APPENDIX C

AIR QUALITY IMPACT ASSESSMENT

Pacific Environment Limited

Consulting • Technologies • Monitoring • Toxicology

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BOGGABRI COAL PROJECT MODIFICATION – AIR QUALITY IMPACT ASSESSMENT

1 INTRODUCTION

The Boggabri Coal Mine is located approximately 15 kilometres northeast of Boggabri in the Northwest Region of New South Wales (NSW). The Boggabri Coal Mine is operated by Boggabri Coal Pty Limited (Boggabri Coal), a wholly owned subsidiary of Idemitsu Australia Resources Pty Limited.

In 2009, Boggabri Coal applied for Project Approval for the Boggabri Coal Project, which was supported by the Continuation of Boggabri Coal Mine Environmental Assessment document dated December 2010 (Boggabri EA). The Boggabri Coal Project includes upgrades to the Boggabri Infrastructure Facilities, including the construction and use of a coal handling and processing plant (CHPP), by-pass crusher, associated coal stockpiles and private rail loop and spur.

In July 2012, Project Approval was granted for the Boggabri Coal Project by the Planning Assessment Commission (PAC) of NSW under delegation from the NSW Minister for Planning and Infrastructure pursuant to section 75J of the Environmental Planning and Assessment Act, 1979 (EP&A Act). Under Project Approval 09_0182, the Boggabri Coal Mine is approved to extract up to 8.6 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal and transport up to 7 Mtpa of product coal from the site until 31 December 2033.

The adjacent Tarrawonga Coal Mine is owned and operated by Tarrawonga Coal Pty Ltd (TCPL). In March 2011, TCPL submitted a Project Application and Environmental Assessment (Tarrawonga Coal Project EA) to the DP&I seeking approval under Part 3A of the EP&A Act (Project Application No. 11_0047) for the Tarrawonga Coal Project. A key component of the Tarrawonga Coal Project is the construction and use of a services corridor (including a haul road) linking it to the Boggabri Infrastructure Facilities. Coal trucks would use the services corridor to access the Boggabri Infrastructure Facilities. At these facilities, up to 3 Mtpa of coal from the Tarrawonga Coal Project would be processed and loaded onto trains for off-site transport.

In January 2013, Project Approval (11_0047) was granted for the Tarrawonga Coal Project by the PAC under delegation from the NSW Minister for Planning and Infrastructure pursuant to section 75J of the EP&A Act.

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The Boggabri EA did not include the receipt of coal from the Tarrawonga Coal Project, or the associated processing and transport. As such, a modification to the project approval (09_0182) for the Boggabri Coal Project is required (the Modification).

The Tarrawonga Coal Project EA included an assessment of the potential air quality impacts associated with the handling and processing of Tarrawonga coal at the Boggabri Infrastructure Facilities.

This report provides a summary of potential changes to air quality impacts predicted in the Boggabri EA due to the Modification.

1.1 Summary of Previous Assessment

1.1.1. Boggabri Coal Project

PAEHolmes completed a detailed air quality impact assessment (**PAEHolmes, 2010**) as input to the Boggabri EA. Potential air quality impacts for years 1, 5, 10 and 21 of the Boggabri Coal Project (with Year 1 proposed to commence in 2012) were assessed.

The results of the assessment indicated that over the 21 year approval period of the Boggabri Coal Project, there were privately-owned residences predicted to experience particulate matter deposition rates or concentrations above the relevant impact assessment criteria.

These impacts were assessed and approved by the PAC subject to the Boggabri Coal Project being managed in accordance with the relevant conditions of Schedule 3 of Project Approval (09_0182).

1.1.2. Tarrawonga Coal Project

PAEHolmes completed a detailed air quality impact assessment (**PAEHolmes, 2012**) as part of the Tarrawonga Coal Project EA. Potential air quality impacts for years 2, 4, 6 and 16 of the Tarrawonga Coal Project (with Year 1 proposed to commence in 2012) were assessed.

The assessment included the potential impacts associated with the processing and handling of Tarrawonga coal (3 Mtpa) at the Boggabri Infrastructure Facilities (i.e. the activities associated with the Modification).

The results of the assessment indicated that there were no privately-owned receivers predicted to experience 24-hour PM_{10} concentrations, annual average PM_{10} concentrations, TSP concentrations or dust deposition levels above the relevant assessment criteria due to the Tarrawonga Coal Project-only (including the activities associated with the Modification) (**PAEHolmes, 2012**).

Cumulative emissions from the Boggabri Coal Project, the Tarrawonga Coal Project and the Maules Creek Coal Project were predicted to result in PM_{10} concentrations that would exceed the 24-hour and annual PM_{10} criteria at one privately-owned residence, and the 24-hour PM_{10} criterion at another receiver.

2 OVERVIEW OF MODIFICATION

The Modification to Project Approval (09_0182) for the Boggabri Coal Project involves the processing of up to 3 Mtpa of ROM coal from the Tarrawonga Coal Project at the Boggabri Infrastructure Facilities and the loading of the product coal onto trains for off-site transport. The location of the Boggabri Infrastructure Facilities, the extent of the approved Boggabri Coal Mine and Tarrawonga Coal Project are shown on **Figure 2.1**.

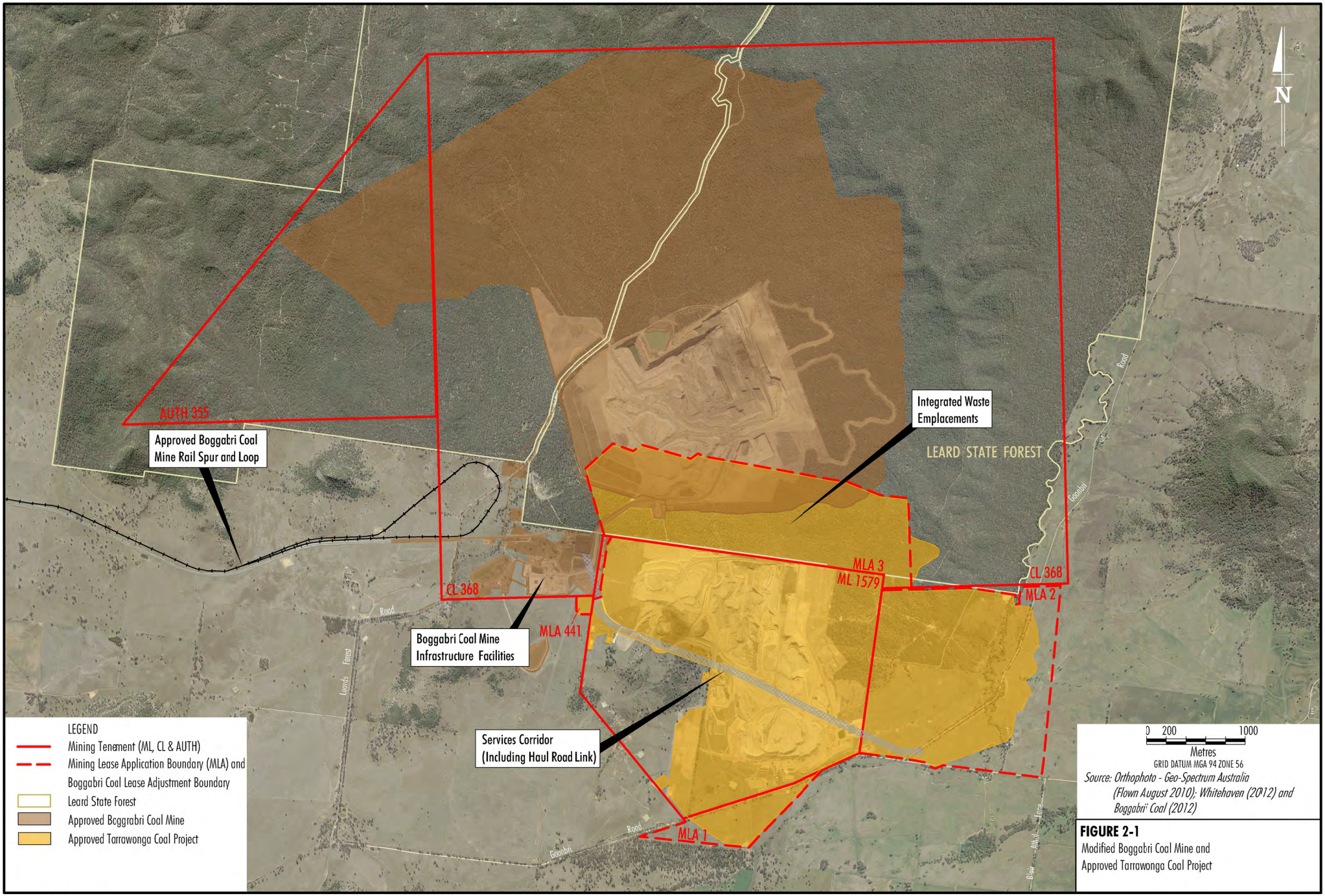

FIGURE 2-1
Modified Boggabri Coal Mine and Approved Tarrawonga Coal Project

WHC-12-08_BM AQA_101D

3 EXISTING AIR QUALITY ENVIRONMENT

A detailed description of the existing ambient air quality environment is provided in **PAEHolmes (2010)** and **PAEHolmes (2012)**. Ambient air quality monitoring data are collected at 29 dust deposition gauge locations and two high volume air sampler locations in the vicinity of the Boggabri Coal Mine and Tarrawonga Coal Mine. The data indicate that air quality is compliant with the annual average impact assessment criteria. There are occasions when 24-hour PM_{10} concentrations are elevated above the relevant 24-hour PM_{10} impact assessment criterion, however these can be mostly attributed to extreme weather conditions (high winds), regional dust storms or bushfires.

4 ASSESSMENT OF IMPACTS FROM MODIFICATION

4.1 Emission Estimates for Modification

The Modification would potentially result in increased dust emissions from the Boggabri Coal Mine due to the:

- Unloading and loading of Tarrawonga ROM coal at the Boggabri Infrastructure Facility.
- Screening and crushing of Tarrawonga ROM coal at the Boggabri Infrastructure Facility.
- Unloading and loading of Tarrawonga product coal on product stockpiles and at the Boggabri rail loop facility.
- Wind erosion and maintenance of stockpiles of Tarrawonga coal at the Boggabri Infrastructure Facility.

The estimated annual dust emissions (expressed as TSP in kg/annum) from the activities associated with the Modification (as described above) have been estimated based on the proposed coal processing rate of 3 Mtpa and are shown in **Table 4.1**. These emissions are consistent with those predicted in **PAEHolmes (2012)**.

Table 4.1: Summary of estimated TSP emissions from the Modification (kg/annum)

Activity	TSP Emissions
Unloading ROM coal at ROM pad	143,496
Loading coal to hopper with FEL	143,496
Screening	37,500
Crushing	30,000
Loading Product coal stockpile	143,496
Dozers on product stockpiles	242,694
Rail Load Out	540
Wind Erosion ROM coal stockpiles	143
Wind Erosion Product coal stockpiles	143
Total	**741,510**

The estimated maximum annual dust emissions from the Modification have been compared with the total emissions for years 5 and 10 of the Boggabri Coal Project (**PAEHolmes, 2010**) (**Table 4.2**). The total emissions from the proposed Modification would result in an increase in annual dust emissions of up to approximately 13% comparative the estimates for the Boggabri Coal Project.

Table 4.2: Annual TSP Emissions Estimates

	Continuation of BCM Year 5	Continuation of BCM Year 10
TSP Emissions (kg/annum)	5,619,260	7,512,262
Modification as % of Continuation of BCM	13%	10%

4.2 Predicted Ground Level Concentrations from Modification

The potential impacts associated with the Modification were assessed in the air quality assessment for the Tarrawonga Coal Project (**PAEHolmes, 2012**). Dispersion modelling predictions were made for the activities associated with the Modification based on the emissions outlined in **Table 4.1**.

Dispersion model predictions at each residence location for the Modification in isolation are presented in **Table 4.3**. Refer to **Appendix A** for residence locations. The contribution of the Modification to annual average PM_{10} concentrations is predicted to be less than 1 µg/m³ at all privately-owned residences, except residences 45, 43 and 44b where annual average PM_{10} concentrations are predicted to be 2.8 µg/m³, 1.7 µg/m³ and 1.1 µg/m³ respectively.

Dispersion model predictions at relevant residence locations for the Boggabri Coal Project plus the Modification are presented in **Table 4.4**. It is predicted that the Boggabri Coal Project plus the Modification would result in 24-hour PM_{10} concentrations above the impact assessment criterion at privately-owned residence 45 (Boggabri ID 54). However, 24-hour PM_{10} concentrations were predicted to exceed the impact assessment criterion at this location due to the Boggabri Coal Project alone.

This level of impact was assessed and approved by the PAC subject to the Boggabri Coal Project being managed in accordance with the relevant conditions of Schedule 3 of Project Approval (09_0182). This includes Condition 25, which provides property acquisition rights to the owner (McGregor) of residence 45 (Boggabri ID 54).

It should be noted that the results presented in **Table 4.4** are based on the trucking of coal from the Boggabri Coal Mine to the existing rail loadout facility on the Werris Creek Mungindi Railway, which was the base case scenario assessed in the Boggabri EA. **PAEHolmes (2010)** also assessed the potential air quality impacts associated with the use of the private Boggabri rail spur (for year 5 only), and determined that these impacts would be less than the base case scenario. On this basis, the result presented in **Table 4.4** would be conservative as only the rail spur would be used to transport coal for the Modification.

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Table 4.3: Predicted Ground Level Concentrations from Boggabri Modification

Residence ID	24-Hour PM10	Annual PM10	Annual TSP	DD
31	1.4	0.2	0.4	0.02
33	2.8	0.4	0.8	0.01
38a	2.7	0.4	0.6	0.01
38c	4.9	0.5	0.9	0.02
39	2.9	0.4	0.6	0.01
43	11.0	1.7	2.7	0.04
44a	4.5	0.7	1.0	0.01
44b	6.0	1.1	1.7	0.03
45	15.5	2.8	4.7	0.07
50	4.9	0.4	0.7	0.01
53	0.9	0.1	0.1	0.00
54	0.5	0.0	0.1	0.00
60a	1.5	0.1	0.2	0.00
60b	0.6	0.1	0.1	0.00
65a	1.5	0.1	0.3	0.01
65b	1.6	0.2	0.3	0.01
78	2.1	0.2	0.4	0.01
79a	4.6	0.7	1.1	0.02
79b	1.8	0.3	0.4	0.01
80	2.2	0.3	0.4	0.01
83a	5.8	0.9	1.4	0.02
83b	5.7	0.8	1.3	0.02
86	2.9	0.3	0.5	0.01
87a	1.8	0.3	0.4	0.01
87b	3.1	0.5	0.8	0.01
88	6.6	0.7	1.2	0.02
89	2.3	0.4	0.6	0.01
92a	2.3	0.1	0.2	0.00
92b	1.9	0.1	0.2	0.00
92c	1.4	0.1	0.2	0.00
112	2.2	0.1	0.2	0.00
115	1.0	0.1	0.2	0.00
118	2.6	0.3	0.4	0.01
1b	4.6	0.4	0.8	0.02
1c	4.8	0.5	0.9	0.03
1d	3.1	0.3	0.6	0.02
1e	2.2	0.2	0.3	0.01
1f	1.3	0.2	0.4	0.00
1h	5.6	0.9	1.4	0.02
1i	1.7	0.2	0.3	0.00
1j	3.6	0.3	0.5	0.01
1k	3.1	0.3	0.5	0.01
2a	16.7	2.1	3.9	0.06
2b	40.9	8.7	16.9	0.27
2d	0.7	0.1	0.1	0.00

Notes: Residence IDs consistent with Tarrawonga Coal Project EA labelling. Receivers with prefix 1 and 2 (eg. 1a and 2a) are mine-owned.

Table 4.4: Predicted Ground Level Concentrations from Boggabri Continuation plus Modification

Residence ID	24-Hour PM10		Annual PM10		TSP		DD	
	Year 5	Year 10	Year 5	Year 10	Year 5	Year 10	Year 5	Year 10
31	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
33	18	17	3	4	4	4	0.1	0
38a	16	14	1	2	2	2	0.0	0
38c	18	18	2	3	3	3	0.0	0
39	15	15	1	3	3	3	0.0	0
43	33	29	5	7	6	7	0.0	0
44a	45	42	11	9	11	9	0	0
44b	22	23	4	6	6	6	0.0	0
45	**65**	**67**	18	19	20	20	0.2	0
50	45	31	7	6	8	7	0.1	0
53	29	25	3	3	4	3	0.1	0
54	14	13	2	2	2	2	0.0	0
60a	21	17	2	2	3	2	0.1	0
60b	20	19	3	2	3	3	0.1	0
65a	16	13	3	2	3	2	0.1	0
65b	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
78	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
79a	19	17	3	3	3	3	0.0	0
79b	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
80	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
83a	22	25	5	5	5	5	0.0	0
83b	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
86	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
87a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
87b	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
88	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
89	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
92a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
92b	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
92c	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
112	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
115	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
118	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1b	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1c	**55**	46	9	7	10	8	0.5	1
1d	35	25	7	6	8	6	0.1	0
1e	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1f	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1h	**53**	47	13	10	14	11	0.1	0
1i	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1j	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1k	26	19	4	3	4	4	0.1	0
2a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2b	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2d	28	21	3	2	3	2	0.1	0

Notes: Residence IDs consistent with Tarrawonga Coal Project EA labelling. Receivers with prefix 1 and 2 (eg. 1a and 2a) are mine-owned.

N/A – No predictions provided in relevant EA or contribution is zero.

4.3 Cumulative Impacts as a result of Modification

The cumulative impacts associated with the Modification were assessed in the air quality assessment for the Tarrawonga Coal Project (**PAEHolmes, 2012**). The cumulative assessment included emissions associated with the following:

- The Tarrawonga Coal Project.
- The Modification.
- The Boggabri Continuation Project.
- The Maules Creek Coal Project.
- Other sources (conservatively based on existing monitoring data which includes contributions from existing mining operations).

The assessment identified the potential for 24-hour PM_{10} concentrations above the impact assessment criteria at residence 45 (Boggabri ID 54) (as a result of the Boggabri Coal Continuation Project alone) and residence 44a (Boggabri ID 86) (as a result of cumulative contributions from the Boggabri Continuation Project, the Modification and the Tarrawonga Coal Project). It was also concluded that cumulative impacts may occur when background dust levels are high, although this is difficult to precisely predict.

Potential 24-hour PM_{10} exceedances would be managed by the use of the real-time and proactive dust management system required in accordance with Condition 31 of Schedule 3 of Project Approval (09_0182).

Cumulative annual average PM_{10} concentrations above the impact assessment criteria were also identified at residence 45 (Boggabri ID 54) (as a result of cumulative contributions from the Boggabri Continuation Project, the Modification, the Tarrawonga Coal Project, the Maules Creek Coal Project and other sources). The relative contributions of all sources to the cumulative annual average prediction at residence 45 are shown in **Table 4.5**. As described above, the owner (McGregor) of residence 45 (Boggabri ID 54) has air quality property acquisition rights under Condition 25 of Schedule 3 of Project Approval (09_0182).

Table 4.5: Cumulative Annual Average PM_{10} Contributions ($\mu g/m^3$)

ID	Tarrawonga Coal Project	Boggabri Coal Continuation Project[a]	Modification	Maules Creek Coal Project[b]	Non-Mining Sources	Cumulative PM_{10} Concentration
45	4	15	3	n/a	12	34

[a] PM_{10} concentration from Boggabri EA (**PAEHolmes, 2010**).

[b] PM_{10} concentration from Maules Creek Coal Project EA (**PAEHolmes, 2011**).

N/A – No predictions provided in relevant EA or contribution is zero.

5 CONCLUSIONS

The Modification involves the processing and handling of up to 3 Mtpa of Tarrawonga coal at the Boggabri Infrastructure Facilities. Potential air quality impacts associated with the Modification were assessed as part of the air quality impact assessment for Tarrawonga Coal Project.

The potential impacts from activities associated with the Modification have been assessed. The activities associated the Modification were not predicted to result in additional air quality impacts, comparative to those identified in the Boggabri EA. This level of impact was assessed and approved by the PAC subject to the Boggabri Coal Project being managed in accordance with the relevant conditions of Schedule 3 of Project Approval (09_0182).

The cumulative impacts associated with the Modification were assessed in the air quality assessment for the Tarrawonga Coal Project (**PAEHolmes, 2012**), with two privately-owned receivers expected to be impacted.

Air quality impacts from the Boggabri Coal Mine will be managed using a best practice real-time dust management system in accordance with the requirements of the Project Approval (09_0182) for the Boggabri Coal Project.

As the proposed Modification was included in the Tarrawonga Coal Project assessment, no additional mitigation measures, beyond what is currently required at the Boggabri Coal Mine, are recommended as a result of the proposed Modification.

6 REFERENCES

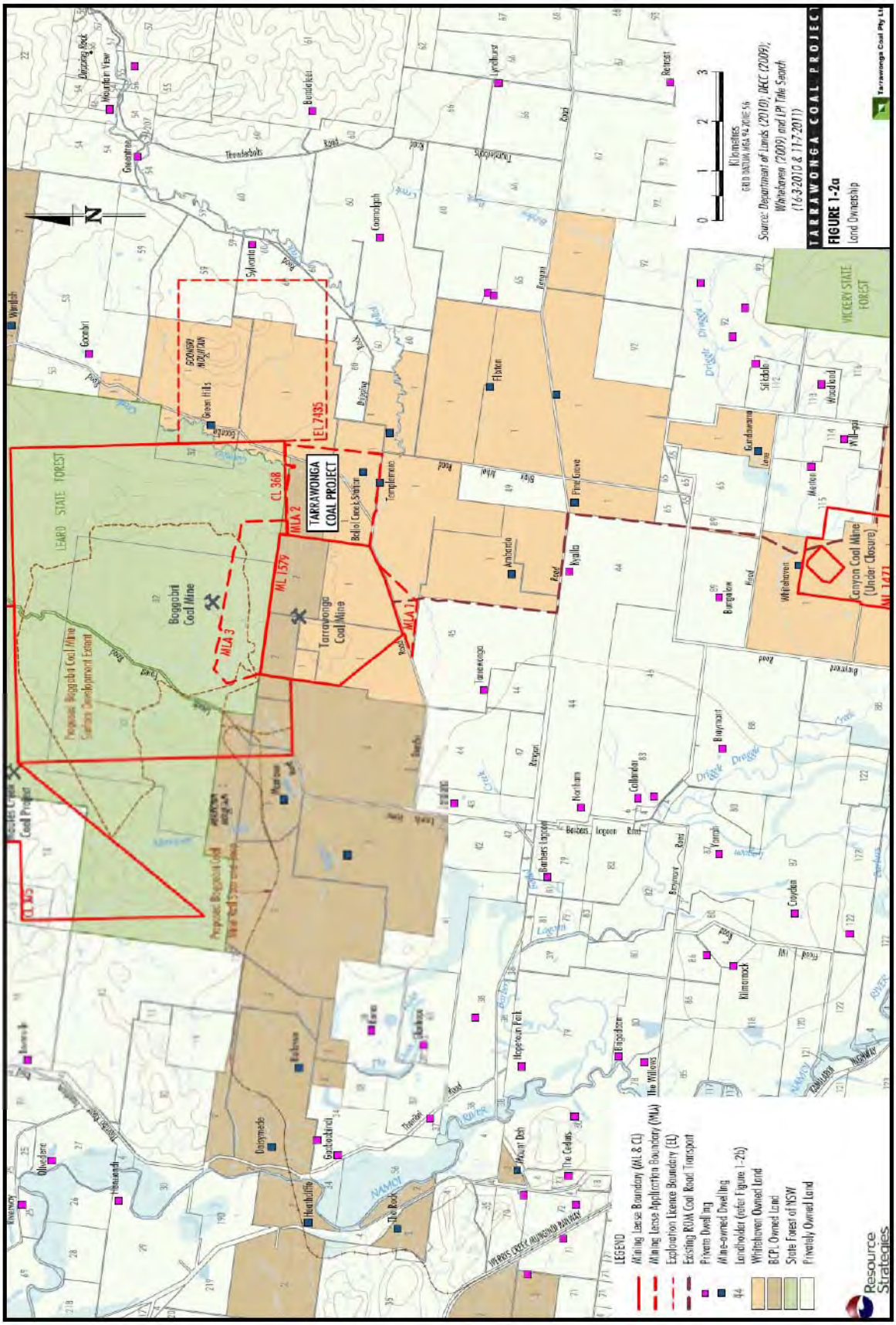
Department of Environment and Conservation (2005) "Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales". New South Wales EPA.

PAEHolmes (2010) "Air Quality Impact Assessment: Continuation of Boggabri Coal Mine" 30 November 2010. Job No. 3362. Prepared for Hansen Bailey on behalf of Boggabri Coal Pty Limited.

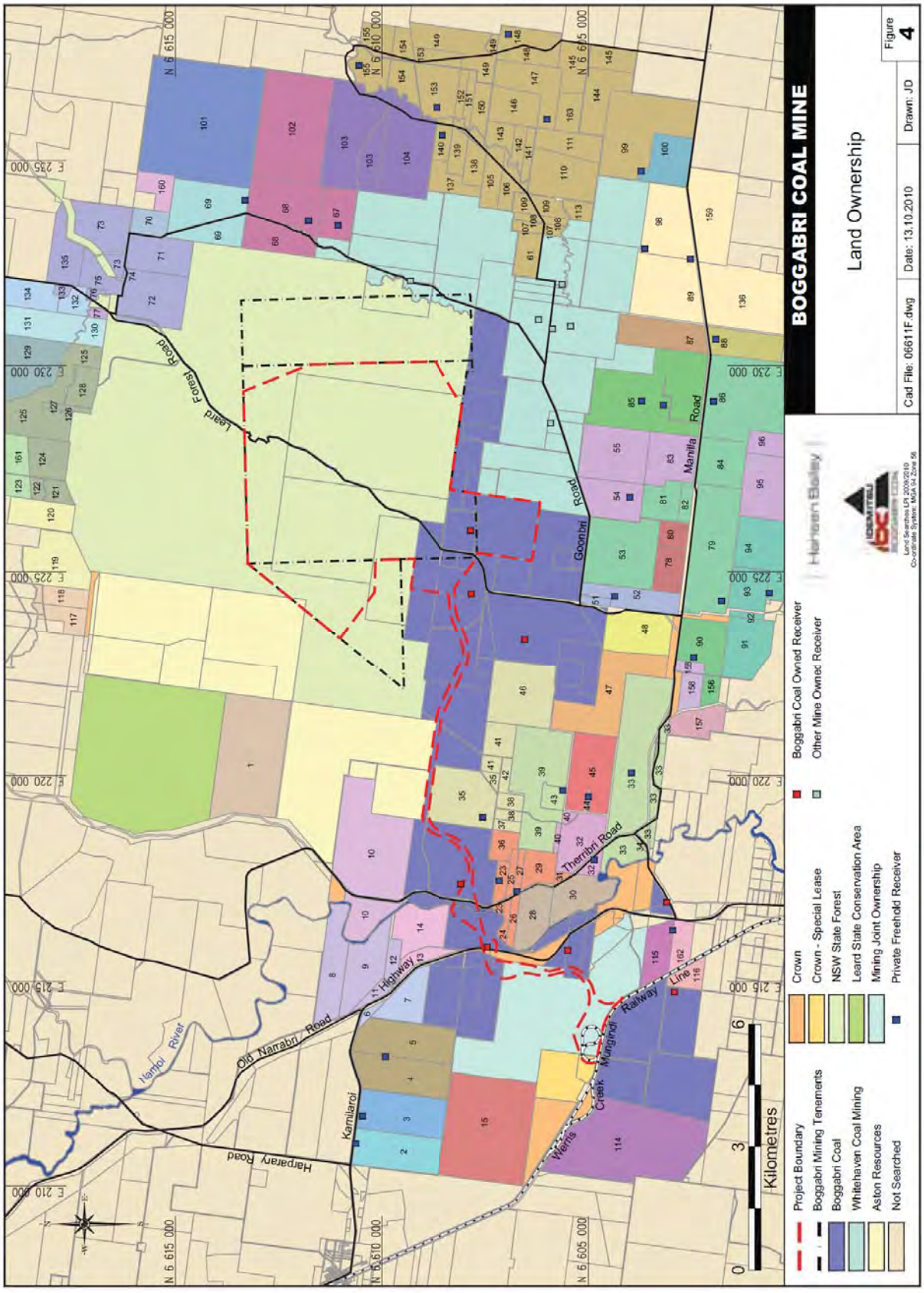
PAEHolmes (2012) "Tarrawonga Coal Project - Air Quality and Greenhouse Gas Assessment" 9 January 2012. Prepared for Resource Strategies on behalf of Tarrawonga Coal Pty Limited.

APPENDIX A: LOCATION OF RESIDENCES - LAND OWNERSHIP FIGURES FROM TARRAWONGA AND BOGGABRI PROJECT APPROVALS

APPENDIX 5
LAND OWNERSHIP PLAN



APPENDIX 4: LAND OWNERSHIP



APPENDIX 4: LAND OWNERSHIP