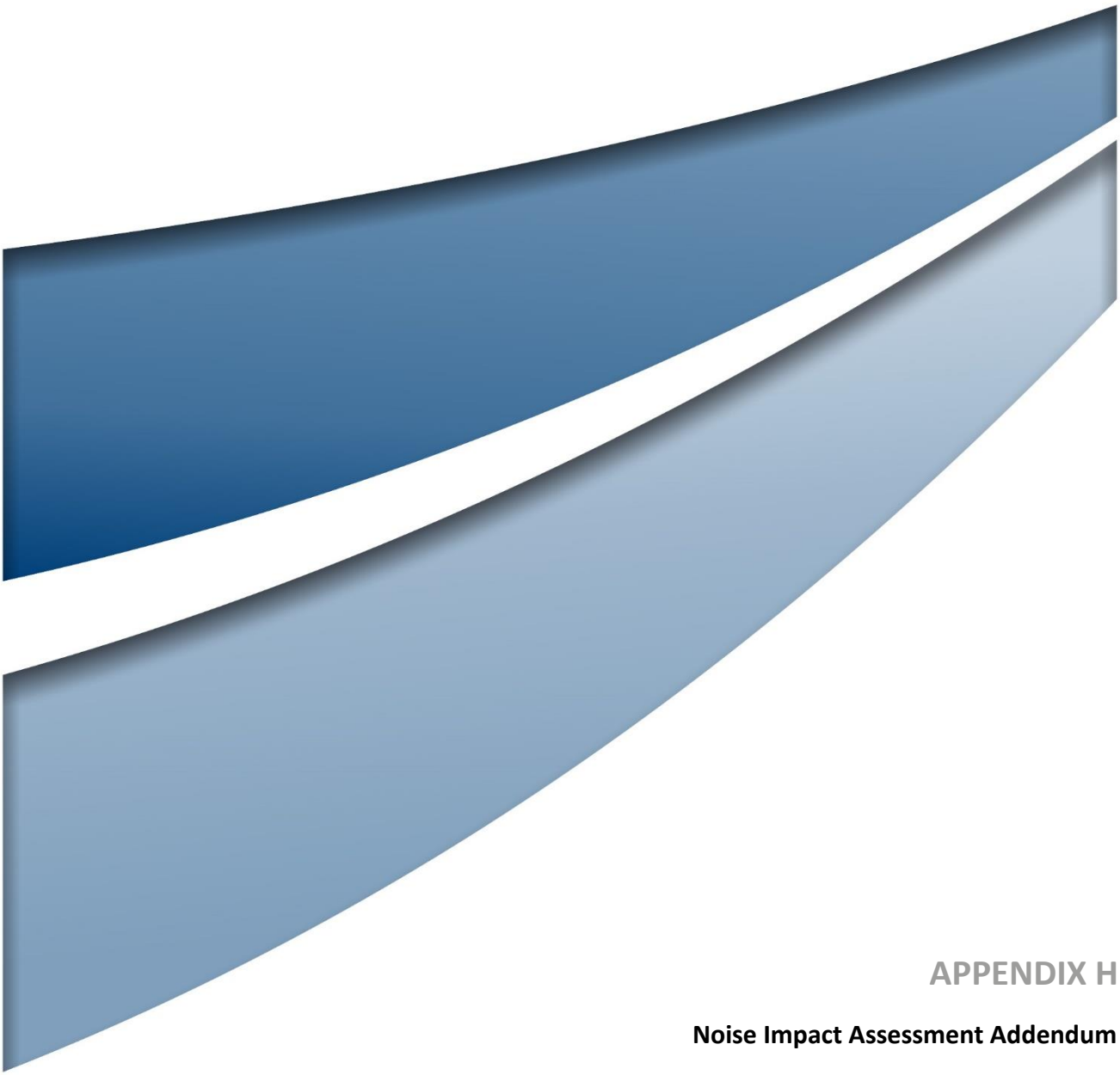
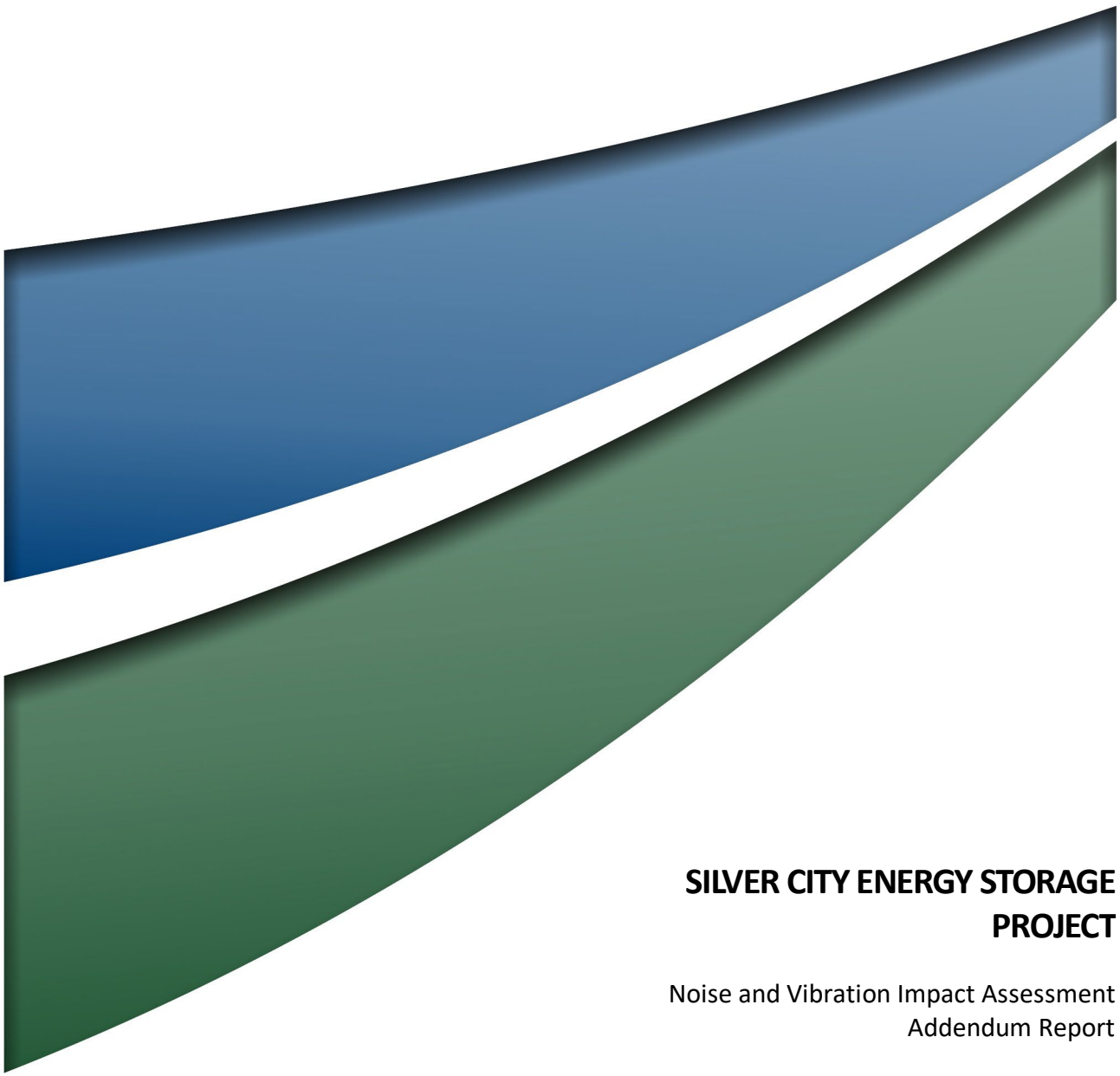


APPENDIX H

Noise Impact Assessment Addendum

umwelt
Environmental & Social Consultants



SILVER CITY ENERGY STORAGE PROJECT

Noise and Vibration Impact Assessment
Addendum Report

FINAL

August 2024

SILVER CITY ENERGY STORAGE PROJECT

Noise and Vibration Impact Assessment Addendum Report

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
A-CAES NSW Pty Ltd

Project Director:	John Merrell
Project Manager:	Penelope Williams
Technical Director:	Tim Procter
Technical Manager:	Ben Carlyle
Report No.	21982/R15
Date:	August 2024

Environmental & Social Consultants

75 York Street
Teralba NSW 2284

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
Final	Tim Proctor	15 August 2024	John Merrell	15 August 2024

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Appendices

1.0 Introduction

A-CAES NSW Pty Ltd (A-CAES NSW, the Proponent) is proposing the Silver City Energy Storage (SCES) Project (the Project) which will use A-CAES NSW proprietary advanced compressed air energy storage (A-CAES) technology to provide large-scale, long duration energy storage for Broken Hill and the broader region (200 megawatt (MW) and 1600 megawatt hours (MWh)).

During the preparation of the Submissions Report (Umwelt 2024), A-CAES NSW has progressed further detailed design and construction scheduling. Through this process A-CAES NSW has identified a requirement for some minor refinements to the layout and some amendments to the proposed construction activities. The proposed amendment to the construction working hours to allow all activities 7 days per week and some selected activities 24 hours per day, 7 days per week (24/7) is proposed to provide for activities that are required to occur 24/7 to align with the underground excavation activities (e.g. the shaft drilling), to avoid extensive delay to the construction timeframe and to align with the needs of a predominately fly in and workforce.

This Noise and Vibration Impact Assessment addendum report (NVIA Addendum) has been prepared to address the amendments to the Project outlined in **Section 2.0** and is supplementary to the previously prepared Silver City Energy Storage Project Noise and Vibration Impact Assessment (Umwelt, July 2023) (EIS NVIA 2023).

2.0 Description of Amendments

The proposed amendments to the Project, that are relevant to the noise and vibration assessment are summarised below and the noise impacts assessed in the subsequent sections of this addendum report.

2.1 Revised SCES Facility Layout

Through detailed design, to optimise the site layout the location of the components has been subject to minor revisions from what was presented in the EIS. The location of noise generating equipment has been maintained and is consistent with that which was presented in the EIS. The proposed underground cavern has also shifted slightly north to align with the associated surface infrastructure. The design of the proposed above-ground water reservoir has been amended, however, the total capacity of 300 ML, as proposed in the EIS has not changed. Further details of the design amendments are provided in the Amendment Report.

The amended conceptual layout of the SCES Facility is provided in **Figure 2.1**, and for comparison the layout presented in the EIS is shown in **Figure 2.2**. The amended conceptual layout provided in **Figure 2.1** includes the following noise control measures:

- acoustic hoods applied to the air compressor and turbine generators.
- a noise barrier located on the southern side of Cooling Water Air Cooled Exchanger (0210-EC-001A/B/C/D).
- multiple barriers around the larger transformers have been incorporated into the design. These barriers range from 7 to 10 m in height.

The Project will be subject to further detailed design prior to construction with the potential for some further minor design refinements to the conceptual layout shown.

2.2 Construction Activities

The EIS proposed a total construction period of approximately 36 months, with a peak construction phase of 10 months undertaken within standard construction hours only (with exception of underground works which were proposed to occur 24/7). The construction period remains approximately 36 months, however, to achieve this construction timeframe amended construction working hours are proposed. In the absence of these amended construction hours the further design work has indicated that an extended construction timeframe would be required (likely minimum 48 months).

The following construction working hours are proposed:

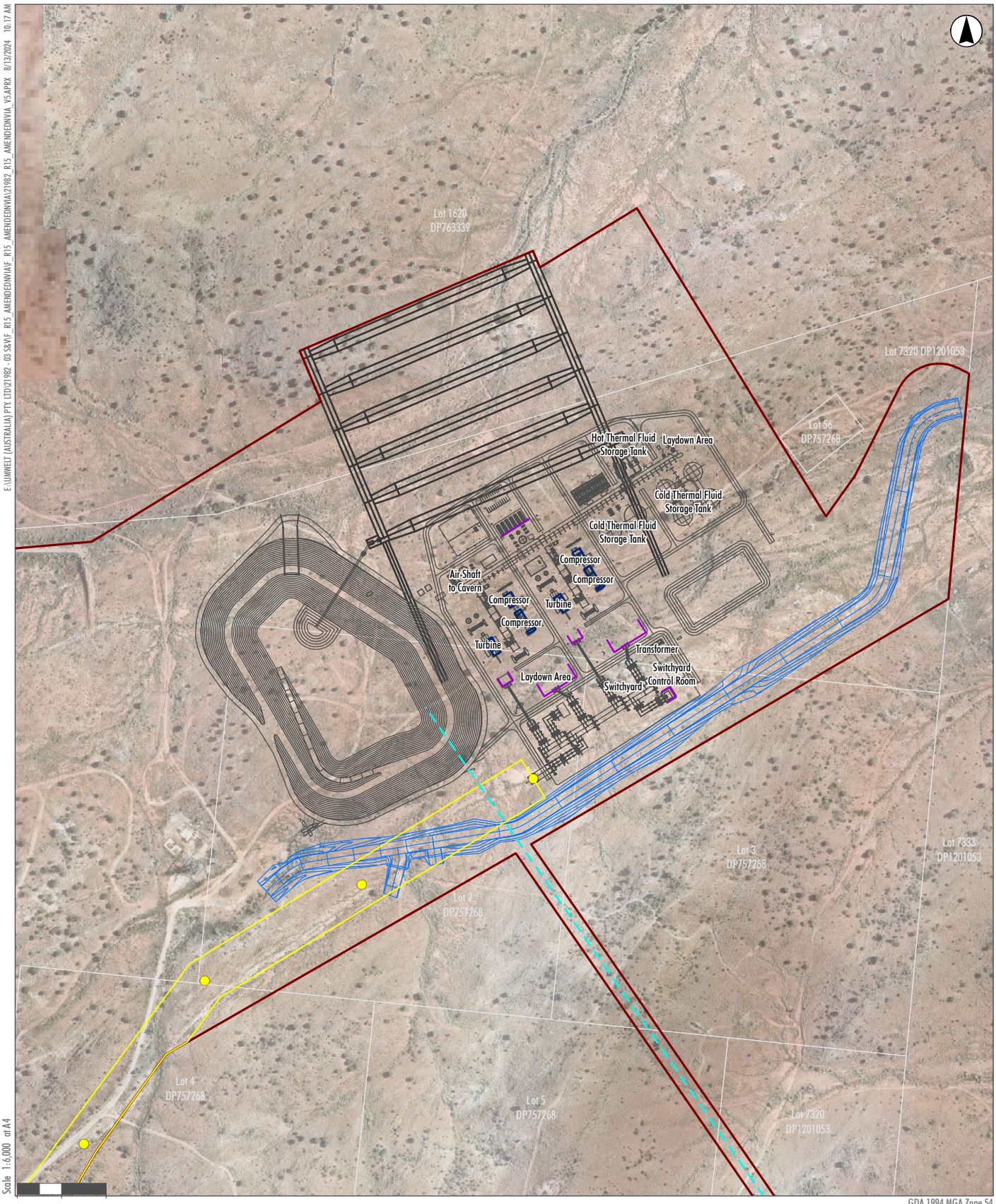
- Transmission Line – standard construction hours:
    - 7:00 am to 6:00 pm Monday to Friday
    - 8:00 am to 1:00 pm on Saturdays
    - No works on Sunday or public holidays.

With the exception of activities which are inaudible at any neighbouring receivers, emergency work, and deliveries and dispatches where required by authorities for safety reasons – these would be undertaken on a 24-hour basis.

- SCES Facility – Construction hours:
    - Underground works and shaft construction (connection between surface facilities and underground cavern) and related construction activities at surface and underground – includes crane/rig welding, compressors/generators, air tools, concrete pumps) – 24/7
    - All other construction activities 7 days per week (daytime only – 7am to 6pm)
    - Limiting nighttime activities to critical activities only e.g., concrete pours.

This NVIA Addendum addresses:

- operational noise from the Amended SCES Facility
- construction noise from the Amended Project, including:
    - standard hour impacts from the construction of the SCES Facility, transmission line and water pipeline
    - out of hours construction work (OOHW) impacts from the SCES Facility
    - construction traffic impacts on public roads.
- EPA submission advice [Ref: DOC23/82311-8, dated 20 October 2023], namely updated assessments for:
    - operational noise from SCES Facility water pipes and valves
    - operational noise (corona discharge) from the transmission line.



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Legend

- Project Area
- Silver City Energy Storage Facility
- Underground Cavern
- Transmission Pole Location
- Transmission Line Easement
- Proposed Creek Diversion
- Proposed Above Ground Water Pipeline
- Property Boundaries
- Turbine Hoods
- Noise Barriers

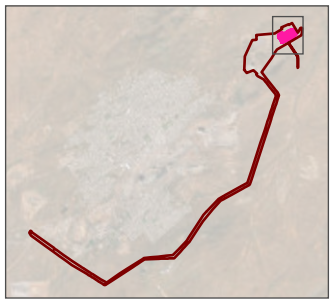
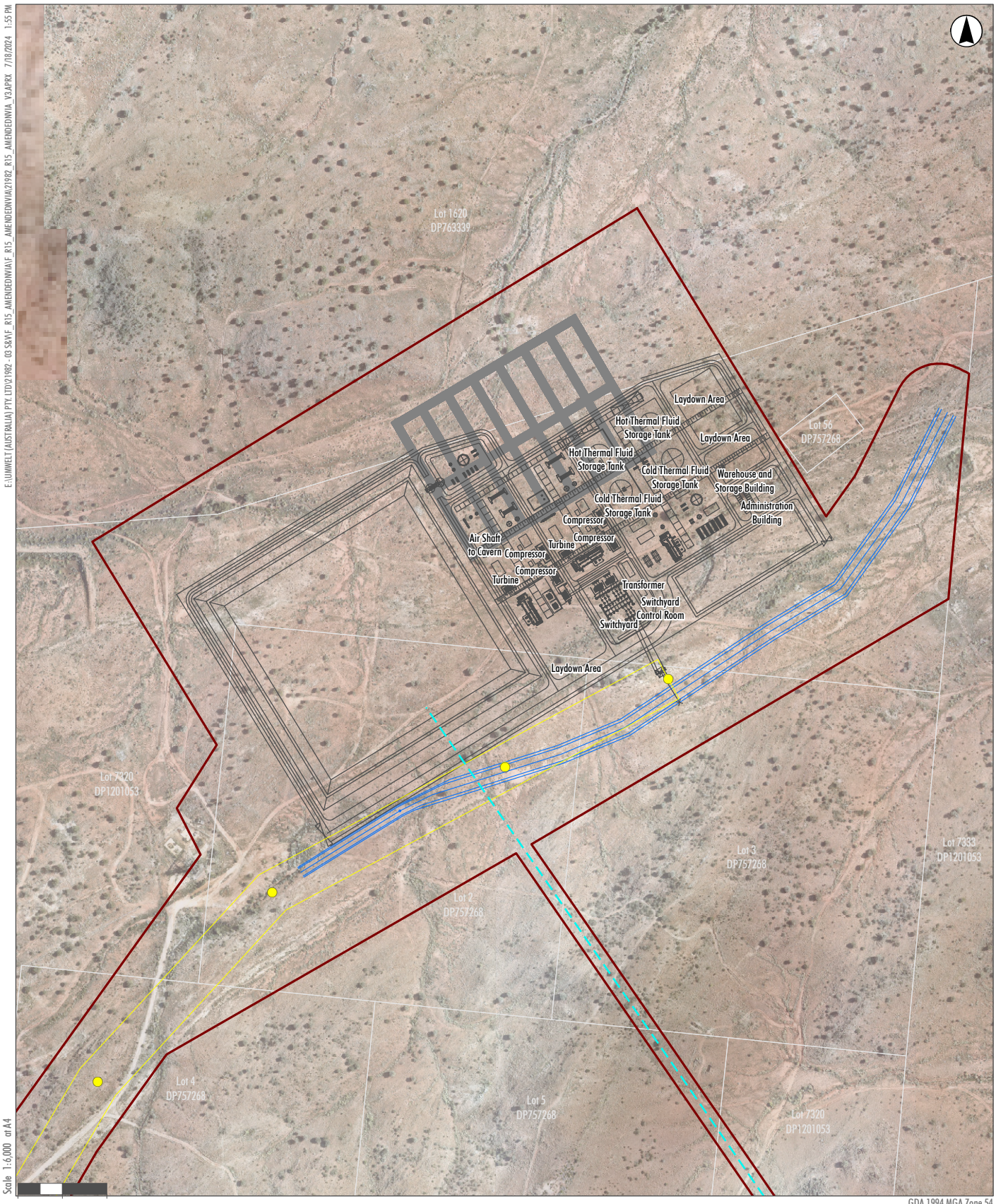


FIGURE 2.1

Amended Project Layout
SCES Facility

Image Source: Nearmap (2022) Data source: DSFI (2023)



Legend

- Project Area
- Silver City Energy Storage Facility
- Underground Cavern
- Transmission Line Easement
- Transmission Pole Location
- Proposed Creek Diversion
- Proposed Above Ground Water Pipeline
- Property Boundaries

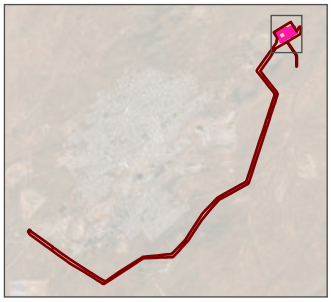


FIGURE 2.2

EIS Project Layout
SCES Facility

Image Source: Nearmap (2022) Data source: DSFI (2023)

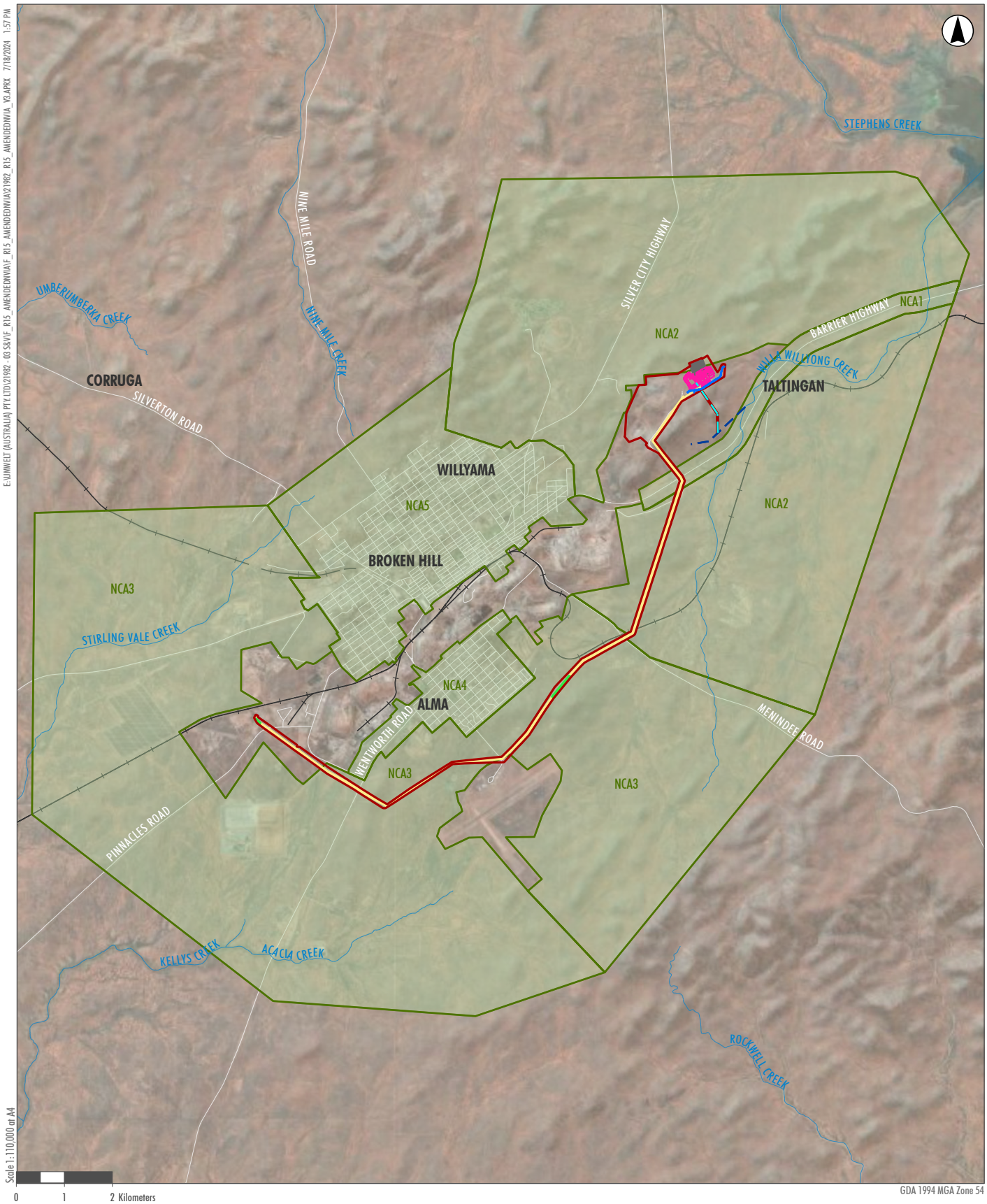
3.0 Sensitive Receivers and Noise Catchment Areas

The sensitive receivers and noise catchment areas (NCAs) are consistent with the EIS NVIA. The NCAs are shown in **Figure 3.1** and the representative receivers for the SCES Facility are shown in **Figure 3.2**.

For clarity, Receiver R10 (1 Mann Street, Broken Hill - Broken Hill Outback View Holiday Park) has been classified as Holiday Accommodation and the amenity criteria is based on a 'suburban' residential land use category. Further, Table 2.2 of the NPfI specifies that for, hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks the recommended amenity noise level is set:

> *5 dB(A) above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day*

Accordingly, in accordance with Table 2.2 of the NPfI, the R10 amenity noise level is set 5 dB(A) above the 'suburban' recommended amenity noise level.



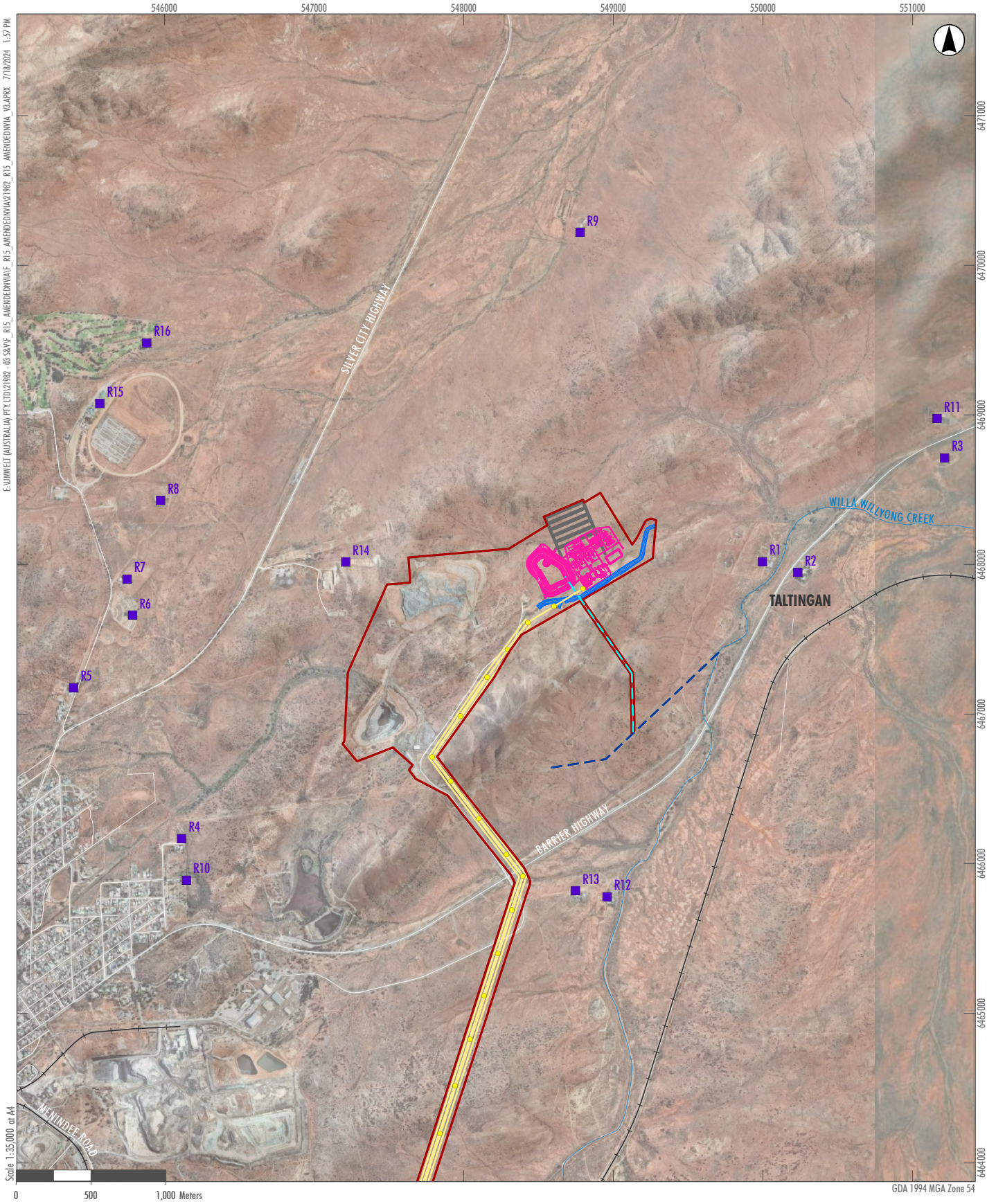
Legend

- Project Area
- Silver City Energy Storage Facility
- Underground Cavern
- Proposed Transmission Line (Above Ground Section)
- Proposed Transmission Line (Underground Section)
- Proposed Creek Diversion
- Existing Stephens Creek Reservoir Water Pipeline (above ground section)
- Proposed Above Ground Water Pipeline
- Drainage Line
- Railway Line
- Road
- Noise Catchment Area

FIGURE 3.1

Noise Catchment Areas

Image Source: ESRI Basemap (2022); Nearmap (2022) Data source: DFSI (2022)



Legend

- Project Area
- Silver City Energy Storage Facility
- Proposed Transmission Line (Above Ground Section)
- Underground Cavern
- Proposed Creek Diversion
- Existing Stephens Creek Reservoir Water Pipeline (above ground section)
- Proposed Above Ground Water Pipeline
- Drainage Line
- Railway Line
- Road
- SCES Facility Receivers

Image Source: ESRI Basemap (2022); Nearmap (2022) Data source: DFSI (2023)

FIGURE 3.2

Representative Receivers for the Operational Noise Modelling for the SCES Facility

4.0 Operational Assessment

Potential operational impacts and findings associated with the SCES Facility sleep disturbance and emergency equipment are consistent with the EIS NVIA and therefore no assessment of change related to the Amended Project are necessary.

For this NIA Addendum, the operational noise criteria in Section 4.1 of the EIS NVIA and the operational noise management plan and operational noise monitoring recommendations in Section 8 EIS NVIA are unchanged and still relevant. Operational noise mitigation and management measures are provided in **Section 7.1**.

4.1 The SCES Facility

Subsequent to the operational noise assessment undertaken as part of the EIS, as described in **Section 2.1**, the conceptual layout of the SCES Facility has undergone some refinements. The refinements are restricted to minor changes in the location of noise emitting equipment. There are no other proposed changes to the SCES Facility that require consideration in this NVIA Addendum (i.e. equipment type, number and noise levels, vehicle movements, hours of operation and expected equipment operational cycles will remain the same).

The location of the main noise generating equipment is relatively unchanged. The separation distance between the nearest receivers and the air compressors and air turbines has not changed. The transformers and switchyard have moved further to the south; however, the separation distance is relatively unchanged. The air-cooled exchanger has moved to the west, approximately 200 m further away from the nearest receivers.

Noise modelling was undertaken to determine if there were any changes to potential noise impacts associated with the updated conceptual layout. The noise model incorporated updated 3-dimensional digital ground contours for the site and the same noise control measures contained in Section 5.3 of the EIS NVIA. The updated location of the acoustic hoods and barriers are shown in **Figure 4.2**. All other noise model inputs and parameters were consistent with that undertaken in the EIS NVIA.

The predicted operational $L_{Aeq,15minute}$ noise levels for the worst-case meteorological condition modelled in the EIS NVIA (F-class with up to 0.5 m/s windspeed) is shown in **Table 4.1**. The predictions are based on the worst-case operation cycles, charge cycle (start-up and normal operation) and discharge cycle (start-up and normal operation).

The results within **Table 4.1** show that the noise levels are predicted to remain under the day, evening and night-time PNTLs and the EIS NVIA cumulative noise criteria at all non-involved sensitive receivers. Further, predicted noise levels at the nearest residential receiver locations (R1 to R6) were determined to be within 1 dB(A) of previous results.

The risk of unacceptable noise emissions from the operation of SCES Facility based on the updated conceptual layout has been assessed and shown that the noise levels can comply with the applicable PNTLs. Additionally, A-CAES NSW has committed to achieving the PNTLs at all non-involved sensitive receivers.

Table 4.1 Predicted Operational Noise Levels $L_{Aeq,15minute}$ from the facility, dB(A)

NCA	Representative Receiver ID	Receiver Type	Night PNTL $L_{Aeq,15min}$	Predicted Noise Levels $L_{Aeq,15minute}$		Exceedance
				Start-up / Charge Cycle	Start-up / Discharge Cycle	
				INV [3]	INV [3]	
NCA 1	R1 [1]	Residential	-	40/39[4]	37/37	-
	R2 [2]	Residential	35	35/35	35/34	Nil
	R3	Residential	35	28/28	27/27	Nil
NCA 2	R4	Residential	35	25/25	24/24	Nil
	R5	Residential	35	23/22	23/23	Nil
	R6	Residential	35	25/25	25/25	Nil
	R7	Residential	35	25/25	25/25	Nil
	R8	Residential	35	27/27	26/26	Nil
	R9	Residential	35	31/31	31/30	Nil
	R10	Holiday Accommodation	43	25/24	24/24	Nil
NCA 1	R11	Commercial	63	29/29	28/28	Nil
NCA 2	R12	Commercial	63	26/25	27/27	Nil
	R13	Commercial	63	27/27	28/28	Nil
	R14	Commercial	63	19/19	20/20	Nil
	R15	Commercial	63	24/24	24/24	Nil
	R16	Active Recreation	53	25/25	25/25	Nil

Note: *[1] An agreement between A-CAES NSW and receiver R1 is in place and the PTNLs are not applicable.*

[2] Receiver R2 has commercial and residential uses. For this assessment noise impacts are based on a residential receiver, as it has the most stringent noise limits.

[3] INV: noise-enhancing meteorological conditions - F class temperature inversion with wind speed of up to 0.5 m/s.

[4] Low frequency penalty of 2 dB applied

[5] Predictions below 20 dB(A) have been presented as <20.

FIGURE 4.1

Location of Acoustic Hoods and Noise Barriers

Image Source: ESRI Basemap (2022); Nearmap (2022) Data source: DFSI (2022)

4.2 Transmission Line

During operation of the electricity transmission network, corona noise and aeolian noise can be generated during certain meteorological conditions and pose potential noise impacts to nearby receivers.

4.2.1 Corona Noise

Corona noise or corona discharge noise emission (hissing or cracking noise) is predominantly associated with the conductor bundles located at the transmission line towers rather than the transmission line itself. The intensity and frequency of the corona discharge and the resulting noise is dependent on the voltage of the transmission line, the state of the conductor surface and concentration of airborne particles (dust, ash) and the meteorological conditions (such as humidity, rain, fog and wind).

Corona effects are relatively small in fair weather but can become evident during light rainfall and humid conditions as a consequence of water droplets mixing with dust on the conductor itself creating a migrating electricity leakage path. Corona effects can also become significant under electrically charged clouds.

Previous research conducted by EirGrid [Ref: *EirGrid Evidence Based Environmental Studies Study 8: Noise Literature review and evidence based field study on the noise effects of high voltage transmission development, May 2016*] (EirGrid Study 8) suggests that:

- Corona noise is only an issue for 350 kV lines and above.
- For 400 kV[1] lines, a recommended separation distances of 100 m from the line and 200 m from towers.

Based the finding of the EirGrid Study 8 and the comparatively lower voltage of the Project transmission line (220 kV), noise impacts are not anticipated.

Nevertheless, for thoroughness, findings from a recent study[2] conducted on a 500 kV was referred to. Based on this study, predicted operational noise setback distances for corona noise is expected to be below the night-time criterion of 35 dB(A) at a distance of 120 m from the transmission line (taken from the tower). This setback distance is based on a sound power level of 78 dB(A) per conductor bundle at the tower.

The nearest identified residential receiver is 83A Pro Hart Way, Broken Hill (R17) which is located 80 m west of the transmission line Project Area, 105 m west of the nearest transmission line and 120 m west of the nearest conductor bundle located at the tower (refer to **Figure 4.2**). The next nearest residential receiver is located approximately 500 m away.

Based on the 500 kV study, it is plausible that corona noise emission may approach the evening and night-time PNTL at 83A Pro Hart Way, Broken Hill; but given the substantially lower voltage of the Project transmission line (220 kV), noise impacts are not anticipated.

[1] It is noted that 400 kV transmission lines are not standard in NSW with the larger capacity lines being 500 kV and 330 kV, however, this study does provide useful information on the risk of corona noise

[2] Australian Acoustic Society – Victoria Division Technical Meeting (July 2024) – A review of corona and aeolian noise risks associated with overhead transmission lines.

Additionally, corona noise is not a constant occurrence but is only present during wet and misty conditions. Based on the 1947 to 2023 meteorological statistics for Broken Hill, the mean number of rain days with rainfall greater than 1 mm occurs less than 8% of the time. Additionally, during heavier rain events, general ambient noise levels in the environment would likely be high and, therefore, potentially have a masking effect over any possible corona discharge noise. The reported highest mean relative humidity at 9am is during June and July at 73% and 72% respectively. As the prevalence of wet and misty conditions is very low in the Broken Hill area, which is in an arid bioregion, the risk of noise disturbance from corona noise is likely to be a low.

Given the limited number of potentially affected receivers (i.e. only R17) and the expected low intensity of corona noise emission associated with a 220 kV line and the expected low occurrence of corona noise in an arid environment, the risk of corona noise occurring such that it would impact on R17 is very low and the potential impacts are considered minimal. In addition, line fittings (such as hardware corona rings) and conductor arrangements (i.e. increasing the conductor size, increasing the distance between conductors and using bundled conductors) can reduce corona discharge and so in the very unlikely event that any issues arise, they could be addressed through either at source or at receiver mitigation.

Legend

- Project Area
- Proposed Transmission Line (Above Ground Section)
- Proposed Transmission Line (Underground Section)
- Railway Line
- Road
- Residential Receiver

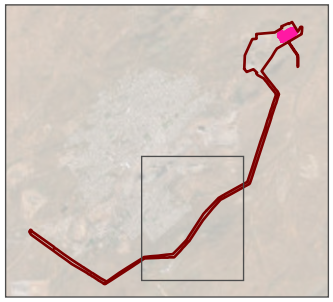


FIGURE 4.2

Nearest Residential Receivers to the Transmission Line

Image Source: ESRI Basemap (2022); Nearmap (2022) Data source: DFSI (2023)

5.0 Construction Noise and Vibration

Potential impacts and findings associated with the assessment of construction blasting and vibration are unchanged from the EIS NVIA and do not necessitate further consideration in this NVIA Addendum. The EIS NVIA found that potential impacts from construction blasting and vibration are anticipated to be minimal.

5.1 Construction Noise Criteria

The NSW EPA recognises that construction activities could potentially generate higher noise levels than those of an industrial operation. The ICNG provides noise management criteria for construction activities. The criteria are intended to guide the need for, and the selection of, feasible and reasonable work practices to minimise construction noise impacts.

The ICNG notes that a residential receiver is 'noise affected' if the $L_{Aeq,15minute}$ construction noise level exceeds the rating background noise level by more than 10 dB during recommended standard hours. A residential receiver is 'highly noise affected' if the $L_{Aeq,15minute}$ construction noise level exceeds 75 dB(A).

During periods outside recommended standard hours, a residential area is 'noise affected' if the $L_{Aeq,15minute}$ construction noise level exceeds the rating background noise level by more than 5 dB(A). It is noted that this level is consistent with the NPfI minimum noise criteria for operational noise. Given construction noise is temporary, this level is considered to be relatively restrictive.

Standard construction hours as defined by the ICNG are provided in **Table 5.1.**

Table 5.1 ICNG Recommended Standard Hours for Construction Work

Work Type	Recommended Standard Hours of Work
Normal Construction	Monday to Friday 7:00 am to 6:00 pm Saturday 8:00 am to 1:00 pm No work on Sunday or public holidays
Blasting	Monday to Friday 9:00 am to 5:00 pm Saturday 9:00 am to 1:00 pm No blasting on Sunday or public holidays

As discussed in **Section 2.2**, there is a requirement to undertake certain construction activities outside of standard construction hours including those associated with the underground cavern including drilling of the shafts and associated activities. Undertaking certain construction activities outside of standard construction hours will also assist in shortening the overall construction timeframe by approximately one year and will provide for more appropriate construction workforce arrangements given the need for fly in fly out construction personnel.

Table 5.2 presents the ICNG construction noise assessment levels for representative receivers surrounding the Project Area.

Table 5.2 ICNG Construction Noise Management Levels

Land use	Construction time	Noise Management Level $L_{Aeq,15minute}$
Residential	Recommended standard hours	RBL + 10 dB(A)
	Outside recommended standard hours	RBL + 5 dB(A)
Classrooms at schools and other educational institutions	Applicable when property is in use	Internal noise level[1] 45 dB(A)
Hospital wards and operating theatres	Applicable when property is in use	Internal noise level 45 dB(A)
Places of Worship	Applicable when property is in use	Internal noise level 45 dB(A)
Community Centres	Applicable when property is in use	Depends on the intended use of the centre. Refer to the recommended 'maximum' internal levels in AS2107 for specific uses[2]. Internal noise level 40 dB(A)
Industrial premises	Applicable when property is in use	External[3],[4] noise level 75 dB(A)
Offices, retail outlets	Applicable when property is in use	External[4] noise level 70 dB(A)
Other businesses that may be very sensitive to noise, where the noise level is project specific: **Childcare Centres**	Applicable when property is in use	External[5] noise level ≤ 55 dB(A) Internal[5] noise level ≤ 40 dB(A) Internal[5] (sleeping area) ≤ 35dB(A)
Active recreation areas	Applicable when property is in use	External noise level 65 dB(A)
Passive recreation areas	Applicable when property is in use	External noise level 60 dB(A)

Notes [1] Applies at the centre of the room in use, most exposed to the construction noise, and can include both airborne and ground-borne noise.

[2] Community Centres generally provide community spaces for life-long learning, social and cultural activities and typically contain a multi-use hall. The assumed conservatively representative design use from AS2107 was for assembly halls and conference rooms within Educational Buildings, resulting in a recommended 'maximum' internal noise level of LAeq,15minute 40 dB(A).

[3] The external noise levels should be assessed at the most-affected occupied point of the premises.

[4] The external noise levels should be assessed at the most-affected occupied point of the premises.

[5] From the Association of Australian Acoustical Consultants Guideline for Child Care Centre Acoustic Assessment, Version 3.0, any location within the respective outdoor play or activity area; indoor activity area; or sleeping area of the Centre during the hours when the Centre is operating.

There is a number of potential sensitive receivers that could be affected by the construction works (transmission line, water pipeline and facility works). This is predominantly attributed to the transmission line works, which extends for 16 km around the southern boundary of Broken Hill, rather than the facility which is relatively isolated. As noted above, audible construction work associated with the transmission line will be undertaken in standard construction hours.

Willyama High School, Broken Hill North Public School, Alma Public School, Rainbow Preschool and Railway Town Public School have been assessed against the noise management levels for educational facilities.

A graphical representation of standard and outside standard hours (out-of-hours work (OOHW) periods) and the determination of residential receiver Noise Management Levels (NML) for each period is shown in **Figure 5.1**.

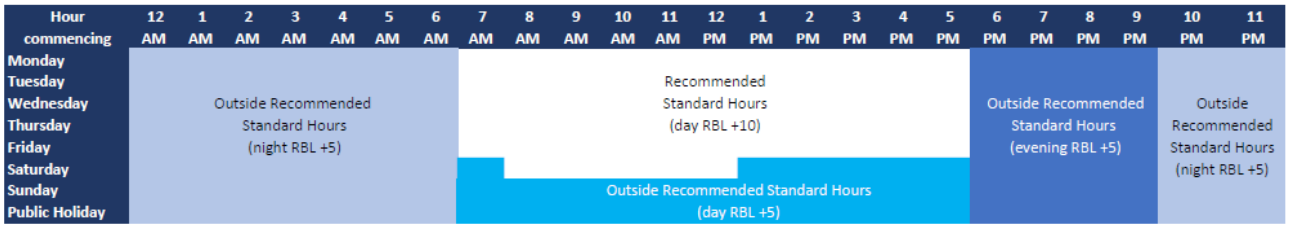


Figure 5.1 ICNG Recommended Standard Hours and Outside Recommended Standard Hours (and NML Determination)

Additionally, the ICNG states the following with respect to the potential for sleep disturbance:

> *Where construction works are planned to extend over more than two consecutive nights, and a quantitative assessment method is used, the analysis should cover the maximum noise level, and the extent and the number of times that the maximum noise level exceeds the RBL. Some guidance indicating the potential for sleep disturbance is in the NSW Environmental Criteria for Road Traffic Noise (EPA 1999).*

The potential for both sleep disturbance and awakenings has been considered using a contemporary approach as nominated in the NPfI. The NPfI approach to assessing maximum noise level events for industrial noise sources at residential locations, includes a screening level test based on Project night-time noise levels exceeding:

- 52 dB(A) L_{Amax}
- the prevailing ambient RBL noise level by more than 15 dB, whichever is greater.

For the purposes of this assessment, the 52 dB(A) L_{Amax} parameter has been adopted to assess the potential for sleep disturbance from construction noise during the night-time period in all NCAs.

5.1.1 Construction Hours

The construction of the transmission line and water pipeline will be undertaken during standard construction hours, with the exception of activities which are inaudible at any neighbouring receivers, emergency work, and deliveries and dispatches where required by authorities for safety reasons – these would be undertaken on a 24-hour basis.

Underground works will be undertaken 24/7 as outlined in the EIS. Potential airborne noise impacts associated with underground works are not anticipated. The assessment of potential impacts from underground blasting was assessed in Section 6.6 of the EIS NVIA.

For the SCES facility, some construction activities are required to be undertaken outside standard construction hours. This includes shaft construction (connection between surface facilities and underground cavern) and related construction activities and equipment at surface (i.e. cranage, rig welding, compressors, generators, air tools, concrete pumps) which are proposed to be undertaken 24/7. All other activities to be undertaken 7 days per week (7am to 6pm) during standard construction hours and OOHW day period.

The proposed construction hours of activities are further described in **Table 5.4** of **Section 5.2.2.1** and justification is provided in **Section 5.2.3**.

5.1.2 Construction Noise Management Levels

Noise management levels used to assess potential construction noise impacts are based on residential receivers, as they typically have the most stringent noise limits.

The construction NMLs for residential receivers are summarised in **Table 5.3** based on the measured RBLs presented in Table 3.4 of the EIS NVIA and the minimum assumed RBLs in Table 4.1 of the EIS NVIA.

Table 5.3 Construction Noise Management Levels for Residential Receivers

NCA / Receiver	Noise Management Levels (NML), $L_{Aeq,15minuite}$ dB(A)					
	Standard Hours of Construction [1]		Outside Standard hours of Construction			
	Noise Affected	Highly Noise Affected	Day	Evening	Night	
	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	LAmax
NCA 1 (R1[2], R2 & R3)	51	75	46	35	35	52
NCA 2-5 (All other residential receivers)	45	75	40	35	35	52

Notes: [1] Recommended standard hours: Monday to Friday 7 am – 6 pm; Saturday 8 am – 1 pm; no work on Sunday and Public Holiday.

[2] An agreement between A-CAES NSW and receiver R1 is in place and the NMLs are not applicable.

5.2 Construction Assessment

5.2.1 Modelling Methodology

Consistent with the EIS NVIA, construction noise level predictions were undertaken using the CONCAWE noise prediction algorithms. The noise models were developed using 3-Dimensional terrain data.

Construction noise levels have been predicted under the screening default worst-case noise-enhancing meteorological conditions (D-class with 3 m/s windspeed or F-class with 2 m/s windspeed). These meteorological conditions represent worst-case enhancing conditions for both standard and outside standard hour construction activities.

5.2.2 Construction Noise Inputs

5.2.2.1 Construction Activities, Equipment and Sound Power Levels

Construction for the Project is planned to occur over a 36-month period and will involve a range of activities along the transmission line, water pipeline and SCES facility. Some of these activities will occur simultaneously through the progression of the construction program.

A-CAES NSW provided details of the construction activities and aspects, periods of operation (i.e. day, evening, or night) and equipment numbers and types that are expected to be used for each aspect. A summary of the construction activities, periods of operation and combined sound power levels for each aspect are provided in **Table 5.4**. Further detail, including individual equipment items, are provided in **Table B.1** of **Appendix B**.

The sound power levels were sourced from the NSW Roads and Maritime Services (RMS) *Construction Noise Estimator Tool* (CNET, 2017), Department for Environment, Food and Rural Affairs (Defra) noise emission database (2004), or from Umwelt's technical database.

Table 5.4 Construction Activity, Period of Operation and Sound Power Level

Work Area / Activity	Aspect	Standard Hours	Outside Standard Hours			Combined Sound Power Level, dB(A) [2] $L_{Aeq,15minute}$
		D [1]	D [1]	E [1]	N [1]	
SCES Facility						
Site establishment	Prelim Earthworks					127 [3]
	Drainage & Utilities					127 [3]
	Hoarding Erection & Site Offices					119
Platform	Cut/Fill Pad Construction					131 [3]
	Concrete pads (concreting)					116
Compound	Deliveries; Maintenance; Office areas; Storage areas; Car parking					117
Shaft	Raiseboring					119 [3]
	Lining install					113
	Grouting					114
Dam	Earthworks					132 [3]
	Concrete pads (concreting)					118
Main process plant	Heat exchangers					109
	Compressors & air handling					109
	Thermal water storage					117
	Piping and pipe racks					119
	Balance of plant					112
	Switchrooms					102
	Switchyards/substations					112
Auxiliary Site						
Perilya stockpile	Crushing					126
	Concrete batch plant (concreting)					115
Cavern – Surface Operations						
Cavern	Spoil transfer					110
Water Pipeline						
Civil works and install	Civil works and installation					119
Transmission Line						
Clearing, civil works and install	Clearing, civil works and installation					123

Note: [1] D = Day; E = Evening; N = Night

[2] Combined sound power level based on standard hours equipment numbers.

[3] A modifying factor of 5 dB(A) has been applied to the sound power for these construction stages to factor in the annoying character of, rock hammers/breakers, jackhammer and saw in accordance with the ICNG.

5.2.3 OOHW Justification

A-CAES NSW have committed to a timeframe for the implementation of the Project to meet the needs of Broken Hill in terms of long-term energy security supply. In order to meet this timeframe a Principal Construction Contractor was engaged to undertake the detailed design of the Project and plan the construction phase. This detailed design process identified the need for some activities to occur outside of standard construction hours in order to meet the required energy security timeframe.

To meet the construction timeframe presented in the EIS and committed to under contract with Transgrid and the Long-Term Energy Service Agreement (LTESA) with the Australian Renewable Energy Agency (ARENA), alternate construction working hours are required for some select activities. Detailed construction scheduling has been undertaken to determine the construction scenarios required including consideration of compliance with relevant criteria particularly noise. Following standard construction hours, as outlined in the EIS (outside of cavern excavation activities which were always identified as a 24/7 activity) is not a viable option for the Project and will add an additional 12 months to the 36-month construction timeframe impacting the economic viability of the Project and not meeting energy security timeframes for Broken Hill.

The proposed co-location of the SCES Facility within the Potosi Mine site was selected due to favourable geological conditions, utilisation of existing mining areas, existing mine infrastructure for access and ability to suitably manage environmental and social impacts. Specifically in relation to the proposed amendment, 24 hour operations are common with mining activities and is a familiar occurrence within and surrounding Broken Hill.

It is also noted once operational, the SCES Facility will operate 24/7. The OOHW evening and night construction noise criteria are consistent with the operational noise criteria. That is, any work undertaken during the evening and night-time periods during construction must meet the same criteria at operations undertaken in the evening and night. In effect, the proposed changes to construction hours do not result in any greater noise impacts than those proposed for operations in these periods and A-CAES NSW has committed to manage construction noise to meet these criteria.

5.2.4 Construction Program and Scenarios

A-CAES NSW provided details of an indicative construction program and what activities and aspects are expected to operate concurrently. Based on the information, five (5) construction scenarios were adopted for this assessment and are shown in **Table 5.5**. The scenarios cover all of the construction aspects and address the worst-case periods of the construction program when multiple aspects are occurring simultaneously. The detailed indicative construction program is provided in **Table B.2** of **Appendix B**.

The modelled scenarios cover the construction of the shafts during the OOHW evening and night which is indicated in **Table 5.4** and **Table B.1** of **Appendix B**, and is further broken down into the following aspects:

- Raiseboring (RIG, Generator, compressor)
- Lining install (Crane, welders, hand tools, EWP)
- Grouting (concrete mixer and pump, hand tools, generator, forklift, pump)

The shaft construction aspects and equipment are captured in modelled Scenarios 3 and 4, which is shown in **Table 5.5** and **Table 5.6**. Modelled scenario 3 also covers concrete pad works for the dam construction during OOHW evening. Earthworks associated with dam construction is restricted to standard hours and OOHW day.

The activities provided by A-CAES NSW include rock crushing and concrete batching at the Perilya stockpile. Given these activities are already approved as part of Perilya operations, the inclusion of these activities into the modelled scenarios is considered a conservative approach.

Except for potential impacts from blasting which was assessed in Section 6.6 of the EIS NVIA, noise and vibration impacts from the construction of the cavern is limited to truck movements between the Potosi portal and Perilya stockpile which have been modelled 24/7 throughout the construction program.

Any noise emission from the excavation of cavern is expected to be insignificant and not expected to contribute to surface equipment noise emissions, as the intervening ground will provide substantial noise attenuation. Similarly, due to the significant separation distances between the cavern and the nearest receivers, ground-borne noise and vibration is expected to be imperceptible.

Table 5.5 Construction Scenarios

Work Area / Activity	Aspect	Scenario				
		Sc. 1	Sc. 2	Sc. 3	Sc. 4	Sc. 5
SCES Facility						
Site establishment	Prelim earthworks	■				
	Drainage and utilities	■	■			
	Hoarding erection and site offices	■	■			
Platform	Cut/fill pad construction		■			
	Concrete pads (concreting)				■	
Compound	Deliveries; maintenance; office areas; storage areas; car parking		■	■	■	■
Shaft	Raiseboring			■		
	Lining install			■		
	Grouting				■	
Dam	Earthworks	■	■			
	Concrete pads (concreting)			■		
Main process plant	Heat exchangers				■	
	Compressors and air handling					■
	Thermal water storage				■	■
	Piping and pipe racks			■	■	
	Balance of plant					■
	Switchrooms			■	■	■
	Switchyards/substations				■	■

Work Area / Activity	Aspect	Scenario				
		Sc. 1	Sc. 2	Sc. 3	Sc. 4	Sc. 5
Auxiliary Site						
Perilya stockpile	Crushing					
	Concrete batch plant (concreting)					
Cavern – Surface Operations						
Cavern	Spoil transfer					
Water Pipeline						
Civil works & install	Civil works and installation					
Transmission Line						
Clearing, civil works & install	Clearing, civil works and installation					

5.2.5 Noise Level Predictions

5.2.5.1 Standard Hours Assessment

The scenario representing the construction activities that will occur during standard hours and incorporates the following construction elements:

- Transmission line construction: A sound power of 123 dB(A) has been used to represent transmission line construction component, as a line source in the noise model. This assumes all equipment associated with that stage will be in use for 100% of the assessment period and operating at the closest point to the receiver which are highly conservative, worst case assessment assumptions.
- Water pipeline construction: A sound power of 119 dB(A) has been used to represent water pipeline construction component, as a line source in the noise model. This assumes all equipment associated with that stage will be in use for 100% of the assessment period and operating at the closest point to the receiver which are highly conservative, worst case assessment assumptions.
- SCES Facility: Scenario 2 within **Table 5.5**. This is the loudest standard hours scenario, which incorporates the highest emitting aspects, including Platform – Cut/Fill Pad Construction (131 dB(A)) and Dam – Earthworks (132 dB(A)). The relevant equipment for Scenario 2 (refer to **Appendix B**) was placed as point sources and line sources at the relevant location within the facility and auxiliary site. The model is based on all equipment associated with this scenario operating for 100% of the assessment period which again, is a conservative assessment assumption.

The construction noise model does not incorporate any buildings and property fencing, and the associated acoustic shielding that would be provided. Accordingly, the noise predictions are conservative, particularly for the receivers in the built-up area of Broken Hill.

The $L_{Aeq(15min)}$ noise level contours are shown in **Figure 5.2** and **Figures C.1** to **C.3** of **Appendix C**.

Consistent with the EIS NIA, as indicated in **Figures C.1** to **C.3** of **Appendix C**, a number of sensitive receivers are predicted to experience noise levels above the applicable noise management levels during standard construction hours. The majority of these receivers are predicted to be impacted by the construction of the transmission line tower rather than the facility and the water pipeline. Given the transient nature of the transmission line works, construction works will not occur in any one location for a long period of time and so potential noise impacts at any one receiver are anticipated to be short in duration.

The predicted exceedances are consistent with the EIS NIA, except in proximity to the SCES Facility. The number of exceedances in proximity to the SCES Facility has reduced and degree of exceedance has also reduced, by approximately 8 dB(A). This is attributed to the comprehensive construction activity and equipment information provided by A-CAES NSW, enabling detailed noise modelling.

No receivers were predicted to be highly noise affected.

The noise modelling results and analysis for average noise levels indicate that reasonable and feasible noise mitigation measures are required to minimise the potential impacts on the communities surrounding the Project. Reasonable and feasible mitigation measures were detailed in Section 8.3 of the EIS NIA and are unchanged for this NIA Addendum.

The $L_{Aeq(15min)}$ predicted noise levels at Willyama High School (45 dB(A)), Broken Hill North Public School (42 dB(A)), Alma Public School (49 dB(A)), Rainbow Preschool (49 dB(A)) and Railway Town Public School (40 dB(A) comply with the applicable noise management level of 55 dB(A).

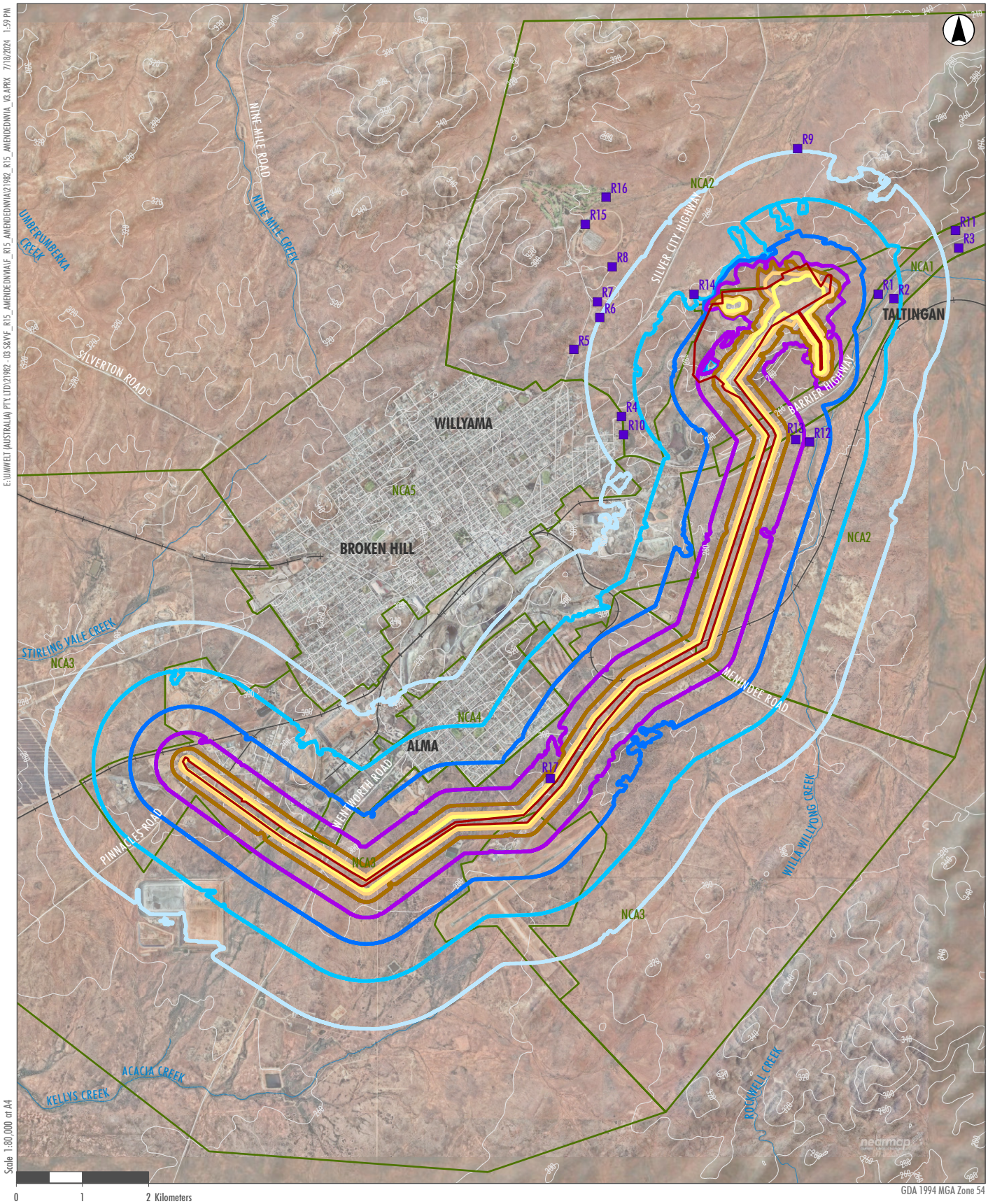


FIGURE 5.2

Standard Hours Worst-Case Construction LAeq(15min) Noise Contours

Image Source: ESRI Basemap (2022); Nearmap (2022) Data source: DFSI (2022)

5.2.5.2 Out of Hours Assessment

OOHW construction noise level predictions are based on the equipment in **Appendix B** and the scenarios in **Table 5.5**.

The predictions incorporate the following noise control measures, which are also detailed in **Table B.1** of **Appendix B** and reiterated within the reasonable and feasible mitigation measures outlined in **Section 7.0**:

- No road saw activity outside of standard hours.
- Reduced number of 50 T excavators with hammers during the OOHW daytime period.
- For Grouting activities – grout mixer and pump and generator to be placed behind 3 m high hoarding.
- The following equipment to be located at least 8 m below surface:
    - for Raiseboring activities - Raisebore RIG, generator and compressor
    - for Lining install activities – welding equipment
    - for Grouting activities – power hand tools.

The predicted construction $L_{Aeq,15minute}$ noise levels for modelled scenarios and the assigned noise management levels are shown in **Table 5.6**. With the noise control measures in place, the OOHW construction noise levels are predicted to comply with the out of hours noise management levels at all non-involved sensitive receivers.

Noise contours for the worst-case scenario during OOHW day (Scenario 2), OOHW evening (Scenario 3) and OOHW night (Scenario 3) are presented in **Figure 5.3** to **Figure 5.5**.

Maximum Noise Event (Sleep Disturbance)

To assess potential sleep disturbance impacts from construction of the SCES Facility during the night period, the following scenario was modelled under noise-enhancing meteorological conditions:

- A maximum single event sound power level of 122 dB(A) associated with potential clangs and bangs emanating from the shaft(s) steel liner sections.

Based on the above, the maximum noise level at all the receivers was predicted to be a L_{Amax} of 44 dB(A) at receiver R1 and a L_{Amax} 39 of dB(A) at receiver R2. This is not greater than the sleep disturbance L_{Amax} criteria of 52dB(A). Accordingly, the Project is predicted to comply with the sleep disturbance criteria at all receivers.

Table 5.6 Predicted OOHW Construction Noise Levels $L_{Aeq,15minute}$ from the SCES Facility, dB(A)

NCA	Receiver ID	Receiver Type	OOHW NML			Predicted Noise Levels LAeq,15minute															Exceedance
						Day (H) / Day (L) [2]					Evening					Night					
			D [1]	E [1]	N [1]	Sc.1	Sc.2	Sc.3	Sc.4	Sc.5	Sc.1	Sc.2	Sc.3	Sc.4	Sc.5	Sc.1	Sc.2	Sc.3	Sc.4	Sc.5	
NCA 1	R1 [3]	Residential	-	-	-	47/41	48/42	39/38	40/39	37/36	22	22	37	37	28	22	22	35	32	22	-
	R2 [4]	Residential	46	35	35	46/39	46/41	39/37	40/39	36/35	<20	<20	35	35	26	<20	<20	34	31	<20	Nil
	R3	Residential	46	35	35	40/35	41/36	31/29	34/32	31/29	<20	<20	28	30	22	<20	<20	26	25	<20	Nil
NCA 2	R4	Residential	40	35	35	30/29	30/29	22/21	20/20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	Nil
	R5	Residential	40	35	35	30/30	30/30	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	Nil
	R6	Residential	40	35	35	29/28	29/29	20/20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	Nil
	R7	Residential	40	35	35	30/29	30/30	20/20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	Nil
	R8	Residential	40	35	35	36/36	36/36	21/20	20/20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	Nil
	R9	Residential	40	35	35	37/35	37/36	26/25	26/26	23/22	<20	<20	24	24	<20	<20	<20	21	21	<20	Nil
	R10	Holiday Accommodation	40	35	35	29/28	29/28	20/20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	Nil
NCA 1	R11	Commercial	70	70	70	38/32	38/33	28/27	30/29	26/25	<20	<20	26	26	<20	<20	<20	22	21	<20	Nil
NCA 2	R12	Commercial	70	70	70	30/28	31/30	31/31	29/29	27/27	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	Nil
	R13	Commercial	70	70	70	34/33	35/35	37/37	35/35	33/33	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	Nil
	R14	Commercial	70	70	70	45/45	45/45	27/27	27/27	26/25	26	26	28	28	27	26	26	27	27	26	Nil
	R15	Commercial	70	70	70	29/27	29/28	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	Nil
	R16	Active Recreation	65	65	65	29/27	29/27	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	Nil
NCA 3	R17	Residential	40	35	35	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	Nil

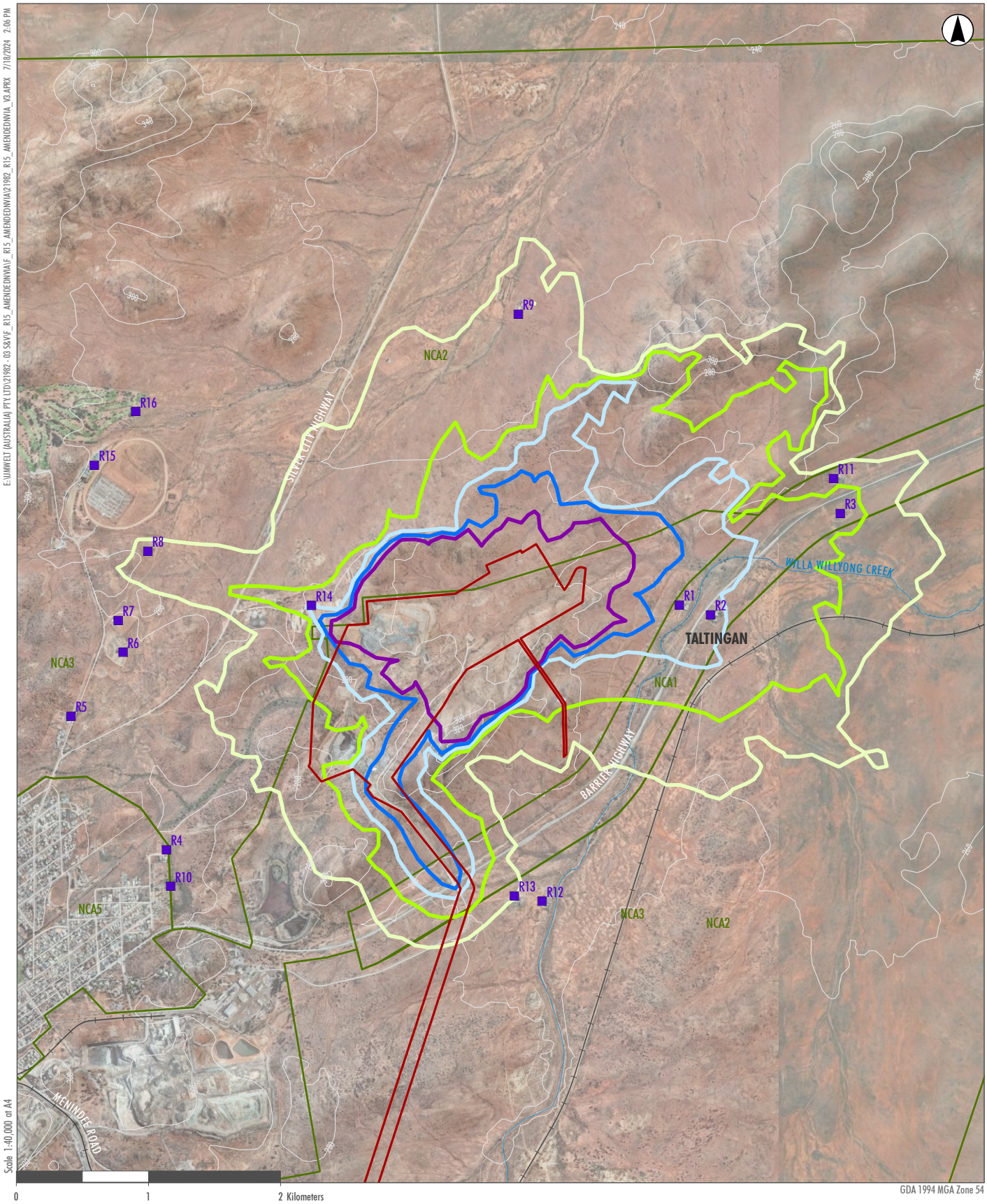
Note: [1] D = Day; E = Evening; N = Night

[2] Day (H) = High Impact Assessment – includes assigned high impact equipment (excavators with hammers, jackhammer, road saw and sandblasting), with sound power levels greater than 115 dB(A)
Day (L) = Low Impact Assessment – excludes high impact equipment

[3] An agreement between A-CAES NSW and receiver R1 is in place and the NMLs are not applicable.

[4] Receiver R2 has commercial and residential uses. For this assessment noise impacts are based on a residential receiver, as it has the most stringent noise limits.

[5] Predictions below 20 dB(A) have been presented as <20



Legend

- Project Area
- Noise Catchment Area
- SCES Facility Receivers
- Contours (10m Interval)
- Drainage Line
- Railway Line
- Road

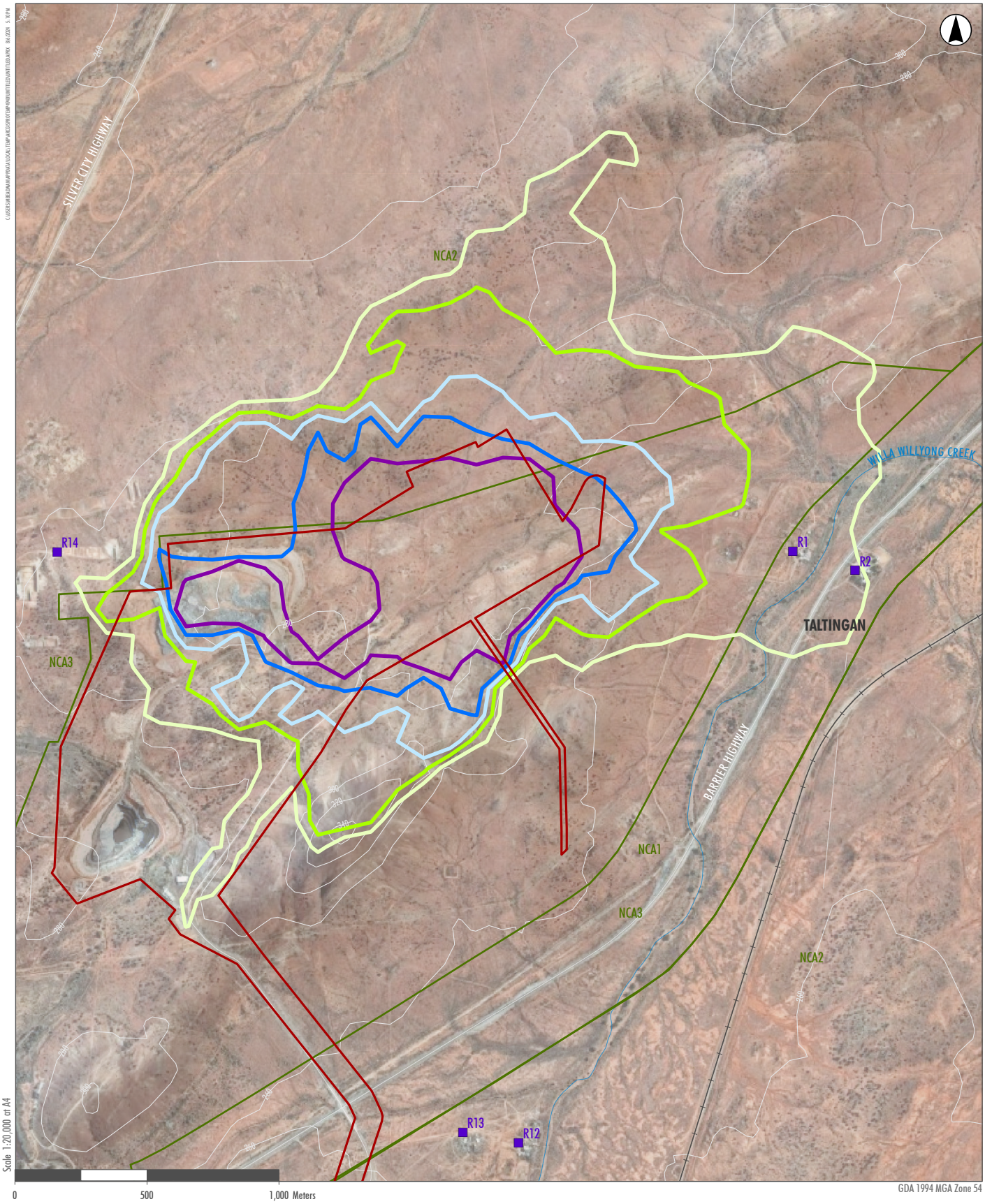
Predicted Noise Levels

- Noise Contour Level 35 dB(A)
- Noise Contour Level 40 dB(A)
- Noise Contour Level 45 dB(A)
- Noise Contour Level 50 dB(A)
- Noise Contour Level 55 dB(A)

FIGURE 5.3

Worst-Case Scenario for OOHW Day – Scenario 2
Construction LAeq(15min) Noise Contours

Image Source: ESRI Basemap (2022); Nearmap (2022) Data source: DFSI (2022)



Legend

- Project Area
- Noise Catchment Area
- SCES Facility Receivers
- Contours (10m Interval)
- Drainage Line
- Railway Line
- Road

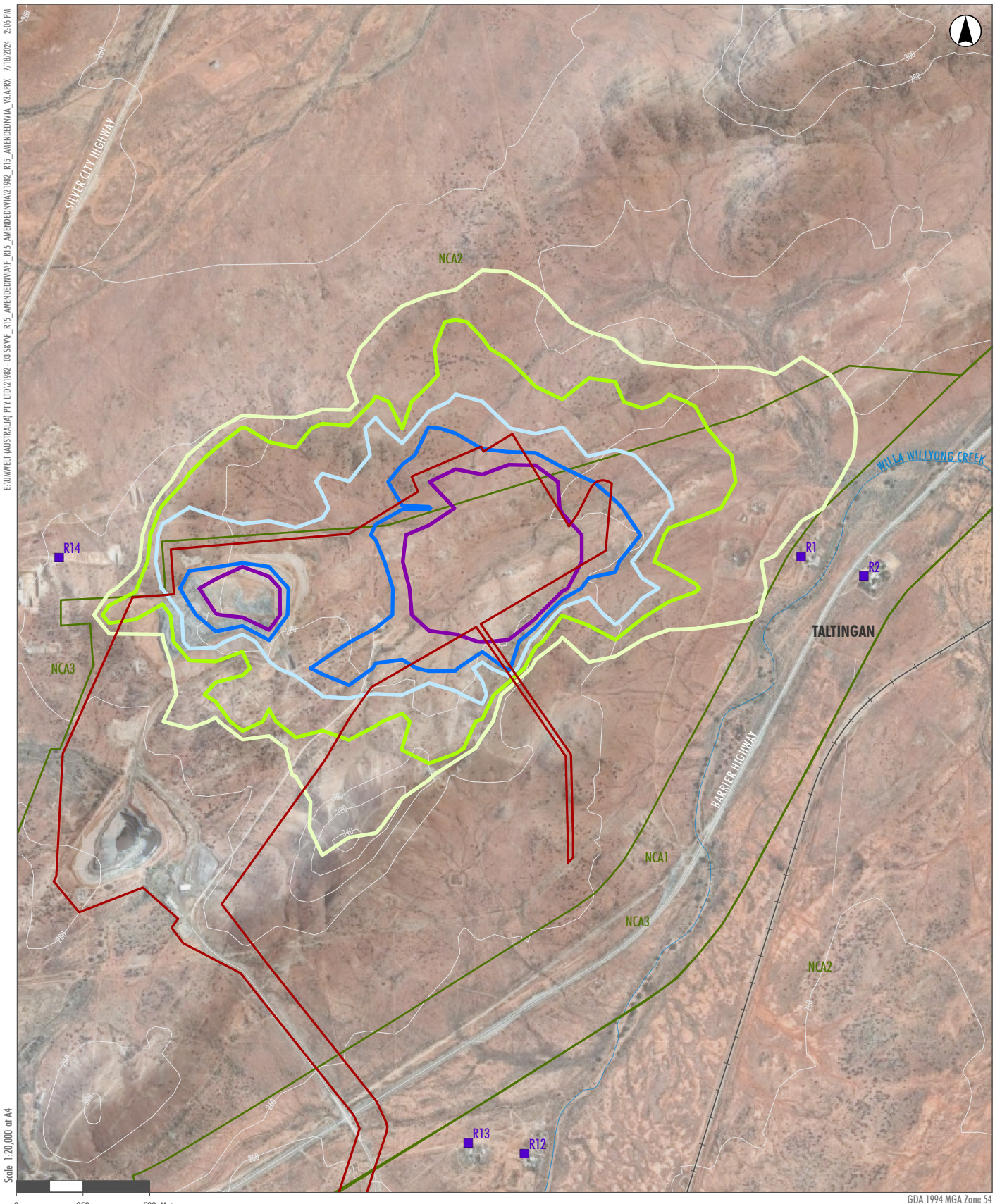
Predicted Noise Levels

- Noise Contour Level 35 dB(A)
- Noise Contour Level 40 dB(A)
- Noise Contour Level 45 dB(A)
- Noise Contour Level 50 dB(A)
- Noise Contour Level 55 dB(A)

FIGURE 5.4

Worst-Case Scenario for OOHW Evening – Scenario 3
Construction LAeq(15min) Noise Contours

Image Source: ESRI Basemap (2022); Nearmap (2022) Data source: DFSI (2022)



Legend

- Project Area
- Noise Catchment Area
- SCES Facility Receivers
- Contours (10m Interval)
- Drainage Line
- Railway Line
- Road

Predicted Noise Levels

- Noise Contour Level 35 dB(A)
- Noise Contour Level 40 dB(A)
- Noise Contour Level 45 dB(A)
- Noise Contour Level 50 dB(A)
- Noise Contour Level 55 dB(A)

FIGURE 5.5

Worst-Case Scenario for OOHW Night – Scenario 3
Construction LAeq(15min) Noise Contours

Image Source: ESRI Basemap (2022); Nearmap (2022) Data source: DFSI (2022)

6.0 Road Traffic Noise Assessment

Potential noise impacts and findings associated with operational traffic are consistent with the EIS NVIA and therefore no further consideration is required in this NVIA Addendum. The EIS NVIA found that given the low number of staff vehicle movements, operational road traffic noise is anticipated to be minimal.

6.1 Construction Traffic

The anticipated vehicle traffic routes and volumes are outlined in the Samsa Consulting report *Silver City Energy Storage Project: Broken Hill, Transport Impact Assessment: Revised*, dated August 2024 (Revised TIA) and include:

- The preferred over-size / over-mass (OSOM) transport route will be via the Port of Adelaide and onwards to Barrier Highway then into the Broken Hill urban area via, Rakow Street, Creedon Street, Gaffney Street, South Road, Crystal Street, Menindee Road and Argent Street to Barrier Highway (east) and Silver Peak Road.
- For standard heavy vehicle transport, deliveries from the south of Broken Hill are proposed to travel via Silver City Highway (south), Kanandah Road and Ryan Street into Creedon Street and continue along the OSOM transport route described above. Deliveries from the east of the Project Area will access Silver Peak Road directly off Barrier Highway to the east of Broken Hill.
- Light vehicles would predominately travel to site from the Broken Hill urban area.
- For the transmission line, light and heavy vehicles will predominantly travel to site from Broken Hill urban area via multiple access points, spread along the transmission line route.

In accordance with the Revised TIA the anticipated maximum daily construction generation is as follows:

- For OSOM heavy vehicle transport, it is estimated that 2 movements would be required.
- For general (non-OSOM) heavy vehicle transport, it is estimated that 44 movements would be required.
- For shuttle buses (50 seat), it is estimated that 32 shuttle bus movements would be required.
- For staff light vehicles, it is estimated that 84 light vehicle movements would be required.

The following assumptions have been applied in evaluating the potential traffic noise impacts:

- As indicated in the Revised TIA, traffic generation for the transmission line works is anticipated to be relatively low with a maximum of 32 heavy vehicles and 30 light vehicles per day occurring during peak construction months. Given the low number of vehicles, and multiple access locations, any traffic noise impacts associated with the transmission line works is anticipated to be minimal and has not been addressed further.
- For a conservative assessment, it has been assumed that 100% of light and heavy vehicles will travel to the Project Area via Broken Hill.

- For existing traffic volumes, it has been assumed that there is a nominal split of 90% during the day period (7.00 am – 10.00 pm) to 10% during the night period (10.00 pm – 7.00 am).
- It has been assumed that project-related heavy vehicle volumes are split 80% during the day period (7.00 am – 10.00 pm) to 20% during the night period (10.00 pm – 7.00 am).
- In accordance with the Revised TIA, it has been assumed that project-related shuttle buses and light vehicle volumes are split 50% during the day period (7.00 am – 10.00 pm) to 50% during the night period (10.00 pm – 7.00 am).

Based on the above inputs and assumptions, the indicative construction-related traffic volumes adopted for the noise assessment are presented in **Table 6.1**.

Table 6.1 Indicative Construction-related Traffic Volumes

Traffic Scenario	Parameter	Barrier Hwy / Silver Peak Rd	Argent St	South Rd / Crystal St	Gaffney St / Creedon St	Kanandah Rd / Ryan St	Barrier Hwy / Rakow St
Day time (7.00 am – 10.00 pm)							
Existing traffic volume (without Project)	Light Vehicles	432	4824	7173	1674	1206	2142
	Heavy Vehicles	198	387	189	207	243	234
	Total	630	5211	7362	1881	1449	2376
Project-related traffic volume	Light Vehicles	42	42	42	14	14	0
	Heavy Vehicles	53	53	53	53	24	11
	Total	95	95	95	67	38	11
Combined traffic volume (Existing and Project)	Light Vehicles	474	4866	7215	1688	1220	2142
	Heavy Vehicles	251	440	242	260	267	245
	Total	725	5306	7457	1948	1487	2387
Night-time (10.00 pm – 7.00 am)							
Existing traffic volume (without Project)	Light Vehicles	48	536	797	186	134	238
	Heavy Vehicles	22	43	21	23	27	26
	Total	70	579	818	209	161	264
Project-related traffic volume	Light Vehicles	42	42	42	14	14	0
	Heavy Vehicles	25	25	25	25	6	3
	Total	67	67	67	39	20	3
Combined traffic volume (Existing and Project)	Light Vehicles	90	578	839	200	148	238
	Heavy Vehicles	47	68	46	48	33	29
	Total	137	646	885	248	181	267

Traffic Scenario	Parameter	Barrier Hwy / Silver Peak Rd	Argent St	South Rd / Crystal St	Gaffney St / Creedon St	Kanandah Rd / Ryan St	Barrier Hwy / Rakow St
Hourly (peak) Traffic – vehicles per hour							
Existing traffic volume (without Project)	Light Vehicles	142	587	782	232	194	283
	Heavy Vehicles	52	52	37	52	42	81
	Total	194	639	819	284	236	364
Project-related traffic volume	Light Vehicles	32	32	32	6	6	0
	Heavy Vehicles	20	20	20	20	4	2
	Total	52	52	52	26	10	2
Combined traffic volume (Existing and Project)	Light Vehicles	174	607	814	238	200	283
	Heavy Vehicles	72	72	57	72	46	83
	Total	246	679	871	310	246	366

As outlined in Section 4.3 of the EIS NVIA, in assessing noise impact, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.

Based on the traffic volumes in **Table 6.1**, analysis was undertaken to determine the increase in traffic noise level attributed to the Project. The predicted traffic noise level change for each road is shown in **Table 6.2**.

Table 6.2 Predicted Traffic Noise Level Change, dB(A)

Traffic Scenario	Barrier Hwy / Silver Peak Rd	Argent St	South Rd / Crystal St	Gaffney St / Creedon St	Kanandah Rd / Ryan St	Barrier Hwy / Rakow St
Day time (7.00am – 10.00pm)						
Noise Level Change due to Project [1]	1.1	0.3	0.3	0.5	0.3	0.1
Night-time (10.00pm – 7.00am)						
Noise Level Change due to Project [1]	3.8	1.2	1.2	1.6	0.7	0.3
Hourly (peak) Traffic						
Noise Level Change due to Project [1]	1.2	0.8	0.8	1.1	0.3	0.1

Note: [1] Total traffic noise level minus existing traffic noise level. Analysis based on road source emission noise level within SoundPlan.

As shown in **Table 6.2**, except for the Barrier Highway / Silver Peak Road, the predicted noise level change is below the 2 dB increase threshold of the RNP and in accordance with the RNP, the Project traffic noise levels are predicted to be acceptable and have minor impact.

For Barrier Highway / Silver Peak Road, no residential receivers have been identified in proximity to these roads. However, residential receivers have been identified at the eastern fringe of Broken Hill, where Barrier Highway turns into Argent Street. For this section of road, noise level predictions were performed with SoundPLAN version 8.2, using the Calculation of Road Traffic Noise (CorRTN) algorithms. Predictions were undertaken at various distance from the road edge for comparison with the applicable RNP noise limit. In accordance with the Revised TIA a posted speed limit of 50 km/h has been adopted.

The predicted road traffic noise levels are presented in **Table 6.3** based on the nominated traffic volumes presented in **Table 6.1**. The results in **Table 6.3,** show that the construction traffic noise levels are predicted to comply with the criteria. In accordance with the RNP the Project construction traffic noise is predicted to be acceptable and have minor impact. Furthermore, the Project-related construction traffic noise levels, are comparable (within 1 dB) to that predicted in the EIS NVIA.

Table 6.3 Predicted Traffic Noise Levels Including the Project-Related Construction Traffic

Location	Period	Distance from road edge	Existing traffic noise levels, dB(A)	Existing + Project Combined traffic noise levels, dB(A)	Noise Limit Day/Night period, dB(A)	Noise Level Change, dB(A)	Comply/Exceed
Barrier Highway (Argent Street)	**Day (7.00 am – 10.00 pm) LAeq(15 hour)**	10 m	55	56	60	N/A [1]	Complies
		20 m	53	54	60	N/A [1]	Complies
		30 m	52	53	60	N/A [1]	Complies
		40 m	50	51	60	N/A [1]	Complies
	Night (10.00 pm – 7.00 am) LAeq(9 hour)	10 m	47	51	55	N/A [1]	Complies
		20 m	45	49	55	N/A [1]	Complies
		30 m	44	47	55	N/A [1]	Complies
		40 m	42	46	55	N/A [1]	Complies

Notes: [1] Change in noise level assessment is not applicable if the predicted noise level is below the noise limit.

7.0 Noise Mitigation and Management

7.1 Operational Noise Mitigation and Management

Consistent with the EIS NIA, the operational noise modelling as part of this assessment is based on conceptual design information which whilst detailed, is not the final design for construction. Therefore, it is recommended that consistency modelling of noise levels associated with the final detailed design is undertaken.

A-CAES NSW will anticipate the potential for audible tones and low frequency content in the final design specifications of the facility's equipment and if required will investigate and undertake noise management and control strategies to reduce the emissions from the Project to achieve compliance with the noise limits. This may include alternative equipment, additional noise controls, machinery redesign, enclosures and localised barriers.

7.1.1 Water Pipes and Valves

At the EIS stage of the Project, the quantitative assessment of any potential noise impacts generated by water pipes and valves was not possible as design specific details were not available.

Through further consultation with the design team since the completion of the EIS, it has been identified that water pipes and values will not be a significant noise source. This is because the potential generation of noise from water pipes and valves is associated with cavitation, that is, the formation and collapse of vapour bubbles in the water stream caused by a localised pressure drop across a device. The design process specifically addresses avoiding cavitation and therefore no potential noise impacts associated with water pipes and valves are predicted and no further assessment is required.

7.2 Construction Noise Mitigation and Management

The reasonable and feasible mitigation measures detailed in Section 8.3 of the EIS NIA are unchanged and remain relevant for this NIA Addendum. Specific noise controls for SCES Facility OOHW are provided below.

7.2.1 SCES Facility OOHW Specific Noise Controls

With reference to **Section 5.2.5.2**, the following measures are to be adopted for the proposed SCES Facility OOHW:

- No road saw activity outside of standard hours
- Reduced number of 50 T excavators with hammers during the OOHW daytime period
- For Grouting activities – grout mixer and pump and generator to be placed behind 3 m high hoarding
- The following equipment to be located at least 8 m below surface:
    - for Raiseboring activities – Raisebore RIG, generator and compressor
    - for Lining install activities – welding equipment

- for Grouting activities – power hand tools.

- For best practice and in the event of noise complaints from the community, it is recommended that a noise verification program is carried out in accordance with the NVMP for the Project. The noise verification monitoring should be undertaken at the commencement of the various OOHW activities/aspects.

8.0 Cumulative and Decommissioning

Potential impacts and assessment findings associated with cumulative noise and decommissioning are unchanged from the EIS NVIA and therefore do not require further assessment in this NVIA Addendum.

9.0 Conclusion

This addendum report to the previously prepared Umwelt report, Silver City Energy Storage Project Noise and Vibration Impact Assessment (Umwelt, 2023) was prepared to assess the potential for changes to noise impacts as related to the amendments to the Project outlined in **Section 2.0** and to address the submission from the EPA on the EIS.

Operational Noise

Noise emissions from the operation of SCES Facility has been assessed and predicted noise levels were determined to remain within 1 dB(A) of the EIS NIA results at the nearest residential receiver locations. Further, the noise levels were predicted to remain under the day, evening and night-time PNTLs and the cumulative noise criteria at all non-involved sensitive receivers. A suite of noise control measures has been incorporated into the design to achieve this outcome.

The operational noise modelling as part of this assessment is based on conceptual design information which whilst detailed, is not the final design for construction. Therefore, it is recommended that consistency modelling of noise levels associated with the final detailed design is undertaken.

Potential operational noise impacts associated with the transmission line are considered minimal and not anticipated.

Operational noise mitigation and management measures are provided in **Section 7.1**. The operational noise management plan and operational noise monitoring recommendations in Section 8 EIS NVIA are unchanged and remain relevant for this NIA Addendum.

Construction Noise

Construction-related noise levels have been assessed at nearby sensitive receivers surrounding the Project Area. This included the evaluation of construction scenarios that represent the various construction activities required for the Project.

Consistent with the EIS NIA, the noise levels from all construction activities during standard construction hours were predicted to be greater than the applicable noise management levels at a number of sensitive receivers. The majority of these receivers are predicted to be impacted by the construction of the transmission line tower rather than the facility. Given the transient nature of the transmission line works, construction works will not occur in any one location for a long period of time and so potential noise impacts at any one receiver are anticipated to be short in duration.

The predicted exceedances during standard construction hours are consistent with the EIS NIA, except in proximity to the SCES Facility. The number of exceedances in proximity to the SCES Facility has reduced and degree of exceedance has also reduced, by approximately 8 dB(A). This is attributed to the comprehensive construction activity and equipment information provided by A-CAES NSW, enabling detailed noise modelling.

No receivers were predicted to be highly noise affected.

The reasonable and feasible mitigation measures detailed in Section 8.3 of the EIS NIA and are unchanged and remain relevant for this NIA Addendum.

In regard to proposed OOHW for the SCES Facility, it was demonstrated that with the proposed noise control measures in place, the OOHW construction noise levels are predicted to comply with the out of hours noise management levels at all non-involved sensitive receivers. Whilst no exceedances are predicted for the OOHW, for best practice, it is recommended that noise verification program is carried at the commencement of the various OOHW activities/aspects.

Road traffic noise during the construction phase of the Project is predicted to comply with the relative increase criterion of 2 dB(A) and/or be under the RNP noise limits. Furthermore, the Project-related construction traffic noise levels, are comparable (within 1 dB) to that predicted in the EIS NVIA.

Potential impacts and findings from construction blasting and vibration, cumulative noise and decommissioning, and operational traffic, sleep disturbance and emergency equipment are unchanged from the assessment findings outlined in the EIS NVIA.

10.0 References

Australian Standard AS1055-2018 *Acoustics – Description and measurement of environmental noise*.

Australian Standard AS2436-2010 (R2016) *Guide to Noise Control on Construction, Demolition and Maintenance Sites*.

Australian Standard AS2187.2:2006 *Explosives —Storage and use Part 2: Use of explosives*.

Australian and New Zealand Environment Conservation Council (ANZECC) – *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration*.

British Standard BS7385-2:1993 *Evaluation and measurement for vibration in buildings Part 2. Guide to damage levels from ground borne vibration*.

Department of Environment and Climate Change, 2009. *Interim Construction Noise Guideline (ICNG).*

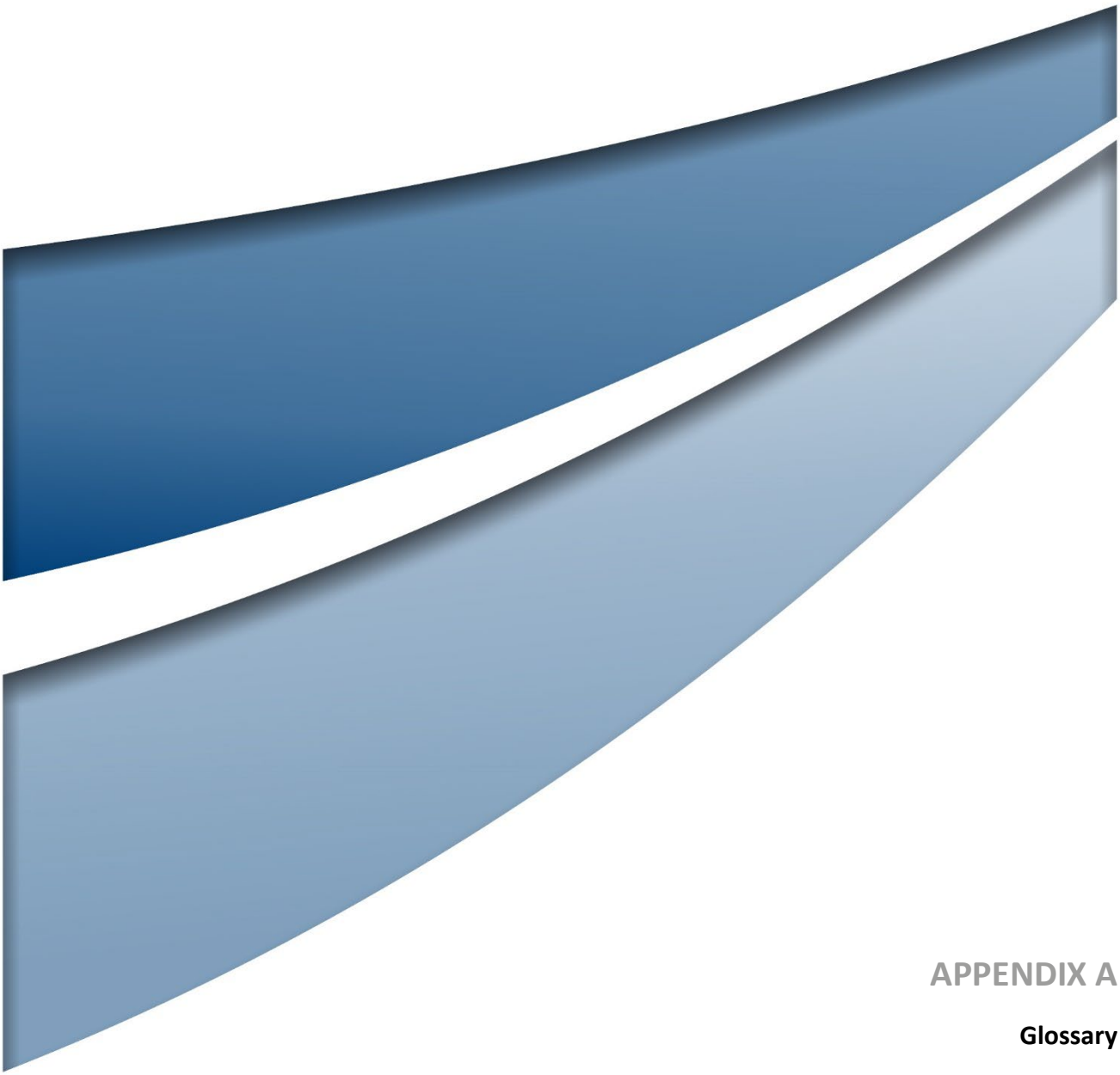
Department of Environment, Climate Change & Water, 2011. *NSW Road Noise Policy (RNP).*

German Standard (Deutsche Norm) DIN 4150-3:1999-02 Structural Vibration Part 3: Effects of vibration on structures.

NSW Environment Protection Authority, 2017. *Noise Policy for Industry (NPfI).*

NSW Roads and Maritime, 2016. *Construction Noise and Vibration Guideline (CNVG)*, v 1.0.

NSW Roads and Maritime, 2017. *Construction Noise Estimator Tool (CNET)* version 21/03/2017.



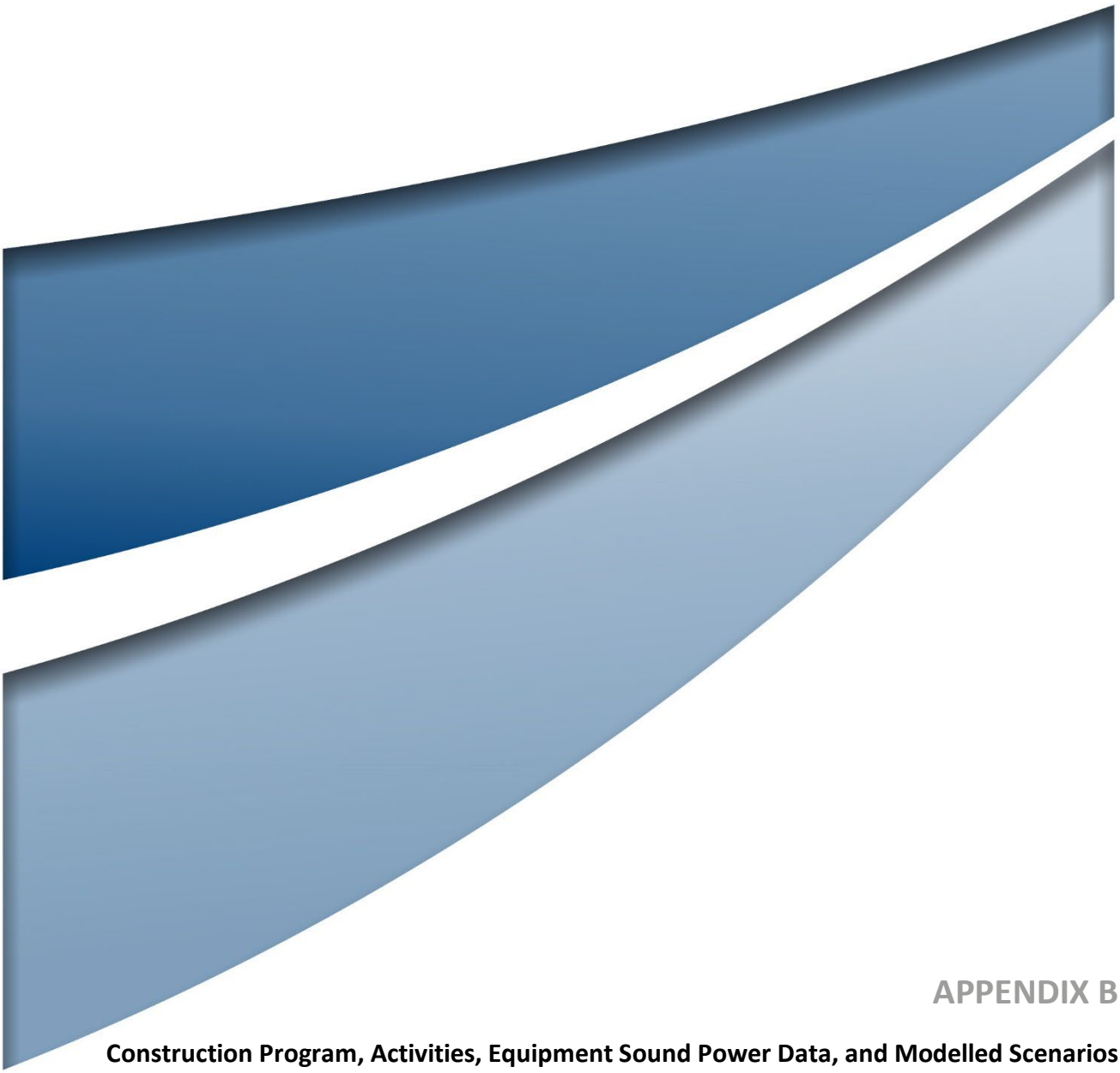
APPENDIX A

Glossary

Glossary

Term	Description
1/3 Octave	Single octave bands divided into three parts.
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment background level – A single-figure background noise level representing each assessment period – day, evening and night (that is, three assessment background levels are determined for each 24 hour period of the monitoring period). It is determined by taking the lowest 10th percentile of the L_{90} level for each assessment period.
Ambient Noise	The noise associated with a given environment. Typically, a composite of sounds from many sources located both near and far where no particular sound is dominant.
Recommended Amenity Noise Level	Recommended noise levels scaled to reflect the perceived differential expectations and ambient noise environments of rural, suburban and urban communities for sensitive receivers.
Assessment Background Level (ABL)	The single-figure background level representing each assessment period: day, evening and night (that is, three assessment background levels are determined for each 24-hour period of the monitoring period). Its determination is by the methods described in Fact Sheet B.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dB(A), dBA	Decibels A-weighted.
dB(C), dBC	Decibels C-weighted.
dB(Z), dB(L)	Decibels Linear or decibels Z-weighted.
Day	The period from 7:00 am to 6:00 pm Monday to Saturday or 8:00 am to 6:00 pm on Sundays and public holidays.
Decibel (dB)	The units of sound level and noise exposure measurement where a step of 10 dB is a ten-fold increase in intensity or sound energy and actually sounds a little more than twice as loud.
Evening	Refers to the period from 6:00 pm to 10:00 pm.
Hertz (Hz)	The measure of the frequency of sound wave oscillations per second – 1 oscillation per second equals 1 hertz.
L_{A10}	The percentile sound pressure level exceeded for 10% of the measurement period with 'A' frequency weighting calculated by statistical analysis. Typically used to assess the impact of an existing operation on a receiver area and is referred to as the cumulative noise levels at the receiver attributable to the noise source.
L_{A90}	Background Noise Level. The percentile sound pressure level exceeded for 90% of the measurement period with 'A' frequency weighting calculated by statistical analysis.
L_{Amax}	The maximum of the sound pressure levels recorded over an interval of 1 second.
$L_{A1,1minute}$	The measure of the short duration high-level noises that cause sleep arousal. The noise level is measured as the percentile sound pressure level that is exceeded 1% of measurement period with 'A' frequency weighting calculated by statistical analysis during a measurement time interval of 1 minute.

Term	Description
$L_{Aeq,t}$	Equivalent continuous sound pressure level – The value of the sound pressure level of a continuous steady noise that, a measurement interval of time (t), has the same mean square sound pressure as the sound under consideration whose level varies with time. Usually measured in dB with 'A' weighting.
L_{An}	Percentile level – A measure of the fluctuation of the sound pressure level which is exceeded 'n' percent of the observation time.
Night	The period between 10:00 am and 7:00 pm.
Project Noise Trigger Levels (PNTL)	Target noise levels for a particular noise-generating facility. They are based on the most stringent of the project intrusiveness noise level or the project amenity noise level.
Project Amenity Noise Levels	The project amenity noise level seeks to protect against cumulative noise impacts from industry and maintain amenity for particular land uses. Calculated as the recommended amenity noise level less 5 decibels and refers to the day, evening and night periods.
Project Intrusive Noise Levels	The project intrusiveness noise level aims to protect against significant changes in noise levels. Calculated as rated background level plus 5 decibels and refers to a 15-minute period.
Receiver	The noise-sensitive land use at which noise from a development can be heard.
Rating Background Noise level (RBL)	The overall single figure background level representing each assessment period over the whole monitoring period determined by taking the median of the ABLs found for each assessment period.
Sleep Disturbance	Awakenings and disturbance to sleep stages.
Sound Pressure Level (dBA)	The basic measure of noise loudness. The level of the root-mean-square sound pressure in decibels given by: $SPL = 10.\log10\ (p/po)^2$ where p is the rms sound pressure in pascals and po is the sound reference pressure at 20 uPa db.
Sound Power Level	A measure of the energy emitted from a source as sound and is given by: $SWL = 10.\log10\ (W/Wo)$ where W is the sound power in watts and Wo is the sound reference power at 10^{-12} watts.
Temperature Inversion	An atmospheric condition in which temperature increases with height above the ground.



APPENDIX B

Construction Program, Activities, Equipment Sound Power Data, and Modelled Scenarios

Table B1: Construction Timetable, Activities and Equipment **SILVER CITY - A-CAES NSW**

Work Area / Activity	Aspect	Plant / Equipment	Standard Hours	Outside of Standard Hours			Sound Power Level LAeq dB	Comments
			Day	Day	Evening	Night		
SCES Facility								
Site Establishment	Prelim earthworks	Excavator 50T with hammer	2	2	-	-	123 (118 + 5)	
		Excavator 30T w bucket	2	2	-	-	103	
		Dump Truck 30T	10 p.h.	10 p.h.	-	-	110	
		Water cart	2	2	-	-	107	
		Vibratory Roller 16T (Smoothdrum)	2	2	-	-	109	
		Vibratory Roller 16T (Padfoot)	2	2	-	-	109	
		Tipper Truck 12T	2	2	-	-	104	
	Drainage & utilities	Workshop Hand tools	1	1	-	-	108	
		Generator	1	1	-	-	103	
		Water pump	2	2	-	-	93	
		Excavator 12T w rockhammer	2	2	-	-	120 (115 + 5)	
		Road saw	1	-	-	-	124 (119 + 5)	No sawing during out of hours
		Pipe cutter	1	1	-	-	107	
		Trench roller	1	1	-	-	107	
		Concrete Aqi	2	2	-	-	108	
		Delivery truck	2	2	-	-	108	
		Slew Crane	1	1	-	-	105	
		Tipper Truck 12T	2	2	-	-	104	
	Hoarding Erection and Site Offices	Excavator 20T w bucket and auger	2	2	-	-	103	
		Franna Crane / Manitou	2	2	-	-	102	
		Concrete Aqi	4 p.h.	4 p.h.	-	-	108	
		Power Hand Tools	6	6	-	-	108	
		EWP / Scissor Lift	4	4	-	-	99	
		Mobile Crane 150T	1	1	-	-	105	
SCES Facility								
Plattform	Cut/Fill Pad Construction	Excavator 50T with hammer	6	3	-	-	123 (118 + 5)	A maximum of 3 during out of hours
		Excavator 30T w bucket	2	2	-	-	103	
		Dump Truck 30T	10 p.h.	10 p.h.	-	-	110	Import/export material
		Water cart	2	2	-	-	107	
		Vibratory Roller 16T (Smoothdrum)	2	2	-	-	109	
		Vibratory Roller 16T (Padfoot)	2	2	-	-	109	
		Tipper Truck 12T	2	2	-	-	104	
	Concrete pads (concreting)	Concrete pump	2	2	2	-	103	
		Compressor	4	4	4	-	103	
		Genset	2	2	2	-	103	
		Pneumatic vibrator	10	10	10	-	97	
		Concrete road agitator	3 p.h	3 p.h	3 p.h	-	108	
		Telehandler	1	1	1	-	98	
SCES Facility								
Compound	Deliveries; Maintenance; Office areas; Storage areas; Car parking	Delivery truck	4 per hour	4 per hour	-	-	108	Start site installation offices and cribs
		Light vehicle	60 in/ out	60 in/ out	30 in/ out	20 in/ out	89	
		Compressor	1	1	-	-	103	
		Workshop Hand Tools	1	1	-	-	108	
		Franna Crane	1	1	-	-	102	
		Water cart/ Street Sweeper	1	1	-	-	107	
Shaft construction	Raiseboring (One RIG)	Raisebore RIG SBM 900	1	1	1	1	105	RIG doing one shaft at a time. Equipment located 8m below surface (i.e. pad RL)
		Generator 750 kVA	1	1	1	1	110	Equipment located 8m below surface (i.e. pad RL)
		Compressor	1	1	1	1	103	Equipment located 8m below surface (i.e. pad RL)
		Delivery truck	1 per hour	1 per hour	-	-	108	
		Power hand tools	1	1	-	-	108	
		Jackhammer	1	1	-		117 (112 + 5)	
	Lining install (2 strandtowers)	CrawlerCrane 280T	2	2	2	2	105	Will lift in 22m long steel liner section
		Welding equipment	1	1	1	1	101	Equipment located 8m below surface (i.e. pad RL), mostly operating 1m above ground.
		Workshop Hand Tools	1	1	1	1	108	
		Delivery Trucks	4 p.d.	4 p.d.	-	-	108	Daytime only
		EWP	1	1	1	1	99	
	Grouting	Grout mixer and pump	1	1	1	1	108	To be located behind hoarding (hoarding placed on southern side)
		Power hand tools	1	1	1	1	108	Equipment located 8m below surface (i.e. pad RL)
		Generator	1	1	1	1	103	To be located behind hoarding (hoarding placed on southern side)
		Site Forklift	1	1	1	1	99	To move cement bags if required
		Water pump	1	1	1	1	93	
		Water cart	2	2	-	-	107	For grout mixing
Dam construction	Earthworks	Excavator 50T w hammer	6	3	-	-	123 (118 + 5)	A maximum of 3 during out of hours
		Excavator 30T w bucket	2	2	-	-	103	Loading Dump truck
		Dozer D10	2	2	-	-	115	
		Loader CAT380	3	3	-	-	112	
		Watercart	4	4	-	-	107	
		Vibratory Roller 16T (Smoothdrum)	2	2	-	-	109	
		Vibratory Roller 16T (Padfoot)	2	2	-	-	109	
		Dump truck 30T	8	8	-	-	110	Cart to/from stockpile
	Concrete pads (concreting)	Concrete pump	2	2	2	-	103	
		Compressor	4	4	4	-	103	
		Genset	2	2	2	-	103	
		pneumatic vibrator	10	10	10	-	97	
		Concrete road agitator	6 p.h	6 p.h	6 p.h	-	108	
		Telehandler	1	1	1	-	98	
SCES Facility								
Main process plant	Heat exchangers	400 tonne crawler crane	1	1	-	-	106	
		EWP	1	1	-	-	98	
		250 tonne low loader	1	1	-	-	105	
	Compressors and air handlir	400 tonne crawler crane	1	1	-	-	106	
		EWP	1	1	-	-	98	
		250 tonne low loader	1	1	-	-	105	
	Thermal water storage	250 tonne crawler crane	1	1	-	-	105	
		EWP	1	1	-	-	98	
		Compressors	1	1	1	-	103	
		Diesel welding machines	3	3	3		101	Welding activities may occassionally go into evenings. Welding can be screened to largely eliminate light emissions.
		30 tonne rough terrain crane	1	1	-	-	102	
		Sand blasting	1	1	-	-	116	
	Piping and pipe racks	50 tonne rough terrain crane	1	1	1	1	102	
		30 tonne rough terrain crane	1	1	-	-	102	
		Telehandler	1	1	-	-	98	
		Air tools including rattle guns	2	2	2	2	108	
		Compressors	2	2	2	2	103	
		Diesel welding machines	4	4	4	4	101	Welding activities may occassionally go into evenings. Welding can be screened to largely eliminate light emissions.
		Diesel lighting plant	1	1	1	1	95	
		Sand blasting	1	1	-	-	116	
		Delivery truck	2 per day	-	-	-	108	
		Fuel truck	1 per day	-	-	-	108	
	Balance of plant	20 tonne Franna	1	1	-	-	102	
		30 tonne rough terrain crane	1	1	-	-	102	
		Compressors	2	2	-	-	103	
		Diesel welding machines	2	2	-	-	101	
		Delivery truck	2 per day	-	-	-	108	
	Switchrooms	50 tonne rough terrain crane	1	1	-	-	102	

Table B1: Construction Timetable, Activities and Equipment **SILVER CITY - A-CAES NSW**

Work Area / Activity	Aspect	Plant / Equipment	Standard Hours	Outside of Standard Hours			Sound Power Level LAeq dB	Comments
			Day	Day	Evening	Night		
	Switchyards/substations	50 tonne rough terrain crane	1	1	-	-	102	
		Air tools including rattle guns	2	2	-	-	108	
	NDT testing	Testing equipment	-	-	1	-	-	Lights can be placed to point away from areas that are likely to create any offence. If this is impractical light source can be shielded
		Diesel lighting plant for NDT testing	-	-	1	-	95	
Auxiliary site								
Perilya stockpile	Crushing	Jaw Crusher and screens	1	1	-	-	123	
		Cone Crusher and screens	1	1	-	-	118	
		Excavator 50T w bucket	1	1	-	-	106	
		Excavator 30T w bucket	1	1	-	-	103	
		Dump Truck 30T	10 p.h.	10 p.h.	-	-	110	Import/export material
		Water cart	1	1	-	-	107	
		Dozer D10	1	1	-	-	115	
		Loader CAT380	1	1	-	-	112	
		Tipper Truck 12T	1	1	-	-	104	
	Concrete batch plant (concreting)	Concrete mixer	1	1	1	1	108	Supplying day/ night 7 days per week until tunnelling is completed (14/04/2027), the days only
		Compressor	1	1	1	1	103	
		Genset	1	1	1	1	103	
		Pneumatic vibrator	1	1	1	1	97	
		Concrete road agitator	3 p.h	3 p.h	3 p.h	3 p.h	108	
		Telehandler	1	1	1	-	98	
Cavern - Surface Operations								
Cavern	Spoil transfer from Potosi portal to Perilya stockpile	Dump truck 30T	10 p.h.	10 p.h.	10 p.h.	10 p.h.	110	Cart from Potosi portal to Perilya stockpile
Water Pipeline								
Civil works and installation	Civil works and installation	Pick Up Trucks	2	-	-	-	108	
		Water cart	1	-	-	-	107	
		Diesel generator	2	-	-	-	103	
		Wheel Loader with Backhoe	2	-	-	-	112	
		Roller/Compactor	1	-	-	-	109	
		Telehandler	2	-	-	-	98	
		Skid steers	2	-	-	-	106	
		Articulating Offroad Trucks (40 t)	1	-	-	-	110	
		Boom Truck	2	-	-	-	103	
		Welding machines	2	-	-	-	101	
Transmission Line								
Clearing, civil works and installation	Clearing, civil works and installation	Pick Up Trucks	4	-	-	-	108	
		Water cart	1	-	-	-	107	
		Diesel generator	2	-	-	-	103	
		Wheel Loader with Backhoe	2	-	-	-	112	
		Roller/Compactor	1	-	-	-	109	
		Cranes	2	-	-	-	105	
		Telehandler	2	-	-	-	98	
		Skid steers	1	-	-	-	106	
		Boom Trucks/trailers	2	-	-	-	103	
		Augers /Driller	2	-	-	-	112	
		Telescopic Jibs /Manlifts	3	-	-	-	99	
		Tub grinder / mulcher	1	-	-	-	116	
		Chainsaw	1	-	-	-	114	

Table B2: SCES Facility OOH Construction Program and Modelled Scenarios

SILVER CITY - A-CAES NSW

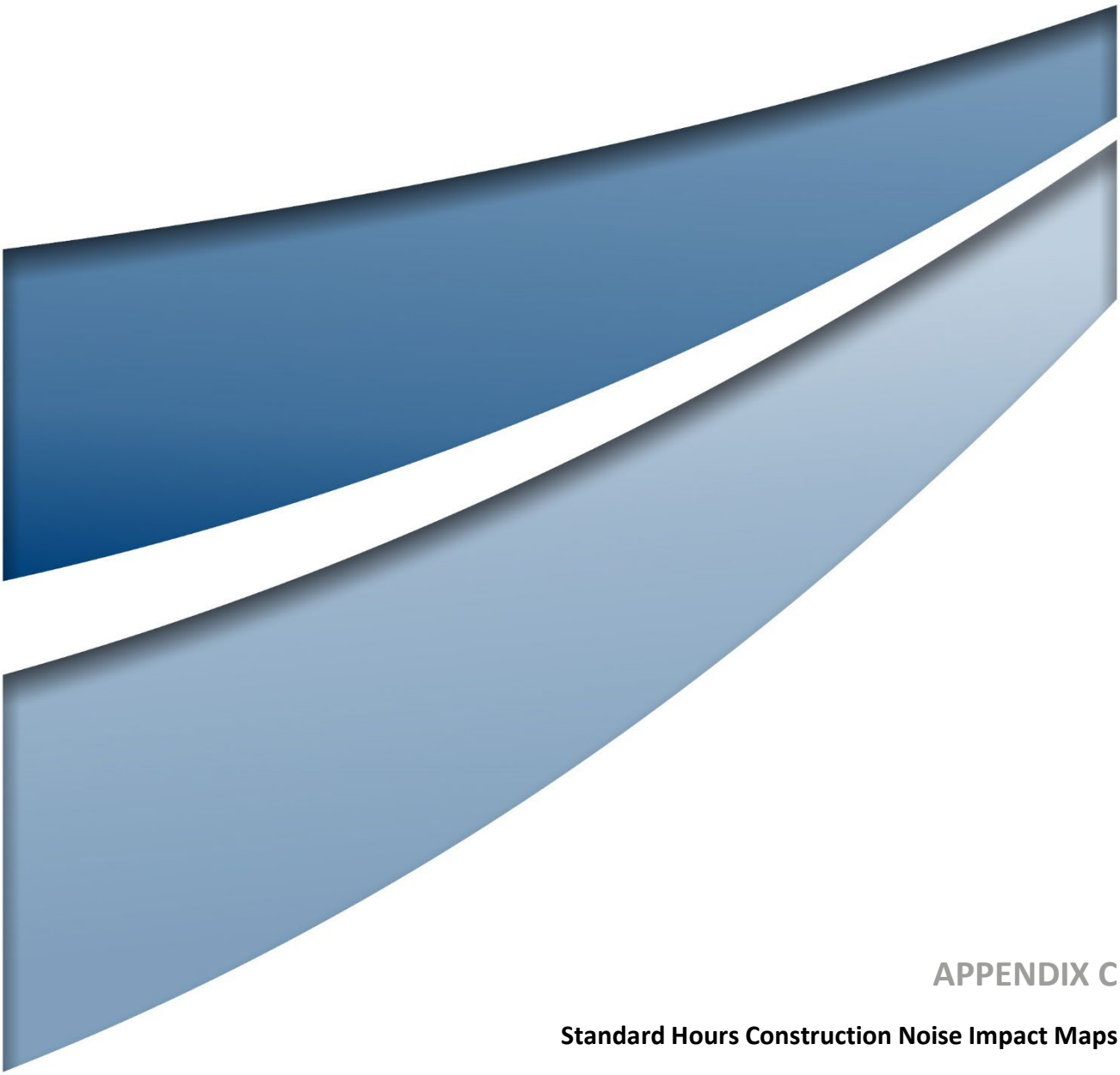
Work Area / Activity	Aspect	Jan-25	Feb-25	Scenario 1 Mar-25	Apr-25	May-25	Jun-25	Jul-25	Scenario 2 Aug-25	Sep-25	Oct-25	Nov-25	Dec-25	Scenario 3 Jan-26	Feb-26	Mar-26	Apr-26	May-26	Scenario 4 Jun-26	Jul-26	Aug-26	Sep-26	Scenario 5 Oct-26	Nov-26	Dec-26	Jan-27	Feb-27	Mar-27	Apr-27	May-27	Jun-27	Jul-27	Aug-27	Sep-27	Oct-27	Nov-27	Dec-27
SCES Facility																																				
Site Establishment	Prelim earthworks																																			
	Drainage & utilities																																			
	Hoarding Erection & Site Offices																																			
SCES Facility																																				
Plattform	Cut/Fill Pad Construction																																			
	Concrete pads (concreting)																																			
SCES Facility																																				
Compound	Deliveries; Maintenance; Office areas; Storage areas; Car parking																																			
Shaft construction	Raiseboring (One RIG)																																			
	Lining install (2 strandtowers)																																			
	Grouting																																			
Dam construction	Earthworks																																			
	Concrete Lining (concreting)																																			
SCES Facility																																				
Main process plant	Heat exchangers																																			
	Compressors and air handling																																			
	Thermal water storage																																			
	Piping and pipe racks																																			
	Balance of plant																																			
	Switchrooms																																			
	Switchyards/substations																																			
	NDT testing																																			
Auxilary site																																				
Perilya stockpile	Crushing																																			
	Concrete batch plant (concreting)																																			
Cavern - Surface Operations																																				
Cavern	Spoil transfer - Potosi portal to Perilya stockpile																																			

Notes:

Daytime (standard and OOHW)

Evening OOHW

Night OOHW



APPENDIX C

Standard Hours Construction Noise Impact Maps

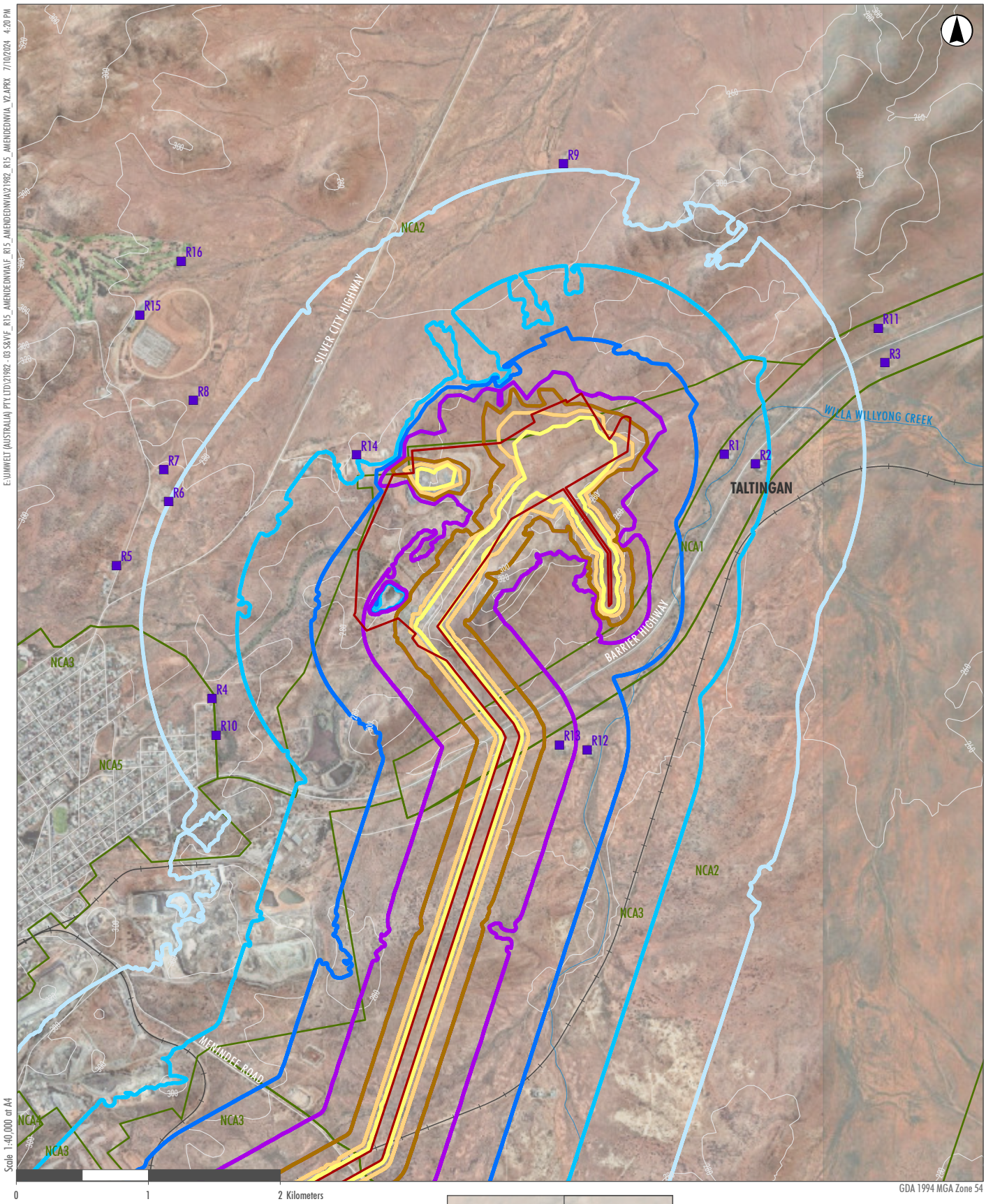
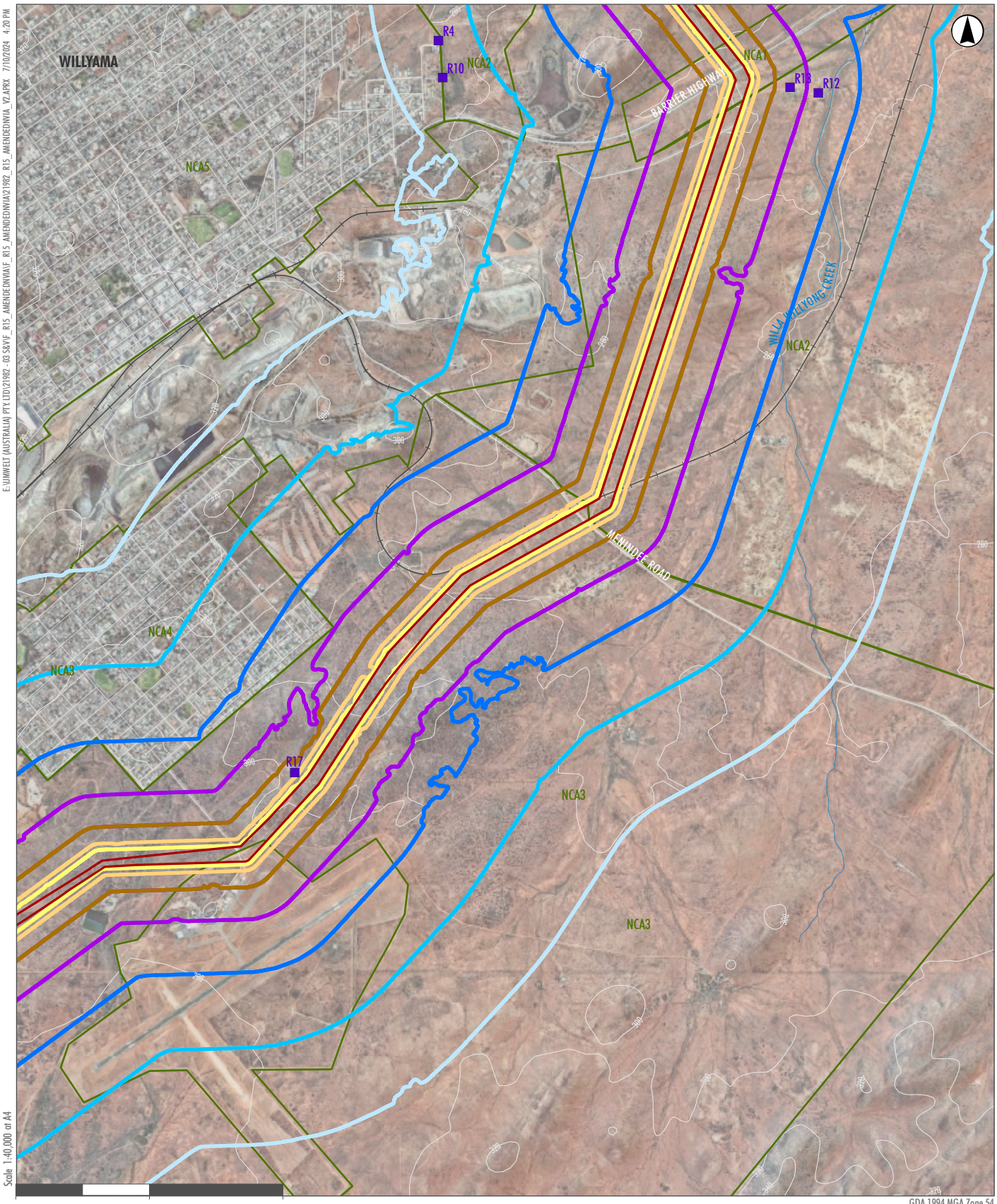


FIGURE C.1

Standard Hours Worst-Case Construction LAeq(15min) Noise Contours

Image Source: ESRI Basemap (2022); Nearmap (2022) Data source: DFSI (2022)



Legend

- Project Area
- Noise Catchment Area
- SCES Facility Receivers
- Residential Receiver
- Contours (10m Interval)
- Drainage Line
- Railway Line
- Road

Predicted Noise Levels

- Noise Contour Level 45 dB(A)
- Noise Contour Level 50 dB(A)
- Noise Contour Level 55 dB(A)
- Noise Contour Level 60 dB(A)
- Noise Contour Level 65 dB(A)
- Noise Contour Level 70 dB(A)
- Noise Contour Level 75 dB(A)

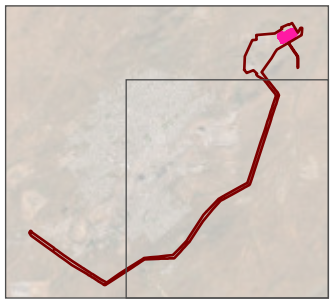
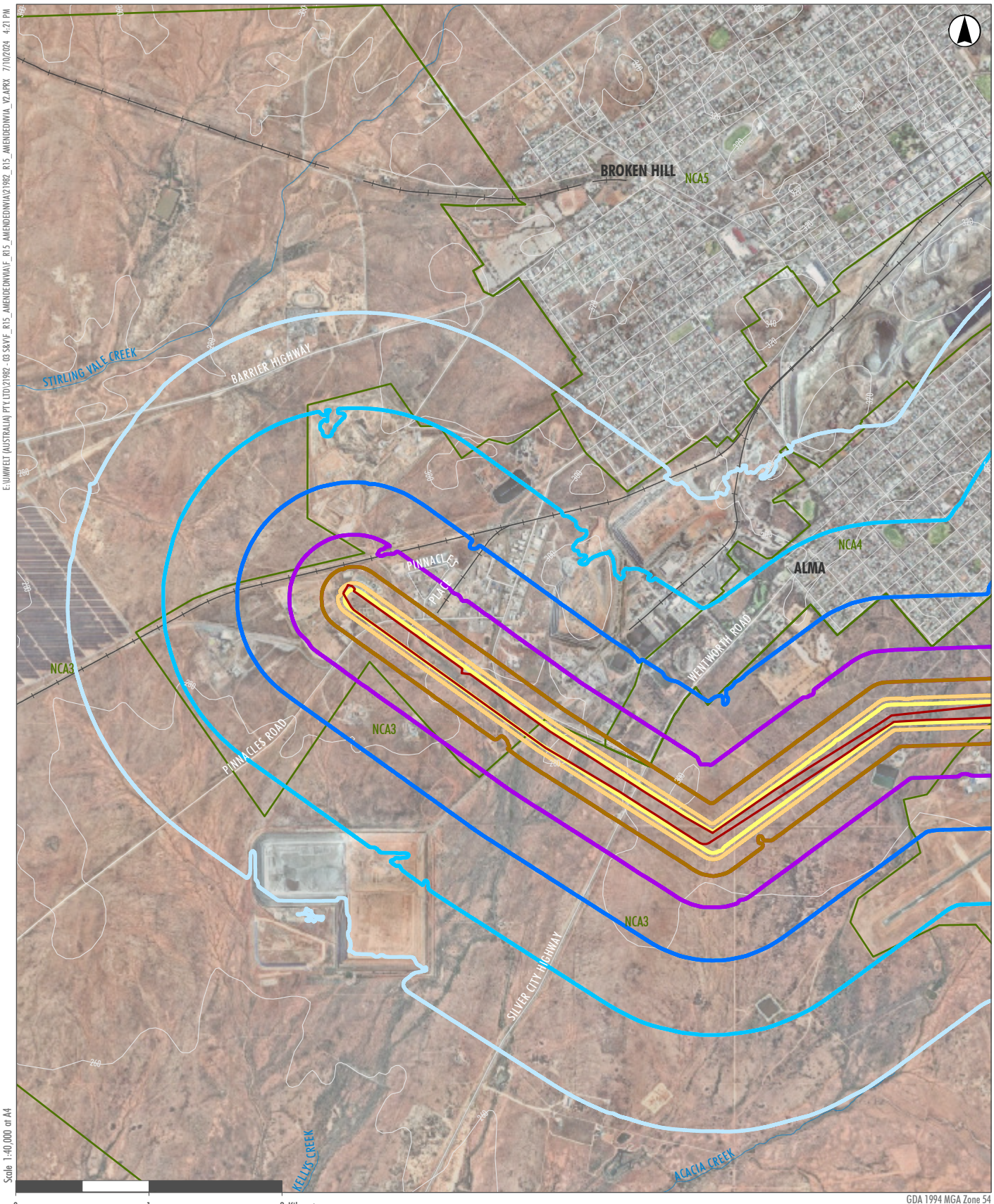


FIGURE C.2

Standard Hours Worst-Case Construction LAeq(15min) Noise Contours

Image Source: ESRI Basemap (2022); Nearmap (2022) Data source: DFSI (2022)



Legend

- Project Area
- Noise Catchment Area
- Contours (10m Interval)
- Drainage Line
- Railway Line
- Road

Predicted Noise Levels

- Noise Contour Level 45 dB(A)
- Noise Contour Level 50 dB(A)
- Noise Contour Level 55 dB(A)
- Noise Contour Level 60 dB(A)
- Noise Contour Level 65 dB(A)
- Noise Contour Level 70 dB(A)
- Noise Contour Level 75 dB(A)

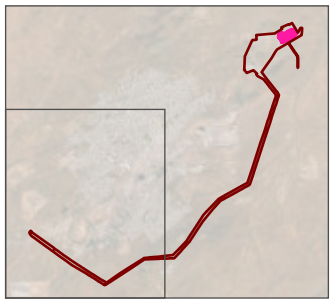


FIGURE C.3

Standard Hours Worst-Case Construction LAeq(15min) Noise Contours

Image Source: ESRI Basemap (2022); Nearmap (2022) Data source: DFSI (2022)

umwelt
Environmental & Social
Consultants

Umwelt (Australia) Pty Limited

T| 1300 793 267 E| info@umwelt.com.au www.umwelt.com.au