



CopperString 2032

Early Works Package

Hughenden Camp Hub Noise Assessment

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Prepared for
UGL CPB JV

Client representative
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Rev01



Table of Contents

1. Introduction.....	1
2. Description of Camp Hubs.....	2
3. Noise Assessment Criteria.....	4
3.1 Planning Scheme.....	4
3.2 Queensland State Noise Provisions.....	4
4. Existing Noise Environment.....	5
5. Noise Modelling Methodology and Assumptions.....	5
6. Noise Sources.....	6
7. Noise Modelling Results.....	7
8. Railway Noise.....	9
9. Noise Mitigation Measures.....	10
10. Construction Noise.....	10
11. Ground Vibration.....	10
12. Conclusions.....	10

List of figures

Figure 1 - CopperString 2032 Overview.....	1
Figure 2 – Hughenden Nearest Residences (base image from NearMap).....	2
Figure 3 - Hughenden Site Layout.....	3
Figure 4 – Hughenden, SoundPLAN Noise Model.....	6
Figure 5 - SoundPLAN grid map of noise contours at the Hughenden site.....	8

List of tables

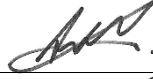
Table 1 - Camp Hub Location Details.....	1
Table 2 – Accommodation and Parking Capacity.....	3
Table 3 – EPP Acoustic Quality Objectives.....	4
Table 4 – Ambient Noise Logging Data.....	5
Table 5 – Modelled noise source details.....	6
Table 6 - Noise modelling results at existing sensitive receivers near the CopperString camp hubs - $L_{eq,1hr}$ - dB(A).....	7
Table 7 – Inside Noise Levels at Accommodation Camp.....	8

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Revision History

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00	Hughenden Only Version	DF & AS	AB	AB	14/02/2024
01	Added Railway Noise Assessment	AS	DF	AB	26/02/2024

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1. Introduction

This noise assessment has been prepared to support the planning application for a Camp Hub, to be constructed in Hughenden, to facilitate accommodation of personnel and logistics for the CopperString 2032 electricity transmission line construction project. It is one of six camp hubs, required for the project, with the others located at Cloncurry, Julia Creek, Richmond, Pentland and Charters Towers.

The CopperString 2032 Project is a new 1100km long, extra high voltage electricity transmission system stretching from Townsville to Mount Isa, that will connect the North West Power System near Cloncurry and Mount Isa to the Powerlink network and National Electricity Market at Woodstock. An overview of the project is shown in Figure 1 below.

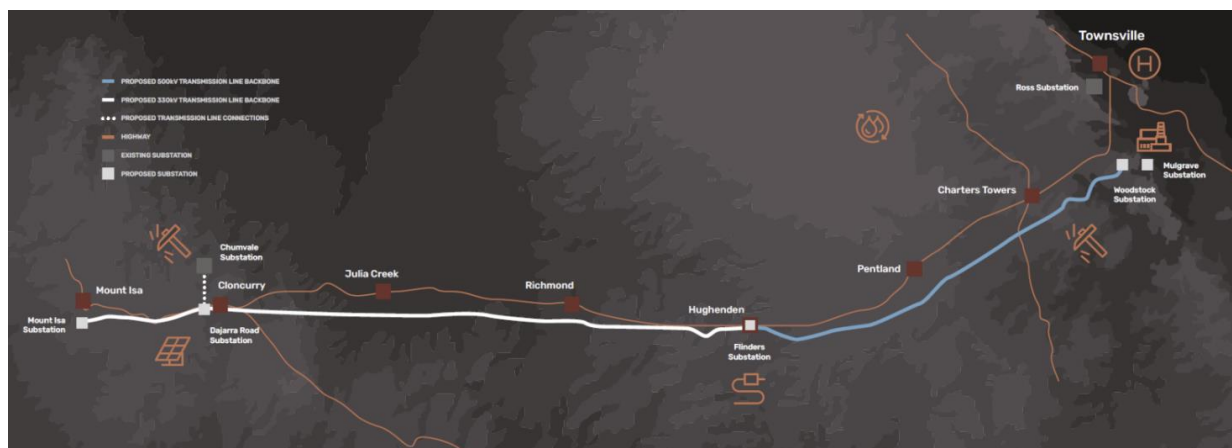


Figure 1 - CopperString 2032 Overview

The project includes the development of the transmission line, substations, laydown areas, construction camps, communication huts, access tracks and equipment storage locations. The duration of construction operations is currently estimated to be two to three years. CPB Contractors and UGL Limited have entered an early contractor involvement (ECI) as a Joint Venture (JV) arrangement to facilitate the delivery of the project.

Location details of the Hughenden camp hub are summarised in Table 1 below and shown in Figure 2 below.

Table 1 - Camp Hub Location Details

Camp Hub	Lot ID	Address	Municipality	Zoning	Distance to Nearest Sensitive Receiver (m)
Hughenden	129 SP119557	Flinders Highway, Hughenden	Flinders Regional Council	Special Purpose Zone (Public facilities and infrastructure)	210

Sensitive Receivers

The sensitive receivers near the camp hub are all residences. Noise modelling results are provided later in this report for selected existing representative sensitive receivers, identified as “R1”, “R2” etc in Figure 2. Property boundaries are indicated in orange. The proposed site directly adjoins an area of undeveloped land, some of which is zoned General Residential and some Rural Residential. This area is shaded red in Figure 2. Although it may be unlikely that this land will be subdivided and developed into housing during the maximum expected five year period that the camp hubs will operate, noise level results have been provided for these areas, as well as the nearest existing residences.

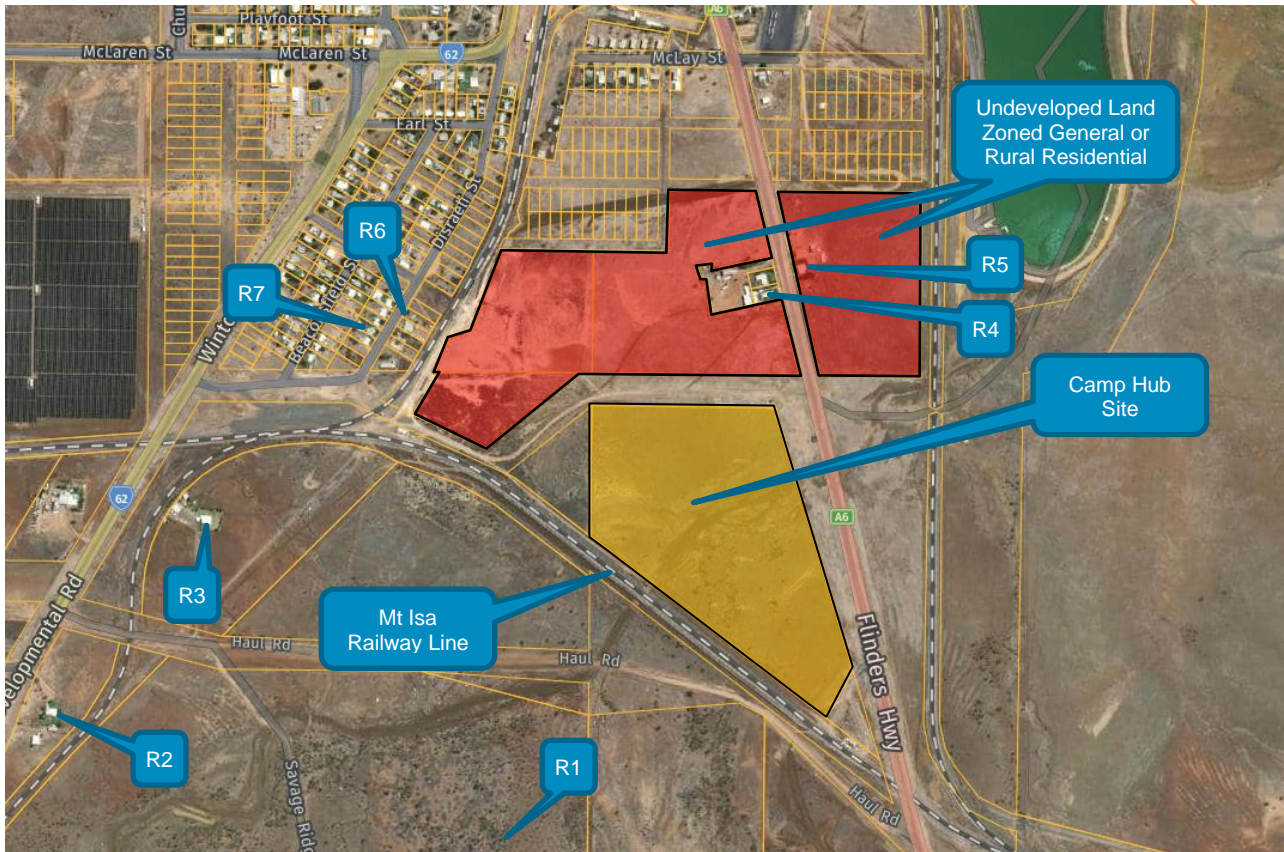


Figure 2 – Hughenden Nearest Residences (base image from NearMap)

2. Description of Camp Hubs

The Hughenden camp hub will provide the following facilities:

- An accommodation camp for personnel working on the project, including a mess, commercial kitchen, laundry, recreation rooms, offices, meeting rooms and car park, constructed from demountable buildings in the style of a typical mining camp.
- A materials storage area (a large outdoor hardstand area).
- A vehicle refuelling facility.
- A vehicle and equipment maintenance workshop; and
- A vehicle washdown bay.

If possible, the camp hub will be connected to existing water supply, sewage and electricity networks. If this is not feasible suitable potable water treatment systems, wastewater treatment plants, wastewater disposable irrigation fields and electrical generators will be established on-site. Final arrangements for these services had not been confirmed at the time of writing this report, so on-site water treatment plants and electricity gen-sets have been included in the noise assessment.

Hours of Operation

The hours of operation for construction, maintenance and logistics work related activities on site are 6.30am to 6.30pm. Normally no night time activity will be undertaken other than that relating to the occupancy of the accommodation. An “out of hours” work permit system will be in place to ensure appropriate noise mitigation and other controls, are implemented for any work that must be carried out outside of normal hours.

Vehicle Movements

Around 150 to 240 light vehicle traffic movements to and from the site, are expected each day, and around 50 to 90 heavy vehicle movements each day. Light vehicle movements will include private cars, personnel minibuses, courier deliveries and work utes. Heavy vehicle movements will include deliveries of construction materials including; cable drums, steel, food, laundry, and diesel, despatch of concrete, and waste/refuse collection. Onsite mobile plant will include forklifts, cranes and other mobile lifting equipment.

Table 2 below lists the planned accommodation and car park capacity of the camp hub.

Table 2 – Accommodation and Parking Capacity

Camp Hub	Accommodation Capacity	Car Parking Spaces	Mini-bus Parking Spaces
Hughenden	410	170	11

Figure 3 below shows the concept design site layout for the camp hub. Note that areas allowed for wastewater irrigation areas, water treatment plants and electrical gen-sets are provisional, and may not be required if grid services are able to be utilised.

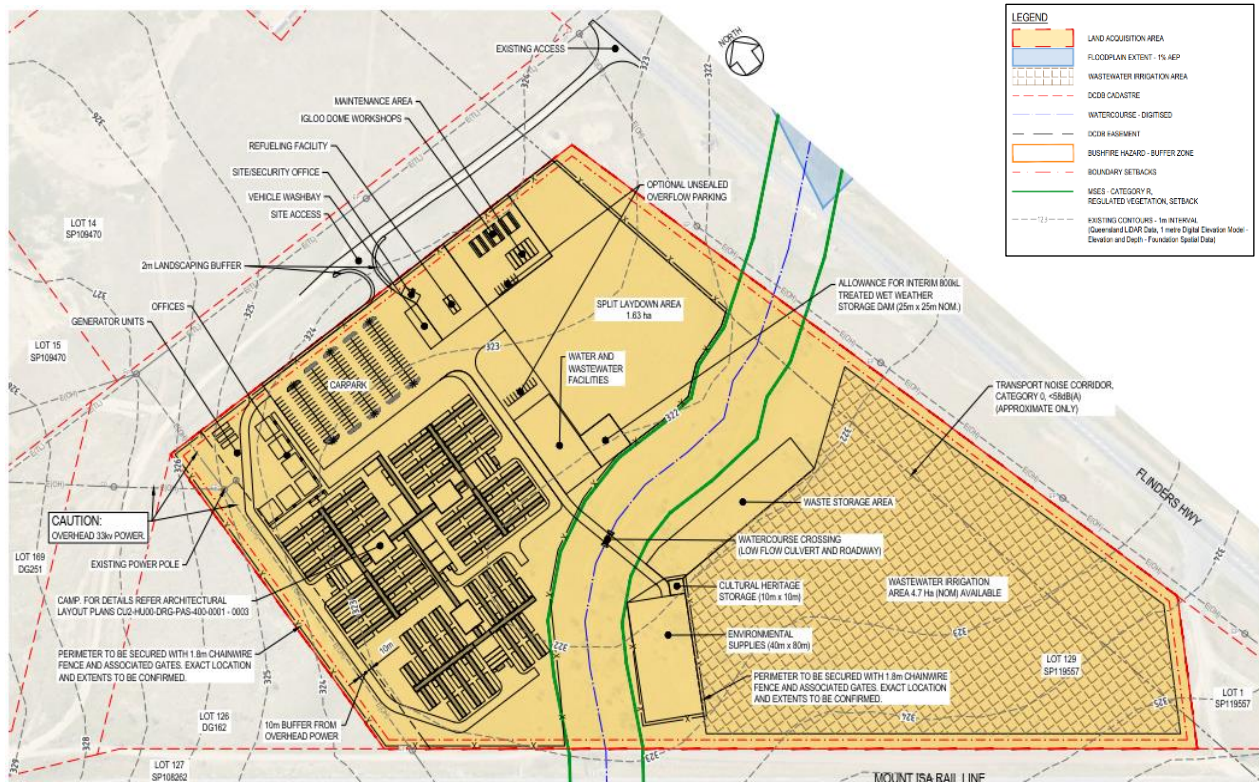


Figure 3 - Hughenden Site Layout.

3. Noise Assessment Criteria

3.1 Planning Scheme

The Shire of Flinders Planning Scheme has provisions requiring the amenity of nearby sensitive receivers to be protected from adverse noise impacts from new development. The planning schemes does not provide quantitative criteria for evaluation of noise emissions, however it makes reference to the Queensland *Environmental Protection (Noise) Policy 2019* for this purpose. It requires that new developments are located, designed, orientated, and suitable noise mitigation measures implemented, in order to minimise noise impacts on existing sensitive uses.

3.2 Queensland State Noise Provisions

The Queensland *Environmental Protection (Noise) Policy 2019* (the EPP) provides a framework for achieving the objectives of the *Environmental Protection Act 1994* relating to protection of the acoustic environment. The legislation aims to strike a balance between protecting the amenity and wellbeing of the community and allowing development to occur in a sustainable, cost-effective manner. Schedule 1 of the EPP specifies various “Acoustic Quality Objectives” which may be used to assess the impact of noise emissions from a proposed activity on the amenity and wellbeing of sensitive receptors such as residences. The objectives are informed by the World Health Organization’s *Guideline for Community Noise 1999*.

Table 3 below shows the Acoustic Quality Objectives relevant to sensitive receptors in the areas surrounding the proposed camp hub. These include criteria relevant to use of outdoor recreation areas and avoiding sleep disturbance. The noise levels indicated must include adjustments to account for intrusive noise characteristics such as tonality, impulsiveness.

Table 3 – EPP Acoustic Quality Objectives

Activity	Time of Day	L _{Aeq,1hr}	L _{A10,1hr}	L _{A1,1hr}
Residences - Outdoor Recreation	Daytime and Evening	50	55	65
Residences - Indoor	Daytime and Evening	35	40	45
Residences – Indoor (Sleep Disturbance)	Night time	30	35	40
Education Institutions - Indoor	Daytime	35	-	-

If an outdoor to indoor noise reduction for a typical house with open windows, of 7 dB(A) is assumed, the noise limits based on the EPP acoustic quality objectives, measured at the façade of nearby residences are:

- Daytime (7am to 6pm) 42 dB(A)
- Evening (6pm to 10pm) 42 dB(A); and
- Night time (10pm to 7am) 37 dB(A).

Background Creep

Background creep is defined as a gradual increase in the background noise in an area, as a result of the progressive, cumulative impact of new developments or increases in activities. The current version of the EPP no longer contains criteria for background creep, but does state that background creep should be minimised to the extent that is practicable. The proposed camp hub will only be in use for up to a maximum of five years, so will not make a permanent contribution to noise creep.

Planning for Noise Control Guideline

The Queensland Department of Environment and Science (DES) previously published a guideline document entitled “Planning for Noise Control”, which contained guidance on various aspects of noise assessment, measurement and modelling. This document is currently listed as being “under review” on the DES website. As such, the specific noise assessment criteria contained in the guideline will not be utilised for this assessment.

4. Existing Noise Environment

The camp hub is located on the southern outskirts of Hughenden. Traffic volumes on nearby roads are light, especially at night, so existing ambient noise levels are relatively low. The site adjoins the Townsville to Mount Isa railway line, but rail traffic is also quite light. Ambient noise at the nearest residences to the camp hubs, is currently dominated by local traffic during the daytime, declining to lower levels overnight. Other existing noise sources include nearby commercial premises, residential air-conditioners, insects, birds, dogs, stock and the wind blowing through vegetation.

A survey of ambient noise levels was undertaken in September 2010 to support the environmental assessment report for the overall CopperString 2032 project. Ambient noise data for various locations along the route of the transmission line was published in; *CopperString 2.0, Noise technical report data Copperstring 1.0, Volume 3, Appendix W*, prepared by GHD from noise measurements carried out by URS (which has since been acquired by AECOM.) This work includes unattended noise logging of one to two days duration, at a location on the outskirts of Hughenden. These results are summarised in Table 4 below. While this data does not include all of the areas around the site, the location surveyed is reasonably representative of all of the areas. While the data was collected in 2010, it is still considered representative of current acoustic conditions as there has not been significant changes in population, traffic volumes or industrial activities.

Table 4 – Ambient Noise Logging Data

Camp Hub	Measurement Location	Background Noise Level L ₉₀ dB(A)			Ambient Noise Level L _{eq} dB(A)			Peak Noise Level L ₁ dB(A)		
		D	E	N	D	E	N	D	E	N
Hughenden	Beaconsfield Street, Hughenden	31	35	32	49	45	43	57	57	48

5. Noise Modelling Methodology and Assumptions

Noise modelling was carried out using SoundPLAN 8.2 environmental noise modelling software. Modelling assumptions and settings include:

- The ISO 9613-2 noise calculation standard was used within SoundPLAN to model noise emissions from site. This captures conservative, worst case meteorological conditions assuming a light breeze from source to receiver and a moderate inversion layer
- Existing buildings, roads and other permanent structures and features were included within the model. All building footprints were sourced from Queensland Globe
- Terrain topography for the camp hub site was obtained from the ELVIS elevation database
- Ground absorption factors were set to 70% soft
- Noise sources for fixed are modelled have been point sources. Mobile plant has been modelled as point or line sources depending on the amount of movement about the site expected. Trucks and other vehicles entering and leaving site have been represented as line sources, originating at the site entry point and stretching to typical on-

site destinations; and

- One scenario has been modelled. This is the likely worst case scenario, during the 6:30am to 7am period during which personnel depart from the accommodation for their worksites, on-site activities commence, and materials deliveries start to be received or despatched. All plant has been assumed to be operational during this scenario.

Figure 4 below shows the layout of the SoundPLAN noise model. Green and yellow dots indicate noise receivers. Red lines and red/blue dots indicate moving and stationary noise sources. Property boundaries and terrain contour lines (at a 2m contour interval) are shown in grey. Buildings are cross hatched in green.

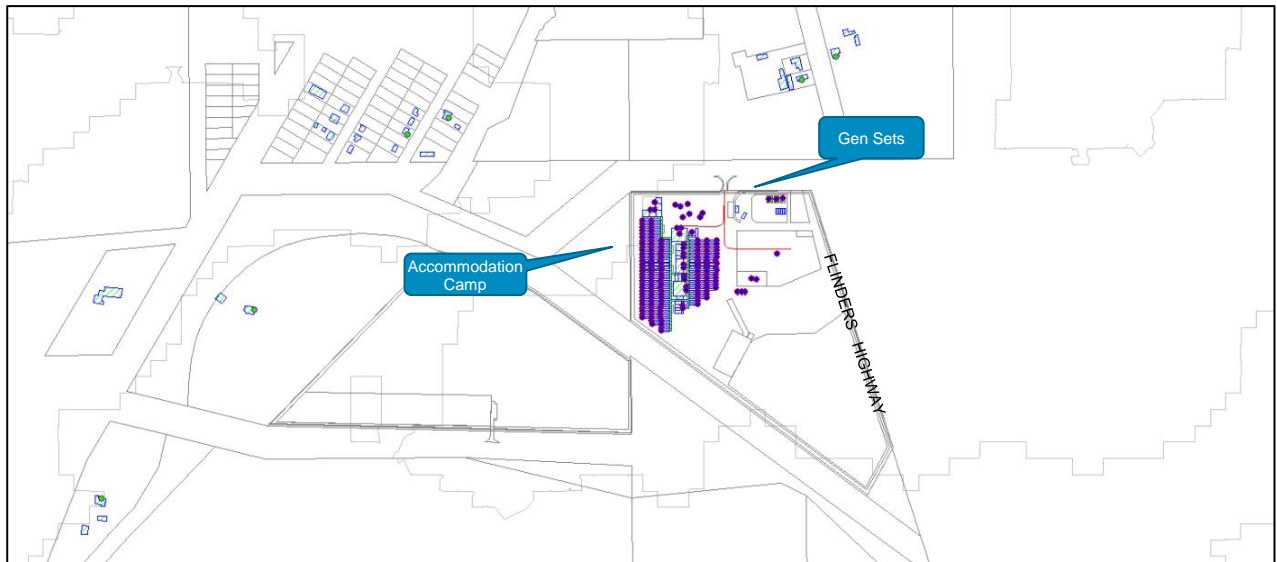


Figure 4 – Hughenden, SoundPLAN Noise Model.

6. Noise Sources

Table 5 below lists details of the noise sources operating on the camp hub site during normal operations. (Camp construction noise is considered separately in Section 9.) It includes the instantaneous maximum sound power levels, the number of sources active at one time, the minutes per hour that the noise sources are expected to typically operate for and the octave band spectra. In the model the sound power levels have been adjusted to provide one hour continuous equivalent levels, so the noise modelling results may be compared to the EPP Acoustic Quality Objective levels. Sound power levels have been sourced from pitt&sherry’s in-house database of plant noise level measurements, equipment manufacturer’s datasheets, and from the SoundPLAN noise source library.

Table 5 – Modelled noise source details

Source	Qty per Site	Height Above Ground – m	Minutes Operating per Hour	Sound Power Level dB(A)	Octave Band Spectra – dB(A)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
General												
2kW Air Conditioner Units (in groups of 3)	varies	0.5	60	67.0	46.3	63.3	61.8	59.8	54.8	48.3	46.3	37.3
125kVA Generators (in groups of 3)	3	1	60	94.2	66.5	79.6	88.0	90.4	86.7	83.9	78.6	69.6
Forklift (Laydown Area)	1	1.5	60	89.8	62.9	70.6	76.2	81.1	84.8	85.1	81.2	68.4
Truck Movement	1	1.5	15	103.9	85.5	89.5	93.5	96.5	99.5	97.5	92.5	87.5

Source	Qty per Site	Height Above Ground – m	Minutes Operating per Hour	Sound Power Level dB(A)	Octave Band Spectra – dB(A)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Light Vehicles	6	0.5	5	70.0	51.6	55.6	59.6	62.6	65.6	63.6	58.6	53.6
Power Tools (Maintenance Workshops)	3	1.0	20	80.1	30.2	34.3	42.8	56.2	69.4	77.6	73.4	71.3
Water and Wastewater Treatment Plants												
Air Blower	1	0.5	60	82.5	40.7	58.8	78.8	73.7	73.9	74.6	72.9	66.8
Pumps	1	0.5	60	82.5	66.3	66.4	69.9	70.3	76.5	77.7	75.5	69.4

The most significant noise sources are trucks moving on the site, followed by the electricity gen sets.

Three 125kVA electricity gensets is included in the noise model for the site. This is sufficient capacity to provide the entire electrical demand for the accommodation camp. If practicable the camp hubs will be connected to the grid and generators will only operate in the event of a blackout. There will also be some other much smaller generators in different parts of each site, which will not make a significant contribution to the overall site noise emissions.

Other noise sources are generally much less significant but have been included for completeness.

7. Noise Modelling Results

Noise Levels at Nearby Sensitive Receivers

Table 6 below lists the $L_{eq,1hr}$ noise levels predicted by the modelling at sensitive receivers near the camp sites. It can be seen that the noise levels meet the relevant EPP Acoustic Quality Objectives.

Figure 5 below is a noise grid maps showing the distribution of noise across the areas surrounding from the camp hubs.

Table 6 - Noise modelling results at existing sensitive receivers near the CopperString camp hubs - $L_{eq,1hr}$ - dB(A).

Hughenden		
R1	143 Haul Rd	21.0
R2	36209 Kennedy Development Rd	20.0
R3	Winton Rd	21.4
R4	36 Flinders Hwy	32.1
R5	31 Flinders Hwy	29.9
R6	46 Disraeli St	25.7
R7	39 Disraeli St	24.8

Noise Levels on Nearby Undeveloped Residential Land

As can be seen in Figure 2, an area of undeveloped land, partly zoned Rural Residential and partly General Residential adjoins the proposed camp hub site to the north. Predicted noise levels across this land can be seen in Figure 5. The predicted noise level across the majority of this land is lower than 37 dB(A). A small area immediately across the road from the site reaches about 42 dB(A). It is unlikely that houses would be developed within this area, during the maximum five year operational life of the project.

Noise Levels at the Accommodation Camps

Table 7 below gives the range of predicted inside noise levels at the accommodation camps, assuming an outside to inside noise reduction factor of 25 dB(A), which is a conservative reduction for demountable buildings with closed windows. These generally meet the EPP Acoustic Quality Objective night time indoor noise level limit of 30 dB(A) for sleep disturbance and/or the daytime residential indoor noise limit of 35 dB(A). Note that personnel residing in the camps will normally commence work prior to the end of the “night time” period at 7am.

No significant off-site noise sources have been identified that would adversely affect night time noise levels at the accommodation camp.

Table 7 – Inside Noise Levels at Accommodation Camp

Camp Hub	Predicted Noise Levels Inside Accommodation dB(A)
Hughenden	18 – 30

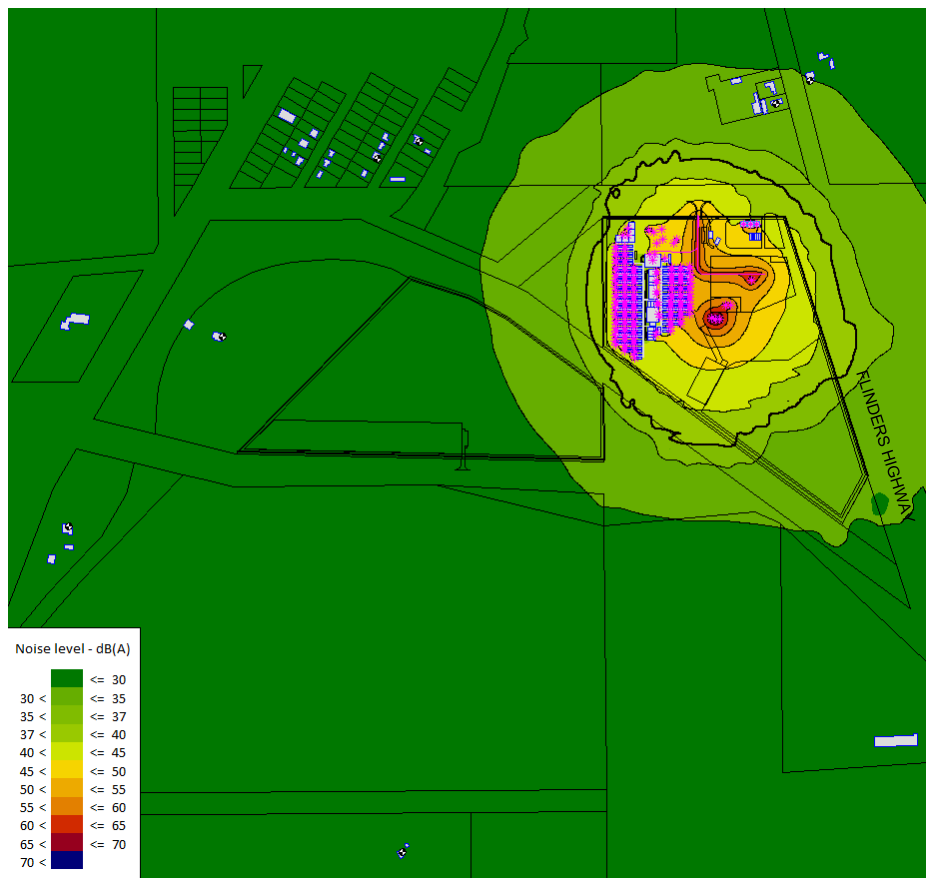


Figure 5 - SoundPLAN grid map of noise contours at the Hughenden site.

8. Railway Noise

Due to the proximity of some of the accommodation units in the southern corner of the proposed camp to the Mount Isa railway line (as shown in Figure 6 below) railway noise levels have been assessed.

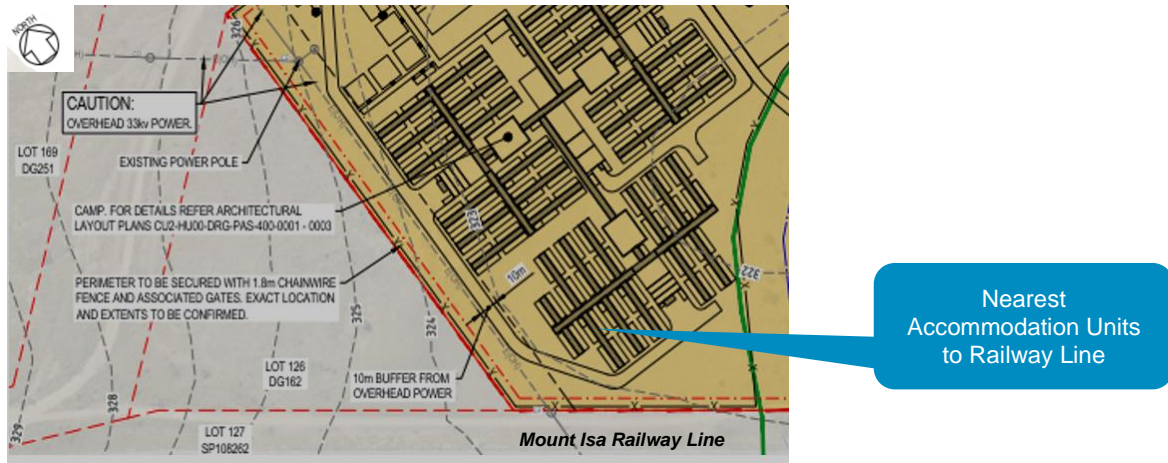


Figure 6 - Accommodation units close to railway line

Railway Noise Criteria

The Coordinator General's Report requirements (Appendix 2, Part B) for railway noise at construction camps are as follows:

- (i) For all private and communal open space associated with the workers camps, the following external noise criteria must be met:
 - < 62 dB(A) $L_{eq, 24hour}$ free field;
 - < 84 dB(A) single event maximum sound pressure level (L_{max}) free field;
 - < 65 dB(A) $L_{eq, 24hour}$ façade corrected; and
 - < 84 dB(A) single event maximum sound pressure level (L_{max}) façade corrected.
- (ii) For all residential workforce accommodation not covered by Mandatory Part 4.4 of the Queensland Development Code, the following internal noise criteria must be met:
 - < 45 dB(A) single event maximum sound pressure level for all habitable rooms.

Noise levels have been modelled assuming a maximum instantaneous locomotive sound power level of 121 dB(A). This value has been derived from a reference maximum sound pressure level of 94dB(A), measured at 15 metres, for a PR22L Diesel electric locomotive, listed in the Transport for New South Wales, Asset Standards Authority, database of rail noise levels. This sound power level provides a conservative representation of the noise of the freight and passenger trains that run on the Mount Isa line.

This sound power level has been used directly to estimate the single event L_{max} , results and has been used to calculate a $L_{eq, 24hour}$ sound power level which assumes that six trains pass along the railway line per day, at 80 kmh. This has been applied to a line source centred on the railway line in the SoundPlan model, with an equivalent sound power level of 80.4dB(A)/m. The 24 hour modelled noise level, $L_{Aeq, 24hour}$ was predicted to be 59.4dB(A) (free-field) or 62.4 at the façade of the accommodation unit.

Several 121.1dB(A) point sources were tested at various locations along the railway line, to identify the highest L_{max} level at the accommodation, resulting in a worst case L_{Amax} , of 79.6dB(A).

Both of these noise levels fall below the required criteria for open space. To meet the L_{max} 45 dB(A) criterium for internal noise levels, a noise reduction (R_w) rating of 35 dB(A) is required for the nearest rooms facing towards the railway line. This is readily achievable by conventional construction materials and windows and doors with effective acoustic seals.

Note that this assessment is based on conservative assumptions about train noise levels and frequency. If specific information relating to the Mount Isa railway line operations is obtained, lower noise levels may be evident.

9. Noise Mitigation Measures

The following general “good practice” noise mitigation measures will be adopted to help ensure that excessive noise emissions are not generated:

- All access roads, pavement and hardstand areas on the site will be maintained in good condition, to minimise tyre noise and rattling noise from heavy vehicles
- All plant and equipment will be maintained in good order at all times, especially noise control equipment such as mufflers and exhaust pipes
- Drivers will be encouraged to avoid dropping loads and scraping loader buckets on the ground
- An on-site speed limit of 20 km/h will be observed to avoid excessive noise (as well as for safety); and
- All heavy vehicles will be fitted with “broadband” style reversing beacons.

No additional noise mitigation measures are required other than specification of an R_w rating of 35 dB(A) for the accommodation units close to the railway line.

10. Construction Noise

Construction of the camp hub site will be carried out during normal daytime working hours of 7am to 5pm, Monday to Friday using conventional civil construction techniques and equipment. Appropriate precautions will be taken to limit the generation of excessive noise. No unusually loud plant or equipment (such as pile driving or blasting) is expected to be required. This will be a short-term impact prior to commencement of operation of the camp, which is expected to take nominally 2 months, with the majority of site facilities pre-fabricated offsite.

11. Ground Vibration

The proposed camp hub will not include any significant sources of ground vibration, either during construction or operations.

12. Conclusions

On the basis of this noise assessment, it may be concluded that the level of noise emissions from the proposed camp hub will comply with the Queensland EPP Acoustic Quality Objectives.

Noise emissions from the camp hub will not be sufficient to cause loss of amenity or environmental harm at nearby residences, meeting the noise related provisions of the applicable town planning scheme.

Noise levels within the accommodation units on the camp hub site, will also meet the Acoustic Quality Objectives for residential amenity and the coordinator general’s criteria for rail noise.

The detailed design phase for the camp hubs, will include revision and updating of this noise assessment, as required to ensure that the noise mitigation measures required, are implemented in the final design.

Camp Hub Noise Assessment

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