



COPPERSTRING 2.0

CopperString 2.0

Noise and vibration

Volume 2 Chapter 11



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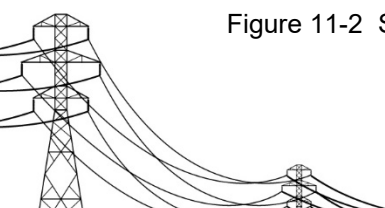
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11. Noise and vibration

11.1 Introduction

11.1.1 Project overview

The CopperString 2.0 Project (the Project) involves the construction and operation of approximately 1,060 km of extra high voltage overhead electricity transmission line that will extend from Mount Isa to the Powerlink transmission network, via a new connection point near Woodstock, south of Townsville.

The Project involves construction of seven new substations at Woodstock, Hughenden, Dajarra Road (Cloncurry), Mount Isa, Selwyn, Cannington Mine and Phosphate Hill Mine.

The CopperString transmission network is divided into the following eight sections as shown in Figure 11-1:

1. Woodstock Substation
2. Renewable Energy Hub
3. CopperString Core
4. Mount Isa Augmentation
5. Southern Connection
6. Cannington Connection
7. Phosphate Hill Connection
8. Kennedy Connection (option).

11.1.2 Objectives

Development is planned, designed, constructed and operated to protect the environmental values of the acoustic environment.

11.1.3 Purpose of chapter

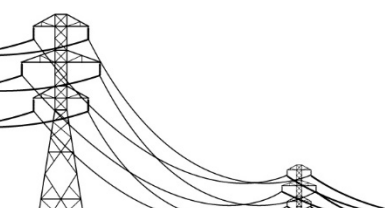
The purpose of this chapter is to describe the existing acoustic environment (Section 11.3) and noise and vibration associated with the construction and operation of the Project and associated infrastructure (Section 11.4). This chapter defines relevant noise and vibration goals and standards for the Project (Section 11.2.3) and recommends mitigation measures and reporting requirements to be adopted to achieve these goals (Section 11.4.5).

11.1.4 Defined terms

The following are a list of defined terms utilised throughout this chapter.

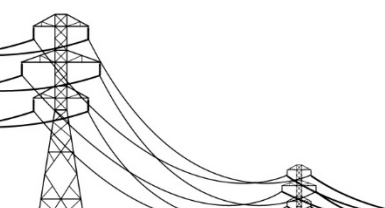
Corridor selection: The baseline investigation corridor being a nominal 1,000 km long corridor transmission line alignment including a 120 m wide easement for the 330 kV transmission line from Woodstock to Dajarra Road, and 60 m wide for the 220 kV transmission lines from Dajarra Road to Mount Isa, Dajarra Road to Chumvale Substation, Dajarra Road to Selwyn, and Selwyn to Phosphate Hill and Cannington.

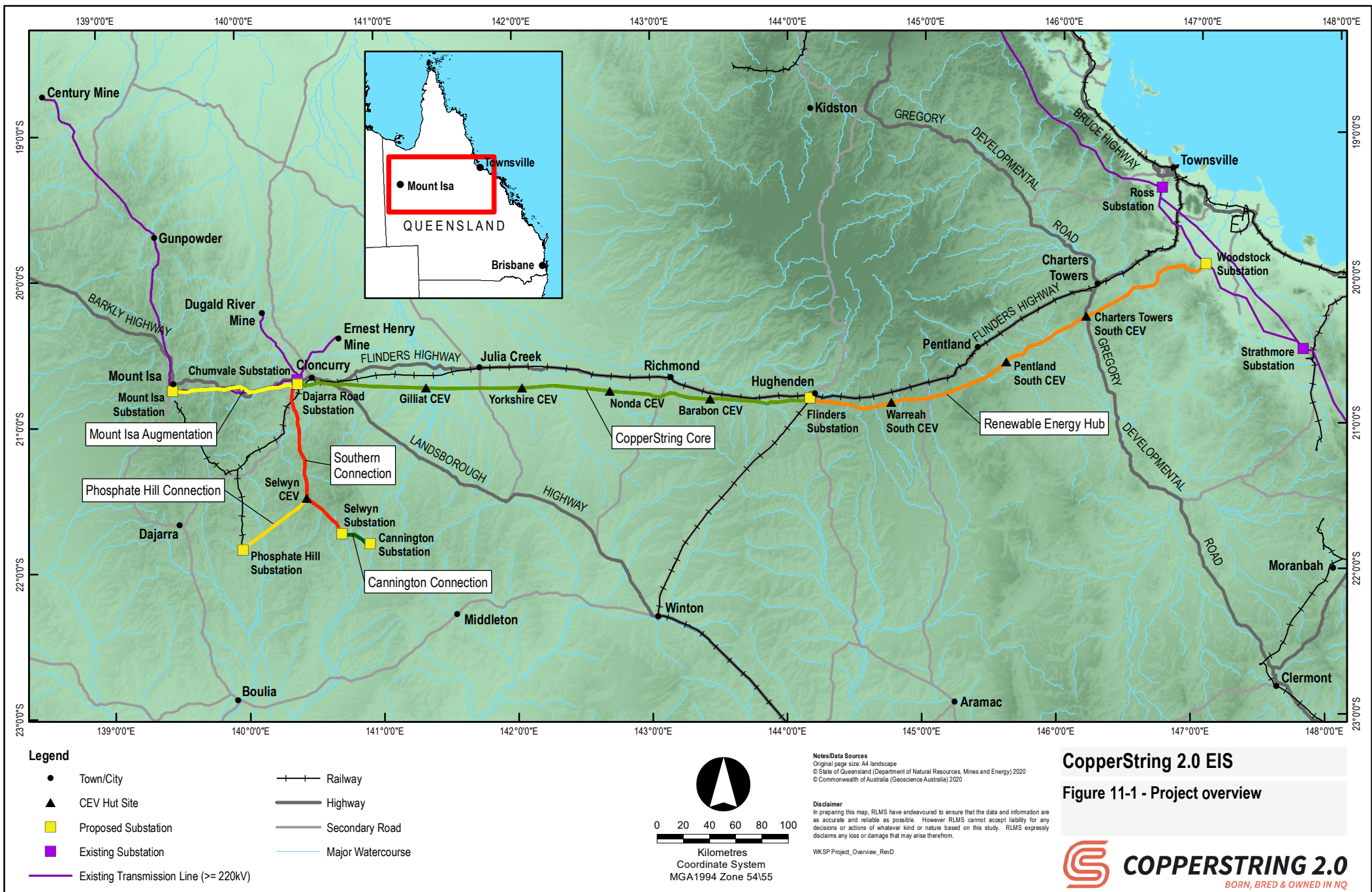
Study area: As defined by individual technical studies in the methodology section or by default the 5 km wide study corridor defined in the Initial Advice Statement and referred to in the EIS ToR.





Project area: The 120 m or 60 m wide easement and associated infrastructure (including laydown areas, substations, CEV huts, access tracks, brake and winch sites and construction camps) and works referred to in the EIS ToR (these include off-easement components).





11.2 Methodology

11.2.1 Study area

The area of focus for this assessment is the updated corridor selection, paying particular attention to a two kilometre area surrounding the transmission line.

11.2.2 Data sources

The noise and vibration assessment included in the CopperString 1.0 EIS was completed by URS Australia Pty Ltd in 2010. The noise monitoring undertaken to support the previous assessment is has been used to support this EIS and is presented in Volume 3 Appendix W Noise technical report data CopperString 1.0. The assessment has been updated within this chapter to include:

- Any changes to the numbers of sensitive receptors within proximity of the corridor selection;
- Updates to noise and vibration legislation since the CopperString 1.0 EIS study was conducted;
- A review of the ambient noise measurements to confirm noise and vibration criteria.

Based on a review of Volume 3 Appendix W Noise technical report data CopperString 1.0 and the nature of the acoustic environment in proximity to the corridor selection, it was observed that:

- Sensitive receptors are generally greater than 750 m from the alignment, with the exception of Mount Isa. The noise environment at sensitive receptors outside of the Mount region have not significantly changed since the original study was conducted.
- The industrial site near Mount Isa would be the significant change in environment since the original study was conducted. As the changes consist of several large additional noise sources in the area (including the new Diamantina power station), it is concluded that the use of the noise criteria determined in the CopperString 1.0 EIS assessment for the Mount Isa area would be conservative as the original noise criteria was based on lower background noise levels than what would currently exist.

11.2.3 Legislative context and standards

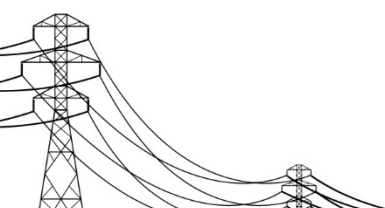
Environmental noise

In Queensland, the environment is protected under the *Environmental Protection Act 1994* (EP Act). The object of the EP Act is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (*ecologically sustainable development*).

In relation to noise, the EP Act is supported by the *Environmental Protection (Noise) Policy 2019* (EPP(Noise)). The EP Act establishes a number of environmental protection policies. The key environmental values for the acoustic environment are outlined within Section 7 of the EPP(Noise) as below:

The environmental values to be enhanced or protected under this policy are—

- the qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems; and*



- (b) *the qualities of the acoustic environment that are conducive to human health and wellbeing, including by ensuring a suitable acoustic environment for individuals to do any of the following—*
- (i) *sleep;*
 - (ii) *study or learn;*
 - (iii) *be involved in recreation, including relaxation and conversation; and*
- (c) *the qualities of the acoustic environment that are conducive to protecting the amenity of the community.*

To further assist in determining noise levels consistent with the identified environmental values, the EPP (Noise) also sets out acoustic quality objectives as shown in Table 11-1. Based on a typical dwelling façade noise reduction of 10 dB(A) through a partially open window, an external criterion of 40 dB(A) $L_{Aeq,adj,1hr}$ is recommended for health and well-being in relation to the ability to sleep. This acoustic quality objective is measured at the receptor.

Table 11-1 Acoustic Quality Objectives for Dwellings

Sensitive receptor	Time of day	Acoustic quality objectives (measured at receptor) dB(A)			Environmental value
		$L_{Aeq,adj,1hr}$	$LA_{10,adj,1hr}$	$LA_{1,adj,1hr}$	
Dwelling (for outdoors)	Daytime and evening	50	55	65	Health and wellbeing
Dwelling (for indoors)	Daytime and evening	35	40	45	Health and wellbeing
	Night-time	30	35	40	Health and wellbeing, in relation to the ability to sleep

It is noted that the following noise sources relevant to the project are specifically excluded from the EPP (Noise):

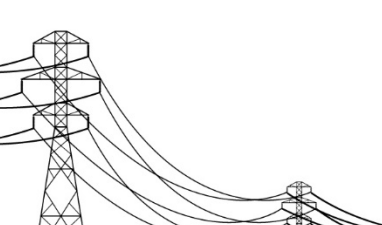
- Safety signal noise from a reversing vehicle
- Noise from aircraft movement
- Noise from the ordinary use of a public road or State-controlled road.

Construction noise

For construction work occurring during normal daytime hours, provided all mechanical powered plant is fitted with appropriate mufflers, specific noise limits are generally not warranted in Queensland. In this regard, it may be noted that the EPP (Noise) does not include construction noise limits.

In Queensland, it is generally accepted that construction activities should be in accordance with general building work hours as described under Section 440R– “Building Work” of the EP Act. Under the regulation, no audible noise is permitted:

- Between 6:30 pm to 6:30 am – Monday to Saturday
- Sundays and public holidays.



The time restrictions are designed to strike a balance between protecting noise amenity and the need to start construction activities early in the morning. This does not mean that the project is limited to construction work only between 6:30 am to 6:30 pm Monday to Saturday, just that audible noise will not be heard by an individual who is an occupier of a building outside of this time frame.

Noise impacts are usually minimised by limiting the hours of operation and, in particular in circumstances, scheduling the noisiest activities to occur at times when they would generate least disruption. For construction works extending outside normal working hours, particular noise limits should be applied. As such, the World Health Organisation (WHO) recommended for quality of sleep, maximum noise levels should not exceed 45 dB(A) inside a dwelling. This guideline is recommended for construction work occurring inside the hours listed above. Based on a typical building façade noise reduction of 10 dB(A) through a partially open window, an external criterion of L_{Amax} 55 dB(A) is recommended for sleep disturbance, assessable at 4 metres (m) from the building façade. The application of the external criterion of 40 dB(A) $L_{Aeq,adj,1hr}$ from the Acoustic Quality Objectives would be slightly more stringent than the L_{Amax} noise level for the night period.

The day and evening noise level target outside the standard construction hours (from 6:30 pm to 6:30 am – Monday to Saturday, and on Sunday and public holidays) is recommended to be 50 dB(A) $L_{Aeq,adj,1hr}$, also from the Acoustic Quality Objectives

Blasting overpressure and vibration

Blasting is not anticipated to be required for construction of the Project. In the unlikely event that it is required, a licenced contractor will be required to manage all health and safety risks and blasting will not occur unless these conditions medium to long term disruption or impacts.

EP Act Section 440ZB Blasting provides criteria for the assessment of blasting impacts.

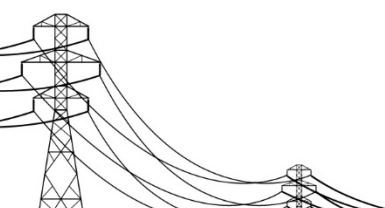
The EP Act states that blasting must not be conducted if:

- a. *the airblast overpressure is more than 115dB Z Peak for four out of any five consecutive blasts;*
- b. *the airblast overpressure is more than 120dB Z Peak for any blast; or*
- c. *the ground vibration is —*
 - (i) *for vibrations of more than 35Hz--more than 25mm a second ground vibration, peak particle velocity.*
 - (ii) *for vibrations of no more than 35Hz--more than 10mm a second ground vibration, peak particle velocity.*

The vibration and air blast overpressure limits for blasting, as shown in Table 11-2, are typically applied as conditions of approval for blasting activities.

Table 11-2 Blast overpressure and vibration criteria

Airblast overpressure	Ground vibration
120 dB(lin) peak	10 mm/s peak particle velocity (ppv)
Must not be more than 120 dB(lin) peak at any time, when measured at or extrapolated to any nuisance sensitive place.	Must not exceed a peak particle velocity (ppv) of 10 mm/s at any time, when measured at or extrapolated to any nuisance sensitive place.



11.2.4 Desktop assessment

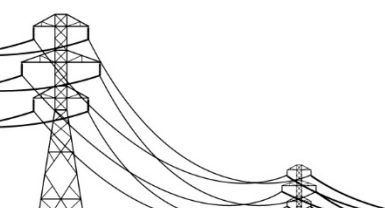
A baseline noise survey was conducted to determine existing noise levels at sensitive receptors within the acoustic study area as a part of the Copperstring 1.0 EIS in 2010 with the results of the survey included in Volume 3 Appendix W Noise technical report data CopperString 1.0. A desktop assessment was carried out in 2020 to define the existing environment in terms of noise and vibration and determine what had changed since the original study was conducted. This involved a review of more recent impact studies for the areas, which included ambient noise measurements very similar to those measured during the 2010 study. The summary of the assessment is provided in Section 11.3.

11.2.5 Impact assessment

An impact assessment was undertaken to characterise potential impacts to the noise and vibration environment and provide potential mitigation measures. The method of construction and final operations were effectively unchanged in terms of noise and vibration impacts, so the buffer distances determined from the original noise and vibration assessment using noise modelling were unchanged. This is detailed in Section 11.4.

11.2.6 Terms of reference

The Terms of Reference (ToR) were used as a guide in completing this EIS chapter. Volume 3 Appendix A Terms of reference and cross reference table describes the ToR and cross references the section within which each has been addressed in this chapter.



11.3 Existing environment

11.3.1 Background noise

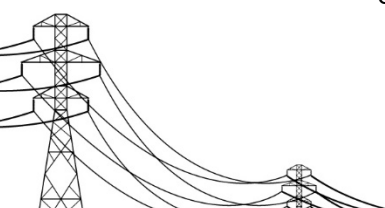
While conducting the field work and background noise measurement program in 2010, a number of observations were made in relation to the acoustic environment. These observations are summarised below and can be reviewed in Volume 3 Appendix W Noise technical report data CopperString 1.0. The observations are representative of the background noise environment in each of the areas including Mount Isa, residences near the Barkly Highway, Cloncurry, Richmond, Hughenden and Charters Towers.

Mount Isa

- Relatively-steady state noise emissions from the existing Mica Creek Power Station dominate the existing daytime, evening and night background noise levels at all the sensitive receptors along Mica Creek Road. It is noted that the power station is likely to be decommissioned at the end of 2020, though the background noise level is likely to continue to be dominated by steady state noise emissions from the two new gas fired power stations nearby.
- Monitoring conducted north of Mica Creek Road indicates that background noise levels are impacted by existing noise sources (including a concrete batching plant on Mica Creek Road, other industrial noise sources on Powerhouse Road, west of Happy Valley, and Mica Creek Power Station).
- At Happy Valley, located approximately 3.5 km north of the proposed Mount Isa Substation site, Mica Creek Power Station and other industrial noise sources to the west and south were clearly discernible within the ambient noise data.
- During the evening and night time measurements, at this location, industrial noise hum and insects dominated the measured background noise level. During the daytime period noise from birds, insects, wind and intermittent traffic along Fourth Avenue generally masked the industrial noise sources.
- Since the fieldwork was carried out, additional industrial noises have been built in the area, including the Diamantina Power Station.

Barkly Highway

- Relatively few vehicle movements were observed on Barkly Highway during the course of the fieldwork, with durations of up to 20 minutes without any vehicle pass-bys noted during the daytime period and greater durations observed during the night. However, vehicles pass-bys were perceived to be very loud due to the rough road surface and the high proportion of road trains and B-doubles on the road.
- Ambient noise levels were affected by traffic due to close proximity to Barkly Highway (10 m away from the edge of the road).
- Due to the intermittent traffic movements on Barkly Highway, the determined Rated Background Levels (RBL) result from the relatively quiet lulls in vehicle movements, whilst the ambient noise levels are dominated by the relatively loud intermittent vehicle pass-bys. The identified RBLs at this location are representative of the natural background noise of the area. Vehicle movements which dominate the ambient noise levels, are considered part of the noise profile of this location.



Cloncurry

- Some mining activities were identified about 2 km northeast of this monitoring location. However, industrial noise was barely audible, most likely due to the shielding provided by the local topography. Background and ambient levels at this location were dominated by the noise generated by insects and birds.

Richmond

- Only day monitoring was undertaken at this location where noise levels were considerably low and steady with little or no influence from road traffic and no audible industrial sources. It would be expected that evening and night background and ambient noise levels may be similar to those measured at day.

Hughenden

- Two noise-sensitive areas were identified: south of the township of Hughenden in the vicinity of Beaconsfield Street; and the more rural residential area along Kennedy Developmental Road about 6 km south of Hughenden.
- At the Beaconsfield Street location, evening measurements were affected by train unloading/loading activities about 500 m away to the south of the dwellings. Attended measurements confirmed higher background noise levels in the evening than during the day, mainly due to insects.

Charters Towers

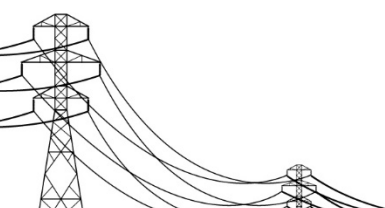
- No industrial noise was observed in the vicinity of this location;
- Background and ambient noise levels were dominated by natural sounds and light wind effects; and
- The unattended monitoring results at this location are considered to provide a good representation of the acoustic environment.

Summary

In general, the landscape in which the corridor selection is located is rural, with low levels of background noise. Some areas are affected by industrial noise sources (in Mount Isa near the power stations), while others are affected by mining activities such as sensitive receptors near Cloncurry. Based on a review of the previous noise survey information provided in Volume 3 Appendix W Noise technical report data CopperString 1.0 and the nature of the acoustic environment in proximity to the corridor selection, use of the noise criteria determined in Volume 3 Appendix W Noise technical report data CopperString 1.0 would be conservative.

11.3.2 Background vibration

Vibration goals and impacts have been assessed based on absolute criteria and are not dependent on background levels of vibration. There are no significant sources of vibration near the existing sensitive receptors, beyond distant mining activities in some areas such as Cloncurry and small amounts generated by heavy vehicles on local roads.



11.3.3 Sensitive receptors

Potentially affected sensitive receptors include residential premises and building points which are in the vicinity of the corridor selection. For the study of the noise and vibration impact assessment, residences within two kilometres of the centre line of the proposed corridor selection or substation site are considered. The review identified 55 sensitive receptors for the purposes of the noise and vibration assessment, with Location 52 the power station and Location 57 the golf club (and not considered sensitive receptors). These are provided in Table 11-3.

Table 11-3 Sensitive receptors

Residential (unless otherwise noted)	Approximate distance from transmission line (m)	Coordinates (GDA94) (m)	
		Easting	Northing
1	1,866	478,715	7,791,461
2	782	470,070	7,787,999
3	1,739	465,442	7,781,419
4	962	422,731	7,759,354
5	1,743	421,973	7,759,802
6	1,848	354,040	7,720,974
7	1,958	205,273	7,686,069
8	1,549	196,358	7,684,976
9	1,177	768,786	7,686,785
10	1,799	739,942	7,691,521
11	1,695	716,251	7,693,234
12	1,815	700,852	7,691,947
13	1,894	654,981	7,700,778
14	1,893	629,778	7,698,952
15	1,910	613,729	7,697,966
16	1,903	613,659	7,697,973
17	1,876	453,691	7,704,669
18	1,827	448,434	7,707,124
19	1,020	448,214	7,706,232
20	1,732	447,910	7,706,889
21	1,995	343,827	7,702,956
22	882	343,770	7,701,816
23	1,898	343,674	7,702,941
24	1,617	343,671	7,699,317
25	1,585	343,652	7,699,349
26	1,602	343,642	7,699,332
27	1,590	343,618	7,699,344
28	1,667	343,617	7,699,266
29	1,431	343,559	7,702,420
30	1,357	343,550	7,702,320
31	1,933	343,530	7,703,081
32	1,833	343,524	7,702,968
33	1,431	343,497	7,702,481
34	1,723	343,459	7,702,879
35	1,475	343,457	7,702,573
36	1,370	343,455	7,702,437

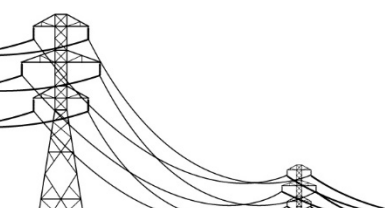
Residential (unless otherwise noted)	Approximate distance from transmission line (m)	Coordinates (GDA94) (m)	
		Easting	Northing
37	1,578	343,397	7,702,746
38	1,790	343,360	7,703,014
39	747	343,079	7,701,931
40	914	343,051	7,702,178
41	783	343,051	7,702,011
42	1,151	343,043	7,702,459
43	990	343,028	7,702,282
44	1,315	342,994	7,702,659
45	309	342,944	7,701,240
46	311	342,920	7,701,241
47	318	342,891	7,701,248
48	296	342,866	7,701,243
49	271	342,839	7,701,244
50	250	342,815	7,701,245
51	222	342,787	7,701,245
52 (Mica Creek Power Station)	305	342,771	7,701,611
53	199	342,763	7,701,244
54	174	342,737	7,701,249
55	145	342,707	7,701,246
56	1,878	341,786	7,703,158
57 (Mt Isa Golf Club)	1,862	341,713	7,703,107

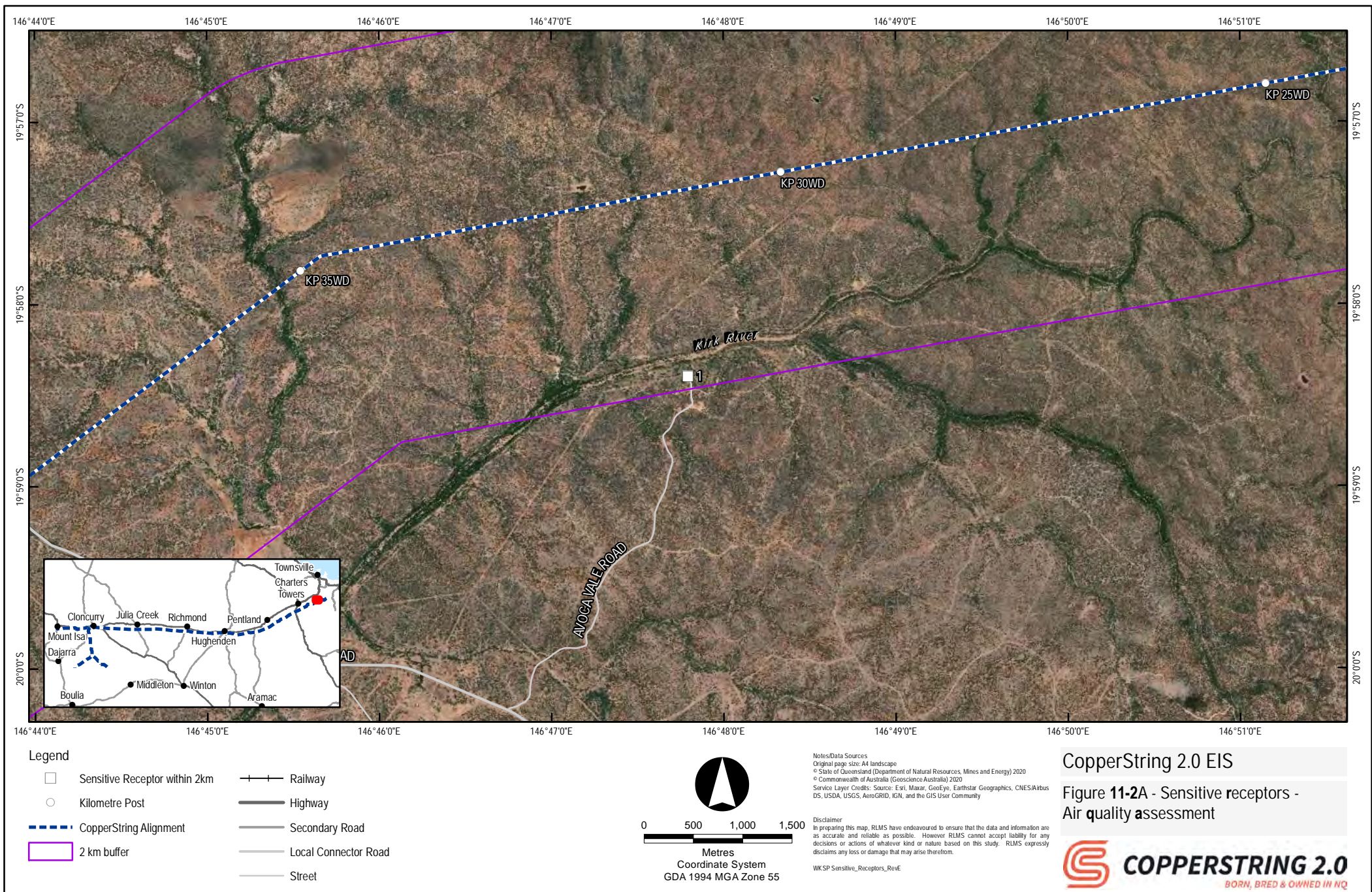
Note: Receptors 1-9 in MGA94 Zone 55, remainder in MGA94 Zone 54

A review of potentially affected sensitive receptors along the corridor selection indicates that the 46 of the 57 identified sensitive receptors are greater than 750 m from the proposed transmission line. The exceptions to this include sensitive receptors 45-55, which are existing workers accommodation located between approximately 150 m and 350 m of the existing Mount Isa power stations and electrical substations. The sensitive receptors are displayed in Figure 11-2.

Fauna

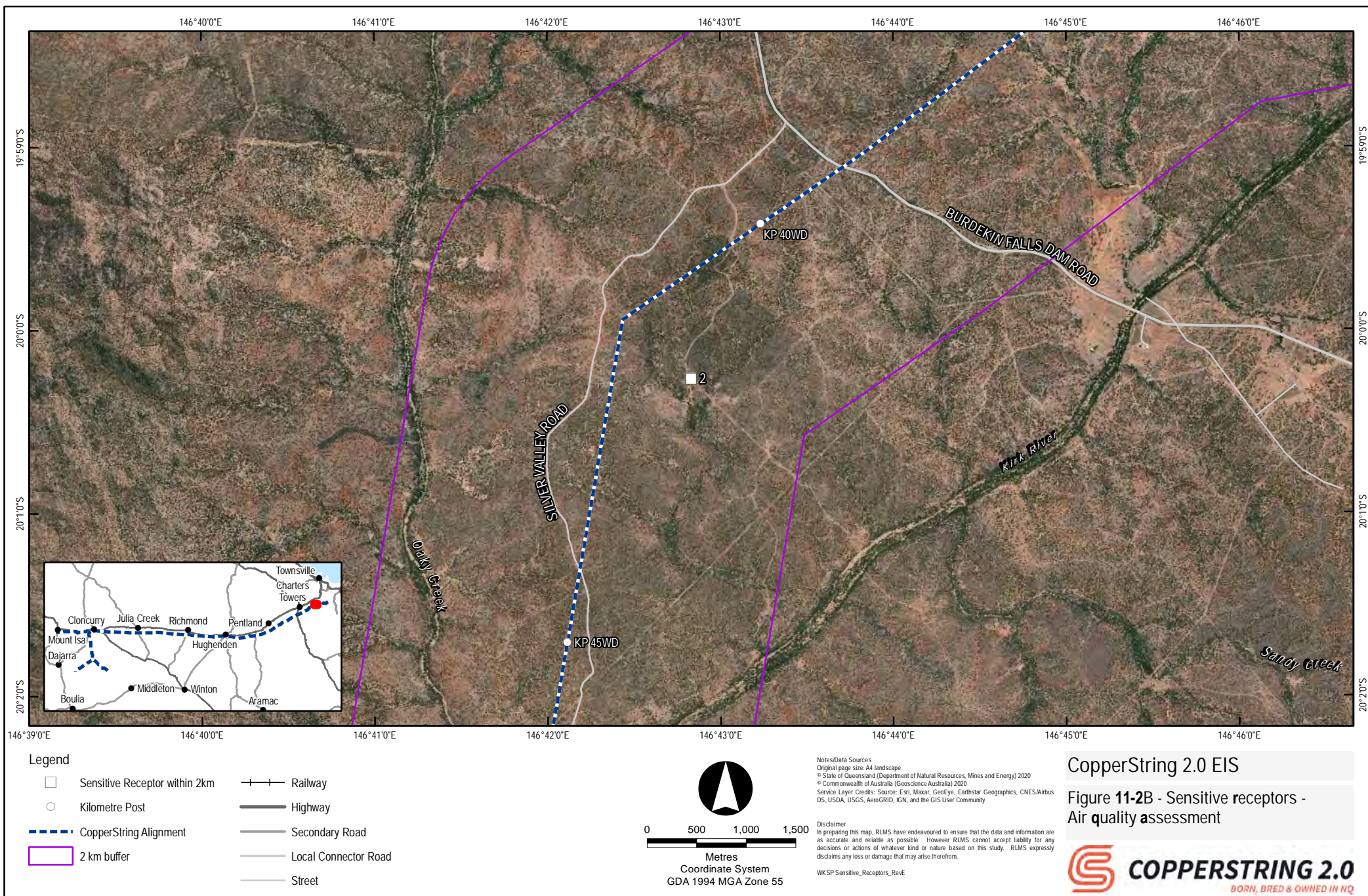
Non-residential sensitive receptors within the Project study area are described in Volume 2 Chapter 7 Flora and Fauna of this EIS.

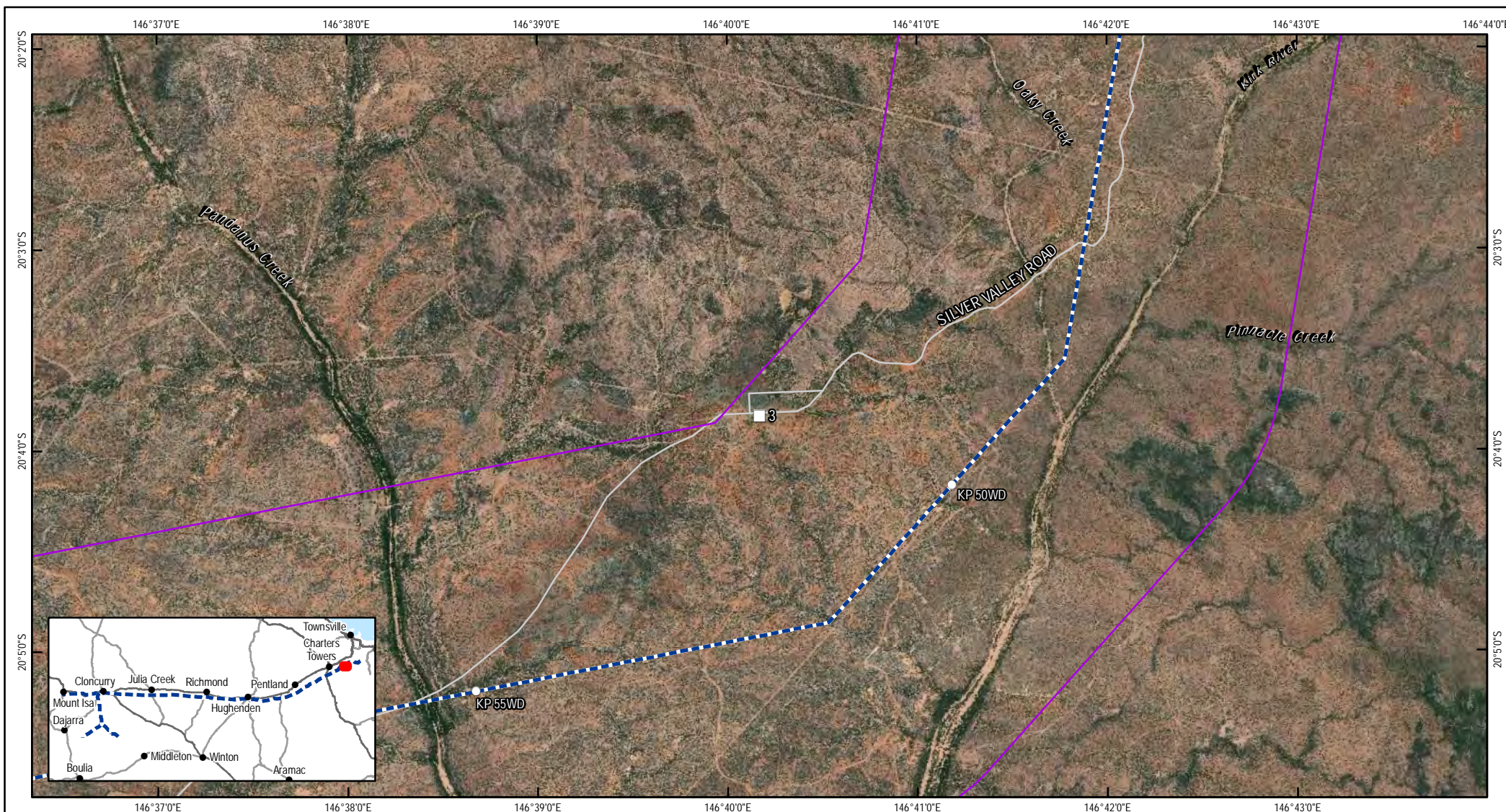




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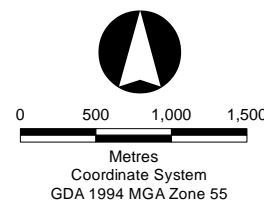
Figure 11-2A - Sensitive receptors -
Air quality assessment





Legend

- Sensitive Receptor within 2km
- Kilometre Post
- CopperString Alignment
- 2 km buffer
- Railway
- Highway
- Secondary Road
- Local Connector Road
- Street



Notes/Data Sources
Original page size: A4 landscape
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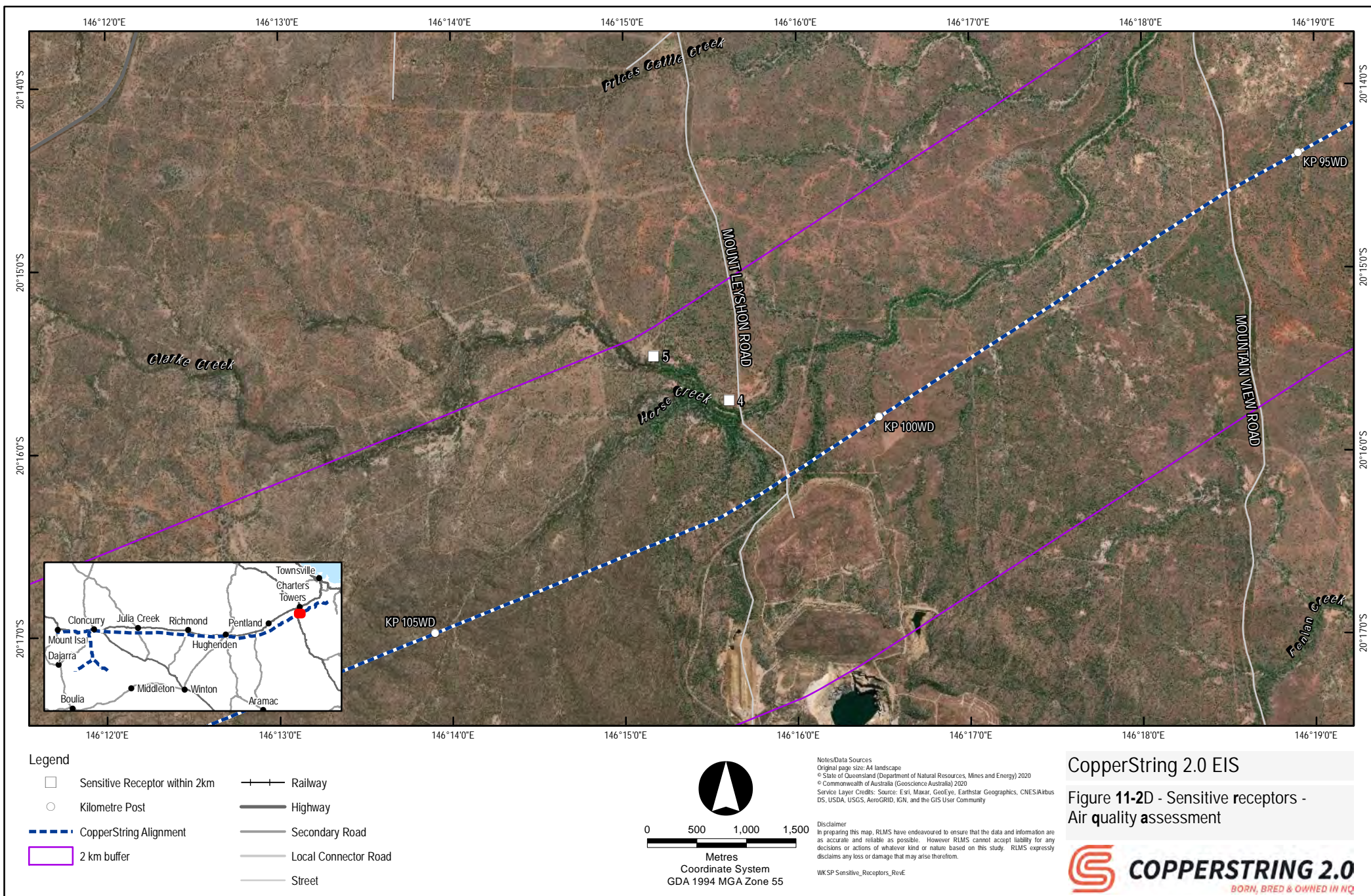
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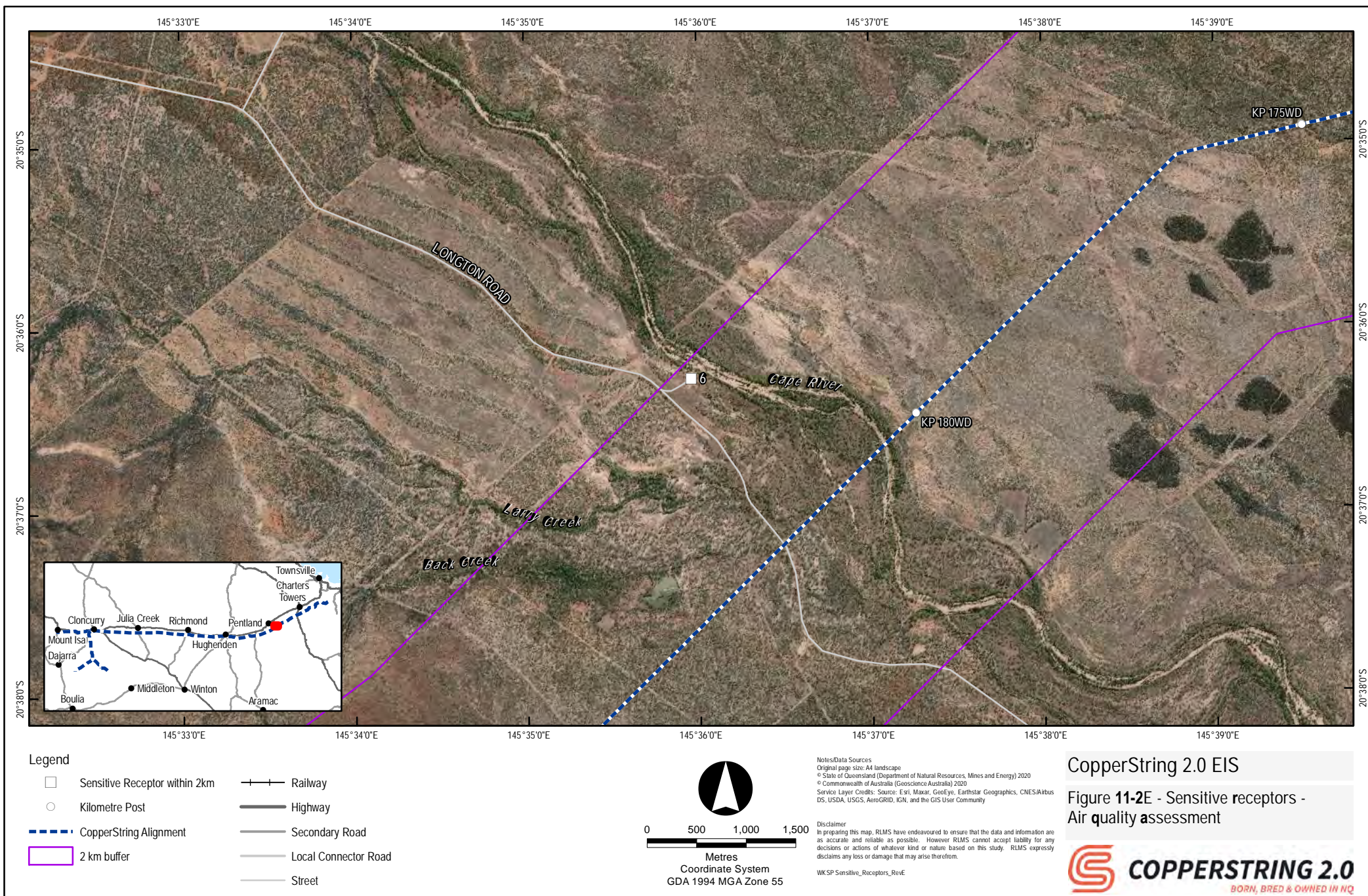
Figure 11-2C - Sensitive receptors -
Air quality assessment

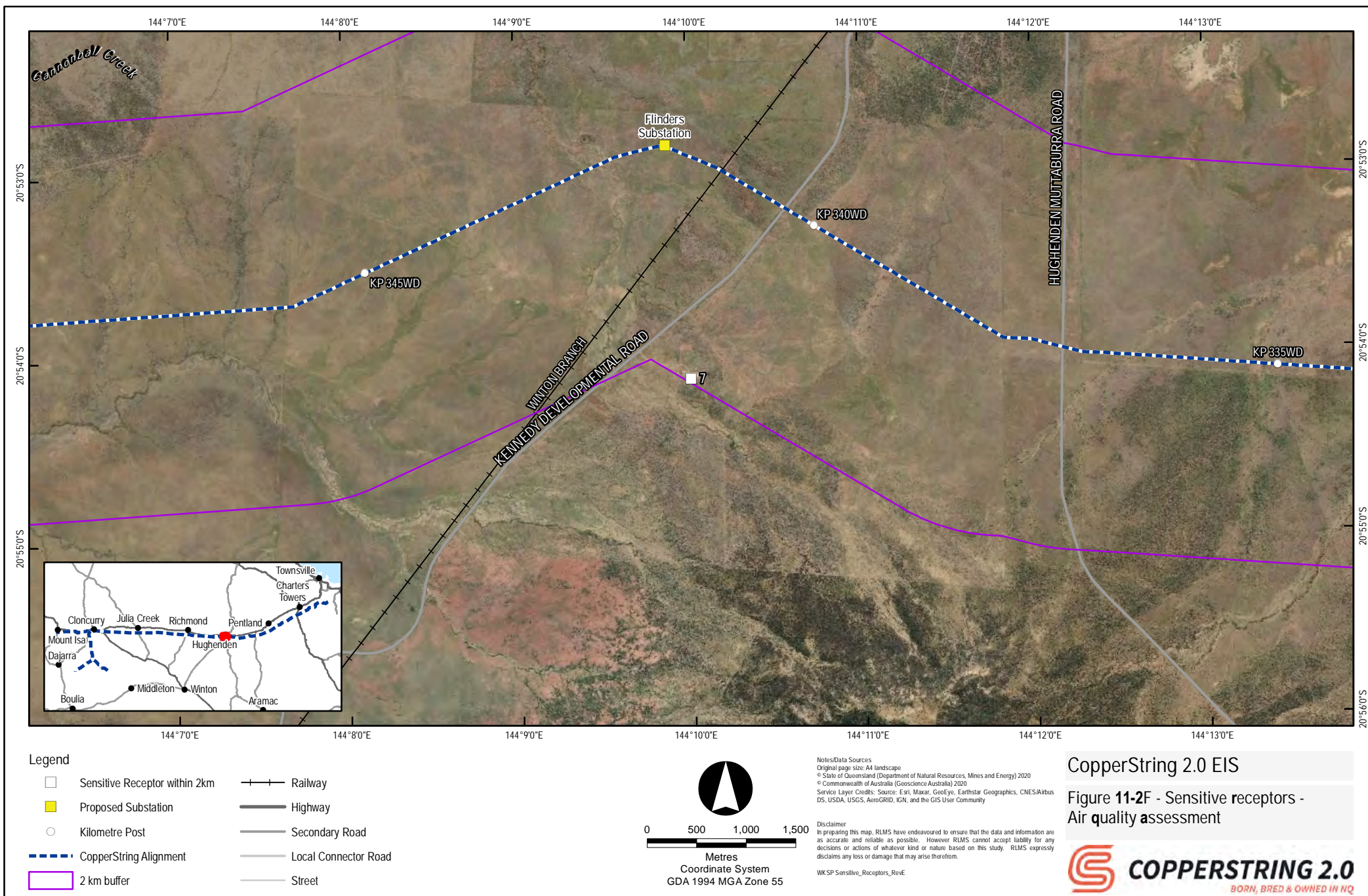


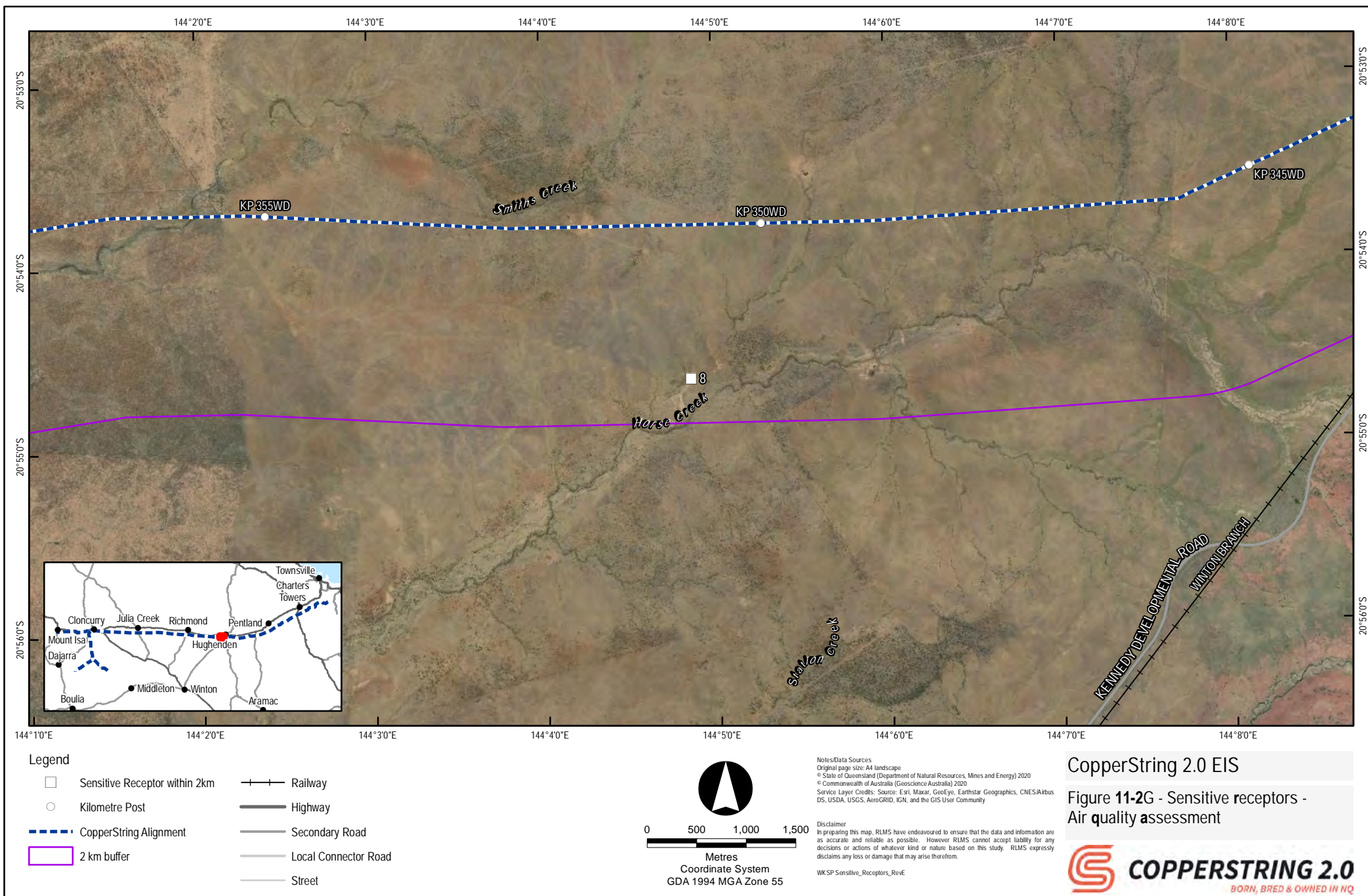


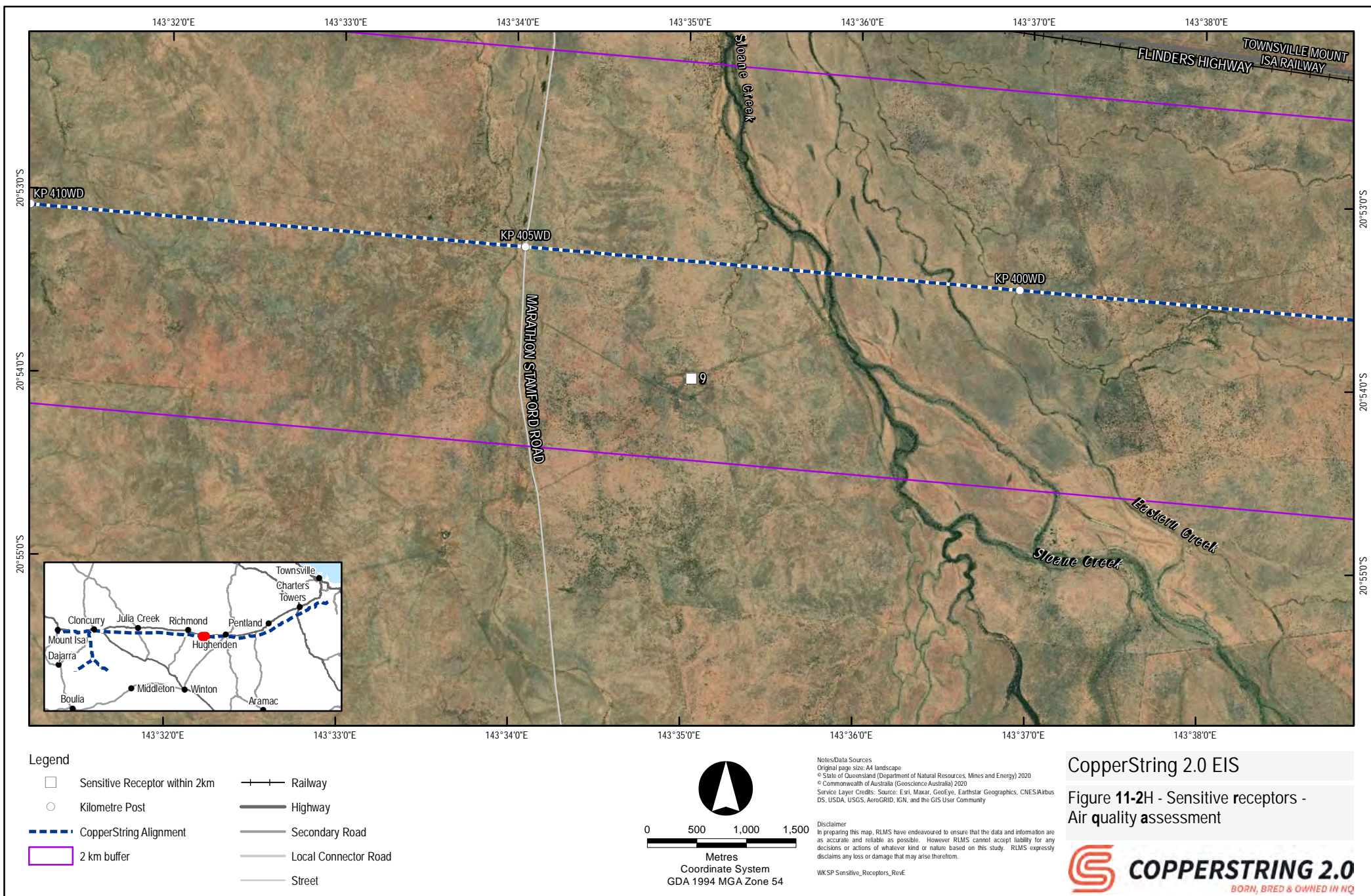
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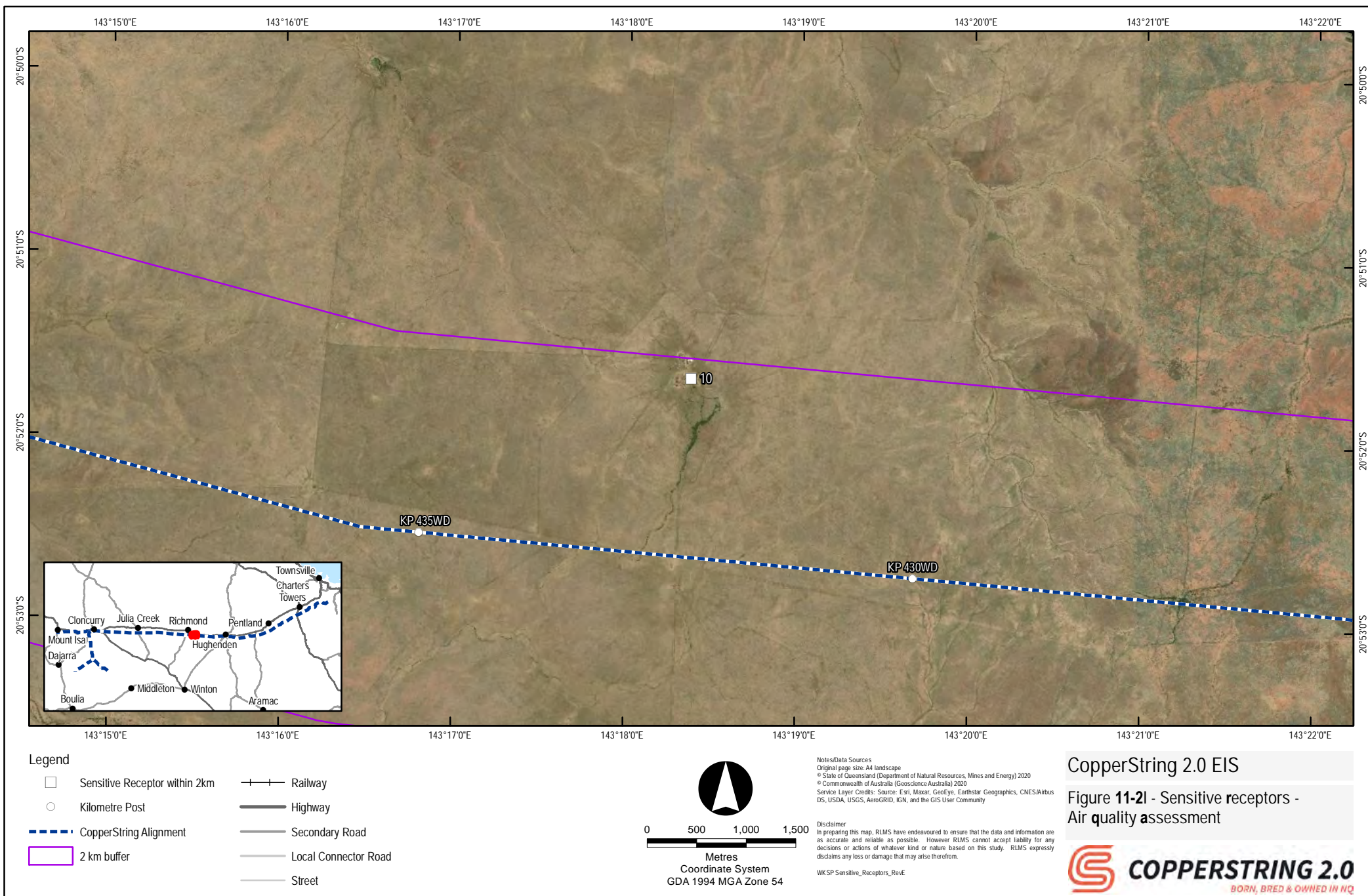
Figure 11-2D - Sensitive receptors -
Air quality assessment

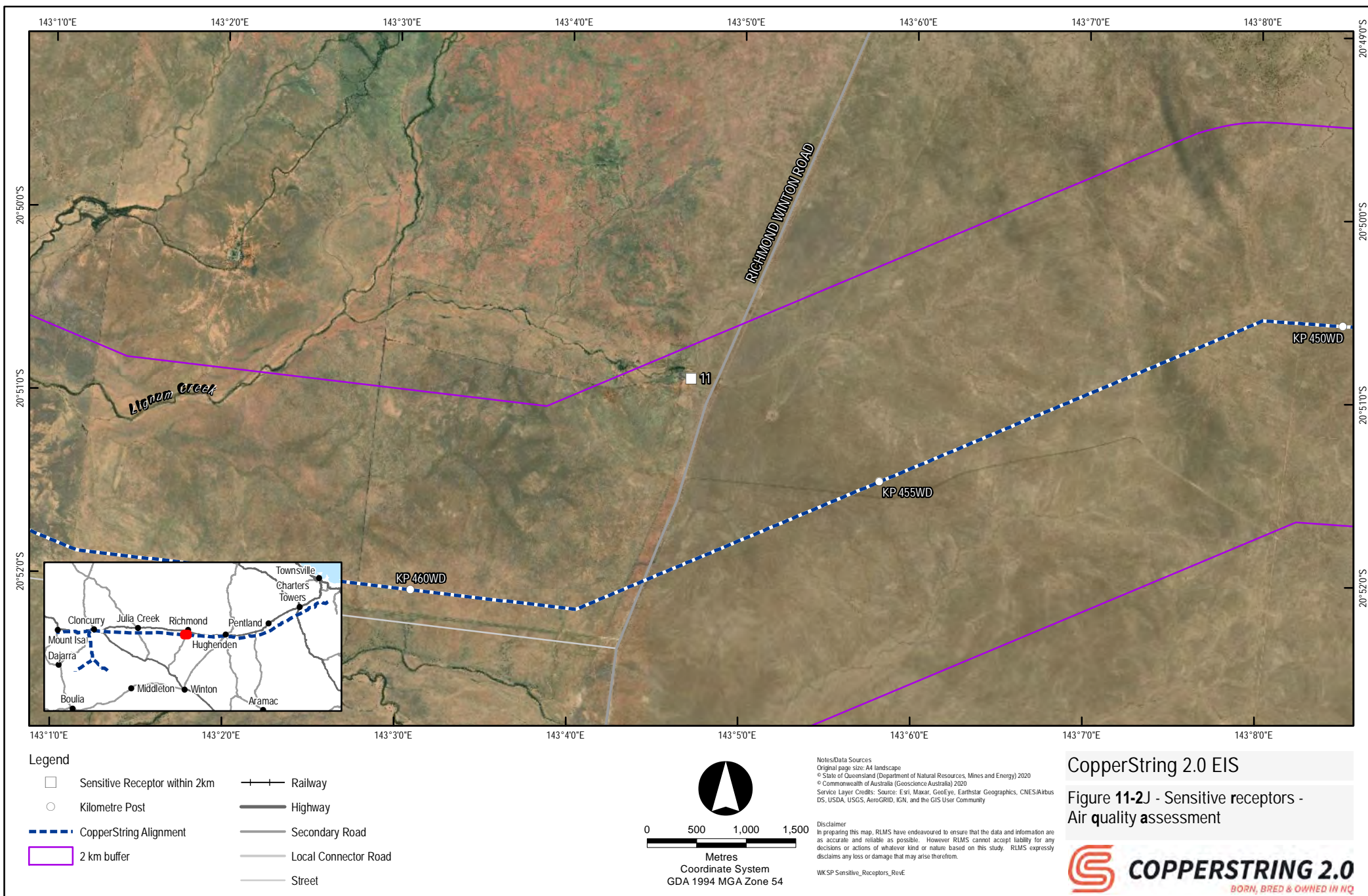






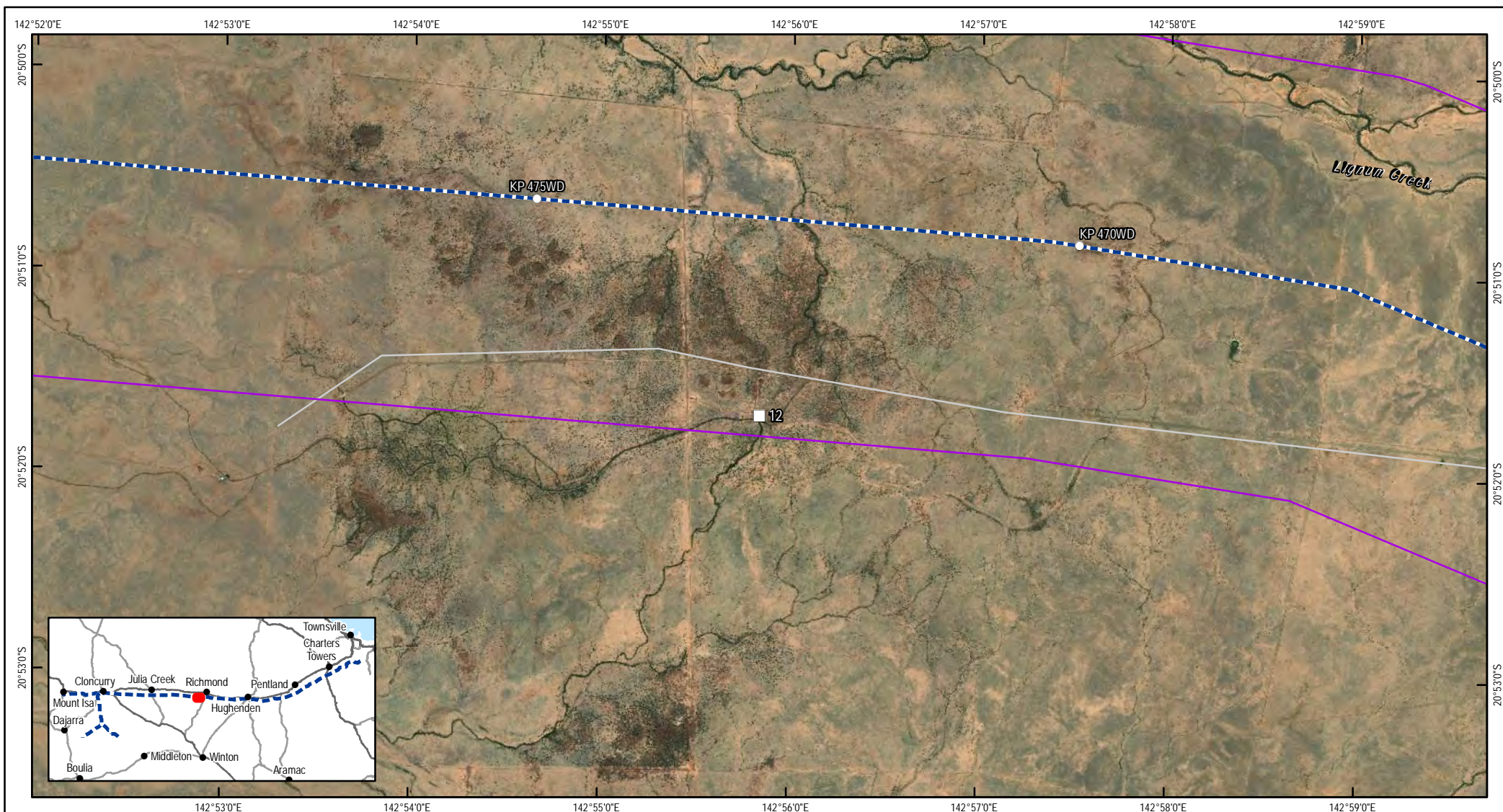






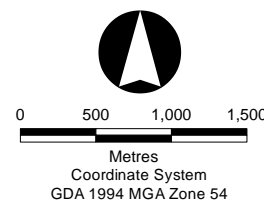
CopperString 2.0 EIS

Figure 11-2J - Sensitive receptors - Air quality assessment



Legend

- Sensitive Receptor within 2km
- Kilometre Post
- CopperString Alignment
- 2 km buffer
- Railway
- Highway
- Secondary Road
- Local Connector Road
- Street



Notes/Data Sources
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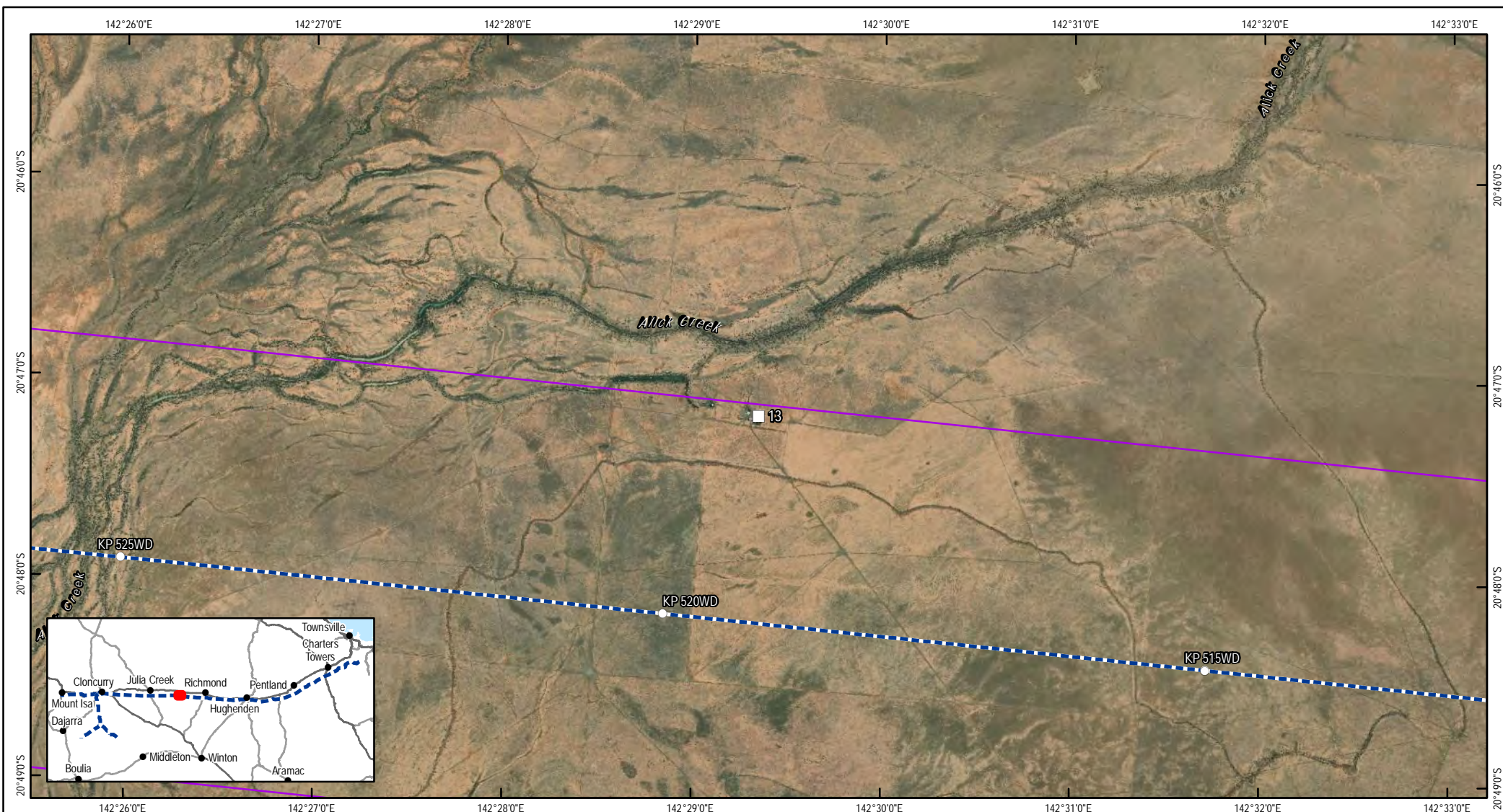
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WK SP Sensitive_Receptors_RevE

CopperString 2.0 EIS

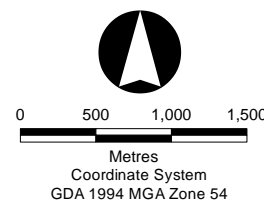
Figure 11-2K - Sensitive receptors -
 Air quality assessment





Legend

- Sensitive Receptor within 2km
- Kilometre Post
- CopperString Alignment
- 2 km buffer
- Railway
- Highway
- Secondary Road
- Local Connector Road
- Street



Notes/Data Sources
 Original page size: A4 landscape
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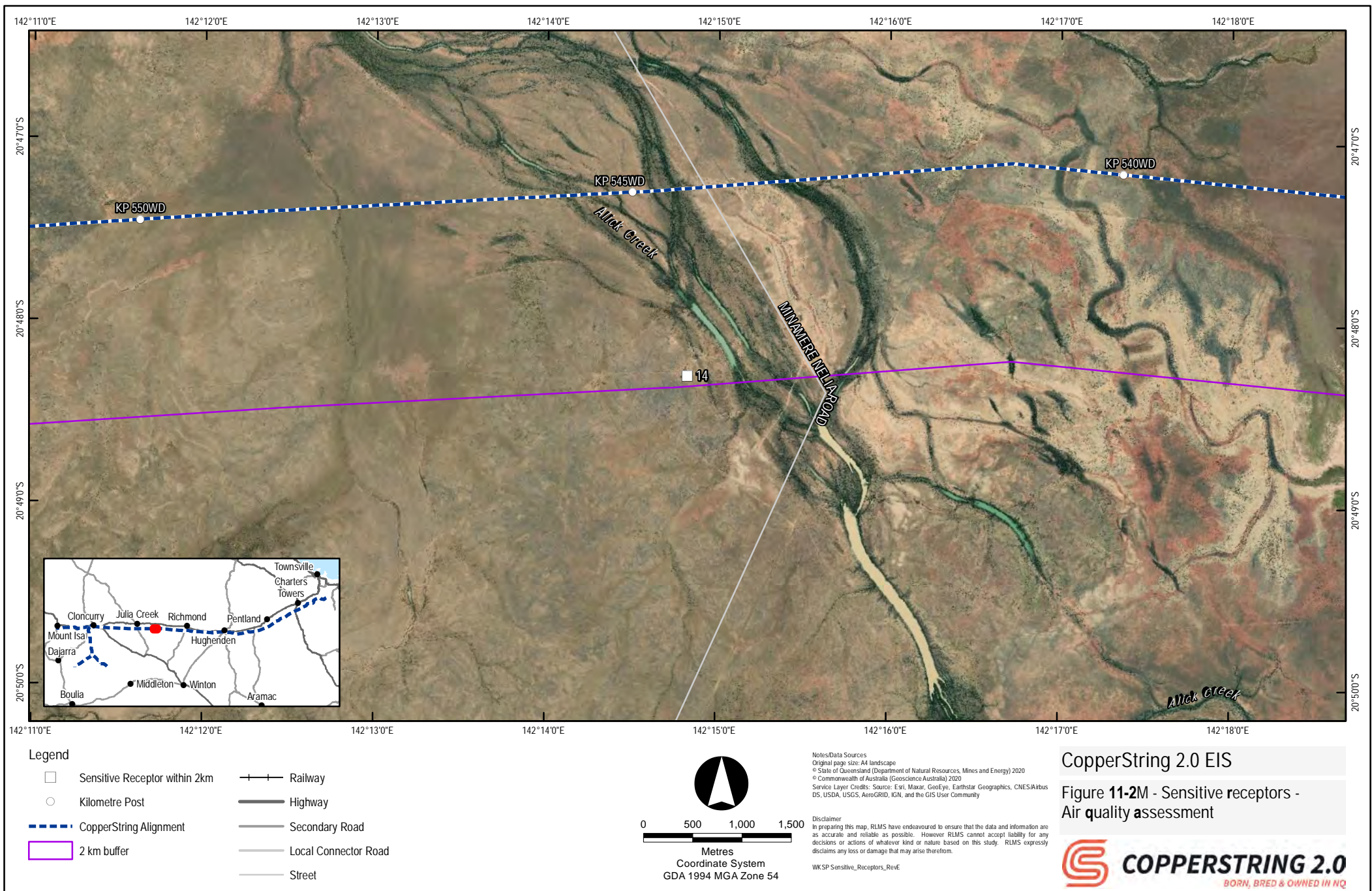
Disclaimer
 In preparing this map, RLMS have endeavoured to ensure that the data and information are as accurate and reliable as possible. However RLMS cannot accept liability for any decisions or actions of whatever kind or nature based on this study. RLMS expressly disclaims any loss or damage that may arise therefrom.

WK SP Sensitive_Receptors_RevE

CopperString 2.0 EIS

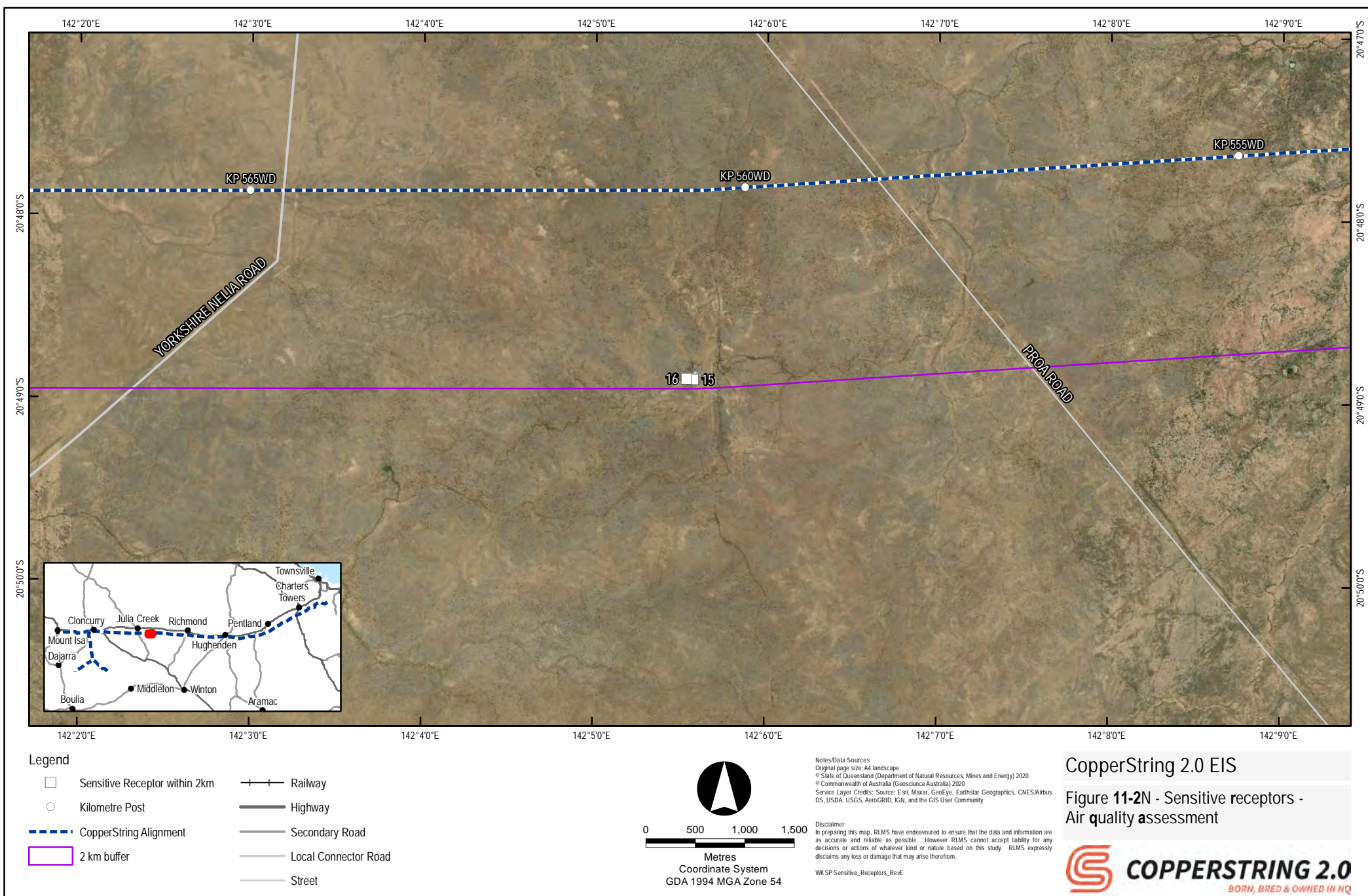
Figure 11-2L - Sensitive receptors -
 Air quality assessment





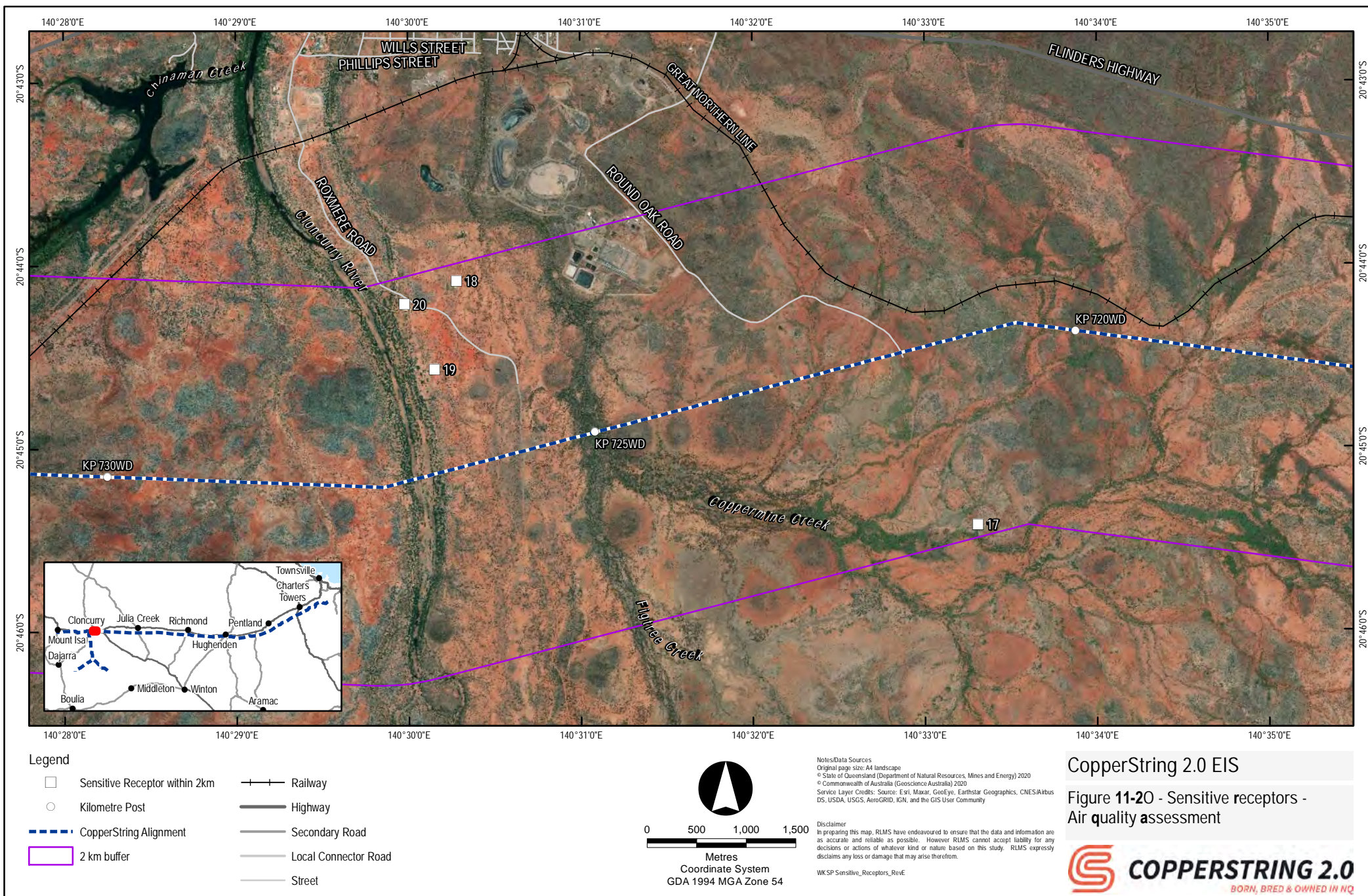
CopperString 2.0 EIS

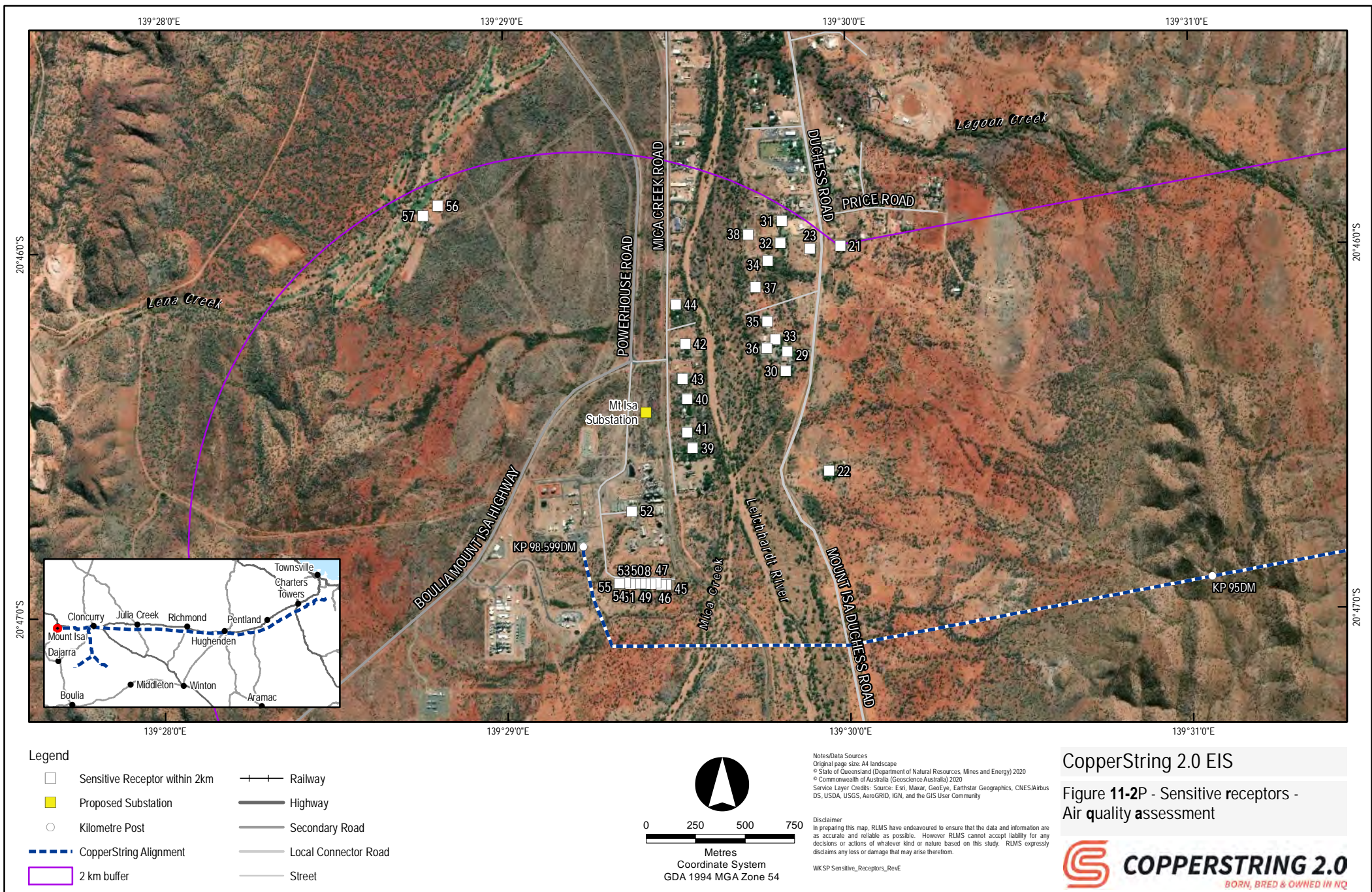
Figure 11-2M - Sensitive receptors -
Air quality assessment

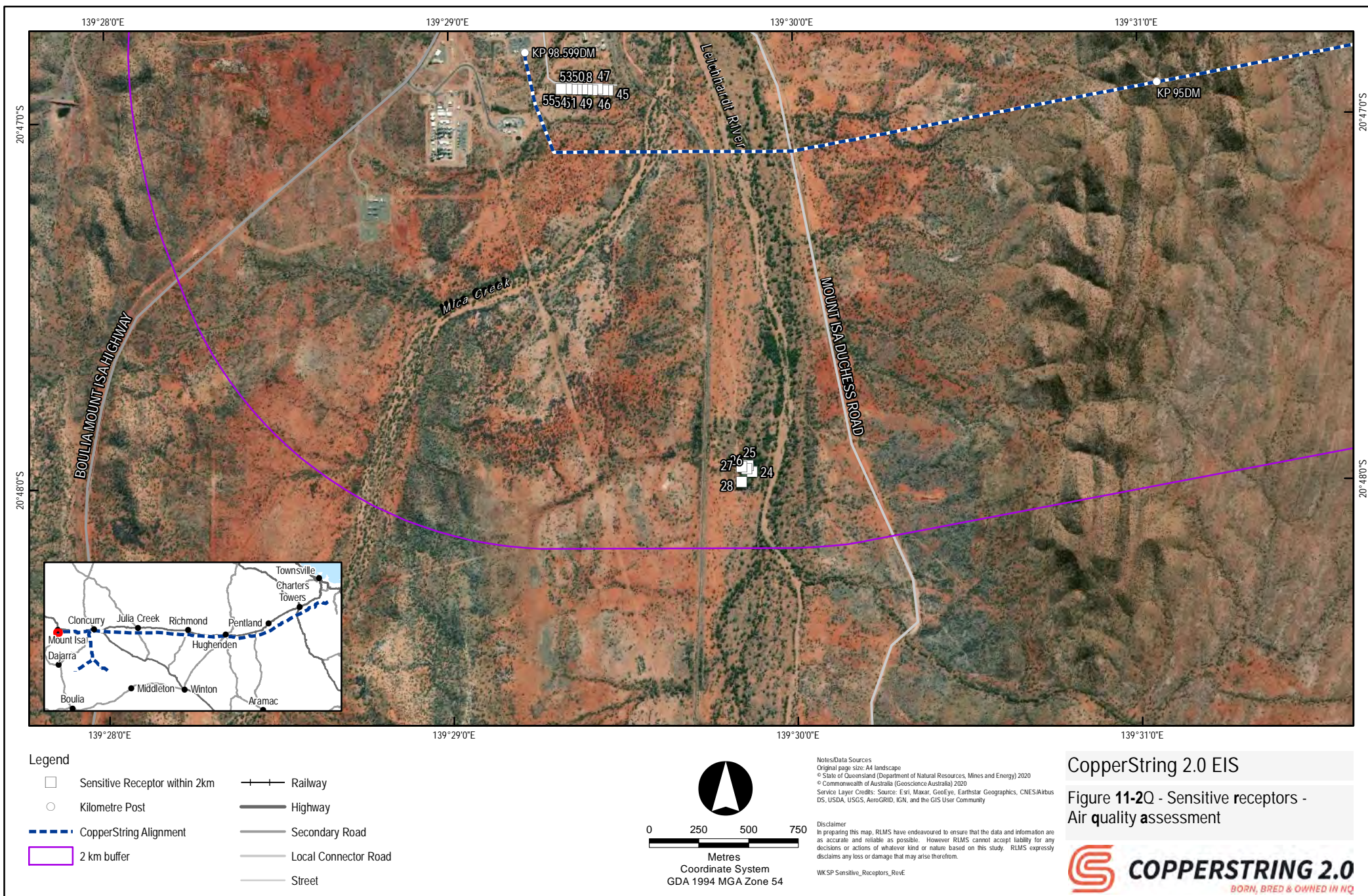


CopperString 2.0 EIS

Figure 11-2N - Sensitive receptors - Air quality assessment







11.3.4 Recommendations

Based on the review of the existing environment (Section 11.3) in terms of sensitive receptors, potential proximity to the transmission line and existing noise and vibration levels, it is recommended that the transmission line and substations should be located at least 500 m from the nearest sensitive receptor, where possible.

11.4 Impact assessment and mitigation measures

The primary risk of impacts on the ambient noise environment is associated with the immediate construction of the transmission line. There are residences adjacent to the corridor selection that will be affected by noise from machinery operating in the area, and by vehicles traversing the access tracks during construction.

Blasting is considered unlikely in order to construct foundations for the tower structures. If blasting is required, this will be matted and capped; however it is likely to produce noise and vibration, which may affect the surrounding environment.

Post construction (operations) there may be an audible hum from the transmission lines during humid or lightly raining conditions to people standing adjacent the transmission line.

11.4.1 Buffer distances

Based on the technical assessment worst-case buffer distances have been proposed between sensitive receptors and construction activities that would ensure compliance with appropriate noise limits outlined in Volume 3 Appendix W Noise technical report data CopperString 1.0. The buffer distances were selected to achieve the acoustic quality objective level of 50 dB(A) $L_{Aeq, adj}$ for daytime operation and are conservatively based on flat ground terrain for the modelled emission levels. These are outlined in Table 11-4.

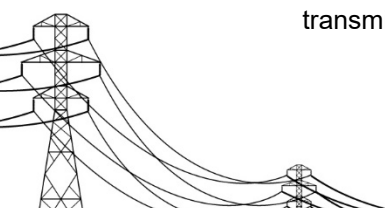
Table 11-4 Buffer distances

Construction component	Proposed buffer distance (m)
Tower construction	500 – 1000
Substation construction	500 – 1000
Concrete batching	>1000
Construction laydown/delivery areas	750 – 2400
Construction traffic	Predicted to comply at all points

11.4.2 Design response

The alignment of the corridor selection means that it is limited to the proximity of the road network, and passes by existing industrial noise sources (near Mount Isa), agricultural land uses, near train movements and loading/unloading (near Hughenden) and a small number of residential properties.

The corridor selection was initially identified such that the transmission line could be located no closer than 500 m (as per recommendation in Section 11.3.4) to any residential area, in order to retain a sufficient buffer distance, however this did not include the residential houses adjoining the Mica Creek power station site. The existing workers accommodation south of the existing Mica Creek Power Station are built on industrial land near to where the transmission line must travel to reach the power station. The houses are located between 145 m and 310 m from the transmission line. The next closest receptor is located approximately 750 m from the transmission line (see Figure 11-2).



The Project involves two distinct phases which may result in noise and vibration to the surroundings. These are:

- Construction of the transmission line, substations and related infrastructure.
- Operation of the transmission line, particularly during humid or rainy conditions;

The following sections outline noise and vibration issues associated with construction and operation of the Project.

11.4.3 Construction

Construction noises will be temporary and during daylight hours between 6.30 am to 6.30 pm Monday to Saturday, weather conditions permitting. Construction work outside of these hours is anticipated to be carried out far from residential receptors, resulting in inaudibility at these receptors. These will include machinery and vehicle noise.

In general, the landscape in which the corridor selection is located is rural, with low levels of background noise. Noise generated during construction will be temporary and will occur during daylight hours only. Noise impacts may be in the form of heavy vehicle movements, movement of machinery and general personnel presence, and helicopters during stringing of the conductors.

Construction access tracks may be in proximity to a number of residences and workplaces along the corridor selection, and the noise generated by construction activity may be of inconvenience for limited periods of times (up to several days, every few months during different construction phase cycles).

Noise during construction has the greatest potential to impact on livestock. Landowners will be consulted as part of the construction scheduling process to manage stock access and potential impacts. Noises associated with drilling, small scale blasting (if required, this is dependent on geological basement i.e. rock foundation type) and in particular helicopter stringing may impact on stock. Noise will also be generated during the vegetation clearing phase of construction. Chainsaws and other high-pitched motor noises have a significant localised impact on wildlife. Many species of wildlife are highly mobile and will exhibit avoidance behaviour if there are loud and persistent noises. With the cessation of activity and noise wildlife will return to the affected area and noise impacts are temporary.

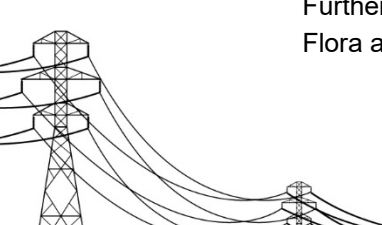
It is unlikely that blasting will be required during construction, however the requirements for this will be determined by the outcomes of the geotechnical investigations. If required, it would only be in areas of hard rocky substrate to place foundations for the structures.

Workers accommodation

The locations of the temporary workers accommodation camps are described in Volume 2 Chapter 2 Project Description of this EIS. The facilities are not currently existing and are expected to be constructed using non-permanent demountable structures. Camps are to be in proximity to existing townships and be co-located with construction laydown areas.

Fauna

The operation of machinery and equipment during construction may disrupt local fauna behaviour, through increased exposure to light, noise and vibration. The corridor selection is predominantly rural and will be developed to minimise impacts to ecologically sensitive areas. Further detail on impacts to ecologically sensitive areas can be found in Volume 2 Chapter 7 Flora and Fauna of this EIS.



11.4.4 Operation

During operation of the electricity transmission network, noise emissions will include:

- Corona effect of the extra high voltage transmission lines; and
- Wind effects on the conductors and structures.

The corona is the term applied to the electrical discharge that can occur due to an intense localised electric field adjacent to an energised part. Energised surfaces, such as conductors, are surrounded by regions of high electric field strength causing ionisation of the air. The corona effect is caused by minor electrical discharge from the conductors into the ionised air and is strongest during wet weather. If this effect was to represent a health hazard, then it should also operate in the absence of power lines due to the natural, slowly-fluctuating unidirectional electric field called “fair weather field”. This field exists everywhere in the open and is discharged from point sources such as the end of pointed leaves. Further assessment on electro-magnetic fields is provided in Volume 3 Appendix AC Electro-magnetic field specialist study.

Corona effects are relatively small in fair weather but can become significant under electrically charged clouds. One potential impact of corona effect is audible noise characterised by a crackling sound that is normally heard 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. This is generally not audible beyond 100 m from the infrastructure. There are no residences within 140 m of the corridor selection and only people in the immediate vicinity of the transmission structures will hear the corona effects and then only under particular atmospheric conditions. The nearest residence from the corridor selection is approximately 145 m east of the transmission line within lot 10 on SP293841 (Receptor 55 near to existing power stations in Mount Isa).

Noise from wind effects is expected to be incidental, and should only occur during periods of higher wind speeds, with the impacts reduced by the masking effect of noise generated by wind moving through surrounding vegetation.

With the exception of the above, noise along the corridor selection during operation is commensurate with a rural environment, with noise limited to wind effects on conductors and structures.

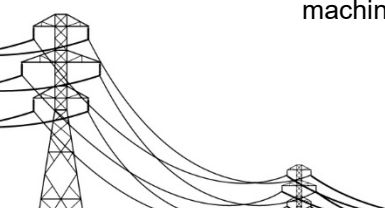
Disturbance of wildlife through exposure to light, noise and vibration

The Project will have negligible impact on flora and fauna through light, noise and vibration. No lighting is proposed for the project during the operation phase. Noise levels associated with transmission lines are also negligible, resulting in low-level, constant noise unlikely to cause substantial behavioural disruption to local fauna.

11.4.5 Summary of potential mitigation and management measures

Mitigation measures

The Environmental Work Plans (prepared immediately prior to construction by the EPC contractor) will illustrate the access routes to the site for points along the corridor selection. The Framework environmental management plan (FEMP) (Volume 3 Appendix Q Framework environmental management plan) will detail mitigation measures to control noise emissions, including restricted vehicle speeds, work hours (6:30 am to 6:30 pm Monday to Saturday weather conditions permitting where near to residential receptors), the regular maintenance of machinery, and the fitting of noise suppression devices. The movement of vehicles and



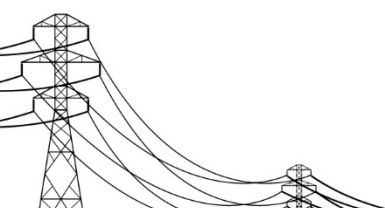
construction activity schedules will be discussed on a case by case basis with individual landholders as appropriate. Any construction activities identified as causing unreasonable noise and a possibility of nuisance will be timed to the mutual agreement of both construction management and the landholder to ensure that essential livelihood operations (such as moving cattle or harvesting) are able to be undertaken when necessary. Some construction activities, such as helicopter stringing, may be less flexible in their time frames, and schedules for such activities will be developed between the construction manager and the landholder well in advance of the actual activity.

Blasting for construction is likely to be of concern for some landholders. Should unforeseen geological conditions along the corridor selection result in the need for blasting, the Project will advise the landholders of the requirements and work with the landholder so that there is no significant impact on livestock operations or general property safety. Blasting would be carried out in accordance with current industry standards, and will be carried out to minimise ground vibration, airblast overpressure, dust and fly rock. All blasting will be carried out in accordance with AS 2187 and legislative requirements. Appropriate approvals will be obtained and qualified and experienced shot firers will be used in the unlikely event that blasting is required.

Audible corona from the transmission line will only occur under certain meteorological conditions, and may be masked by wind, topography, and other activities adjacent to the corridor selection. The distance of the transmission line from noise sensitive receptors mitigates the risk of the transmission infrastructure providing an audible impact.

Table 11-5 Mitigation and management measures summary

Timing	Mitigation and management measures
Construction	The location of the corridor selection has ensured that with the exception of the houses associated with the Mica Creek Power station in Mount Isa, a buffer of approximately 750 metres between the transmission line and the nearest sensitive receptor will minimise the noise and vibration impact of the Project.
	Environmental Work Plans including land access management plans will be developed for access routes to site for points along the corridor selection. These plans will include mitigation measures including restricted vehicle speeds, work hours (6:30 am to 6:30 pm Monday to Saturday weather conditions permitting where near to residential receptors), the regular maintenance of machinery, and the fitting of noise suppression devices.
	Carrying out all construction works during standard daytime construction hours (6:30 am to 6:30 pm Monday to Saturday where near to residential receptors) wherever possible. Close consultation with the affected community will be essential where construction works are proposed outside normal working hours.
	Restricting heavy vehicles' entry to sites near noise sensitive receptors and departure from site to the nominated construction hours.
	Blasting would be carried out in accordance with current industry standards, and will be carried out to minimise ground vibration, airblast overpressure,



Timing	Mitigation and management measures
	dust and fly rock. All blasting will be carried out in accordance with AS 2187 and legislative requirements.
	Monitor initial blasts to develop blast site laws, optimise further blasts and confirm blasting predictions.
	Where noise level exceedances cannot be avoided, consideration should be given to applying time restrictions and/or providing quiet periods for nearby residents. Landowners will be notified in advance of expected noisy works.
	Ongoing consultation with local residents and land holders and building owners to be undertaken to assist in the alleviation of community concerns. Previous experience on similar projects has demonstrated that affected noise sensitive receptors may be prepared to endure higher construction noise levels for a short duration if they have been provided with sufficient warning in the place of intermittent but extended periods of construction noise at lower levels.
	Conducting targeted community communication prior to especially noisy activities such as blasting activities and helicopter (aerial) stringing of lines. These types of activities may have impacts on domestic livestock and pets, so landowners should be forewarned of these activities
	Minimising noise emissions from concrete batching plants by ensuring equipment is well maintained and appropriately located with respect to adequate setback distance from receptors and provision of adequate acoustic shielding where required from topography, material stockpiles or temporary barriers. If necessary restricting concrete batching operations to between 6.30 am and 6.30 pm.
	Minimising noise emissions from laydown areas by ensuring personnel are informed of the sensitivity to noise during the night-time period, vehicles and equipment are well maintained and ensuring the laydown areas are appropriately located with respect to adequate setback distance from receptors and provision of adequate acoustic shielding where required from topography, material stockpiles or temporary barriers.
Operation	Route selection has ensured that with the exception of the houses associated with the Mica Creek Power station in Mount Isa, a buffer of approximately 750 metres between the corridor selection and the nearest sensitive receptor will minimise the noise and vibration impact of the project during operation.
	Community consultation with local residents and building owners to be undertaken to assist in the alleviation of community concerns.
	Conducting targeted community communication prior to especially noisy activities. These types of activities may have impacts on domestic livestock and pets, so landowners should be forewarned of these activities
	Maintaining a suitable complaint register. Should noise complaints be received, undertake noise monitoring at the locations concerned. Reasonable

Timing	Mitigation and management measures
	and feasible measures would need to be implemented to reduce noise impacts.

A summary of potential noise and vibration impacts associated with the construction and operation of the Project, including unmitigated and mitigated risk ratings are provided in Table 11-6 and Table 11-7 respectively.

Table 11-6 Construction risk mitigation summary

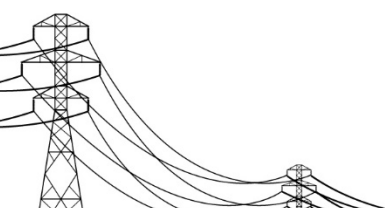
Construction activities	Associated potential impacts	Unmitigated risk rating	Mitigated risk rating
Blasting at base of tower location (where necessary)	Overpressure and vibration emissions. Disruption to sensitive receptors, flora and fauna, and employees	Moderate	Low
Tower construction	Disruption to sensitive receptors, flora and fauna, and employees	Moderate	Low
Concrete batch plant operations	Disruption to sensitive receptors, flora and fauna, and employees	Moderate	Low
Activities at material laydown / delivery areas	Disruption to sensitive receptors, flora and fauna, and employees	Moderate	Low
Substation construction	Disruption to sensitive receptors, flora and fauna, and employees	Moderate	Low
Construction vehicle traffic	Disruption to sensitive receptors, flora and fauna, and employees	Low	Low

Table 11-7 Operation risk mitigation summary

Operational activities	Associated potential impacts	Unmitigated risk rating	Mitigated risk rating
Transmission line operation	Disruption to residential sensitive receptors	Low	Low
Substation operation	Disruption to residential sensitive receptors.	Moderate	Low

11.5 Monitoring and Auditing

Noise monitoring will be undertaken when required by the administering authority. In the event that noise monitoring is requested by the administering authority the details of the monitoring will be recorded and detailed in the monthly reports the Construction contractor would supply to CuString.



A suitable complaint register will be maintained in compliance with a Stakeholder Management Plan to be developed by the Construction contractor. Reasonable and feasible mitigation measures would be considered to reduce noise impacts if required.

11.6 Conclusion

The assessment of noise indicated that the Project may be constructed and operated without significant impact on sensitive receptors as long as appropriate management practices are implemented and siting studies are completed.

The placement of concrete batching plants and laydown areas should consider the proximity of sensitive receptors and ensure that adequate buffer distances are maintained or other noise mitigation measures are adopted.

Construction activities have the greatest potential for impact, although this is mitigated by the duration of construction in any particular location. Operational noise is not expected to result in any impacts on the environmental values of receptors near the line.

Decommissioning noise would be expected to be similar to construction of the transmission lines and substations. Mitigation activities to reduce the impact of construction noise would apply to decommissioning actions.

Commitments to manage potential noise and vibration impacts include:

- Development of Environmental Work Plans
- Undertaking consultation and engagement with interested parties, and targeted communications and consultation with potentially affected parties
- Maintain a complaints register for the management and tracking of complaints.

No cumulative noise and vibration impacts are anticipated as a result of the Project.

