContours_CS1

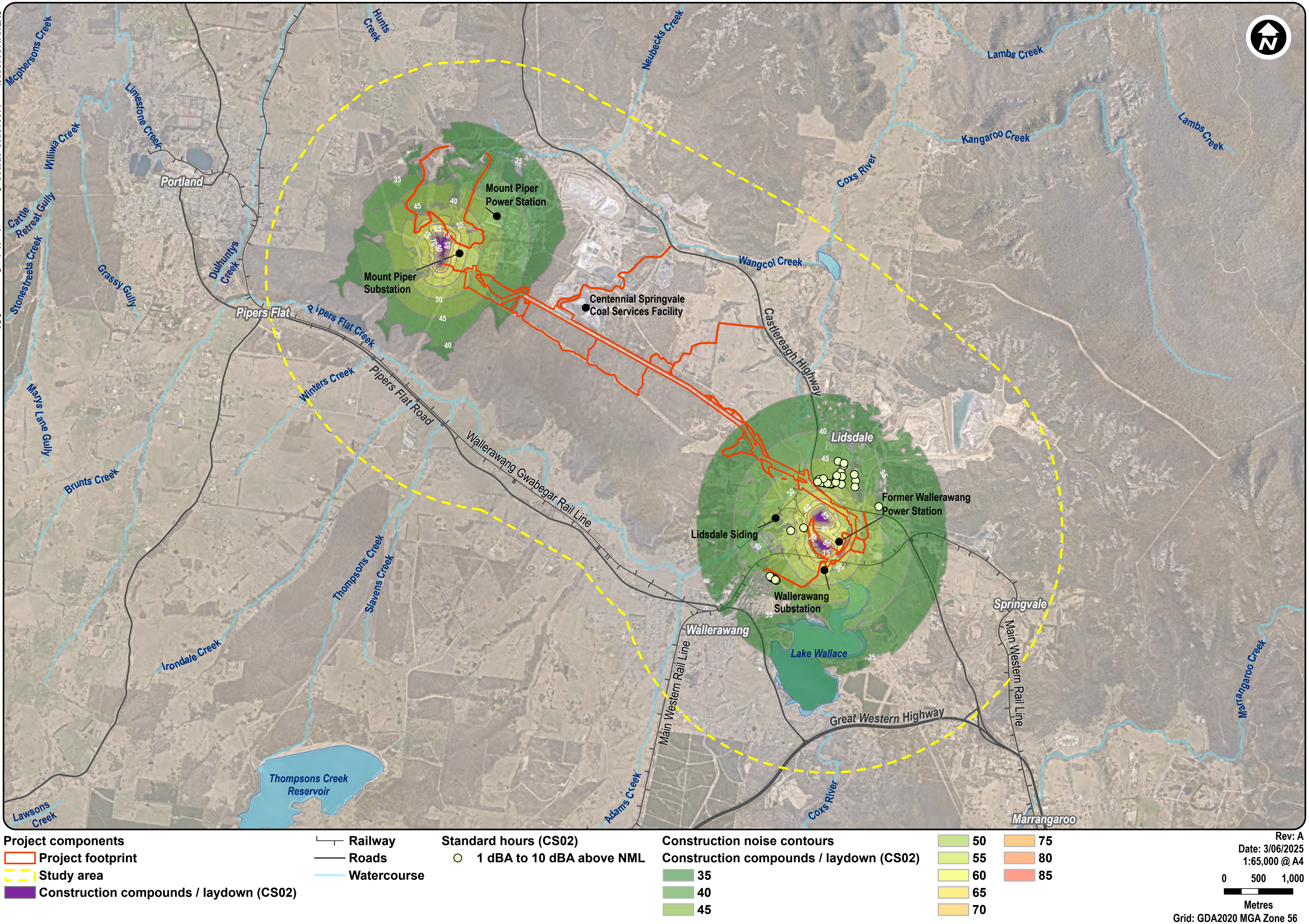
Project components
- Project footprint
- Study area
- Early works / site establishment (CS01)

Railway
Roads
Watercourse

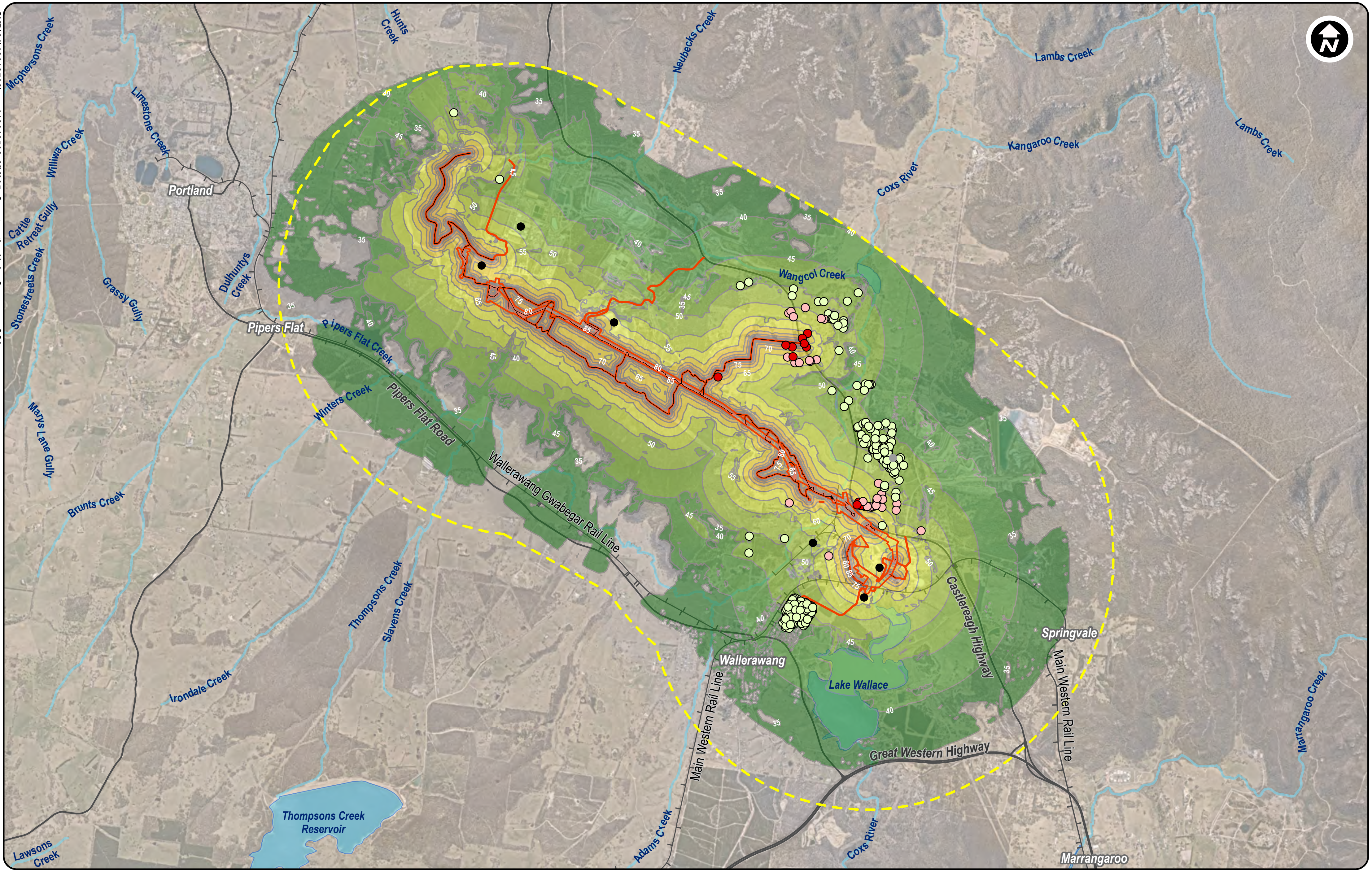
Standard hours (CS01)
- 1 dBA to 10 dBA above NML
- 10 dBA to 20 dBA above NML
- More than 20 dBA above NML

Construction noise contours
Early works / site establishment (CS01)
35
40
45
50
55
60
65
70
75
80
85

Rev: A
Date: 3/06/2025
1:65,000 @ A4
0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56


SYD\21\12612502\aprx\12612502_NV005_ConstructionNoiseContours_CS2
Mount Piper Power Station
Mount Piper Substation
Centennial Springvale Coal Services Facility
Lidsdale
Lidsdale Siding
Former Wallerawang Power Station
Wallerawang Substation
Wallerawang
Lake Wallace
Portland
Pipers Flat
Springvale
Marrangaroo
Thompsons Creek Reservoir
Castlereagh Highway
Great Western Highway
Pipers Flat Road
Wallerawang Gwabegar Rail Line
Main Western Rail Line
Mcphersons Creek
Limestone Creek
Williwa Creek
Cattle Retreat Gully
Stonestreets Creek
Grassy Gully
Dulhuntys Creek
Pipers Flat Creek
Winters Creek
Marys Lane Gully
Brunts Creek
Irondale Creek
Thompsons Creek
Slavens Creek
Lawsons Creek
Adams Creek
Coxs River
Hunts Creek
Neubecks Creek
Lambs Creek
Kangaroo Creek
Wangcol Creek
Marrangaroo Creek
Project components
Project footprint
Study area
Construction compounds / laydown (CS02)
Railway
Roads
Watercourse
Standard hours (CS02)
1 dBA to 10 dBA above NML
Construction noise contours
Construction compounds / laydown (CS02)
35
40
45
50
55
60
65
70
75
80
85
Rev: A
Date: 3/06/2025
1:65,000 @ A4
0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV005_ConstructionNoiseContours_CS3



Project components

- Project footprint
- Study area
- Access track upgrades (CS03)
- Railway
- Roads
- Watercourse

Standard hours (CS03)

- 1 dBA to 10 dBA above NML
- 10 dBA to 20 dBA above NML
- More than 20 dBA above NML

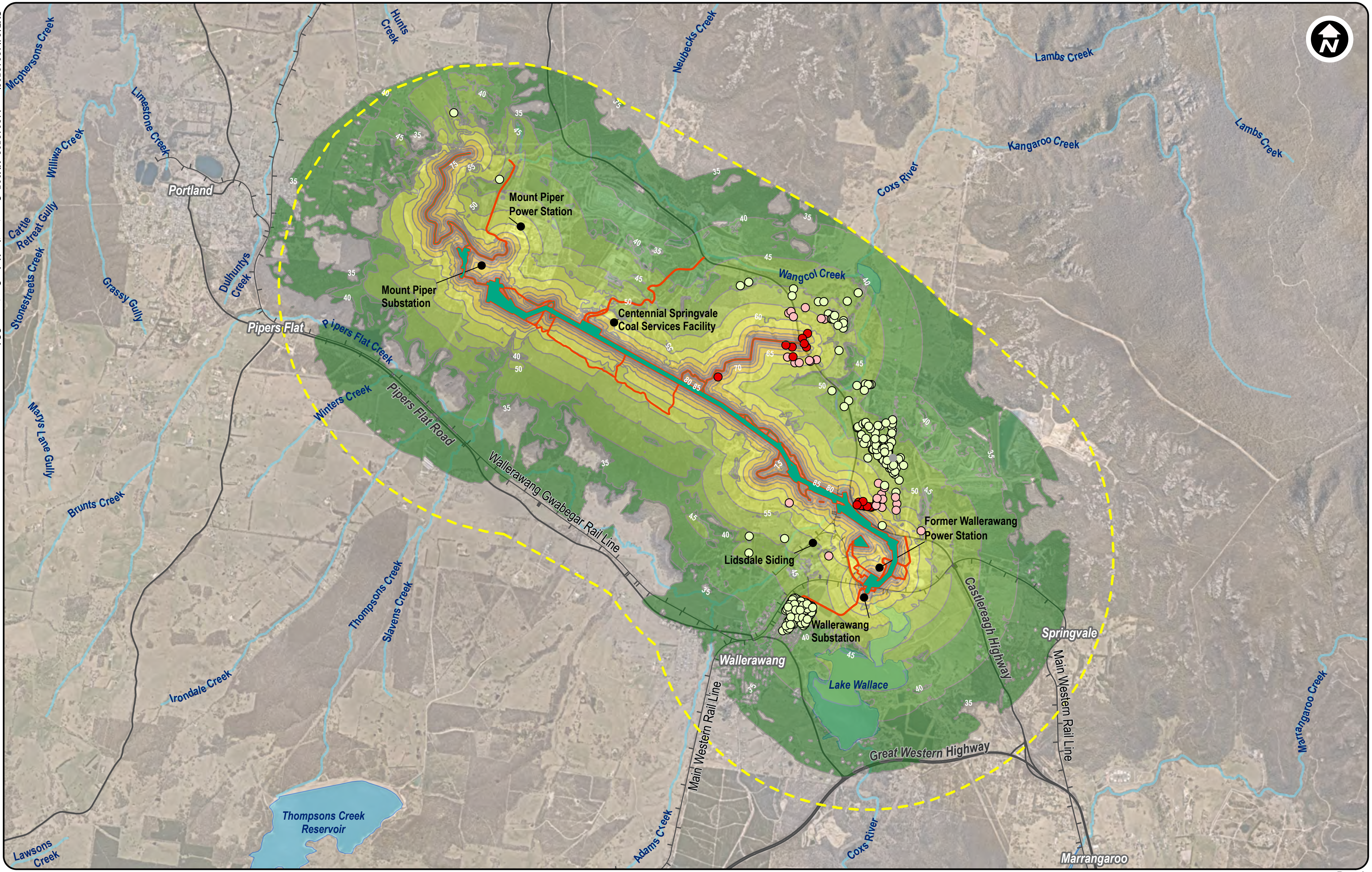
Construction noise contours Access track upgrades (CS03)

35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

Rev: A
Date: 3/06/2025
1:65,000 @ A4

0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV005_ConstructionNoiseContours_CS4



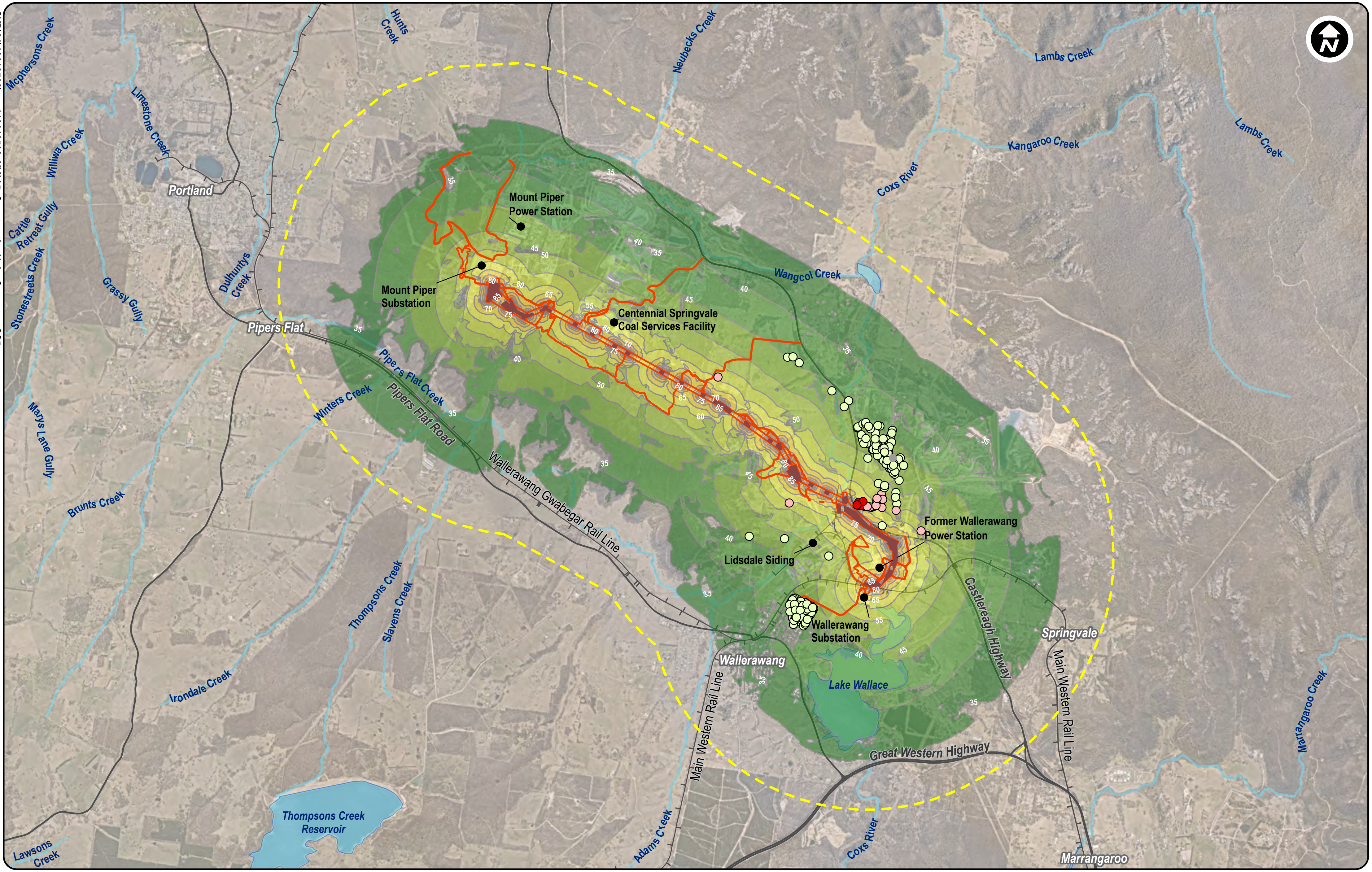
Project components
- Project footprint
- Study area
- Vegetation clearing (CS04)

- Railway
- Roads
- Watercourse

Standard hours (CS04)
- 1 dBA to 10 dBA above NML
- 10 dBA to 20 dBA above NML
- More than 20 dBA above NML

Construction noise contours Vegetation clearing (CS04)
35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

Rev: A
Date: 3/06/2025
1:65,000 @ A4
0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56



Project components

- Project footprint
- Study area
- Earthworks & civil works (CS05)
- Railway
- Roads
- Watercourse

Standard hours (CS05)

- 1 dBA to 10 dBA above NML
- 10 dBA to 20 dBA above NML
- More than 20 dBA above NML

Construction noise contours Earthworks & civil works (CS05)

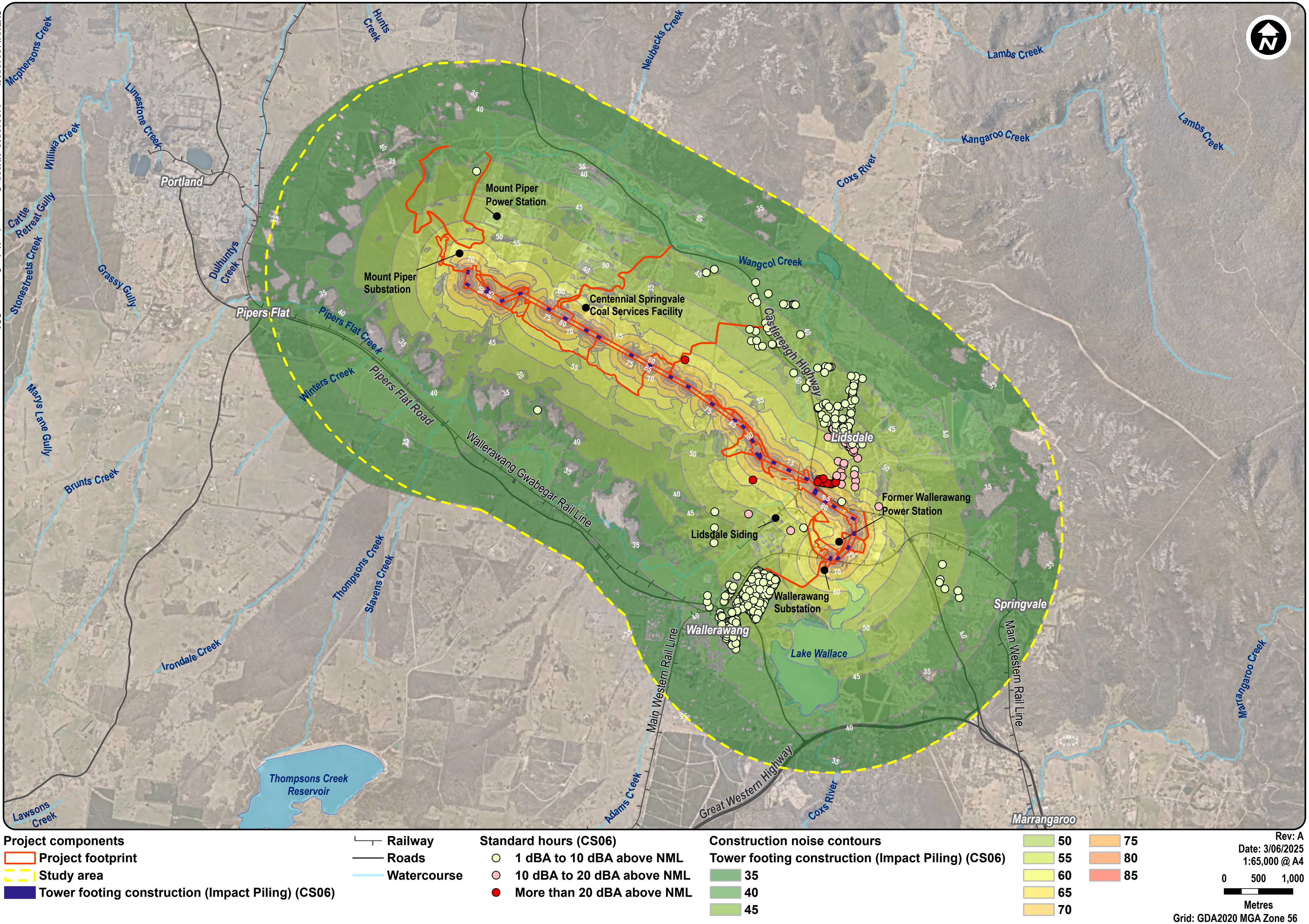
35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

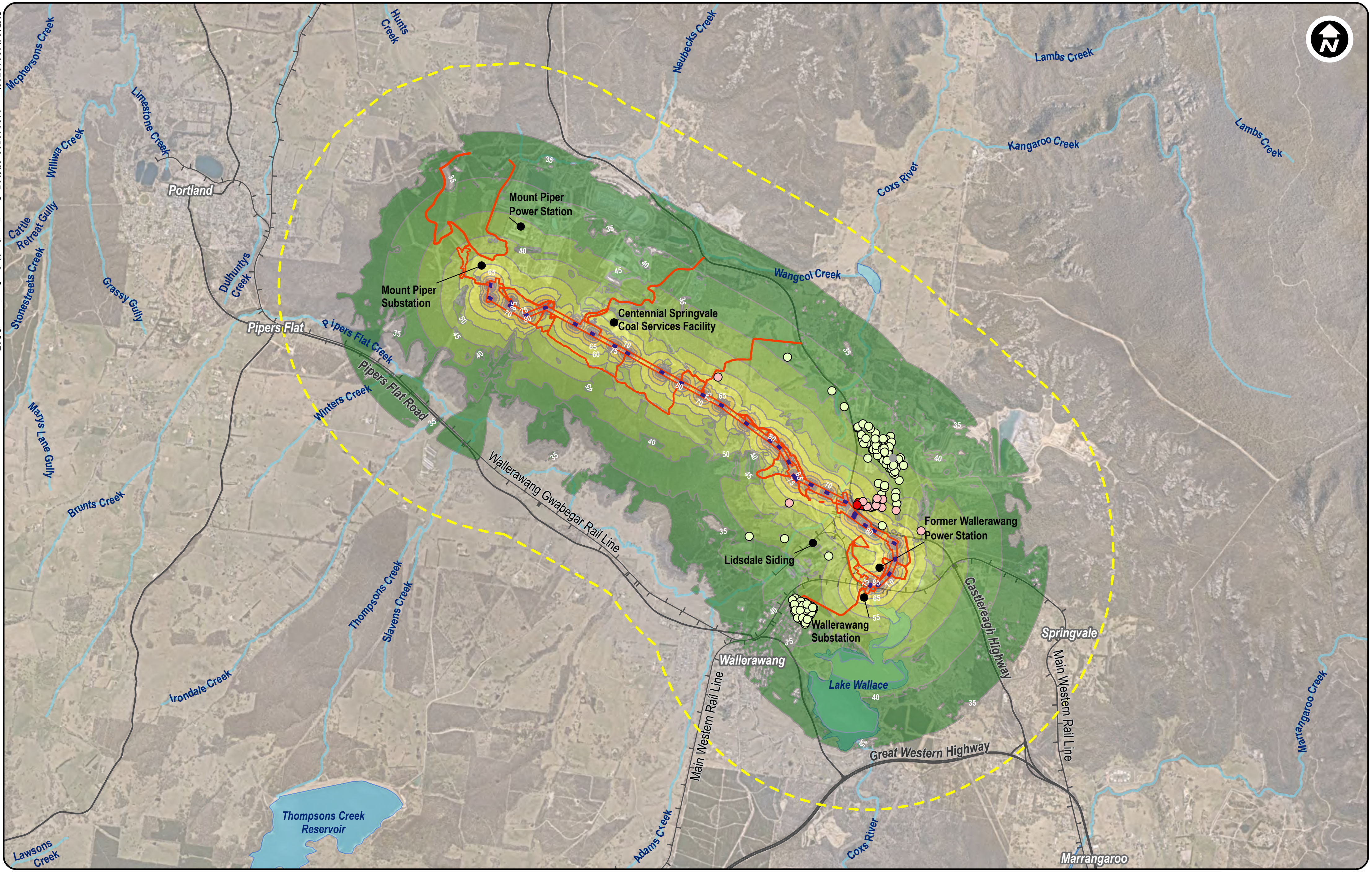
Rev: A
Date: 3/06/2025
1:65,000 @ A4

0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV005_ConstructionNoiseContours_CS5

SYD\21\12612502\aprx\12612502_NV005_ConstructionNoiseContours_CS6





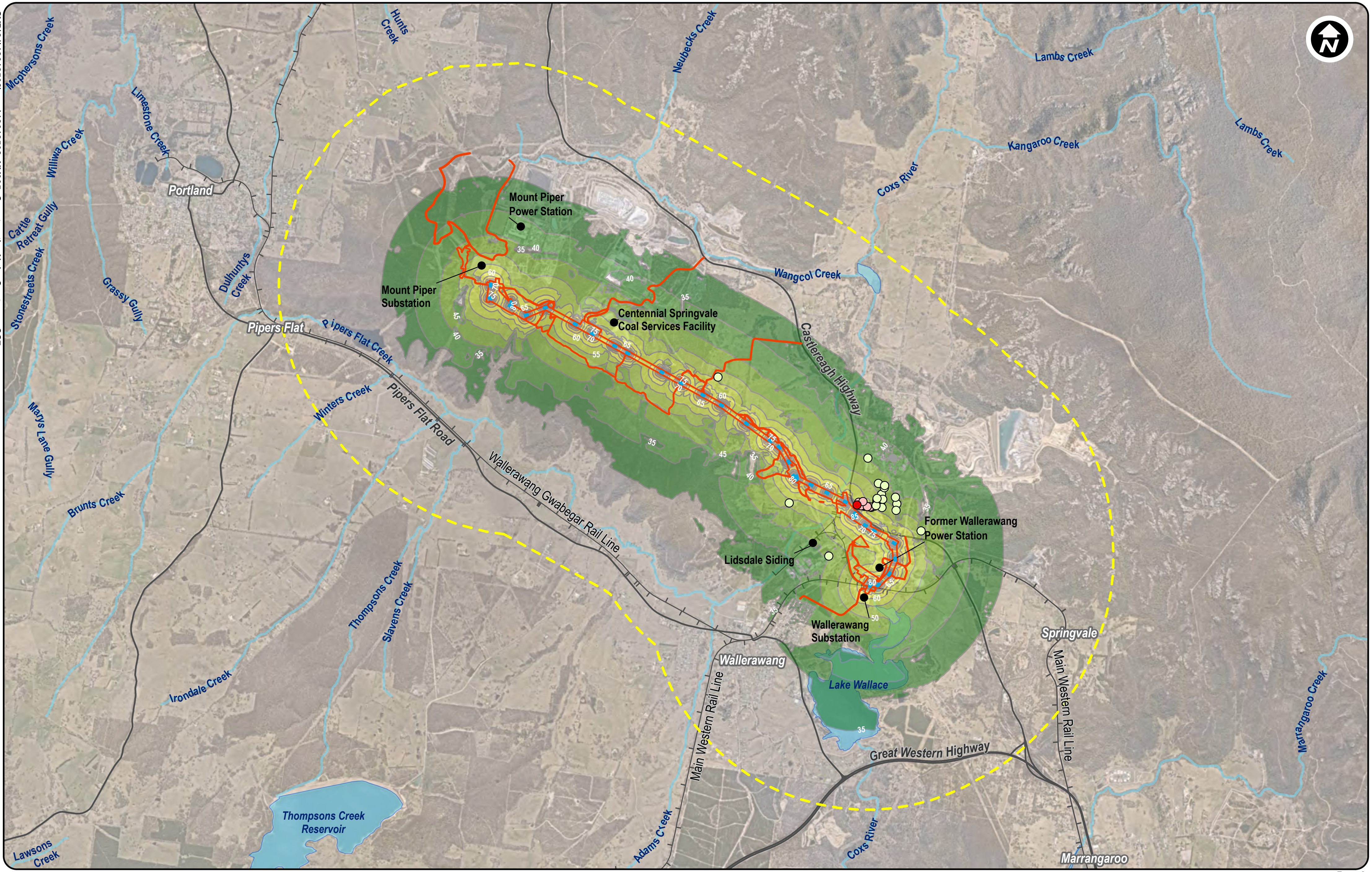
Project components
- Project footprint
- Study area
- Tower footing construction (Bored Piling) (CS06B)

- Railway
- Roads
- Watercourse

Standard hours (CS06B)
- 1 dBA to 10 dBA above NML
- 10 dBA to 20 dBA above NML
- More than 20 dBA above NML

Construction noise contours
Tower footing construction (Bored Piling) (CS06B)
35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

Rev: A
Date: 3/06/2025
1:65,000 @ A4
0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56



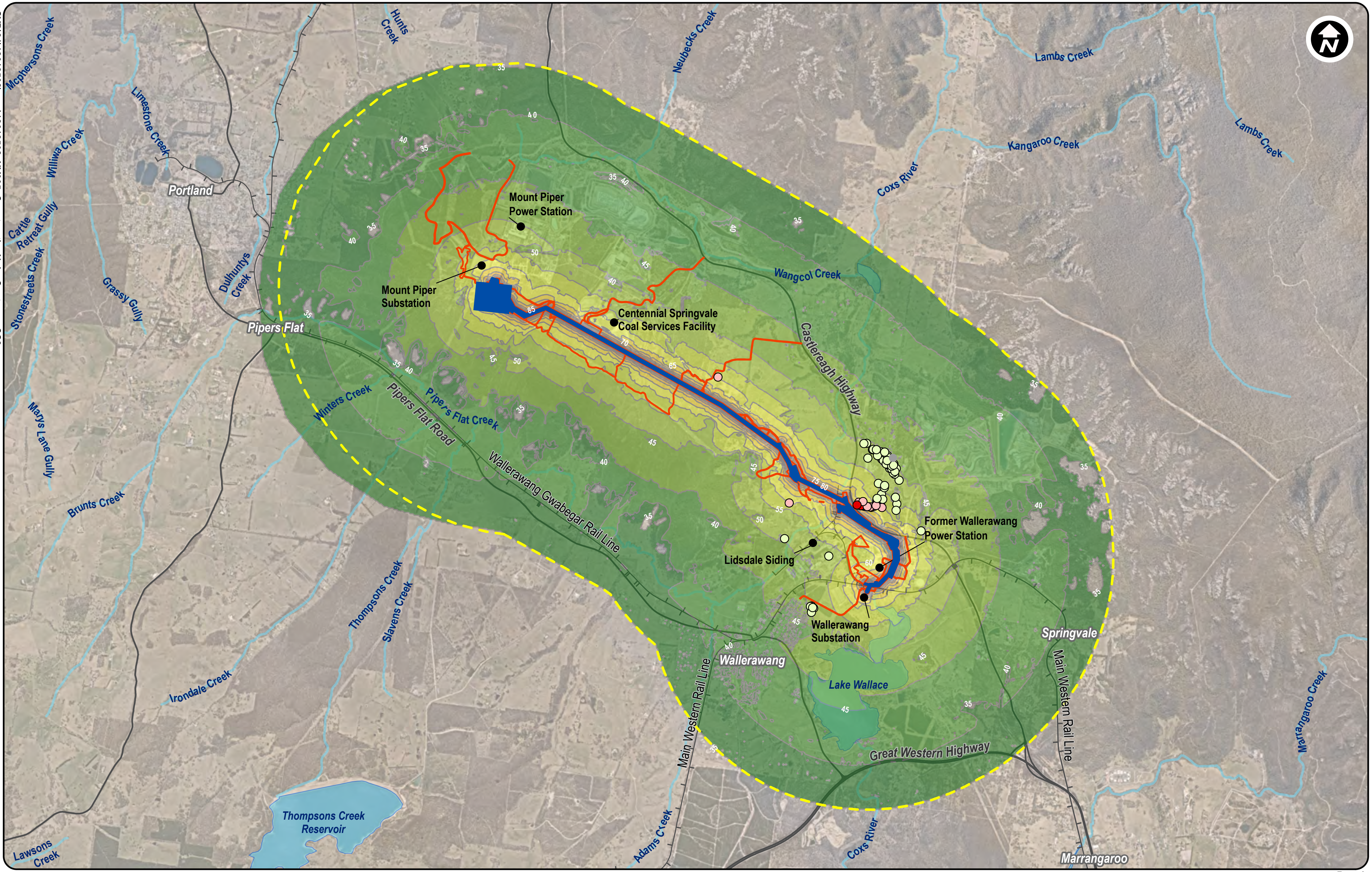
Project components
Project footprint
Study area
Tower assembly and erection (CS07)

Railway
Roads
Watercourse

Standard hours (CS07)
1 dBA to 10 dBA above NML
10 dBA to 20 dBA above NML
More than 20 dBA above NML

Construction noise contours
Tower assembly and erection (CS07)
35
40
45
50
55
60
65
70
75
80
85

Rev: A
Date: 3/06/2025
1:65,000 @ A4
0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56



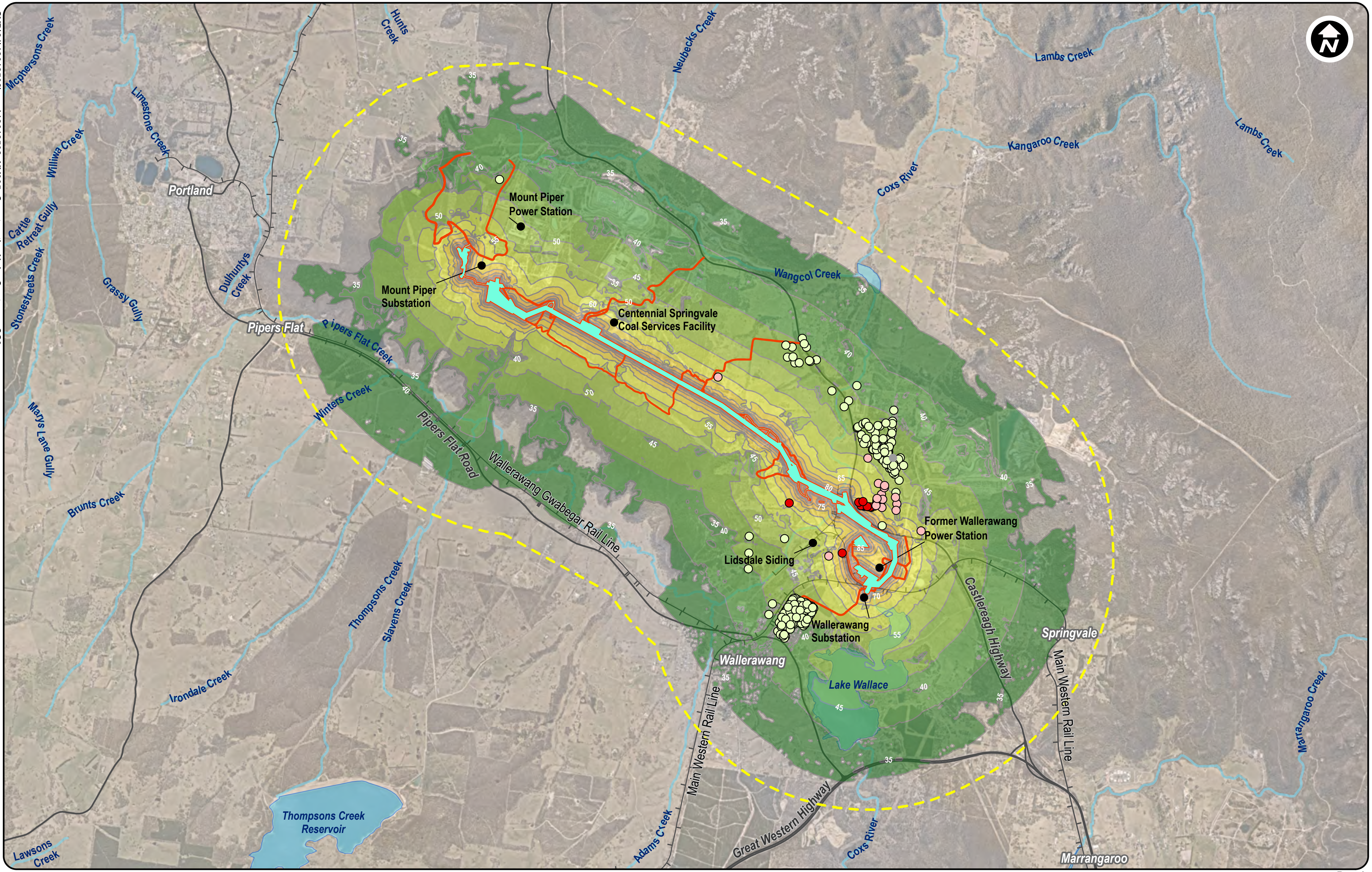
Project components
- Project footprint
- Study area
- Stringing transmission lin (CS08)

- Railway
- Roads
- Watercourse

Standard hours (CS08)
- 1 dBA to 10 dBA above NML
- 10 dBA to 20 dBA above NML
- More than 20 dBA above NML

Construction noise contours
Stringing transmission line (CS08)
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75
- 80
- 85

Rev: A
Date: 3/06/2025
1:65,000 @ A4
0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56



Project components
Project footprint
Study area
Demolition / rehabilitation (CS09)

Railway
Roads
Watercourse

Standard hours (CS09)
1 dBA to 10 dBA above NML
10 dBA to 20 dBA above NML
More than 20 dBA above NML

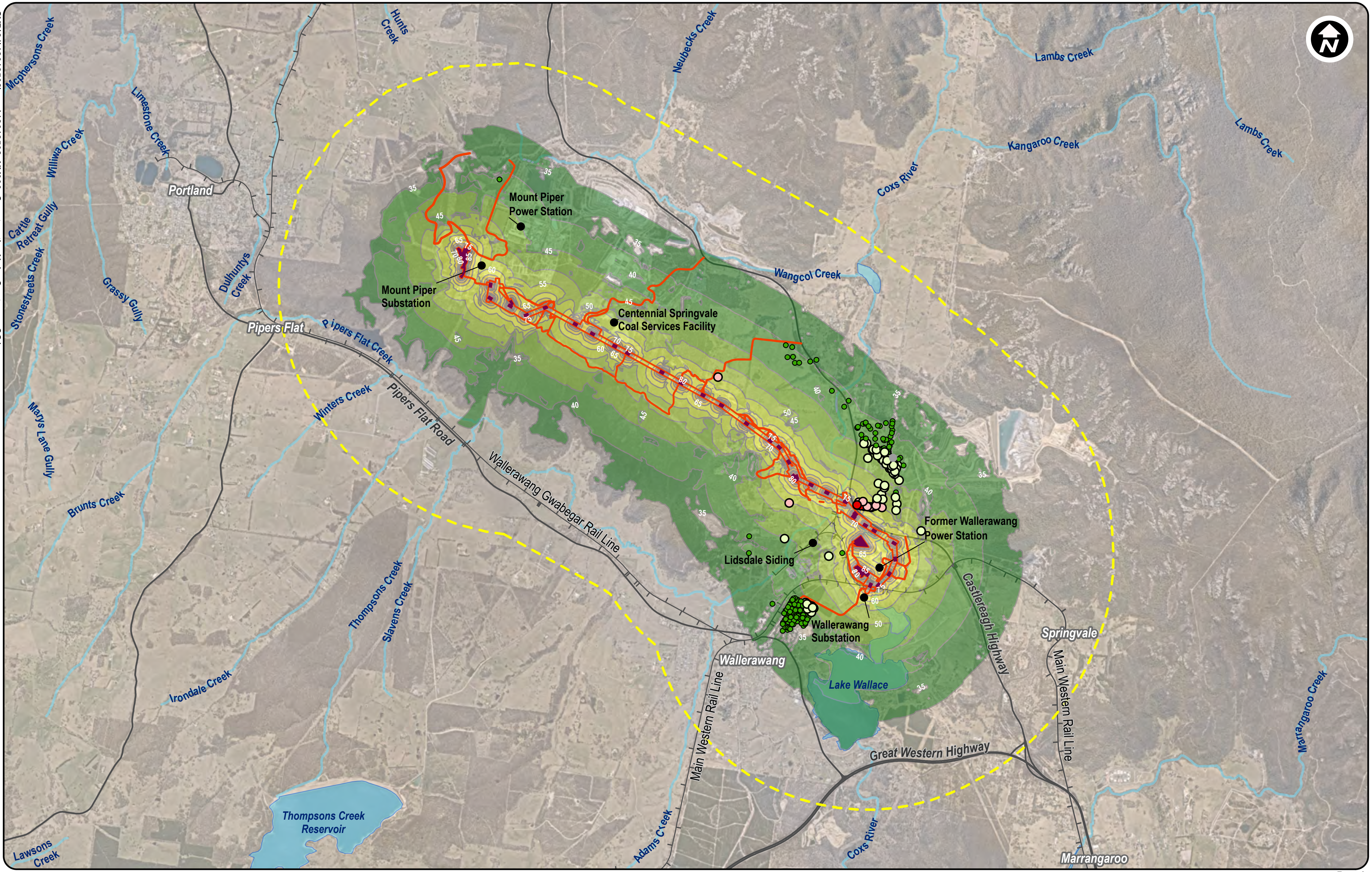
Construction noise contours
Demolition / rehabilitation (CS09)
35
40
45
50
55
60
65
70
75
80
85

Rev: A
Date: 3/06/2025
1:65,000 @ A4
0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56

Appendix D

Construction noise contours – OOHW day

SYD\21\12612502\aprx\12612502_NV006_ConstructionNoiseContours_CS1



Project components

- Project footprint
- Study area
- Early works / site establishment (CS01)
- Railway
- Roads
- Watercourse

Out of hours, Day (CS01)

- 1 dBA to 5 dBA above NML
- 5 dBA to 15 dBA above NML
- 15 dBA to 25 dBA above NML
- More than 25 dBA above NML

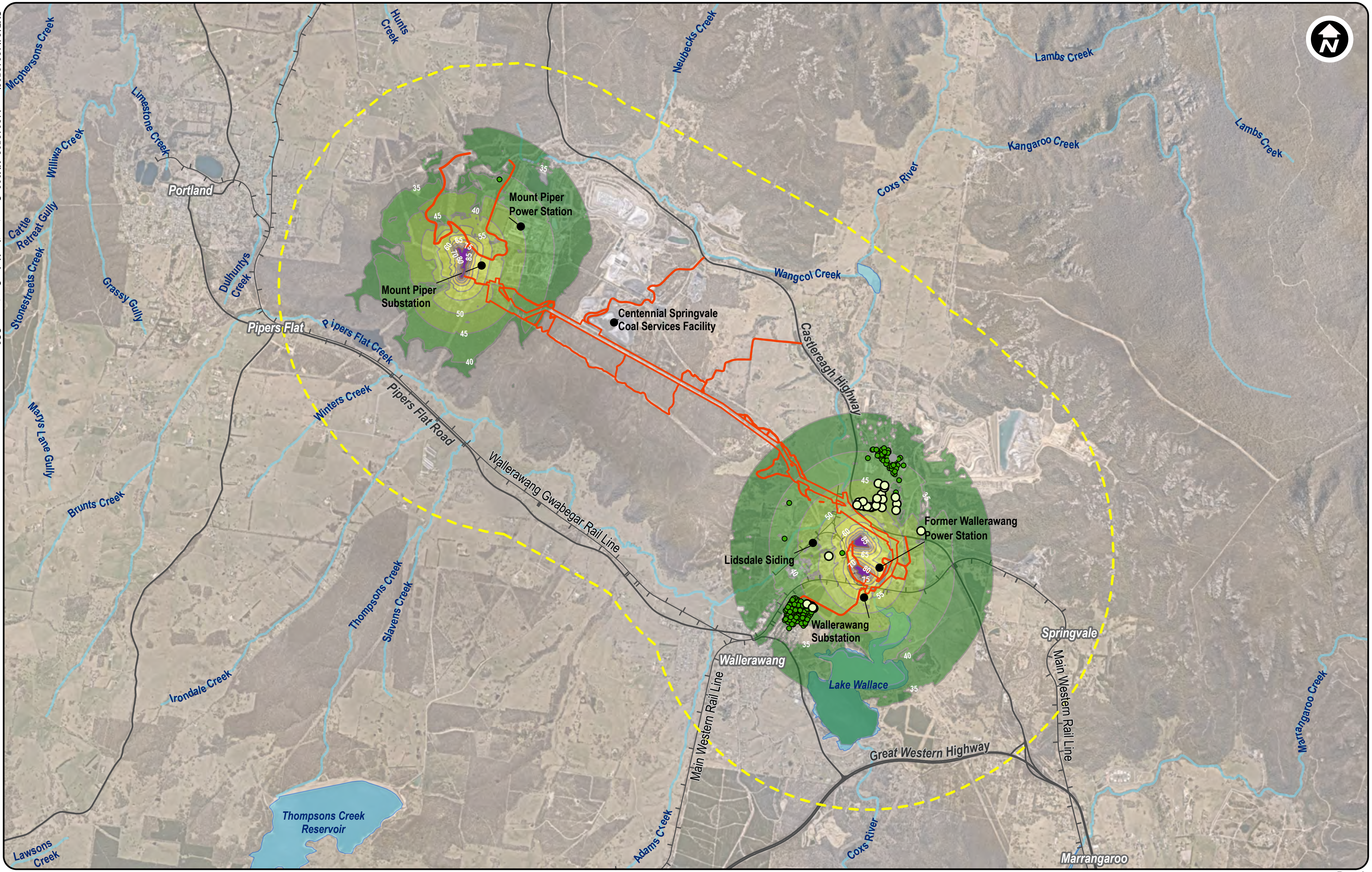
Construction noise contours

Early works / site establishment (CS01)

35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

Rev: A
Date: 3/06/2025
1:65,000 @ A4

0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56



Project components

- Project footprint
- Study area
- Construction compounds / laydown (CS02)
- Railway
- Roads
- Watercourse

Out of hours, Day (CS02)

- 1 dBA to 5 dBA above NML
- 5 dBA to 15 dBA above NML

Construction noise contours

Construction compounds / laydown (CS02)

35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

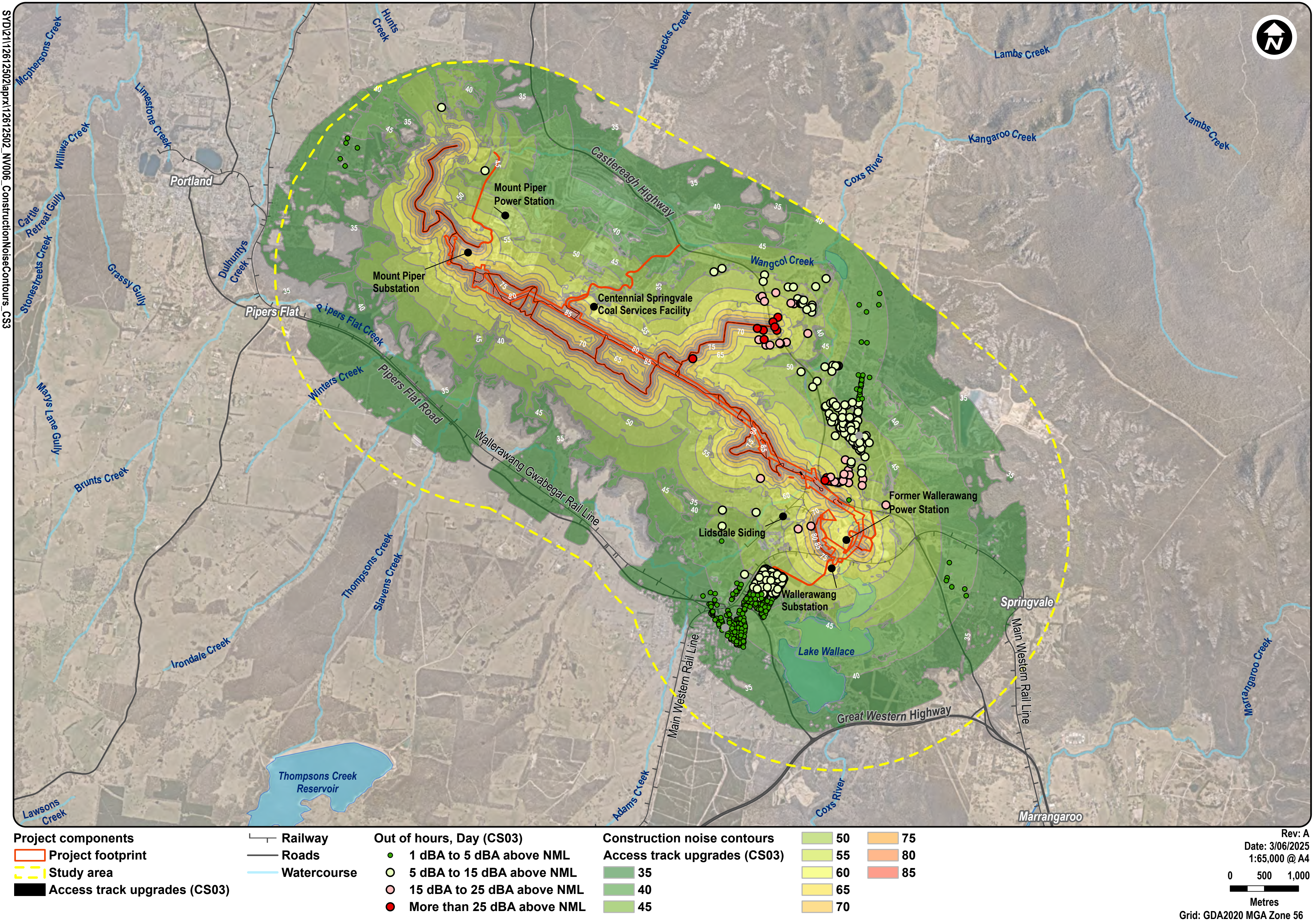
Rev: A
Date: 3/06/2025
1:65,000 @ A4

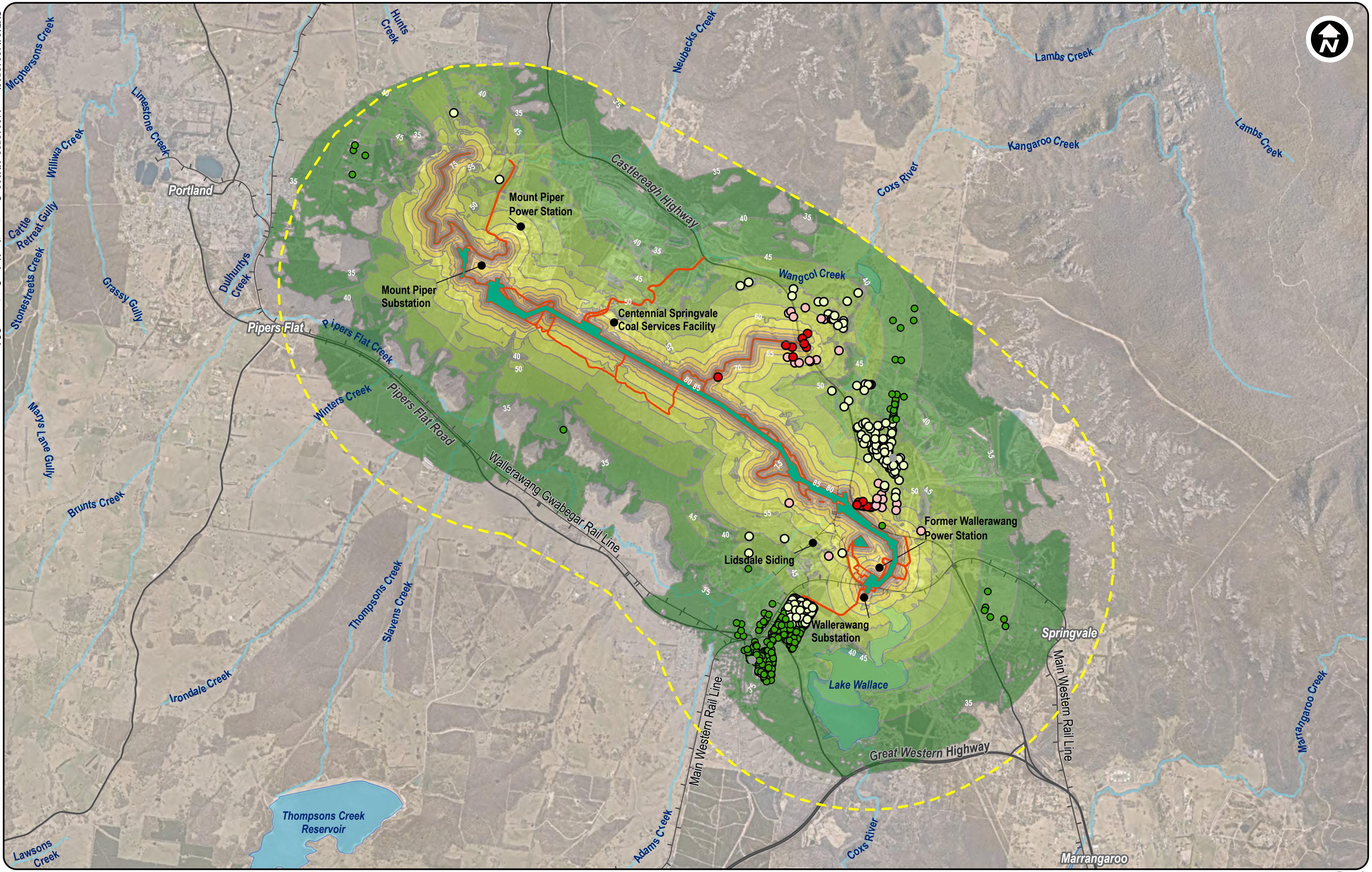
0 500 1,000
Metres

Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV006_ConstructionNoiseContours_CS2

SYD2112612502\aprx\12612502_NV006_ConstructionNoiseContours_CS3





SYD\21\12612502\aprx\12612502_NV006_ConstructionNoiseContours_CS4

Project components
- Project footprint
- Study area
- Vegetation clearing (CS04)

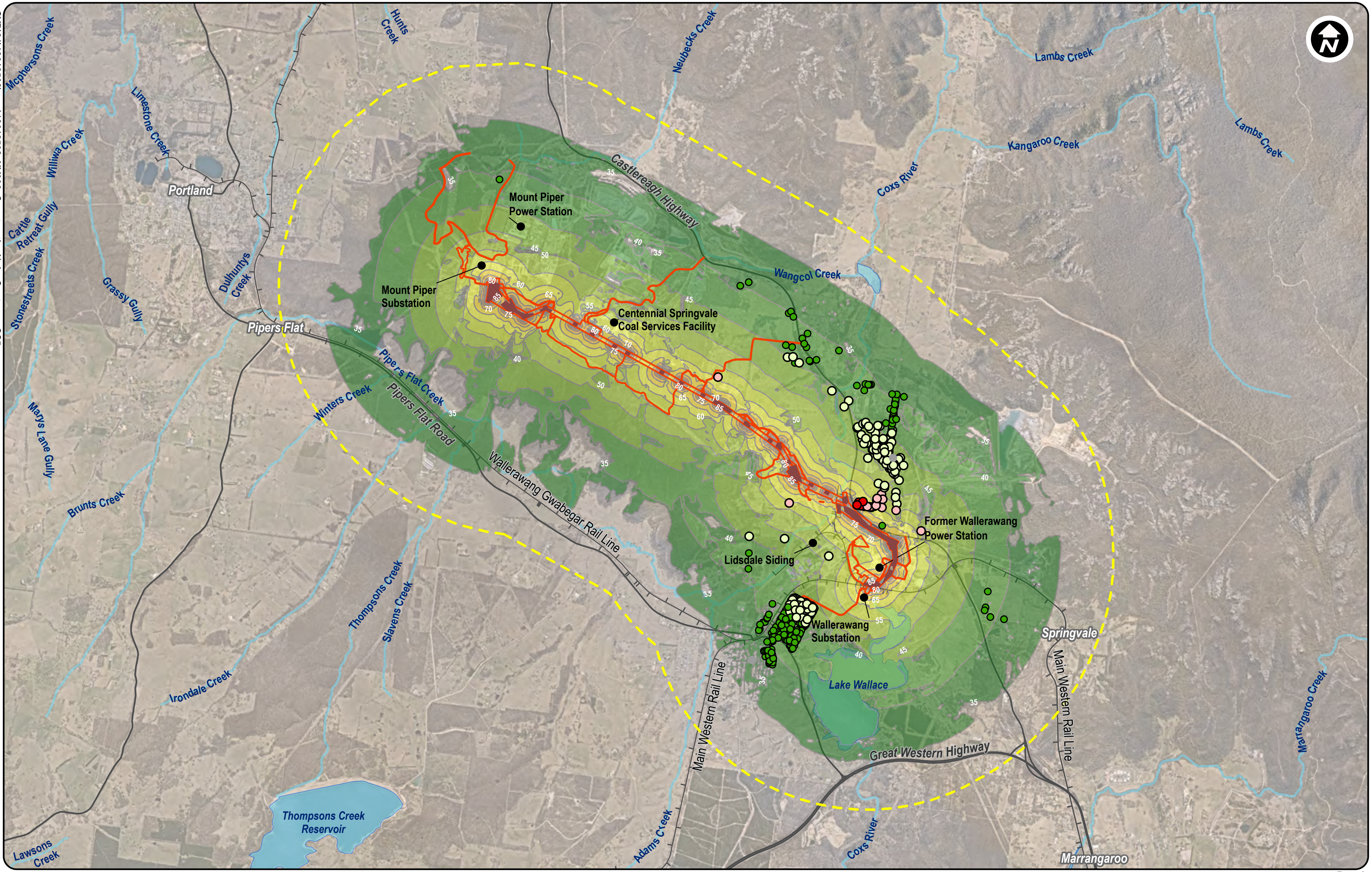
- Railway
- Roads
- Watercourse

Out of hours, Day (CS04)
- 1 dBA to 5 dBA above NML
- 5 dBA to 15 dBA above NML
- 15 dBA to 25 dBA above NML
- More than 25 dBA above NML

Construction noise contours
Vegetation clearing (CS04)
35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

Rev: A
Date: 3/06/2025
1:65,000 @ A4
0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV006_ConstructionNoiseContours_CS5



Project components

- Project footprint
- Study area
- Earthworks & civil works (CS05)
- Railway
- Roads
- Watercourse

Out of hours, Day (CS05)

- 1 dBA to 5 dBA above NML
- 5 dBA to 15 dBA above NML
- 15 dBA to 25 dBA above NML
- More than 25 dBA above NML

Construction noise contours
Earthworks & civil works (CS05)

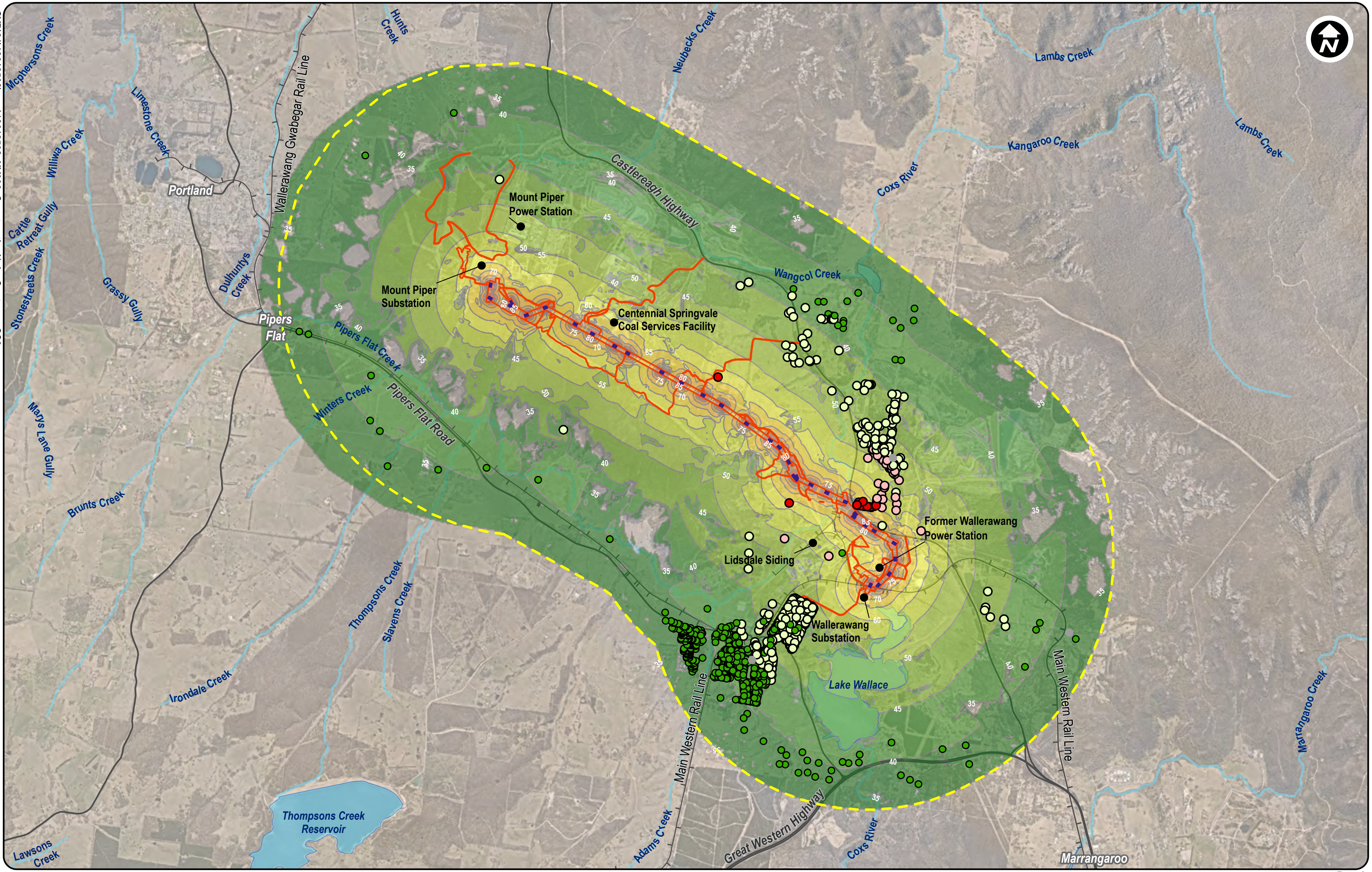
35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

Rev: A
Date: 3/06/2025
1:65,000 @ A4

0 500 1,000
Metres

Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV006_ConstructionNoiseContours_CS6



Project components

Project footprint

Study area

Tower footing construction (Impact Piling) (CS06)

Railway

Roads

Watercourse

Out of hours, Day (CS06)

- 1 dBA to 5 dBA above NML
- 5 dBA to 15 dBA above NML
- 15 dBA to 25 dBA above NML
- More than 25 dBA above NML

Construction noise contours

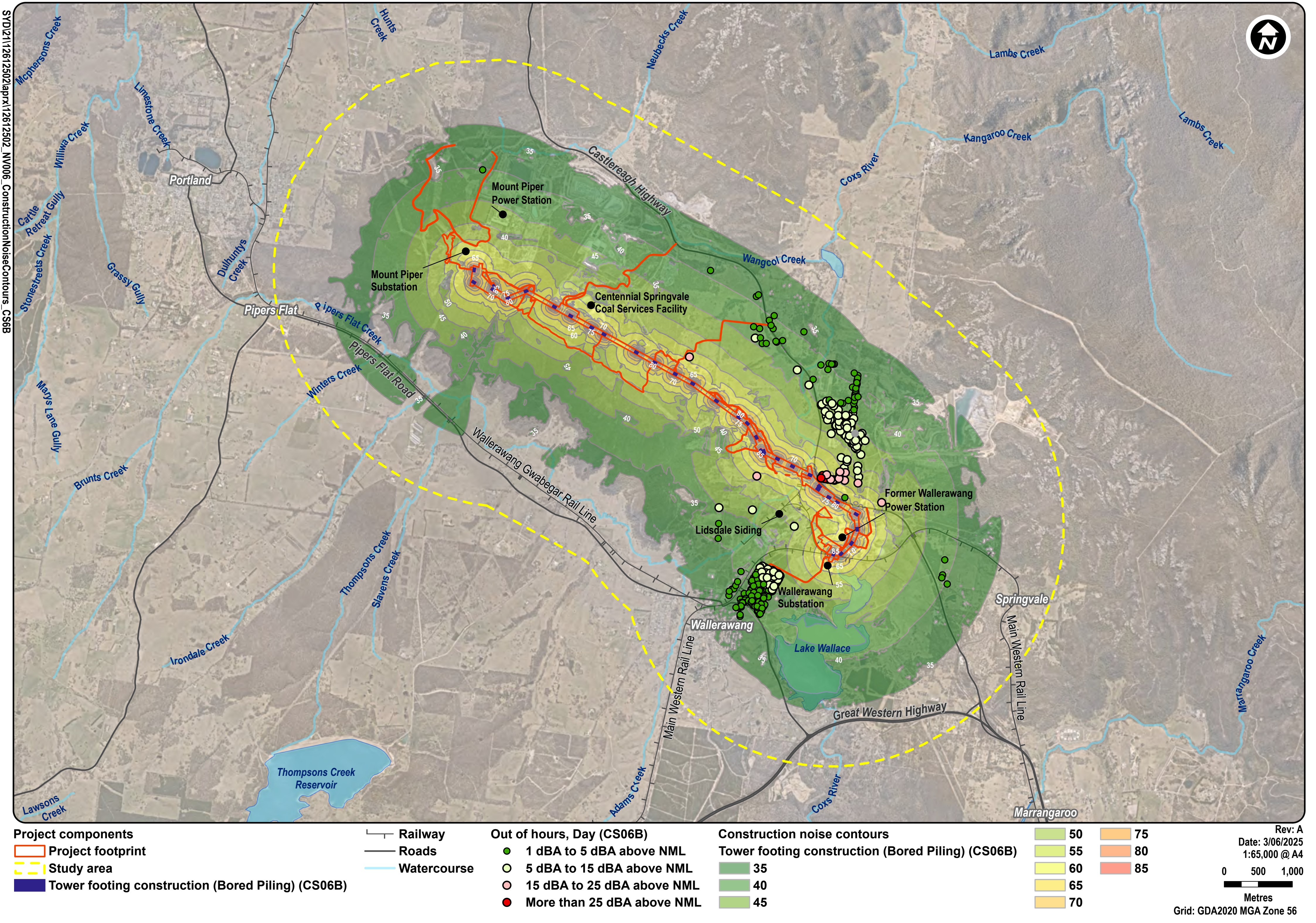
Tower footing construction (Impact Piling) (CS06)

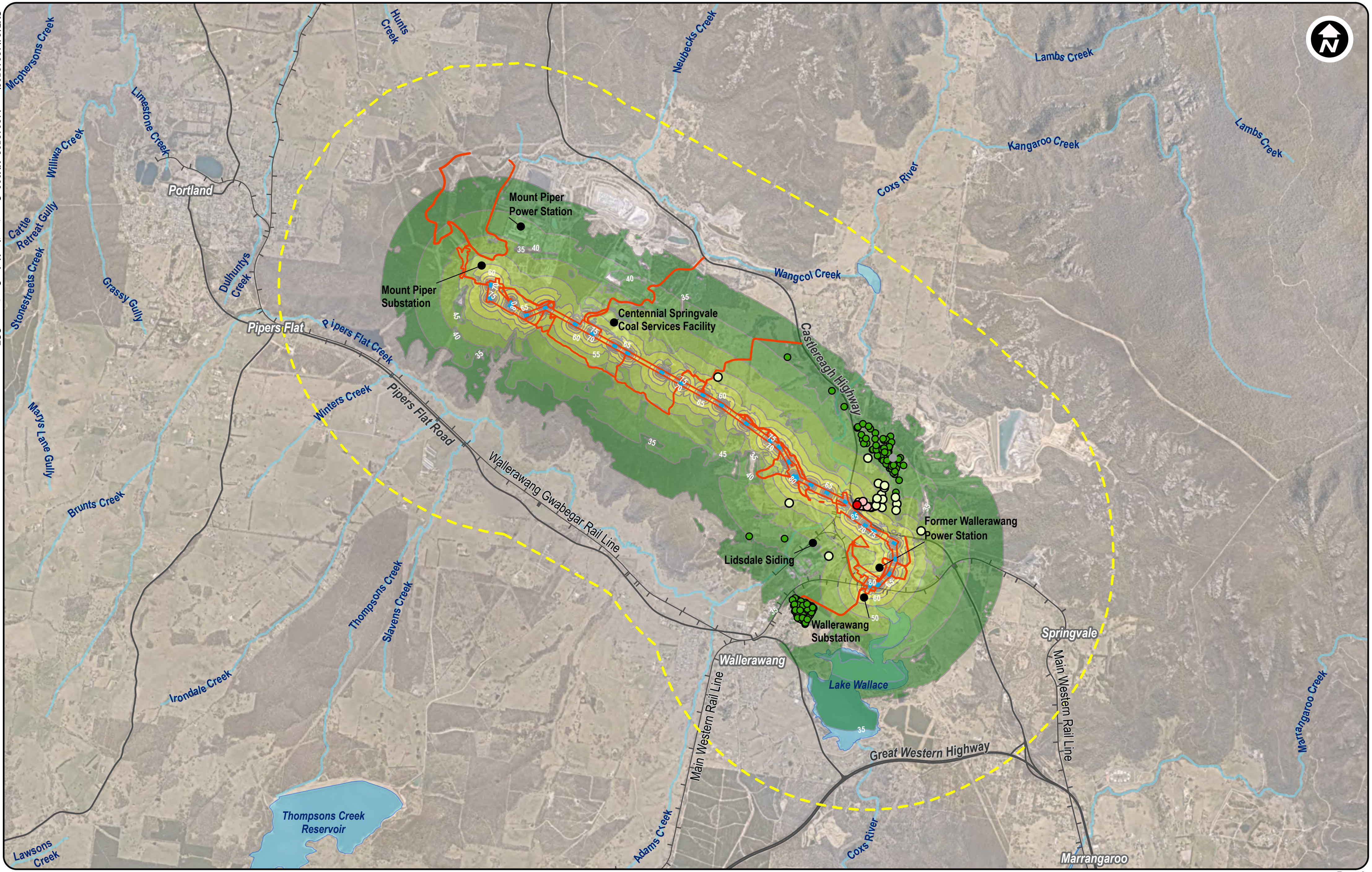
35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

Rev: A
Date: 3/06/2025
1:65,000 @ A4

0 500 1,000
Metres

Grid: GDA2020 MGA Zone 56


SYD\21\12612502\aprx\12612502_NV006_ConstructionNoiseContours_CS6B
Portland
Pipers Flat
Mount Piper Power Station
Mount Piper Substation
Centennial Springvale Coal Services Facility
Former Wallerawang Power Station
Lidsdale Siding
Wallerawang Substation
Wallerawang
Lake Wallace
Springvale
Marrangaroo
Thompsons Creek Reservoir
Castlereagh Highway
Great Western Highway
Pipers Flat Road
Wallerawang Gwabegar Rail Line
Main Western Rail Line
Mcphersons Creek
Hunts Creek
Neubecks Creek
Lambs Creek
Kangaroo Creek
Coxs River
Wangcol Creek
Limestone Creek
Williwa Creek
Cattle Retreat Gully
Stonestreets Creek
Grassy Gully
Dulhuntys Creek
Pipers Flat Creek
Winters Creek
Marys Lane Gully
Brunts Creek
Thompsons Creek
Slavens Creek
Irondale Creek
Adams Creek
Lawsons Creek
Marrangaroo Creek
Project components
Project footprint
Study area
Tower footing construction (Bored Piling) (CS06B)
Railway
Roads
Watercourse
Out of hours, Day (CS06B)
1 dBA to 5 dBA above NML
5 dBA to 15 dBA above NML
15 dBA to 25 dBA above NML
More than 25 dBA above NML
Construction noise contours
Tower footing construction (Bored Piling) (CS06B)
35
40
45
50
55
60
65
70
75
80
85
Rev: A
Date: 3/06/2025
1:65,000 @ A4
0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56



SYD\21\12612502\aprx\12612502_NV006_ConstructionNoiseContours_CS7

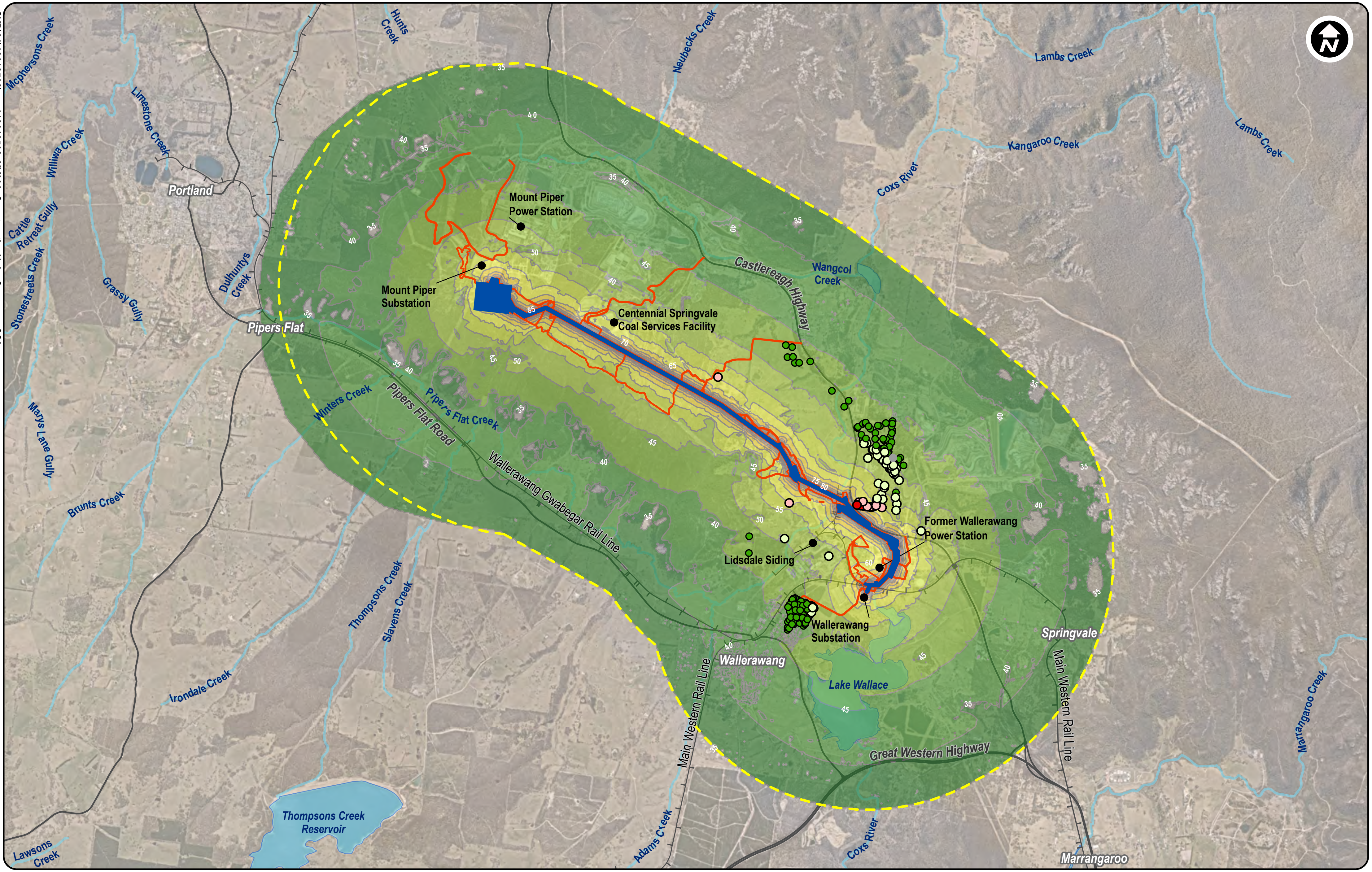
Project components
- Project footprint
- Study area
- Tower assembly and erection (CS07)

- Railway
- Roads
- Watercourse

Out of hours, Day (CS07)
- 1 dBA to 5 dBA above NML
- 5 dBA to 15 dBA above NML
- 15 dBA to 25 dBA above NML
- More than 25 dBA above NML

Construction noise contours
Tower assembly and erection (CS07)
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75
- 80
- 85

Rev: A
Date: 3/06/2025
1:65,000 @ A4
0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56



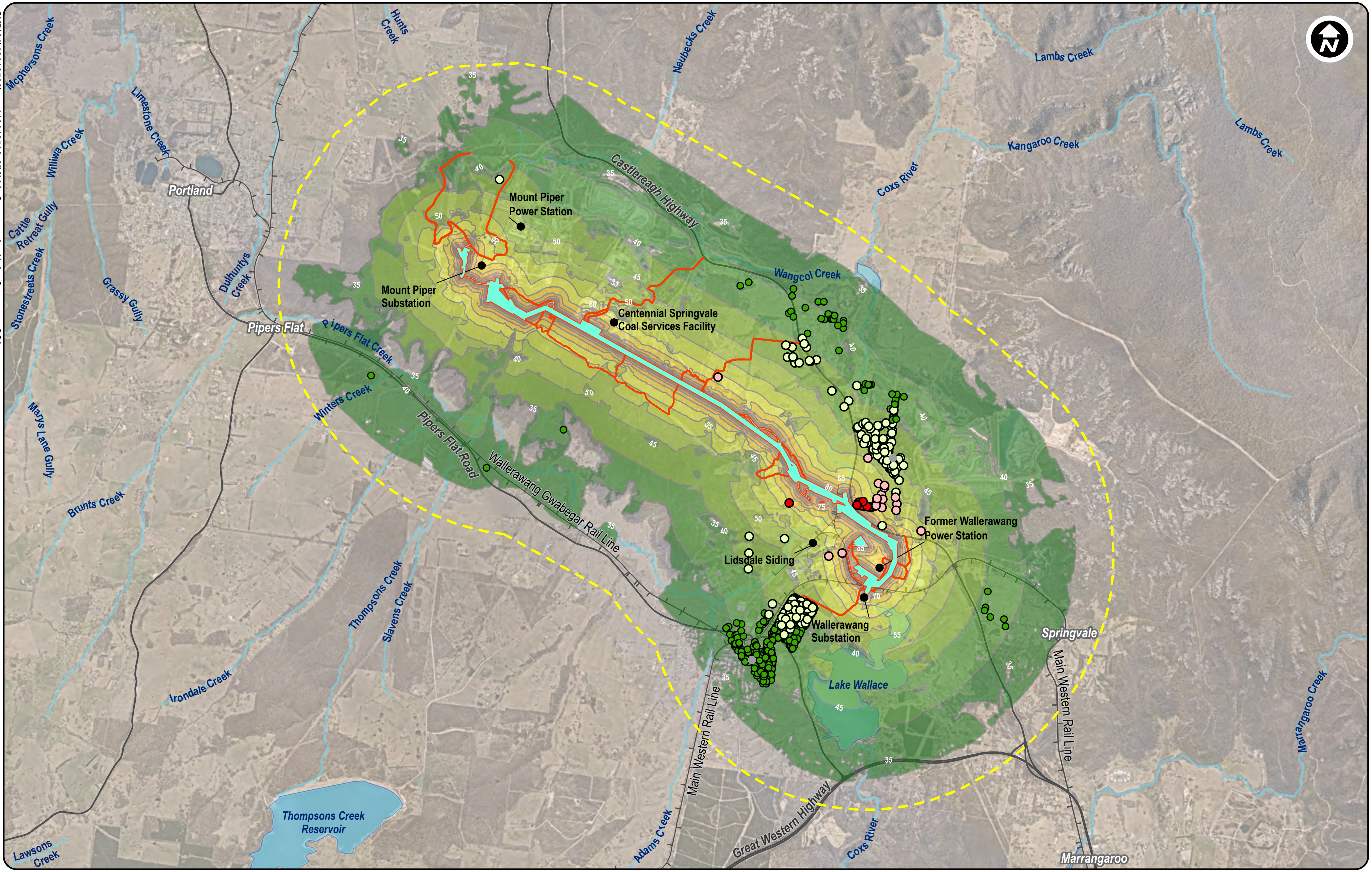
Project components
- Project footprint
- Study area
- Stringing transmission lin (CS08)

- Railway
- Roads
- Watercourse

Out of hours, Day (CS08)
- 1 dBA to 5 dBA above NML
- 5 dBA to 15 dBA above NML
- 15 dBA to 25 dBA above NML
- More than 25 dBA above NML

Construction noise contours Stringing transmission line (CS08)
35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

Rev: A
Date: 3/06/2025
1:65,000 @ A4
0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56



SYD\21\12612502\aprx\12612502_NV006_ConstructionNoiseContours_CS9

Project footprint
Study area
Demolition / rehabilitation (CS09)

Railway
Roads
Watercourse

Out of hours, Day (CS09)
- 1 dBA to 5 dBA above NML
- 5 dBA to 15 dBA above NML
- 15 dBA to 25 dBA above NML
- More than 25 dBA above NML

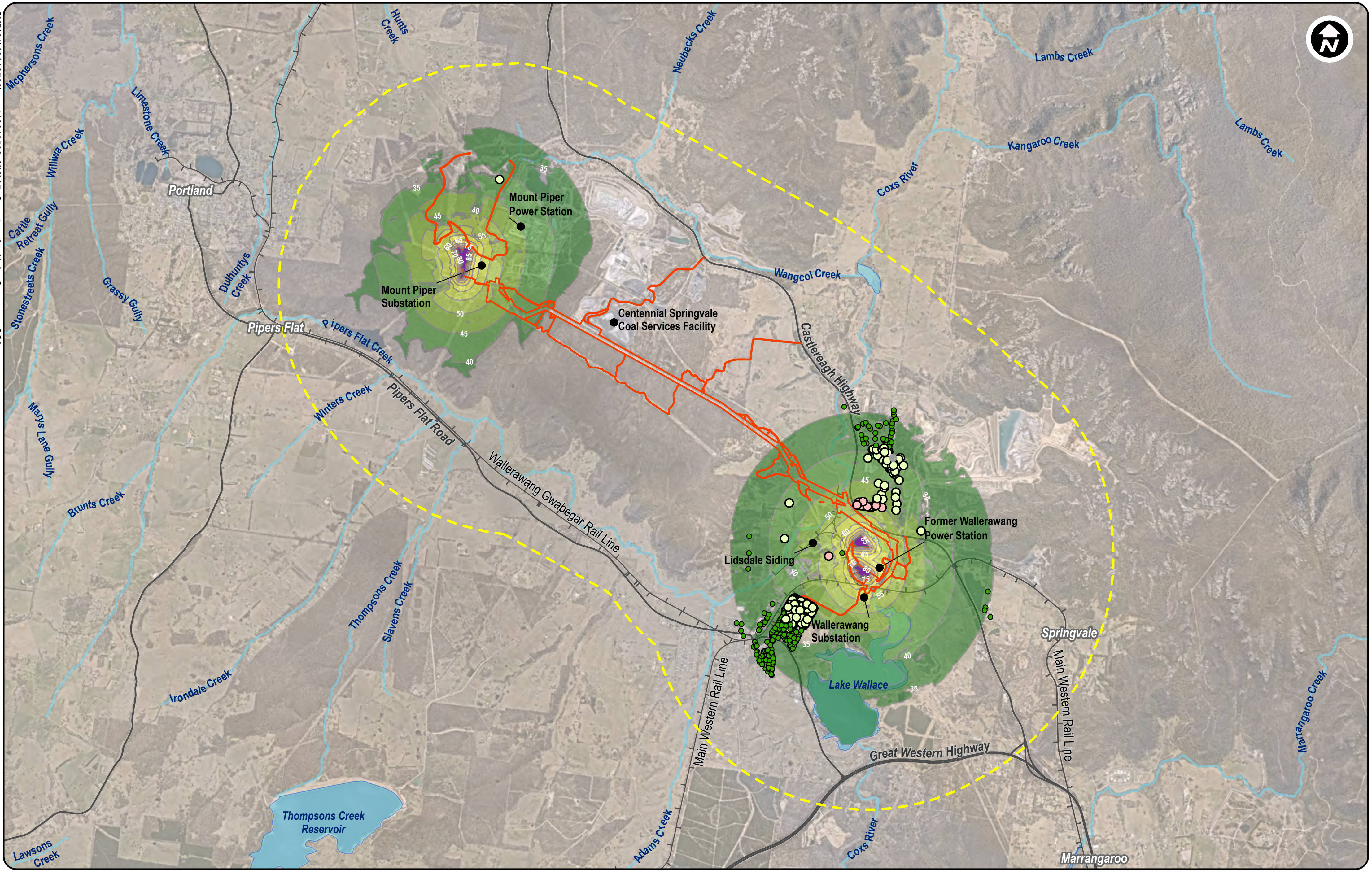
Construction noise contours Demolition / rehabilitation (CS09)
35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

Rev: A
Date: 3/06/2025
1:65,000 @ A4

0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56

Appendix E

Construction noise contours – OOHW evening/night



Project components

- Project footprint
- Study area
- Construction compounds / laydown (CS02)
- Railway
- Roads
- Watercourse

Out of hours, Night (CS02)

- 1 dBA to 5 dBA above NML
- 5 dBA to 15 dBA above NML
- 15 dBA to 25 dBA above NML

Construction noise contours

Construction compounds / laydown (CS02)

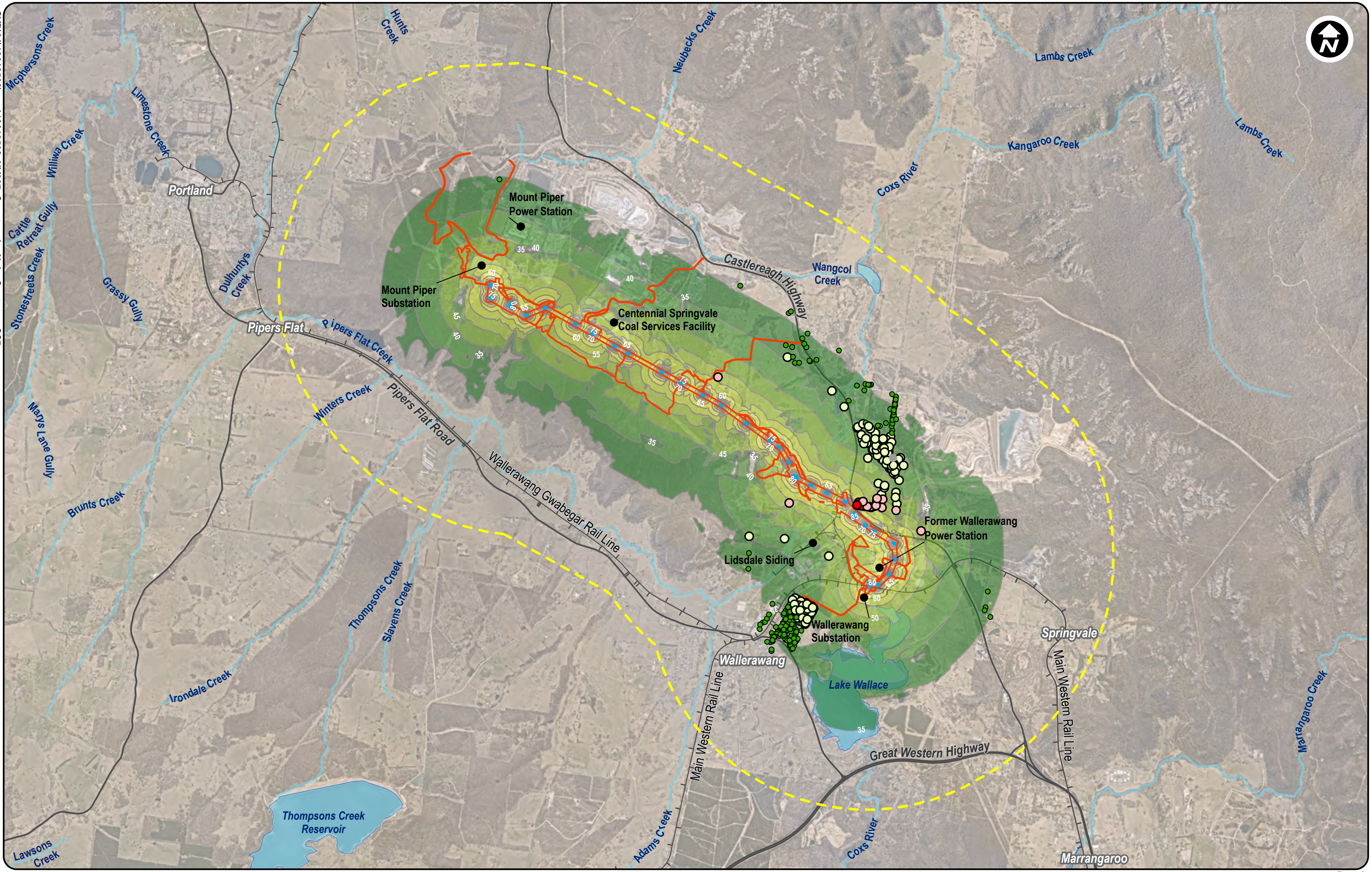
35
40
45
50
55
60
65
70
75
80
85

Rev: A
Date: 3/06/2025
1:65,000 @ A4

0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV007_ConstructionNoiseContours_CS2

SYD\21\12612502\aprx\12612502_NV007_ConstructionNoiseContours_CS7



Project components

- Project footprint
- Study area
- Tower assembly and erection (CS07)
- Railway
- Roads
- Watercourse

Out of hours, Night (CS07)

- 1 dBA to 5 dBA above NML
- 5 dBA to 15 dBA above NML
- 15 dBA to 25 dBA above NML
- More than 25 dBA above NML

Construction noise contours

Tower assembly and erection (CS07)

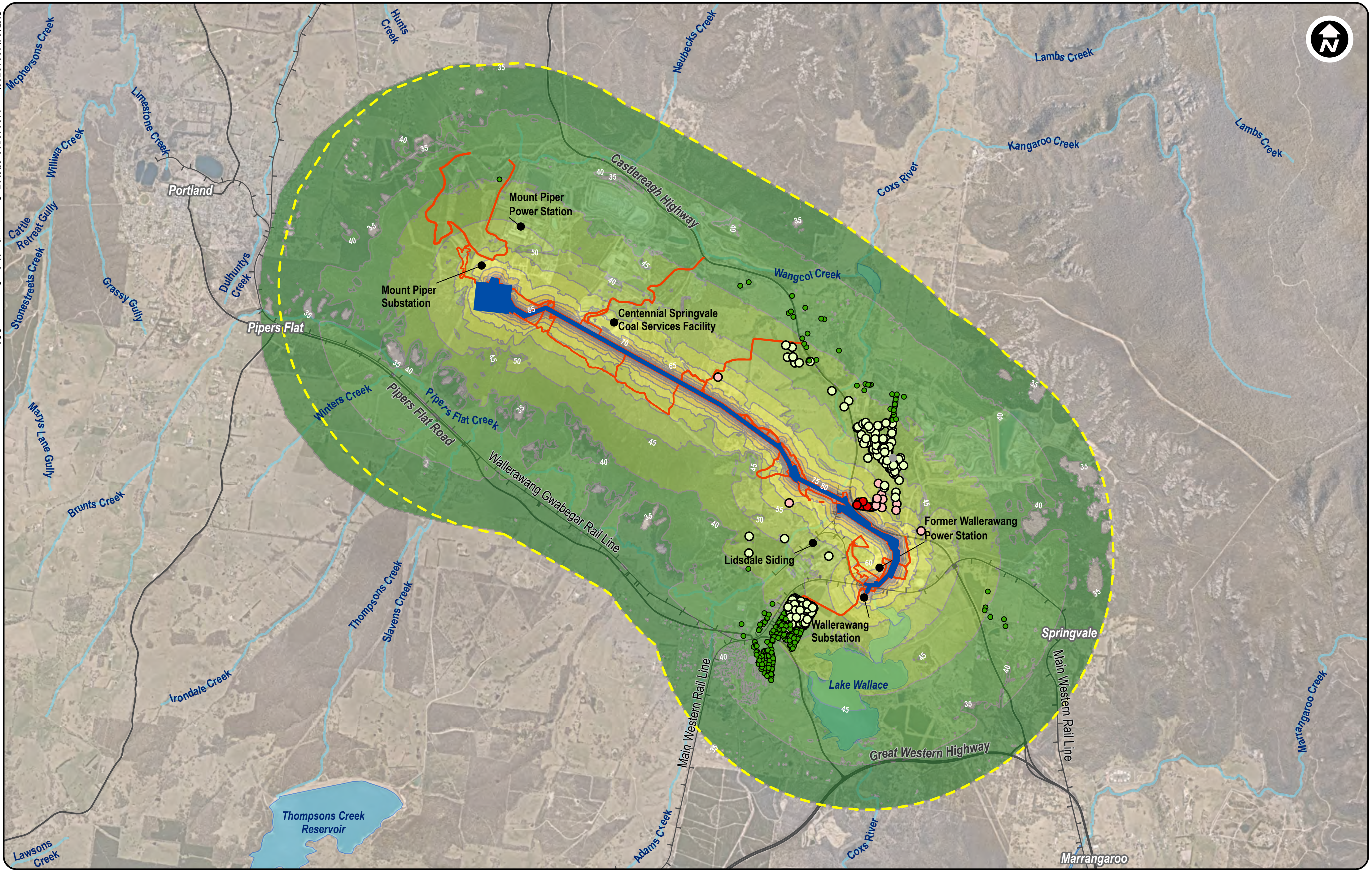
35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

Rev: A
Date: 3/06/2025
1:65,000 @ A4

0 500 1,000
Metres

Grid: GDA2020 MGA Zone 56

SYD\21\12612502\aprx\12612502_NV007_ConstructionNoiseContours_CS8



Project components
Project footprint
Study area

Railway
Roads
Watercourse
Stringing transmission lin (CS08)

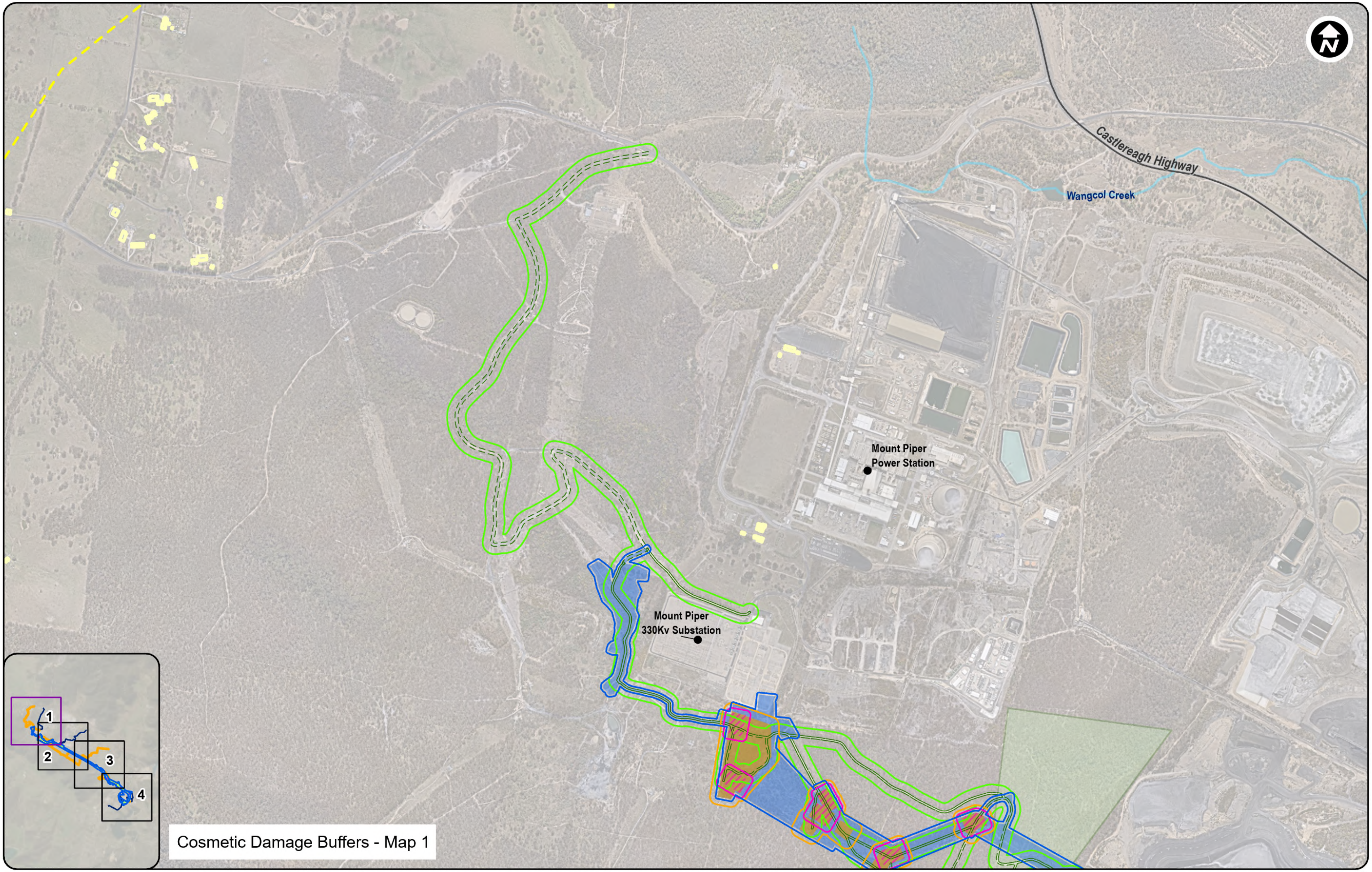
Out of hours, Night (CS08)
1 dBA to 5 dBA above NML
5 dBA to 15 dBA above NML
15 dBA to 25 dBA above NML
More than 25 dBA above NML

Construction noise contours
Stringing transmission line (CS08)
35
40
45
50
55
60
65
70
75
80
85

Rev: A
Date: 3/06/2025
1:65,000 @ A4
0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56

Appendix F

Construction vibration buffers

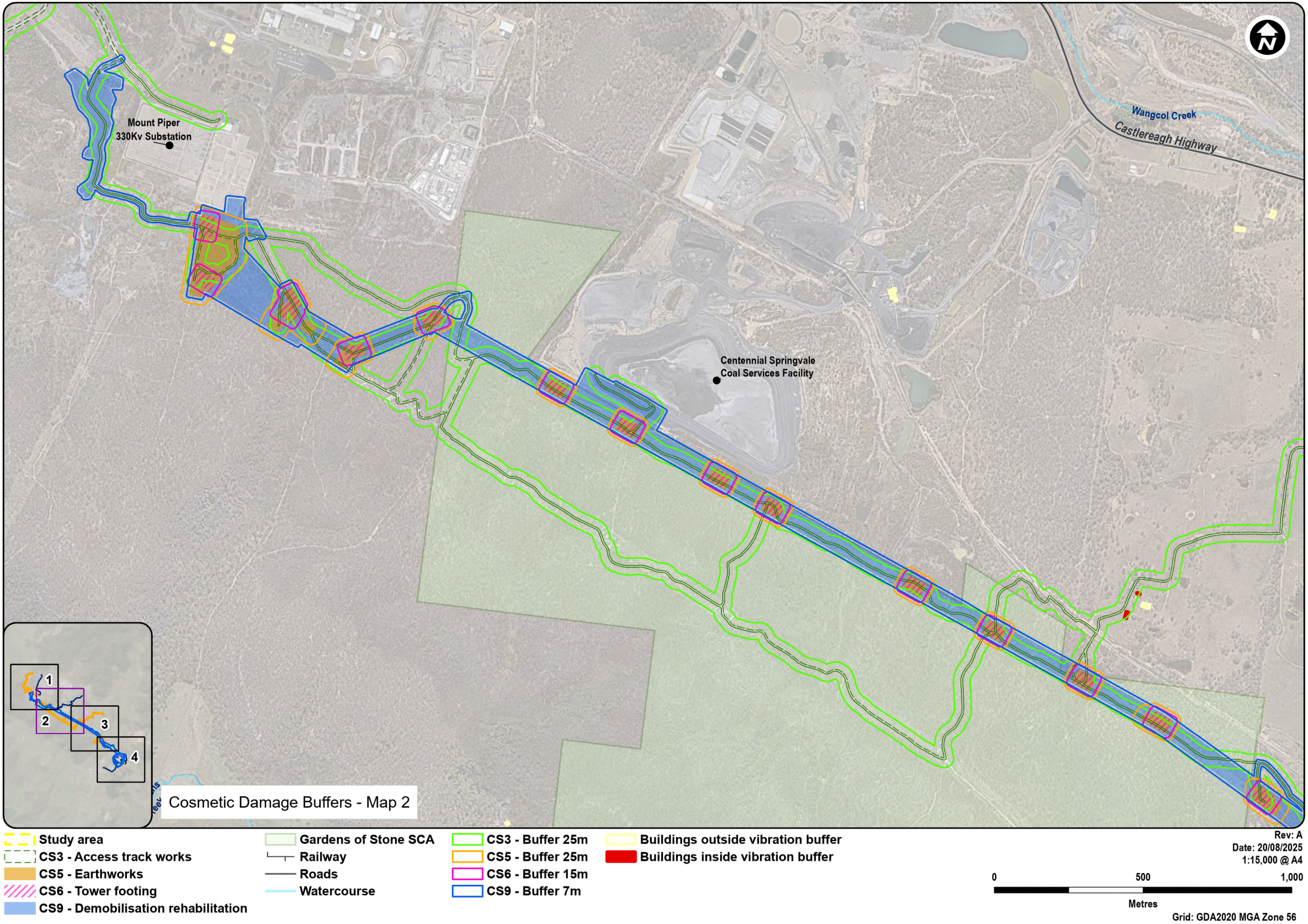


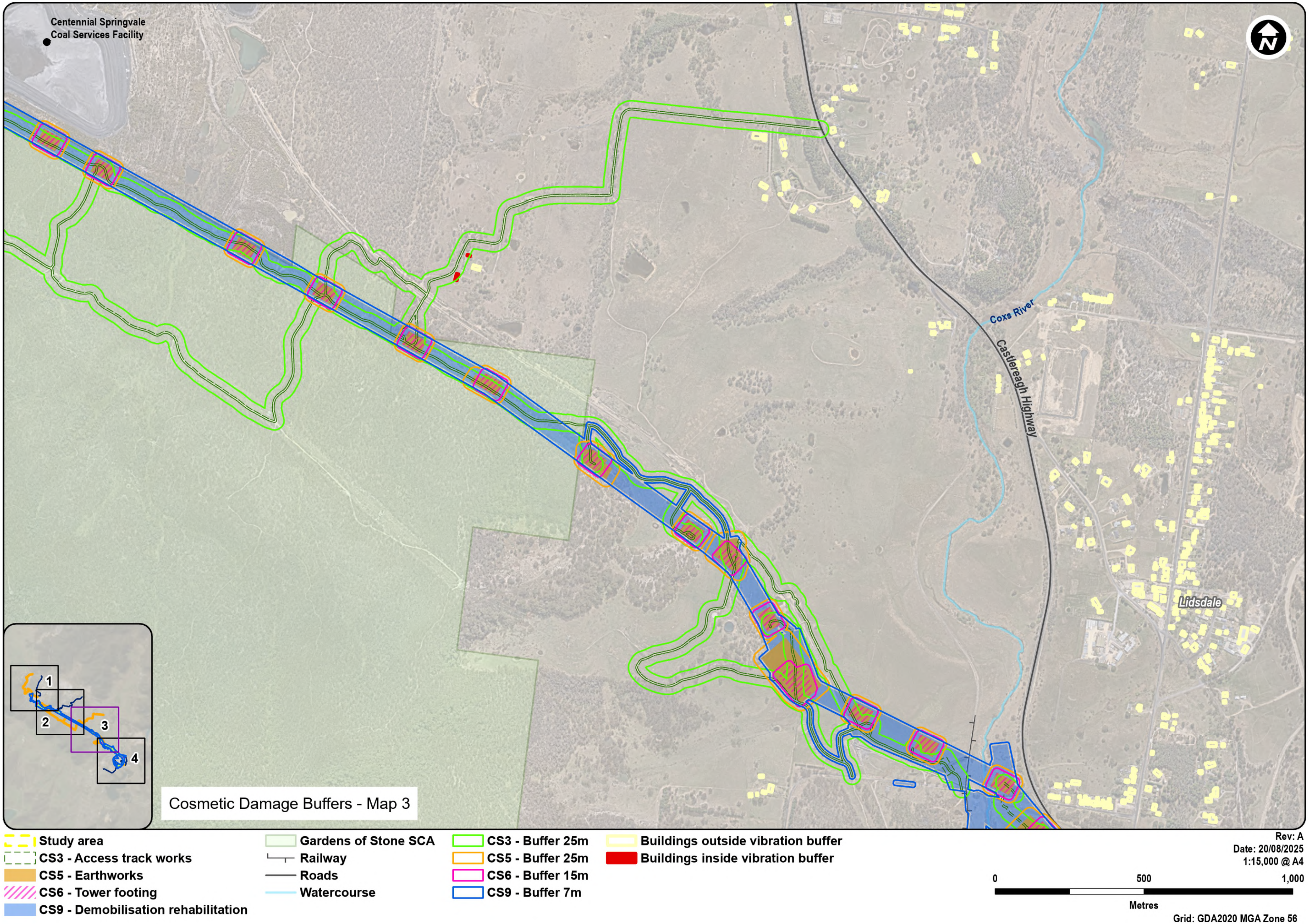
Study area
CS3 - Access track works
CS5 - Earthworks
CS6 - Tower footing
CS9 - Demobilisation rehabilitation
Gardens of Stone SCA
Roads
Watercourse
CS3 - Buffer 25m
CS5 - Buffer 25m
CS6 - Buffer 15m
CS9 - Buffer 7m
Buildings outside vibration buffer

Rev: A
Date: 20/08/2025
1:15,000 @ A4

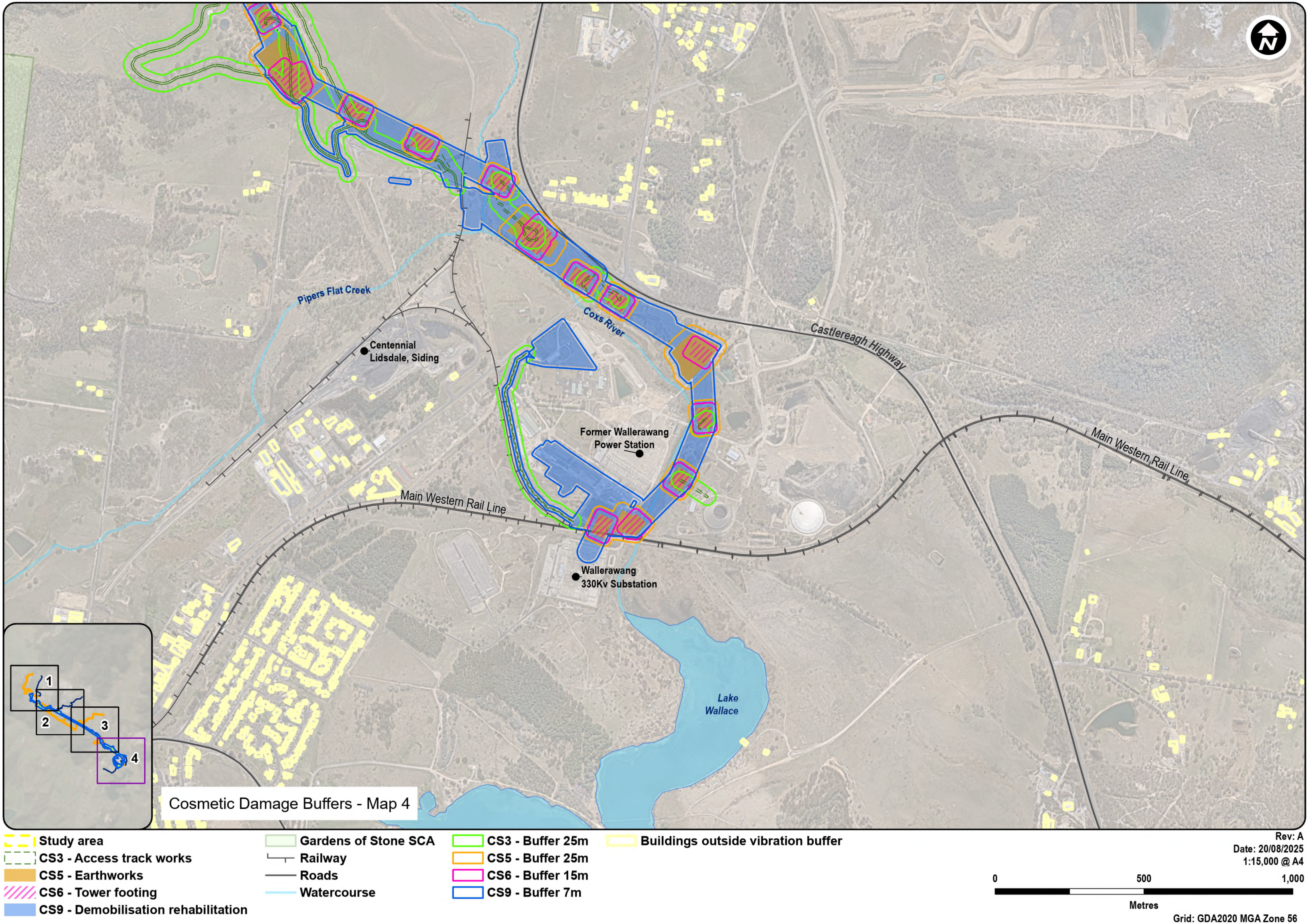
0 500 1,000
Metres

Grid: GDA2020 MGA Zone 56

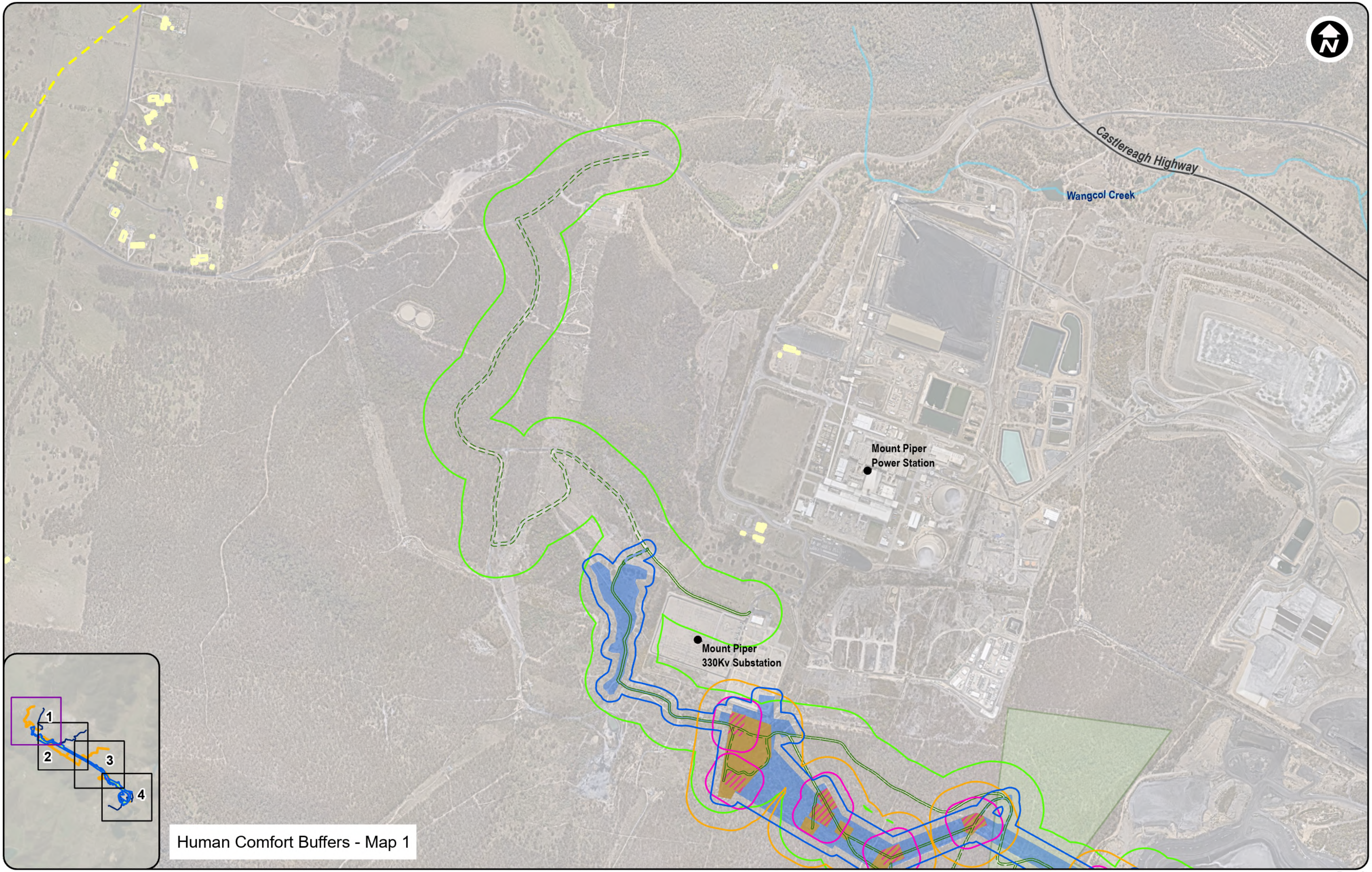

Cosmetic Damage Buffers - Map 2
Mount Piper
330Kv Substation
Centennial Springvale
Coal Services Facility
Wangcol Creek
Castlereagh Highway
1
2
3
4
Study area
CS3 - Access track works
CS5 - Earthworks
CS6 - Tower footing
CS9 - Demobilisation rehabilitation
Gardens of Stone SCA
Railway
Roads
Watercourse
CS3 - Buffer 25m
CS5 - Buffer 25m
CS6 - Buffer 15m
CS9 - Buffer 7m
Buildings outside vibration buffer
Buildings inside vibration buffer
Rev: A
Date: 20/08/2025
1:15,000 @ A4
0
500
1,000
Metres
Grid: GDA2020 MGA Zone 56



Centennial Springvale
Coal Services Facility
Coxs River
Castlereagh Highway
Lidsdale
1
2
3
4
Cosmetic Damage Buffers - Map 3
Study area
CS3 - Access track works
CS5 - Earthworks
CS6 - Tower footing
CS9 - Demobilisation rehabilitation
Gardens of Stone SCA
Railway
Roads
Watercourse
CS3 - Buffer 25m
CS5 - Buffer 25m
CS6 - Buffer 15m
CS9 - Buffer 7m
Buildings outside vibration buffer
Buildings inside vibration buffer
Rev: A
Date: 20/08/2025
1:15,000 @ A4
0
500
1,000
Metres
Grid: GDA2020 MGA Zone 56



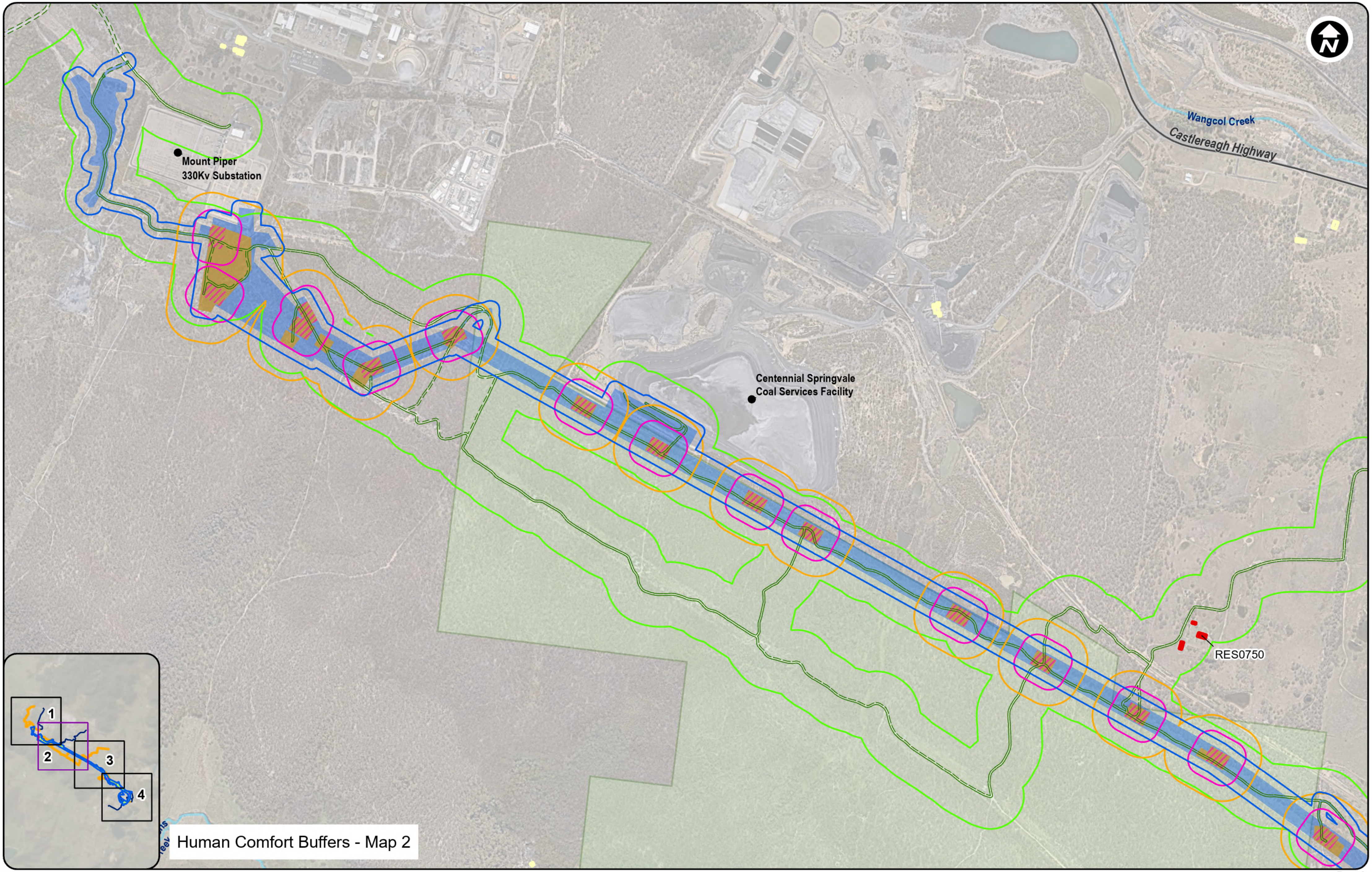
Pipers Flat Creek
Coxs River
Castlereagh Highway
Centennial
Lidsdale, Siding
Former Wallerawang
Power Station
Main Western Rail Line
Main Western Rail Line
Wallerawang
330Kv Substation
Lake
Wallace
1
2
3
4
Cosmetic Damage Buffers - Map 4
Study area
CS3 - Access track works
CS5 - Earthworks
CS6 - Tower footing
CS9 - Demobilisation rehabilitation
Gardens of Stone SCA
Railway
Roads
Watercourse
CS3 - Buffer 25m
CS5 - Buffer 25m
CS6 - Buffer 15m
CS9 - Buffer 7m
Buildings outside vibration buffer
Rev: A
Date: 20/08/2025
1:15,000 @ A4
0
500
1,000
Metres
Grid: GDA2020 MGA Zone 56



Study area
CS3 - Access track works
CS5 - Earthworks
CS6 - Tower footing
CS9 - Demobilisation rehabilitation
Gardens of Stone SCA
Roads
Watercourse
CS3 - Buffer 100m
CS6 - Buffer 50m
CS5 - Buffer 100m
CS9 - Buffer 23m
Buildings outside vibration buffer

Rev: A
Date: 20/08/2025
1:15,000 @ A4

0 500 1,000
Metres
Grid: GDA2020 MGA Zone 56

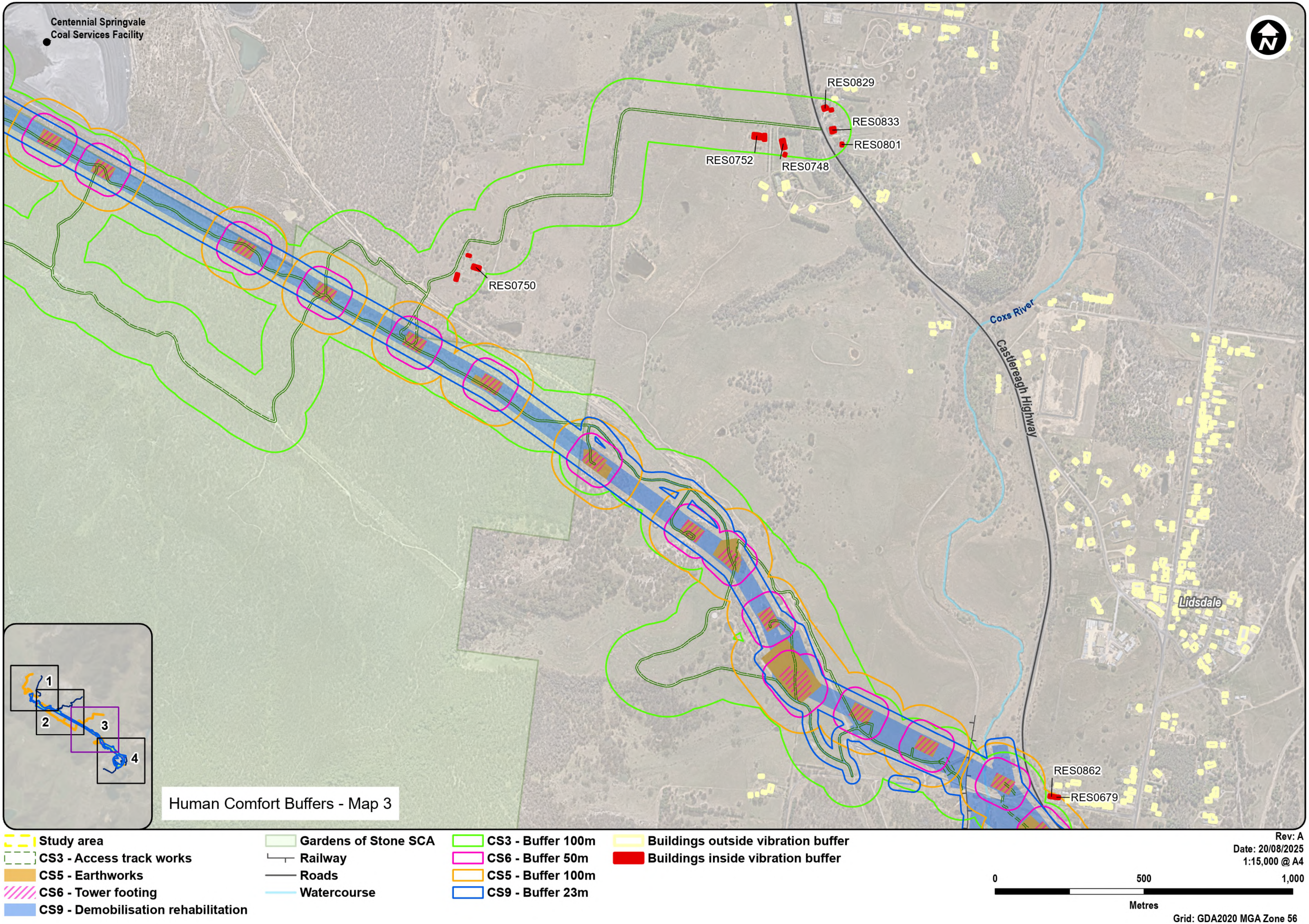


Study area
CS3 - Access track works
CS5 - Earthworks
CS6 - Tower footing
CS9 - Demobilisation rehabilitation
Gardens of Stone SCA
Railway
Roads
Watercourse
CS3 - Buffer 100m
CS6 - Buffer 50m
CS5 - Buffer 100m
CS9 - Buffer 23m
Buildings outside vibration buffer
Buildings inside vibration buffer

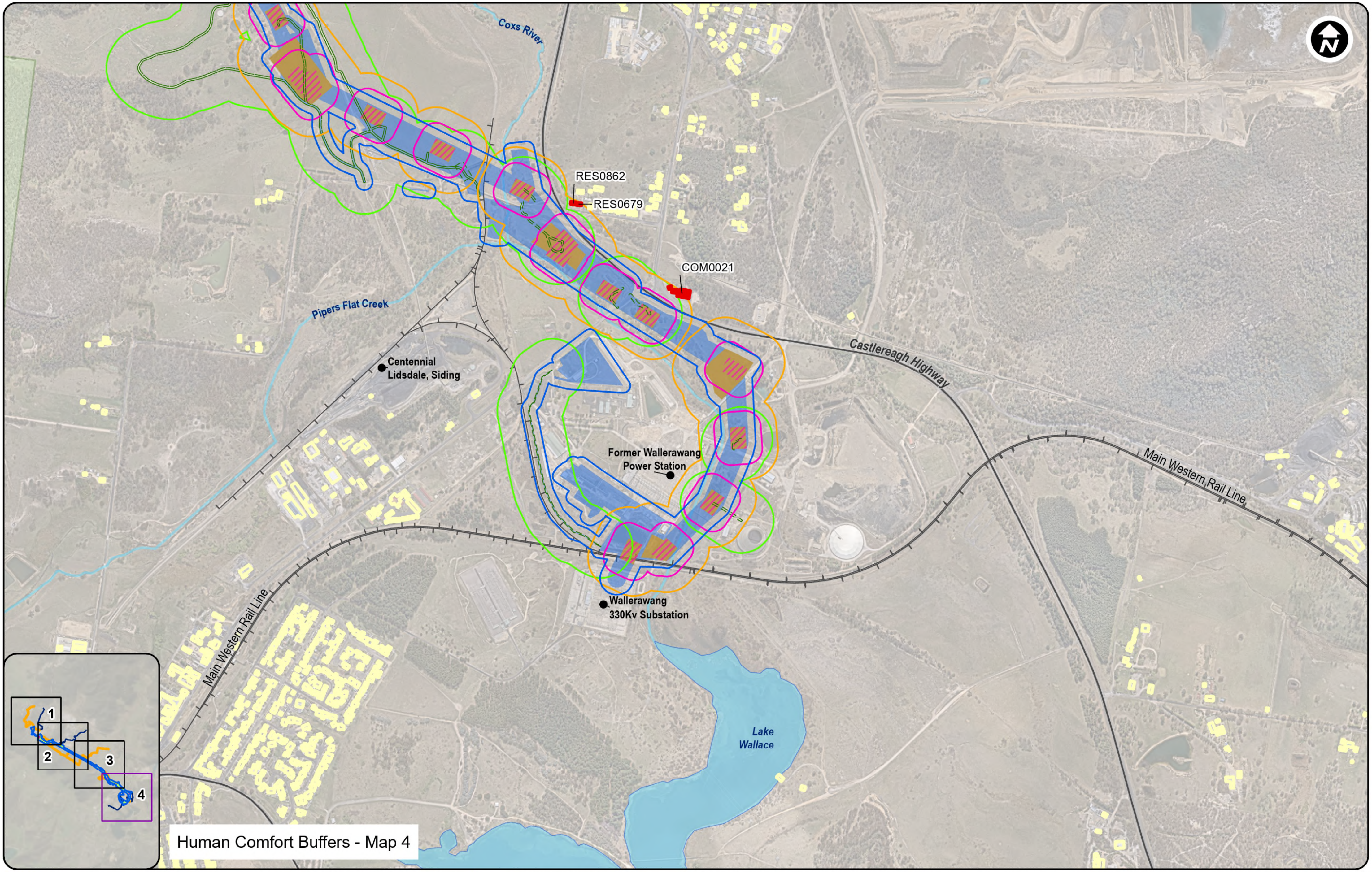
Rev: A
Date: 20/08/2025
1:15,000 @ A4

0 500 1,000
Metres

Grid: GDA2020 MGA Zone 56



Centennial Springvale Coal Services Facility
RES0829
RES0833
RES0801
RES0752
RES0748
RES0750
Coxs River
Castlereagh Highway
Lidsdale
RES0862
RES0679
1
2
3
4
Human Comfort Buffers - Map 3
Study area
CS3 - Access track works
CS5 - Earthworks
CS6 - Tower footing
CS9 - Demobilisation rehabilitation
Gardens of Stone SCA
Railway
Roads
Watercourse
CS3 - Buffer 100m
CS6 - Buffer 50m
CS5 - Buffer 100m
CS9 - Buffer 23m
Buildings outside vibration buffer
Buildings inside vibration buffer
Rev: A
Date: 20/08/2025
1:15,000 @ A4
0
500
1,000
Metres
Grid: GDA2020 MGA Zone 56



Study area
CS3 - Access track works
CS5 - Earthworks
CS6 - Tower footing
CS9 - Demobilisation rehabilitation
Gardens of Stone SCA
Railway
Roads
Watercourse
CS3 - Buffer 100m
CS6 - Buffer 50m
CS5 - Buffer 100m
CS9 - Buffer 23m
Buildings outside vibration buffer
Buildings inside vibration buffer

Rev: A
Date: 20/08/2025
1:15,000 @ A4

0 500 1,000
Metres

Grid: GDA2020 MGA Zone 56

Appendix G

Construction noise level tables

*Receiver locations are shown on maps in Appendix B

Key to cell formatting: ## > CNML Day ## > Highly affected level ## > CNML Evening/Night

Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment	Construction compounds / laydown areas	Access track upgrades	Vegetation clearing	Earthworks & civil works	Tower footing construction (Impact Piling)	Tower footing construction (Bored Piling)	Tower assembly and erection	Stringing transmission line	Demolition / rehabilitation	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
			CS01	CS02	CS03	CS04	CS05	CS06	CS06B	CS07	CS08	CS09						
ACT0002	228182	6299198	41	38	44	46	45	51	44	39	41	47	65	65	65	65	-	ACT
ACT0003	229575	6300466	48	42	53	53	52	57	51	46	48	54	65	65	65	65	-	ACT
ACT0005	228859	6302413	38	35	43	44	42	47	41	36	38	45	65	65	65	65	-	ACT
ACT0006	226909	6299182	35	34	40	39	38	43	37	32	34	40	65	65	65	65	-	ACT
IND0001	223758	6304989	45	45	53	59	48	53	46	42	44	51	75	75	75	75	-	IND
IND0003	228737	6300253	62	62	66	68	66	71	65	60	62	69	75	75	75	75	-	IND
IND0028	229025	6300773	60	50	57	66	65	69	63	58	62	67	75	75	75	75	-	IND
PAS0001	227230	6299555	38	38	44	42	41	47	40	35	37	45	60	60	60	60	-	PAS
PAS0003	228817	6298975	43	40	46	48	46	51	45	40	43	49	60	60	60	60	-	PAS
PAS0004	224745	6300549	29	24	35	34	33	39	32	27	29	34	60	60	60	60	-	PAS
PAS0005	226764	6304369	35	23	47	47	39	44	38	33	35	41	60	60	60	60	-	PAS
PAS0006	227684	6299023	38	37	42	43	42	47	41	36	38	44	60	60	60	60	-	PAS
PAS0007	227962	6298765	38	37	43	44	42	47	41	36	39	45	60	60	60	60	-	PAS
PAS0008	228862	6302375	39	35	43	44	42	48	41	37	39	45	60	60	60	60	-	PAS
PLA0001	226856	6299169	34	34	39	39	37	43	36	32	34	40	55	55	55	55	-	PLA
PLA0003	228220	6300456	59	59	75	65	55	60	54	49	50	76	55	55	55	55	-	PLA
ACT0001	227095	6299161	37	37	43	42	41	47	40	35	37	43	65	65	65	65	-	ACT
ACT0004	226902	6299637	38	37	43	42	41	47	40	35	37	44	65	65	65	65	-	ACT
CMU0001	227153	6299527	39	37	43	44	42	48	41	36	38	44	55	55	55	55	-	CMU
CMU0002	227035	6299212	37	37	42	42	41	47	40	35	37	43	55	55	55	55	-	CMU
COM0001	227185	6299592	40	39	45	44	43	49	42	37	39	46	70	70	70	70	-	COM
COM0002	227136	6299479	37	37	43	42	40	46	39	35	36	44	70	70	70	70	-	COM
COM0003	227207	6299620	40	39	45	45	43	49	42	37	39	46	70	70	70	70	-	COM
COM0004	227114	6299549	39	38	44	43	42	48	41	36	38	44	70	70	70	70	-	COM
COM0005	227096	6299435	38	38	44	43	42	48	41	36	38	44	70	70	70	70	-	COM
COM0006	227261	6299687	41	40	46	44	42	48	41	36	37	47	70	70	70	70	-	COM
COM0007	227092	6299408	38	38	44	43	42	48	41	36	38	44	70	70	70	70	-	COM
COM0008	226812	6299299	36	36	41	41	39	45	38	33	35	42	70	70	70	70	-	COM
COM0009	226827	6299297	36	36	41	41	40	45	39	33	35	42	70	70	70	70	-	COM
COM0010	226794	6299300	36	35	41	41	39	45	38	33	35	42	70	70	70	70	-	COM
COM0011	227225	6299325	39	38	44	42	41	47	40	35	36	45	70	70	70	70	-	COM
COM0012	226908	6299390	37	37	42	42	40	46	39	34	36	43	70	70	70	70	-	COM
COM0013	226989	6299199	37	36	42	42	40	46	39	34	36	42	70	70	70	70	-	COM
COM0014	226838	6299671	38	37	43	42	40	46	39	34	36	43	70	70	70	70	-	COM
COM0015	226841	6299691	38	37	43	42	40	46	39	34	36	43	70	70	70	70	-	COM
COM0016	226844	6299711	38	37	43	42	41	46	40	35	36	43	70	70	70	70	-	COM
COM0017	227158	6299632	40	39	45	44	43	49	42	37	39	46	70	70	70	70	-	COM
COM0018	227253	6299673	40	40	46	45	44	49	43	38	40	46	70	70	70	70	-	COM
COM0019	227245	6299656	40	40	46	45	43	49	42	37	40	47	70	70	70	70	-	COM
COM0020	227188	6299694	40	40	46	45	43	49	42	37	39	46	70	70	70	70	-	COM
COM0021	228775	6300836	68	56	72	75	72	77	71	66	69	76	70	70	70	70	-	COM
EDU0001	227610	6298513	37	36	41	42	41	46	40	34	37	43	55	55	55	55	-	EDU
EDU0002	227582	6298404	36	35	41	41	40	46	39	34	36	42	55	55	55	55	-	EDU
IND0002	229503	6302215	38	36	42	43	41	47	40	35	37	44	75	75	75	75	-	IND
IND0004	226505	6300160	36	35	42	42	39	45	38	33	35	42	75	75	75	75	-	IND
IND0005	230118	6299004	37	35	43	43	41	47	40	35	37	42	75	75	75	75	-	IND
IND0006	230176	6299068	37	35	43	43	41	47	40	35	37	42	75	75	75	75	-	IND
IND0007	230129	6299164	38	36	43	43	42	48	41	36	38	43	75	75	75	75	-	IND
IND0008	230238	6298985	37	34	42	42	40	46	39	34	36	42	75	75	75	75	-	IND
IND0009	230101	6299005	38	35	43	43	41	47	40	35	37	43	75	75	75	75	-	IND
IND0010	230102	6299030	38	35	43	43	41	47	40	35	37	43	75	75	75	75	-	IND
IND0011	230108	6299112	38	35	43	43	42	47	41	36	37	43	75	75	75	75	-	IND
IND0012	227698	6300357	48	47	55	53	49	55	48	43	46	55	75	75	75	75	-	IND
IND0013	227562	6300177	46	45	52	50	48	53	47	42	44	53	75	75	75	75	-	IND
IND0014	227377	6299948	43	42	49	47	45	51	44	39	42	49	75	75	75	75	-	IND
IND0015	227509	6300279	45	45	51	50	47	52	46	41	43	52	75	75	75	75	-	IND
IND0016	227657	6300251	47	47	53	51	48	54	47	42	44	54	75	75	75	75	-	IND
IND0017	228114	6300513	57	57	67	63	55	60	54	49	50	68	75	75	75	75	-	IND
IND0018	227789	6300306	49	49	56	53	49	55	48	43	46	57	75	75	75	75	-	IND
IND0019	227735	6300340	46	46	54	50	48	53	47	42	45	55	75	75	75	75	-	IND
IND0020	227530	6300150	45	44	51	49	46	52	45	40	43	51	75	75	75	75	-	IND
IND0021	227749	6300226	49	48	55	52	49	55	48	43	45	56	75	75	75	75	-	IND
IND0022	227481	6300238	45	44	51	49	46	52	45	40	43	51	75	75	75	75	-	IND
IND0023	227760	6300352	49	48	55	53	49	55	48	44	46	56	75	75	75	75	-	IND
IND0024	227771	6300296	49	48	55	53	49	55	48	43	45	56	75	75	75	75	-	IND
IND0025	227821	6300272	49	49	56	54	49	55	48	43	45	57	75	75	75	75	-	IND
IND0026	225645	6303944	46	30	51	51	50	56	49	44	46	52	75	75	75	75	-	IND

*Receiver locations are shown on maps in Appendix B

Key to cell formatting: ## > CNML Day ## > Highly affected level ## > CNML Evening/Night

Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment CS01	Construction compounds / laydown areas CS02	Access track upgrades CS03	Vegetation clearing CS04	Earthworks & civil works CS05	Tower footing construction (Impact Piling) CS06	Tower footing construction (Bored Piling) CS06B	Tower assembly and erection CS07	Stringing transmission line CS08	Demolition / rehabilitation CS09	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
IND0027	230911	6300054	35	32	40	40	39	45	38	33	35	40	75	75	75	75	-	IND
OTH0001	227344	6299708	42	41	47	46	45	50	44	39	41	48	70	70	70	70	-	OTH
OTH0002	227350	6299742	42	41	47	46	45	50	44	39	41	48	70	70	70	70	-	OTH
PLA0001	226834	6299168	36	35	41	41	39	45	38	33	35	41	55	55	55	55	-	PLA
PLA0001	226834	6299168	36	35	41	41	39	45	38	33	35	41	55	55	55	55	-	PLA
PLA0002	226658	6298766	33	33	38	38	37	43	36	31	33	39	55	55	55	55	-	PLA
RES0001	226528	6299386	33	33	38	37	36	41	35	30	32	38	45	40	35	35	75	RES
RES0002	227139	6299622	38	37	42	43	40	46	39	34	36	43	45	40	35	35	75	RES
RES0003	227119	6299494	39	38	44	43	42	48	41	36	38	45	45	40	35	35	75	RES
RES0004	227121	6299466	37	37	43	42	40	46	39	34	36	43	45	40	35	35	75	RES
RES0005	226260	6299383	33	32	38	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0006	226281	6299382	31	31	36	36	34	40	33	28	30	37	45	40	35	35	75	RES
RES0007	226211	6299396	33	32	38	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0008	227148	6299499	39	38	44	44	42	48	41	36	38	45	45	40	35	35	75	RES
RES0009	227074	6299401	38	37	44	43	42	47	41	36	38	44	45	40	35	35	75	RES
RES0010	227062	6299384	38	37	43	43	41	47	40	35	37	44	45	40	35	35	75	RES
RES0011	227174	6299546	39	39	45	44	43	48	42	37	38	45	45	40	35	35	75	RES
RES0012	227251	6299751	41	40	46	45	44	50	43	38	40	47	45	40	35	35	75	RES
RES0013	227079	6299464	38	38	44	43	42	48	41	36	38	44	45	40	35	35	75	RES
RES0014	227181	6299558	38	37	43	43	41	46	40	35	37	44	45	40	35	35	75	RES
RES0015	227128	6299506	36	34	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0016	226129	6299341	32	32	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES0017	226257	6299262	33	32	38	37	36	42	35	30	32	38	45	40	35	35	75	RES
RES0018	226162	6299299	32	32	37	37	35	42	35	29	31	37	45	40	35	35	75	RES
RES0019	226269	6299312	31	31	36	35	34	40	33	28	30	37	45	40	35	35	75	RES
RES0020	226213	6299321	33	32	38	37	36	42	35	30	31	38	45	40	35	35	75	RES
RES0021	226533	6299294	34	34	40	39	38	44	37	32	33	40	45	40	35	35	75	RES
RES0022	226257	6299220	33	32	38	37	36	42	35	30	32	38	45	40	35	35	75	RES
RES0023	226115	6299416	32	32	38	38	36	42	35	29	31	37	45	40	35	35	75	RES
RES0024	226186	6299124	32	31	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES0025	226301	6299326	31	31	36	36	34	40	33	28	30	37	45	40	35	35	75	RES
RES0026	226188	6299163	32	32	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES0027	226153	6299253	32	32	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES0028	226454	6299306	34	33	39	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0029	226174	6299228	32	32	37	37	35	42	34	29	31	37	45	40	35	35	75	RES
RES0030	226456	6299270	34	33	39	38	37	43	36	31	32	39	45	40	35	35	75	RES
RES0031	226641	6299393	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0032	226677	6299444	35	34	39	39	37	43	36	31	33	40	45	40	35	35	75	RES
RES0033	226546	6299428	35	34	40	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0034	226644	6299436	36	35	41	39	37	43	36	31	33	41	45	40	35	35	75	RES
RES0035	226608	6299415	35	35	40	40	38	44	37	32	34	41	45	40	35	35	75	RES
RES0036	226772	6299316	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0037	226688	6299323	34	33	39	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0038	226661	6299328	35	35	40	40	38	44	38	32	34	41	45	40	35	35	75	RES
RES0039	226734	6299318	36	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0040	226627	6299332	35	34	40	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0041	226593	6299342	35	34	40	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0042	226848	6299305	36	36	42	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0043	226682	6299241	35	35	40	40	38	44	37	32	34	41	45	40	35	35	75	RES
RES0044	226566	6299282	35	34	40	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0045	226284	6299245	33	32	38	37	36	42	35	30	32	38	45	40	35	35	75	RES
RES0046	226279	6299343	33	33	38	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0047	226201	6299297	33	32	38	37	36	42	35	30	31	38	45	40	35	35	75	RES
RES0048	226460	6299218	32	32	37	36	35	41	34	29	31	37	45	40	35	35	75	RES
RES0049	226224	6299391	33	32	38	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0050	226652	6299232	35	34	40	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0051	226757	6299320	36	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0052	226762	6299280	36	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0053	226742	6299303	35	35	40	39	37	43	36	31	33	40	45	40	35	35	75	RES
RES0054	226470	6299331	34	34	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0055	226212	6299347	33	32	38	37	36	42	35	30	31	38	45	40	35	35	75	RES
RES0056	227023	6299015	35	34	40	39	38	43	37	32	34	40	45	40	35	35	75	RES
RES0057	227101	6298860	36	35	41	41	40	46	39	34	36	41	45	40	35	35	75	RES
RES0058	227235	6298798	37	36	41	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0059	227186	6298813	36	36	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0060	226848	6298594	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0061	226871	6298404	31	31	36	36	35	40	34	29	31	37	45	40	35	35	75	RES

Appendix G
Construction scenario predicted noise levels

*Receiver locations are shown on maps in Appendix B

Key to cell formatting: ## > CNML Day ## > Highly affected level ## > CNML Evening/Night

Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment CS01	Construction compounds / laydown areas CS02	Access track upgrades CS03	Vegetation clearing CS04	Earthworks & civil works CS05	Tower footing construction (Impact Piling) CS06	Tower footing construction (Bored Piling) CS06B	Tower assembly and erection CS07	Stringing transmission line CS08	Demolition / rehabilitation CS09	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
RES0062	226722	6298862	34	33	39	39	38	44	37	31	33	39	45	40	35	35	75	RES
RES0063	227578	6299229	39	37	42	43	43	48	42	36	38	44	45	40	35	35	75	RES
RES0064	227206	6298997	37	37	42	42	41	47	40	35	37	43	45	40	35	35	75	RES
RES0065	227143	6298804	36	35	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0066	227632	6299627	44	44	50	49	47	53	46	41	44	50	45	40	35	35	75	RES
RES0067	226684	6299108	35	34	40	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0068	227071	6298948	36	36	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0069	226568	6298925	33	33	39	38	37	43	36	31	32	39	45	40	35	35	75	RES
RES0070	226938	6298608	34	33	39	39	38	44	37	32	33	39	45	40	35	35	75	RES
RES0071	227598	6299811	45	44	50	49	47	53	46	42	44	51	45	40	35	35	75	RES
RES0072	227580	6299685	44	43	50	49	47	53	46	41	43	50	45	40	35	35	75	RES
RES0073	227492	6299172	40	39	44	44	43	49	42	37	39	45	45	40	35	35	75	RES
RES0074	226794	6298420	33	32	38	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0075	227064	6298931	36	35	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0076	226896	6298614	34	33	39	39	38	44	37	31	33	39	45	40	35	35	75	RES
RES0077	227413	6299508	34	26	40	40	39	43	37	32	35	41	45	40	35	35	75	RES
RES0078	227664	6299520	44	43	49	49	47	53	46	41	43	50	45	40	35	35	75	RES
RES0079	227239	6299308	39	38	44	42	39	45	38	33	34	45	45	40	35	35	75	RES
RES0080	226841	6298670	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0081	227680	6299747	45	45	51	50	48	54	47	42	45	52	45	40	35	35	75	RES
RES0082	226868	6298888	35	34	40	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0083	227660	6299456	37	36	41	40	39	44	37	32	34	42	45	40	35	35	75	RES
RES0084	227374	6299343	39	38	44	45	43	49	42	37	40	46	45	40	35	35	75	RES
RES0085	227506	6299659	43	43	49	47	46	52	45	40	42	49	45	40	35	35	75	RES
RES0086	227538	6299596	43	42	48	47	46	52	45	40	42	49	45	40	35	35	75	RES
RES0087	227711	6299768	46	45	52	50	48	54	47	42	45	52	45	40	35	35	75	RES
RES0088	227514	6299776	44	43	49	48	46	52	45	40	42	50	45	40	35	35	75	RES
RES0089	226900	6298554	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0090	226787	6298812	34	33	39	39	38	44	37	32	34	39	45	40	35	35	75	RES
RES0091	226852	6298564	33	33	38	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0092	227227	6298678	34	34	39	39	38	43	37	32	34	40	45	40	35	35	75	RES
RES0093	227054	6298835	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0094	226872	6298907	35	34	40	40	39	45	38	32	34	40	45	40	35	35	75	RES
RES0095	226513	6298737	32	32	38	37	36	42	35	30	32	38	45	40	35	35	75	RES
RES0096	227003	6298839	35	35	40	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0097	226451	6298727	32	30	36	36	35	41	34	29	30	36	45	40	35	35	75	RES
RES0098	227499	6299756	42	41	47	45	43	49	42	37	39	48	45	40	35	35	75	RES
RES0099	226825	6298410	33	32	38	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0100	226850	6298548	33	33	38	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0101	226712	6299160	35	34	40	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0102	227222	6299194	37	36	42	42	40	46	39	34	37	43	45	40	35	35	75	RES
RES0103	227136	6298708	36	35	40	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0104	226584	6299099	34	33	39	39	37	43	37	31	33	39	45	40	35	35	75	RES
RES0105	227001	6298460	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0106	227111	6298956	37	36	42	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0107	227568	6299310	37	35	40	41	41	46	39	34	36	42	45	40	35	35	75	RES
RES0108	227133	6298724	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0109	227579	6299777	45	44	50	49	47	53	46	41	43	51	45	40	35	35	75	RES
RES0110	226561	6298781	33	32	38	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0111	226802	6298890	35	34	40	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0112	226783	6299158	35	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0113	227353	6299519	37	37	42	42	40	46	39	34	36	43	45	40	35	35	75	RES
RES0114	227727	6299519	44	44	50	50	48	53	47	42	44	50	45	40	35	35	75	RES
RES0115	227393	6299377	41	40	46	46	44	50	43	38	40	46	45	40	35	35	75	RES
RES0116	226843	6298656	32	32	37	37	36	41	35	30	32	38	45	40	35	35	75	RES
RES0117	227396	6299582	38	37	43	42	41	47	40	35	37	43	45	40	35	35	75	RES
RES0118	227758	6299728	46	46	52	51	49	55	48	43	45	53	45	40	35	35	75	RES
RES0119	227438	6299368	39	38	44	44	42	48	41	37	39	45	45	40	35	35	75	RES
RES0120	226593	6298920	33	33	39	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0121	226789	6298834	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0122	227242	6299346	39	39	44	43	42	48	41	36	38	45	45	40	35	35	75	RES
RES0123	226635	6298987	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0124	226856	6298411	33	32	38	38	37	43	36	30	32	38	45	40	35	35	75	RES
RES0125	227432	6299254	40	38	44	45	44	49	43	38	39	45	45	40	35	35	75	RES
RES0126	226786	6298796	34	33	39	39	38	44	37	32	34	39	45	40	35	35	75	RES
RES0127	226951	6298391	33	32	38	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0128	226900	6298537	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES

Appendix G
Construction scenario predicted noise levels

*Receiver locations are shown on maps in Appendix B

Key to cell formatting: ## > CNML Day ## > Highly affected level ## > CNML Evening/Night

Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment CS01	Construction compounds / laydown areas CS02	Access track upgrades CS03	Vegetation clearing CS04	Earthworks & civil works CS05	Tower footing construction (Impact Piling) CS06	Tower footing construction (Bored Piling) CS06B	Tower assembly and erection CS07	Stringing transmission line CS08	Demolition / rehabilitation CS09	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
RES0129	226957	6298501	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0130	227496	6299550	41	40	46	43	41	47	40	35	37	47	45	40	35	35	75	RES
RES0131	227643	6299354	36	34	40	40	40	45	39	33	35	40	45	40	35	35	75	RES
RES0132	226434	6298744	32	31	37	37	36	42	35	30	31	37	45	40	35	35	75	RES
RES0133	227175	6298704	34	33	39	39	38	43	36	32	34	40	45	40	35	35	75	RES
RES0134	226967	6298581	32	32	37	37	36	41	35	30	32	38	45	40	35	35	75	RES
RES0135	227325	6299371	40	39	45	44	42	48	42	36	38	46	45	40	35	35	75	RES
RES0136	227761	6299581	45	44	51	50	48	54	48	43	45	51	45	40	35	35	75	RES
RES0137	227431	6299299	40	39	45	45	44	49	43	38	40	46	45	40	35	35	75	RES
RES0138	227154	6298624	33	33	38	38	37	42	36	31	33	39	45	40	35	35	75	RES
RES0139	227186	6298783	36	35	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0140	227362	6299537	39	38	42	42	41	46	40	35	36	44	45	40	35	35	75	RES
RES0141	226741	6298421	32	32	37	37	36	42	35	30	32	38	45	40	35	35	75	RES
RES0142	227564	6299762	44	43	49	47	44	50	43	38	40	50	45	40	35	35	75	RES
RES0143	227448	6299595	42	41	47	45	44	50	43	38	39	48	45	40	35	35	75	RES
RES0144	227044	6298453	34	33	39	39	38	44	37	31	33	39	45	40	35	35	75	RES
RES0145	226769	6299205	36	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0146	227152	6299021	37	36	42	42	41	47	40	35	37	43	45	40	35	35	75	RES
RES0147	226606	6298767	33	32	38	38	37	43	36	30	32	38	45	40	35	35	75	RES
RES0148	227623	6299753	45	44	50	49	48	53	47	42	44	51	45	40	35	35	75	RES
RES0149	226925	6298958	35	35	38	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0150	227786	6299617	45	45	51	50	49	54	48	43	45	52	45	40	35	35	75	RES
RES0151	227413	6299413	37	37	41	43	40	46	39	34	36	43	45	40	35	35	75	RES
RES0152	227151	6299039	35	33	38	40	38	44	37	32	35	41	45	40	35	35	75	RES
RES0153	226898	6298595	34	33	39	39	37	44	37	31	33	39	45	40	35	35	75	RES
RES0154	226475	6298795	33	32	38	37	36	42	35	30	32	38	45	40	35	35	75	RES
RES0155	227618	6299546	43	43	49	48	47	53	46	41	43	50	45	40	35	35	75	RES
RES0156	227452	6299574	38	37	42	44	41	47	40	35	39	44	45	40	35	35	75	RES
RES0157	227206	6298922	37	36	42	42	41	46	40	35	37	42	45	40	35	35	75	RES
RES0158	227430	6299425	41	40	46	46	44	50	43	38	40	47	45	40	35	35	75	RES
RES0159	226739	6298838	34	33	39	39	38	44	37	31	33	39	45	40	35	35	75	RES
RES0160	227474	6299514	42	41	47	47	45	50	43	38	41	47	45	40	35	35	75	RES
RES0161	227467	6299499	42	41	47	46	45	51	44	39	41	48	45	40	35	35	75	RES
RES0162	227154	6298854	36	36	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0163	226908	6299100	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0164	227035	6298491	34	33	39	39	38	44	37	32	34	39	45	40	35	35	75	RES
RES0165	226846	6298783	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0166	227058	6298867	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0167	226892	6298633	34	33	39	39	38	44	37	32	33	39	45	40	35	35	75	RES
RES0168	226927	6299038	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0169	226731	6298905	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0170	227434	6299657	42	42	48	46	44	50	43	38	40	48	45	40	35	35	75	RES
RES0171	227025	6298968	36	35	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0172	227241	6298763	36	36	41	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0173	227228	6298731	36	35	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0174	227596	6299508	43	42	48	48	46	52	45	40	42	49	45	40	35	35	75	RES
RES0175	227544	6299331	39	36	43	44	43	49	42	37	39	44	45	40	35	35	75	RES
RES0176	226950	6298484	34	31	37	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0177	226901	6298399	33	32	38	38	37	43	36	31	32	38	45	40	35	35	75	RES
RES0178	227586	6299799	45	44	50	49	47	53	46	41	44	51	45	40	35	35	75	RES
RES0179	227458	6299694	40	39	46	45	44	49	43	38	40	47	45	40	35	35	75	RES
RES0180	227037	6298375	34	33	38	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0181	226567	6299043	32	32	37	37	35	41	34	29	31	38	45	40	35	35	75	RES
RES0182	227651	6299612	44	44	50	49	47	53	46	42	44	51	45	40	35	35	75	RES
RES0183	227548	6299730	44	43	49	48	47	52	46	41	43	50	45	40	35	35	75	RES
RES0184	227564	6299831	45	44	50	49	47	53	46	41	43	51	45	40	35	35	75	RES
RES0185	226993	6298742	35	34	40	40	39	45	38	32	34	40	45	40	35	35	75	RES
RES0186	226574	6298723	33	32	38	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0187	227418	6299277	40	39	45	45	44	50	43	38	40	46	45	40	35	35	75	RES
RES0188	227483	6299325	37	36	41	42	41	47	40	35	36	42	45	40	35	35	75	RES
RES0189	227595	6299406	33	31	36	38	37	43	36	31	33	37	45	40	35	35	75	RES
RES0190	227601	6299720	43	42	49	47	46	51	45	40	42	50	45	40	35	35	75	RES
RES0191	227075	6299028	35	35	40	40	38	43	37	32	35	41	45	40	35	35	75	RES
RES0192	226761	6299189	35	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0193	227765	6299662	46	45	52	51	49	55	48	43	45	52	45	40	35	35	75	RES
RES0194	226483	6298730	30	30	35	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0195	227546	6299210	37	36	41	42	41	47	40	35	36	42	45	40	35	35	75	RES

*Receiver locations are shown on maps in Appendix B

Key to cell formatting: ## > CNML Day ## > Highly affected level ## > CNML Evening/Night

Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment CS01	Construction compounds / laydown areas CS02	Access track upgrades CS03	Vegetation clearing CS04	Earthworks & civil works CS05	Tower footing construction (Impact Piling) CS06	Tower footing construction (Bored Piling) CS06B	Tower assembly and erection CS07	Stringing transmission line CS08	Demolition / rehabilitation CS09	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
RES0196	227038	6298422	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0197	226560	6298729	33	32	38	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0198	227537	6299611	43	42	49	48	46	52	45	40	42	49	45	40	35	35	75	RES
RES0199	227263	6299325	36	35	40	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0200	227024	6298984	36	35	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0201	226946	6298453	33	33	38	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0202	227254	6299298	39	38	44	44	42	48	41	36	39	45	45	40	35	35	75	RES
RES0203	227497	6299315	35	34	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0204	227082	6298731	35	35	40	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0205	227224	6299219	38	38	44	43	42	48	41	36	38	44	45	40	35	35	75	RES
RES0206	227082	6298715	35	35	40	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0207	227198	6298848	37	36	42	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0208	226591	6298998	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0209	227175	6298716	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0210	226730	6299162	35	34	40	40	39	44	38	32	34	41	45	40	35	35	75	RES
RES0211	227554	6299171	39	38	43	44	43	49	42	37	38	44	45	40	35	35	75	RES
RES0212	227037	6299094	37	36	42	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0213	226659	6299037	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0214	226586	6298724	33	32	38	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0215	226937	6298394	33	32	38	38	37	43	36	31	33	38	45	40	35	35	75	RES
RES0216	226730	6298802	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0217	226592	6298778	33	32	38	38	37	43	36	30	32	38	45	40	35	35	75	RES
RES0218	226863	6299105	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0219	227732	6299583	45	44	50	50	48	54	47	42	44	51	45	40	35	35	75	RES
RES0220	226923	6299059	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0221	226648	6298717	33	32	38	38	37	43	36	31	32	38	45	40	35	35	75	RES
RES0222	226665	6298986	34	33	39	39	38	44	37	32	33	39	45	40	35	35	75	RES
RES0223	227252	6298908	37	36	42	42	41	47	40	35	37	43	45	40	35	35	75	RES
RES0224	226857	6298827	35	34	40	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0225	227482	6299264	38	38	43	41	39	45	38	33	34	43	45	40	35	35	75	RES
RES0226	226861	6298454	33	32	38	38	37	43	36	31	33	38	45	40	35	35	75	RES
RES0227	226871	6299044	36	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0228	227715	6299501	44	43	49	49	48	53	47	42	44	50	45	40	35	35	75	RES
RES0229	226840	6299108	36	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0230	227544	6299632	43	43	49	48	46	52	45	40	43	49	45	40	35	35	75	RES
RES0231	227260	6298967	38	37	43	43	41	47	40	35	37	43	45	40	35	35	75	RES
RES0232	226650	6298864	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0233	227518	6299122	40	38	44	44	43	49	42	37	39	45	45	40	35	35	75	RES
RES0234	227558	6299421	38	36	42	43	42	48	41	36	37	43	45	40	35	35	75	RES
RES0235	226672	6299033	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0236	227523	6299292	40	39	45	45	44	50	43	38	39	45	45	40	35	35	75	RES
RES0237	227299	6299430	39	39	44	43	42	48	41	36	37	44	45	40	35	35	75	RES
RES0238	226923	6298474	33	33	38	38	37	43	36	31	33	38	45	40	35	35	75	RES
RES0239	227461	6299391	41	36	39	46	45	50	44	39	41	47	45	40	35	35	75	RES
RES0240	226846	6298625	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0241	227097	6298844	36	35	41	41	40	46	39	34	36	41	45	40	35	35	75	RES
RES0242	227023	6298644	35	34	40	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0243	227607	6299630	44	43	49	49	47	53	46	41	43	50	45	40	35	35	75	RES
RES0244	227109	6298942	36	36	42	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0245	227089	6298797	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0246	227254	6299014	38	37	43	43	41	47	40	35	37	43	45	40	35	35	75	RES
RES0247	227095	6298828	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0248	227037	6298719	35	34	40	40	39	45	38	33	35	40	45	40	35	35	75	RES
RES0249	227317	6299356	39	39	45	43	42	48	41	36	38	45	45	40	35	35	75	RES
RES0250	227660	6299712	45	45	51	50	48	54	47	42	44	51	45	40	35	35	75	RES
RES0251	227465	6299586	42	41	47	46	44	50	43	38	40	48	45	40	35	35	75	RES
RES0252	227331	6299487	39	38	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0253	227081	6299083	35	35	40	40	39	44	38	33	35	41	45	40	35	35	75	RES
RES0254	226711	6298903	34	33	39	39	38	44	37	32	33	39	45	40	35	35	75	RES
RES0255	226605	6298992	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0256	227187	6298798	36	35	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0257	227233	6298691	36	35	41	41	40	46	39	34	36	41	45	40	35	35	75	RES
RES0258	227087	6298764	34	33	39	39	37	43	36	31	34	40	45	40	35	35	75	RES
RES0259	227147	6299056	37	36	41	41	40	46	39	34	35	42	45	40	35	35	75	RES
RES0260	227635	6299767	45	45	51	50	48	54	47	42	44	51	45	40	35	35	75	RES
RES0261	226670	6299162	35	34	40	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0262	227711	6299690	45	45	51	50	48	54	47	43	45	52	45	40	35	35	75	RES

Appendix G
Construction scenario predicted noise levels

*Receiver locations are shown on maps in Appendix B

Key to cell formatting: ## > CNML Day ## > Highly affected level ## > CNML Evening/Night

Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment CS01	Construction compounds / laydown areas CS02	Access track upgrades CS03	Vegetation clearing CS04	Earthworks & civil works CS05	Tower footing construction (Impact Piling) CS06	Tower footing construction (Bored Piling) CS06B	Tower assembly and erection CS07	Stringing transmission line CS08	Demolition / rehabilitation CS09	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
RES0263	227682	6299446	42	41	47	48	46	52	45	40	42	48	45	40	35	35	75	RES
RES0264	227693	6299673	45	45	51	50	48	54	47	42	44	51	45	40	35	35	75	RES
RES0265	226498	6298734	32	32	37	37	36	42	35	30	32	38	45	40	35	35	75	RES
RES0266	226890	6298673	34	33	39	39	38	44	37	32	34	39	45	40	35	35	75	RES
RES0267	226701	6298789	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0268	226699	6298985	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0269	227573	6299325	39	37	42	43	42	48	41	36	38	44	45	40	35	35	75	RES
RES0270	226874	6298924	35	34	40	40	39	45	38	33	34	40	45	40	35	35	75	RES
RES0271	226731	6298823	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0272	227157	6298929	36	36	42	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0273	227102	6299050	37	36	42	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0274	226530	6299002	32	31	37	36	35	41	34	29	31	37	45	40	35	35	75	RES
RES0275	227160	6298949	37	36	42	41	40	46	39	34	35	41	45	40	35	35	75	RES
RES0276	227124	6298663	33	33	38	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0277	226837	6298683	34	33	39	39	38	44	37	31	33	39	45	40	35	35	75	RES
RES0278	226506	6298938	33	32	38	38	37	43	36	30	32	38	45	40	35	35	75	RES
RES0279	227240	6298825	37	36	42	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0280	227147	6298822	34	34	39	39	38	43	37	32	33	39	45	40	35	35	75	RES
RES0281	227520	6299384	40	37	43	44	43	49	42	37	39	45	45	40	35	35	75	RES
RES0282	227310	6299333	39	39	45	44	42	48	41	36	38	45	45	40	35	35	75	RES
RES0283	226948	6298468	34	33	38	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0284	226705	6299190	35	34	40	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0285	226597	6299043	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0286	227624	6299320	38	36	42	42	41	47	40	35	36	42	45	40	35	35	75	RES
RES0287	227119	6298645	35	34	40	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0288	226967	6298651	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0289	226581	6299043	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0290	227203	6299015	37	37	42	42	41	47	40	35	37	43	45	40	35	35	75	RES
RES0291	227264	6299381	39	38	43	42	41	47	40	35	36	44	45	40	35	35	75	RES
RES0292	227429	6299409	37	37	42	42	39	45	38	33	35	43	45	40	35	35	75	RES
RES0293	227529	6299556	43	42	48	47	46	51	45	40	41	49	45	40	35	35	75	RES
RES0294	227107	6299002	37	36	42	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0295	227051	6298802	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0296	227037	6298754	35	34	40	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0297	226561	6299000	34	33	39	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0298	227396	6299488	41	40	46	45	43	49	42	37	39	47	45	40	35	35	75	RES
RES0299	227485	6299627	41	40	46	45	42	48	41	36	38	47	45	40	35	35	75	RES
RES0300	226994	6298790	35	34	40	40	39	45	38	33	34	40	45	40	35	35	75	RES
RES0301	227630	6299570	44	43	49	49	47	53	46	41	43	50	45	40	35	35	75	RES
RES0302	227612	6299491	39	38	44	43	43	48	42	36	38	45	45	40	35	35	75	RES
RES0303	226763	6298976	33	32	38	38	36	42	35	30	32	39	45	40	35	35	75	RES
RES0304	226623	6298913	34	33	39	38	37	43	36	31	32	39	45	40	35	35	75	RES
RES0305	227015	6298921	34	33	39	39	37	43	36	32	33	39	45	40	35	35	75	RES
RES0306	226989	6299155	37	36	42	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0307	227477	6299720	41	41	47	45	42	48	41	36	38	47	45	40	35	35	75	RES
RES0308	227451	6299479	40	40	45	44	41	47	40	35	36	46	45	40	35	35	75	RES
RES0309	227570	6299447	34	33	39	39	38	44	37	32	33	39	45	40	35	35	75	RES
RES0310	227490	6299528	42	42	48	46	45	51	44	39	41	48	45	40	35	35	75	RES
RES0311	226530	6298734	33	32	38	37	36	42	35	30	32	38	45	40	35	35	75	RES
RES0312	227174	6298735	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0313	227348	6299426	38	38	41	43	40	46	39	34	36	43	45	40	35	35	75	RES
RES0314	227066	6298538	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0315	227063	6298517	34	33	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0316	227132	6299094	37	36	42	42	41	47	40	35	37	43	45	40	35	35	75	RES
RES0317	226774	6299076	33	33	38	38	37	42	36	31	33	39	45	40	35	35	75	RES
RES0318	227609	6299296	38	36	42	42	41	47	40	35	37	43	45	40	35	35	75	RES
RES0319	227645	6299787	45	45	51	50	48	54	47	42	44	52	45	40	35	35	75	RES
RES0320	227171	6298689	34	33	39	39	37	43	36	32	34	40	45	40	35	35	75	RES
RES0321	227015	6298937	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0322	227171	6299088	35	34	38	40	38	43	37	31	33	40	45	40	35	35	75	RES
RES0323	227349	6299305	40	39	45	45	43	49	42	37	39	45	45	40	35	35	75	RES
RES0324	227210	6298979	37	37	42	42	41	47	40	35	37	43	45	40	35	35	75	RES
RES0325	227060	6298917	36	35	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0326	226971	6298602	32	32	37	36	36	41	34	29	31	37	45	40	35	35	75	RES
RES0327	226844	6298642	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0328	227528	6299337	40	38	43	45	44	50	43	38	39	45	45	40	35	35	75	RES
RES0329	227160	6298989	36	35	40	40	39	45	38	33	34	40	45	40	35	35	75	RES

*Receiver locations are shown on maps in Appendix B

Key to cell formatting: ## > CNML Day ## > Highly affected level ## > CNML Evening/Night

Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment CS01	Construction compounds / laydown areas CS02	Access track upgrades CS03	Vegetation clearing CS04	Earthworks & civil works CS05	Tower footing construction (Impact Piling) CS06	Tower footing construction (Bored Piling) CS06B	Tower assembly and erection CS07	Stringing transmission line CS08	Demolition / rehabilitation CS09	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
RES0330	227141	6298788	36	35	41	41	40	45	39	33	36	41	45	40	35	35	75	RES
RES0331	227155	6298907	36	36	42	41	40	46	39	34	35	42	45	40	35	35	75	RES
RES0332	227349	6299404	38	37	43	43	40	46	39	34	38	44	45	40	35	35	75	RES
RES0333	227824	6299690	47	46	53	52	50	56	49	44	46	53	45	40	35	35	75	RES
RES0334	226637	6298870	34	33	39	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0335	227458	6299241	40	39	45	45	44	50	43	38	40	45	45	40	35	35	75	RES
RES0336	226763	6299177	35	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0337	226673	6298915	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0338	227715	6299594	45	44	50	50	48	54	47	42	44	51	45	40	35	35	75	RES
RES0339	226740	6298855	34	33	39	39	38	44	37	32	33	39	45	40	35	35	75	RES
RES0340	226578	6298774	33	32	38	37	36	43	36	30	32	38	45	40	35	35	75	RES
RES0341	226621	6298993	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0342	227289	6299297	39	39	44	44	43	49	42	37	39	45	45	40	35	35	75	RES
RES0343	227103	6298875	36	35	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0344	226750	6298904	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0345	226717	6298935	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0346	227794	6299721	46	46	52	51	50	55	49	44	46	53	45	40	35	35	75	RES
RES0347	226698	6299160	35	34	40	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0348	227542	6299825	44	44	50	48	46	52	45	40	43	50	45	40	35	35	75	RES
RES0349	226602	6298723	33	32	38	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0350	227509	6299361	40	38	44	44	43	49	42	37	39	45	45	40	35	35	75	RES
RES0351	226852	6298580	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0352	226611	6299044	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0353	227542	6299466	42	42	47	47	46	51	45	40	42	48	45	40	35	35	75	RES
RES0354	226946	6298662	33	32	37	37	36	42	35	30	32	38	45	40	35	35	75	RES
RES0355	227250	6299036	36	36	41	41	40	45	39	34	36	42	45	40	35	35	75	RES
RES0356	227647	6299532	43	43	49	49	47	52	46	41	43	50	45	40	35	35	75	RES
RES0357	226810	6298993	35	34	40	40	39	45	38	32	34	40	45	40	35	35	75	RES
RES0358	227645	6299403	34	31	39	39	38	44	37	32	33	39	45	40	35	35	75	RES
RES0359	227460	6299420	41	40	46	46	45	50	44	39	41	47	45	40	35	35	75	RES
RES0360	227550	6299521	43	42	48	47	46	52	45	40	42	49	45	40	35	35	75	RES
RES0361	226843	6298726	34	33	39	39	38	44	37	32	34	39	45	40	35	35	75	RES
RES0362	226664	6298721	33	32	38	38	37	43	36	31	33	38	45	40	35	35	75	RES
RES0363	227651	6299379	39	37	43	43	42	48	41	36	38	43	45	40	35	35	75	RES
RES0364	227752	6299672	44	44	50	48	47	52	46	41	42	51	45	40	35	35	75	RES
RES0365	226819	6299052	35	35	40	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0366	227362	6299326	40	39	44	45	43	49	42	37	40	46	45	40	35	35	75	RES
RES0367	226810	6298419	31	30	36	36	34	40	33	28	30	36	45	40	35	35	75	RES
RES0368	227674	6299573	44	43	50	49	47	53	46	42	44	50	45	40	35	35	75	RES
RES0369	227630	6299484	40	38	41	46	44	49	43	38	41	47	45	40	35	35	75	RES
RES0370	227655	6299694	45	44	50	49	48	54	47	42	44	51	45	40	35	35	75	RES
RES0371	227093	6298779	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0372	226726	6298788	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0373	227005	6298381	33	33	38	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0374	227182	6298767	36	35	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0375	227191	6299082	38	37	43	43	41	47	40	35	37	43	45	40	35	35	75	RES
RES0376	226632	6298720	33	32	38	38	37	43	36	30	32	38	45	40	35	35	75	RES
RES0377	226936	6298972	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0378	226904	6298464	32	32	37	37	36	42	35	30	31	37	45	40	35	35	75	RES
RES0379	227745	6299639	45	45	51	50	49	54	48	43	45	52	45	40	35	35	75	RES
RES0380	227482	6299411	41	41	47	46	45	51	44	39	41	47	45	40	35	35	75	RES
RES0381	227451	6299672	41	41	47	45	41	47	40	35	38	47	45	40	35	35	75	RES
RES0382	226681	6299156	34	33	38	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0383	227569	6299575	43	43	49	48	46	52	45	40	42	49	45	40	35	35	75	RES
RES0384	227512	6299305	40	37	43	45	44	50	43	38	39	45	45	40	35	35	75	RES
RES0385	227646	6299680	45	44	50	49	48	53	47	42	44	51	45	40	35	35	75	RES
RES0386	227095	6299085	35	35	40	40	39	44	38	33	35	41	45	40	35	35	75	RES
RES0387	227246	6298848	37	36	42	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0388	227004	6298871	34	33	39	39	37	43	36	31	34	39	45	40	35	35	75	RES
RES0389	227108	6298979	37	36	42	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0390	227254	6299231	39	38	44	44	42	48	41	36	38	44	45	40	35	35	75	RES
RES0391	226551	6298931	32	31	37	37	34	40	33	28	30	37	45	40	35	35	75	RES
RES0392	226743	6299151	35	34	40	40	39	45	38	32	34	41	45	40	35	35	75	RES
RES0393	227128	6298693	35	34	40	40	39	45	38	33	35	40	45	40	35	35	75	RES
RES0394	227237	6299096	38	37	43	43	42	47	41	36	38	44	45	40	35	35	75	RES
RES0395	226708	6298804	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0396	227150	6298836	34	34	39	39	38	44	37	32	33	39	45	40	35	35	75	RES

*Receiver locations are shown on maps in Appendix B

Key to cell formatting: ## > CNML Day ## > Highly affected level ## > CNML Evening/Night

Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment CS01	Construction compounds / laydown areas CS02	Access track upgrades CS03	Vegetation clearing CS04	Earthworks & civil works CS05	Tower footing construction (Impact Piling) CS06	Tower footing construction (Bored Piling) CS06B	Tower assembly and erection CS07	Stringing transmission line CS08	Demolition / rehabilitation CS09	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
RES0397	227177	6298750	36	35	41	41	40	46	39	34	36	41	45	40	35	35	75	RES
RES0398	226910	6298444	31	31	36	36	35	40	34	29	30	36	45	40	35	35	75	RES
RES0399	227162	6298970	36	36	41	41	40	46	39	34	35	41	45	40	35	35	75	RES
RES0400	227208	6298940	37	36	42	42	41	47	40	35	36	42	45	40	35	35	75	RES
RES0401	226721	6299192	35	35	40	40	39	45	38	32	34	41	45	40	35	35	75	RES
RES0402	227778	6299714	46	46	52	51	49	55	48	43	46	53	45	40	35	35	75	RES
RES0403	227334	6299387	36	33	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0404	226793	6298856	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0405	226902	6298575	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0406	227003	6298427	34	33	38	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0407	226649	6299162	35	34	40	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0408	227150	6299099	37	37	42	42	41	47	40	35	37	43	45	40	35	35	75	RES
RES0409	226882	6299001	35	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0410	227031	6299061	37	36	42	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0411	227165	6298642	35	35	40	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0412	226933	6299017	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0413	227747	6299739	46	46	52	51	49	55	48	43	45	53	45	40	35	35	75	RES
RES0414	227060	6298882	36	35	41	41	39	45	39	33	35	41	45	40	35	35	75	RES
RES0415	226824	6299011	35	34	40	40	39	45	38	33	34	41	45	40	35	35	75	RES
RES0416	227518	6299790	43	43	49	47	46	52	45	40	42	50	45	40	35	35	75	RES
RES0417	227011	6298490	34	33	39	39	38	44	37	31	33	39	45	40	35	35	75	RES
RES0418	226863	6298864	35	34	40	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0419	227805	6299648	45	44	51	50	48	53	47	42	45	52	45	40	35	35	75	RES
RES0420	227039	6298738	35	34	40	40	39	45	38	33	34	40	45	40	35	35	75	RES
RES0421	227273	6299292	39	39	44	44	43	48	42	37	39	45	45	40	35	35	75	RES
RES0422	227169	6298672	36	35	40	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0423	227776	6299600	45	45	51	51	49	54	48	43	45	52	45	40	35	35	75	RES
RES0424	227590	6299598	44	43	49	48	47	52	46	41	43	50	45	40	35	35	75	RES
RES0425	227749	6299561	45	44	50	50	48	54	47	42	45	51	45	40	35	35	75	RES
RES0426	227792	6299633	46	45	51	51	49	55	48	43	46	52	45	40	35	35	75	RES
RES0427	226988	6298650	35	34	39	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0428	227172	6299103	38	37	43	43	41	47	40	35	37	43	45	40	35	35	75	RES
RES0429	226575	6298868	33	33	38	37	35	40	34	29	31	38	45	40	35	35	75	RES
RES0430	226802	6298915	33	32	38	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0431	227500	6299183	40	38	44	44	43	49	42	37	39	45	45	40	35	35	75	RES
RES0432	226635	6299113	34	34	40	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0433	227705	6299470	44	43	49	49	47	53	46	41	43	50	45	40	35	35	75	RES
RES0434	227561	6299649	44	43	49	48	47	52	46	41	43	50	45	40	35	35	75	RES
RES0435	227117	6298631	35	33	39	39	38	44	37	32	33	39	45	40	35	35	75	RES
RES0436	227059	6298851	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0437	227347	6299492	39	38	45	43	41	47	40	35	38	46	45	40	35	35	75	RES
RES0438	226546	6298999	34	33	39	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0439	227254	6298938	37	37	42	42	41	47	40	35	37	43	45	40	35	35	75	RES
RES0440	226517	6298782	33	32	38	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0441	227235	6298774	36	36	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0442	227607	6299583	44	43	49	48	47	53	46	41	43	50	45	40	35	35	75	RES
RES0443	227530	6299806	44	44	50	48	47	52	46	41	43	50	45	40	35	35	75	RES
RES0444	227110	6298925	35	34	40	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0445	226661	6298859	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0446	227684	6299529	44	43	49	49	47	53	46	41	44	50	45	40	35	35	75	RES
RES0447	227488	6299738	43	43	48	47	46	52	45	40	42	49	45	40	35	35	75	RES
RES0448	227401	6299306	40	39	45	45	44	49	43	38	40	46	45	40	35	35	75	RES
RES0449	226615	6298712	33	32	38	38	37	43	36	30	32	38	45	40	35	35	75	RES
RES0450	226489	6298949	33	32	38	38	37	43	36	30	32	38	45	40	35	35	75	RES
RES0451	227634	6299341	37	34	41	41	41	47	40	35	36	42	45	40	35	35	75	RES
RES0452	227443	6299556	41	41	46	45	44	50	43	38	39	47	45	40	35	35	75	RES
RES0453	227558	6299291	39	37	43	43	42	48	41	36	38	44	45	40	35	35	75	RES
RES0454	226889	6298654	32	32	37	37	36	41	35	30	32	38	45	40	35	35	75	RES
RES0455	227534	6299255	39	38	43	44	43	49	42	37	38	44	45	40	35	35	75	RES
RES0456	226931	6298996	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0457	227132	6298758	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0458	227404	6299598	40	39	45	44	42	48	41	36	38	46	45	40	35	35	75	RES
RES0459	226744	6298930	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0460	227590	6299704	43	42	48	47	45	51	44	40	41	49	45	40	35	35	75	RES
RES0461	226576	6298997	34	33	39	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0462	226805	6298934	35	34	40	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0463	226904	6298485	33	33	38	38	37	43	36	31	33	39	45	40	35	35	75	RES

Appendix G
Construction scenario predicted noise levels

*Receiver locations are shown on maps in Appendix B

Key to cell formatting: ## > CNML Day ## > Highly affected level ## > CNML Evening/Night

Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment CS01	Construction compounds / laydown areas CS02	Access track upgrades CS03	Vegetation clearing CS04	Earthworks & civil works CS05	Tower footing construction (Impact Piling) CS06	Tower footing construction (Bored Piling) CS06B	Tower assembly and erection CS07	Stringing transmission line CS08	Demolition / rehabilitation CS09	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
RES0464	226640	6299035	34	34	39	39	38	44	37	32	33	39	45	40	35	35	75	RES
RES0465	227517	6299680	42	42	47	46	44	49	43	38	40	48	45	40	35	35	75	RES
RES0466	227422	6299524	41	41	46	44	43	49	42	37	38	47	45	40	35	35	75	RES
RES0467	227383	6299360	36	25	39	40	40	45	39	33	34	40	45	40	35	35	75	RES
RES0468	227697	6299643	45	44	51	50	48	54	47	42	44	51	45	40	35	35	75	RES
RES0469	227007	6299222	37	36	42	42	40	46	40	34	36	43	45	40	35	35	75	RES
RES0470	227494	6299224	40	38	44	44	43	49	42	37	39	45	45	40	35	35	75	RES
RES0471	227591	6299251	38	37	42	43	42	48	41	36	37	43	45	40	35	35	75	RES
RES0472	226538	6298928	32	31	36	37	34	40	33	28	30	37	45	40	35	35	75	RES
RES0473	227049	6298469	34	33	39	39	38	44	37	32	34	39	45	40	35	35	75	RES
RES0474	226699	6299105	35	34	40	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0475	227201	6299032	37	37	43	42	41	47	40	35	36	42	45	40	35	35	75	RES
RES0476	227679	6299596	44	44	50	49	48	53	47	42	44	51	45	40	35	35	75	RES
RES0477	227331	6299278	38	38	42	43	41	47	40	35	38	44	45	40	35	35	75	RES
RES0478	226773	6299101	35	35	40	40	39	45	38	33	34	41	45	40	35	35	75	RES
RES0479	226991	6298760	33	33	38	38	37	42	35	31	32	38	45	40	35	35	75	RES
RES0480	227212	6298959	37	36	42	42	41	47	40	35	37	43	45	40	35	35	75	RES
RES0481	227076	6299051	37	36	42	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0482	226701	6299034	35	34	40	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0483	227108	6298910	36	36	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0484	226886	6298404	33	32	38	38	37	43	36	31	32	38	45	40	35	35	75	RES
RES0485	227413	6299620	41	40	46	45	43	49	42	37	38	47	45	40	35	35	75	RES
RES0486	226489	6298792	33	32	38	37	36	42	35	30	32	38	45	40	35	35	75	RES
RES0487	226604	6298874	33	33	39	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0488	227394	6299471	41	40	46	44	42	48	41	36	38	47	45	40	35	35	75	RES
RES0489	227032	6299030	36	36	42	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0490	227000	6298808	35	35	40	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0491	226855	6298845	35	34	40	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0492	227103	6299026	37	36	42	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0493	227050	6298819	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0494	227600	6299268	38	37	42	43	42	48	41	36	37	43	45	40	35	35	75	RES
RES0495	227494	6299641	43	42	48	47	46	51	45	40	41	49	45	40	35	35	75	RES
RES0496	227124	6298678	35	35	40	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0497	226555	6298866	33	32	38	38	37	43	36	31	32	38	45	40	35	35	75	RES
RES0498	227246	6299054	38	37	43	43	41	47	40	35	38	43	45	40	35	35	75	RES
RES0499	227004	6298824	33	33	38	38	37	42	36	31	33	39	45	40	35	35	75	RES
RES0500	227614	6299734	45	44	50	49	47	53	46	42	44	51	45	40	35	35	75	RES
RES0501	227370	6299437	39	39	45	45	43	49	42	37	40	46	45	40	35	35	75	RES
RES0502	227737	6299681	46	45	51	50	49	54	48	43	45	52	45	40	35	35	75	RES
RES0503	227693	6299552	44	44	50	49	48	53	47	42	44	50	45	40	35	35	75	RES
RES0504	226541	6299051	32	31	37	36	35	41	34	29	31	37	45	40	35	35	75	RES
RES0505	227654	6299480	41	41	47	45	43	49	42	37	39	48	45	40	35	35	75	RES
RES0506	227046	6298785	35	35	40	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0507	226620	6298864	33	33	39	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0508	227068	6298982	35	34	40	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0509	227085	6298747	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0510	227547	6299273	39	38	43	44	43	49	42	37	38	44	45	40	35	35	75	RES
RES0511	227381	6299564	40	40	46	44	41	47	40	35	37	46	45	40	35	35	75	RES
RES0512	227488	6299243	40	38	44	44	43	49	42	37	39	45	45	40	35	35	75	RES
RES0513	227587	6299386	39	33	39	43	42	48	41	36	38	44	45	40	35	35	75	RES
RES0514	226918	6298399	33	32	38	38	37	43	36	31	33	38	45	40	35	35	75	RES
RES0515	226784	6299180	36	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0516	227556	6299744	44	44	50	48	47	53	46	41	43	50	45	40	35	35	75	RES
RES0517	226768	6299037	35	34	40	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0518	227170	6299189	36	35	41	40	39	45	38	33	35	42	45	40	35	35	75	RES
RES0519	226780	6298755	34	33	39	39	38	44	37	31	33	39	45	40	35	35	75	RES
RES0520	227008	6298888	36	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0521	226989	6298386	33	33	38	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0522	227238	6299118	38	38	43	43	42	48	41	36	38	44	45	40	35	35	75	RES
RES0523	227022	6298380	33	33	38	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0524	226543	6298726	33	32	38	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0525	226773	6298736	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0526	226626	6299039	34	33	39	39	38	44	37	31	33	39	45	40	35	35	75	RES
RES0527	227599	6299556	43	43	49	48	47	52	46	41	43	50	45	40	35	35	75	RES
RES0528	226495	6298848	31	31	36	36	34	40	33	28	30	36	45	40	35	35	75	RES
RES0529	227132	6298742	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0530	226855	6298531	33	33	38	38	37	43	36	31	33	39	45	40	35	35	75	RES

*Receiver locations are shown on maps in Appendix B

Key to cell formatting: ## > CNML Day ## > Highly affected level ## > CNML Evening/Night

Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment CS01	Construction compounds / laydown areas CS02	Access track upgrades CS03	Vegetation clearing CS04	Earthworks & civil works CS05	Tower footing construction (Impact Piling) CS06	Tower footing construction (Bored Piling) CS06B	Tower assembly and erection CS07	Stringing transmission line CS08	Demolition / rehabilitation CS09	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
RES0531	227071	6299002	37	36	42	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0532	226640	6298913	32	32	36	37	35	41	34	29	30	37	45	40	35	35	75	RES
RES0533	227674	6299727	45	45	51	50	48	54	47	42	44	52	45	40	35	35	75	RES
RES0534	227522	6299469	42	41	47	47	45	51	44	39	41	48	45	40	35	35	75	RES
RES0535	226785	6299194	36	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0536	227571	6299664	44	43	49	48	47	52	46	41	43	50	45	40	35	35	75	RES
RES0537	227025	6298997	36	36	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0538	226923	6298938	35	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0539	226841	6298411	33	32	38	38	36	43	35	30	32	38	45	40	35	35	75	RES
RES0540	227001	6298856	35	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0541	227635	6299662	44	44	50	49	48	53	47	42	44	51	45	40	35	35	75	RES
RES0542	227018	6298523	34	33	39	39	38	44	37	32	34	39	45	40	35	35	75	RES
RES0543	227252	6299247	39	38	44	44	42	48	41	36	38	45	45	40	35	35	75	RES
RES0544	226605	6299119	34	34	39	39	38	44	37	32	33	40	45	40	35	35	75	RES
RES0545	226779	6298777	32	32	37	37	36	41	35	30	31	38	45	40	35	35	75	RES
RES0546	227505	6299567	42	41	48	47	45	51	44	39	41	48	45	40	35	35	75	RES
RES0547	227439	6299444	40	39	45	44	43	48	42	37	39	46	45	40	35	35	75	RES
RES0548	227028	6299079	37	36	42	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0549	227468	6299706	43	42	48	47	45	51	44	39	42	49	45	40	35	35	75	RES
RES0550	227289	6299414	39	38	43	43	40	45	39	33	35	44	45	40	35	35	75	RES
RES0551	227092	6298809	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0552	226845	6298611	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0553	227153	6299004	36	35	40	40	40	46	39	33	35	41	45	40	35	35	75	RES
RES0554	226457	6298793	32	32	37	37	36	42	35	30	32	38	45	40	35	35	75	RES
RES0555	227407	6299394	39	37	44	44	43	49	42	37	38	44	45	40	35	35	75	RES
RES0556	227202	6298904	37	36	42	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0557	227040	6298768	35	35	40	40	39	45	38	33	35	40	45	40	35	35	75	RES
RES0558	226738	6299197	35	35	40	40	39	45	38	33	34	41	45	40	35	35	75	RES
RES0559	227177	6299224	38	38	43	43	42	48	41	36	38	44	45	40	35	35	75	RES
RES0560	226875	6299023	35	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0561	226468	6298740	31	30	35	35	34	39	33	28	30	36	45	40	35	35	75	RES
RES0562	226805	6298951	35	34	40	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0563	227070	6298965	36	36	41	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0564	226880	6298982	35	35	40	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0565	227140	6299070	34	33	39	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0566	227435	6299539	41	41	47	45	43	49	42	37	39	47	45	40	35	35	75	RES
RES0567	227041	6298437	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0568	227668	6299556	44	43	50	49	47	53	46	41	44	50	45	40	35	35	75	RES
RES0569	227190	6299105	38	37	43	43	41	47	40	35	37	43	45	40	35	35	75	RES
RES0570	226658	6298911	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0571	226999	6298444	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0572	227255	6299364	35	35	40	39	38	44	37	31	33	40	45	40	35	35	75	RES
RES0573	227413	6299323	40	39	45	45	44	50	43	38	40	46	45	40	35	35	75	RES
RES0574	226858	6298473	33	32	38	38	37	43	36	31	33	38	45	40	35	35	75	RES
RES0575	227135	6298771	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0576	226821	6299088	35	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0577	227583	6299363	39	37	42	43	42	48	41	36	38	43	45	40	35	35	75	RES
RES0578	227261	6298995	38	37	43	43	41	47	40	35	37	43	45	40	35	35	75	RES
RES0579	227198	6298863	37	36	42	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0580	226853	6298804	34	34	40	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0581	226505	6298792	33	32	38	37	36	42	35	30	32	38	45	40	35	35	75	RES
RES0582	227032	6299046	36	36	42	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0583	226714	6298951	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0584	226620	6299113	34	34	39	39	38	44	37	32	33	40	45	40	35	35	75	RES
RES0585	226795	6298873	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0586	226753	6298948	34	34	40	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0587	226915	6299080	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0588	227730	6299749	46	46	52	51	49	55	48	43	45	53	45	40	35	35	75	RES
RES0589	226770	6299054	35	34	40	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0590	227709	6299487	44	43	49	49	47	53	46	41	44	50	45	40	35	35	75	RES
RES0591	226822	6299029	35	35	40	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0592	226847	6298766	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0593	227499	6299401	41	39	45	45	44	50	43	38	40	46	45	40	35	35	75	RES
RES0594	227501	6299462	40	40	45	44	40	45	39	33	36	46	45	40	35	35	75	RES
RES0595	226681	6298982	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0596	226904	6299120	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES
RES0597	227278	6299396	36	35	41	41	39	45	38	33	35	41	45	40	35	35	75	RES

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Construction scenario predicted noise levels

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Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment CS01	Construction compounds / laydown areas CS02	Access track upgrades CS03	Vegetation clearing CS04	Earthworks & civil works CS05	Tower footing construction (Impact Piling) CS06	Tower footing construction (Bored Piling) CS06B	Tower assembly and erection CS07	Stringing transmission line CS08	Demolition / rehabilitation CS09	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
RES0598	227614	6299419	33	31	38	38	37	43	36	31	32	38	45	40	35	35	75	RES
RES0599	227021	6299179	37	36	42	42	40	46	39	34	36	43	45	40	35	35	75	RES
RES0600	226994	6298773	35	34	40	40	39	45	38	33	34	40	45	40	35	35	75	RES
RES0601	227033	6299165	37	36	42	42	40	46	39	34	36	43	45	40	35	35	75	RES
RES0602	227561	6299213	39	38	43	44	43	49	42	37	38	44	45	40	35	35	75	RES
RES0603	227238	6299075	38	37	43	43	41	47	40	35	38	43	45	40	35	35	75	RES
RES0604	226765	6299018	35	34	40	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0605	227735	6299536	44	44	50	50	48	54	47	42	44	51	45	40	35	35	75	RES
RES0606	226650	6298986	32	32	37	37	36	41	35	30	32	38	45	40	35	35	75	RES
RES0607	227583	6299564	43	42	49	48	46	52	45	40	42	49	45	40	35	35	75	RES
RES0608	226701	6298823	34	33	39	39	37	43	36	31	33	39	45	40	35	35	75	RES
RES0609	227533	6299132	40	38	44	44	43	49	42	37	39	45	45	40	35	35	75	RES
RES0610	227022	6298597	34	34	39	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0611	226788	6299209	36	35	41	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0612	227564	6299382	34	33	38	37	36	42	35	30	32	38	45	40	35	35	75	RES
RES0613	227809	6299699	47	46	52	52	50	55	49	44	46	53	45	40	35	35	75	RES
RES0614	227861	6303139	41	31	61	61	45	50	44	39	40	47	45	40	35	35	75	RES
RES0615	228752	6301151	55	50	60	61	59	64	58	53	56	62	45	40	35	35	75	RES
RES0616	228695	6301143	56	51	61	62	60	65	59	54	56	63	45	40	35	35	75	RES
RES0617	228764	6301271	52	48	57	58	56	62	55	50	53	59	45	40	35	35	75	RES
RES0618	228804	6301364	51	47	55	56	54	60	53	49	50	57	45	40	35	35	75	RES
RES0619	228639	6301890	46	41	51	52	50	56	49	44	46	53	45	40	35	35	75	RES
RES0620	228649	6301895	46	41	51	52	50	56	49	44	46	53	45	40	35	35	75	RES
RES0621	228431	6302193	44	38	49	50	48	53	47	42	44	50	45	40	35	35	75	RES
RES0622	228427	6302197	44	37	49	49	48	53	47	42	43	50	45	40	35	35	75	RES
RES0623	228502	6302032	45	40	50	51	49	55	48	43	45	52	45	40	35	35	75	RES
RES0624	228438	6302207	43	37	49	49	47	53	46	41	43	49	45	40	35	35	75	RES
RES0625	228309	6302571	42	35	48	48	46	52	45	40	42	48	45	40	35	35	75	RES
RES0626	229076	6302626	38	34	43	43	41	47	40	35	37	43	45	40	35	35	75	RES
RES0627	228423	6302781	40	34	48	48	44	50	43	38	40	46	45	40	35	35	75	RES
RES0628	228561	6302797	39	34	48	48	43	49	42	37	38	44	45	40	35	35	75	RES
RES0629	228621	6302795	38	32	47	47	42	48	41	36	38	44	45	40	35	35	75	RES
RES0630	228600	6302791	38	34	47	47	42	48	41	36	38	44	45	40	35	35	75	RES
RES0631	228541	6302802	39	34	48	48	43	49	42	37	39	45	45	40	35	35	75	RES
RES0632	228580	6302794	39	34	47	47	43	48	42	37	38	44	45	40	35	35	75	RES
RES0633	227775	6303116	42	31	62	62	45	51	44	39	41	48	45	40	35	35	75	RES
RES0634	227763	6303128	40	31	63	63	44	50	43	38	40	47	45	40	35	35	75	RES
RES0635	227477	6303787	38	27	58	58	42	48	41	36	37	44	45	40	35	35	75	RES
RES0636	227508	6303810	38	27	58	58	42	48	41	36	37	43	45	40	35	35	75	RES
RES0637	227543	6304123	36	26	52	52	39	45	39	33	35	41	45	40	35	35	75	RES
RES0638	221679	6302920	36	34	40	40	39	45	38	33	35	40	45	40	35	35	75	RES
RES0639	224993	6300650	33	27	38	37	36	42	35	30	32	37	45	40	35	35	75	RES
RES0640	223282	6301639	33	30	37	38	37	43	36	31	33	38	45	40	35	35	75	RES
RES0641	224349	6302168	36	23	40	41	40	46	39	34	35	41	45	40	35	35	75	RES
RES0642	223999	6301473	33	28	39	38	37	43	36	31	32	38	45	40	35	35	75	RES
RES0643	220974	6304747	30	25	35	35	34	40	33	27	29	35	45	40	35	35	75	RES
RES0644	222828	6306566	34	34	54	54	36	42	35	30	32	39	45	40	35	35	75	RES
RES0645	223462	6305643	43	43	55	55	43	49	42	37	39	49	45	40	35	35	75	RES
RES0646	227459	6303176	43	30	65	65	47	52	46	41	42	49	45	40	35	35	75	RES
RES0647	221339	6305943	30	29	40	40	34	40	33	27	29	34	45	40	35	35	75	RES
RES0648	221599	6305976	31	29	41	41	34	41	33	28	29	35	45	40	35	35	75	RES
RES0649	221349	6305816	30	28	41	40	34	40	33	27	29	34	45	40	35	35	75	RES
RES0650	221682	6305838	30	28	40	40	34	40	33	28	29	34	45	40	35	35	75	RES
RES0651	221434	6306046	31	30	41	41	34	40	33	28	29	35	45	40	35	35	75	RES
RES0652	221627	6305671	28	25	40	40	32	38	31	26	27	33	45	40	35	35	75	RES
RES0653	221470	6306182	29	28	40	40	32	38	31	26	27	34	45	40	35	35	75	RES
RES0654	221420	6305711	30	27	41	41	34	40	33	28	29	34	45	40	35	35	75	RES
RES0655	221455	6306117	31	30	41	41	34	40	33	28	29	35	45	40	35	35	75	RES
RES0656	228716	6301831	47	41	51	53	50	56	49	44	47	53	45	40	35	35	75	RES
RES0657	228793	6301819	45	41	49	50	49	54	48	43	44	50	45	40	35	35	75	RES
RES0658	228958	6302570	38	35	43	44	42	48	41	36	38	44	45	40	35	35	75	RES
RES0659	228962	6302612	38	35	43	44	42	48	41	36	38	44	45	40	35	35	75	RES
RES0660	228987	6301676	46	42	50	51	49	55	48	43	45	52	45	40	35	35	75	RES
RES0661	228849	6301809	46	41	50	51	49	55	48	44	46	52	45	40	35	35	75	RES
RES0662	228950	6302538	39	35	43	44	42	48	41	36	38	45	45	40	35	35	75	RES
RES0663	228965	6301298	45	41	50	52	48	54	47	42	45	53	45	40	35	35	75	RES
RES0664	228585	6301099	60	53	64	67	64	69	63	58	61	68	45	40	35	35	75	RES

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Key to cell formatting: ## > CNML Day ## > Highly affected level ## > CNML Evening/Night

Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment CS01	Construction compounds / laydown areas CS02	Access track upgrades CS03	Vegetation clearing CS04	Earthworks & civil works CS05	Tower footing construction (Impact Piling) CS06	Tower footing construction (Bored Piling) CS06B	Tower assembly and erection CS07	Stringing transmission line CS08	Demolition / rehabilitation CS09	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
RES0665	228877	6301634	47	43	52	53	51	57	50	45	47	53	45	40	35	35	75	RES
RES0666	228864	6301861	45	41	49	51	49	54	48	43	45	52	45	40	35	35	75	RES
RES0667	228965	6302627	38	31	43	43	42	47	41	36	38	44	45	40	35	35	75	RES
RES0668	228959	6302554	38	32	43	43	41	47	40	35	37	43	45	40	35	35	75	RES
RES0669	228922	6302339	38	35	43	44	42	47	41	36	38	44	45	40	35	35	75	RES
RES0670	228954	6301742	45	42	50	51	49	55	48	43	45	52	45	40	35	35	75	RES
RES0671	228558	6301980	46	40	50	52	49	55	48	44	46	53	45	40	35	35	75	RES
RES0672	228804	6302023	44	39	48	50	48	53	47	42	44	50	45	40	35	35	75	RES
RES0673	228811	6301883	45	41	50	51	49	55	48	43	45	52	45	40	35	35	75	RES
RES0674	228528	6301105	64	53	65	69	68	73	67	61	63	70	45	40	35	35	75	RES
RES0675	228962	6302589	38	35	43	44	42	48	41	36	38	44	45	40	35	35	75	RES
RES0676	229009	6301467	47	44	51	52	51	56	50	45	46	53	45	40	35	35	75	RES
RES0677	228547	6301108	62	53	65	68	67	72	65	60	62	70	45	40	35	35	75	RES
RES0678	228769	6301860	46	41	50	52	50	55	49	44	46	53	45	40	35	35	75	RES
RES0679	228444	6301122	68	53	68	74	72	77	71	66	68	75	45	40	35	35	75	RES
RES0680	228507	6302250	43	38	48	49	47	52	46	41	43	49	45	40	35	35	75	RES
RES0681	228701	6301178	55	50	60	61	59	64	58	53	56	62	45	40	35	35	75	RES
RES0682	228970	6301630	46	43	51	51	50	55	49	44	46	52	45	40	35	35	75	RES
RES0683	228526	6302715	40	34	47	47	44	49	42	37	39	45	45	40	35	35	75	RES
RES0684	228623	6301090	59	53	63	66	63	68	62	57	60	67	45	40	35	35	75	RES
RES0685	228701	6301195	55	50	59	61	59	64	58	53	55	62	45	40	35	35	75	RES
RES0686	228943	6302472	39	34	44	45	43	49	42	37	39	45	45	40	35	35	75	RES
RES0687	228919	6302287	41	37	45	46	44	50	43	39	41	47	45	40	35	35	75	RES
RES0688	228955	6302502	39	35	43	44	43	48	42	37	39	45	45	40	35	35	75	RES
RES0689	228796	6302024	44	39	48	50	48	53	47	42	44	50	45	40	35	35	75	RES
RES0690	228948	6301550	47	44	51	52	51	56	50	45	47	53	45	40	35	35	75	RES
RES0691	228801	6301788	46	42	49	50	49	55	48	43	45	51	45	40	35	35	75	RES
RES0692	228576	6301774	49	42	53	55	52	58	51	46	49	56	45	40	35	35	75	RES
RES0693	228777	6301795	47	42	51	52	50	56	49	44	47	53	45	40	35	35	75	RES
RES0694	228769	6301760	47	42	51	53	51	56	50	45	47	54	45	40	35	35	75	RES
RES0695	228729	6301803	47	42	51	53	51	56	50	45	47	54	45	40	35	35	75	RES
RES0696	228770	6301822	46	41	51	52	50	56	49	44	46	53	45	40	35	35	75	RES
RES0697	228791	6301741	47	42	51	53	51	56	50	45	47	54	45	40	35	35	75	RES
RES0698	228709	6301810	47	42	51	53	51	56	50	45	47	54	45	40	35	35	75	RES
RES0699	228033	6300414	54	54	63	59	53	58	52	47	49	64	45	40	35	35	75	RES
RES0700	228694	6301891	46	41	51	52	50	55	49	44	46	53	45	40	35	35	75	RES
RES0701	228782	6301203	53	49	58	59	57	62	56	51	54	60	45	40	35	35	75	RES
RES0702	228480	6301114	66	53	67	72	70	75	69	64	66	73	45	40	35	35	75	RES
RES0703	228869	6301671	47	43	51	52	50	56	49	44	46	52	45	40	35	35	75	RES
RES0704	228847	6301759	46	42	51	52	50	56	49	44	46	53	45	40	35	35	75	RES
RES0705	228771	6301089	56	51	61	63	60	65	59	54	57	64	45	40	35	35	75	RES
RES0706	228679	6302122	44	39	48	49	47	53	46	41	44	50	45	40	35	35	75	RES
RES0707	228848	6301787	46	42	50	52	50	55	49	44	46	52	45	40	35	35	75	RES
RES0708	228978	6302658	38	34	43	43	41	47	40	35	37	44	45	40	35	35	75	RES
RES0709	228890	6302076	43	39	47	48	47	52	46	41	43	49	45	40	35	35	75	RES
RES0710	229026	6301778	44	41	49	50	48	54	47	42	44	50	45	40	35	35	75	RES
RES0711	228887	6302455	38	34	43	43	42	48	41	36	38	44	45	40	35	35	75	RES
RES0712	229002	6301759	45	41	49	50	48	54	47	43	44	51	45	40	35	35	75	RES
RES0713	228916	6302159	42	38	46	48	46	51	45	40	42	48	45	40	35	35	75	RES
RES0714	228928	6301570	47	43	52	52	51	56	50	45	47	53	45	40	35	35	75	RES
RES0715	228878	6301944	44	40	49	50	48	54	47	42	44	51	45	40	35	35	75	RES
RES0716	228486	6302098	45	39	49	51	49	54	48	43	45	51	45	40	35	35	75	RES
RES0717	228905	6301626	47	43	51	52	51	56	50	45	47	53	45	40	35	35	75	RES
RES0718	228950	6301589	47	43	51	52	50	56	49	45	46	53	45	40	35	35	75	RES
RES0719	228923	6302353	38	35	43	43	42	47	41	36	38	44	45	40	35	35	75	RES
RES0720	228859	6301883	45	41	49	51	49	54	48	43	45	51	45	40	35	35	75	RES
RES0721	228742	6302220	42	38	47	48	46	52	45	40	42	49	45	40	35	35	75	RES
RES0722	228829	6301693	47	43	51	51	50	56	49	44	46	52	45	40	35	35	75	RES
RES0723	228544	6302253	43	37	47	48	46	52	45	40	42	49	45	40	35	35	75	RES
RES0724	228937	6301694	46	42	50	51	50	55	49	44	46	52	45	40	35	35	75	RES
RES0725	228978	6301139	51	48	57	57	55	61	54	49	52	58	45	40	35	35	75	RES
RES0726	228690	6301951	45	40	50	51	49	55	48	43	45	52	45	40	35	35	75	RES
RES0727	228668	6301107	57	52	62	64	61	66	60	55	59	65	45	40	35	35	75	RES
RES0728	228967	6301049	53	49	58	59	57	63	56	51	53	60	45	40	35	35	75	RES
RES0729	228775	6301905	45	40	50	51	49	55	48	43	45	52	45	40	35	35	75	RES
RES0730	228721	6301423	52	46	56	57	55	61	54	49	51	58	45	40	35	35	75	RES
RES0731	228865	6301903	43	39	47	49	47	52	46	41	43	50	45	40	35	35	75	RES

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RES0732	228936	6302386	38	35	42	44	42	47	41	36	38	45	45	40	35	35	75	RES
RES0733	228775	6301893	45	41	50	51	49	55	48	43	45	52	45	40	35	35	75	RES
RES0734	228714	6302226	42	38	47	48	46	52	45	40	42	49	45	40	35	35	75	RES
RES0735	228521	6301976	46	40	50	52	50	55	49	44	46	53	45	40	35	35	75	RES
RES0736	228606	6301097	60	53	63	67	64	69	62	57	61	68	45	40	35	35	75	RES
RES0737	228936	6302372	39	36	44	44	43	49	42	37	39	45	45	40	35	35	75	RES
RES0738	228677	6302041	44	39	49	50	48	54	47	42	44	51	45	40	35	35	75	RES
RES0739	228831	6302032	44	39	48	49	47	53	46	41	44	50	45	40	35	35	75	RES
RES0740	228906	6301663	47	43	51	52	50	56	49	44	46	53	45	40	35	35	75	RES
RES0741	228933	6302413	38	36	43	44	42	47	41	36	38	45	45	40	35	35	75	RES
RES0742	228912	6302662	38	34	44	44	42	47	41	36	38	44	45	40	35	35	75	RES
RES0743	228905	6302216	42	38	46	47	45	51	44	39	41	48	45	40	35	35	75	RES
RES0744	228880	6301972	44	40	48	50	48	53	47	42	44	50	45	40	35	35	75	RES
RES0745	226917	6300238	40	39	45	45	44	49	43	38	39	46	45	40	35	35	75	RES
RES0746	226921	6304216	38	25	51	51	41	47	40	35	37	43	45	40	35	35	75	RES
RES0747	228247	6302488	43	36	49	49	47	53	46	41	43	49	45	40	35	35	75	RES
RES0748	227525	6303315	41	29	78	78	45	51	44	39	41	47	45	40	35	35	75	RES
RES0749	227542	6303736	38	26	58	58	41	47	40	35	37	43	45	40	35	35	75	RES
RES0750	226495	6302899	56	29	78	78	60	66	59	54	56	63	45	40	35	35	75	RES
RES0751	227419	6300656	46	44	53	53	50	56	49	44	46	54	45	40	35	35	75	RES
RES0752	227437	6303342	42	29	81	81	45	51	44	39	41	48	45	40	35	35	75	RES
RES0753	227563	6303096	42	30	62	62	45	51	44	40	41	48	45	40	35	35	75	RES
RES0754	226804	6304167	38	25	50	50	42	48	41	36	37	43	45	40	35	35	75	RES
RES0755	227484	6301151	56	42	65	65	60	66	59	54	57	66	45	40	35	35	75	RES
RES0756	226924	6300456	42	39	48	48	45	51	44	39	41	48	45	40	35	35	75	RES
RES0757	228688	6301116	57	52	62	64	61	66	60	55	58	65	45	40	35	35	75	RES
RES0758	228610	6302182	43	38	48	49	47	53	46	41	43	50	45	40	35	35	75	RES
RES0759	228567	6301102	61	53	64	68	65	70	64	59	62	69	45	40	35	35	75	RES
RES0760	228905	6301995	44	39	48	49	47	53	46	41	43	50	45	40	35	35	75	RES
RES0761	228076	6302708	43	34	51	51	47	53	46	41	43	49	45	40	35	35	75	RES
RES0762	227536	6303180	43	30	66	66	46	52	45	40	42	49	45	40	35	35	75	RES
RES0763	226928	6300689	44	39	51	51	47	53	46	42	43	50	45	40	35	35	75	RES
RES0764	226348	6299682	34	34	40	40	38	44	37	32	33	39	45	40	35	35	75	RES
RES0765	227622	6303098	43	31	63	63	46	52	45	40	42	49	45	40	35	35	75	RES
RES0766	228546	6302269	43	37	47	48	46	52	45	40	42	49	45	40	35	35	75	RES
RES0767	228915	6302254	41	37	46	47	45	51	44	39	41	47	45	40	35	35	75	RES
RES0768	228549	6302046	45	40	49	51	49	54	48	43	45	52	45	40	35	35	75	RES
RES0769	228449	6301161	63	52	68	70	68	72	66	61	65	72	45	40	35	35	75	RES
RES0770	228958	6301230	50	46	54	55	54	59	53	48	49	56	45	40	35	35	75	RES
RES0771	228787	6302043	44	39	48	50	47	53	46	42	44	50	45	40	35	35	75	RES
RES0772	228854	6301848	45	41	50	51	49	55	48	43	45	52	45	40	35	35	75	RES
RES0773	228586	6302216	43	38	47	49	47	52	46	41	43	49	45	40	35	35	75	RES
RES0774	228808	6301394	51	46	55	55	54	60	53	48	50	56	45	40	35	35	75	RES
RES0775	228918	6302305	39	35	43	44	42	48	41	37	39	45	45	40	35	35	75	RES
RES0776	228936	6302439	39	36	44	45	43	49	42	37	39	46	45	40	35	35	75	RES
RES0777	228826	6302260	42	37	46	47	45	51	44	39	41	48	45	40	35	35	75	RES
RES0778	228968	6302314	39	36	44	44	43	49	42	37	39	45	45	40	35	35	75	RES
RES0779	228872	6301931	44	40	49	50	48	54	47	42	44	51	45	40	35	35	75	RES
RES0780	228932	6301676	46	42	51	52	50	55	49	44	46	52	45	40	35	35	75	RES
RES0781	228703	6301214	54	50	59	60	58	63	57	52	55	61	45	40	35	35	75	RES
RES0782	228800	6301912	45	41	50	51	49	54	48	43	45	52	45	40	35	35	75	RES
RES0783	228950	6302521	39	35	43	44	42	48	41	36	39	45	45	40	35	35	75	RES
RES0784	228808	6301857	46	41	50	51	49	55	48	43	46	52	45	40	35	35	75	RES
RES0785	228508	6301171	62	52	65	67	66	71	65	60	61	68	45	40	35	35	75	RES
RES0786	228908	6302122	42	38	47	48	46	52	45	40	42	49	45	40	35	35	75	RES
RES0787	228842	6301741	46	42	51	52	50	56	49	44	46	53	45	40	35	35	75	RES
RES0788	230911	6299390	34	31	39	39	38	44	37	32	33	39	45	40	35	35	75	RES
RES0789	230962	6299487	34	31	39	39	38	44	37	32	33	39	45	40	35	35	75	RES
RES0790	230486	6299440	37	34	42	42	40	46	39	34	36	42	45	40	35	35	75	RES
RES0791	226901	6298226	32	31	37	37	36	42	35	30	32	37	45	40	35	35	75	RES
RES0792	227515	6297896	31	30	36	36	35	40	34	29	31	37	45	40	35	35	75	RES
RES0793	227667	6297691	33	31	37	38	37	43	36	30	32	38	45	40	35	35	75	RES
RES0794	228451	6297548	33	32	38	38	37	43	36	31	33	38	45	40	35	35	75	RES
RES0795	228307	6297540	33	32	38	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0796	228225	6297556	33	32	38	38	37	43	36	31	33	39	45	40	35	35	75	RES
RES0797	226530	6298446	32	31	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES0798	228462	6297658	34	32	38	39	38	44	37	31	33	39	45	40	35	35	75	RES

Appendix G
Construction scenario predicted noise levels

*Receiver locations are shown on maps in Appendix B

Key to cell formatting: ## > CNML Day ## > Highly affected level ## > CNML Evening/Night

Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment CS01	Construction compounds / laydown areas CS02	Access track upgrades CS03	Vegetation clearing CS04	Earthworks & civil works CS05	Tower footing construction (Impact Piling) CS06	Tower footing construction (Bored Piling) CS06B	Tower assembly and erection CS07	Stringing transmission line CS08	Demolition / rehabilitation CS09	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
RES0799	226674	6298412	30	30	35	35	34	39	33	28	30	36	45	40	35	35	75	RES
RES0800	226851	6298164	32	31	37	37	36	42	35	29	31	37	45	40	35	35	75	RES
RES0801	227722	6303314	40	30	73	73	44	50	43	38	40	46	45	40	35	35	75	RES
RES0802	228232	6303578	36	29	52	52	40	45	38	33	35	41	45	40	35	35	75	RES
RES0803	228081	6303756	36	28	55	55	39	45	38	33	35	41	45	40	35	35	75	RES
RES0804	228957	6303142	35	31	45	45	39	45	38	33	34	40	45	40	35	35	75	RES
RES0805	229071	6301673	45	42	49	50	49	54	48	43	44	51	45	40	35	35	75	RES
RES0806	228026	6303775	36	27	54	54	39	45	38	33	35	41	45	40	35	35	75	RES
RES0808	229212	6303685	32	28	43	43	36	41	34	29	31	37	45	40	35	35	75	RES
RES0809	229038	6303132	35	31	44	44	38	44	37	32	34	40	45	40	35	35	75	RES
RES0810	227887	6303945	36	27	53	53	39	45	38	33	35	41	45	40	35	35	75	RES
RES0811	230240	6299923	40	37	45	45	44	50	43	38	40	45	45	40	35	35	75	RES
RES0812	230756	6298877	33	31	39	38	37	43	36	31	33	38	45	40	35	35	75	RES
RES0813	230209	6299702	40	37	45	45	43	49	42	37	39	45	45	40	35	35	75	RES
RES0814	230465	6299538	37	35	43	42	41	47	40	35	37	42	45	40	35	35	75	RES
RES0815	230196	6299661	40	37	45	45	43	49	42	37	39	45	45	40	35	35	75	RES
RES0816	230276	6299568	39	36	44	44	42	48	41	36	38	44	45	40	35	35	75	RES
RES0817	227964	6303945	35	27	52	52	39	45	38	33	34	41	45	40	35	35	75	RES
RES0818	228174	6303267	38	31	56	56	42	48	41	36	38	44	45	40	35	35	75	RES
RES0819	229223	6303852	31	27	42	42	35	41	34	28	30	36	45	40	35	35	75	RES
RES0820	227973	6303701	37	28	57	57	40	46	39	34	36	42	45	40	35	35	75	RES
RES0821	228066	6303704	36	28	55	55	40	46	39	34	35	42	45	40	35	35	75	RES
RES0822	227738	6303504	39	29	67	67	43	48	42	37	38	45	45	40	35	35	75	RES
RES0823	228238	6303681	36	29	53	53	39	45	38	33	35	41	45	40	35	35	75	RES
RES0824	228082	6303703	36	28	55	55	40	46	39	34	35	42	45	40	35	35	75	RES
RES0825	228234	6303648	36	29	53	53	40	45	38	33	35	41	45	40	35	35	75	RES
RES0826	228101	6303700	36	28	55	55	40	46	39	34	35	42	45	40	35	35	75	RES
RES0827	228441	6304068	33	27	48	48	37	42	35	30	32	38	45	40	35	35	75	RES
RES0828	228160	6303616	36	29	54	54	40	45	39	34	35	42	45	40	35	35	75	RES
RES0829	227666	6303436	40	29	76	76	43	49	42	37	39	46	45	40	35	35	75	RES
RES0830	227707	6303862	37	27	56	56	40	46	39	34	36	42	45	40	35	35	75	RES
RES0831	227928	6303710	37	28	56	56	40	46	39	34	36	42	45	40	35	35	75	RES
RES0832	227523	6304026	37	26	53	53	40	46	39	34	36	42	45	40	35	35	75	RES
RES0833	227692	6303362	40	30	82	82	44	50	43	38	39	46	45	40	35	35	75	RES
RES0834	228924	6303686	33	28	45	45	37	43	36	30	32	38	45	40	35	35	75	RES
RES0835	228289	6303952	34	27	50	50	38	44	37	31	33	39	45	40	35	35	75	RES
RES0836	229030	6303582	33	29	44	44	37	43	36	30	32	38	45	40	35	35	75	RES
RES0837	228114	6303753	36	28	54	54	39	45	38	33	35	41	45	40	35	35	75	RES
RES0839	226141	6299305	32	32	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES0840	226816	6299378	36	36	42	41	40	46	39	34	35	42	45	40	35	35	75	RES
RES0841	227332	6299461	37	36	41	41	38	44	37	32	34	42	45	40	35	35	75	RES
RES0842	226280	6299001	32	32	37	37	36	42	35	29	31	37	45	40	35	35	75	RES
RES0843	226151	6299374	33	32	38	38	36	42	35	29	31	38	45	40	35	35	75	RES
RES0844	226191	6299375	33	32	38	38	36	42	35	30	31	38	45	40	35	35	75	RES
RES0845	226167	6299325	33	32	38	37	36	42	35	30	31	38	45	40	35	35	75	RES
RES0846	227201	6299603	40	39	45	44	43	49	42	37	39	46	45	40	35	35	75	RES
RES0847	226265	6299340	33	32	38	38	36	42	35	30	31	38	45	40	35	35	75	RES
RES0848	226821	6299470	37	36	42	41	40	46	39	34	36	42	45	40	35	35	75	RES
RES0849	226753	6299486	36	36	42	41	39	45	38	33	35	42	45	40	35	35	75	RES
RES0850	226257	6299313	33	32	38	37	36	42	35	30	32	38	45	40	35	35	75	RES
RES0851	227229	6299246	35	35	38	39	39	45	38	32	34	40	45	40	35	35	75	RES
RES0852	227378	6299454	39	39	45	43	41	47	40	35	36	46	45	40	35	35	75	RES
RES0853	227070	6298636	33	33	38	38	37	42	36	31	33	39	45	40	35	35	75	RES
RES0854	226871	6298946	35	34	40	40	39	45	38	33	35	41	45	40	35	35	75	RES
RES0855	226654	6299112	35	34	40	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0856	226676	6299111	35	34	40	39	38	44	37	32	34	40	45	40	35	35	75	RES
RES0857	227223	6299178	37	36	42	42	40	45	39	34	36	43	45	40	35	35	75	RES
RES0858	231231	6298754	31	29	36	36	34	40	33	28	30	35	45	40	35	35	75	RES
RES0859	231461	6299263	31	29	36	36	34	41	33	28	30	35	45	40	35	35	75	RES
RES0860	231649	6299400	30	28	35	35	34	40	33	28	29	35	45	40	35	35	75	RES
RES0861	231735	6299370	30	27	35	35	33	39	32	27	29	34	45	40	35	35	75	RES
RES0862	228425	6301124	68	52	70	75	72	77	71	66	69	76	45	40	35	35	75	RES
RES0863	229314	6300764	54	46	56	60	59	63	57	52	55	61	45	40	35	35	75	RES
RES0864	229248	6297153	30	29	35	35	34	40	33	28	29	35	45	40	35	35	75	RES
RES0865	229278	6297249	31	29	35	36	34	41	33	28	30	36	45	40	35	35	75	RES
RES0866	229160	6297308	31	30	35	36	35	41	34	29	30	36	45	40	35	35	75	RES
RES0867	228038	6297310	32	30	36	37	35	41	34	29	31	37	45	40	35	35	75	RES

*Receiver locations are shown on maps in Appendix B

Key to cell formatting: ## > CNML Day ## > Highly affected level ## > CNML Evening/Night

Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment CS01	Construction compounds / laydown areas CS02	Access track upgrades CS03	Vegetation clearing CS04	Earthworks & civil works CS05	Tower footing construction (Impact Piling) CS06	Tower footing construction (Bored Piling) CS06B	Tower assembly and erection CS07	Stringing transmission line CS08	Demolition / rehabilitation CS09	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
RES0868	227844	6297349	32	30	36	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES0869	229035	6297371	32	30	36	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES0870	227612	6297407	31	30	36	36	35	41	34	29	31	36	45	40	35	35	75	RES
RES0871	227739	6297409	32	30	36	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES0872	228070	6297438	32	31	37	37	36	42	35	30	32	38	45	40	35	35	75	RES
RES0873	230104	6297458	30	28	35	35	34	40	33	28	29	35	45	40	35	35	75	RES
RES0875	230303	6297502	30	28	34	34	33	40	32	27	29	34	45	40	35	35	75	RES
RES0876	226879	6297503	29	28	34	34	33	39	32	27	28	34	45	40	35	35	75	RES
RES0877	230400	6297506	30	28	34	34	33	39	32	27	28	34	45	40	35	35	75	RES
RES0878	227429	6297521	31	30	36	36	35	41	34	29	31	36	45	40	35	35	75	RES
RES0879	227214	6297521	30	29	35	35	34	40	33	28	30	35	45	40	35	35	75	RES
RES0880	229983	6297526	31	29	35	35	34	41	33	28	29	35	45	40	35	35	75	RES
RES0881	227349	6297527	31	30	35	36	34	41	33	28	30	36	45	40	35	35	75	RES
RES0882	226991	6297536	30	29	34	35	33	39	32	27	29	35	45	40	35	35	75	RES
RES0883	230486	6297540	29	26	34	34	32	38	31	26	28	31	45	40	35	35	75	RES
RES0884	227893	6297543	33	31	37	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0885	230261	6297576	30	29	35	35	34	40	33	28	29	35	45	40	35	35	75	RES
RES0886	227734	6297577	33	31	37	38	36	42	35	30	32	38	45	40	35	35	75	RES
RES0887	226754	6297595	29	28	34	34	33	39	32	27	28	34	45	40	35	35	75	RES
RES0888	226688	6297603	29	28	34	34	33	39	32	26	28	34	45	40	35	35	75	RES
RES0889	226633	6297612	27	27	32	32	31	37	30	25	26	32	45	40	35	35	75	RES
RES0890	230433	6297621	30	28	35	34	34	40	33	27	29	34	45	40	35	35	75	RES
RES0891	227445	6297652	32	30	36	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES0892	226747	6297681	30	29	34	34	33	39	32	27	29	34	45	40	35	35	75	RES
RES0893	226624	6297699	29	28	34	34	33	39	32	27	28	34	45	40	35	35	75	RES
RES0894	226564	6297712	29	28	34	34	33	39	32	26	28	34	45	40	35	35	75	RES
RES0895	227374	6297721	32	31	36	37	35	42	34	29	31	37	45	40	35	35	75	RES
RES0896	229612	6297734	33	31	37	37	37	43	36	30	32	37	45	40	35	35	75	RES
RES0897	226856	6297772	30	29	35	35	34	40	33	28	30	35	45	40	35	35	75	RES
RES0898	230602	6297775	30	28	35	35	34	40	33	27	29	34	45	40	35	35	75	RES
RES0899	229934	6297787	32	30	36	36	36	42	35	29	31	36	45	40	35	35	75	RES
RES0900	228903	6297826	35	33	39	40	38	44	37	32	34	40	45	40	35	35	75	RES
RES0901	227126	6297845	31	30	36	36	35	41	34	29	31	37	45	40	35	35	75	RES
RES0902	226830	6297862	31	30	35	36	34	40	33	28	30	36	45	40	35	35	75	RES
RES0903	226601	6297936	29	27	33	34	33	39	32	27	28	33	45	40	35	35	75	RES
RES0904	226859	6297998	31	30	36	36	35	41	34	29	31	36	45	40	35	35	75	RES
RES0905	226686	6298116	29	28	34	34	33	38	32	27	29	34	45	40	35	35	75	RES
RES0906	226585	6298355	29	29	34	34	33	39	32	27	29	35	45	40	35	35	75	RES
RES0907	225768	6298485	26	26	31	31	30	36	29	24	25	31	45	40	35	35	75	RES
RES0908	225900	6298619	29	29	34	34	33	39	32	27	28	34	45	40	35	35	75	RES
RES0909	225924	6298682	30	29	35	34	33	39	32	27	29	35	45	40	35	35	75	RES
RES0910	225934	6298721	30	29	35	34	33	39	32	27	29	35	45	40	35	35	75	RES
RES0911	225838	6298733	29	29	34	34	33	39	32	27	28	34	45	40	35	35	75	RES
RES0912	226139	6298809	31	30	36	36	34	41	33	28	30	36	45	40	35	35	75	RES
RES0913	226100	6298814	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0914	226088	6298816	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0915	226068	6298818	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0916	226033	6298821	31	30	36	35	34	40	33	28	29	35	45	40	35	35	75	RES
RES0917	226018	6298827	30	30	36	35	34	40	33	28	29	35	45	40	35	35	75	RES
RES0918	226000	6298829	30	30	35	35	34	40	33	28	29	35	45	40	35	35	75	RES
RES0919	225976	6298830	30	30	35	35	34	40	33	28	29	35	45	40	35	35	75	RES
RES0920	225931	6298831	30	29	35	35	34	40	33	27	29	35	45	40	35	35	75	RES
RES0921	225964	6298831	30	30	35	35	34	40	33	27	29	35	45	40	35	35	75	RES
RES0922	225930	6298842	30	29	35	35	34	40	33	27	29	35	45	40	35	35	75	RES
RES0923	226164	6298847	31	31	36	36	35	41	34	28	30	36	45	40	35	35	75	RES
RES0924	226075	6298860	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0925	225935	6298862	30	29	35	35	34	40	33	27	29	35	45	40	35	35	75	RES
RES0926	226126	6298863	31	30	36	36	35	41	34	28	30	36	45	40	35	35	75	RES
RES0927	226037	6298865	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0928	225990	6298870	31	30	36	35	34	40	33	28	29	35	45	40	35	35	75	RES
RES0929	226079	6298876	31	30	36	36	34	40	33	28	30	36	45	40	35	35	75	RES
RES0930	226166	6298877	32	31	37	36	35	41	34	29	30	36	45	40	35	35	75	RES
RES0931	225946	6298878	30	30	35	35	34	40	33	27	29	35	45	40	35	35	75	RES
RES0932	226036	6298881	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0933	226129	6298885	31	30	36	36	35	41	34	28	30	36	45	40	35	35	75	RES
RES0934	225985	6298886	30	30	36	35	34	40	33	28	29	35	45	40	35	35	75	RES
RES0935	226080	6298893	31	30	36	35	34	40	33	28	29	36	45	40	35	35	75	RES

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Key to cell formatting: ## > CNML Day ## > Highly affected level ## > CNML Evening/Night

Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment CS01	Construction compounds / laydown areas CS02	Access track upgrades CS03	Vegetation clearing CS04	Earthworks & civil works CS05	Tower footing construction (Impact Piling) CS06	Tower footing construction (Bored Piling) CS06B	Tower assembly and erection CS07	Stringing transmission line CS08	Demolition / rehabilitation CS09	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
RES0936	225944	6298894	30	30	35	35	34	40	33	27	29	35	45	40	35	35	75	RES
RES0937	226038	6298894	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0938	226171	6298896	32	31	37	36	35	41	34	29	31	37	45	40	35	35	75	RES
RES0939	225987	6298902	31	30	36	35	34	40	33	28	29	35	45	40	35	35	75	RES
RES0940	225946	6298906	30	30	35	35	34	40	33	28	29	35	45	40	35	35	75	RES
RES0941	226083	6298908	31	30	36	36	34	40	33	28	30	36	45	40	35	35	75	RES
RES0942	226135	6298911	31	31	36	36	35	41	34	28	30	36	45	40	35	35	75	RES
RES0943	226042	6298911	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0944	225990	6298917	31	30	36	35	34	40	33	28	29	36	45	40	35	35	75	RES
RES0945	225952	6298925	30	30	35	35	34	40	33	28	29	35	45	40	35	35	75	RES
RES0946	226045	6298926	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0947	226133	6298928	31	31	36	36	35	41	34	28	30	36	45	40	35	35	75	RES
RES0948	226173	6298930	32	31	37	36	35	41	34	29	30	37	45	40	35	35	75	RES
RES0949	226088	6298933	31	30	36	36	34	41	34	28	30	36	45	40	35	35	75	RES
RES0950	226045	6298942	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0951	225958	6298956	31	30	36	35	34	40	33	28	29	35	45	40	35	35	75	RES
RES0952	226047	6298958	31	30	36	36	34	40	33	28	30	36	45	40	35	35	75	RES
RES0953	226190	6298959	32	31	37	36	35	41	34	29	31	37	45	40	35	35	75	RES
RES0954	226000	6298963	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0955	226175	6298964	30	29	35	34	33	39	32	27	29	35	45	40	35	35	75	RES
RES0956	226126	6298971	31	31	36	36	35	41	34	29	30	36	45	40	35	35	75	RES
RES0957	226147	6298971	31	31	37	36	35	41	34	29	30	37	45	40	35	35	75	RES
RES0958	226050	6298972	29	29	34	33	32	38	31	26	28	34	45	40	35	35	75	RES
RES0959	226001	6298977	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0960	225955	6298982	31	30	36	35	34	40	33	28	29	36	45	40	35	35	75	RES
RES0961	226052	6298988	31	30	36	36	34	40	33	28	30	36	45	40	35	35	75	RES
RES0962	226002	6298994	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0963	225960	6298997	31	30	36	35	34	40	33	28	29	36	45	40	35	35	75	RES
RES0964	226057	6299003	31	30	36	36	34	41	33	28	30	36	45	40	35	35	75	RES
RES0965	226100	6299004	31	31	36	36	35	41	34	28	30	36	45	40	35	35	75	RES
RES0966	226004	6299006	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0967	225963	6299012	31	30	36	35	34	40	33	28	29	36	45	40	35	35	75	RES
RES0968	226057	6299016	31	30	36	36	34	41	33	28	30	36	45	40	35	35	75	RES
RES0969	226006	6299024	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0970	225964	6299027	29	28	34	33	32	38	31	26	27	34	45	40	35	35	75	RES
RES0971	226101	6299030	31	31	36	36	35	41	34	29	30	36	45	40	35	35	75	RES
RES0972	226059	6299034	29	29	34	33	32	38	31	26	28	35	45	40	35	35	75	RES
RES0973	225783	6299035	30	29	35	35	33	39	32	27	29	35	45	40	35	35	75	RES
RES0974	226008	6299040	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0975	225967	6299041	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0976	226105	6299048	32	31	37	36	35	41	34	29	30	37	45	40	35	35	75	RES
RES0977	226061	6299050	31	31	36	36	35	41	34	28	30	36	45	40	35	35	75	RES
RES0978	226012	6299054	31	30	36	36	34	40	33	28	30	36	45	40	35	35	75	RES
RES0979	226107	6299059	32	31	37	36	35	41	34	29	30	37	45	40	35	35	75	RES
RES0980	226064	6299068	31	31	36	36	35	41	34	28	30	36	45	40	35	35	75	RES
RES0981	225973	6299069	31	30	36	35	34	40	33	28	30	36	45	40	35	35	75	RES
RES0982	226012	6299071	31	30	36	36	34	40	33	28	30	36	45	40	35	35	75	RES
RES0983	226106	6299077	32	31	37	36	35	41	34	29	30	37	45	40	35	35	75	RES
RES0984	225975	6299086	31	30	36	36	34	40	33	28	30	36	45	40	35	35	75	RES
RES0985	226066	6299090	31	31	36	36	35	41	34	28	30	36	45	40	35	35	75	RES
RES0986	226111	6299092	32	31	37	36	35	41	34	29	30	37	45	40	35	35	75	RES
RES0987	226016	6299094	31	30	36	36	34	41	33	28	30	36	45	40	35	35	75	RES
RES0988	225976	6299101	30	29	36	36	34	40	33	27	30	35	45	40	35	35	75	RES
RES0989	226112	6299107	32	31	37	36	35	41	34	29	31	37	45	40	35	35	75	RES
RES0990	226071	6299111	31	31	36	36	35	41	34	29	30	36	45	40	35	35	75	RES
RES0991	226019	6299114	31	31	36	36	35	41	34	28	30	36	45	40	35	35	75	RES
RES0992	226115	6299121	32	31	37	36	35	41	34	29	31	37	45	40	35	35	75	RES
RES0993	225979	6299129	31	30	36	36	34	40	33	28	30	36	45	40	35	35	75	RES
RES0994	226022	6299131	31	31	36	36	35	41	34	28	30	36	45	40	35	35	75	RES
RES0995	226117	6299135	32	31	37	36	35	41	34	29	31	37	45	40	35	35	75	RES
RES0996	225981	6299144	31	30	36	36	34	40	33	28	30	36	45	40	35	35	75	RES
RES0997	226142	6299174	32	31	37	36	35	41	34	29	31	37	45	40	35	35	75	RES
RES0998	226128	6299175	32	31	37	36	35	41	34	29	31	37	45	40	35	35	75	RES
RES0999	226112	6299176	32	31	37	36	35	41	34	29	31	37	45	40	35	35	75	RES
RES1000	226195	6299179	32	32	37	37	36	42	35	29	31	37	45	40	35	35	75	RES
RES1001	226098	6299180	32	31	37	36	35	41	34	29	31	37	45	40	35	35	75	RES
RES1002	226081	6299182	32	31	37	36	35	41	34	29	30	37	45	40	35	35	75	RES

*Receiver locations are shown on maps in Appendix B

Key to cell formatting: ## > CNML Day ## > Highly affected level ## > CNML Evening/Night

Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment CS01	Construction compounds / laydown areas CS02	Access track upgrades CS03	Vegetation clearing CS04	Earthworks & civil works CS05	Tower footing construction (Impact Piling) CS06	Tower footing construction (Bored Piling) CS06B	Tower assembly and erection CS07	Stringing transmission line CS08	Demolition / rehabilitation CS09	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
RES1003	226067	6299183	32	31	37	36	35	41	34	29	30	37	45	40	35	35	75	RES
RES1004	225799	6299215	30	30	36	36	34	40	33	27	29	35	45	40	35	35	75	RES
RES1005	226206	6299223	32	32	37	37	36	42	35	29	31	38	45	40	35	35	75	RES
RES1006	226043	6299230	32	31	37	36	35	41	34	29	30	37	45	40	35	35	75	RES
RES1007	226193	6299242	32	32	37	37	36	42	35	29	31	38	45	40	35	35	75	RES
RES1008	226105	6299245	32	31	37	37	35	41	34	29	30	37	45	40	35	35	75	RES
RES1009	225981	6299253	31	31	37	36	34	41	34	28	30	36	45	40	35	35	75	RES
RES1010	226144	6299257	32	31	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES1011	226118	6299258	32	31	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES1012	226131	6299259	32	31	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES1013	226097	6299263	32	31	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES1014	226080	6299267	32	31	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES1015	226043	6299269	32	31	37	37	35	41	34	29	30	37	45	40	35	35	75	RES
RES1016	225983	6299273	31	31	37	37	35	41	34	28	30	36	45	40	35	35	75	RES
RES1017	226082	6299304	32	31	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES1018	225992	6299316	32	31	37	37	35	41	34	29	30	37	45	40	35	35	75	RES
RES1019	226083	6299319	32	31	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES1020	226026	6299320	32	31	37	37	35	41	34	29	30	37	45	40	35	35	75	RES
RES1021	225995	6299335	32	31	37	37	35	41	34	29	30	37	45	40	35	35	75	RES
RES1022	226089	6299344	32	31	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES1023	225998	6299348	32	31	37	37	35	41	34	29	30	37	45	40	35	35	75	RES
RES1024	226116	6299352	32	32	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES1025	226051	6299363	32	31	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES1026	225999	6299365	32	31	37	37	35	41	34	29	30	37	45	40	35	35	75	RES
RES1027	226034	6299370	32	31	37	37	35	41	34	29	30	37	45	40	35	35	75	RES
RES1028	225999	6299381	32	31	37	37	35	41	34	29	30	37	45	40	35	35	75	RES
RES1029	226063	6299389	32	31	37	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES1030	226091	6299397	32	32	38	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES1031	225958	6299397	31	31	37	37	35	41	34	29	30	36	45	40	35	35	75	RES
RES1032	225883	6299406	31	30	37	37	35	41	34	29	30	36	45	40	35	35	75	RES
RES1033	225860	6299417	31	30	37	37	35	41	34	29	30	36	45	40	35	35	75	RES
RES1034	226013	6299431	32	31	38	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES1035	226051	6299432	32	31	38	38	35	41	34	29	31	37	45	40	35	35	75	RES
RES1036	226034	6299436	32	31	38	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES1037	225964	6299466	32	31	38	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES1038	225918	6299475	31	31	37	37	35	41	34	29	30	37	45	40	35	35	75	RES
RES1039	225943	6299477	32	31	38	37	35	41	34	29	31	37	45	40	35	35	75	RES
RES1040	225865	6299487	31	30	37	37	35	41	34	29	30	36	45	40	35	35	75	RES
RES1041	225887	6299493	31	31	37	37	35	41	34	29	30	36	45	40	35	35	75	RES
RES1042	225845	6299512	31	30	37	37	35	41	34	29	30	36	45	40	35	35	75	RES
RES1043	225768	6299517	31	30	37	37	35	41	34	29	30	36	45	40	35	35	75	RES
RES1044	225534	6299551	30	29	37	36	34	40	33	28	29	35	45	40	35	35	75	RES
RES1045	225762	6299631	32	30	38	38	35	41	34	29	30	37	45	40	35	35	75	RES
RES1046	225336	6299652	30	28	36	36	34	40	33	27	29	35	45	40	35	35	75	RES
RES1047	225276	6299657	30	28	36	36	33	39	32	27	29	34	45	40	35	35	75	RES
RES1048	225192	6299887	30	27	36	36	34	40	33	27	29	34	45	40	35	35	75	RES
RES1049	224170	6300579	30	24	37	35	34	40	33	28	29	35	45	40	35	35	75	RES
RES1050	223698	6300918	30	26	37	35	34	40	33	27	29	35	45	40	35	35	75	RES
RES1051	222611	6301613	32	30	37	37	36	42	35	30	31	37	45	40	35	35	75	RES
RES1052	221908	6301663	31	30	35	36	35	41	33	28	30	36	45	40	35	35	75	RES
RES1053	221802	6302149	33	32	37	37	37	42	35	30	32	38	45	40	35	35	75	RES
RES1054	221667	6302296	33	32	37	38	37	43	36	30	32	38	45	40	35	35	75	RES
RES1055	221107	6302376	31	30	36	36	35	40	33	28	30	36	45	40	35	35	75	RES
RES1056	220604	6303423	31	29	36	36	34	40	33	28	29	36	45	40	35	35	75	RES
RES1057	220810	6303494	32	28	36	36	36	41	34	29	31	36	45	40	35	35	75	RES
RES1058	220683	6303532	31	28	36	36	35	41	34	29	30	36	45	40	35	35	75	RES
RES1059	220554	6304896	30	28	38	38	34	40	33	27	29	35	45	40	35	35	75	RES
RES1060	220594	6304897	30	28	38	38	34	40	33	28	29	35	45	40	35	35	75	RES
RES1061	220576	6304902	30	28	38	38	34	40	33	27	29	35	45	40	35	35	75	RES
RES1062	220536	6304906	30	28	38	38	34	40	33	27	29	35	45	40	35	35	75	RES
RES1063	220600	6304958	30	28	38	38	34	40	33	28	29	35	45	40	35	35	75	RES
RES1064	220584	6304959	30	28	38	38	34	40	33	27	29	35	45	40	35	35	75	RES
RES1065	220562	6304960	30	28	38	38	34	40	33	27	29	35	45	40	35	35	75	RES
RES1066	220542	6304962	30	28	38	38	33	40	32	27	29	35	45	40	35	35	75	RES
RES1067	220572	6305035	30	28	38	38	34	40	33	27	29	35	45	40	35	35	75	RES
RES1068	220556	6305045	30	28	38	38	33	40	32	27	28	35	45	40	35	35	75	RES
RES1069	220690	6305166	30	28	37	37	34	40	33	27	28	34	45	40	35	35	75	RES

Appendix G
Construction scenario predicted noise levels

*Receiver locations are shown on maps in Appendix B

Key to cell formatting: ## > CNML Day ## > Highly affected level ## > CNML Evening/Night

Receiver ID	Coordinate X	Coortinate Y	Early works / site establishment	Construction compounds / laydown areas	Access track upgrades	Vegetation clearing	Earthworks & civil works	Tower footing construction (Impact Piling)	Tower footing construction (Bored Piling)	Tower assembly and erection	Stringing transmission line	Demolition / rehabilitation	CNML Day	CNML OOHW Day	CNML OOHW Evening	CNML OOHW Night	Highly affected level	Receiver type
			CS01	CS02	CS03	CS04	CS05	CS06	CS06B	CS07	CS08	CS09						
RES1070	220660	6305331	29	28	35	35	31	37	30	25	26	33	45	40	35	35	75	RES
RES1071	221505	6306411	29	28	37	36	31	37	30	25	27	33	45	40	35	35	75	RES
TEM0001	227285	6299766	39	39	44	43	42	47	41	36	38	44	70	70	70	70	-	TEM
TEM0002	227290	6299753	42	41	47	46	44	50	43	38	40	47	70	70	70	70	-	TEM
TEM0003	227275	6299809	42	41	47	46	44	50	43	38	40	47	70	70	70	70	-	TEM
TEM0004	227288	6299773	40	40	45	44	42	47	41	36	38	46	70	70	70	70	-	TEM
TEM0005	227280	6299805	42	41	47	46	44	50	43	38	40	48	70	70	70	70	-	TEM
TEM0006	227289	6299801	42	41	47	46	44	50	43	38	40	48	70	70	70	70	-	TEM
TEM0007	227296	6299798	42	41	47	46	44	50	43	38	40	48	70	70	70	70	-	TEM
TEM0008	227304	6299794	40	40	45	44	42	48	41	36	38	46	70	70	70	70	-	TEM
TEM0009	227913	6300154	52	51	58	54	52	58	51	46	49	59	70	70	70	70	-	TEM
TEM0010	227885	6300197	51	51	57	54	51	57	50	45	48	58	70	70	70	70	-	TEM
TEM0011	227788	6300141	49	48	55	52	49	55	48	44	46	56	70	70	70	70	-	TEM
TEM0012	227828	6300103	49	49	56	53	51	56	50	45	47	56	70	70	70	70	-	TEM
TEM0013	227897	6300116	51	51	57	54	52	57	51	46	48	58	70	70	70	70	-	TEM
TEM0014	227778	6300125	47	46	53	50	48	53	47	42	44	55	70	70	70	70	-	TEM
TEM0015	227926	6300121	52	51	58	54	52	58	51	46	49	59	70	70	70	70	-	TEM
TEM0016	227854	6300109	51	50	57	53	51	57	50	45	48	57	70	70	70	70	-	TEM
TEM0017	227802	6300141	50	49	56	53	50	56	49	44	47	56	70	70	70	70	-	TEM
TEM0018	227893	6300187	51	51	58	54	51	57	50	45	48	58	70	70	70	70	-	TEM
TEM0019	227838	6300129	50	50	56	53	51	56	50	45	47	57	70	70	70	70	-	TEM
TEM0020	227857	6300174	51	50	57	54	51	57	50	45	48	58	70	70	70	70	-	TEM
TEM0021	227282	6299710	41	41	47	45	42	48	41	36	40	47	70	70	70	70	-	TEM
TEM0022	227213	6299729	40	39	46	45	42	48	41	36	39	46	70	70	70	70	-	TEM
TEM0023	227230	6299718	41	40	46	45	43	49	42	37	40	47	70	70	70	70	-	TEM
TEM0024	227227	6299746	39	39	44	44	41	47	40	35	37	45	70	70	70	70	-	TEM
TEM0025	227238	6299739	40	40	45	44	44	49	43	38	39	46	70	70	70	70	-	TEM

Appendix H

Corona noise report

Central-West Orana Renewal Energy Zone – TL7G/71

Corona Noise Report

Transgrid

Reference: P528069

Revision: C

14 March 2025

aurecon

Bringing ideas to life

Document control record

Document prepared by:

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A	2025-02-03	Draft report for review	ES	AG	LF	LF
B	2025-02-28	Final report	ES	AG	LF	LF
C	2025-03-14	Final report	ES	AG	LF	LF
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Approval			
Author signature		Approver signature	
Name	Ellie Sacilotto	Name	Luke Fu
Title	Electrical Engineer	Title	Associate

Contents

Appendices

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Figures

Tables

1 Project Overview

The NSW Government's Electricity Infrastructure Roadmap (DPIE 2020) identifies that the expansion of renewable generation must be accompanied by increased transmission capacity to transfer power from REZs in inland NSW to key demand centres. Interest in new energy generation projects in the CWO REZ is forecasted to exceed the existing transmission network capacity in several locations. The existing infrastructure located between the Mount Piper 550/330 kV substation (Mount Piper 330 kV substation) and the Wallerawang 330/132 kV substation (Wallerawang 330 kV substation) has been identified in the NSW Network Infrastructure Strategy (EnergyCo 2023) as requiring upgrades.

The Mount Piper to Wallerawang Transmission Line Upgrade Project (the project) would provide the additional capacity required to reliably transmit power from the CWO REZ to the Greater Sydney region. The project would comprise construction and operation of approximately 8 km of new 330 kV transmission line between the Mount Piper and Wallerawang 330 kV substations. The standard easement widths for 132 kV and 330 kV transmission lines are 45 m and 60 m respectively. However, easements may vary in width where multiple transmission lines converge/ diverge or where they overlap with an existing easement.

1.1 Report scope

This report assesses the impact of audible noise and radio interference from the proposed 330 kV double circuit transmission line constructed between Mt Piper Substation and Wallerawang Substation.

1.2 Abbreviations and Definitions

Abbreviation	Description
ACSR/GZ	Aluminium Conductor Steel Reinforced/Galvanized
BYDA	Before You Dig Australia
CBL	Calculated Breaking Load (kN)
CWO REZ	Central-West Orana Renewal Energy Zone
EDMS	Electronic Document Management System
EMF	Electromagnetic Field
Hz	Hertz SI unit of frequency
ICAO	International Civil Aviation Organisation
ICNIRP	International Commission on Non-Ionising Radiation Protection
LHS	Left Hand Side
LIDAR	A remote sensing technology that measures distance by illuminating a target with a laser and analysing the reflected light.
MOT	Maximum Operating Temperature
NPfI	EPA Noise Policy for Industry
OHEW	Overhead Earth Wire
OPGW	Optical Fibre Ground Wire
PSSR	Power System Safety Rules
RHS	Right Hand Side

SC/AC	Steel Conductor/Aluminium Clad
SC/GZ	Steel Conductor/Galvanized
SRF	Span Reduction Factor (unitless)
SWMS	Safe Work Method Statements

1.3 References

1.3.1 Transgrid project requirements and standards

Table 1-1: Transgrid standards and requirements

Document No.	Document Title
TLDM – MNB Rev 2.0	Transmission Line Design Manual – Major New Build Rev 2.0

1.3.2 Australian standards

Table 1-2: Australian standards

Document No.	Document Title
AS 1154.1-2009	Insulator and conductor fittings for overhead power lines, Part 1: Performance, material, general requirements and dimensions
AS 1154.3-2009	Insulator and conductor fittings for overhead power lines, Part 3: Performance and general requirements for helical fittings
AS 2344:2016	Limits of electromagnetic interference from overhead a.c. powerlines and high voltage equipment installations in the frequency range 0.15 MHz to 3000 MHz
AS IEC 60437-2005	Radio interference test on high-voltage insulators
AS/NZS 7000:2016	Overhead line design
HB 102-1997 (CJC 6)	Coordination of power and telecommunications - Low Frequency Induction (LFI) - Application Guide to the LFI Code. Standards Australia Committee ET/7
Noise Policy for Industry	Noise Policy for Industry (2017)

1.3.3 International standards and guidelines

Table 1-3: International standards and International industry technical bodies

Document No.	Document Title
CISPR TR 18-2:2017	Radio interference characteristics of overhead power lines and high-voltage equipment - Part 2: Methods of measurement and procedure for determining limits.
IEEE Transactions on Power Delivery (Volume: 7, Issue: 2, April 1992), Page(s): 903 - 913	Comparison of several methods for calculating power line electromagnetic interference levels and calibration with long term data
EPRI, 1982	Transmission Line Reference Book 345 kV and Above

2 Design criteria

2.1 Audible noise

Transgrid Transmission Line Design Manual – Major New Build (Rev 2) states that transmission line audible noise shall not show worse performance than 50 dB (A) at the edge of the line easement in L50 wet conditions.

EPA Noise Policy for Industry (NPfI) provides a benchmark to assess both the increase in noise level above background levels (intrusiveness noise level) and the absolute level of noise from industrial sources (amenity noise level). The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source does not exceed the background noise level based on L90 descriptor by more than 5 dB when beyond a minimum threshold. The recommended amenity noise levels for each new source of industrial noise level should be the recommended amenity noise level minus 5 dB(A).

NPfI provides a minimum intrusiveness noise of 35 dB(A) ($L_{Aeq,15min}$) for night time. Also, based on NPfI Table 2.2, the minimum amenity noise level for a new source of industrial noise is 38 dB(A) for night time rural residential areas. These noise levels will be assessed under all weather conditions.

2.2 Radio Frequency Interference (RFI)

AS2344 specifies the limits of electromagnetic interference from overhead A.C powerlines and high voltage equipment installations in the frequency range 0.15 MHz to 30 MHz.

Table 2-1: Table 1 from AS2344 – Limits of radiated radio disturbance 0.15 MHz to 30 MHz

TABLE 1

LIMITS OF RADIATED RADIO DISTURBANCE 0.15 MHz TO 30 MHz

Frequency (MHz)[5]	Field strength[2] (dBµA/m) at the boundary of the line corridor[1] or 30 m from an installation		
	Region 3 (Australia)		
	Zone A	Zone B	Zone C
0.15–0.3	−4.5	5.5	−1.5
0.3–3[3]	−18.5	−8.5	−15.5
3 to 30[4]	−18.5 to −31.5	−8.5 to −21.5	−15.5 to −28.5

NOTES:

1 The corridor width is determined by the relevant regulatory authority or from Table 3 where no regulation is applicable.

2 The limits of Tables 1 and 2 apply at the distances defined in Clause 7(c).

3 The limits given for Region 3 apply to rural areas and to urban areas not serviced by local m.f. broadcasts. For urban areas serviced by local broadcast stations, the limits may be increased by 14 dB over the frequency range of 0.5 MHz to 1.7 MHz.

4 The limit decreases linearly with the logarithm of the frequency from 3 MHz to 30 MHz.

5 At the transition frequency the lower limit applies.

In the AS2344 standard Table 1 gives the following limits for Radio Interference as follows. Interpreting the table, the project is considered to be located in Zone C (taken from the figure below) and the boundary of the line corridor is interpreted as the edge of the easement as detailed above in the Observational Zones section.

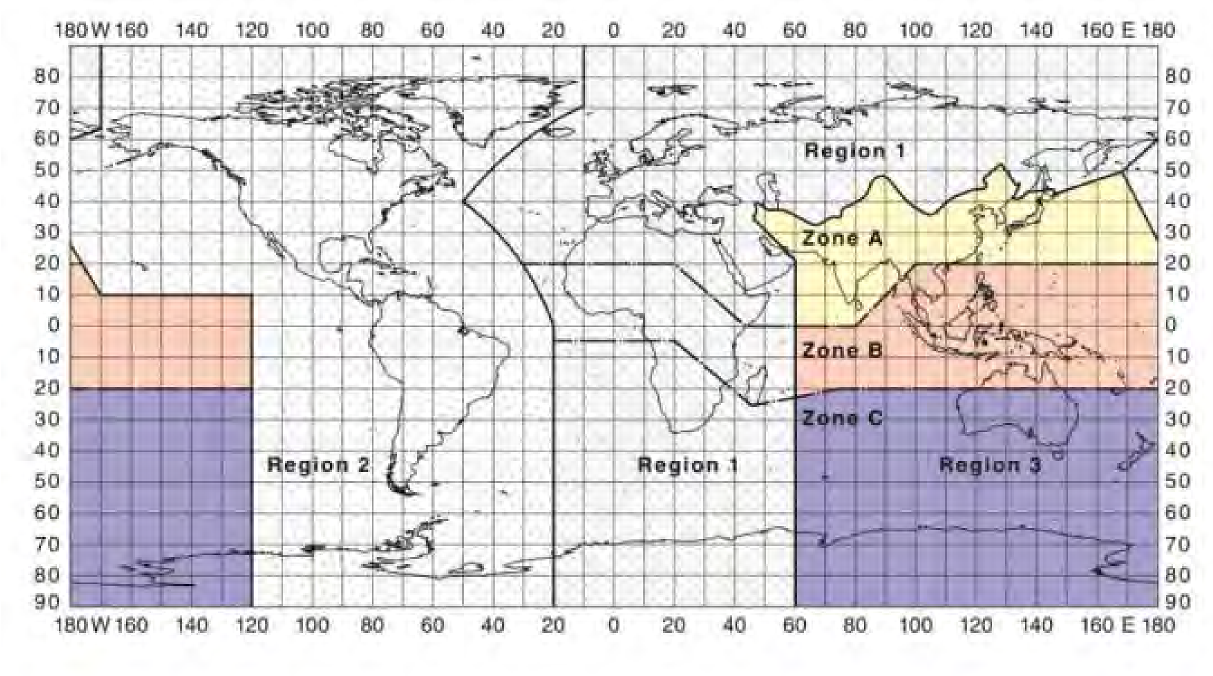


Figure 2-1 Map from AS2344 showing regions and zones for classification of field strength

As shown by the figure above, the proposed transmission line is located in the Zone C section. The Zone C field strength limit at 50 Hz in AS 2344 Table 1 is -15.5 dBμA/m.

Calculation of the radio interference limit according to AS2344:

- 0.3 to 3 MHz radio interference field strength limit of -15.5 dBμA/m.
- AS 2344 page 9 specifies the following formula to convert dBμA/m

$$Limit\ in\ \mathrm{dB}\ \mu\frac{V}{\mathrm{m}} = \ \mathrm{dB}\ \mu\frac{\mathrm{A}}{\mathrm{m}}. +51.5^{*}$$

$$Limit\ in\ \mathrm{dB}\ \mu\frac{V}{\mathrm{m}} = \ -15.5 + 51.5$$

$$= 36\ \mathrm{dB}\ \mu\frac{V}{\mathrm{m}}$$

*51.5 = the characteristic impedance of free space (377 ohms) in decibels.

Accordingly, the limit of radio interference at 50 Hz (fair weather) is 36 dBμV/m. This limit is conservative in comparison to other international standards.

2.3 Radio Interference at higher frequencies

Corona can be a source of severe interference on the AM broadcast band, especially during foul weather, however very few complaints over recent years have been received in this frequency band due to corona. This is part due to the popularity of the FM broadcast band (87 to 108 MHz) which is not affected as much by overhead line interference.

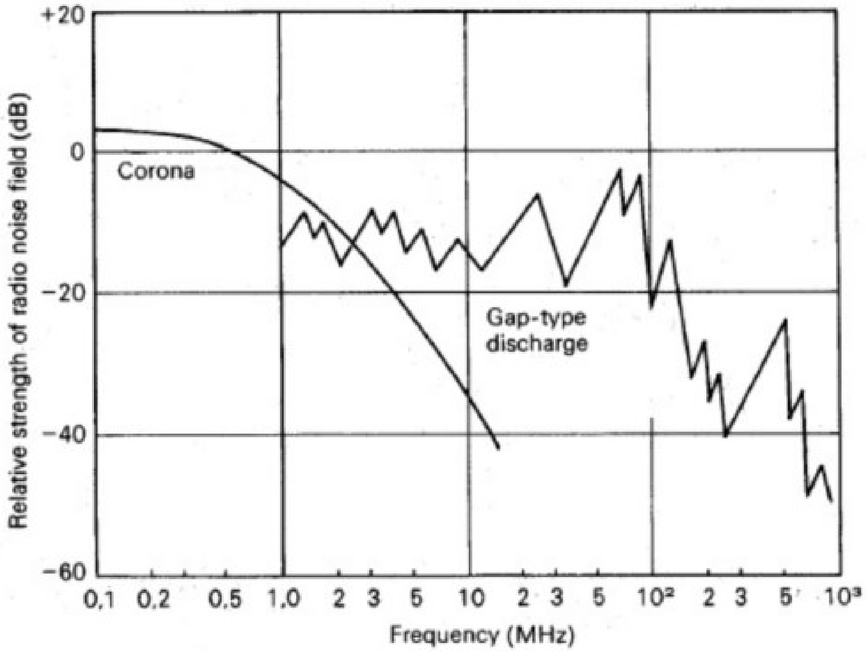


Figure 2-2: Relative strength of corona and gap type discharges as a function of frequency

As can be seen from the figure above, radio interference due to the corona rapidly decreases at frequencies above 3.0 MHz. The AS 2344 limit for radio interference increases at frequencies above 30 MHz, meanwhile the noise produced by the line decreases with frequency. Accordingly, frequencies above 30 MHz are not expected to present any radio interference problems.

3 Assessment inputs and methodologies

3.1 Tower geometry

Existing 330kV line 70/71 and new 330kV line 7G runs between Mt Piper 500/330 kV substation and Wallerawang 330/132kV substation. Existing 132kV line 94E runs between Mt Piper 132 kV substation and Wallerawang 330/132kV substation.

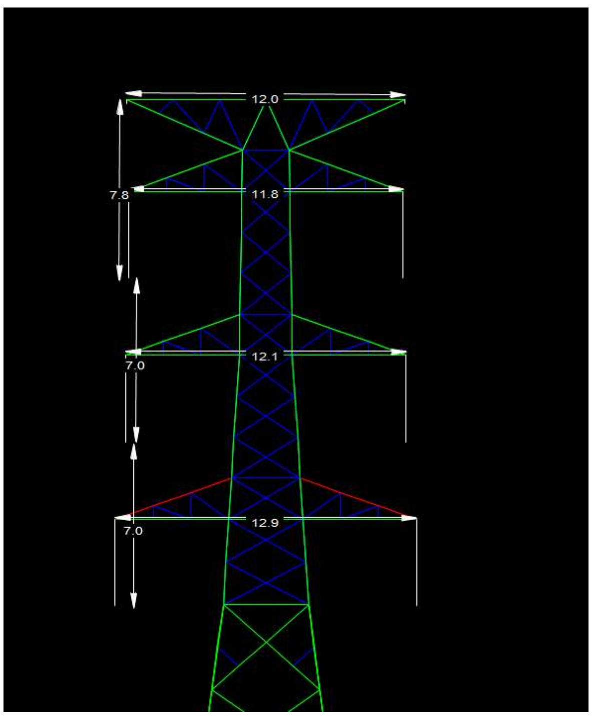
To enable the establishment of 330kV feeder 7G, new 330kV double circuit towers and an associated 60m easement will be established between the Wallerawang substation and the existing 94E line crossing. Then, between the 94E line crossing and Mt Pipper 500/330 kV substation, the existing single circuit 132kV poles will be rebuilt to 330kV double circuit towers with the easement widened from 45m to 60m.

The new easement primarily traverses the Gardens of Stone State Conservation Area and several land parcels designated RU1 Primary Production.

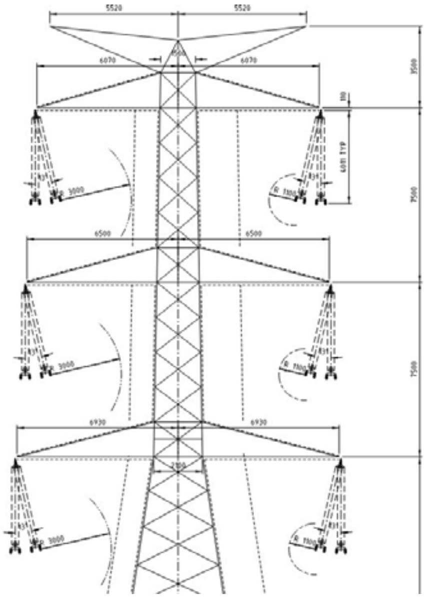
The minimum conductor height has been modelled to determine the anticipated audible noise and radio interference from the line. The lowest conductor height represents a worst-case as it is the closest the conductors will be to receivers. Where the audible noise and radio interference do not comply with the minimum requirements, a more detailed analysis was undertaken, which reviewed the site-specific conductor height and existing noise of the line.

The following tower structures were provided by Transgrid and used as a basis for the audible noise and radio interference studies:

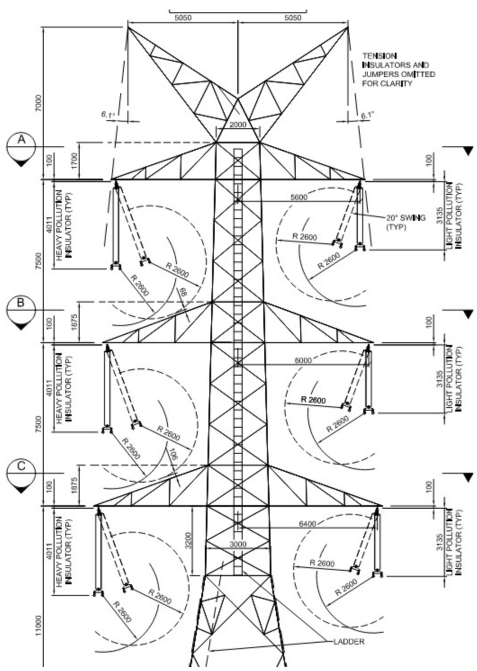
- Existing line 70/71, 330kV Double Circuit Suspension (DSR)



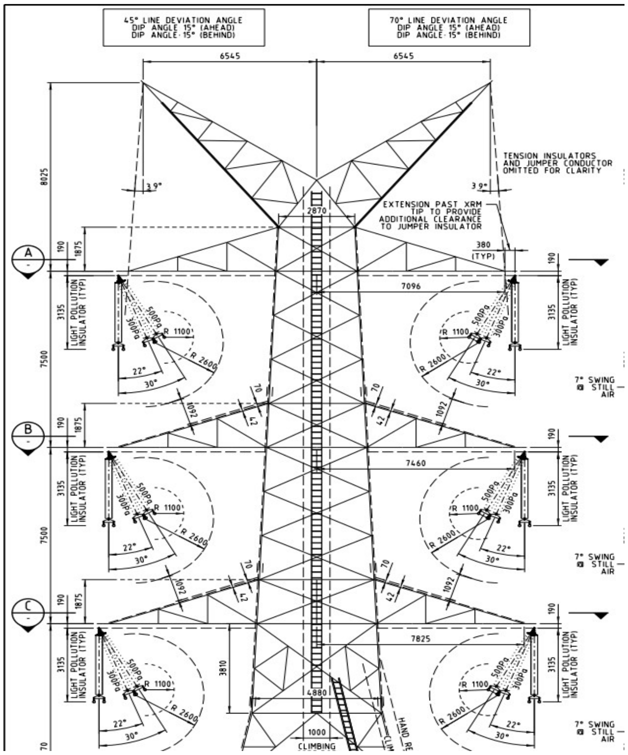
- Proposed 330kV Double Circuit Light Suspension (RSR)



• Proposed 330kV Double Circuit Light Strain (RWA)



• Proposed 330kV Double Circuit Light Terminal (RWD) / 330kV Double Circuit Buckarm (RWD)



3.2 Modelled cases

The following cases were modelled to cover the proposed transmission network augmentation:

- Scenario 1: Tower 3C to 8C, typical 100m easements consist of the new 330kV tower line with LHS 330kV circuit 7G, running in parallel with the existing double circuit 330kV tower line 70/71
- Scenario 2: Site-specific assessment of span 9D-10D to the nearest receiver
- Scenario 3: Site-specific assessment of 330kV to 132kV line crossing at span 12D-13D
- Scenario 4: Tower 13D to 27D, typical 60m easements consist of the standalone new 330kV tower line with left-hand-side (LHS) 330kV circuit 71 and right-hand-side (RHS) 132kV circuit 94E
- Scenario 5: Site-specific assessment of parallel line section at span 27D-28D

330 kV line with only one circuit energised (1C to 3C, 10D to 13D) is expected to produce less noise than the scenario of both circuits energised. Therefore, the conclusions can be conservatively covered in Scenario 4.

Refer to Figure 3-1 and the modelled line parameters below, which are confirmed by Transgrid. The circuit current is based on the design rating of the line, which is to cover both normal and contingency operations.

All cases have been modelled at an observational plane (height above the ground) of 1.8 metre, frequency of 50 Hz and operating voltage of 1.1 p.u.

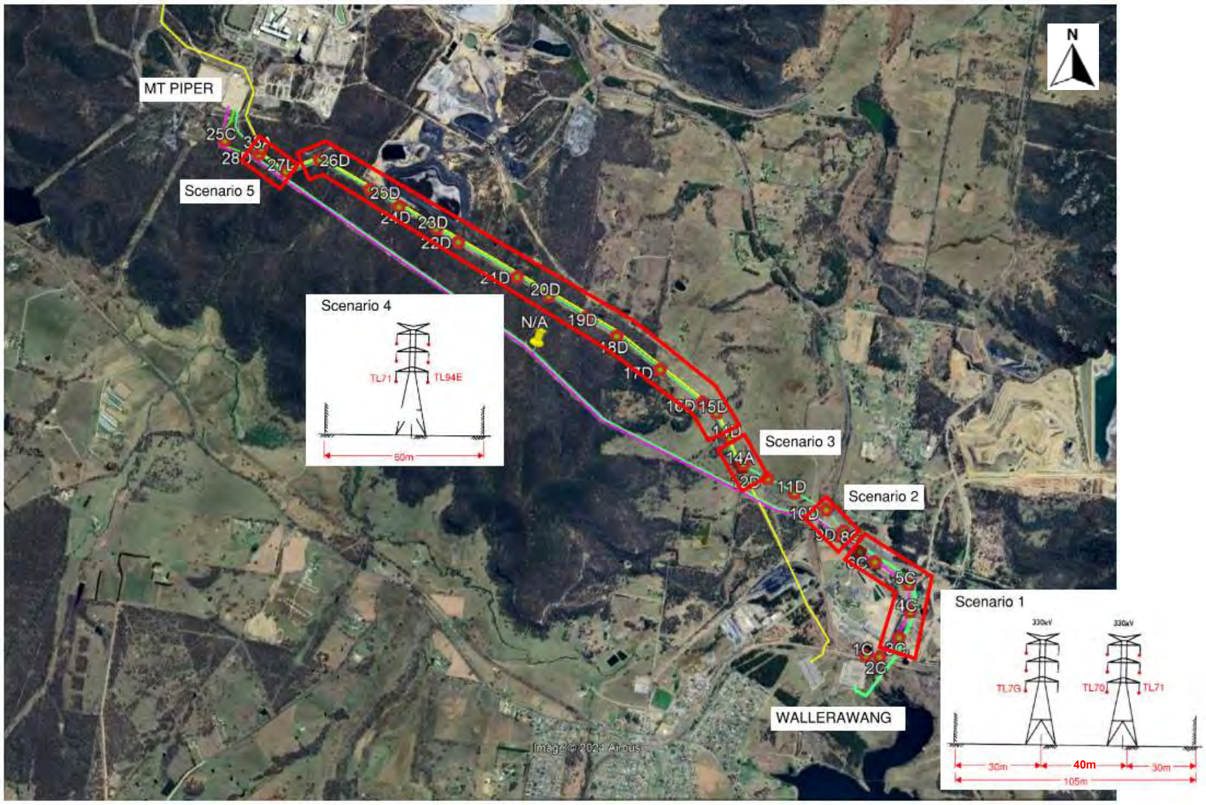


Figure 3-1: Noise assessment locality plan

3.2.1 Scenario 1: Typical case taken at Span 5C to 6C parallel to existing 330kV line 70/71

Model Input	5C to 6C LHS (7G)	7 to 8 LHS (70)	7 to 8 RHS (71)
Shield wire conductors	OPGW	GRAPE	OPGW
Phase conductors	TWIN OLIVE ACSR/GZ	TWIN OLIVE ACSR/GZ	TWIN OLIVE ACSR/GZ
Tower arrangements	RWD	DSR	DSR
Phase configuration	R	B	B
	W	W	W
	B	R	R
Voltage	330 kV	330 kV	330 kV
Current rating	2865 A	2168 A	2167 A

3.2.2 Scenario 2: Span 9D to 10D, TL70 cross-over to the new 330kV tower

Model Input	8C to 10 LHS (7G)	8C to 10 RHS (70)	9D to 10D RHS (71)
Shield wire conductors	GRAPE	OPGW TYBE B - LHS	OPGW TYBE B - LHS
Phase conductors	TWIN OLIVE ACSR/GZ	TWIN OLIVE ACSR/GZ	TWIN OLIVE ACSR/GZ
Tower arrangements	RWA	RWA	RWA
Phase configuration	R	B	B
	W	W	W
	B	R	R
Voltage	330 kV	330 kV	330 kV
Current rating	2721 A	2167 A	2168 A

3.2.3 Scenario 3: Span 12D to 13D, 330kV line 71 crossing 132kV line 94E

Model Input	13A to 14A (71)	12D to 13D (94E)
Shield wire conductors	GRAPE	OPGW
Phase conductors	TWIN OLIVE ACSR/GZ	TWIN OLIVE ACSR/GZ
Tower arrangements	RWD	LUB-LUK
Phase configuration	B	R
	W	W
	R	B
Voltage	330 kV	132 kV
Current rating	2168 A	1067 A

3.2.4 Scenario 4: Typical case taken at Span 17D to 18D

Model Input	17D to 18D LHS (71)	17D to 18D RHS (94E)
Shield wire conductors	OPGW	GRAPE
Phase conductors	TWIN OLIVE ACSR/GZ	TWIN OLIVE ACSR/GZ
Tower arrangements	RSR	RSR
Phase configuration	B	R
	W	W
	R	B
Voltage	330 kV	132 kV
Current rating	2168 A	1067 A

3.2.5 Scenario 5: 27D to 28D parallel to 23 to 24

Model Input	23 to 24 LHS (7G)	23 to 24 RHS (70)	27D to 28D RHS (71)	27D to 28D RHS (94E)
Shield wire conductors	GRAPE	OPGW	GRAPE	OPGW
Phase conductors	TWIN OLIVE ACSR/GZ	TWIN OLIVE ACSR/GZ	TWIN OLIVE ACSR/GZ	TWIN OLIVE ACSR/GZ
Tower arrangements	DSR	DSR	RWD	RWD
Phase configuration	R	B	B	R
	W	W	W	W
	B	R	R	B
Voltage	330 kV	330 kV	330 kV	132 kV
Current rating	2721 A	2167 A	2168 A	1067 A

3.3 CDEGS Methodology

Audible noise assessment was undertaken to the EPRI semi-empirical calculation method.

RFI calculations were undertaken to CISPR 18-2 “Methods for measurement of RI characteristics of overhead power lines and high voltage equipment”.

The modelling for the radio interference and audible noise assessment was completed using SES EnviroPlus. The assessment was completed at 1.8 metres at the average ear height of the normal standing position of the general public (1.8 metres above ground level).

The scenarios detailed above in section 3.2 have been modelled in SES EnviroPlus. The conductor heights have been assessed at lowest conductor height, where results are found to not meet this requirement a more detailed assessment is done using the average conductor height and existing line noise.

A line voltage equal to the system highest voltage of 10% above normal and the rated line loading outlined in was applied for the calculations. To represent the maximum line voltage, the voltage applied to the model included a c factor of 1.1.

3.4 Accumulative noise

If the noise level at a reference point differs by more than 10 dB between sources, the effect of the lower source is negligible due to the log scale used for noise measurements. The following formula (EPRI, 1982) can be applied to calculate the accumulative noise of more than one source with similar frequencies.

$$dB_{total} = 10 \times \log(\sum_{i=1}^{n} 10^{(\frac{dBi}{10})})$$

There are 330 kV existing transmission lines running parallel to the proposed new Piper to Wallerawang transmission line.

3.5 Weather

The following inputs were used through the CDEGS SES Enviroplus software when simulating the noise and radio interference of the 330 kV transmission line to produce results under various weather conditions:

- Fair weather
- L50 (Light Rain): L50 rain is simulated at a rain rate of 0.75mm/h
- Heavy Rain: heavy rain is simulated at a rain rate of 18mm/h

For the audible noise in rain, the assessment is based on the most commonly used calculation methods (Chartier and Stearns 1981; EPRI 1982) refer to the median value, which is the L50 exceedance level, during periods of measurable rain. Transgrid has adopted the same approach in TLDM-MNB based on the local experience.

It shall be noted that based on evidence provided in the EPRI AC Transmission Line Reference Book, a transmission line in heavy rain is expected to produce higher audible noise than in light rain. However, during heavy rain, the ambient noise is very high due to the rain hitting various surfaces. Therefore, for audible noise assessment, it is of more interest to examine L50 rain since this will cause more noise than fair weather, while the sound of the light rain is not expected to mask the sound of the transmission line so effectively.

3.6 Observation Zone

- Audible Noise observational zone – 1.8 m metre above the ground (typical ear height of a person standing)
- Easement width: Transgrid standard 330kV double circuit line easement width is 60m.
- Parallel line separation: As per the transmission line layout design provided for the assessment

4 Surface Voltage Gradients Calculation

Refer to the table below for the calculated surface voltage gradients of the proposed twin Olive conductor bundle. The maximum surface voltage gradient is 16 kV/cm, which is aligned with the TLDM and AS/NZS 7000:2016 recommendation to limit the generation of corona discharges.

Table 4-1: Calculated maximum surface voltage gradients of 330kV Twin Olive

Scenario	Circuit	Phase A	Phase B	Phase C
Scenario 1	7G	15 kV/cm	16 kV/cm	16 kV/cm
	70	15 kV/cm	16 kV/cm	16 kV/cm
	71	15 kV/cm	16 kV/cm	16 kV/cm
Scenario 2	7G	15 kV/cm	16 kV/cm	16 kV/cm
	70	16 kV/cm	16 kV/cm	16 kV/cm
	71	16 kV/cm	16 kV/cm	16 kV/cm
Scenario 3	71	15 kV/cm	16 kV/cm	15 kV/cm
	94E	7 kV/cm	7 kV/cm	7 kV/cm
Scenario 4	71	15 kV/cm	16 kV/cm	16 kV/cm
	94E	7 kV/cm	6 kV/cm	7 kV/cm
Scenario 5	7G	16 kV/cm	16 kV/cm	16 kV/cm
	70	16 kV/cm	16 kV/cm	16 kV/cm
	71	16 kV/cm	16 kV/cm	16 kV/cm
	94E	7 kV/cm	6 kV/cm	7 kV/cm

5 Audible noise results

Refer to the calculated audible noise levels for each assessment scenario. The noise results and easement width in the figures cover both the existing and new lines. Worst-case L50 results are used to generate the audible noise sensitive receiver mapping in Section 7.

5.1 Scenario 1: 5C to 6C parallel to 7

- Audible noise at the nearest receiver (70m from centreline): <30 dB(A), Fair Weather
- Audible noise at the edge of the easement: 48 dB(A), L50 condition
- Audible noise at the nearest receiver (70m from centreline): 44 dB(A), L50 condition

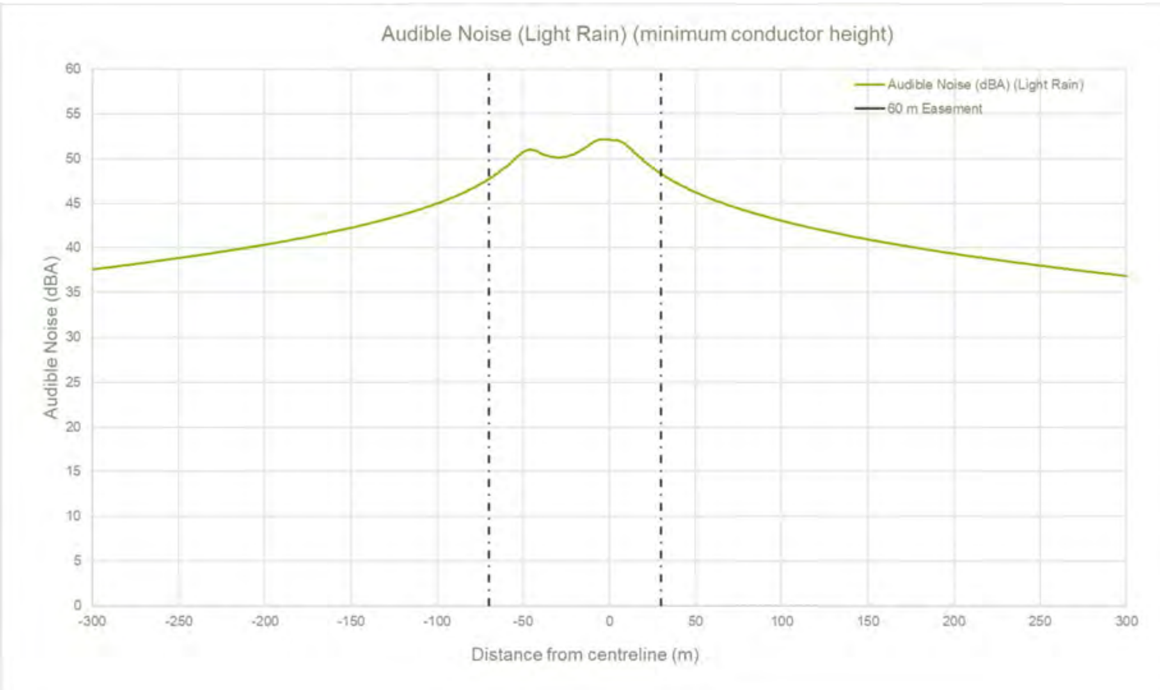


Figure 5-1: Scenario 1 Audible Noise (L50) minimum conductor height

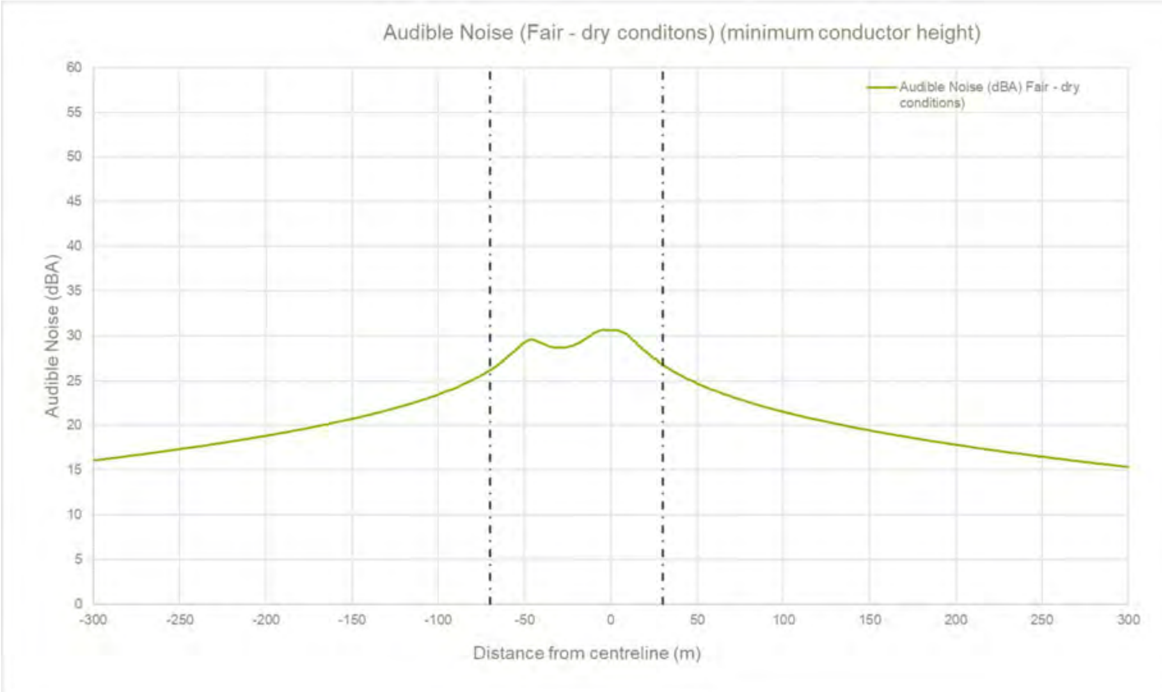


Figure 5-2: Scenario 1 Audible Noise (Fair Weather) minimum conductor height

5.2 Scenario 2: 9D to 10D parallel with 8C to 10

- Audible noise at the nearest receiver (90m from centreline): <30 dB(A), Fair Weather
- Audible noise at the edge of the easement: 48 dB(A), L50 condition
- Audible noise at the nearest receiver (90m from centreline): 43 dB(A), L50 condition

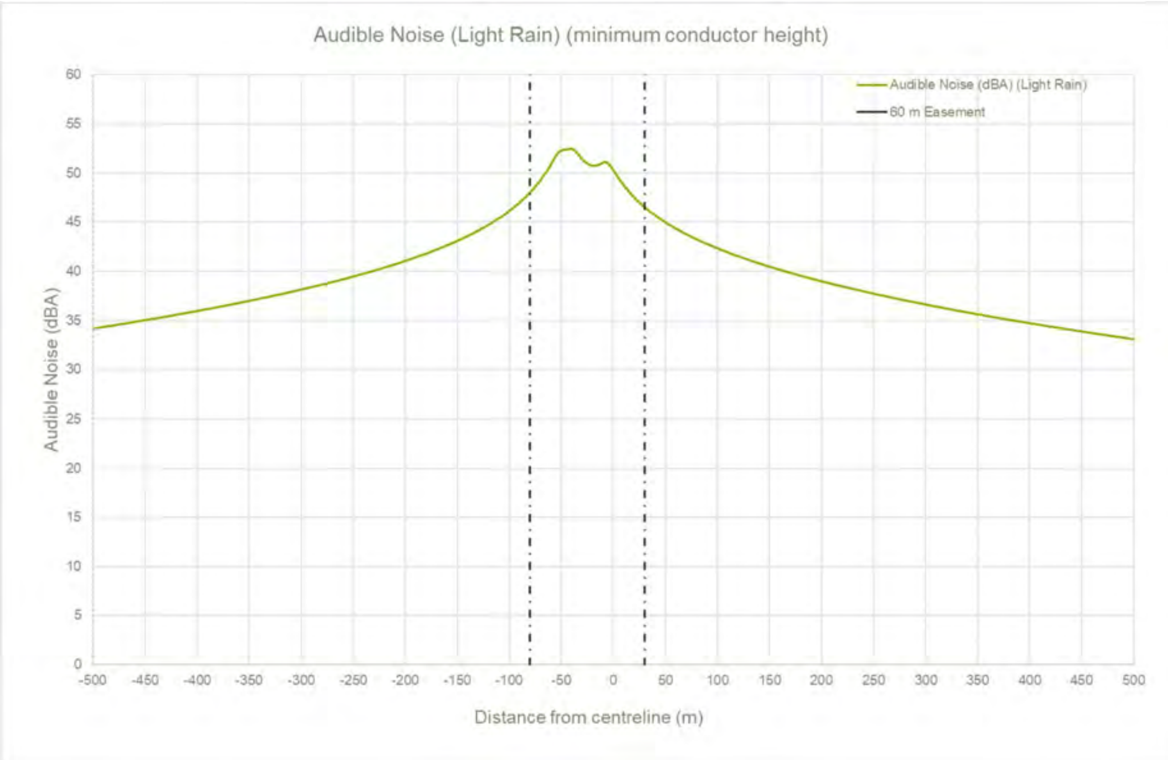


Figure 5-3: Scenario 2 Audible Noise (L50) minimum conductor height

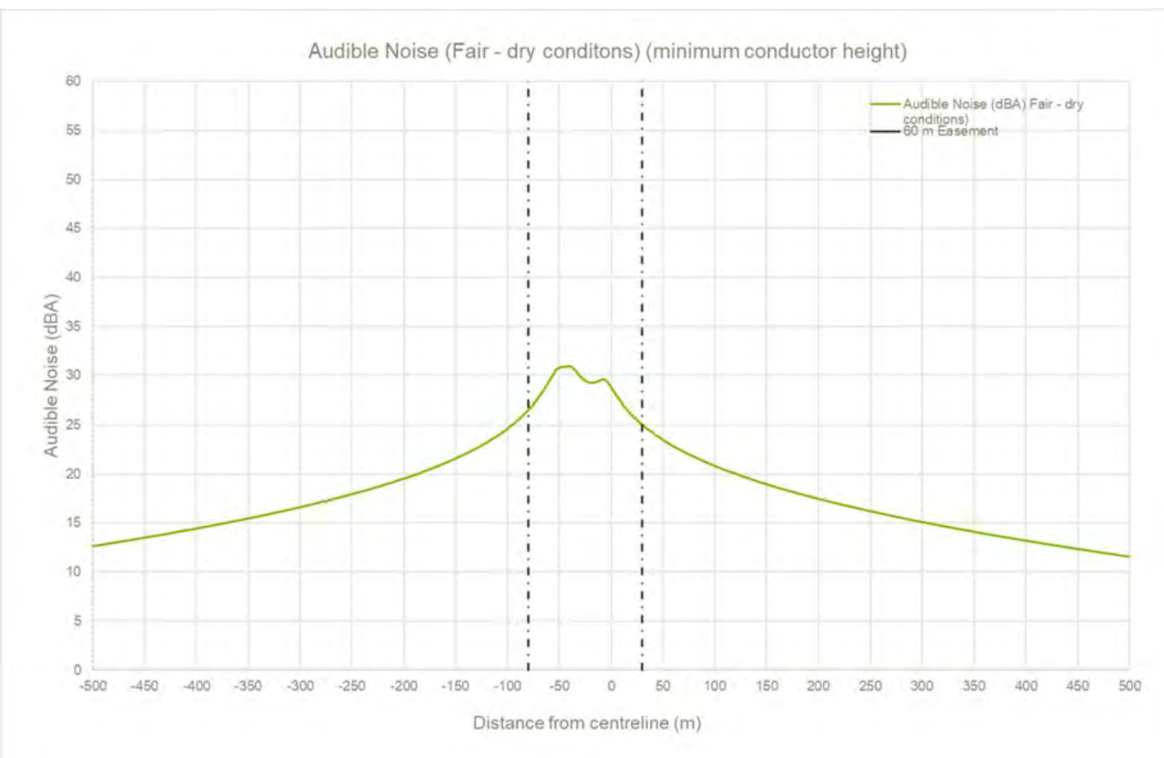


Figure 5-4: Scenario 2 Audible Noise (Fair Weather) minimum conductor height

5.3 Scenario 3: 14A to 13D cross-over

- Audible noise at the nearest receiver (300m from centreline): <30 dB(A), Fair Weather
- Audible noise at the edge of the easement: 48 dB(A), L50 condition
- Audible noise at the nearest receiver (300m from centreline): 32 dB(A), L50 condition

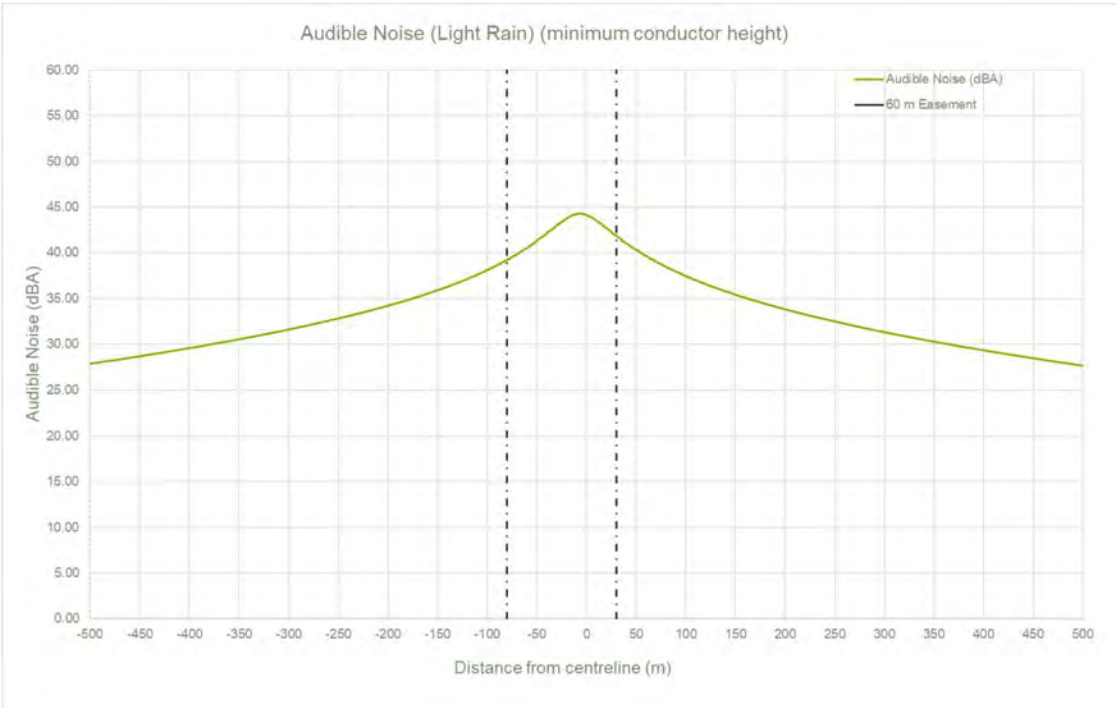


Figure 5-5: Scenario 3 Audible Noise (L50) minimum conductor height

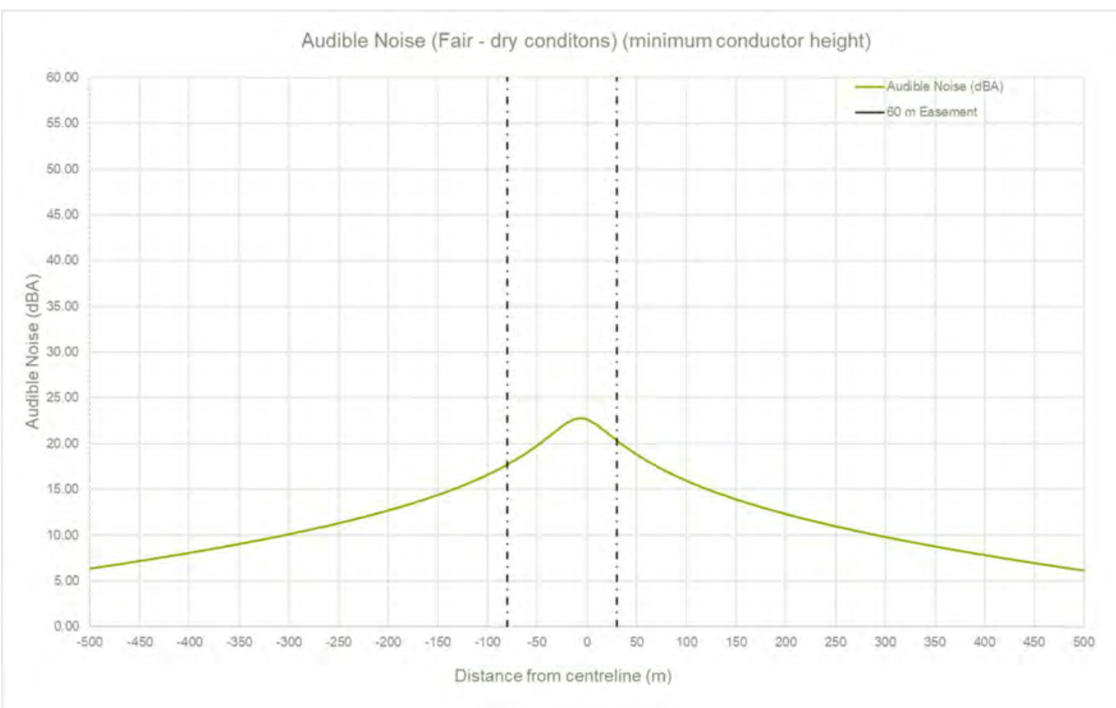


Figure 5-6: Scenario 3 Audible Noise (Fair Weather) minimum conductor height

5.4 Scenario 4: 17D to 18D

- Audible noise at the nearest receiver (250m from centreline): <30 dB(A), Fair Weather
- Audible noise at the edge of the easement: 46 dB(A), L50 condition
- Audible noise at the nearest receiver (250m from centreline): 34 dB(A), L50 condition

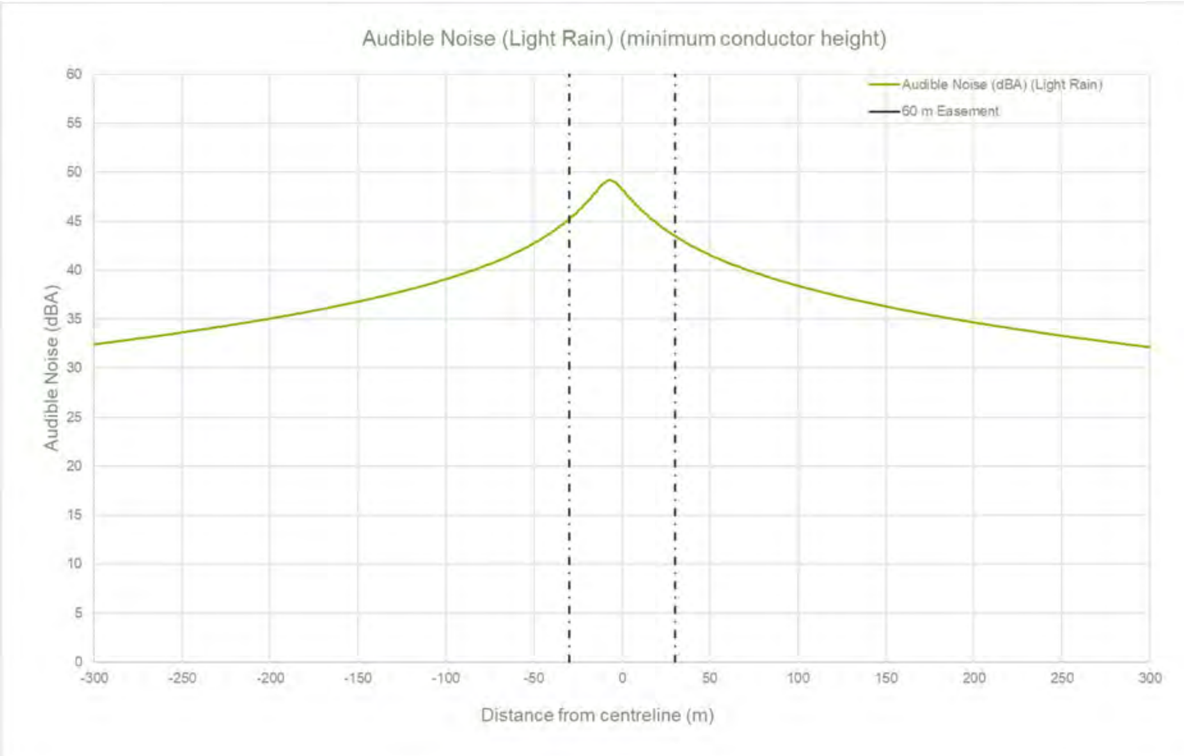


Figure 5-7: Scenario 4 Audible Noise (L50) minimum conductor height

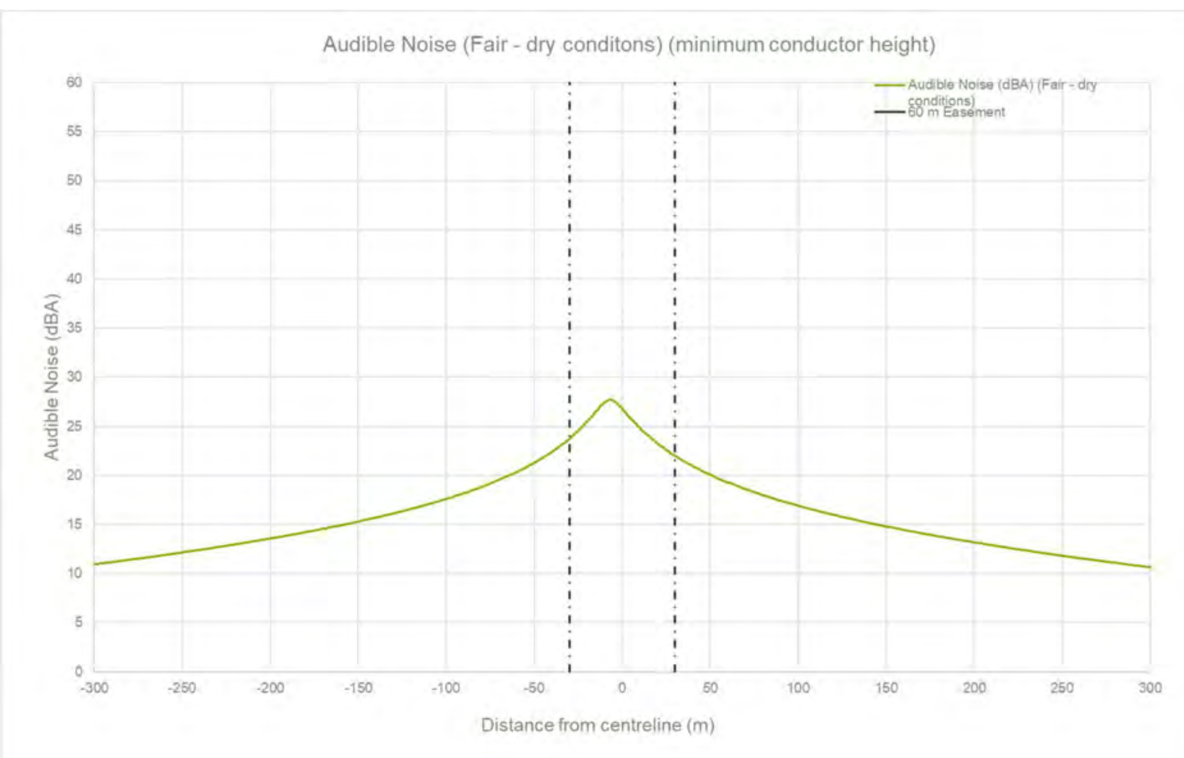


Figure 5-8: Scenario 4 Audible Noise (Fair Weather) minimum conductor height

5.5 Scenario 5: 27D to 28D parallel to 23 to 24

- Audible noise at the nearest receiver (>300m from centerline): <30 dB(A), Fair Weather
- Audible noise at the edge of the easement: 48 dB(A), L50 condition
- Audible noise at the nearest receiver (>300m from centreline): <30 dB(A), L50 condition

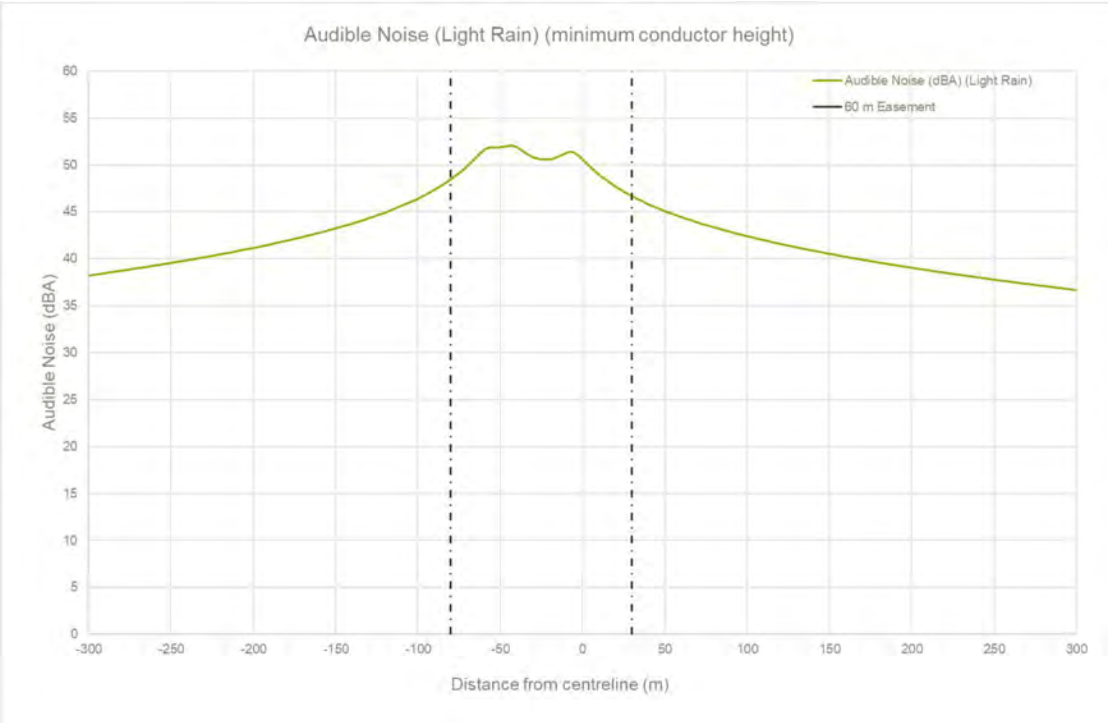


Figure 5-9: Scenario 5 Audible Noise (L50) minimum conductor height

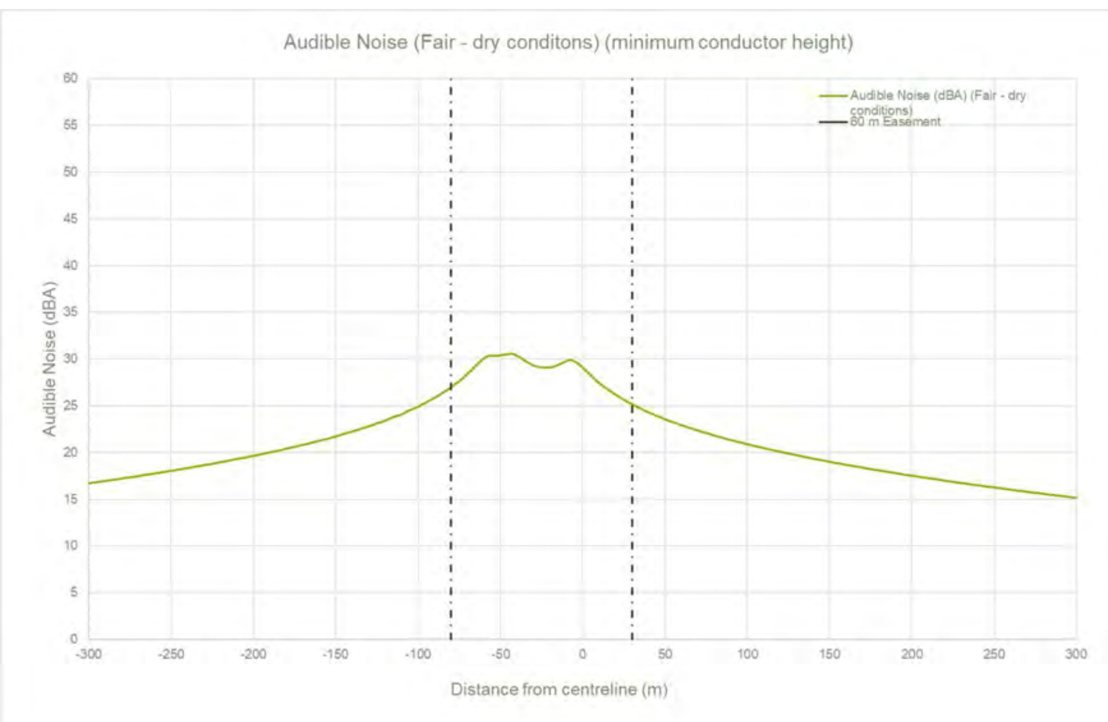


Figure 5-10: Scenario 5 Audible Noise (Fair Weather) minimum conductor height

6 Radio interference results

Refer to the calculated radio interference for each assessment scenario.

6.1 Scenario 1: 5C to 6C parallel to 7

- Radio Frequency Interference at the edge of easement: 40 dBμV/m, Fair Weather
- Radio Frequency Interference at the edge of easement: 58 dBμV/m, L50 condition
- Radio Frequency Interference at the edge of easement: 66 dBμV/m, Heavy Rain

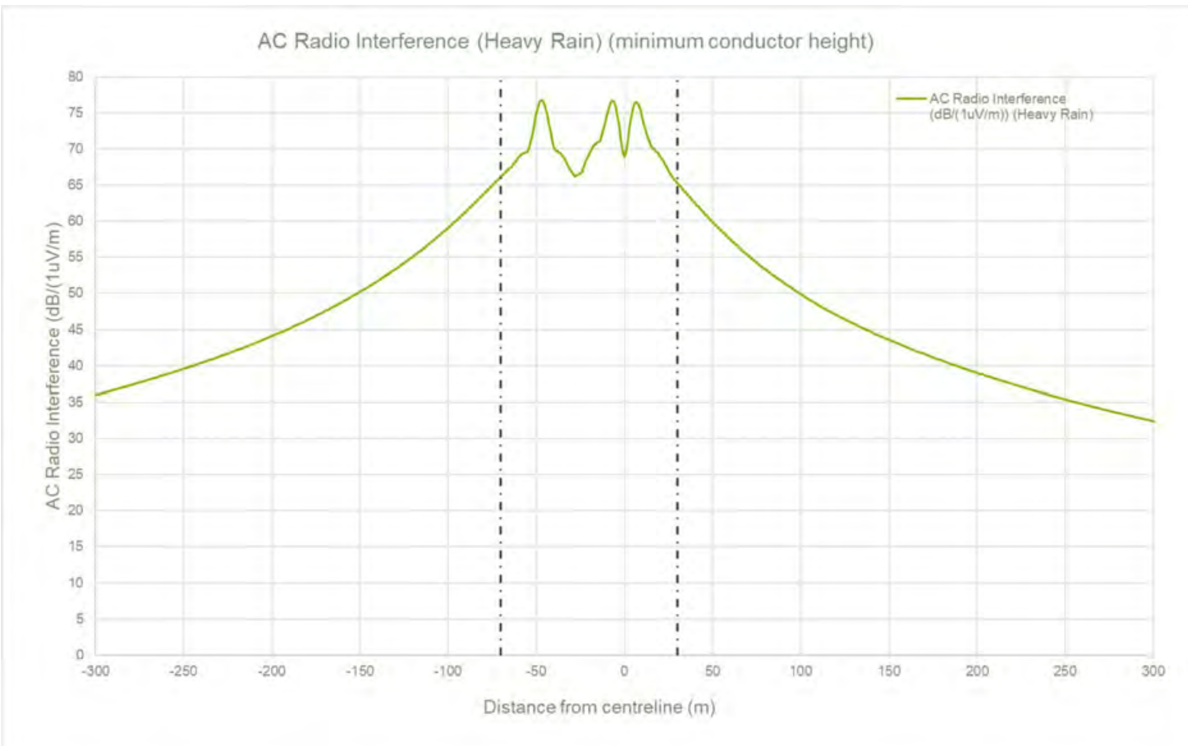


Figure 6-1: Scenario 1 AC Radio Interference (Heavy Rain) minimum conductor height

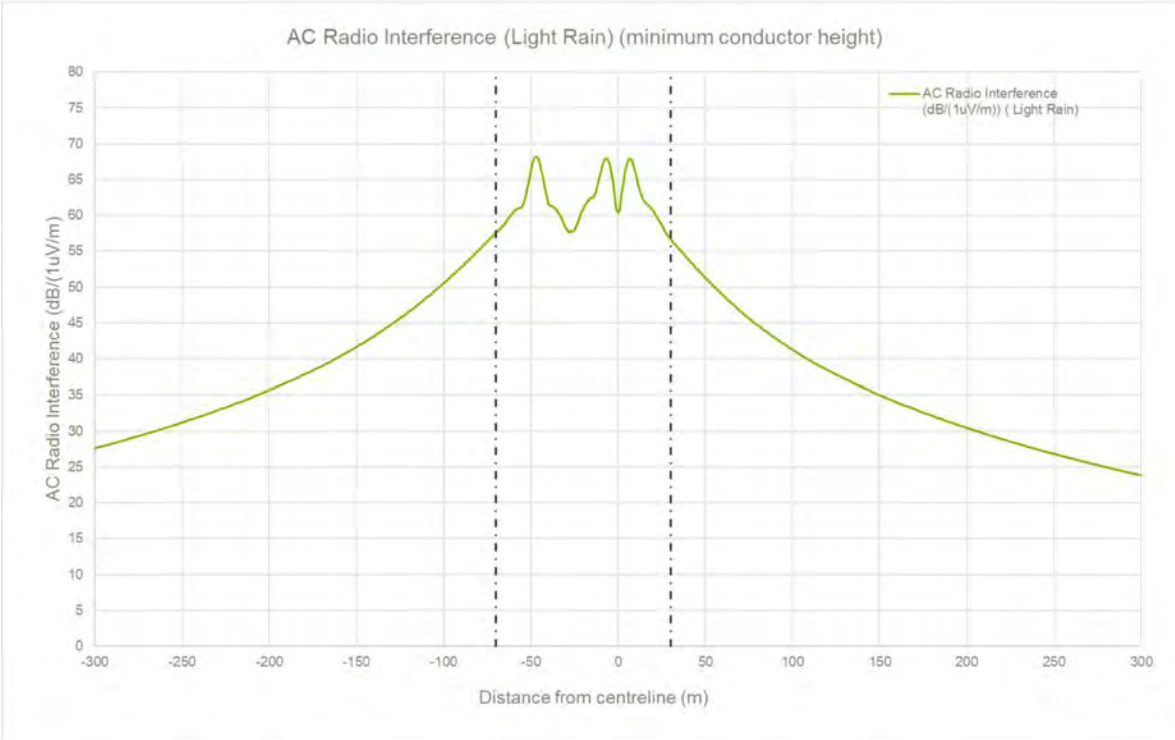


Figure 6-2: Scenario 1 AC Radio Interference (L50) minimum conductor height

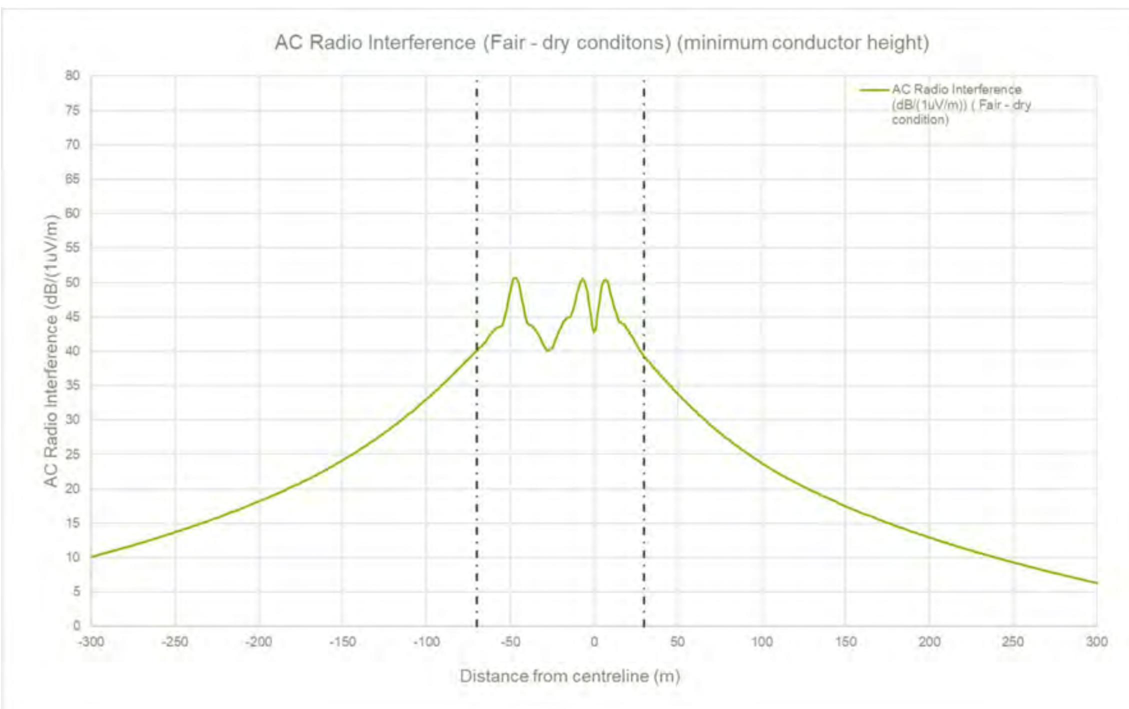


Figure 6-3: Scenario 1 AC Radio Interference (Fair Weather) minimum conductor height

6.2 Scenario 2: 9D to 10D parellel with 8C to 10

- Radio Frequency Interference at the edge of easement: 40 dBµV/m, Fair Weather
- Radio Frequency Interference at the edge of easement: 58 dBµV/m, L50 condition
- Radio Frequency Interference at the edge of easement: 66 dBµV/m, Heavy Rain

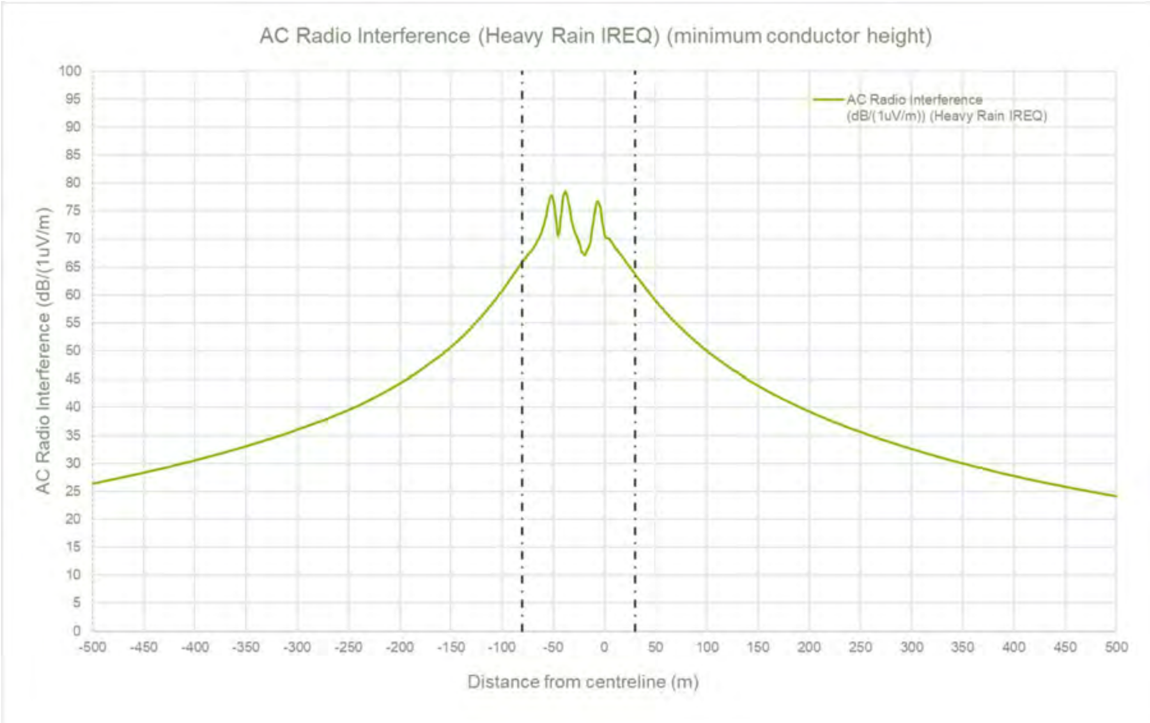


Figure 6-4: Scenario 2 AC Radio Interference (Heavy Rain) minimum conductor height

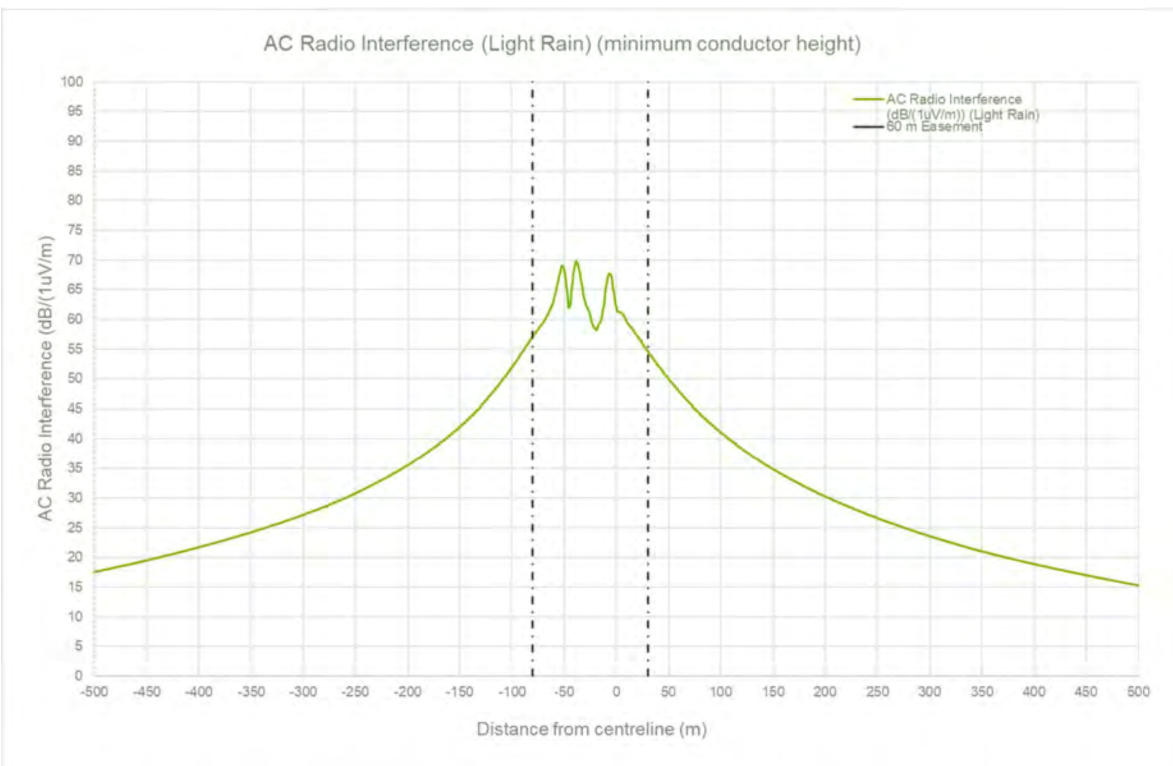


Figure 6-5: Scenario 2 AC Radio Interference (L50) minimum conductor height

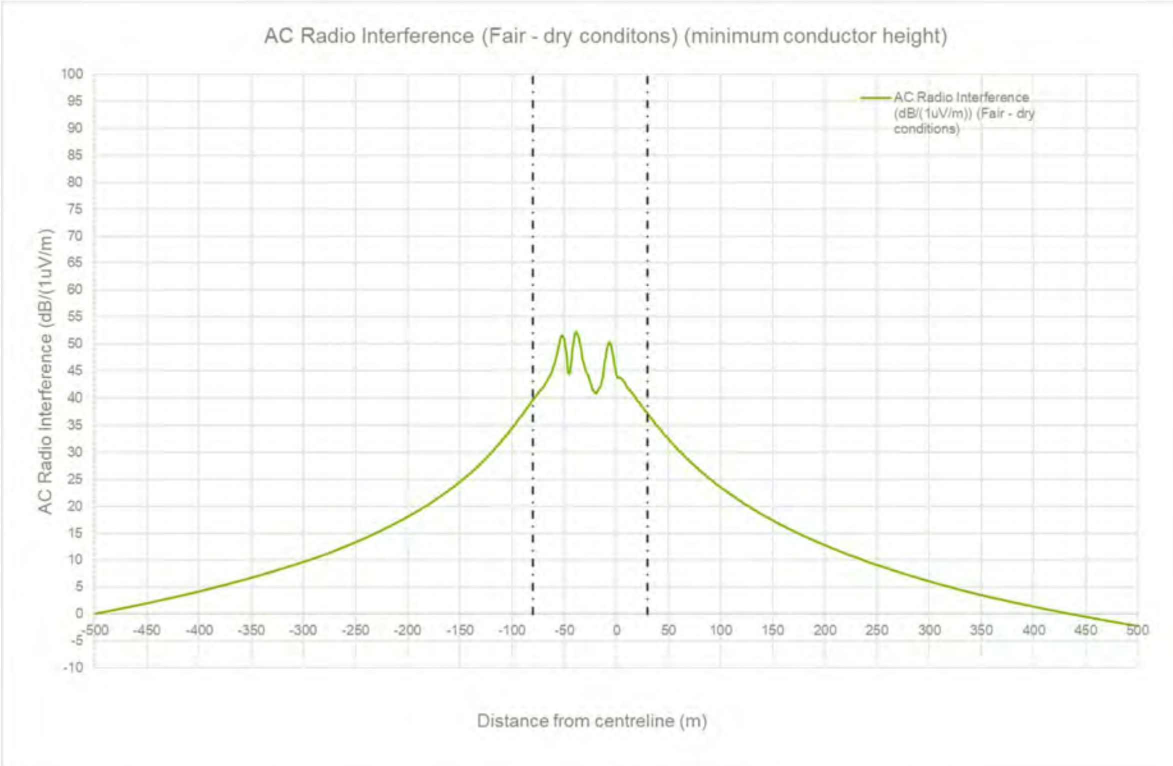


Figure 6-6: Scenario 2 AC Radio Interference (Fair Weather) minimum conductor height

6.3 Scenario 4: 17D to 18D

- Radio Frequency Interference at the edge of easement: 39 dBμV/m, Fair Weather
- Radio Frequency Interference at the edge of easement: 56 dBμV/m, L50 condition
- Radio Frequency Interference at the edge of easement: 65 dBμV/m, Heavy Rain

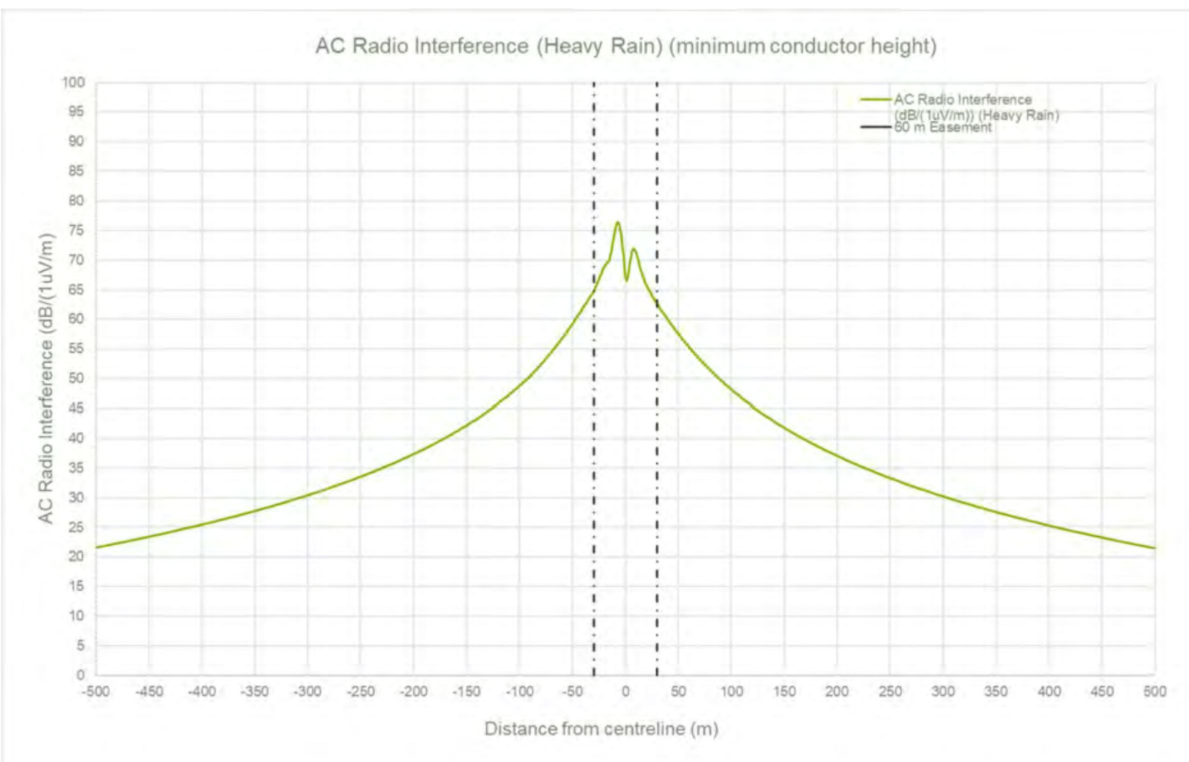


Figure 6-7: Scenario 4 AC Radio Interference (Heavy Rain) minimum conductor height

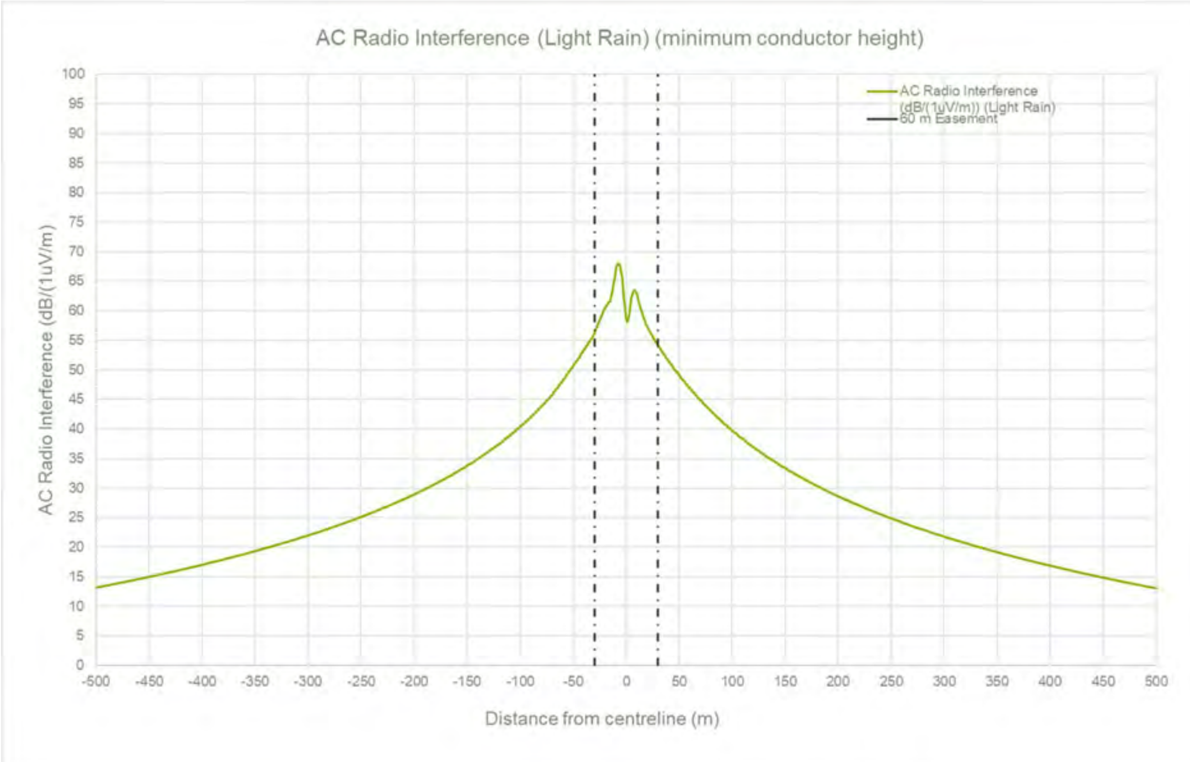


Figure 6-8: Scenario 4 AC Radio Interference (L50) minimum conductor height

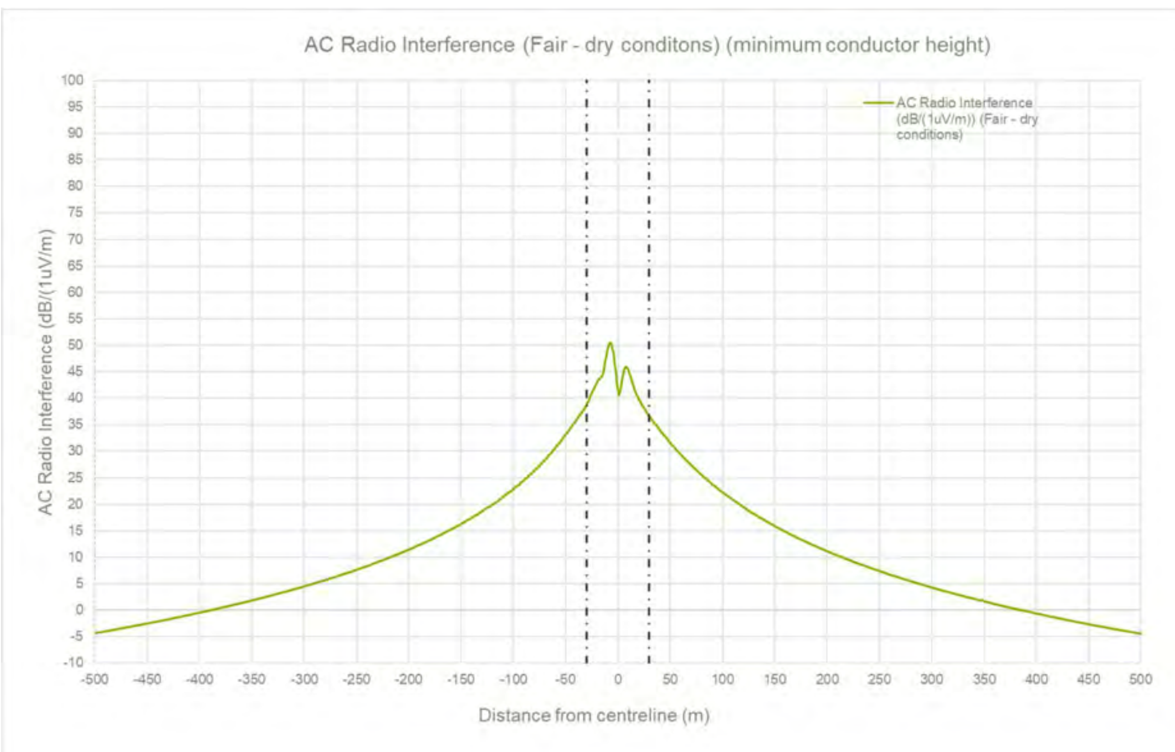


Figure 6-9: Scenario 4 AC Radio Interference (Fair Weather) minimum conductor height

6.4 Scenario 5: 27D to 28D parallel to 23 to 24

- Radio Frequency Interference at the edge of easement: 40 dBμV/m, Fair Weather
- Radio Frequency Interference at the edge of easement: 58 dBμV/m, L50 condition
- Radio Frequency Interference at the edge of easement: 66 dBμV/m, Heavy Rain

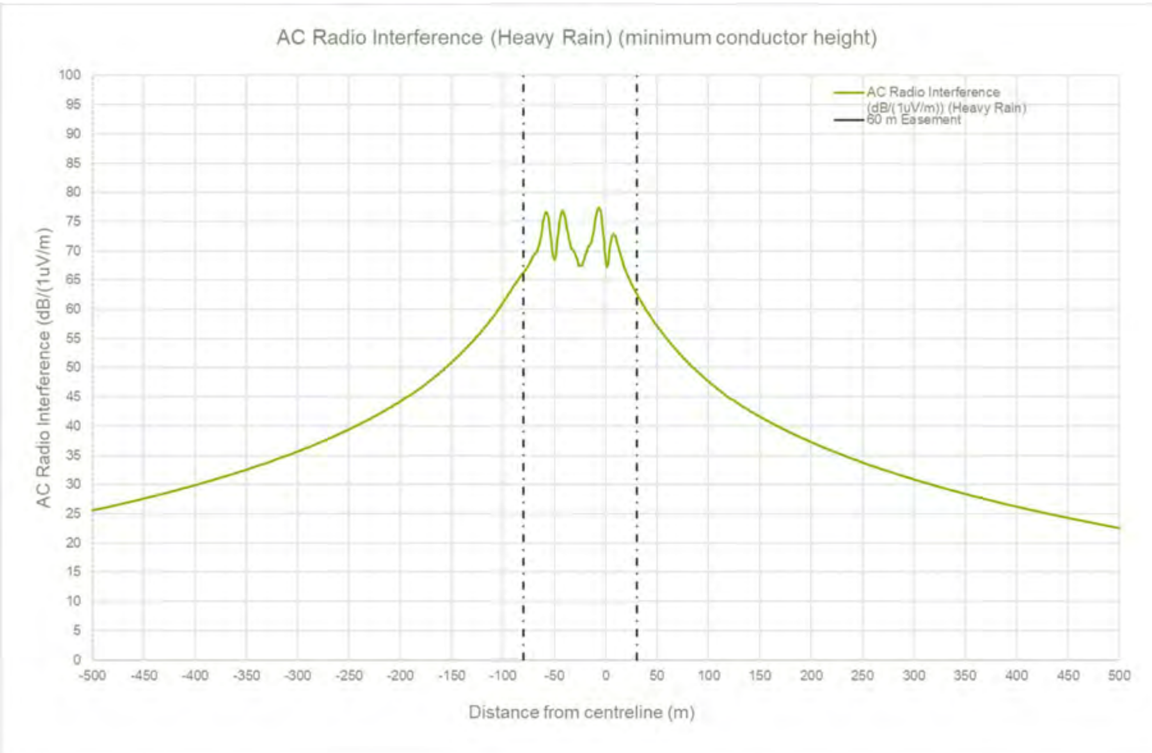


Figure 6-10: Scenario 5 AC Radio Interference (Heavy Rain) minimum conductor height

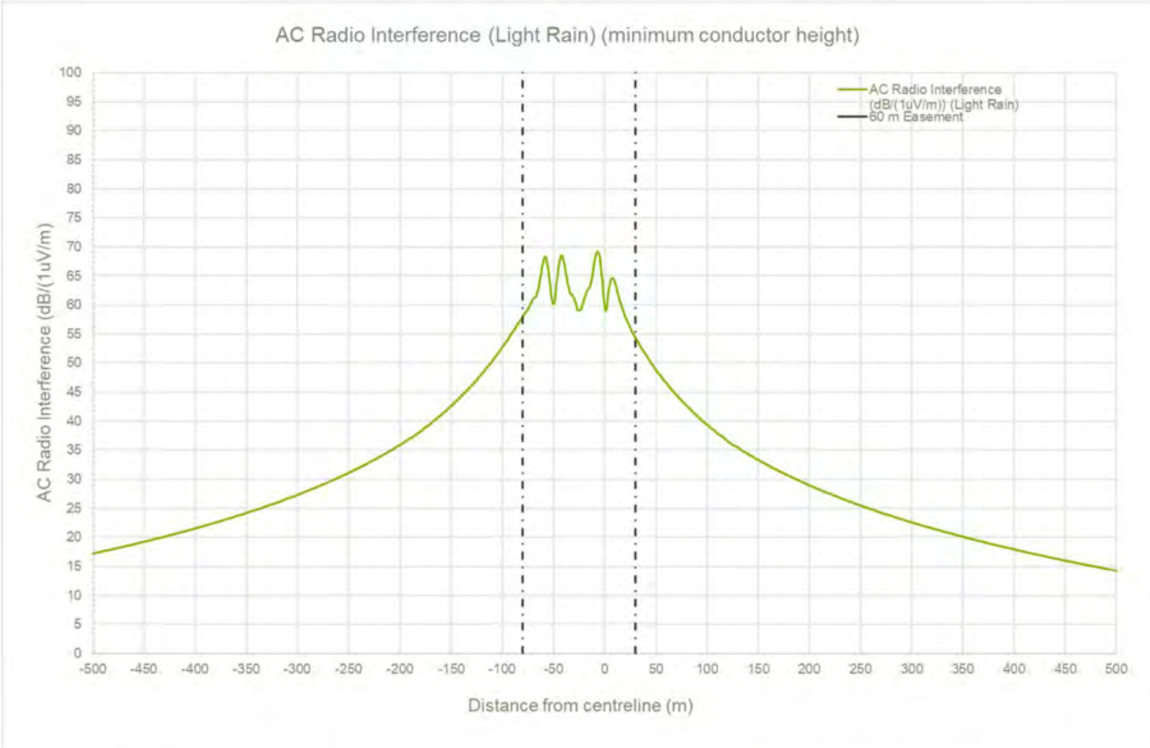


Figure 6-11: Scenario 5 AC Radio Interference (L50) minimum conductor height

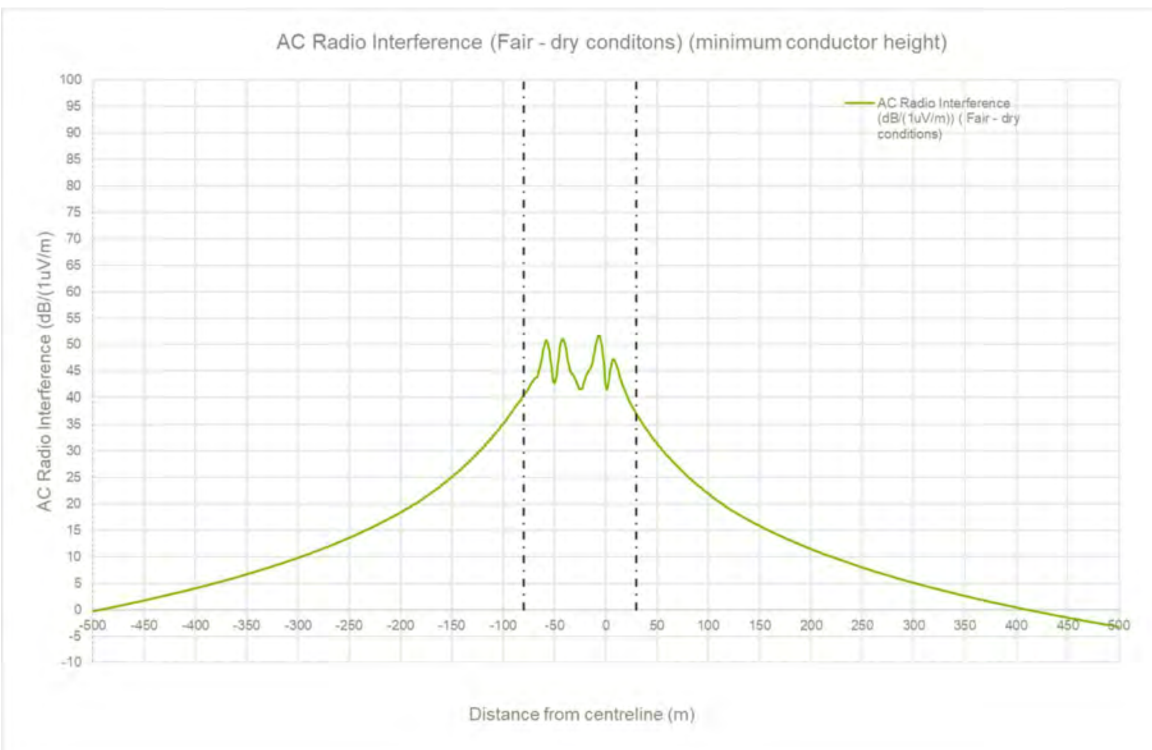


Figure 6-12: Scenario 5 AC Radio Interference (Fair Weather) minimum conductor height

7 Audible noise sensitive receiver mapping

7.1 Audible noise at L50 conditions

Refer to Figure 7-1 for the proposed transmission line operational noise impact mapping. With the most conservative assessment approach (minimum conductor heights and L50 conditions), residential receivers are generally outside the 35 dB(A) contour. The exceptions are near Duncan St, Wolgan Rd and Skelly Rd, where a further site-specific assessment was undertaken – refer to Section 0.

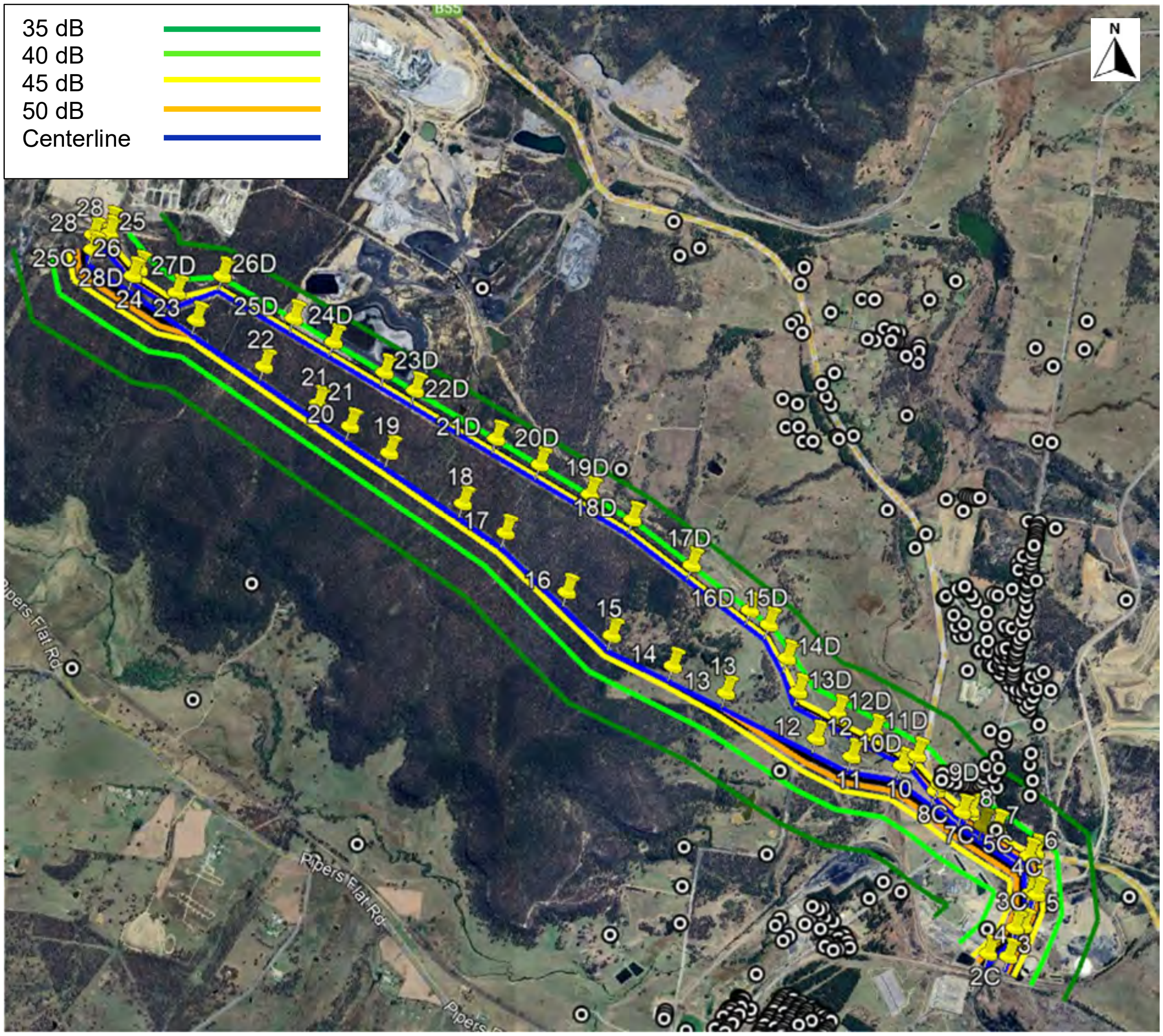


Figure 7-1: Sensitive receiver mapping, audible noise level at L50 conditions

7.2 Scenario 2 assessment – before and after commissioning of the new line

Scenario 2 results suggest that under Fair Weather, the audible noise level is expected to be below 35 dB(A) within and outside the transmission line easement (Section 5.2).

Under the less frequent L50 conditions (light rain or mist), the noise level at nearby receivers may exceed 35 dB(A). However by comparing the results to the noise model of only the existing lines, the anticipated noise increase is approximately 3 dB(A) which is considered minimal. Refer to Figure 7-2 for the noise model results. Refer to Figure 7-3 and Figure 7-4 for the additional receivers within the 35 dB(A) contour.

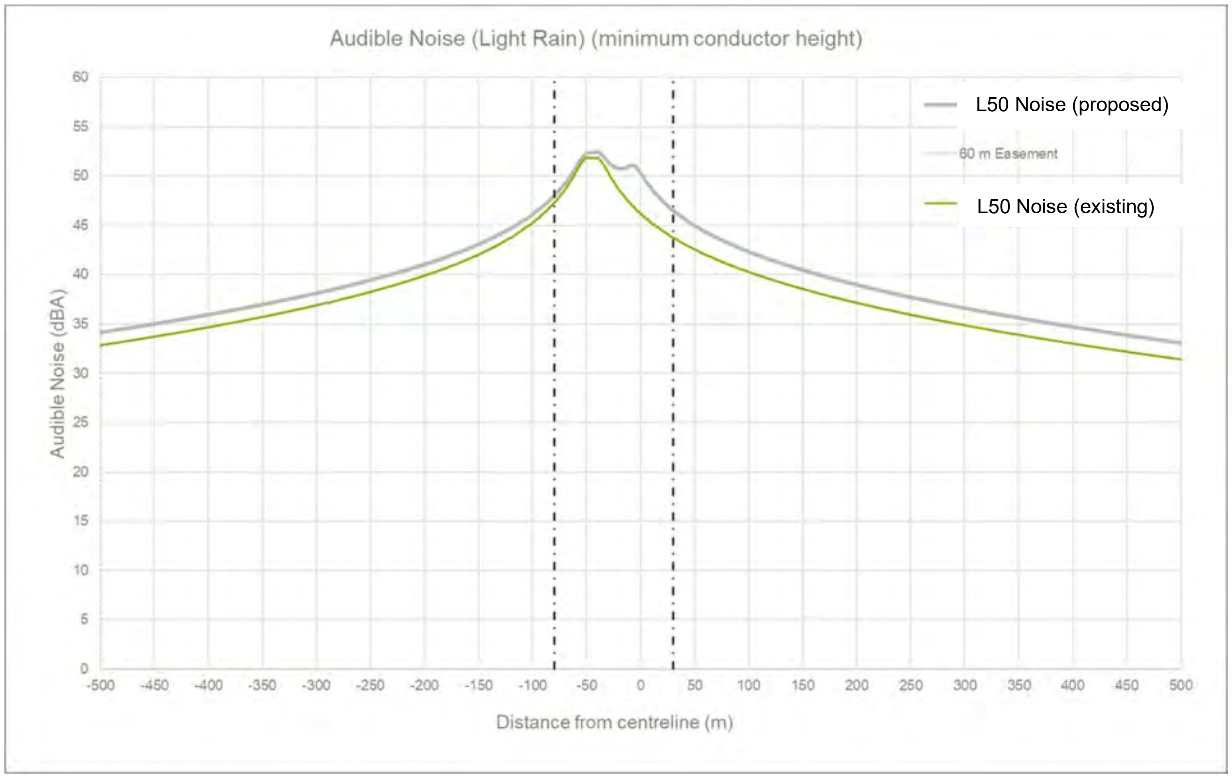


Figure 7-2: Scenario 2, audible noise at L50 conditions, before and after new line commissioning

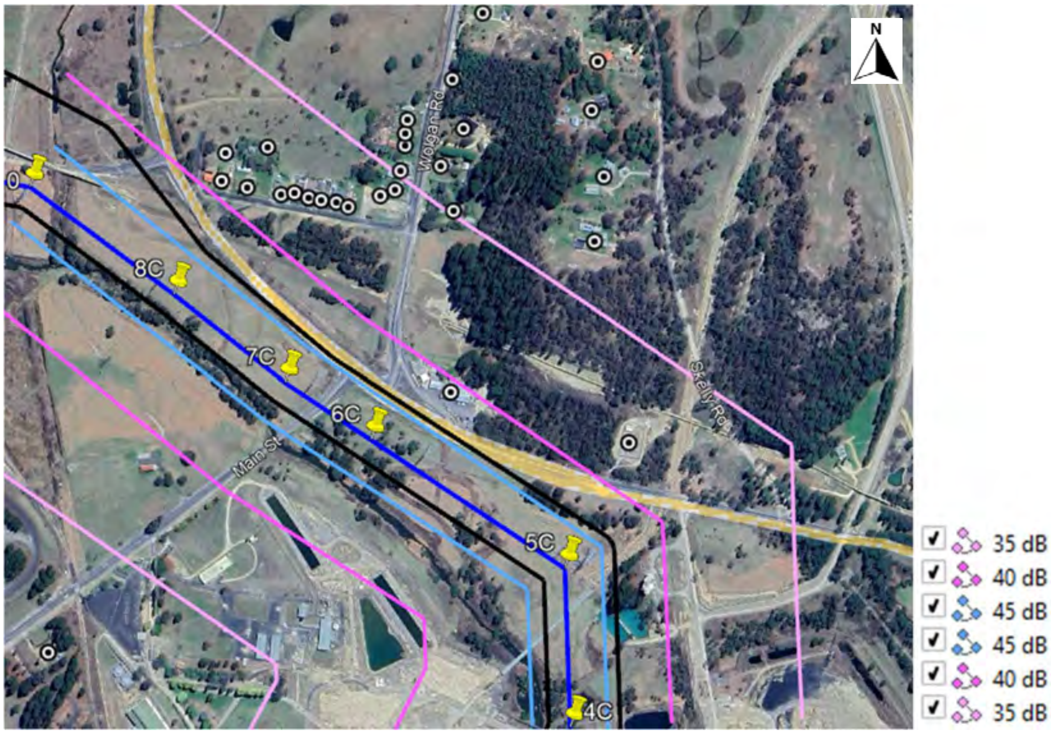


Figure 7-3: Sensitive receiver mapping, Scenario 2, audible noise at L50 conditions (existing)

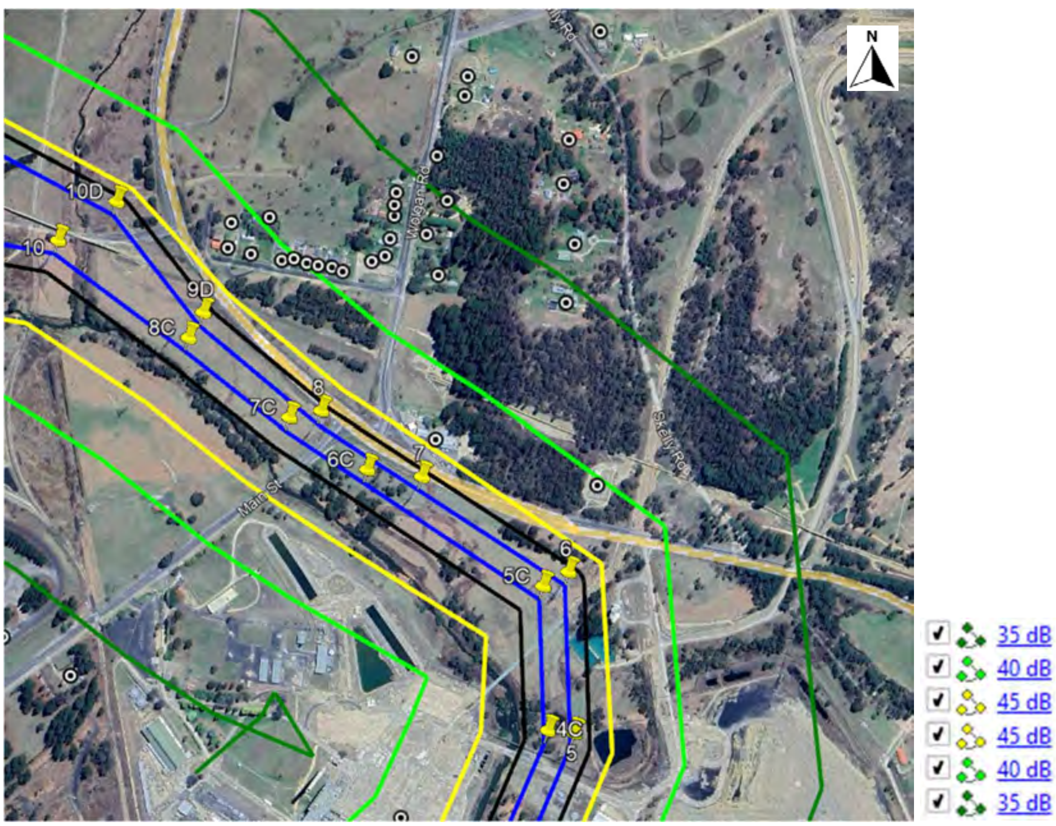


Figure 7-4: Sensitive receiver mapping, Scenario 2, audible noise at L50 conditions (proposed)

8 Point-to-Point Communication Links

An initial review was undertaken, which indicated the proposed transmission line does not impact existing NSWTA links. Refer to Figure 8-1.

Following the initial assessment, Transgrid has also engaged 3rd party to undertake a further desktop review of the latest ACMA RRL archive (dated 10/Nov/2024), and it confirmed that no linked ACMA device system was found to intersect with the new line proposed.

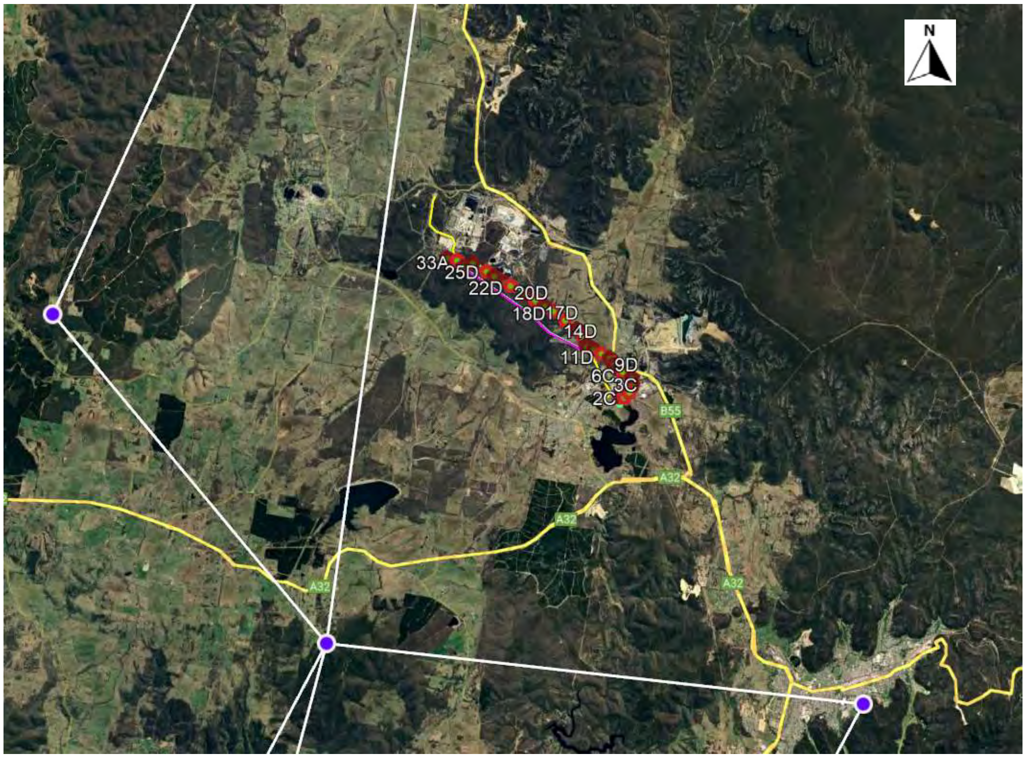


Figure 8-1: NSWTA links (White) in the vicinity of the project site

9 Conclusions

9.1 Audible noise

9.1.1 Assessment results

Refer to Table 9-1 for the transmission line operation audible noise assessment results and Section 7 for the transmission line operational noise-sensitive receiver mapping:

- In all the assessed scenarios, the anticipated transmission line audible noise level at the easement edge is less than 50 dB (A) under L50 wet conditions. This meets the Transgrid Transmission Line Design Manual – Major New Build (Rev 2) requirements.
- In all the assessed scenarios, the anticipated transmission line audible noise level at the nearest receivers is less than 30 dB (A) under Fair Weather conditions. This meets the NPfI requirements under the most prevailing meteorological conditions.
- Under less frequent L50 conditions (light rain or mist), the noise level at nearby receivers may exceed 35 dB(A). However, the model results suggest a marginal accumulative noise increase by comparing it to the noise generated by the existing lines only. (refer to Section 0)
- It shall be noted that the transmission line operational noise assessment results are conservative as the assessment assumes the line operating at maximum rating and does not account for the existing background noise level and local topography.

Table 9-1: Audible noise assessment results (cumulative noise from existing and proposed lines)

From Str. No.	To Str. No.	Max. AN at nearest receiver (Fair Weather)	Max. AN at easement edge (L50)	Max. AN at nearest receiver (L50)
1C	3C	< 30 dB(A)	-	-
		-	48 dB(A)	-
		-	-	< 30 dB(A)
3C	8C/9D	< 30 dB(A)	-	-
		-	48 dB(A)	-
		-	-	44 dB(A)
8C/9D	10D	< 30 dB(A)	-	-
		-	48 dB(A)	-
		-	-	43 dB(A)
10D	12D	< 30 dB(A)	-	-
		-	48 dB(A)	-
		-	-	< 30 dB(A)
12D	13D	< 30 dB(A)	-	-
		-	48 dB(A)	-
		-	-	32 dB(A)
13D	27D	< 30 dB(A)	-	-
		-	46 dB(A)	-
		-	-	34 dB(A)
27D	28D	< 30 dB(A)	-	-
		-	48 dB(A)	-
		-	-	< 30 dB(A)

9.1.2 Audible noise mitigations

The transmission line operational noise is expected to comply with the intrusiveness and amenity noise level under Fair Weather conditions. However, under L50 conditions (light rain or mist), the noise level may exceed the 35 dB(A)

($L_{Aeq,15min}$) limits at the nearest receivers. L50 conditions are considered less frequent given relatively dry climate in the study area, with an annual mean rainfall between 600 – 900mm recorded at the nearest weather station (also refer to Figure 9-1 for the BOM annual rainfall maps).

Figure 9-1: BOM average annual rainfall maps

It is understood that design mitigations have been implemented to minimise transmission line operation noise. In the line route selection, the proposed infrastructure is co-located with the existing lines or positioned to reuse the existing Transgrid easement to minimise the disturbed area. Conductor bundles are selected to control the surface voltage gradient to limit the generation of corona discharges.

To further reduce the potential noise impacts, it is the standard approach to source test records for the proposed insulator assemblies to confirm acceptable noise performance. During construction, adequate conductor stringing methodology will be implemented to avoid any damage and additional burrs leading to additional operational noise impacts.

Any potential audible noise concerns may be further verified via site monitoring before and after the commissioning of the new line. Treatments in accordance with NPfI recommendation can be provided for any proven residual noise impacts – refer to Table 9-2.

Table 9-2: NPfI significance of residual noise impacts and treatment examples

Predicted exceedance of PNTL	Predicted level relative to the amenity noise level	Significance	Example of potential treatment
≤ 2 dBA	-	Negligible	The exceedances would not be discernible by the average listener and therefore would not warrant receiver-based treatments or controls.
≥ 3 but ≤ 5 dBA	Less than the recommended amenity noise level or greater than the recommended amenity noise level, but the increase in total cumulative industrial noise level resulting from the development is less than or equal to 1 dB.	Marginal	Provide mechanical ventilation/comfort condition systems to enable windows to be closed without compromising internal air quality/amenity.
≥ 3 but ≤ 5 dBA	Greater than recommended amenity noise level and the increase in total cumulative industrial noise level resulting from the development is more than 1 dB.	Moderate	As for 'marginal', but also upgraded facade elements, such as windows, doors or roof insulation, to further increase the ability of the building facade to reduce noise levels.
> 5 dBA	Less than or equal to the recommended amenity noise level.		
> 5 dBA	Greater than the recommended amenity noise level.	Significant	May include suitable commercial agreements where considered feasible and reasonable.
Note 1: Reproduced from NPfI Table 4.1 and Table 4.2.			

9.2 Radio interference and mitigations

The AS 2344 derived limit of 36 dBµV/m seems impractical to achieve for the proposed lines. However, radio listening on the AM band had been largely replaced by digital radio operating at above 174 MHz, and accordingly, interference in AM systems may not necessarily be an issue for nearby landowners.

In cases where residents are impacted by radio interference, supplying improved antennas may be a cost-effective solution. In terms of sensitive equipment impacts, the land around the proposed transmission line is primarily rural – farming. Farmers sometimes use VHF as part of the machinery GPS systems for agricultural operations. Such stakeholders will need to be identified and existing field strengths will be measured in the VFH band. It is also recommended that mining sites shall be consulted on the potential impacts. If the project is causing nuisance radio interference, signal-boosting equipment or antenna upgrades may be required.

9.3 Point-to-point communication

No point-to-point communication links were found to cross the proposed transmission lines.

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