



**Australian Rail Track Corporation**

Maitland to Minimbah Third Track Project

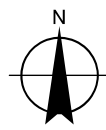
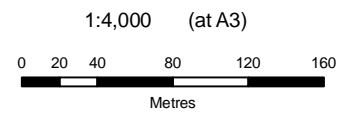
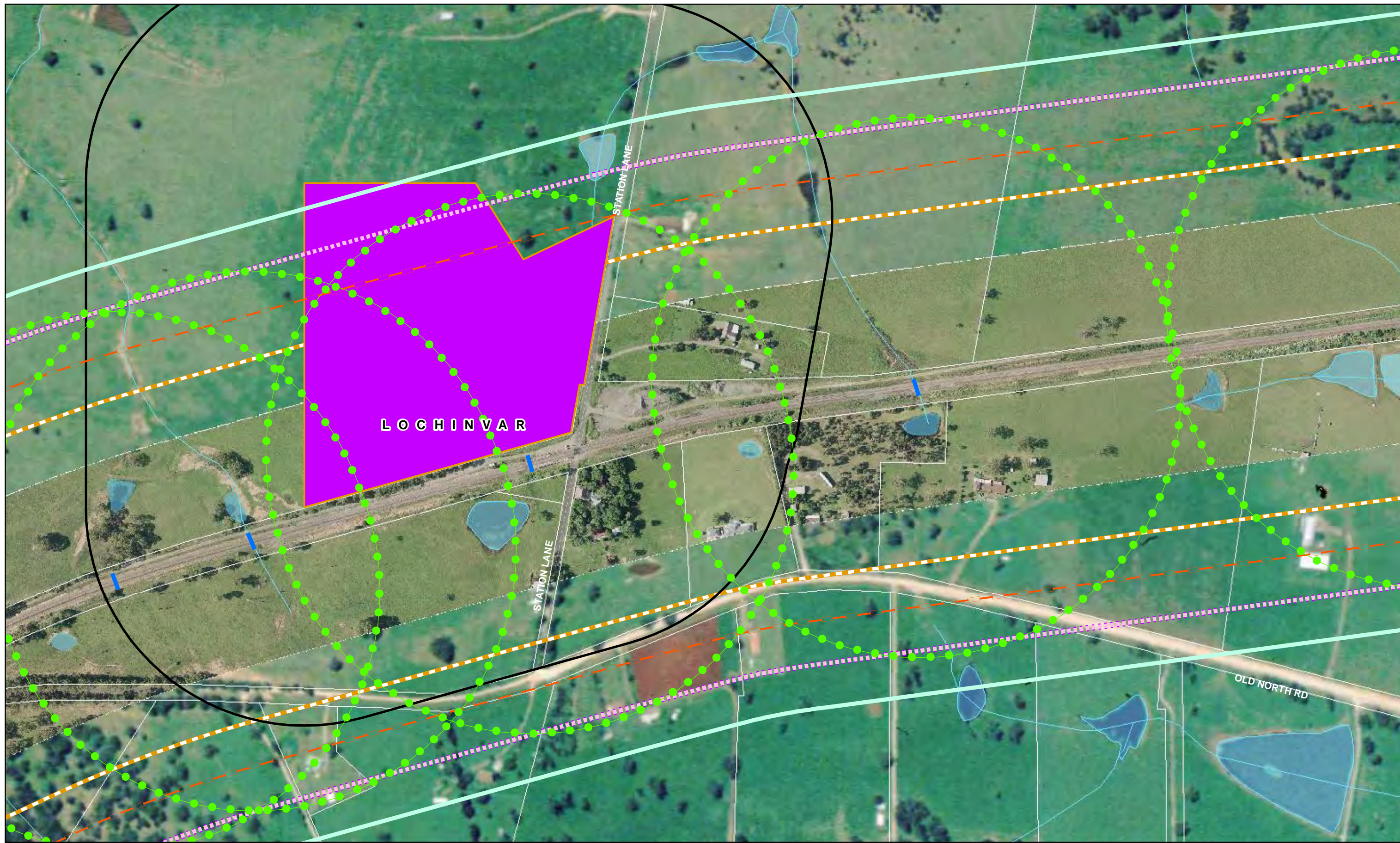
Submissions Report including  
Preferred Project Report

September 2010

H8R-REP-S2G-ENV-0019-0

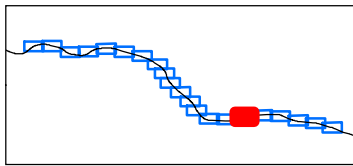


Appendix E  
Noise and Vibration Study



**LEGEND**

- |  |  |                             |
|--|--|-----------------------------|
| Impact Radius for Bridgeworks (Including Culverts) | Impact Radius for Crushing Plant         | Proposed Culvert Extensions |
| Impact Radius for Drainage and Capping             | Impact Radius for Site Compounds         | Proposed Third Track        |
| Impact Radius for Cut and Fill                     | Site Compounds                           | Proposed Crushing Plant     |
| Impact Radius for Topsoiling and Landscaping       | Impact Radius for Clearing and Stripping | Watercourse                 |
|  | Watercourse Area                         | Proposed New Underbridge    |

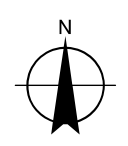
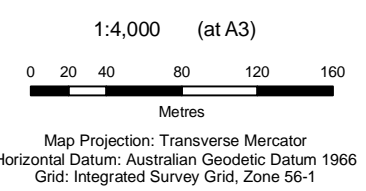


Maitland to Minimbah Third Track  
Submissions Report  
Noise and Vibration Impact Assessment

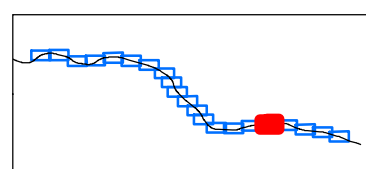
Job Number | 22-14471  
Revision | A  
Date | August 2010

Revised Construction Noise  
Impact Zones

Figure 3.1p



LEGEND	
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	Impact Radius for Drainage and Capping
	Impact Radius for Cut and Fill
	Impact Radius for Topsailing and Landscaping
	Impact Radius for Crushing Plant
	Impact Radius for Site Compounds
	Site Compounds
	Impact Radius for Clearing and Stripping
	Watercourse Area
	Proposed Culvert Extensions
	Proposed Third Track
	Proposed Crushing Plant
	Watercourse
	Proposed New Underbridge

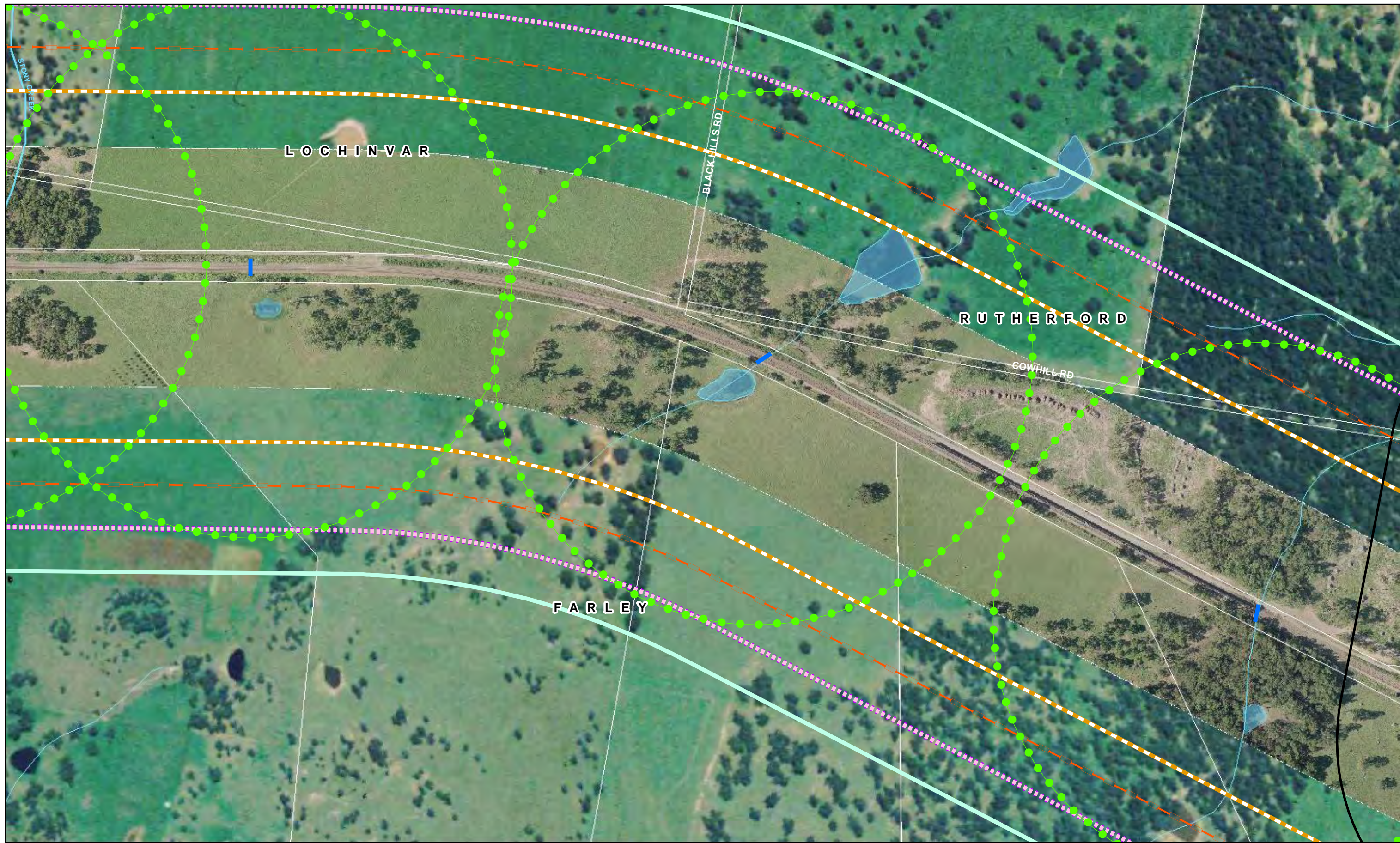


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Noise and Vibration Impact Assessment

Revised Construction Noise  
Impact Zones

Job Number 22-14471  
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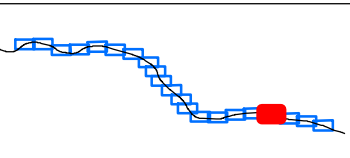
Figure 3.1q



1:4,000 (at A3)  
 0 20 40 80 120 160  
 Metres  
 Map Projection: Transverse Mercator  
 Horizontal Datum: Australian Geodetic Datum 1966  
 Grid: Integrated Survey Grid, Zone 56-1



- LEGEND**
- Impact Radius for Bridgeworks (Including Culverts)
  - Impact Radius for Drainage and Capping
  - Impact Radius for Cut and Fill
  - Impact Radius for Topsoiling and Landscaping
  - Impact Radius for Crushing Plant
  - Impact Radius for Site Compounds
  - Site Compounds
  - Impact Radius for Clearing and Stripping
  - Watercourse Area
  - Proposed Culvert Extensions
  - Proposed Third Track
  - Proposed Crushing Plant
  - Watercourse
  - Proposed New Underbridge

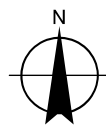
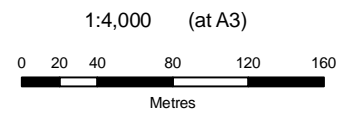
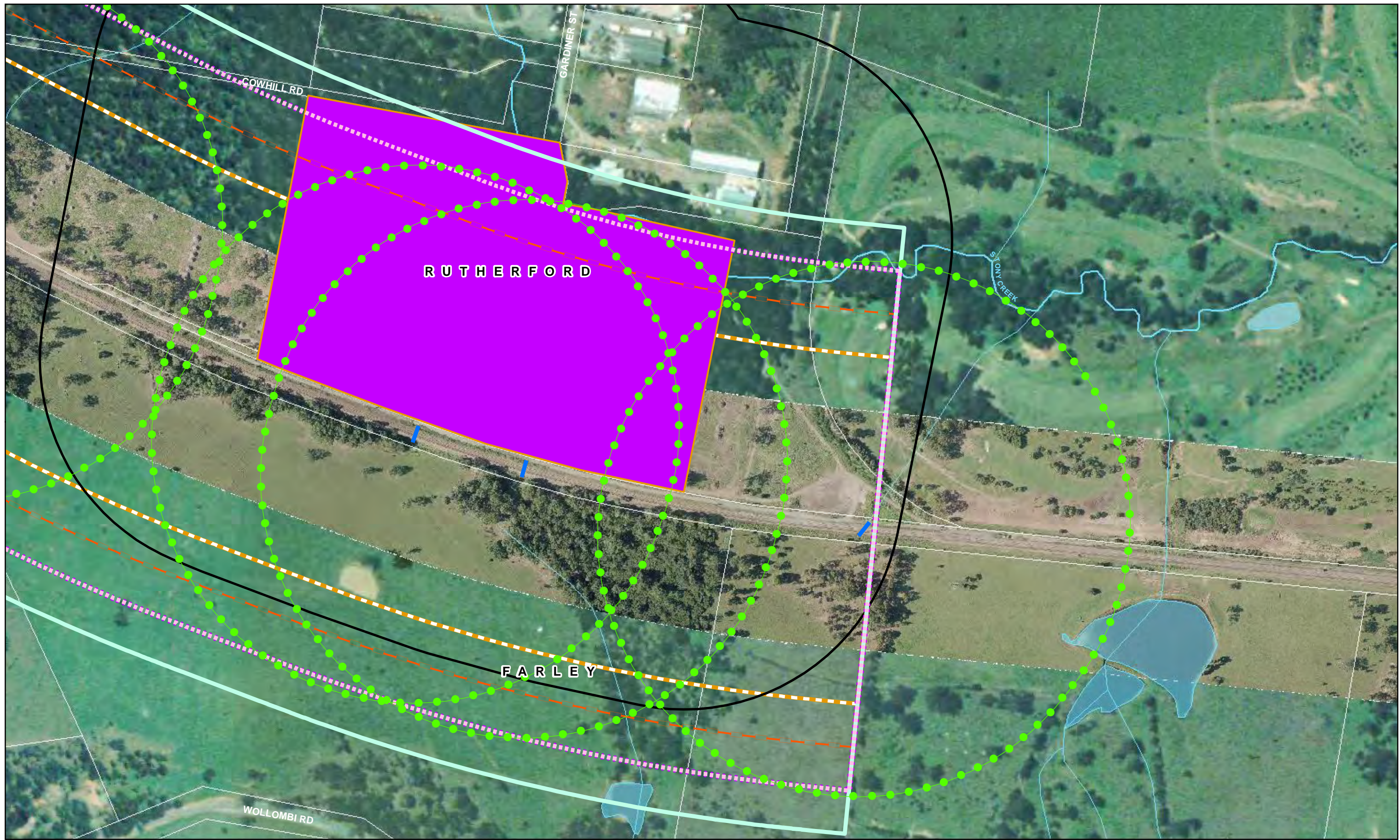


Maitland to Minimbah Third Track  
 Submissions Report  
 Noise and Vibration Impact Assessment

Revised Construction Noise  
 Impact Zones

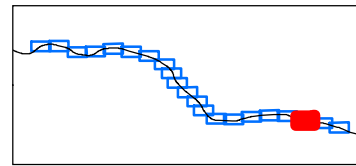
Job Number 22-14471  
 Revision A  
 Date August 2010

**Figure 3.1r**



**LEGEND**

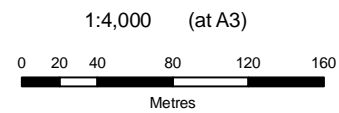
- Impact Radius for Bridgeworks (Including Culverts)
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- Watercourse Area
- Proposed Culvert Extensions
- Proposed Third Track
- Proposed Crushing Plant
- Watercourse
- Proposed New Underbridge



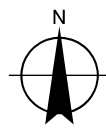
Maitland to Minimbah Third Track  
 Submissions Report  
 Noise and Vibration Impact Assessment  
 Revised Construction Noise  
 Impact Zones

Job Number | 22-14471  
 Revision | A  
 Date | August 2010

Figure 3.1s

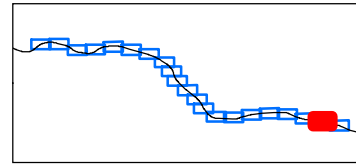


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 Map Projection: Transverse Mercator  
 Horizontal Datum: Australian Geodetic Datum 1966  
 Grid: Integrated Survey Grid, Zone 56-1



**LEGEND**

- |  |  |                             |
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|  | Watercourse Area                         | Proposed New Underbridge    |

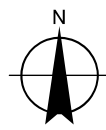
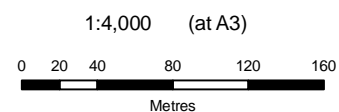


Maitland to Minimbah Third Track  
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 Date August 2010

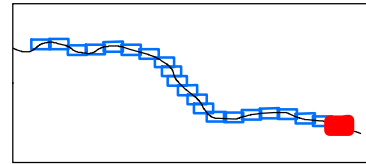
Revised Construction Noise  
 Impact Zones

Figure 3.1t



**LEGEND**

- |  |  |                             |
|--|--|-----------------------------|
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|  | Watercourse Area                         | Proposed New Underbridge    |

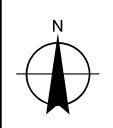
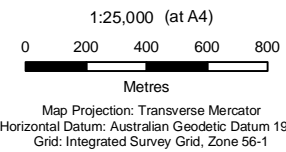
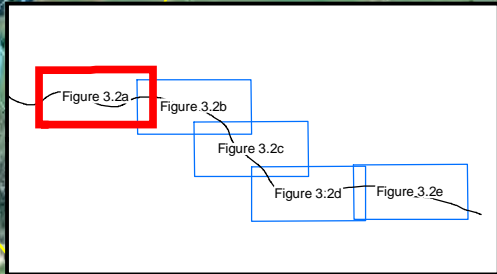
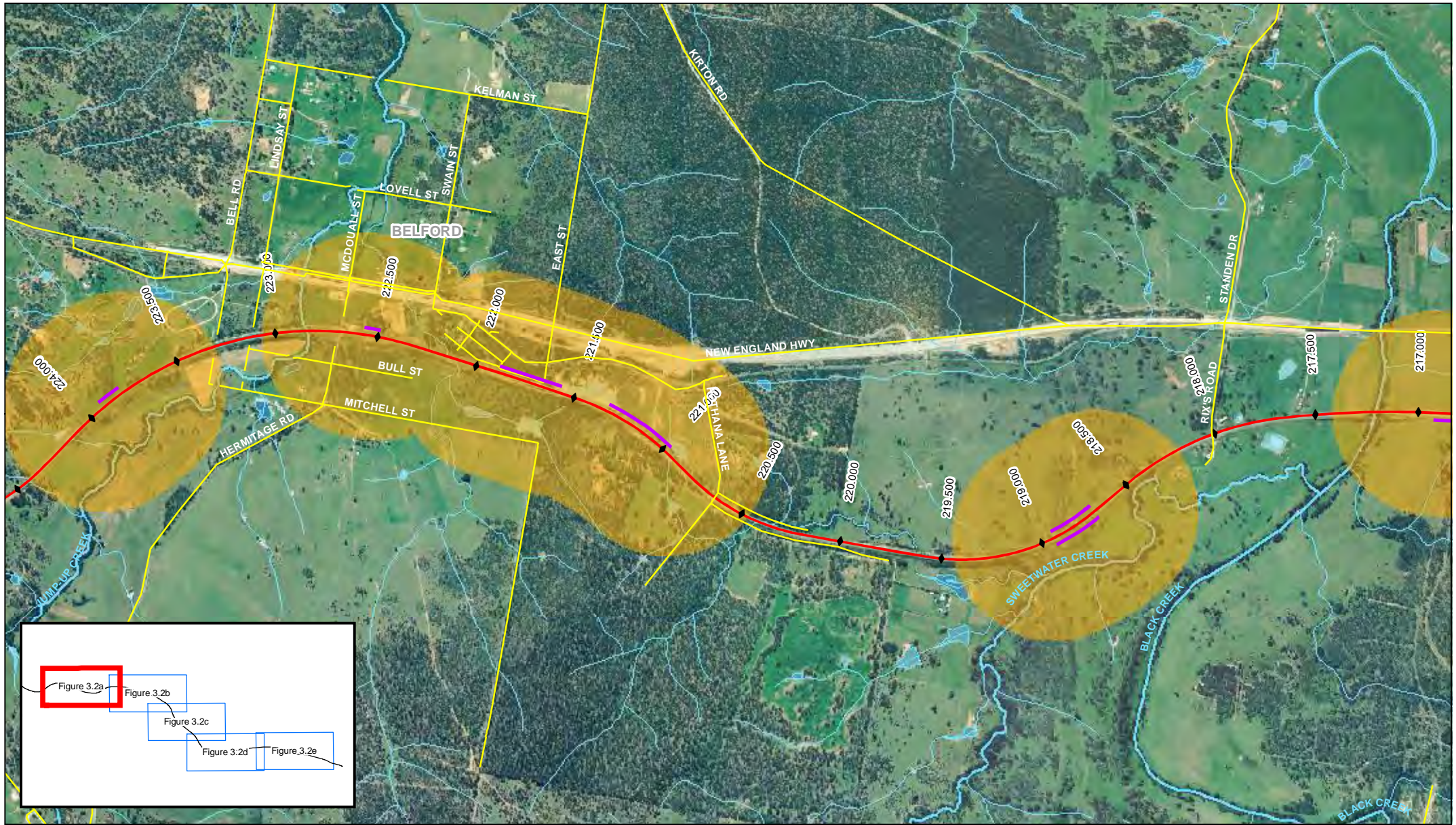


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Submissions Report  
Noise and Vibration Impact Assessment

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Revision A  
Date August 2010

**Revised Construction Noise  
Impact Zones**

**Figure 3.1u**



LEGEND	
	Revised Blasting Locations
	Road Centre Line
	500m Buffer
	Proposed Third Track
	Watercourse area
	Watercourse



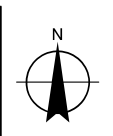
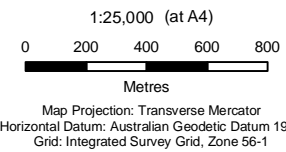
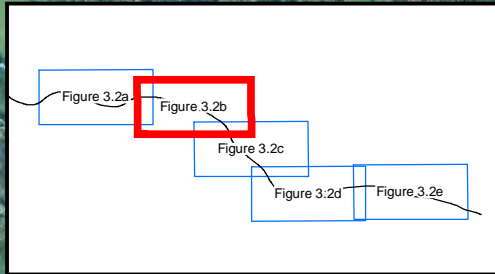
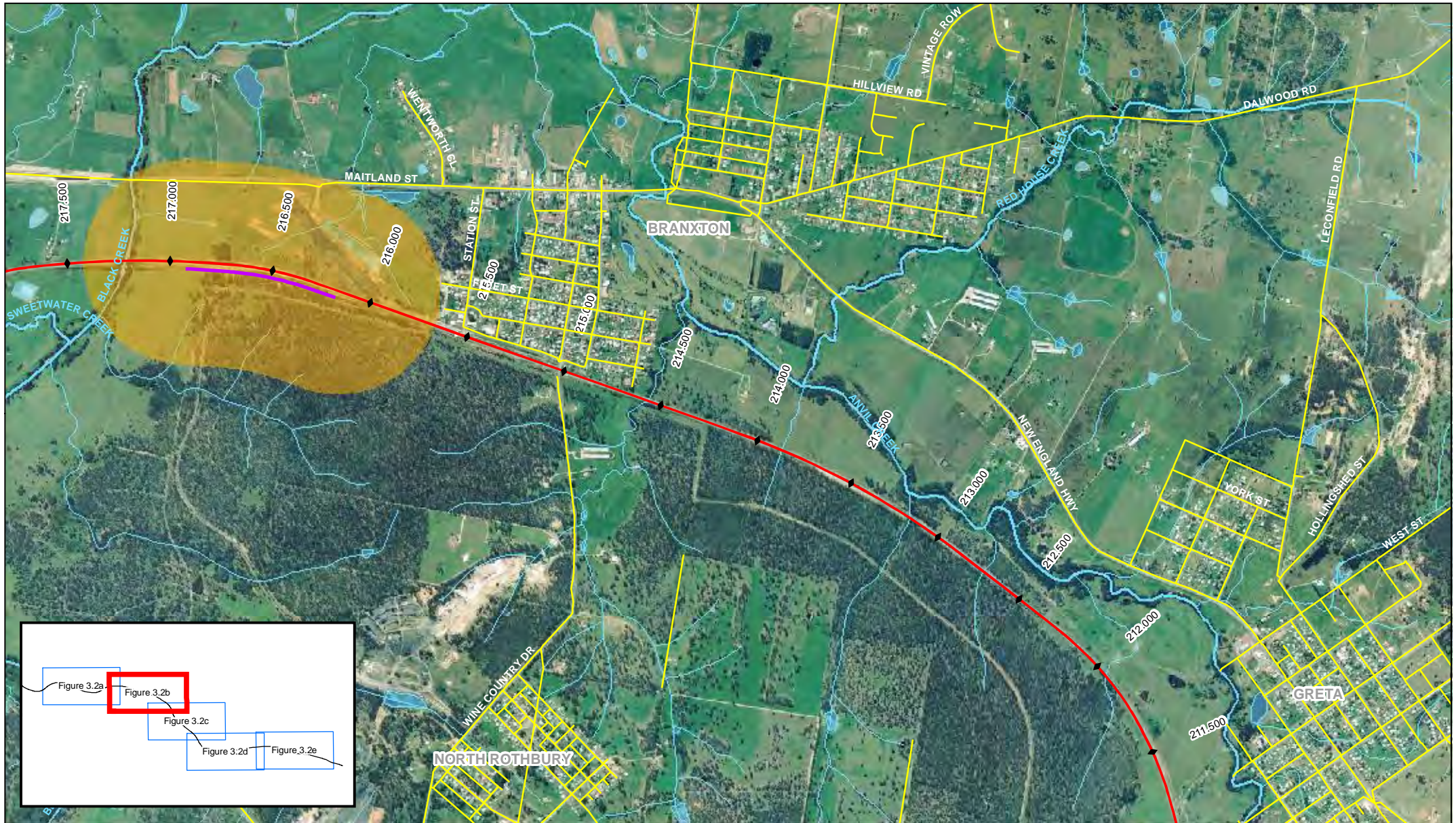
Maitland To Minimbah Third Track  
Submissions Report  
Noise and Vibration Impact Assessment

Job Number	22-14471
Revision	A
Date	August 2010

### Revised Blasting Impact Zones

Figure 3.2a

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LEGEND	
	Revised Blasting Locations
	Road Centre Line
	500m Buffer
	Proposed Third Track
	Watercourse area
	Watercourse

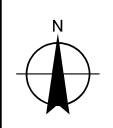
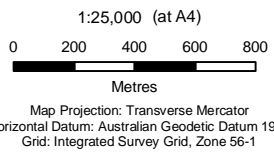


Maitland To Minimbah Third Track  
Submissions Report  
Noise and Vibration Impact Assessment

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### Revised Blasting Impact Zones

Figure 3.2b



LEGEND	
	Revised Blasting Locations
	Road Centre Line
	500m Buffer
	Proposed Third Track
	Watercourse area
	Watercourse



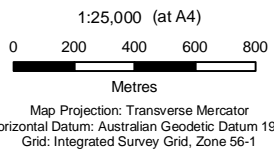
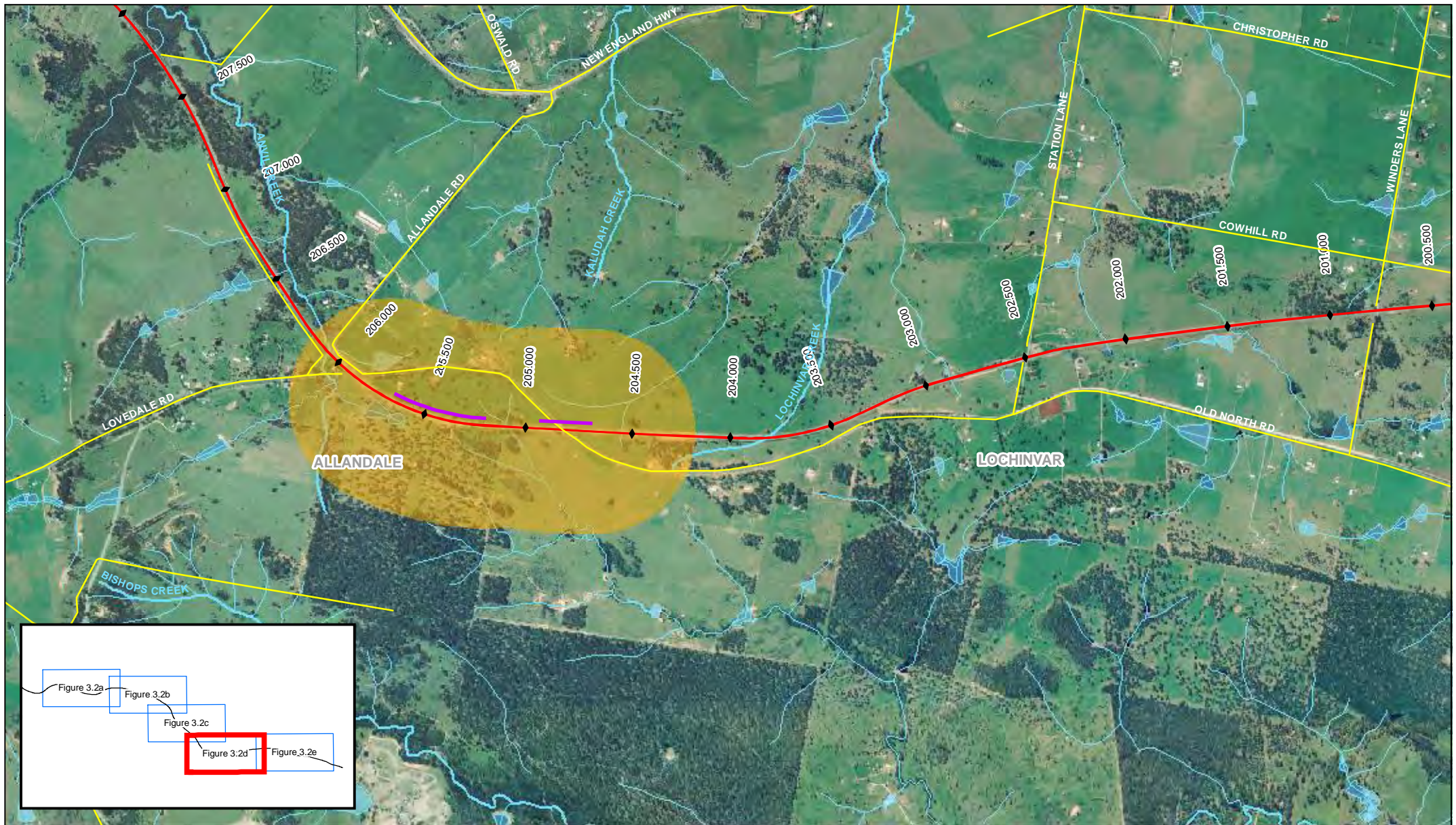
Maitland To Minimbah Third Track  
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### Revised Blasting Impact Zones

Figure 3.2c

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LEGEND	
	Revised Blasting Locations
	Road Centre Line
	500m Buffer
	Proposed Third Track
	Watercourse area
	Watercourse



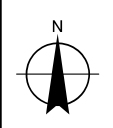
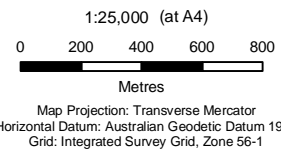
Maitland To Minimbah Third Track  
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### Revised Blasting Impact Zones

Figure 3.2d

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LEGEND	
<span style="color: purple;">—</span> Revised Blasting Locations	<span style="color: red;">—</span> Proposed Third Track
<span style="color: yellow;">—</span> Road Centre Line	<span style="color: lightblue;">—</span> Watercourse area
<span style="color: orange;">—</span> 500m Buffer	<span style="color: cyan;">—</span> Watercourse



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### Revised Blasting Impact Zones

Figure 3.2e

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### 3.3 Operational Rail Noise

#### 3.3.1 $L_{eq}$ Noise Levels

The operational rail noise model has been re-run to account for changes in the earthworks design and also to compare predicted rail noise emissions with and without the proposed deferment of works. Night-time noise contours ( $L_{Aeq, 9hrs}$ ) are presented in the following Appendices:

- ▶ Appendix A – 2012 Scenario without deferment of works (Phase 1 and Phase 2 of the Project).
- ▶ Appendix B – 2012 Scenario with deferment of works (Phase 1 of the Project).
- ▶ Appendix C – 2022 Scenario without deferment of works (Phase 1 and Phase 2 of the Project).
- ▶ Appendix D – 2022 Scenario with deferment of works (Phase 1 of the Project).

Table 3-4 and Table 3-5 show a summary of the modelling results at the monitoring locations.

**Table 3-4 2012 Scenarios - Summary of Results at Monitoring Locations**

Receiver	2012 Model – With Deferment of Works		2012 Model – Without Deferment of Works		Maximum Difference
	Day $L_{Aeq, 15hrs}$	Night $L_{Aeq, 9hrs}$	Day $L_{Aeq, 15hrs}$	Night $L_{Aeq, 9hrs}$	
L1	63.3	63.8	63.3	63.8	0
L2	64.3	64.8	64.3	64.8	0
L3	53.7	54.2	53.7	54.2	0
L4	60.1	60.7	60.1	60.7	0
L5	56.2	56.7	56.3	56.8	0.1
L6	56.4	56.9	56.7	57.2	0.3
L7	61.9	62.4	62.6	63.0	0.7
L8	63.4	63.9	63.4	63.9	0
L9	62.6	63.2	62.9	63.4	0.3
L10	58.5	59.0	58.5	59.0	0
L11	53.5	53.9	53.5	53.9	0
L12	48.6	49.1	48.6	49.1	0
L13	69.6	70.1	69.6	70.1	0

Receiver	2012 Model – With Deferment of Works		2012 Model – Without Deferment of Works		Maximum Difference
	Day L <sub>Aeq, 15hrs</sub>	Night L <sub>Aeq, 9hrs</sub>	Day L <sub>Aeq, 15hrs</sub>	Night L <sub>Aeq, 9hrs</sub>	
L14	65.2	65.6	65.2	65.6	0
L15	65.0	65.5	65.0	65.5	0
L16	67.5	68.1	67.7	68.2	0.2
L17	67.8	68.3	67.9	68.4	0.1

**Table 3-5 2022 Model - Summary of Results at Monitoring Locations**

Receiver	2022 Model – With Deferment of Works		2022 Model – Without Deferment of Works		Difference
	Day L <sub>Aeq, 15hrs</sub>	Night L <sub>Aeq, 9hrs</sub>	Day L <sub>Aeq, 15hrs</sub>	Night L <sub>Aeq, 9hrs</sub>	
L1	64.2	64.8	64.2	64.8	0
L2	65.3	65.9	65.3	65.9	0
L3	54.7	55.2	54.7	55.2	0
L4	61.1	61.7	61.1	61.7	0
L5	57.2	57.8	57.3	57.8	0
L6	57.4	58.0	57.8	58.4	0.4
L7	62.9	63.5	63.7	64.3	0.8
L8	64.4	64.9	64.4	64.9	0
L9	63.6	64.2	64.0	64.6	0.4
L10	59.4	60.0	59.4	60.0	0
L11	54.4	55.0	54.4	55.0	0
L12	49.6	50.2	49.6	50.2	0
L13	70.6	71.1	70.6	71.1	0
L14	66.1	66.6	66.1	66.6	0
L15	66.0	66.5	66.0	66.5	0
L16	68.5	69.1	68.7	69.3	0.2
L17	68.8	69.3	69.0	69.5	0.2

The results in Table 3-4 and Table 3-5 and noise contours shown in Appendix A to D indicate that operational  $L_{eq}$  rail noise emissions are not significantly different with or without deferment of works. This means that  $L_{eq}$  rail noise emissions are primarily dominated by rail volumes rather than the positioning of the third rail track within the corridor.

Table 3-6 and Table 3-7 present the extent of receivers where the Department of Environment, Climate Change and Water (DECCW) *Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects* (IGANRIP) is triggered (the IGANRIP  $L_{eq}$  trigger levels are predicted to be exceeded, and the existing noise levels increased by 2 dB(A) or greater). It also identifies when such exceedances of the IGANRIP trigger levels are first predicted to occur. Note that existing rail noise levels already exceed the IGANRIP trigger levels at some receivers. Also note that reported exceedances account for a + 2.5 dB(A) façade correction.

**Table 3-6 Affected Receivers per Noise Catchment Areas – Up Side**

Chainage	Noise Catchment Area ID	Affected Receivers	IGANRIP Trigger (Y or N)	IGANRIP Exceedance (2022)	Predicted Initial Year of Trigger
222.900 – 223.850	U1	All three residences in U1 (MMU-003.5, MMU-004, MMU-005).	Y	5 to 7 dB(A)	2012
222.300 – 222.700	U2	All land located between the 60dB(A) contour and rail corridor proposed for tourist development (accommodation).	Dependant on the proposed site development and layout.		
220.350 – 222.300	U3	Six residences in U3 (MMU-012, Lot 1 and 2 Sec 7 / DP 758078, Lot 8 to Lot 10 Sec 7 / DP 758078).	Y	3 to 6 dB(A)	2012
214.100 – 215.350	U4	IGANRIP compliance predicted	N	-	-
210.000 – 210.950	U5	Nelson Street (MMU-039, MMU-040) and John Street (MMU-046) residences, Greta.	Y	5 to 8 dB(A).	2012
205.100 – 206.500	U6	Both residences in U6 (MMU-053 and Lot 6 / DP 1112171).	Y	3 dB(A) at MMU-053. 5 dB(A) at Lot 6 / DP 1112171.	2022 at MMU-053 2012 at Lot 6 / DP 1112171
202.050 – 202.500	U7	Single residence in U7 (MMU-057).	Y	3 dB(A).	2022

Chainage	Noise Catchment Area ID	Affected Receivers	IGANRIP Trigger (Y or N)	IGANRIP Exceedance (2022)	Predicted Initial Year of Trigger
200.250 – 201.100	U8	All four residences in NCA U8 (MMU-060 to MMU-062, 510/DP 774517 ). MMU-061 is the most affected residence in this NCA.	Y	Up to 10dB(A) at MMU-061. Up to 7 dB(A) at MMU-060 and MMU-062. 3 dB(A) at 510/DP 774517	2010 (existing) at MMU-061 2012 at MMU-060 and MMU-062 2022 at 510/DP 774517
196.400 – 197.400	U9	All land located between the 60dB(A) contour and rail corridor if proposed for residential development.	Dependant on the proposed site development and layout.		
195.600 – 196.200	U10	Residences on Dumont Close	Y	Up to 7dB(A)	2010 (existing) for southernmost Dumont Close residence 2012 for other Dumont Close residences (southern end)
194.500 – 194.800	U11	All houses directly exposed to the rail lines on Railway Parade and Wentworth Street, Telarah.	Y	Up to 10dB(A).	2010 (existing)

**Table 3-7 Affected Receivers per Noise Catchment Areas – Down Side**

Chainage	Noise Catchment Area ID	Affected Receivers	IGANRIP Trigger (Y or N)	IGANRIP Exceedance (2022)	Predicted Initial Year of Trigger
222.300 – 223.300	D1	MMD-003	Y	3 dB(A)	2022
221.000 – 221.350	D2	IGANRIP compliance predicted	N	-	-
219.250 – 219.700	D3	Pothana Winery (MMD-007)	Y	5 dB(A)	2012
218.000 – 218.150	D4	Single residence in D4 (MMD-008)	Y	7 dB(A)	2012

Chainage	Noise Catchment Area ID	Affected Receivers	IGANRIP Trigger (Y or N)	IGANRIP Exceedance (2022)	Predicted Initial Year of Trigger
215.650 – 217.200	D5	All land located between the 60dB(A) contour and rail corridor if proposed for residential development.			Dependant on the proposed site development and layout.
214.850 – 215.100	D6	Existing residences in D6 have been acquired by the NSW RTA for demolition.	N	-	-
209.850 – 210.900	D7	Lloyd Street residences (Lot 81 DP 607773, Lot 106 DP 250308, Lots 4 and 5 DP 976366). Two residences off Mansfield Street (MMD-018.3 and Lot 104 DP 250308). MMD-017, Lot 1 DP 882276, Lot 2 DP 882276.	Y	4 to 7 dB(A)	2012
209.850 – 210.900	D7	Residences west of Mansfield Street	Y	3 dB(A)	2022
206.750 – 209.850	D8	All land located between the 60dB(A) contour and rail corridor if proposed for residential development.			Dependant on the proposed site development and layout.
205.950 – 206.300	D9	Three residences east of Lovedale Road (MMD-024, Lot 261 DP / 755211, Lot 32 / DP 846828). One residence west of Lovedale Road (Lot 1 DP 434185).	Y	13 dB(A) at MMD-024 and Lot 261 DP / 755211. 3 dB(A) at Lot 32 / DP 846828. 4dB(A) at Lot 1 DP 434185.	Existing (2010) at MMD-024 and Lot 261 DP / 755211 2022 at Lot 1 DP 434185 and Lot 32 / DP 846828
203.050 – 205.100	D10	IGANRIP compliance predicted	N	-	-

Chainage	Noise Catchment Area ID	Affected Receivers	IGANRIP Trigger (Y or N)	IGANRIP Exceedance (2022)	Predicted Initial Year of Trigger
200.800 – 202.500	D11	Clifton House (MMD-029)	Y	11 dB(A) at Clifton House.	Existing (2010) at Clifton House
		MMD-030 to MMD-032		3 dB(A) at MMD-030 to MMD-032	2022 at MMD-030 to MMD-032
195.600 – 196.250	D12	Two residences at the eastern end of Wollombi Road (including MMD-041)	Y	9-11 dB(A)	Existing (2010)

### 3.3.2 L<sub>Max</sub> Noise Levels

The transition from three to two tracks will require some trains to stop in the vicinity of the following turnout locations:

- ▶ Chainage 216.320 kilometres (Branxton).
- ▶ Chainage 196.100 kilometres (Farley).

The operational noise assessment described in the Environmental Assessment assumes all trains operate at a set speed within the investigation area, and does not make provisions for stopping, idling and starting events.

Simulations by ARTC indicate that the proposed deferments of works would lead to a maximum of five train stops at each turnout daily, as follows:

- ▶ Four at chainage 216.320 kilometres.
- ▶ One at chainage 196.100 kilometres.

On average, it is anticipated that trains would station at the turnouts for approximately seven minutes.

Given the large number of daily movements (see Appendix K of the Environmental Assessment), train stop/start events nominated above are unlikely to affect the operational L<sub>eq</sub> rail noise levels. However, local L<sub>max</sub> levels are likely to increase in the vicinity of the turnout locations as train stop or start. Major noise sources in such events are wheel squeal and shunting as the train halts.

Table 3-8 presents the extent of receivers where IGANRIP may be triggered (the IGANRIP L<sub>max</sub> trigger levels are predicted to be exceeded, and the existing noise levels increased by 3 dB(A) or greater).

**Table 3-8 Affected Receivers per Noise Catchment Areas – L<sub>max</sub> Levels**

Chainage	Noise Catchment Area ID	Affected Receivers
196.400 – 197.400	U9	Depending on further investigation, land located along rail corridor is proposed for residential development.
195.600 – 196.200	U10	Residences on the southern side of Regiment Road and on Dumont Close.
215.650 – 217.200	D5	Depending on further investigation, land located along rail corridor has master plan approval for residential development.
195.600 – 196.250	D12	Two residences at the eastern end of Wollombi Road (including MMD-041)

### 3.4 Operational Rail Vibration

Findings with regards to operational vibration remain as described in the Environmental Assessment. Vibration control should be considered where dwellings are located within approximately 40 metres from the nearest rail track, which involves the following receivers (excluding those located along the proposed deferments of works):

- ▶ Two residences east of Lovedale Road (MMD-021 and Lot 261 DP / 755211) in NCA D9.
- ▶ Clifton House (MMD-029) in NCA D11.
- ▶ One residence at the end of Winders Lane, Lochinvar (MMU-061) in NCA U8.

## 4. Mitigation Measures

### 4.1 Construction Noise and Vibration

The mitigation measures and strategy remain as outlined in the Noise and Vibration Impact Assessment (Appendix K of the Environmental Assessment)

### 4.2 Operation Rail Noise and Vibration

Noise attenuation would be provided for existing residences identified as currently exceeding the IGANRIP trigger levels, those predicted to exceed the IGANRIP trigger levels in 2012 (with introduction of the third track), and those predicted to exceed the IGANRIP trigger levels in 2022 (with introduction of the third track).

Table 4-1 and Table 4-2 identify the properties to receive noise attenuation, the proposed attenuation method and the Project phase when the attenuation would be provided.

The proposed noise attenuation comprises of:

1. The Hunter 8 Alliance proposes noise mounds as the preferred noise attenuation option at properties where IGANRIP is triggered for both Phase 1 and Phase 2 of the Project. These noise mounds would be constructed during the relevant construction phases and prior to operation of the third track in these areas. A preliminary review of the locations where attenuation is required indicated that noise mounds could provide the required attenuation.
2. Following Project Approval, and during the construction of the Project, the Hunter 8 Alliance would undertake a detailed inspection of these properties and negotiations with the landholder to confirm whether noise mounds are reasonable and feasible. In the event that noise mounds are determined to not be reasonable or feasible, the Hunter 8 Alliance would consider alternative noise attenuation based on the following priority hierarchy:
  - Noise walls.
  - Architectural treatment (this could include one or more of the various architectural treatments listed in Table 4-3).
  - Property acquisition (if attenuation is not reasonable or feasible).

Table 4-3 identifies the anticipated attenuation that could be provided by the proposed attenuation measures.

3. Monitoring of operational noise levels with the third track in place is to be undertaken at properties where the predicted noise levels are predicted to be 2 dB(A) below the IGANRIP trigger levels. If the monitoring confirms the triggering of IGANRIP, the Hunter 8 Alliance would consider all reasonable and feasible noise attenuation options.
4. Monitoring of operational noise levels with the third track in place for those locations potentially affected by Lmax events in the vicinity of chainage 216.320 kilometres and chainage 196.100 kilometres turnouts.

The measures described in points one to three would be implemented as appropriate during the construction of Phase 1 and Phase 2 of the Project, and would be operational prior to operation of the third track within these areas.



In addition, a noise barrier to be constructed between chainages 194.340 and 194.880 kilometres to attenuate the urban residences at Telarah prior to the operation of the third track through this section (Phase 2). The noise wall would be approximately 4.5 metres in height, which would provide an estimated 10 dB(A) in noise attenuation. This would be provided as part of Phase 2 of the Project prior to operation of the third track in this area.



**Table 4-1 Affected Receivers and Proposed Attenuation– Up Side**

Chainage	Noise Catchment Area ID	Affected Receivers	Predicted Initial Year of Trigger	Proposed Form of Attenuation	Phase 1 or Phase 2 Implementation
222.900 – 223.850	U1	All three residences in U1 (MMU-003.5, MMU-004, MMU-005).	2012	Noise Mound	Phase 1
222.300 – 222.700	U2	All land located between the 60dB(A) contour and rail corridor proposed for tourist development (accommodation).	Subject to negotiations with the landholder about the proposed noise attenuation included in their approved site development plan.		
220.350 – 222.300	U3	Six residences in U3 (MMU-012, Lot 1 and 2 Sec 7 / DP 758078, Lot 8 to Lot 10 Sec 7 / DP 758078).	2012	Noise Mound	Phase 1
210.000 – 210.950	U5	Nelson Street (MMU-039, MMU-040) and John Street (MMU-046) residences, Greta.	2012	Noise Mound	Phase 2
205.100 – 206.500	U6	Both residences in U6 (MMU-053 and Lot 6 / DP 1112171).	2022 at MMU-053 2012 at Lot 6 / DP 112171	Noise Mound	Phase 1
202.050 – 202.500	U7	Single residence in U7 (MMU-057).	2022	Noise Mound	Phase 1
200.250 – 201.100	U8	All four residences in NCA U8 (MMU-060 to MMU-062, 510/DP 774517 ). MMU-061 is the most affected residence in this NCA.	2010 (existing) at MMU-061 2012 at MMU-060 and MMU-062 2022 at 510/DP 774517	Noise Mound	Phase 1
196.400 – 197.400	U9	All land located between the 60dB(A) contour and rail corridor if proposed for residential development.	Subject to negotiations with the landholder about the proposed noise attenuation included in their approved site development plan.		



Chainage	Noise Catchment Area ID	Affected Receivers	Predicted Initial Year of Trigger	Proposed Form of Attenuation	Phase 1 or Phase 2 Implementation
195.600 – 196.200	U10	Residences on Dumont Close	2010 (existing) for southernmost Dumont Close residence	Noise Mound	Phase 1
			2012 for other Dumont Close residences (southern end)	Noise Mound	Phase 2
194.500 – 194.800	U11	All houses directly exposed to the rail lines on Railway Parade and Wentworth Street, Telarah.	2010 (existing)	Noise Wall	Phase 2

**Table 4-2 Affected Receivers and Proposed Attenuation – Down Side**

Chainage	Noise Catchment Area ID	Affected Receivers	Predicted Initial Year of Trigger	Proposed Form of Attenuation	Phase 1 or Phase 2 Implementation
222.300 – 223.300	D1	MMD-003	2022	Noise Mound	Phase 1
219.250 – 219.700	D3	Pothana Winery (MMD-007)	2012	Noise Mound	Phase 1
218.000 – 218.150	D4	Single residence in D4 (MMD-008)	2012	Noise Mound	Phase 1
209.850 – 210.900	D7	Lloyd Street residences (Lot 81 DP 607773, Lot 106 DP 250308, Lots 4 and 5 DP 976366). Two residences off Mansfield Street (MMD-018.3 and Lot 104 DP 250308). MMD-017, Lot 1 DP 882276, Lot 2 DP 882276.	2012	Noise Mound	Phase 2
209.850 – 210.900	D7	Residences west of Mansfield Street	2022	Noise Mound	Phase 2

Chainage	Noise Catchment Area ID	Affected Receivers	Predicted Initial Year of Trigger	Proposed Form of Attenuation	Phase 1 or Phase 2 Implementation
206.750 – 209.850	D8	All land located between the 60dB(A) contour and rail corridor if proposed for residential development.	Landholder required to consider operational noise associated with the Project and to provide noise attenuation.		
205.950 – 206.300	D9	Three residences east of Lovedale Road (MMD-024, Lot 261 DP / 755211, Lot 32 / DP 846828). One residence west of Lovedale Road (Lot 1 DP 434185).	Existing (2010) at MMD-024 and Lot 261 DP / 755211  2022 at Lot 1 DP 434185 and Lot 32 / DP 846828	Noise Mound	Phase 1
200.800 – 202.500	D11	Clifton House (MMD-029)	Existing (2010) at Clifton House	Noise Mound	Phase 1
		MMD-030 to MMD-032	2022 at MMD-030 to MMD-032	Noise Mound	Phase 1
195.600 – 196.250	D12	Two residences at the eastern end of Wollombi Road (including MMD-041)	Existing (2010)	Noise Mound	Phase 1

**Table 4-3 Potential Noise Attenuation Options**

Treatment Options	Estimated Noise Attenuation	Comments
Noise Barriers:		
Noise Mound	10 to 15 dB(A).	Dependant on local topography, wall height and mound material.
Noise Wall	10 to 15 dB(A).	Dependant on local topography and wall height.
Architectural Treatment:		
Building Insulation/ Air Conditioning	10 to 15 dB(A) compared to without insulation and with windows open.	Dependant on materials used on building construction.
Property boundary fence (typical 1.8 metre solid fence)	Up to 5dB(A) at ground level. Less than 2dB(A) for upper levels.	Effectiveness is reduced where adjacent track is on an embankment/ higher than the property.
Double Glazed Windows	5 to 10dB(A) where glazing is the weaker noise path.	Dependant on materials used in building construction and condition of the structure.
Acoustic seals to doors and windows	Up to 5dB(A).	Dependant on materials used in building construction.
Ceiling insulation	Up to 5dB(A).	Dependant on materials used in building construction.

Implementation of the Operational Noise Management Plan would be staged consistent with construction of the third track:

- ▶ The proposed measures would be implemented at the potentially affected properties adjacent to the Phase 1 works prior to commencement of operations on the third track. This would be noise mounds constructed for 33 residential properties.
- ▶ The proposed measures would be implemented at the remaining potentially affected properties prior to commencement of operations on the Phase 2 third track sections. This would be noise mounds constructed for 10 houses and construction of the noise wall at Telarah (as previously discussed).

### Operational Vibration

The Noise and Vibration Assessment undertaken for the Environmental Assessment included vibration monitoring along the rail corridor. From this monitoring, and consideration of the proposed increase in operations, it was determined that properties within 40 metres of the rail corridor would potentially have vibration levels exceeding the human comfort criteria in the *Assessing vibration: a technical guideline* (DECCW 2006) and *BS 6472:1992 Evaluation of human exposure to vibration in buildings (1–80 Hz)*.

It should be noted that the 40 metre distance is a conservative estimate. The actual distance would be dependant on a range of factors, including underlying geology and soil type; and building quality, which can vary throughout the Project area.

Within Phase 1 of the Project, four properties are located within 40 metres of the rail corridor and therefore potentially impacted by operational vibration:

- ▶ Two residences east of Lovedale Road (MMD-021 and Lot 261 DP / 755211) in NCA D9.
- ▶ Clifton House (MMD-029) in NCA D11.
- ▶ One residence at the end of Winders Lane, Lochinvar (MMU-061) in NCA U8.

A vibration monitoring program would be developed and implemented for the listed properties prior to the commencement of operations on the third track. This would involve monitoring at the residences to measure the level of vibration in comparison to the relevant standards (human comfort from *Assessing vibration: a technical guideline, BS 6472:1992 Evaluation of human exposure to vibration in buildings (1–80 Hz)*; and structural damage from *German Standard DIN 4150-3: 1999 Structural Vibration – Part 3: Effects of vibration on structures*).

Vibration monitoring would be undertaken at a distance from the existing track equal to that which the third track is designed to be from the residence.

If the monitoring indicates that the criteria were to be exceeded, the Hunter 8 Alliance would enter negotiations with the landholder to determine an appropriate mitigation measure. This may include (but not be limited to):

- ▶ Property acquisition.
- ▶ Relocation of the existing residence where reasonable and feasible. If relocation is not reasonable or feasible, the landholder would be offered construction of a new residence outside the area of vibration impact.

This process would be implemented at those properties located within 40 metres of the Phase 2 areas following commencement of operations of a third track adjacent to those properties.

## 5. Conclusions

The findings and conclusions of the Environmental Assessment remain generally unchanged, except for the following issues which have been discussed in this report:

- ▶ Construction noise and vibration:
  - Changes in impacted zones due to amendments in compounds and blasting locations, as well as deferment of works. Potentially impacted areas have been updated in this report.
- ▶ Operational rail noise and vibration:
  - The noise model has been updated to account for earthworks design changes since preparation of the Environmental Assessment model and to compare rail noise emissions with and without deferment of works.
  - The extent of potentially affected receivers has been updated, and the potential for  $L_{max}$  noise levels to affect residents located near turnout points has been discussed.
  - The operational noise and vibration mitigation strategy has been updated to account for the findings of the modelling update and additional noise emissions at turnout locations.



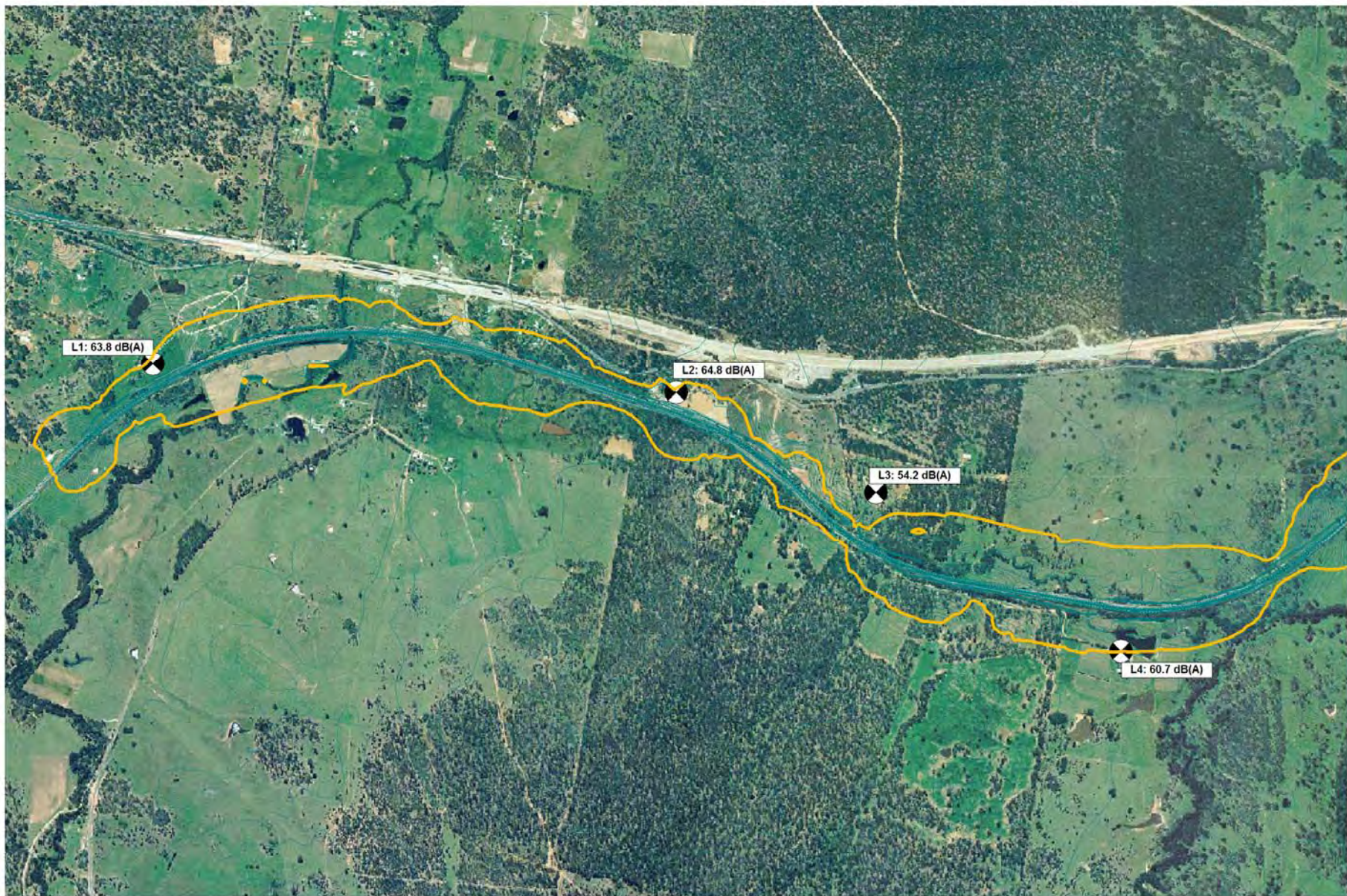
## 6. References

Department of Environment and Climate Change, 2007. *Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects*, <http://www.environment.nsw.gov.au/noise/>.



Appendix A

## Revised 2012 Noise Contours (Without Deferment of Works)



**Legend:**

-  60 dB(A)
-  Monitoring Location

**2012 Night-time Operational Levels**  
**(Without Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)



**Legend:**  
 60 dB(A)  
 Monitoring Location

**2012 Night-time Operational Levels**  
**(Without Deferment Of Works)**  
**60 dB(A) Criteria Contour**  
 1.5m above Ground Level  
 Neutral weather conditions.  
 All levels in dB(A)



**Legend:**

-  60 dB(A)
-  Monitoring Location

**2012 Night-time Operational Levels**

**(Without Deferment Of Works)**

**60 dB(A) Criteria Contour**

1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)



**Legend:**

-  60 dB(A)
-  Monitoring Location

**2012 Night-time Operational Levels**

**(Without Deferment Of Works)**

**60 dB(A) Criteria Contour**



**1.5m above Ground Level**

**Neutral weather conditions.**

**All levels in dB(A)**



**Legend:**

-  60 dB(A)
-  Monitoring Location

**2012 Night-time Operational Levels**  
**(Without Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)



Legend:

-  60 dB(A)
-  Monitoring Location

**2012 Night-time Operational Levels**  
**(Without Deferment Of Works)**  
**60 dB(A) Criteria Contour**



1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)



Appendix B  
Revised 2012 Noise Contours (With  
Deferment of Works)



**Legend:**

-  60 dB(A)  
Criteria Contour
-  Monitoring  
Location

**2012 Night-time Operational Levels**  
**(With Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)



**Legend:**



-  60 dB(A) Criteria Contour
-  Monitoring Location

**2012 Night-time Operational Levels**  
**(With Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)



**Legend:**

-  60 dB(A)  
Monitoring  
Location
- 

**2012 Night-time Operational Levels**  
**(With Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)

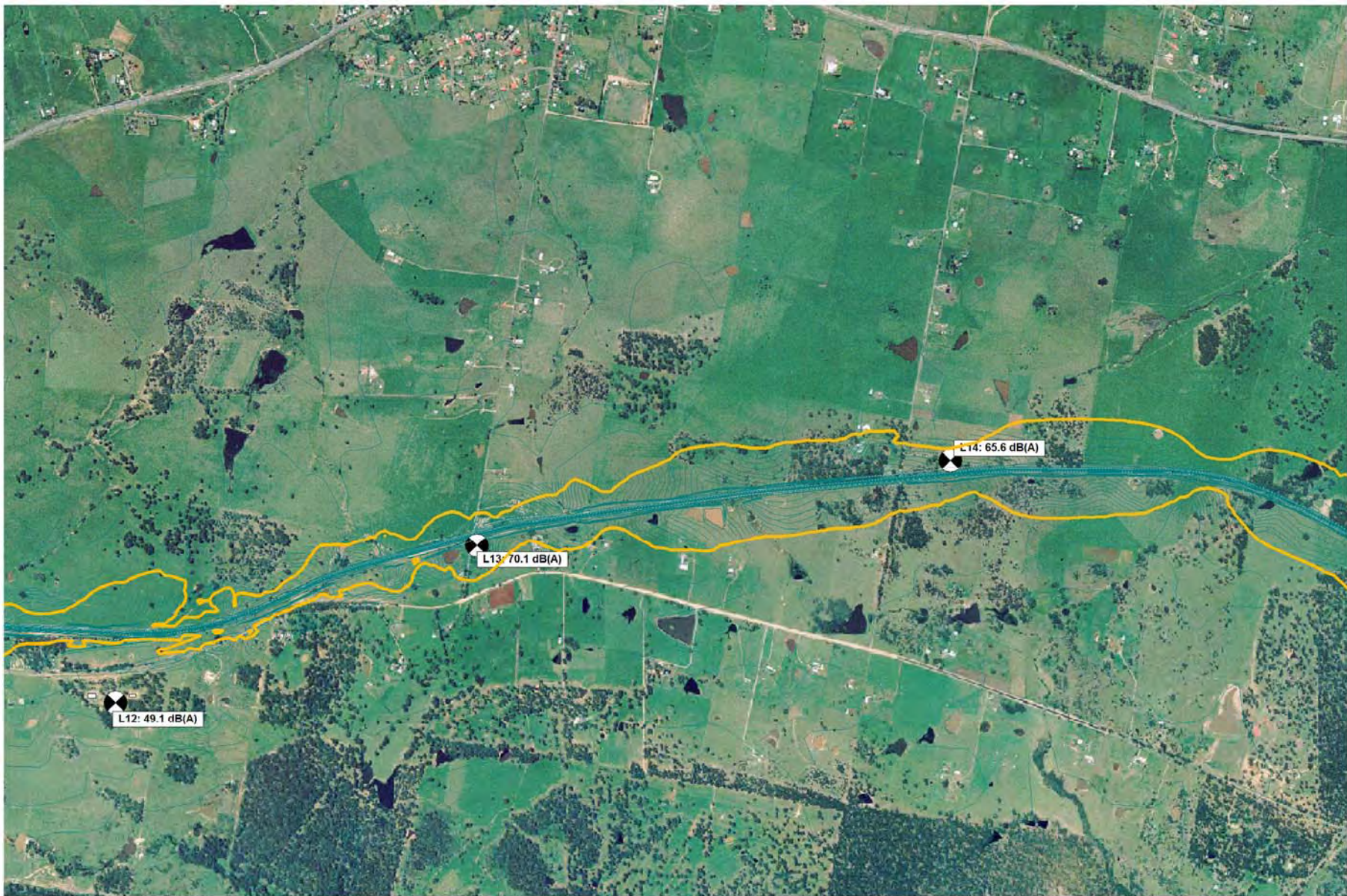


**Legend:**

-  60 dB(A)
-  Monitoring Location

**2012 Night-time Operational Levels**  
**(With Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)



**Legend:**

-  60 dB(A)
-  Monitoring Location

**2012 Night-time Operational Levels**  
**(With Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)



**Legend:**

-  60 dB(A) Criteria Contour
-  Monitoring Location

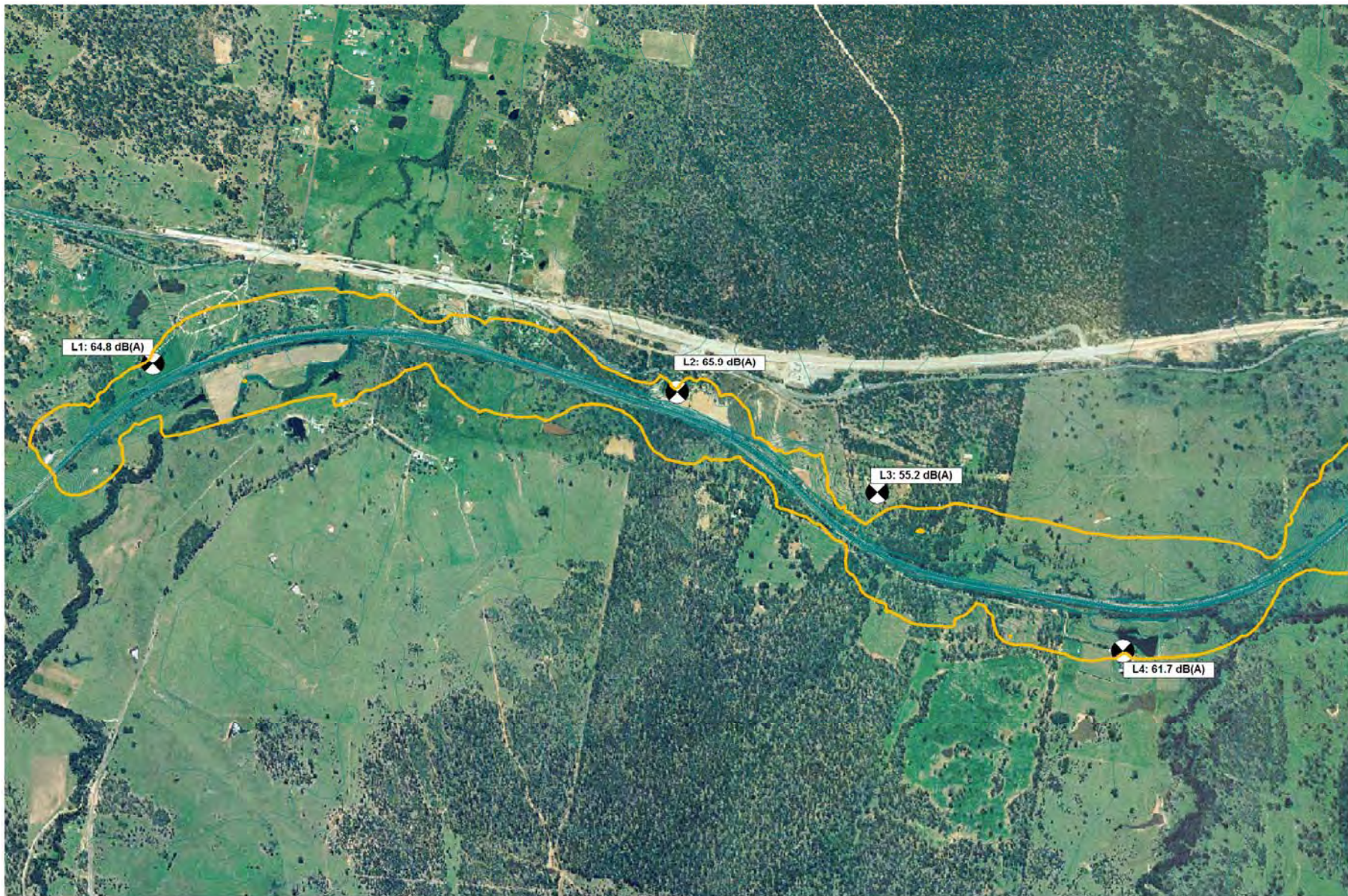
**2012 Night-time Operational Levels**  
**(With Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)



Appendix C

## Revised 2022 Noise Contours (Without Deferment of Works)



**Legend:**

-  60 dB(A)
-  Monitoring Location

**2022 Night-time Operational Levels**  
**(Without Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
 Neutral weather conditions.  
 All levels in dB(A)



**Legend:**

-  60 dB(A)
-  Monitoring Location

**2022 Night-time Operational Levels**  
**(Without Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
 Neutral weather conditions.  
 All levels in dB(A)



**Legend:**

-  60 dB(A)
-  Monitoring Location

**2022 Night-time Operational Levels**  
**(Without Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)

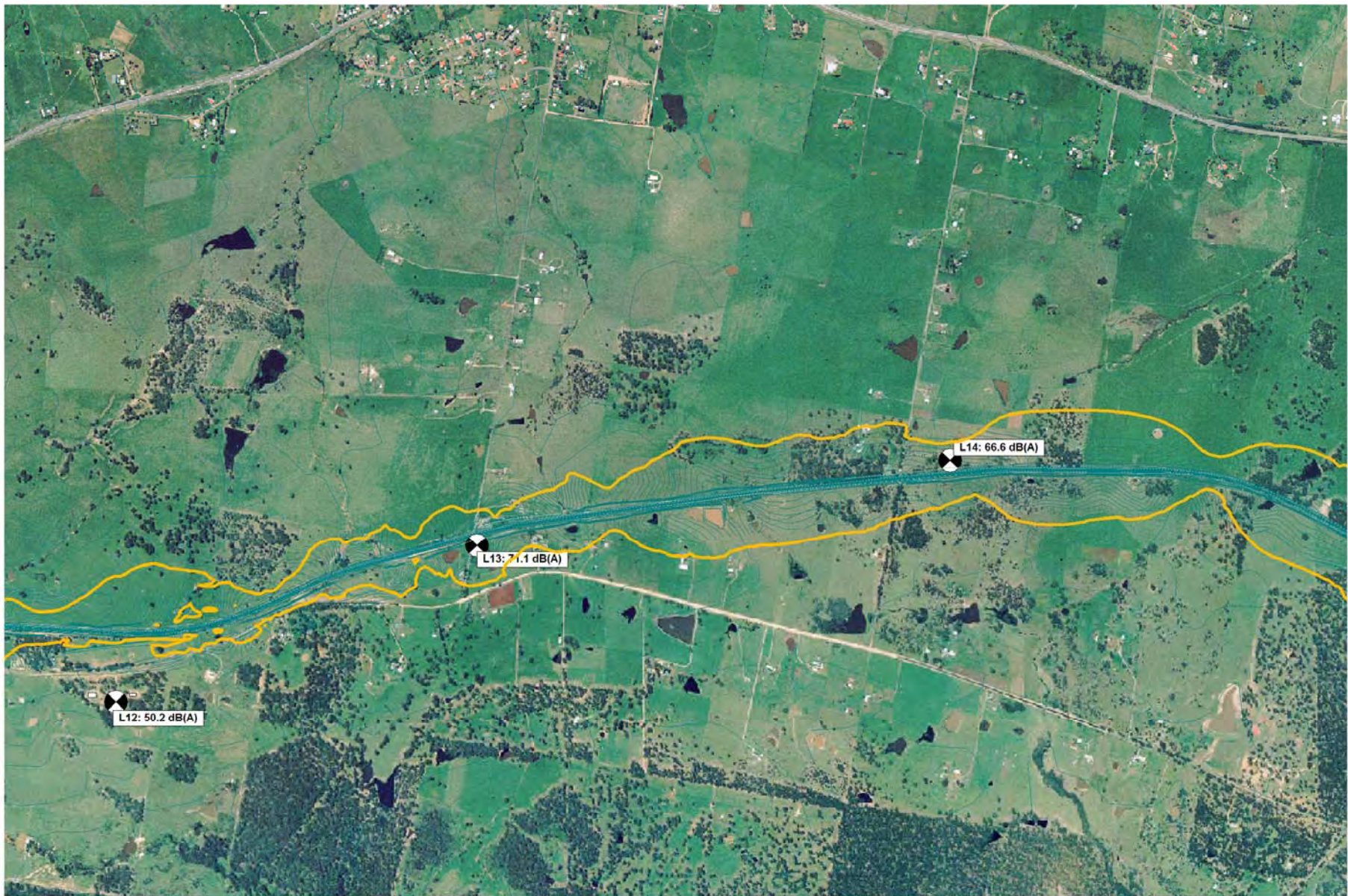


**Legend:**

-  60 dB(A)
-  Monitoring Location

**2022 Night-time Operational Levels**  
**(Without Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)



Legend:

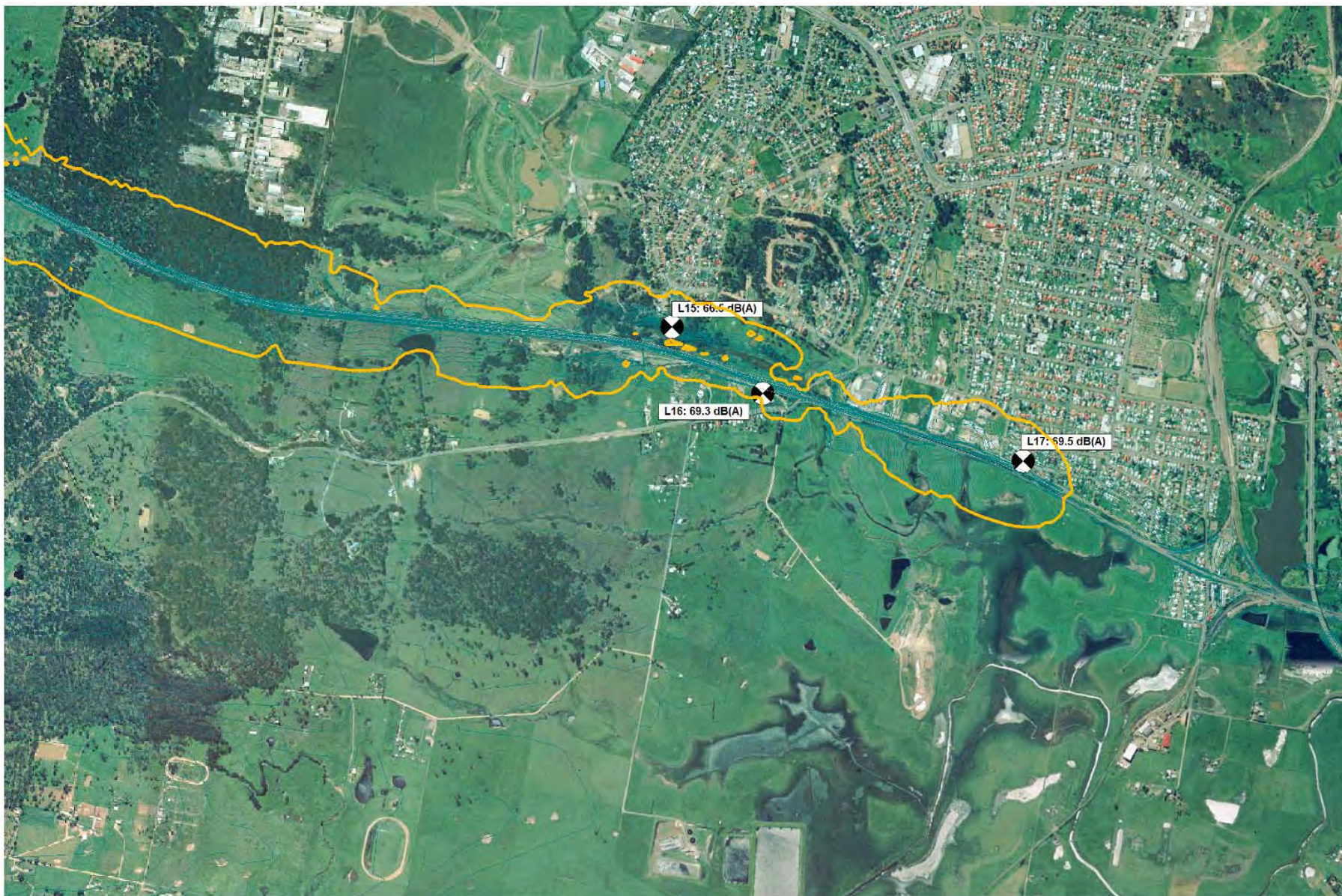
-  60 dB(A)
-  Monitoring Location

**2022 Night-time Operational Levels**

**(Without Deferment Of Works)**

**60 dB(A) Criteria Contour**

1.5m above Ground Level  
 Neutral weather conditions.  
 All levels in dB(A)



**Legend:**

-  60 dB(A)  
Criteria Contour
-  Monitoring  
Location

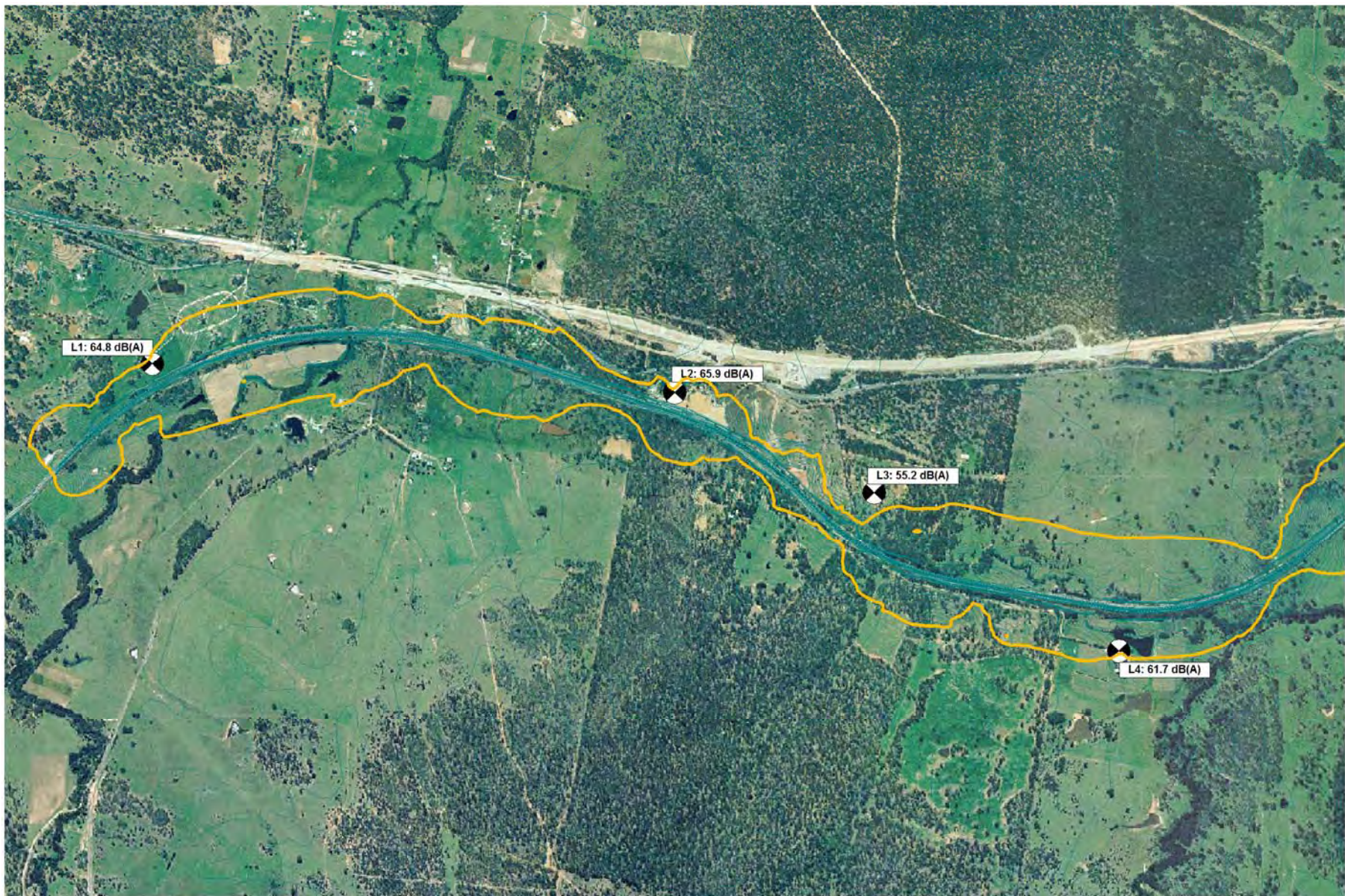
**2022 Night-time Operational Levels**  
**(Without Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)



Appendix D

## Revised 2022 Noise Contours (With Deferment of Works)



**Legend:**

-  60 dB(A)
-  Monitoring Location

**2022 Night-time Operational Levels**

**(With Deferment Of Works)**

**60 dB(A) Criteria Contour**

**1.5m above Ground Level**

**Neutral weather conditions.**

**All levels in dB(A)**



**Legend:**

-  60 dB(A)  
Criteria Contour
-  Monitoring  
Location

**2022 Night-time Operational Levels**

**(With Deferment Of Works)**

**60 dB(A) Criteria Contour**

**1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)**



**Legend:**

-  60 dB(A)
-  Monitoring Location

**2022 Night-time Operational Levels**  
**(With Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)

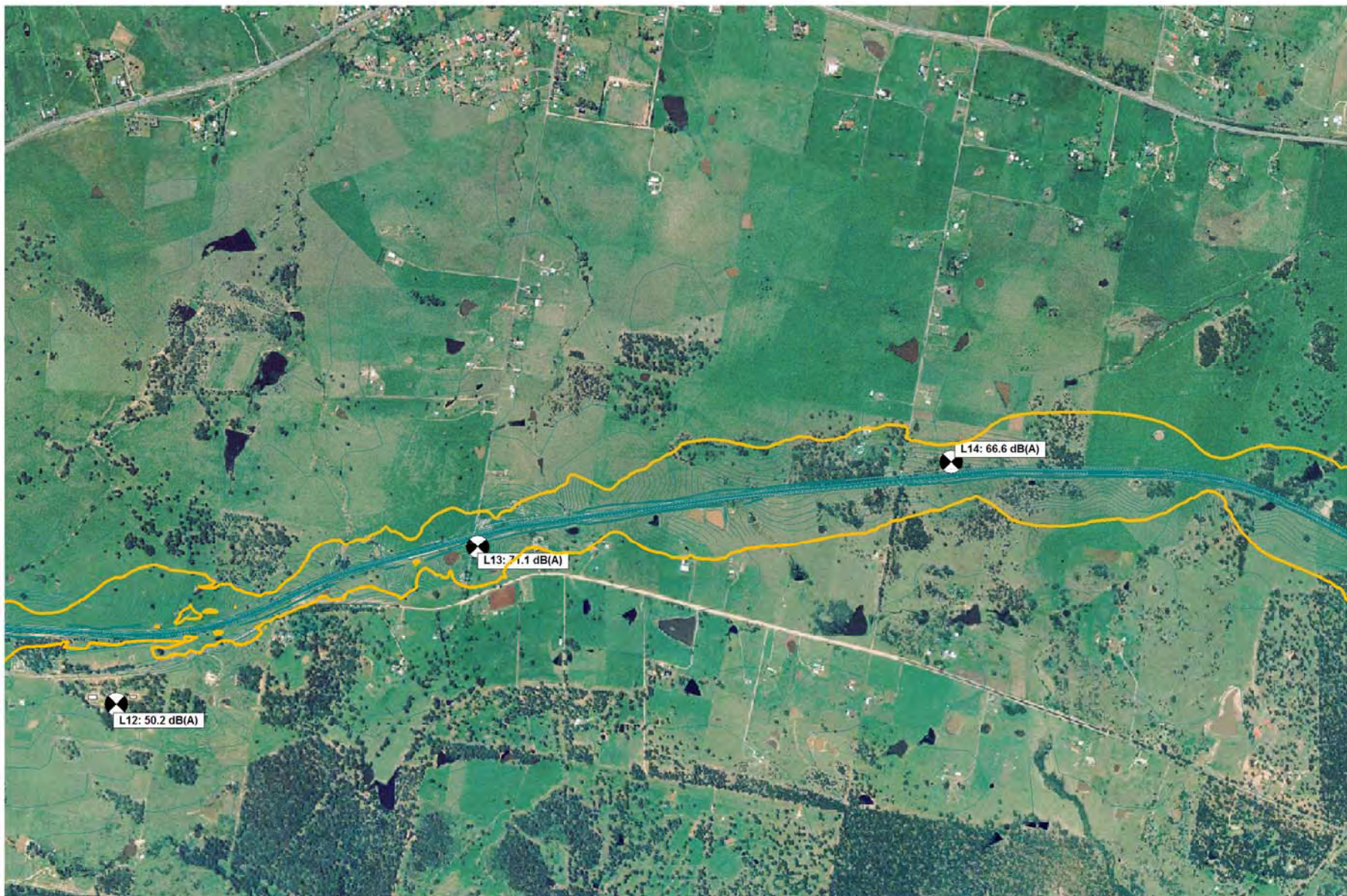


**Legend:**

-  60 dB(A)
-  Monitoring Location

**2022 Night-time Operational Levels**  
**(With Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)



**Legend:**

-  60 dB(A)
-  Monitoring Location

**2022 Night-time Operational Levels**  
**(With Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)



**Legend:**

-  60 dB(A)
-  Monitoring Location

**2022 Night-time Operational Levels**  
**(With Deferment Of Works)**  
**60 dB(A) Criteria Contour**

1.5m above Ground Level  
Neutral weather conditions.  
All levels in dB(A)