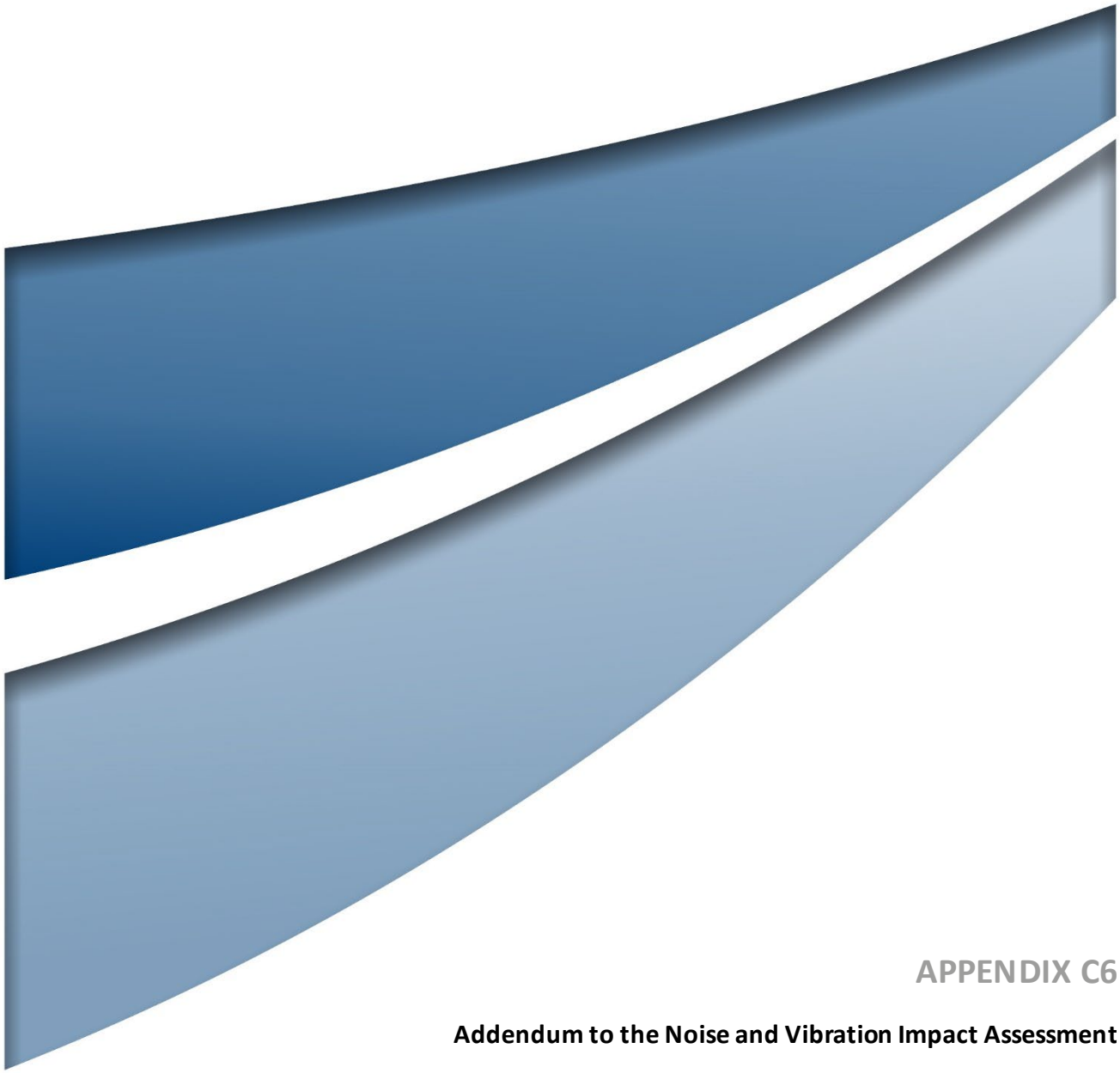

APPENDIX C6

Addendum to the Noise and Vibration Impact Assessment

Inspired People.
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Our Ref: 21450_NIA_Impacts-Design_Change_V1.docx

21 September 2022

Tom Hatfield
Environmental Assessment Manager
APA Group

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Dear Tom

RE: Kurri Kurri Lateral Pipeline - Assessment of Project Amendments on NIA Outcomes

Umwelt (Australia) Pty Ltd prepared the Noise Impact Assessment (NIA) for the Kurri Kurri Lateral Pipeline Project (the Project) on behalf of APA Group (APA) which was included in the Environmental Impact Statement (EIS) for the Project. The NIA provides an assessment of the potential noise and vibration impacts to off-site receivers associated with relevant Project components, being the transmission pipeline, storage pipeline and associated surface facilities. The assessment of both the construction and operational impacts indicated that mitigation and management measures were required for the Project.

Umwelt understand that since the submission of the KKLP EIS in March 2022, APA has continued to consult with directly affected landholders, and stakeholders more broadly. Ongoing consultation has led to several Project amendments, including the relocation of the JGN offtake facility to the eastern side of Lenaghans Drive, an adjusted transmission pipeline alignment in several locations including either side of Buchanan Road, a refined footprint for the storage pipeline and adjustment of the equipment arrangement within the Compressor Station and Delivery Station.

Umwelt has reviewed the Project amendments to assess whether the changes have a material impact on the outcomes of the NIA. A summary of the review and assessment is provided in the following sections.

1.0 JGN Offtake Facility

The noise prediction model for the JGN offtake facility has been updated to reflect the latest design information and location of the facility. The new design incorporates a 4m high retaining wall around the northern edge of the facility.

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As described in Section 6.3.2 of the NIA submitted with the EIS, the pressure control valves (PCVs) are the primary operational noise source for the JGN offtake facility. APA has provided updated source noise levels for the proposed PCVs. The data indicates that one of the proposed PCVs generates a noise level of 80 dB(A) at 1m and the second PCV generates a noise level of 61 dB(A) at 1m. The sound power level for the PCVs has been evaluated based on a full-sphere surface area and is presented in **Table 1**. The vendor-supplied noise level data indicates that the dominant noise energy for the proposed valves is within the higher frequency one-third octave bands between 2 kHz and 8 kHz.

Given the high-frequency energy content included in the vendor-supplied data, there is a risk that the noise prediction algorithms may overestimate the noise barrier attenuation provided by the retaining wall on the northern boundary of the JGN offtake facility. Therefore a sensitivity analysis has also been undertaken to assess how the barrier attenuation from the retaining wall might change with a different reference spectrum for the PCVs. This analysis involved incorporating a reference spectrum that includes greater low-frequency noise energy into the noise model and is presented in **Table 1**.

Table 1 Operational Sound Power Levels used for the JGN Offtake Facility

Plant	Qty	Indicative Sound Power Levels dB(A)/unit								
		Total	Octave Band Center Frequency Hz							
		dB(A)	31	63	125	250	500	1k	2k	4k	8k
PCV Item 1 – attenuated Vendor Supplied	1	72	23	23	23	28	40	52	64	67	70
PCV Item 2 – attenuated Vendor Supplied	1	91	45	45	45	50	59	71	83	86	89
PCV Combined – attenuated Vendor Supplied	1	91	45	45	45	50	59	71	83	86	89
PCV Combined – attenuated Reference Spectrum	1	91	73	84	83	83	79	81	80	82	82

The updated predicted noise levels at nearby sensitive receivers are presented in **Table 2** along with the applicable night-time noise criteria. A +5 dB penalty has been conservatively applied to the noise predictions and may be applicable for low-frequency characteristics, depending on the final valve selection.

Table 2 Predicted Operational Noise Levels LAeq(15min) from the JGN Offtake Facility, dB(A)

Receiver ID	Night Period Criteria LAeq(15min) dB(A)	Predicted Noise Level LAeq(15min) dB(A) [1] Based on Vendor Supplied Data	Predicted Noise Level LAeq(15min) dB(A) [1] Based on Library Reference Spectrum	Exceedance
R8-1	38	< 20	< 20	Nill
R8-2	38	< 20	28	Nill
R8-3	38	< 20	33	Nill
R8-4	38	33	35	Nill
R8-5	38	30	33	Nill
R8-6	38	24	28	Nill
R8-7	38	< 20	< 20	Nill
R8-8	38	< 20	< 20	Nill

Note: [1] A modifying factor of +5 dB(A) has been applied to the prediction results.

As indicated in **Table 2**, the noise levels for the change of location, latest design and proposed equipment are predicted to comply with the applicable noise criteria nominated in the NIA at all receivers. The sensitivity analysis indicates that an increase in the low-frequency noise energy content for the PCVs will also increase the predicted noise levels. However, with the inclusion of the reference spectrum, the noise levels are still predicted to comply with the noise criteria at all receivers.

During the detailed design phase for the project, it is recommended that the final equipment selections are confirmed and the potential noise emissions from the facility are updated, if different from the noise data presented in **Table 1**.

2.0 Compressor and Delivery Station

The rearrangement of the Compressor and Delivery Station equipment has been incorporated into the noise model. The updated noise level predictions are unchanged from the results previously presented in the NIA.

3.0 Transmission Pipeline and Storage Pipeline Re-alignment

Alignment changes for the transmission pipeline and storage pipeline has resulted in the pipeline being located nearer to some sensitive receivers and further from other sensitive receivers. This has the potential to increase the construction-related noise impacts at some locations and decrease the potential impacts at other locations along the alignment. An update to the locations of HDD entry and exit points has also been incorporated within the assessment of the construction noise.

For this assessment, areas of interest include the following:

- Changes to the transmission pipeline alignment between KP 0.0 and KP 6.0, including the relocation of the JGN Offtake Facility and HDD under the M1 Pacific Motorway.
- Changes to the transmission pipeline between KP 11.5 and KP 15.7, including on the eastern side of Buchanan Road, between Buchanan Road and Main Road and on the western side of Main Road.
- A reduction in the east-west length of the storage pipeline construction footprint.

Based on the design changes noted above, the noise prediction results have been updated for the following construction scenarios that were previously presented in the EIS:

- Scenario 1: Combined construction activities during standard hours.
- Scenario 2: HDD and horizontal drilling/boring activities that occur outside of standard hours.
- Scenario 3: Storage Pipeline activities outside of standard hours.

The updated results for each scenario are discussed in the following sections. The revised summary tables for the predicted noise impacts are appended to the end of this report, along with updated noise impact category maps.

3.1 Scenario 1 – Standard Hours Construction Activities

The predicted noise levels for construction Scenario 1 are summarised in **Table A1.1** for construction activities during standard hours and indicate a range of potential noise levels across each NCA. As presented in **Table A1.1**, a number of sensitive receivers are predicted to experience noise levels above the applicable noise management levels in each period. The change in noise level perception categories from the EIS to the amended Project for standard hours is summarised in **Table 3**.

Table 3 Summary of receivers within noise level perception category for Scenario 1

Period	Perception Category	Previous No. Receivers	Updated No. Receivers	Change
Standard hours	Highly intrusive	1	3	+2
	Moderately intrusive	17	23	+6
	Clearly Audible	1,074	1,065	-9
	Total	1,092	1,091	-1

These results represent a net reduction in the overall number of receivers that may be affected by the Project, although there is a small increase in the number of receivers in the highly intrusive category and the moderately intrusive category.

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.

The predicted noise levels at the Industrial and Infrastructure land-use type receivers are summarised in **Table A1.2** for the various construction activities and indicate a range of potential noise levels across each NCA. As presented in **Table A1.2**, the noise levels are predicted to comply with the noise management level of 75dB(A) LAeq(15min) for these receivers.

The predicted noise levels at the Kurri Kurri Tafe are 49 dB(A) LAeq(15min) which comply with the applicable noise management level of 55 dB(A) LAeq(15min). Similarly, the predicted noise levels at the Kurri Kurri High School are 42 dB(A) LAeq(15min) which comply with the applicable noise management level of 55 dB(A) LAeq(15min).

The noise level impact maps, highlighting the noise perception categories for construction activities during standard hours are presented in **Figures A1.1** to **A1.3**.

3.2 Scenario 2 – Outside Standard Hours HDD and Horizontal Boring Activities

The predicted noise levels for construction Scenario 2 are summarised in **Table A1.3** for construction activities occurring outside of standard hours and indicate a range of potential noise levels across each NCA. As presented in **Table A1.3**, a number of sensitive receivers are predicted to experience noise levels above the applicable noise management levels in each period. The change in noise level perception categories from the EIS to the amended Project for each construction period is summarised in **Table 4**.

Table 4 Summary of receivers within noise level perception category for Scenario 2

Period	Perception Category	Previous No. Receivers	Updated No. Receivers	Change
Day	Highly Intrusive	0	0	0
	Moderately Intrusive	1	2	+1
	Clearly Audible	62	44	-18
	Noticeable	658	514	-144
	Total	721	560	-161
Evening	Highly Intrusive	0	1	+1
	Moderately Intrusive	12	4	-8
	Clearly Audible	620	508	-112
	Noticeable	960	1,027	+67
	Total	1,592	1,540	-52
Night	Highly Intrusive	0	1	+1
	Moderately Intrusive	29	12	-17
	Clearly Audible	1,150	991	-159
	Noticeable	1,582	1,591	+9
	Total	2,761	2,595	-166

These results represent a net decrease in the overall number of receivers that may be affected by the Project. While there is an increase in the number of receivers in the highly intrusive category, there is a decrease in the number within the moderately intrusive and clearly audible categories.

The predicted sleep disturbance noise levels (LAmax) are summarised in **Table A1.4**. The modelling results indicate that 96 receivers (an increase from 64) across NCAs 4a, 6a, 6c and 8a are predicted to receive noise levels above the sleep disturbance noise management level of 52 dB(A) LAmax.

The noise modelling results and analysis for both the average noise levels and the sleep disturbance noise levels indicate that reasonable and feasible noise mitigation measures are required to minimise the potential impacts on the communities surrounding the Project.

The predicted noise levels at the Industrial and Infrastructure land-use type receivers are summarised in **Table A1.5** for the various construction activities and indicate a range of potential noise levels across each NCA. As presented in **Table A1.5**, the noise levels are predicted to comply with the noise management level of 75dB(A) LAeq(15min) for these receivers.

The predicted noise levels at the Kurri Kurri Tafe are 40 dB(A) LAeq(15min) which comply with the applicable noise management level of 55 dB(A) LAeq(15min). Similarly, the predicted noise levels at the Kurri Kurri High School are 35 dB(A) LAeq(15min) which comply with the applicable noise management level of 55 dB(A) LAeq(15min).

The noise level impact maps, highlighting the noise perception categories for construction activities outside standard hours are presented in **Figures A1.4** to **A1.15**.

3.3 Scenario 3 – Outside Standard Hours Storage Pipeline Activities

The predicted noise levels for construction Scenario 3 are summarised in **Table A1.6** for construction activities outside of standard hours and indicate a range of potential noise levels across each NCA. As presented in **Table A1.6**, a number of sensitive receivers are predicted to experience noise levels above the applicable noise management levels in each period. The change in noise level perception categories from the EIS to the amended Project for each construction period is summarised in **Table 5**.

Table 5 Summary of receivers within noise level perception category for Scenario 3

Period	Perception Category	Previous No. Receivers	Updated No. Receivers	Change
Day	Noticeable	4	1	-3
Evening	Noticeable	31	4	-27
Night	Clearly Audible	5	2	-3
	Noticeable	261	134	-127

These results represent a net reduction in the overall number of receivers that may be affected by this activity. Consistent with the NIA presented in the EIS, no receivers are expected to experience moderately intrusive or greater during any time period for construction work outside of standard hours.

The predicted sleep disturbance noise levels (LAmax) are summarised in **Table A1.7**. The modelling results indicate that the noise levels are predicted to comply with the applicable sleep disturbance noise management levels of 52 dB(A) LAmax (or 53 dB(A) LAmax for NCA 2a).

The noise modelling results and analysis for both the average noise levels and the sleep disturbance noise levels indicate that reasonable and feasible noise mitigation measures are required to minimise the potential impacts on the communities surrounding the Project.

The predicted noise levels at the Industrial and Infrastructure land-use type receivers are summarised in **Table A1.8** for the various construction activities and indicate a range of potential noise levels across each NCA. As presented in **Table A1.8**, the noise levels are predicted to comply with the noise management level of 75dB(A) LAeq(15min) for these receivers.

The predicted noise levels at the Kurri Kurri Tafe are 39 dB(A) LAeq(15min) which comply with the applicable noise management level of 55 dB(A) LAeq(15min). Similarly, the predicted noise levels at the Kurri Kurri High School are less than 35 dB(A) LAeq(15min) which comply with the applicable noise management level of 55 dB(A) LAeq(15min).

The noise level impact maps, highlighting the noise perception categories for construction activities during standard hours are presented in **Figures A1.16** to **A1.18**.

4.0 Conclusion

The potential impacts related to the proposed Project amendments are summarised as follows:

- The changes to the JGN offtake facility have reduced the potential noise emissions from the facility and are predicted to comply with the night-time noise criteria. During the detailed design phase for the project, it is recommended that the final equipment selections are confirmed and the potential noise emissions from the facility are updated, if different from the noise data presented in **Table 1**.
- The changes to the compressor and delivery station are predicted to comply with the night-time noise criteria and remain unchanged from the EIS.
- The changes to the transmission pipeline alignment and HDD locations have potentially increased the construction-related noise levels at some sensitive receivers and decreased the construction-related noise levels at other sensitive receivers. The construction noise management and mitigation measures previously nominated through the NIA are suitable to manage the potential impacts at those additional sensitive receivers.
- The changes to the storage pipeline construction footprint have reduced the potential construction-related noise emissions and potentially reduced the number of sensitive receivers affected by works undertaken outside of standard hours.

We trust this information meets with your current requirements. Please do not hesitate to contact the undersigned on 1300 793 267 should you require clarification or further information.

Yours sincerely

Stephen Lyons
Principal Acoustics Engineer

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Table A1.1 Summary of predicted noise levels (dB(A)) for Residential receivers from Scenario 1

Noise Catchment Area	No. Receivers within Noise Catchment Area	Range of Predicted Noise Levels	Number of receivers within each Perception Category – Standard Hours [1]			
			HI	MI	CA	Total
NCA1a	1,503	< 35 - 52	-	-	-	-
NCA1b	6	35 - 41	-	-	-	-
NCA1c	240	35 - 42	-	-	-	-
NCA1d	7	< 35 - 37	-	-	-	-
NCA2a	20	48 - 54	-	-	8	8
NCA3a	1	52	-	-	1	1
NCA3b	4	49 - 52	-	-	4	4
NCA4a	484	39 - 63	-	3	243	246
NCA4b	1,509	< 35 - 48	-	-	-	-
NCA4c	57	< 35 - 39	-	-	-	-
NCA5a	3,263	< 35 - 43	-	-	-	-
NCA5b	311	< 35 - 47	-	-	-	-
NCA6a	727	47 - 70	1	7	649	657
NCA6b	841	38 - 47	-	-	-	-
NCA6c	25	37 - 64	-	4	7	11
NCA7a	204	45 - 75	2	7	108	117
NCA7b	277	39 - 44	-	-	-	-
NCA7c	2,832	< 35 - 45	-	-	-	-
NCA7d	1	35	-	-	-	-
NCA8a	1,248	< 35 - 67	-	2	45	47
NCA8b	66	< 35 - 55	-	-	-	-
Total	**13,626**	-	**3**	**23**	**1,065**	**1,091**

Notes: [1] HI is Highly Intrusive; MI is Moderately Intrusive; CA is Clearly Audible; N is Noticeable; Total is the number of receivers greater than the NML.

Table A1.2 Summary of predicted noise levels (dB(A)) for Industrial and Infrastructure Land-use receivers from Scenario 1

Land-use type	Noise Catchment Area	No. Receivers within Noise Catchment Area	Range of Predicted Noise Levels	Comply with NML
Heavy Industrial	NCA1a	15	42 - 45	Yes
Heavy Industrial	NCA5a	16	40 - 44	Yes
Infrastructure	NCA4a	1	62	Yes
Infrastructure	NCA5a	8	< 35 - 38	Yes
Infrastructure	NCA8a	8	35 - 40	Yes
Light Industrial	NCA1a	1	43	Yes
Light Industrial	NCA5a	134	40 - 43	Yes
Light Industrial	NCA7c	1	35	Yes
Light Industrial	NCA8a	461	< 35 - 55	Yes
Total	-	**645**	-	-

Table A1.3 Summary of predicted noise levels (dB(A)) for Residential receivers from Scenario 2 - HDD and Horizontal Boring

NCA	No. Receivers in NCA	Range of Predicted Noise Levels	No. receivers within each Perception Category – Outside Standard Hours – Day [1]					No. receivers within each Perception Category – Outside Standard Hours – Evening					No. receivers within each Perception Category – Outside Standard Hours – Night				
			HI	MI	CA	N	Total	HI	MI	CA	N	Total	HI	MI	CA	N	Total
NCA1a	1,503	< 35 - 45	-	-	-	-	-	-	-	-	-	-	-	-	-	8	8
NCA1b	6	< 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA1c	240	< 35 - 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA1d	7	< 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA2a	20	40 - 45	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3
NCA3a	1	44	-	-	-	1	1	-	-	-	1	1	-	-	-	1	1
NCA3b	4	41 - 46	-	-	-	1	1	-	-	-	1	1	-	-	-	2	2
NCA4a	484	35 - 55	-	-	6	18	24	-	-	7	222	229	-	1	73	380	454
NCA4b	1,509	< 35 - 41	-	-	-	-	-	-	-	-	-	-	-	-	-	373	373
NCA4c	57	< 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA5a	3,263	< 35 - 36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA5b	311	< 35 - 40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA6a	727	40 - 63	-	1	31	443	475	1	-	474	252	727	1	5	713	8	727
NCA6b	841	< 35 - 42	-	-	-	-	-	-	-	-	384	384	-	-	70	584	654
NCA6c	25	< 35 - 59	-	1	5	5	11	-	4	7	7	18	-	4	10	7	21
NCA7a	204	34 - 46	-	-	-	30	30	-	-	14	134	148	-	-	70	133	203
NCA7b	277	< 35 - 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA7c	2,832	< 35 - 39	-	-	-	-	-	-	-	-	2	2	-	-	-	24	24
NCA7d	1	< 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA8a	1,248	< 35 - 58	-	-	2	16	18	-	-	6	24	30	-	2	54	67	123
NCA8b	66	< 35 - 47	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2
Total	**13,626**	-	**0**	**2**	**44**	**514**	**560**	**1**	**4**	**508**	**1,027**	**1,540**	**1**	**12**	**991**	**1,591**	**2,595**

Notes: [1] HI is Highly Intrusive; MI is Moderately Intrusive; CA is Clearly Audible; N is Noticeable; Total is the number of receivers greater than the NML.

Table A1.4 Summary of predicted noise levels (dB(A)) for Residential receivers from Scenario 2 – Sleep Disturbance Assessment

Noise Catchment Area	No. Receivers within Noise Catchment Area	Range of Predicted Noise Levels, dB(A)	No. receivers above Sleep Disturbance Noise Management Level
NCA1a	1,503	< 40 - 48	-
NCA1b	6	< 40	-
NCA1c	240	< 40 - 40	-
NCA1d	7	< 40	-
NCA2a	20	43 - 48	-
NCA3a	1	51	-
NCA3b	4	46 - 50	-
NCA4a	484	39 - 62	7
NCA4b	1,509	< 40 - 47	-
NCA4c	57	< 40	-
NCA5a	3,263	< 40 - 40	-
NCA5b	311	< 40 - 43	-
NCA6a	727	45 - 70	36
NCA6b	841	< 40 - 46	-
NCA6c	25	< 40 - 62	5
NCA7a	204	41 - 52	-
NCA7b	277	< 40 - 42	-
NCA7c	2,832	< 40 - 42	-
NCA7d	1	< 40	-
NCA8a	1,248	< 40 - 62	48
NCA8b	66	< 40 - 51	-
Total	**13,626**	-	**96**

Table A1.5 Summary of predicted noise levels (dB(A)) for Industrial and Infrastructure Land-use receivers from Scenario 2

Land-use type	Noise Catchment Area	No. Receivers within Noise Catchment Area	Range of Predicted Noise Levels	Comply with NML
Heavy Industrial	NCA1a	15	35 - 38	Yes
Heavy Industrial	NCA5a	16	< 35 - 36	Yes
Infrastructure	NCA4a	1	54	Yes
Infrastructure	NCA5a	8	< 35	Yes
Infrastructure	NCA8a	8	< 35 - 35	Yes
Light Industrial	NCA1a	1	35	Yes
Light Industrial	NCA5a	134	< 35 - 35	Yes
Light Industrial	NCA7c	1	< 35	Yes
Light Industrial	NCA8a	461	< 35 - 43	Yes
Total	-	**645**	-	-

Table A1.6 **Summary of predicted noise levels (dB(A)) for Residential receivers from Scenario 3 – Storage Pipeline Construction**

NCA	No. Receivers in NCA	Range of Predicted Noise Levels	No. receivers within each Perception Category – Outside Standard Hours – Day [1]					No. receivers within each Perception Category – Outside Standard Hours – Evening					No. receivers within each Perception Category – Outside Standard Hours – Night				
			HI	MI	CA	N	Total	HI	MI	CA	N	Total	HI	MI	CA	N	Total
NCA1a	1,503	< 35 - 41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA1b	6	< 35 - 37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA1c	240	< 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA1d	7	< 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA2a	20	37 - 42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA3a	1	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA3b	4	39 - 41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA4a	484	< 35 - 44	-	-	-	1	1	-	-	-	1	1	-	-	1	1	2
NCA4b	1,509	< 35 - 43	-	-	-	-	-	-	-	-	3	3	-	-	1	27	28
NCA4c	57	< 35 - 37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA5a	3,263	< 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA5b	311	< 35 - 37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA6a	727	< 35 - 37	-	-	-	-	-	-	-	-	-	-	-	-	-	106	106
NCA6b	841	< 35 - 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA6c	25	< 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA7a	204	< 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA7b	277	< 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA7c	2,832	< 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA7d	1	< 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA8a	1,248	< 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA8b	66	< 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**13,626**	-	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**4**	**4**	**0**	**0**	**2**	**135**	**137**

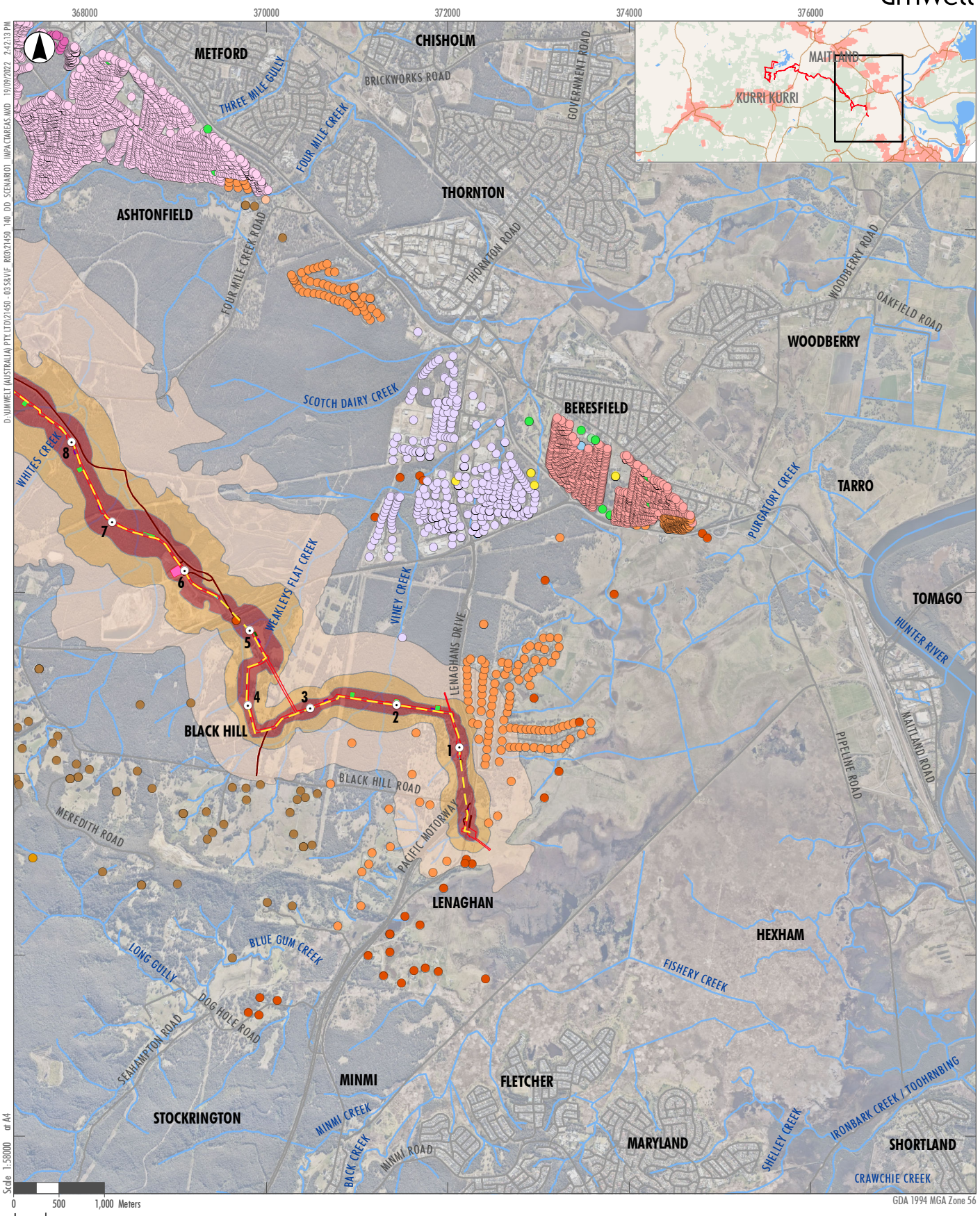
Notes: [1] HI is Highly Intrusive; MI is Moderately Intrusive; CA is Clearly Audible; N is Noticeable; Total is the number of receivers greater than the NML.

Table A1.7 Summary of predicted noise levels (dB(A)) for Residential receivers from Scenario 3 – Sleep Disturbance Assessment

Noise Catchment Area	No. Receivers within Noise Catchment Area	Range of Predicted Noise Levels	No. receivers above Sleep Disturbance Noise Management Level
NCA1a	1,503	< 40 - 43	-
NCA1b	6	< 40	-
NCA1c	240	< 40	-
NCA1d	7	< 40	-
NCA2a	20	< 40 - 43	-
NCA3a	1	41	-
NCA3b	4	40 - 42	-
NCA4a	484	< 40 - 45	-
NCA4b	1,509	< 40 - 44	-
NCA4c	57	< 40	-
NCA5a	3,263	< 40	-
NCA5b	311	< 40	-
NCA6a	727	< 40	-
NCA6b	841	< 40	-
NCA6c	25	< 40	-
NCA7a	204	< 40	-
NCA7b	277	< 40	-
NCA7c	2,832	< 40	-
NCA7d	1	< 40	-
NCA8a	1,248	< 40	-
NCA8b	66	< 40	-
Total	**13,626**	-	-

Table A1.8 Summary of predicted noise levels (dB(A)) for Industrial and Infrastructure Land-use receivers from Scenario 3

Land-use type	Noise Catchment Area	No. Receivers within Noise Catchment Area	Range of Predicted Noise Levels	Comply with NML
Heavy Industrial	NCA1a	15	< 35	Yes
Heavy Industrial	NCA5a	16	< 35	Yes
Infrastructure	NCA4a	1	40	Yes
Infrastructure	NCA5a	8	< 35	Yes
Infrastructure	NCA8a	8	< 35	Yes
Light Industrial	NCA1a	1	< 35	Yes
Light Industrial	NCA5a	134	< 35	Yes
Light Industrial	NCA7c	1	< 35	Yes
Light Industrial	NCA8a	461	< 35	Yes
Total	-	**645**	-	-



Legend

- Project Development Footprint
- Kilometre Point
- Transmission Pipeline Alignment
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turnaround
- Vegetation Stockpile
- Roads
- Watercourses

Noise Impact Areas

- Category 2 - Clearly Audible
- Category 3 - Moderately Intrusive
- Category 4 - Highly Intrusive

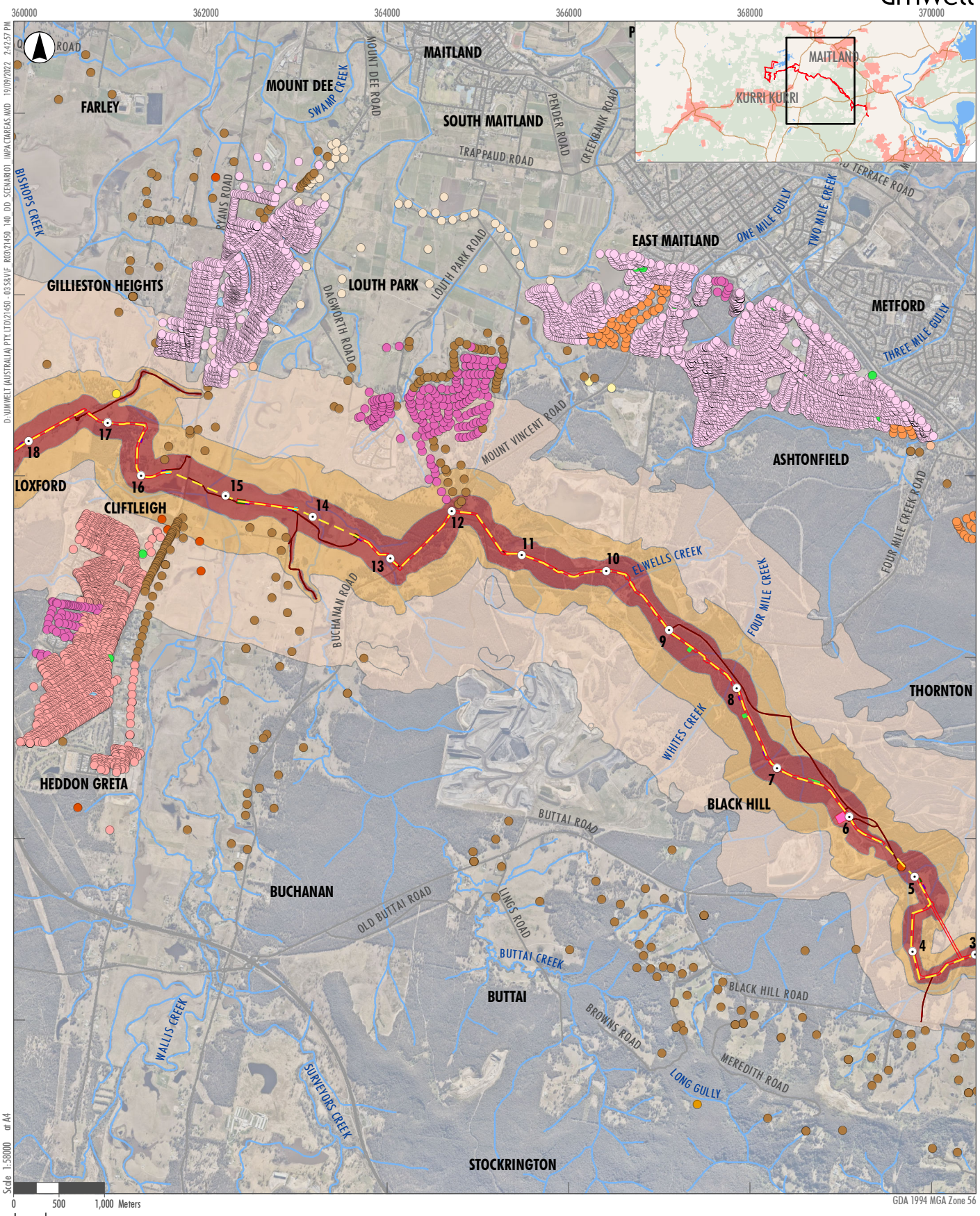
Receivers

- B1 Neighbourhood Centre
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- E4 Environmental Living
- IN2 Light Industrial
- R1 General Residential
- R2 Low Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU2 Rural Landscape
- SP2 Infrastructure

APPENDIX A1. 1

Scenario 1 Standard Hours

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020; 2021)



Legend

- Project Development Footprint
- Kilometre Point
- Transmission Pipeline Alignment
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turnaround
- Vegetation Stockpile
- Roads
- Watercourses

Noise Impact Areas

- Category 2 - Clearly Audible
- Category 3 - Moderately Intrusive
- Category 4 - Highly Intrusive

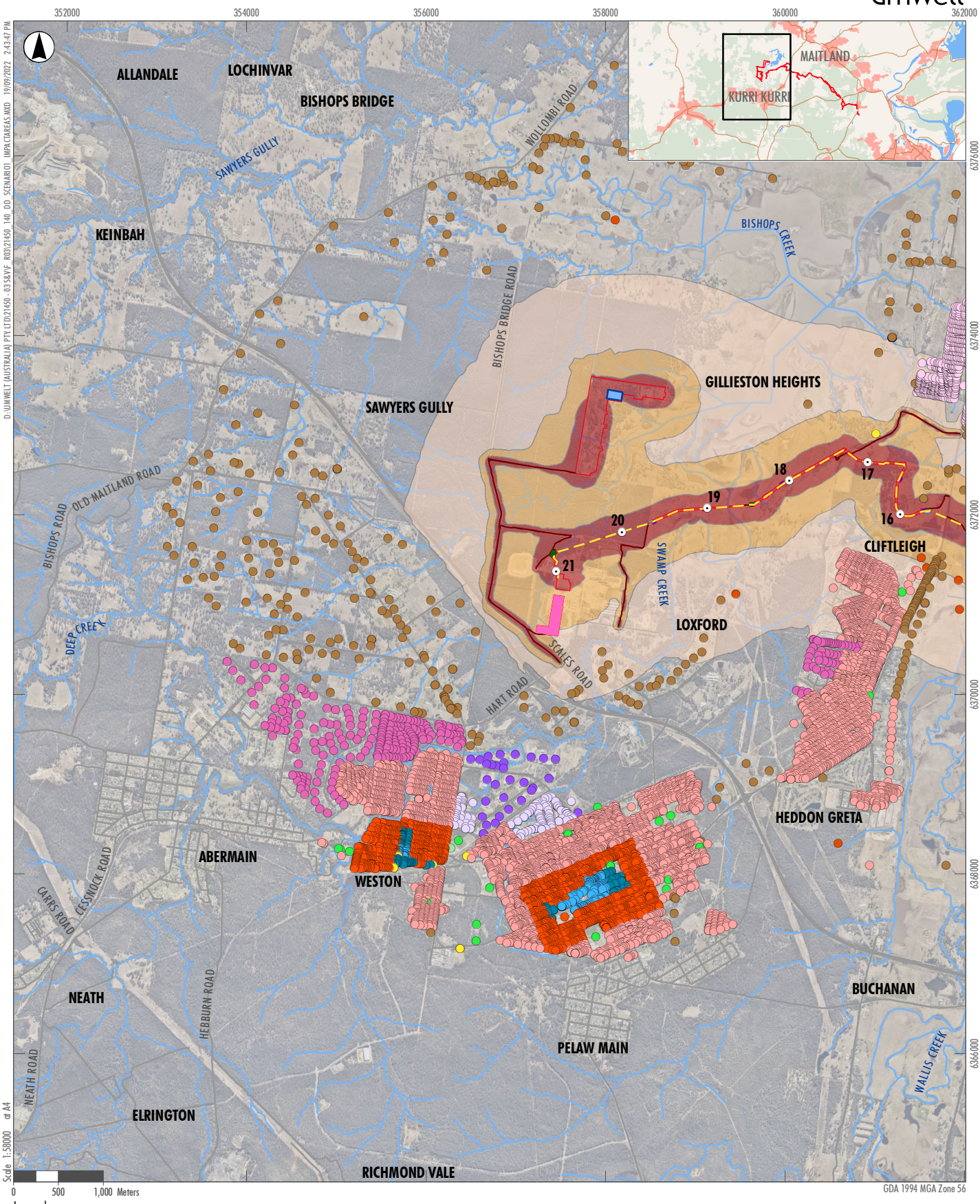
Receivers

- B1 Neighbourhood Centre
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- E4 Environmental Living
- R1 General Residential
- R2 Low Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- Primary Production
- RU2 Rural Landscape
- SP1 Special Activities
- SP2 Infrastructure

APPENDIX A1. 2

Scenario 1 Standard Hours

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020; 2021)



Legend

- Project Development Footprint
- Kilometre Point
- Transmission Pipeline Alignment
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turkeys Nest Dam
- Turnaround
- Roads
- Watercourses

Noise Impact Areas

- Category 2 - Clearly Audible
- Category 3 - Moderately Intrusive
- Category 4 - Highly Intrusive

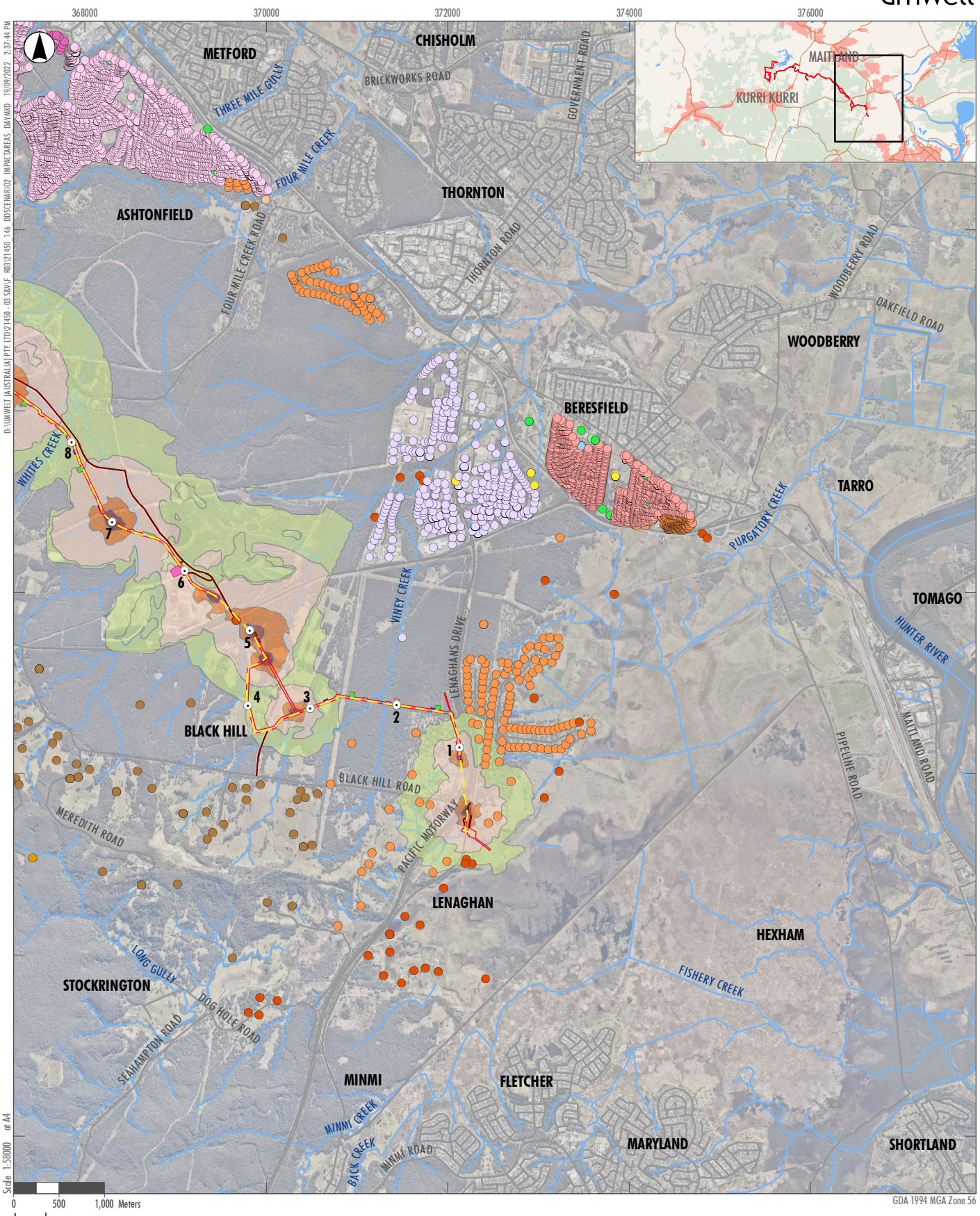
Receivers

- B1 Neighbourhood Centre
- B2 Local Centre
- B4 Mixed Use
- E2 Environmental Conservation
- IN2 Light Industrial
- IN3 Heavy Industrial
- R1 General Residential
- R2 Low Density Residential
- R3 Medium Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU2 Rural Landscape
- SP2 Infrastructure

APPENDIX A1. 3

Scenario 1 Standard Hours

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020; 2021)



Legend

- Project Development Footprint
- Kilometre Point
- Transmission Pipeline Alignment
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turnaround
- Vegetation Stockpile
- Roads
- Watercourses

Noise Impact Areas

- Category 1 - Noticeable
- Category 2 - Clearly Audible
- Category 3 - Moderately Intrusive
- Category 4 - Highly Intrusive

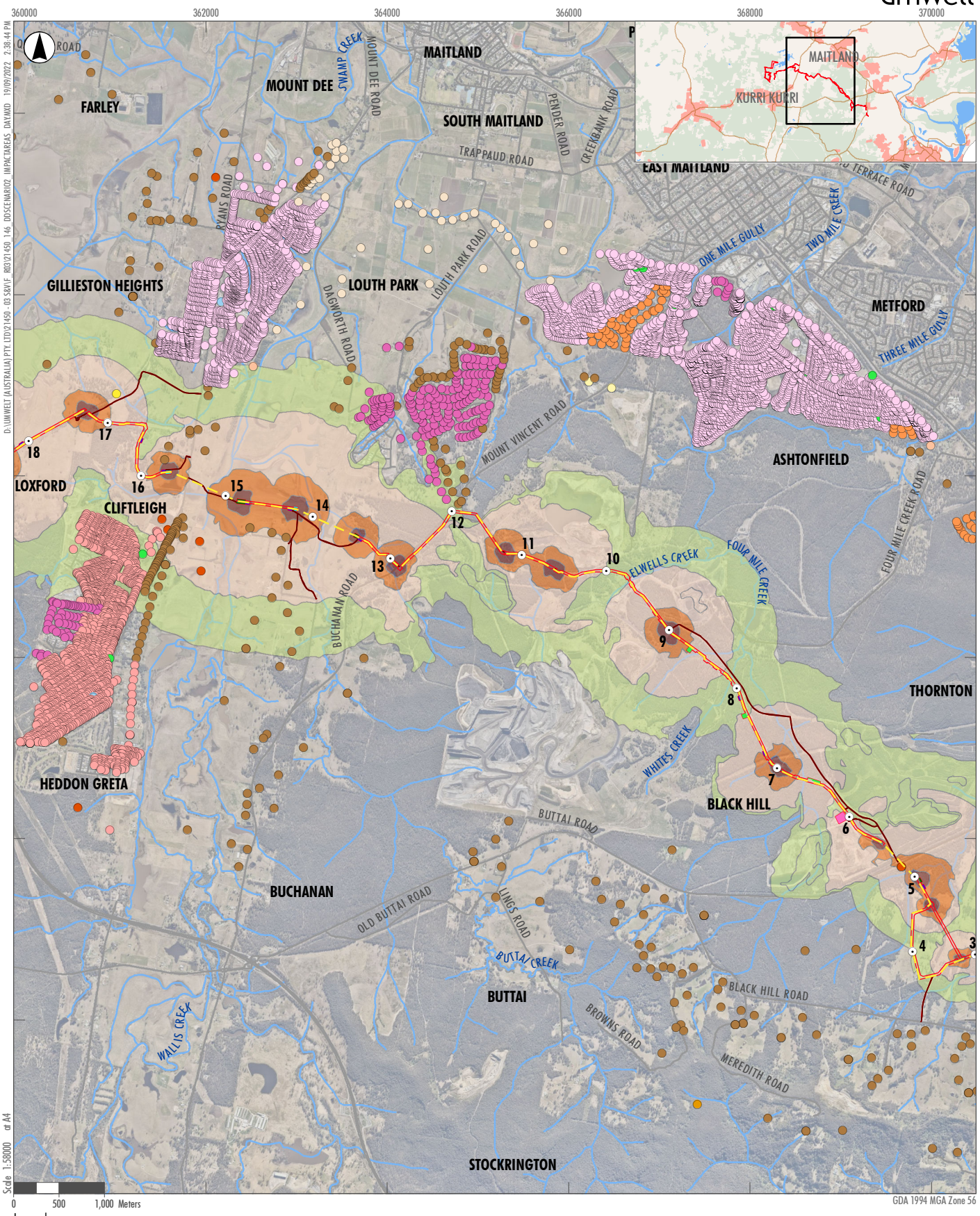
Receivers

- B1 Neighbourhood Centre
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- E4 Environmental Living
- IN2 Light Industrial
- R1 General Residential
- R2 Low Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU2 Rural Landscape
- SP2 Infrastructure

APPENDIX A1. 4

Scenario 2
Day
Drilling/Boring OOWH

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020; 2021)



Legend

- Project Development Footprint
- Kilometre Point
- Transmission Pipeline Alignment
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turnaround
- Vegetation Stockpile
- Roads
- Watercourses

Noise Impact Areas

- Category 1 - Noticeable
- Category 2 - Clearly Audible
- Category 3 - Moderately Intrusive
- Category 4 - Highly Intrusive

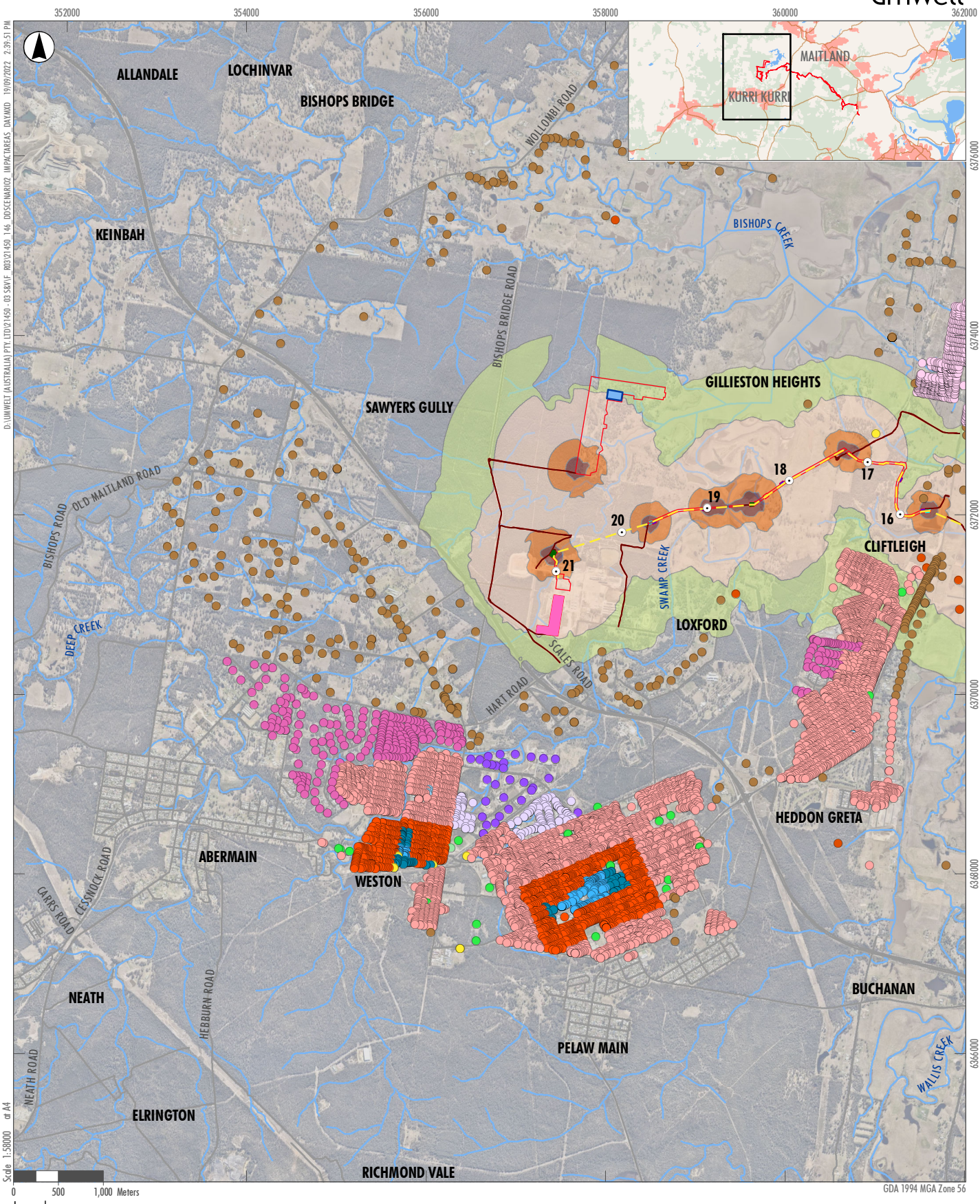
Receivers

- B1 Neighbourhood Centre
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- E4 Environmental Living
- R1 General Residential
- R2 Low Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- Primary Production
- RU2 Rural Landscape
- SP1 Special Activities
- SP2 Infrastructure

APPENDIX A1. 5

Scenario 2
Day
Drilling/Boring OOWH

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020; 2021)



Legend

- Project Development Footprint
- Kilometre Point
- Transmission Pipeline Alignment
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turkeys Nest Dam
- Turnaround
- Roads
- Watercourses

Noise Impact Areas

- Category 1 - Noticeable
- Category 2 - Clearly Audible
- Category 3 - Moderately Intrusive
- Category 4 - Highly Intrusive

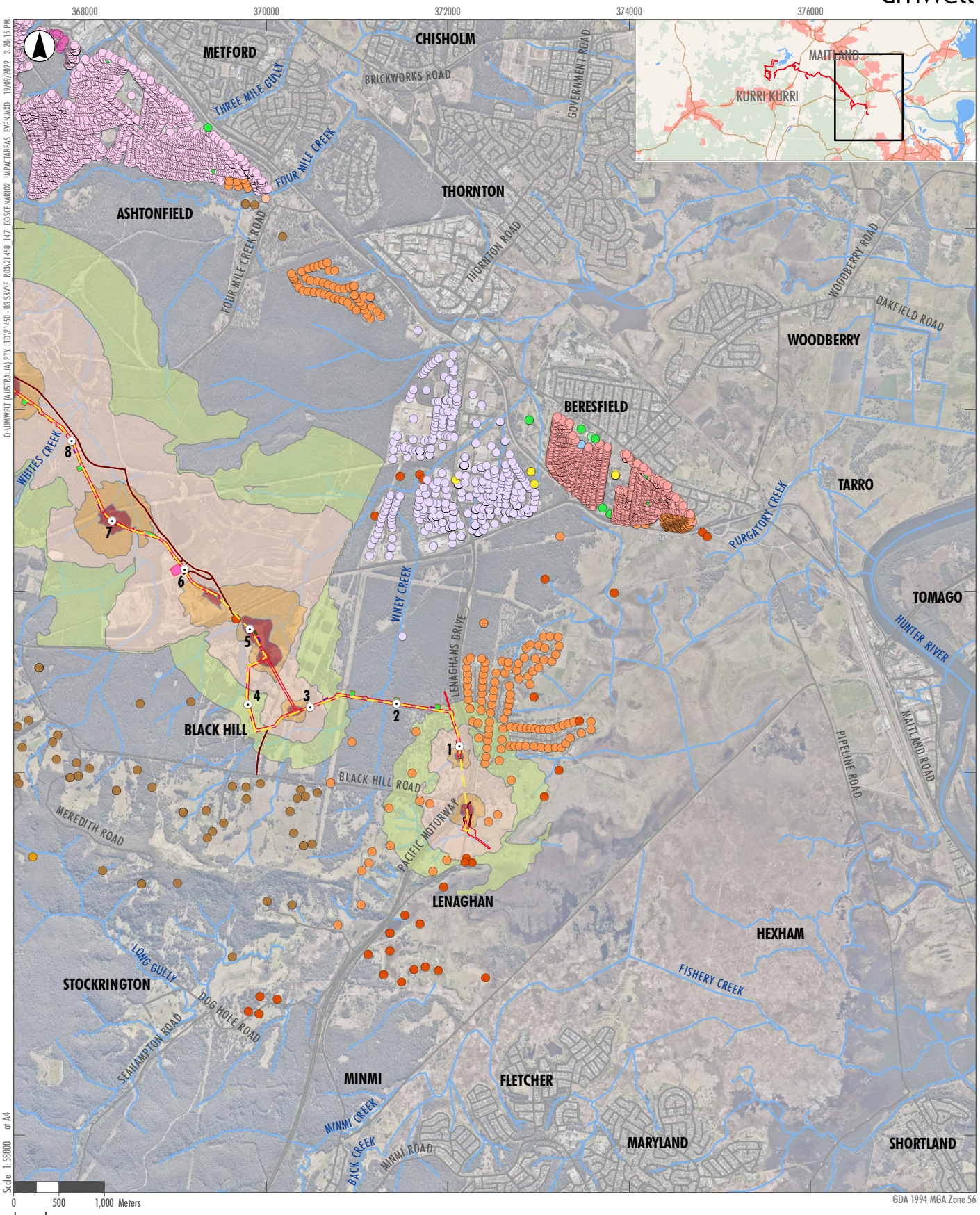
Receivers

- B1 Neighbourhood Centre
- B2 Local Centre
- B4 Mixed Use
- E2 Environmental Conservation
- IN2 Light Industrial
- IN3 Heavy Industrial
- R1 General Residential
- R2 Low Density Residential
- R3 Medium Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU2 Rural Landscape
- SP2 Infrastructure

APPENDIX A1. 6

Scenario 2
Day
Drilling/Boring OOWH

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020; 2021)



Legend

- Project Development Footprint
- Kilometre Point
- Transmission Pipeline Alignment
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turnaround
- Vegetation Stockpile
- Roads
- Watercourses

Noise Impact Areas

- Category 1 - Noticeable
- Category 2 - Clearly Audible
- Category 3 - Moderately Intrusive
- Category 4 - Highly Intrusive

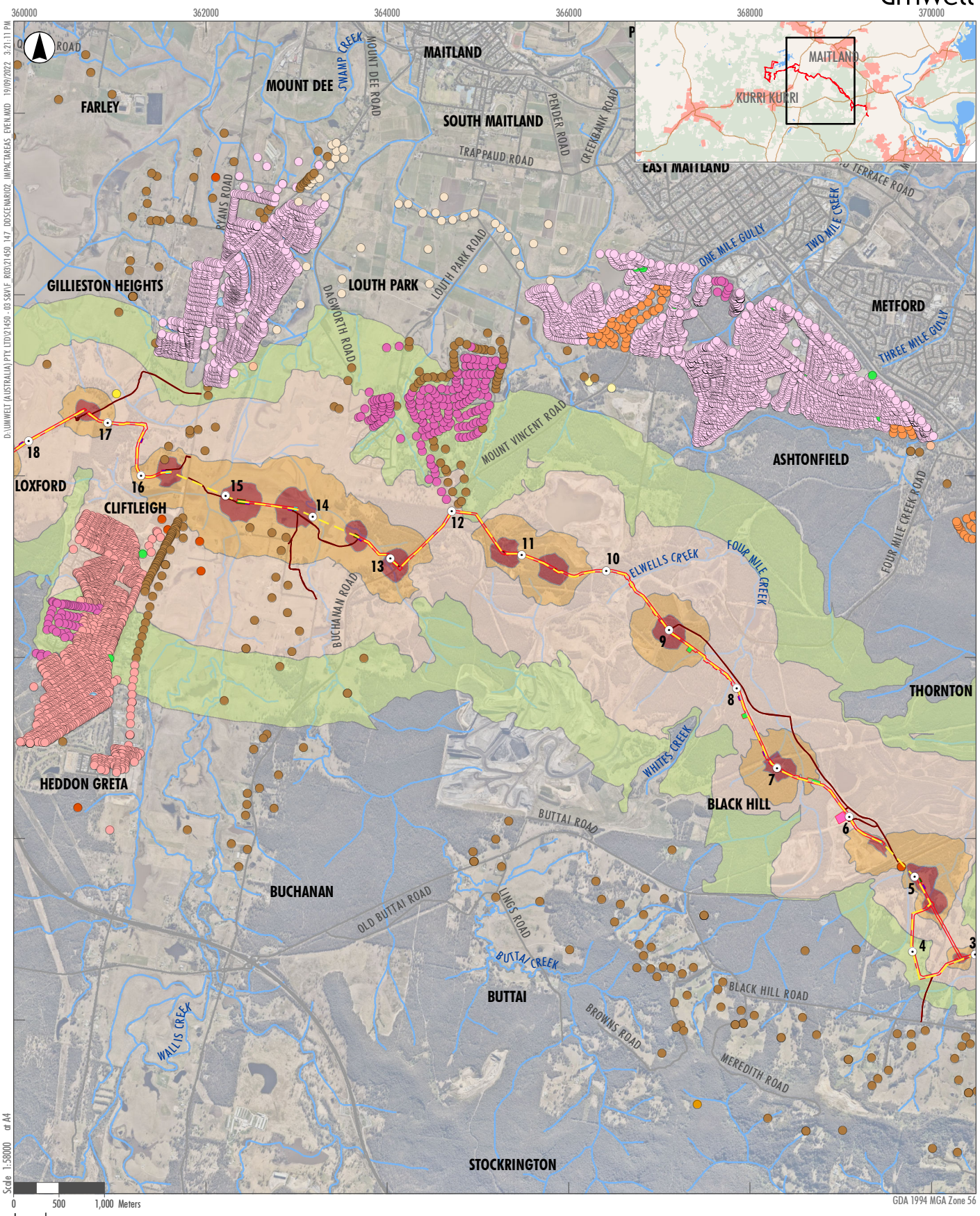
Receivers

- B1 Neighbourhood Centre
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- E4 Environmental Living
- IN2 Light Industrial
- R1 General Residential
- R2 Low Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU2 Rural Landscape
- SP2 Infrastructure

APPENDIX A1. 7

Scenario 2 Evening Drilling/Boring OOWH

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020; 2021)



Legend

- Project Development Footprint
- Kilometre Point
- Transmission Pipeline Alignment
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turnaround
- Vegetation Stockpile
- Roads
- Watercourses

Noise Impact Areas

- Category 1 - Noticeable
- Category 2 - Clearly Audible
- Category 3 - Moderately Intrusive
- Category 4 - Highly Intrusive

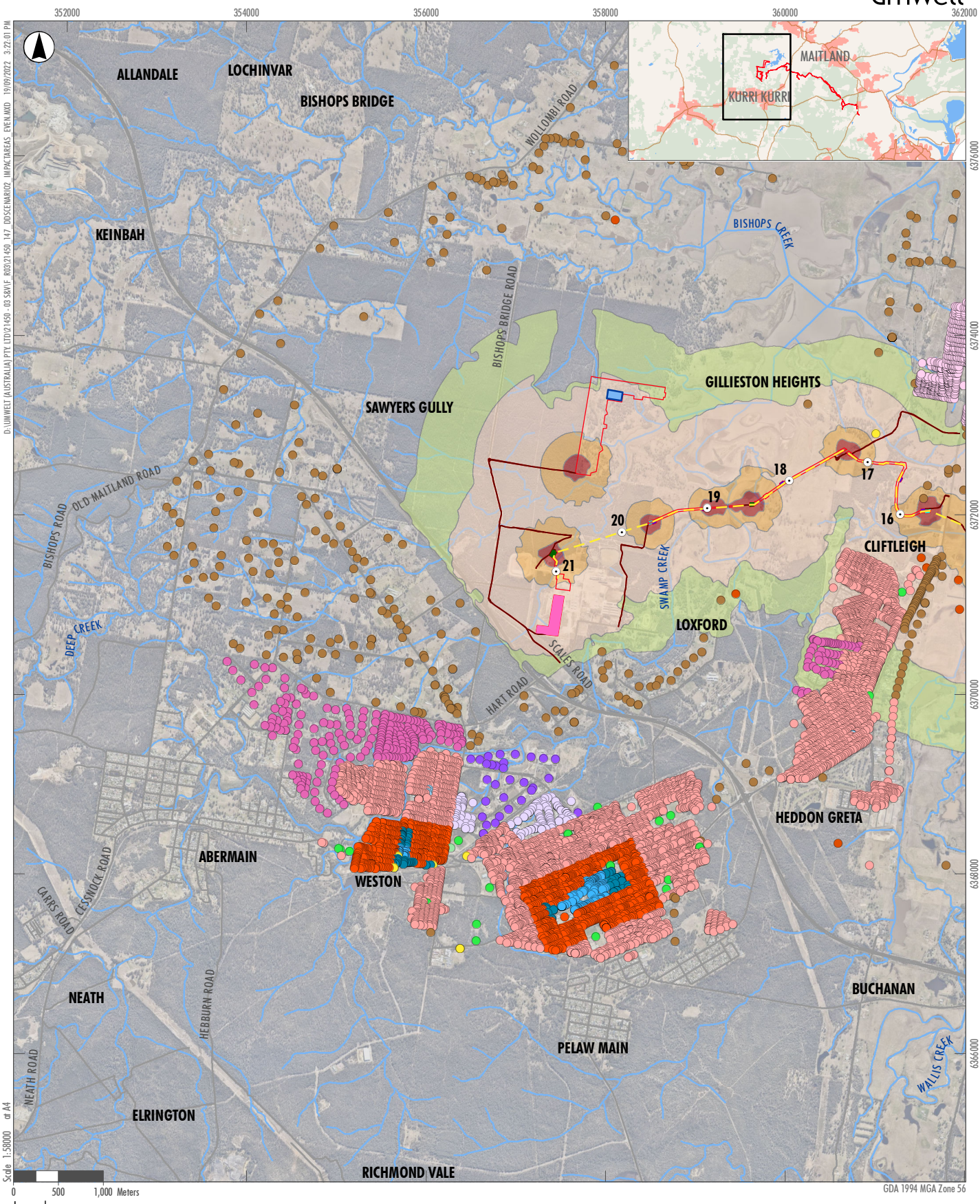
Receivers

- B1 Neighbourhood Centre
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- E4 Environmental Living
- R1 General Residential
- R2 Low Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- Primary Production
- RU2 Rural Landscape
- SP1 Special Activities
- SP2 Infrastructure

APPENDIX A1. 8

Scenario 2 Evening Drilling/Boring OOWH

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020; 2021)



Legend

- Project Development Footprint
- Kilometre Point
- Transmission Pipeline Alignment
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turkeys Nest Dam
- Turnaround
- Roads
- Watercourses

Noise Impact Areas

- Category 1 - Noticeable
- Category 2 - Clearly Audible
- Category 3 - Moderately Intrusive
- Category 4 - Highly Intrusive

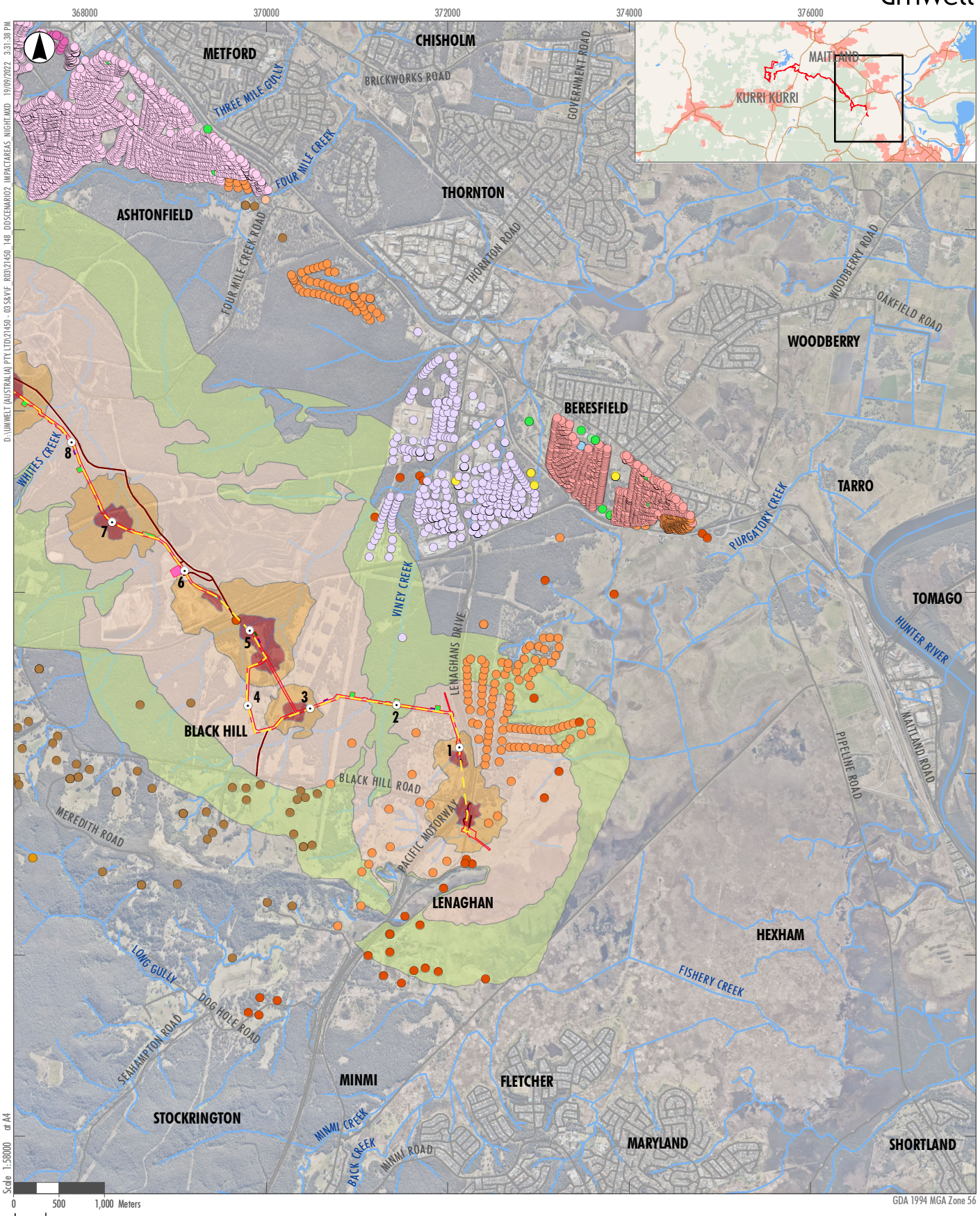
Receivers

- B1 Neighbourhood Centre
- B2 Local Centre
- B4 Mixed Use
- E2 Environmental Conservation
- IN2 Light Industrial
- IN3 Heavy Industrial
- R1 General Residential
- R2 Low Density Residential
- R3 Medium Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU2 Rural Landscape
- SP2 Infrastructure

APPENDIX A1. 9

Scenario 2
Evening
Drilling/Boring OOWH

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020; 2021)



Legend

- Project Development Footprint
- Kilometre Point
- Transmission Pipeline Alignment
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turnaround
- Vegetation Stockpile
- Roads
- Watercourses

Noise Impact Areas

- Category 1 - Noticeable
- Category 2 - Clearly Audible
- Category 3 - Moderately Intrusive
- Category 4 - Highly Intrusive

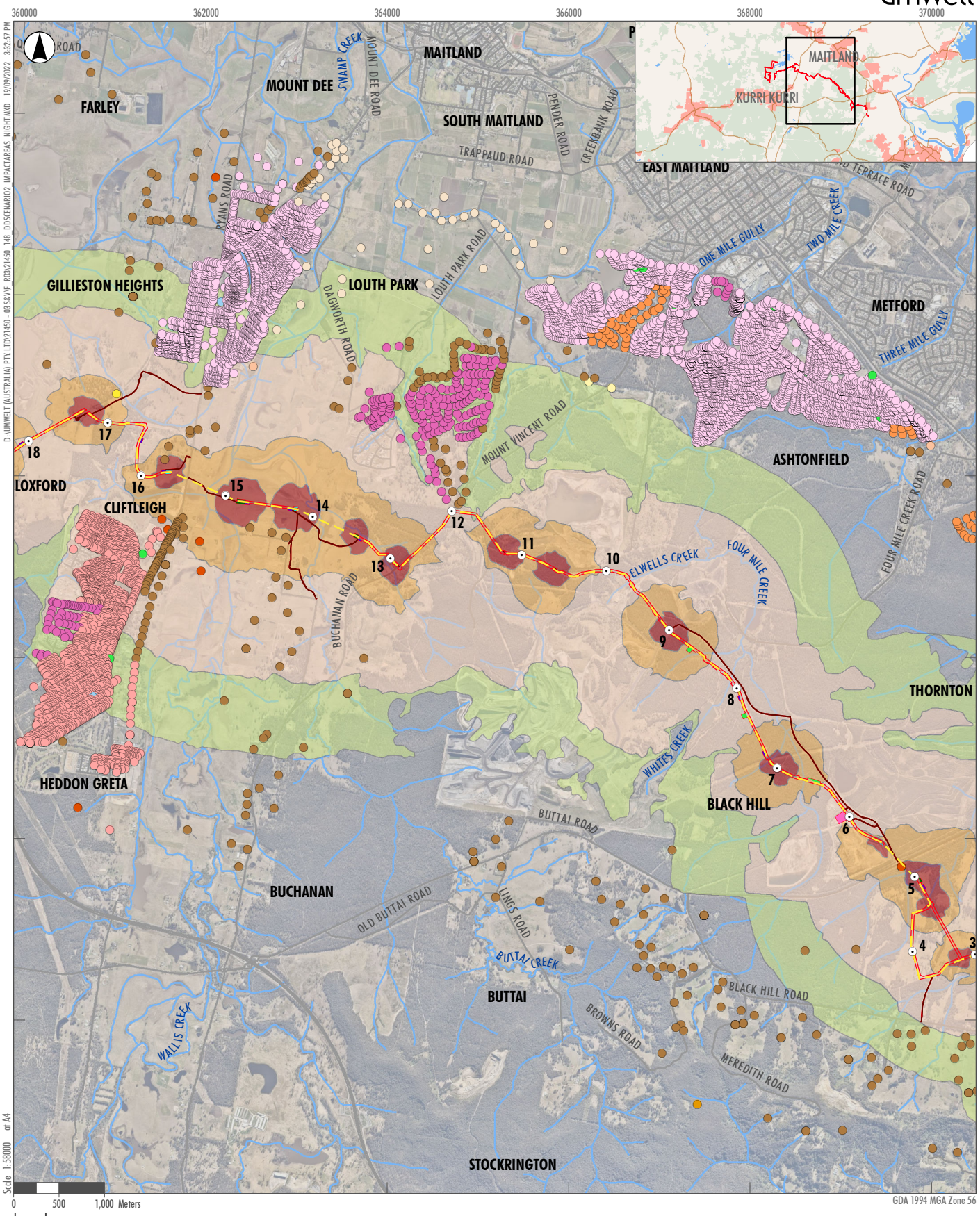
Receivers

- B1 Neighbourhood Centre
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- E4 Environmental Living
- IN2 Light Industrial
- R1 General Residential
- R2 Low Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU2 Rural Landscape
- SP2 Infrastructure

APPENDIX A1. 10

Scenario 2
Night
Drilling/Boring OOWH

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020; 2021)



Legend

- Project Development Footprint
- Kilometre Point
- Transmission Pipeline Alignment
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turnaround
- Vegetation Stockpile
- Roads
- Watercourses

Noise Impact Areas

- Category 1 - Noticeable
- Category 2 - Clearly Audible
- Category 3 - Moderately Intrusive
- Category 4 - Highly Intrusive

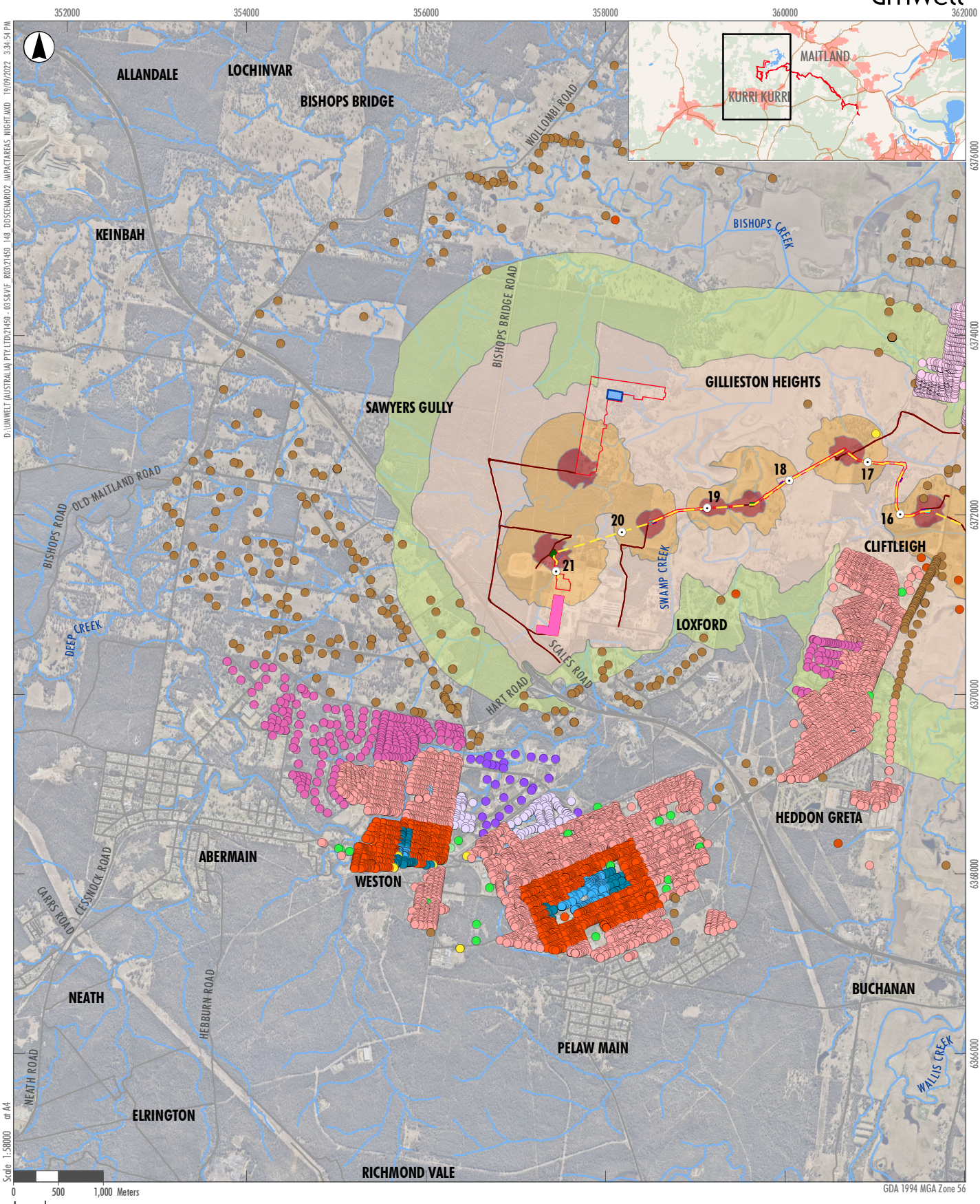
Receivers

- B1 Neighbourhood Centre
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- E4 Environmental Living
- R1 General Residential
- R2 Low Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- Primary Production
- RU2 Rural Landscape
- SP1 Special Activities
- SP2 Infrastructure

APPENDIX A1. 11

Scenario 2
Night
Drilling/Boring OOWH

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020; 2021)



Legend

- Project Development Footprint
- Kilometre Point
- Transmission Pipeline Alignment
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turkeys Nest Dam
- Turnaround
- Roads
- Watercourses

Noise Impact Areas

- Category 1 - Noticeable
- Category 2 - Clearly Audible
- Category 3 - Moderately Intrusive
- Category 4 - Highly Intrusive

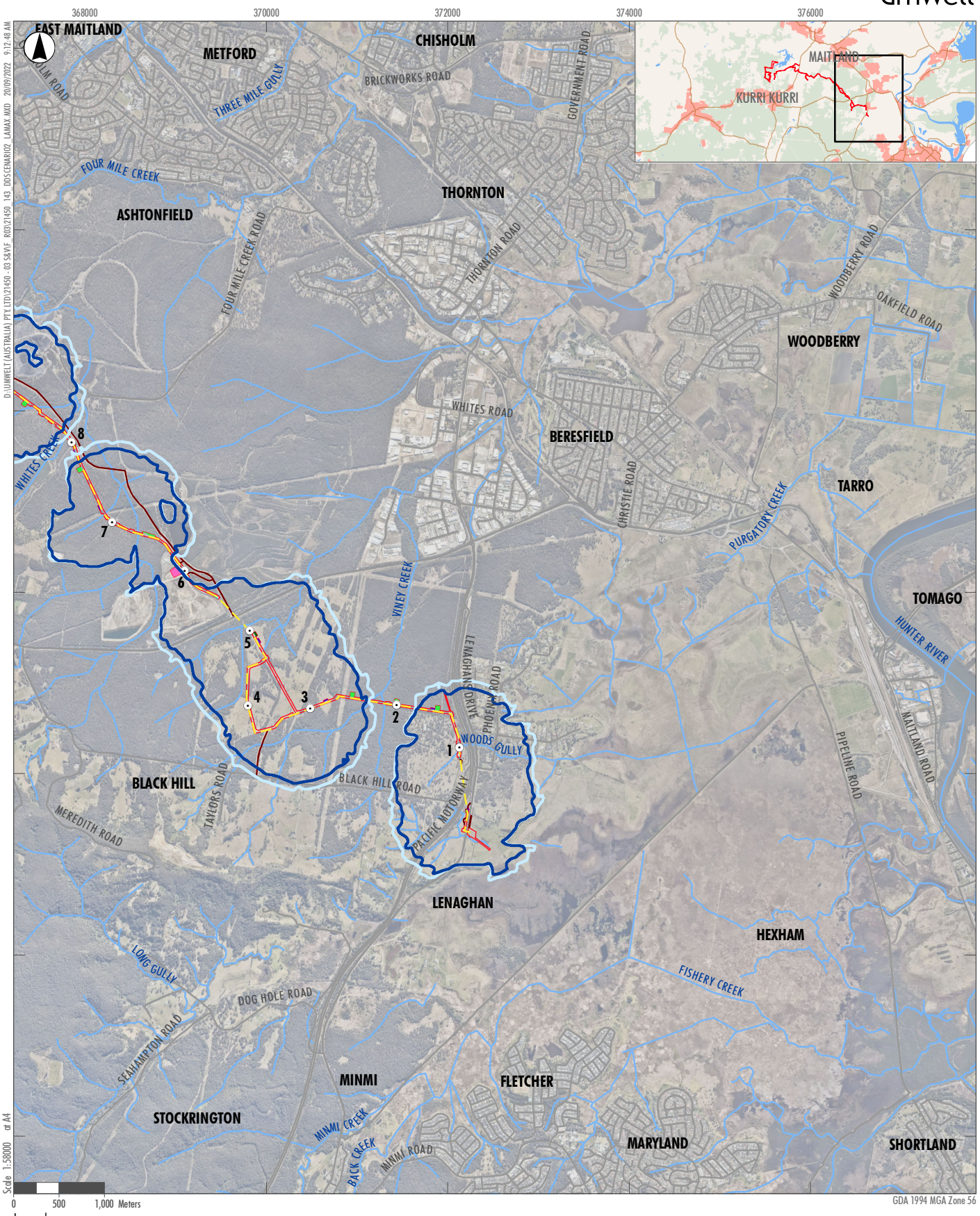
Receivers

- B1 Neighbourhood Centre
- B2 Local Centre
- B4 Mixed Use
- E2 Environmental Conservation
- IN2 Light Industrial
- IN3 Heavy Industrial
- R1 General Residential
- R2 Low Density Residential
- R3 Medium Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU2 Rural Landscape
- SP2 Infrastructure

APPENDIX A1. 12

Scenario 2
Night
Drilling/Boring OOWH

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020; 2021)



Legend

- Project Development Footprint
- Kilometre Point
- Transmission Pipeline Alignment
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turnaround
- Vegetation Stockpile
- Roads
- Watercourses

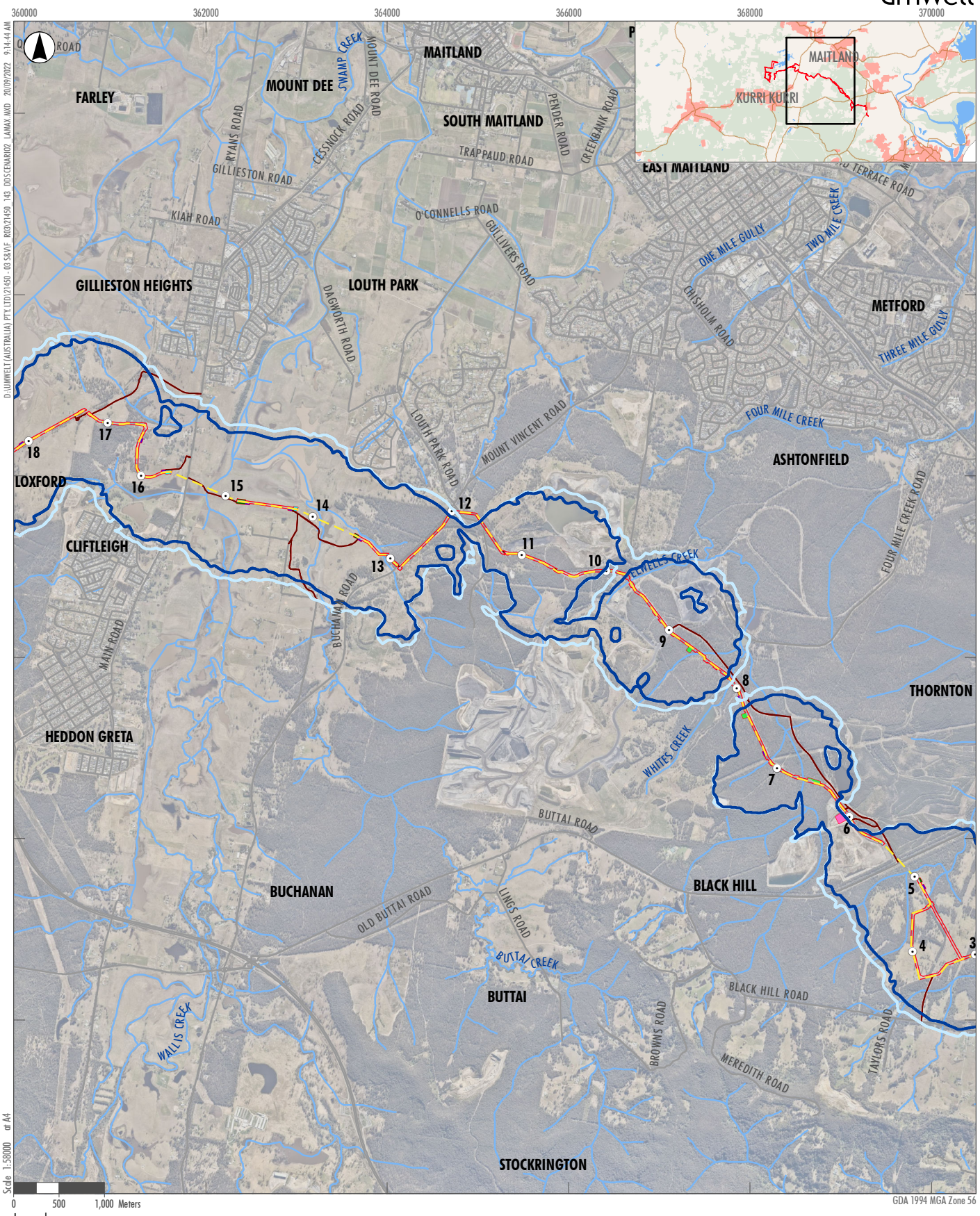
Predicted Noise Levels

- 52 dB(A)
- 53 dB(A)

APPENDIX A1. 13

Scenario 2
Drilling/Boring

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020; 2021)



Legend

- Project Development Footprint
- Kilometre Point
- Transmission Pipeline Alignment
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turnaround
- Vegetation Stockpile
- Roads
- Watercourses

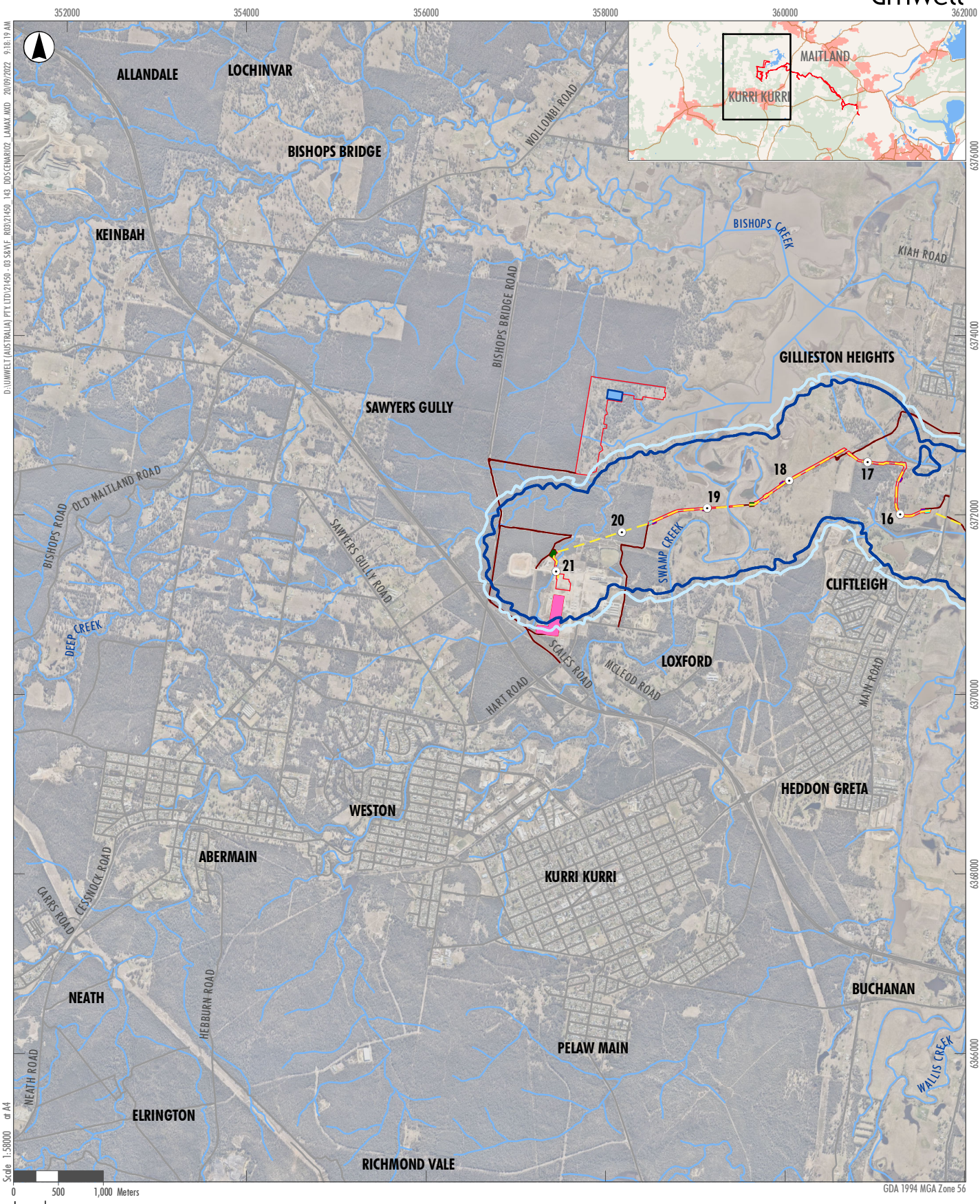
Predicted Noise Levels

- 52 dB(A)
- 53 dB(A)

APPENDIX A1. 14

Scenario 2
Drilling/Boring

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020; 2021)



Legend

- Project Development Footprint
- Kilometre Point
- Transmission Pipeline Alignment
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turkeys Nest Dam
- Turnaround
- Roads
- Watercourses

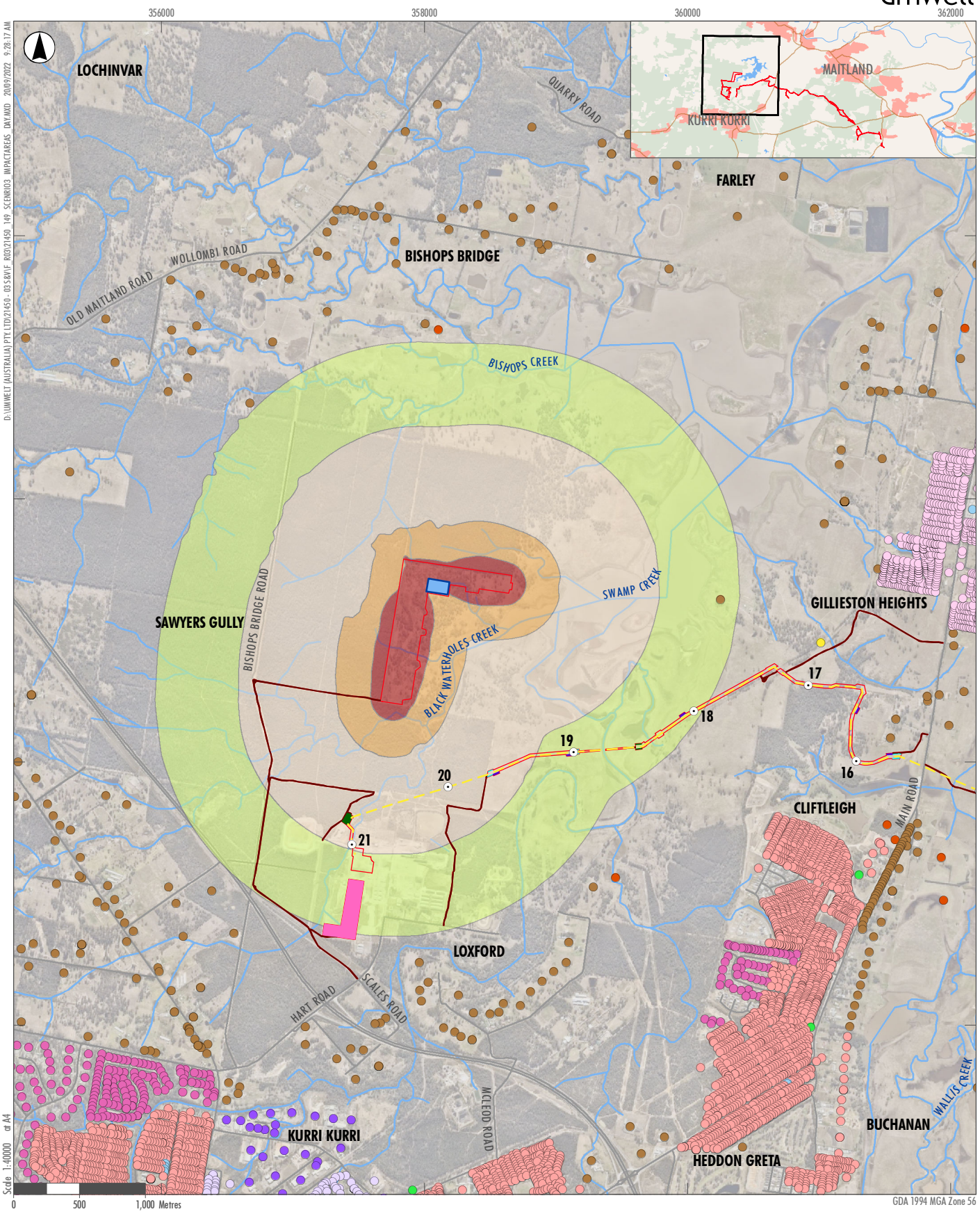
Predicted Noise Levels

- 52 dB(A)
- 53 dB(A)

APPENDIX A1. 15

Scenario 2
Drilling/Boring

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020; 2021)



Legend

- Project Development Footprint
- Transmission Pipeline Alignment
- Kilometre Point
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turkeys Nest Dam
- Turnaround
- Roads
- Watercourses

Noise Impact Areas

- Category 1 - Noticeable
- Category 2 - Clearly Audible
- Category 3 - Moderately Intrusive
- Category 4 - Highly Intrusive

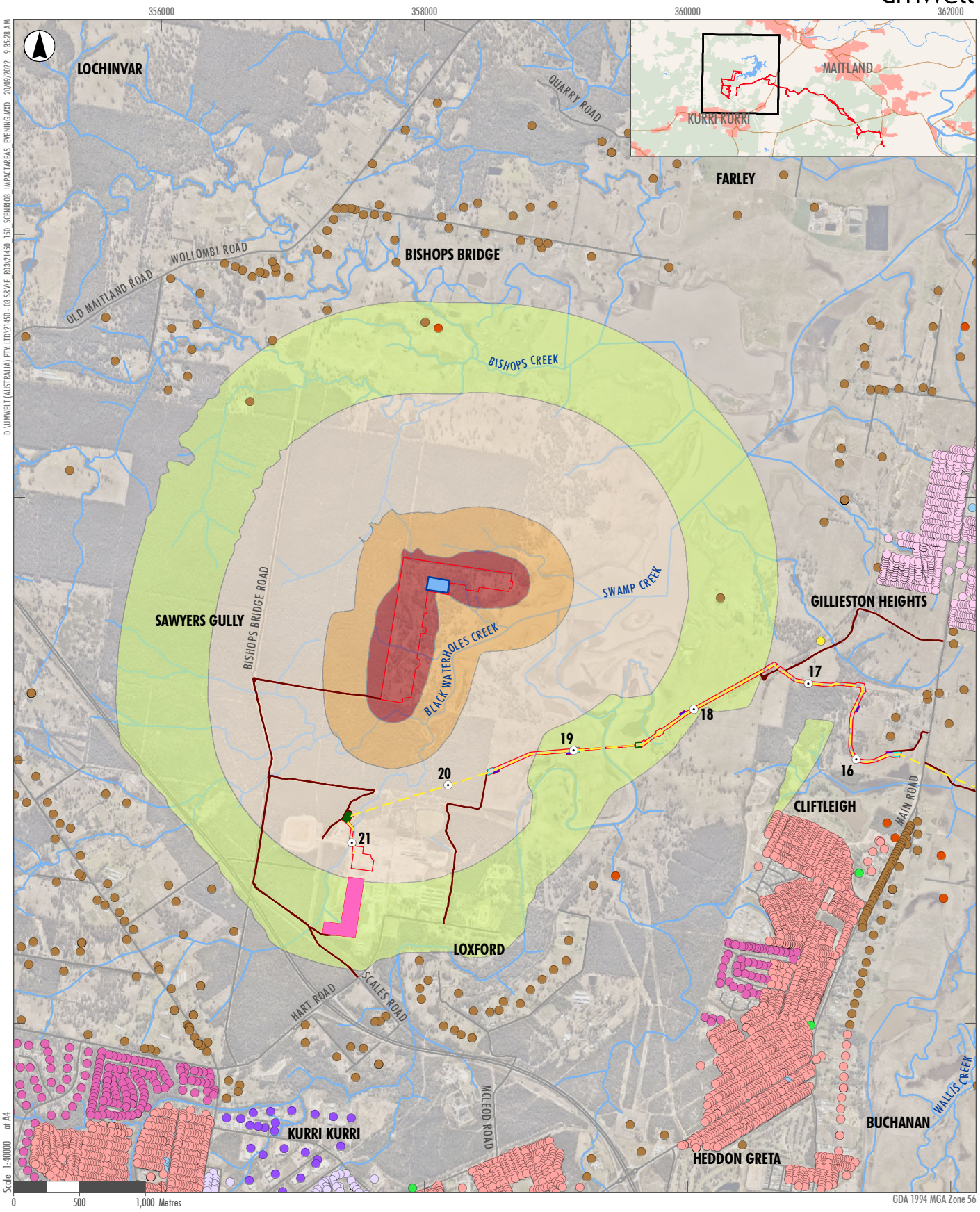
Receivers

- B1 Neighbourhood Centre
- E2 Environmental Conservation
- IN2 Light Industrial
- IN3 Heavy Industrial
- R1 General Residential
- R2 Low Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RU2 Rural Landscape
- SP2 Infrastructure

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020;2021)

APPENDIX A1.16

Scenario 3 Storage Pipeline Outside of Standard Hours Day



Legend

- Project Development Footprint
- Transmission Pipeline Alignment
- Kilometre Point
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turkeys Nest Dam
- Turnaround
- Roads
- Watercourses

Noise Impact Areas

- Category 1 - Noticeable
- Category 2 - Clearly Audible
- Category 3 - Moderately Intrusive
- Category 4 - Highly Intrusive

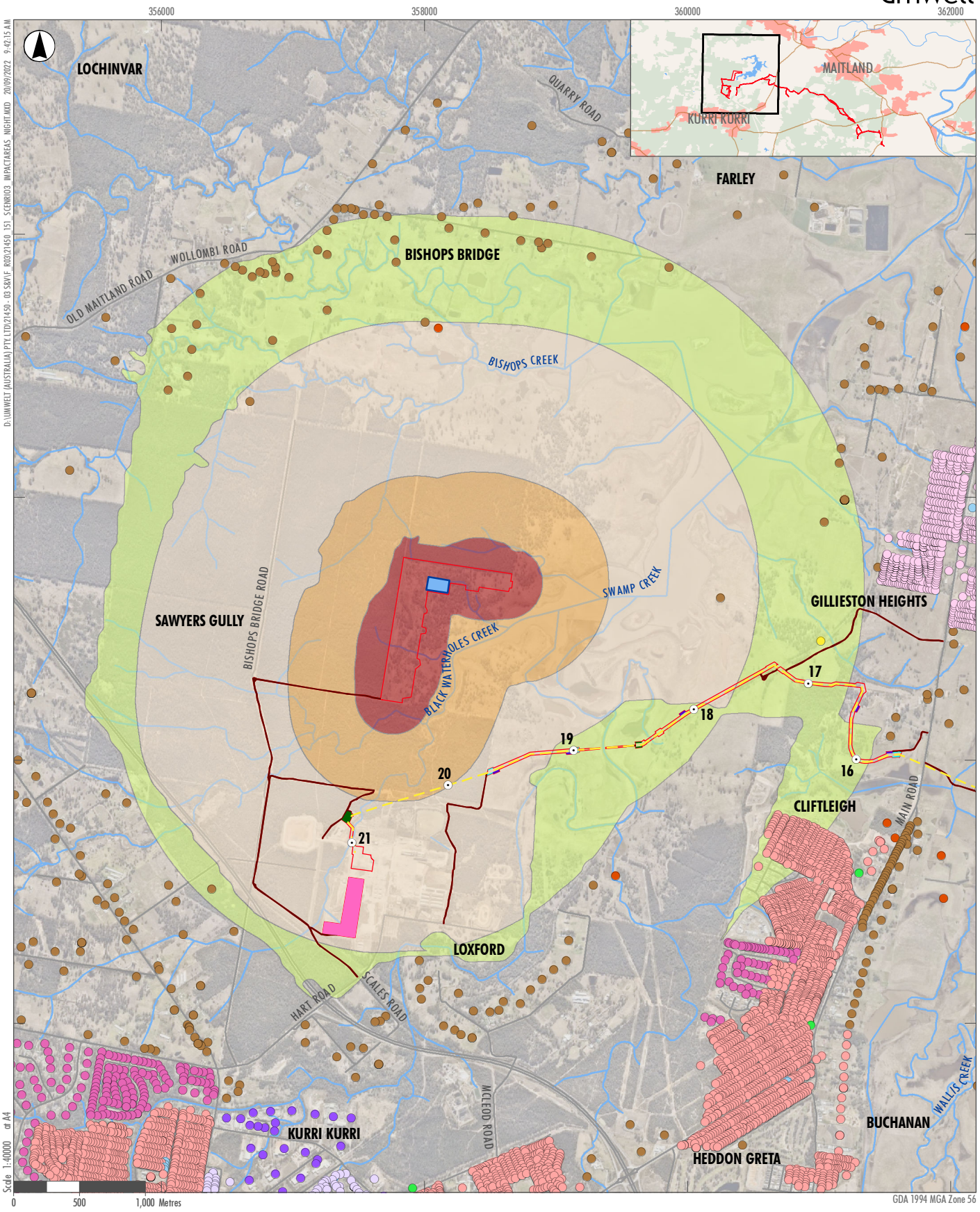
Receivers

- B1 Neighbourhood Centre
- E2 Environmental Conservation
- IN2 Light Industrial
- IN3 Heavy Industrial
- R1 General Residential
- R2 Low Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RU2 Rural Landscape
- SP2 Infrastructure

Image Source: Neamap (August 2021) Data source: NSW LPI (2020;2021)

APPENDIX A1.17

Scenario 3 Storage Pipeline Outside of Standard Hours Evening



Legend

- Project Development Footprint
- Transmission Pipeline Alignment
- Kilometre Point
- Access Track
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turkeys Nest Dam
- Turnaround
- Roads
- Watercourses

Noise Impact Areas

- Category 1 - Noticeable
- Category 2 - Clearly Audible
- Category 3 - Moderately Intrusive
- Category 4 - Highly Intrusive

Receivers

- B1 Neighbourhood Centre
- E2 Environmental Conservation
- IN2 Light Industrial
- IN3 Heavy Industrial
- R1 General Residential
- R2 Low Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RU2 Rural Landscape
- SP2 Infrastructure

Image Source: Nearmap (August 2021) Data source: NSW LPI (2020;2021)

APPENDIX A1.18

Scenario 3
Storage Pipeline
Outside of Standard Hours
Night