Vickery Coal Project

Environmental Impact Statement

APPENDIX C

NOISE AND BLASTING ASSESSMENT

Resource Strategies

WHITEHAVEN COAL

ACOUSTICS AND AIR

VICKERY COAL PROJECT
ENVIRONMENTAL IMPACT STATEMENT
NOISE & BLASTING IMPACT ASSESSMENT

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PREPARED FOR

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1 INTRODUCTION

The Vickery Coal Project (the Project) is owned by Whitehaven Coal Limited (Whitehaven) and is located in the Gunnedah basin approximately 25 kilometres (km) north of Gunnedah in New South Wales (NSW) (Figure 1-1).

Limited underground mining was conducted at the Project between 1986 and March 1991. Beginning in 1991, open cut mining occurred at the Project which extracted approximately 4 million tonnes of coal. In May 1998, at the approval of the NSW Department of Primary Industries, mining operations were suspended and rehabilitation activities began. Rehabilitation activities are now complete and the site is currently in care and maintenance.

Whitehaven acquired 100% of Coal Lease (CL) 316 and Authorisation (AUTH) 406 from Rio Tinto Limited in January 2010. Whitehaven plan to recommence mining activities at the Vickery Coal Mine.

This assessment addresses potential noise and blasting impacts associated with the Project. The proposed life of the Project is 30 years, commencing 2014. The approximate extent of the Project surface development (incorporating the existing and approved development) is shown on Figure 1-2.

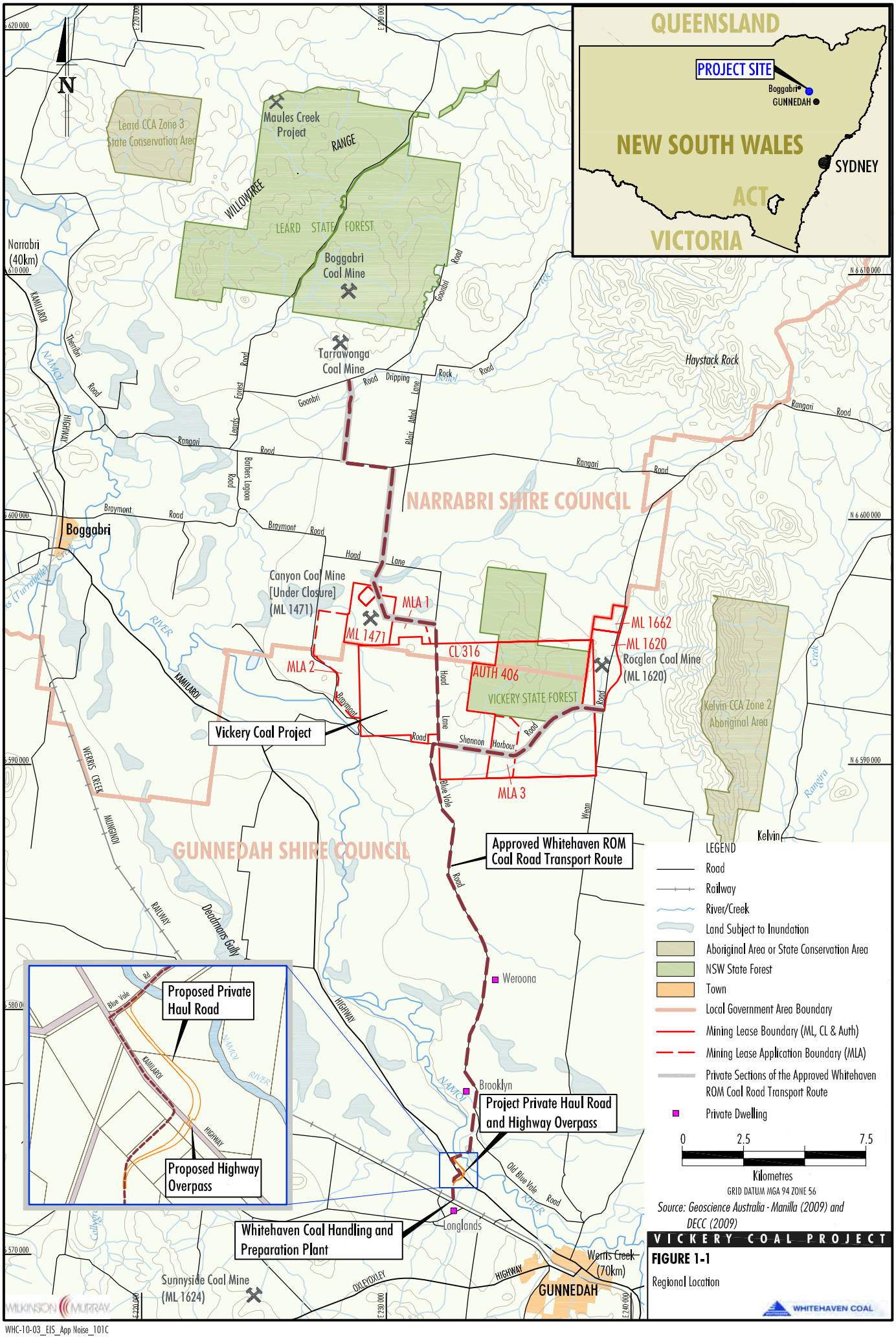
A glossary of terms and definitions is provided as Appendix A of this report.

1.1 Objectives of this Study

The primary objective of this study is to assess the potential noise and blasting impacts associated with the Project by addressing the Director-General's Requirements issued by the NSW Department of Planning and Infrastructure (DP&I) on 19 January 2012, outlined as follows:

> ***Noise, Vibration & Blasting*** *- including a quantitative assessment of potential:*
>
> - *construction, operational and off-site transport noise impacts;*
> - *blasting impacts on people, livestock and property;*
> - *reasonable and feasible mitigation measures (including assessment of restricted night-time operations), including evidence that there are no such measures available other than those proposed; and*
> - *monitoring and management measures, in particular real-time, attended noise monitoring and predictive meteorological forecasting;*

The Namoi Catchment Management Authority and Roads and Maritime Service have also provided agency comments for the noise assessment. These comments are outlined in Table 1-1.



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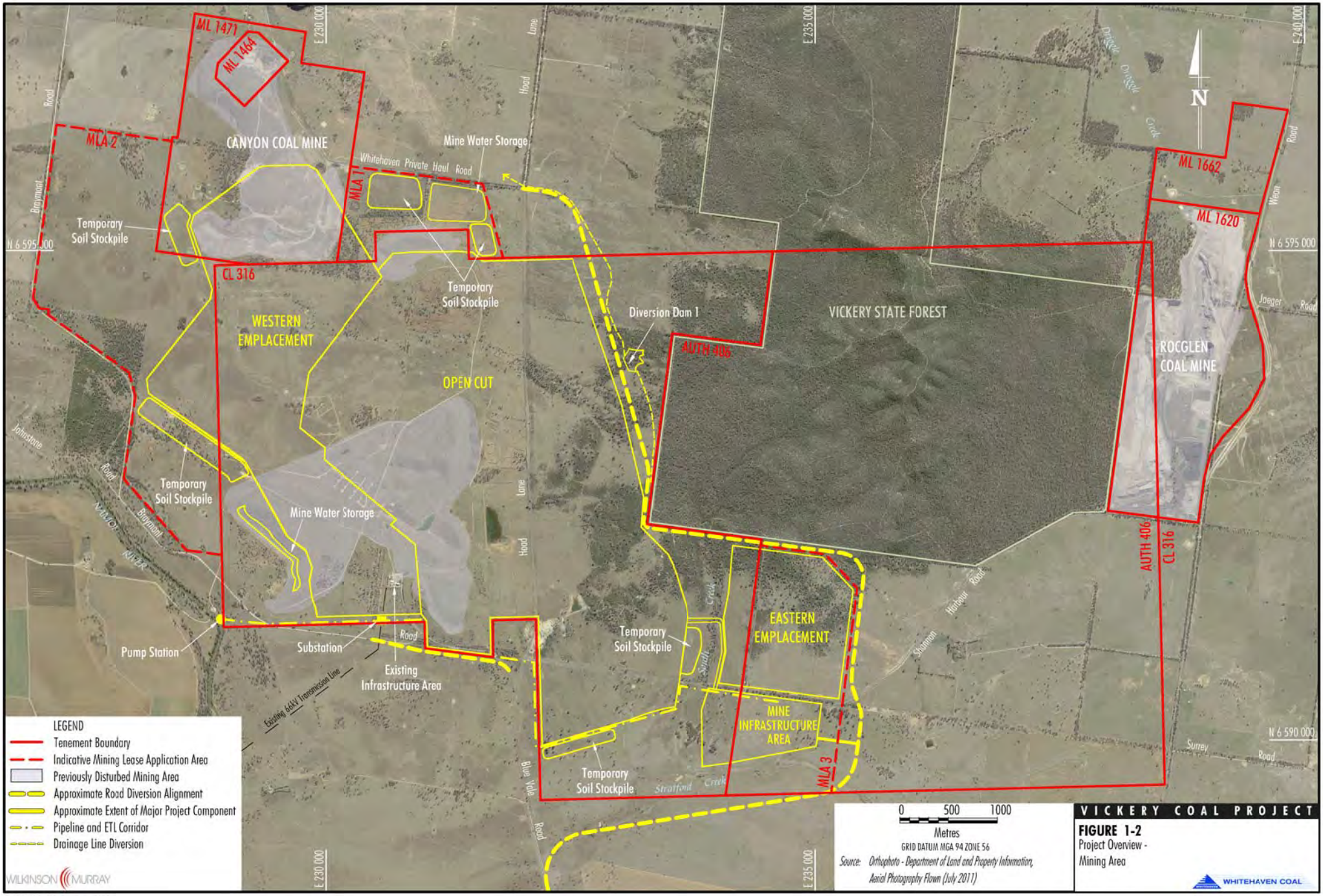

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Table 1-1 Agency Comments – Noise and Blasting

Source	Comment
	General
Namoi Catchment Management Authority	*Noise and Blasting, Air Quality and Greenhouse Gas, Traffic and Transport, Visual Amenity, Social Impact Assessment and Economics,* *The EIS should address and consider the potential impacts, mitigation measures and safeguards on all of the above issues especially with regard to impacts on both the local and broader catchment community.* *The EIS needs to consider the impacts, safeguards and contributions especially in consideration of the catchment Targets within the Namoi CAP (2010-2020):* ***People 1:*** *Natural resource management decisions contribute to social wellbeing.* ***People 2:*** *There is an increase in the adaptive capacity of the catchment Community.* *The EIS needs to undertake a thorough and rigorous pre and post mining risk assessment with respect to long term site specific and cumulative impacts of the above issues on local and catchment communities.*
	Road
Roads and Maritime Service	*A detailed traffic study should be undertaken that takes into account the key issues relevant to the scale of this proposal as set out in Table 2.1 of the Roads and Traffic Authorities current Guide to Traffic Generating Developments. This should include information relating to:* • *…Road Traffic Noise*

2 PROJECT OVERVIEW

2.1 General Description

The main activities associated with the development of the Project would include:

- development and operation of an open cut mine within CL 316, AUTH 406, Mining Lease (ML) 1471, Mining Lease Application (MLA) 1, MLA 2 and MLA 3;
- use of conventional mining equipment, haul trucks and excavators to remove up to 4.5 million tonnes per annum (Mtpa) of run of mine (ROM) coal and approximately 48 million bank cubic metres (Mbcm) of waste rock per annum from the planned open cut;
- placement of waste rock (i.e. overburden and interburden/partings) within external emplacements to the west and east of the planned open cut (i.e. Western Emplacement and Eastern Emplacement) and within mined-out voids;
- construction and use of on-site coal crushing, screening and handling facilities to produce sized ROM coal;
- transport of ROM coal by haulage trucks to the Whitehaven Coal Handling and Preparation Plant (CHPP) on the outskirts of Gunnedah (approximately 20 km to the south of the Project open cut) for processing;
- use of an on-site mobile crusher for coal crushing and screening of up to 150,000 tonnes (t) of domestic specification coal per annum for direct collection by customers at the Project site;
- use of an on-site mobile crusher to produce up to approximately 90,000 cubic metres (m^3) of gravel materials per annum for direct collection by customers at the Project site;
- construction and use of water supply bores, and a surface water extraction point on the bank of the Namoi River and associated pump and pipeline systems;
- construction and use of new dams, sediment basins, channels, dewatering bores and other water management infrastructure required to operate the mine;
- construction and use of new soil stockpile areas, laydown areas and gravel/borrow areas;
- construction of a 66 kilovolt (kV)/11 kV electricity substation and 11 kV electricity transmission line;
- transport of coarse rejects generated within the Whitehaven CHPP via truck to the Project for emplacement within an in-pit emplacement area;
- transport of tailings (i.e. fine rejects) generated within the Whitehaven CHPP via truck to the Project for emplacement within co-disposal storage areas in the open cut and/or disposal in existing off-site licensed facilities (e.g. the Brickworks Pit);
- realignment of sections of Blue Vale Road, Shannon Harbour Road and Hoad Lane to the east and south of the open cut;
- realignment of the southern extent of Braymont Road to the south of the open cut;
- construction of an approximately 1 km long section of Private Haul Road (including an overpass over the Kamilaroi Highway) between Blue Vale Road and the Whitehaven CHPP;
- ongoing exploration, monitoring and rehabilitation activities; and
- construction and use of other associated infrastructure, equipment and mine service facilities.

The proposed life of the Project is 30 years, commencing 2014.

A description of the Project is provided in Section 2 in the Main Report of the Project Environmental Impact Statement (EIS). General Project arrangements for Years 2, 7, 17 and 26 are shown on Figures 2-1 to 2-4, respectively. These general arrangements are based on planned maximum production and mine progression.

The mining layout and sequence shown on Figures 2-1 to 2-4 may be adjusted during the mine life to take account of localised geological features, coal market volume and quality requirements, mining economics and Project detailed engineering design.

The detailed mining sequence over any given period would be documented in the relevant Rehabilitation and Environmental Management Plan or Mining Operations Plan as required by the NSW Department of Resources and Energy.

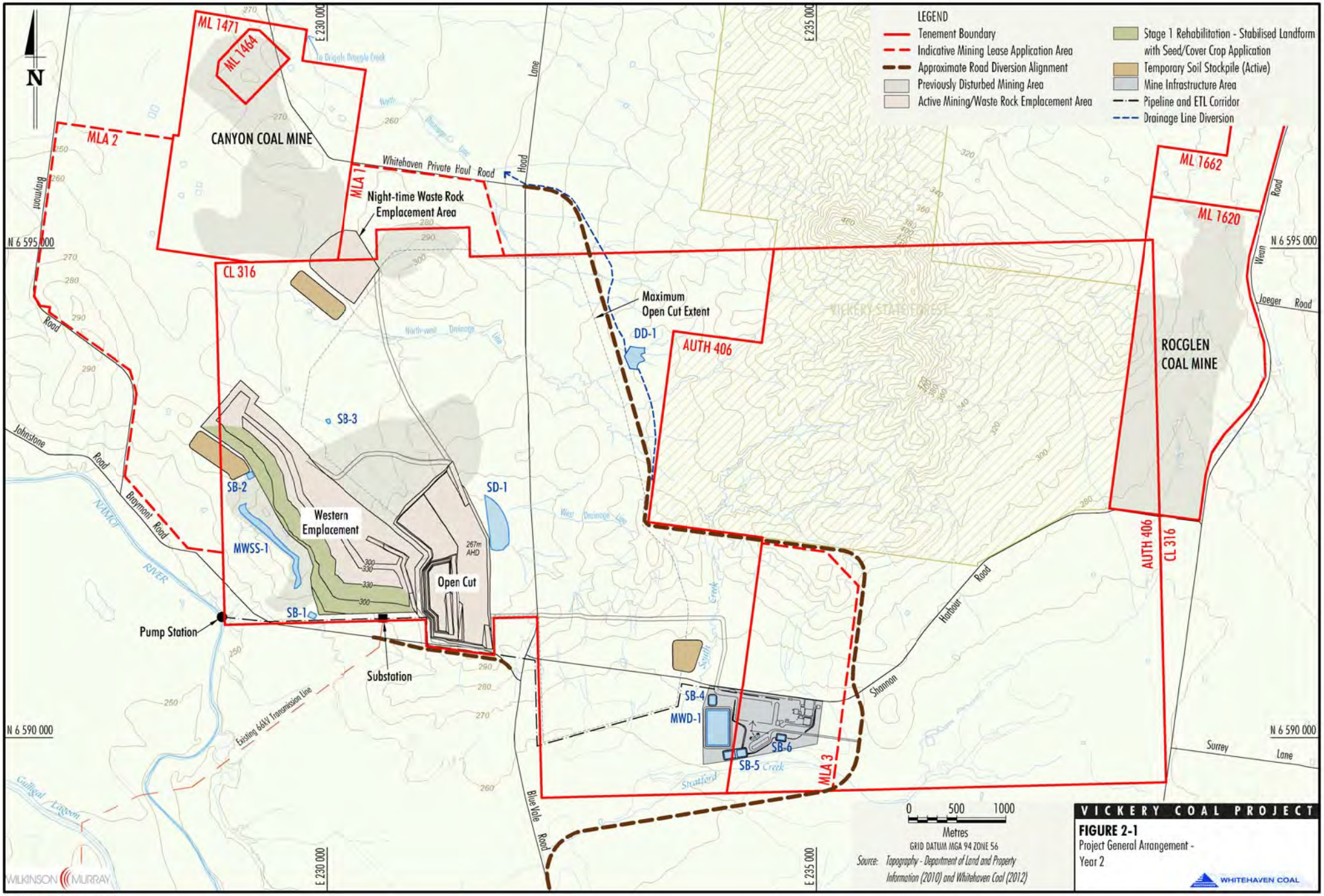
At the completion of Project mining activities, infrastructure would be decommissioned and final landform earthworks and revegetation would be undertaken over a period of approximately one to two years. The final landform and rehabilitation concept for the end of the Project life and progressive rehabilitation is described in Section 5 of the Main report of the EIS.

A detailed description of the Project is provided in Section 2 of the Main Report of the EIS. The subsections below provide an overview of the Project, with a focus on those elements that are material from a noise and blasting assessment perspective.

2.2 Project Construction/Development Activities

Initial construction activities would be undertaken generally during daytime hours up to seven days per week. Construction activities during Year 1 of the Project would be focussed on development of the following Project infrastructure components:

- the mine access road and Blue Vale Road diversion;
- the Mine Infrastructure Area (MIA);
- the Private Haul Road and Highway Overpass;
- the North-west Drainage Line Diversion; and
- water and electricity supply infrastructure.



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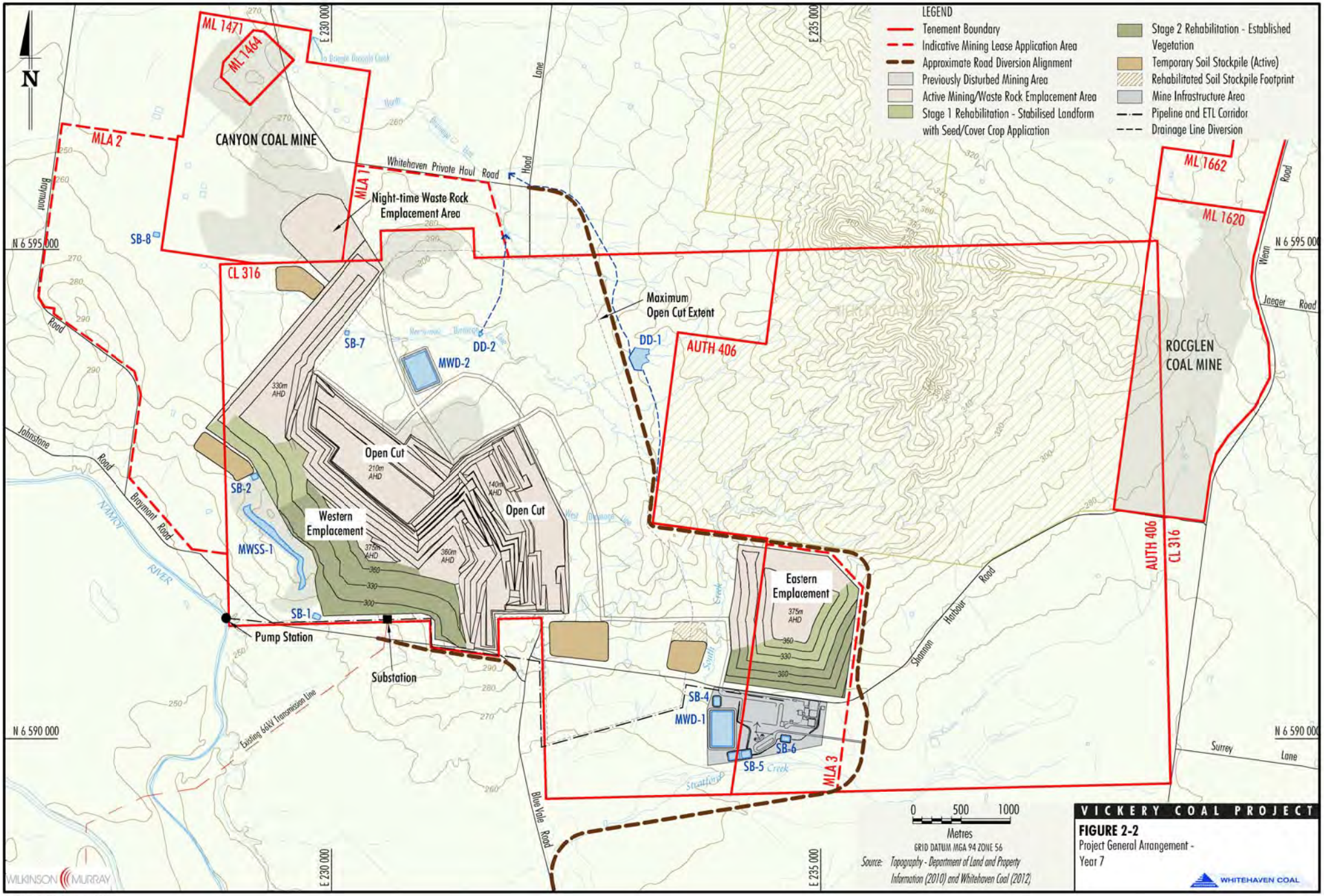

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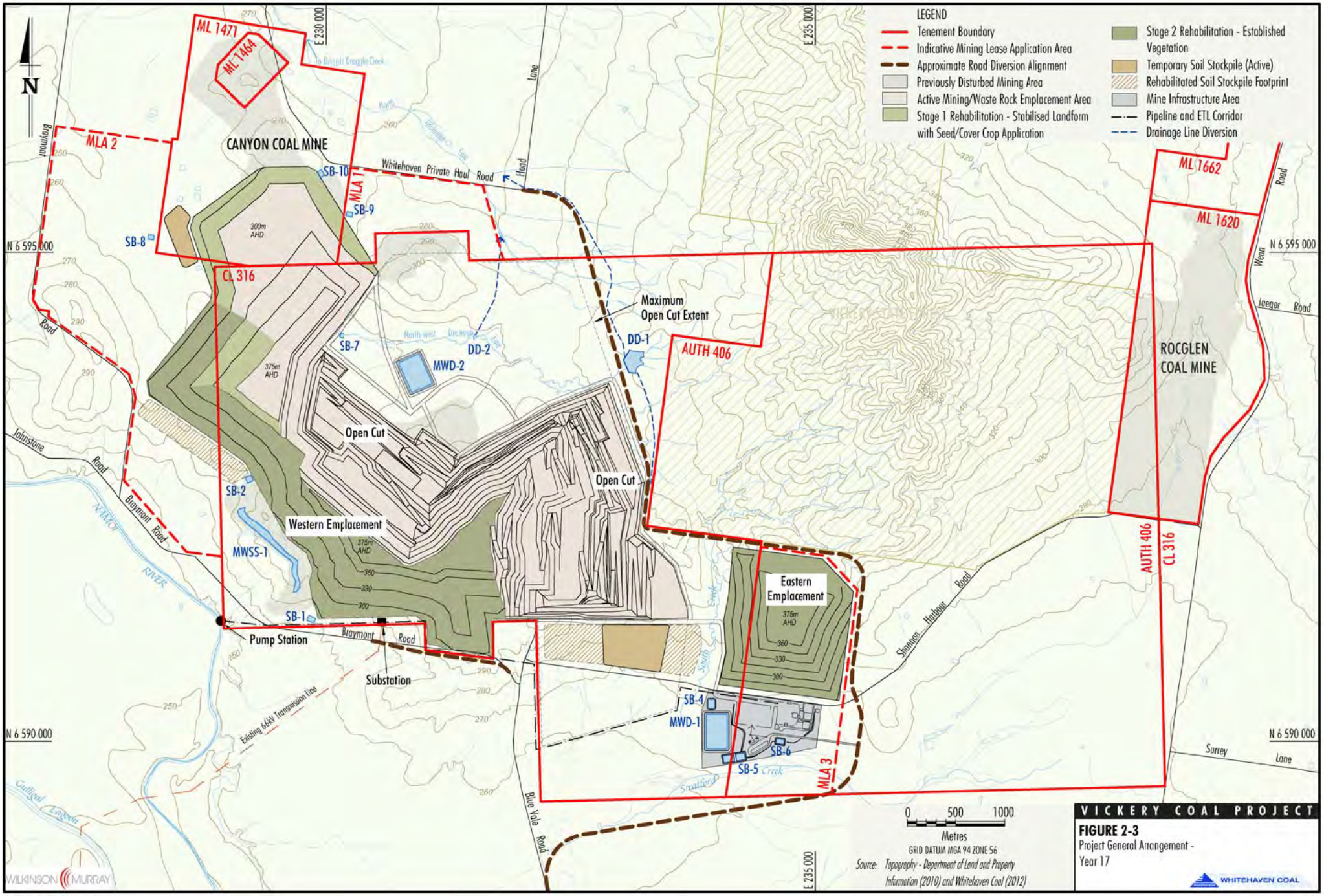

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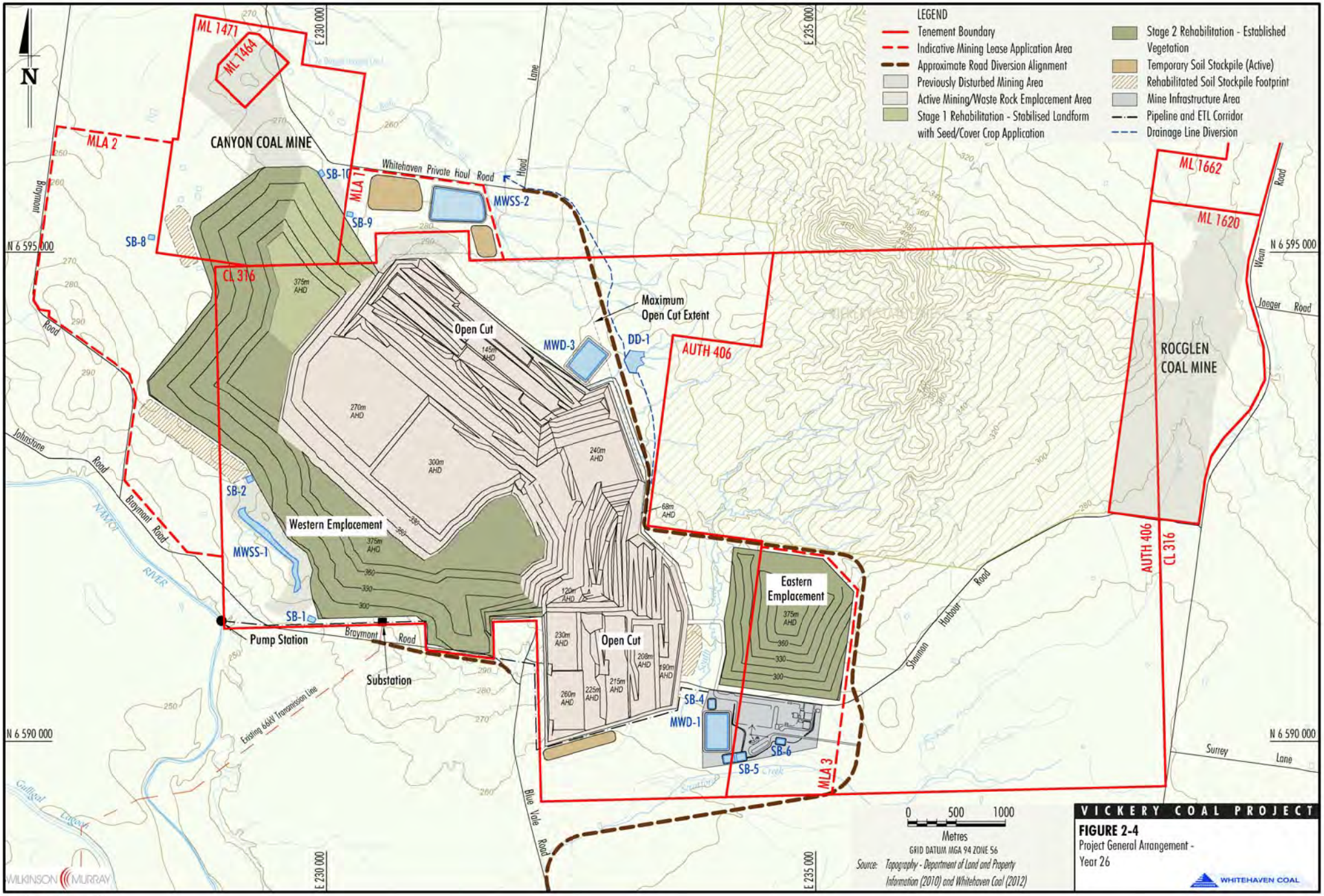

VICKERY COAL PROJECT

FIGURE 2-4

Project General Arrangement - Year 26

WHITEHAVEN COAL

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2.3 Mining Operations

Project mining operations would be conducted 24 hours per day, 7 days per week.

The Project includes open cut mining within the Maules Creek Formation. Up to seven coal seams of the Maules Creek Formation would be mined, with the Cranleigh Seam generally defining the base of the open cut. Depth to the base of the open cut would vary from approximately 100 metres (m) in the west to 250 m in the east (i.e. 190 m Australian Height Datum [AHD] in the west to 70 m AHD in the east).

The open cut would commence in the west and be developed to the east with waste rock progressively emplaced behind the advancing open cut face once sufficient space is available.

2.3.1 Overburden/Interburden Drill, Blast and Removal by Excavator

Drill and blast techniques would be used for the removal of competent overburden and interburden material for the open cut.

A mixture of ammonium nitrate and fuel oil (ANFO) (dry holes) and emulsion blend (wet holes) explosives would be used.

Blast sizes would typically range between:

- intermediate interburden blasts with a maximum instantaneous charge (MIC) of approximately 1,365 kilograms (kg); and
- deep overburden/interburden blasts with a MIC of approximately 2,275 kg.

The number of blasts per week would typically be 5; however, up to 6 blasts per week may occur on some occasions.

Blast designs and sizes would vary over the life of the Project and would depend on factors such as the depth of coal seams and the design of benches.

Following blasting, overburden and interburden would be removed by excavator and haul truck for placement in out-of-pit mine waste rock emplacements, or as infill in the mine void.

2.3.2 Coal Mining and ROM Coal Handling

Open cut coal mining would involve excavators loading ROM coal into haul trucks for haulage to the ROM coal handling area at the MIA via internal haul roads. ROM coal would be either dumped directly into a hopper feeding the crushing and screening facility, or dumped on an adjacent ROM coal stockpile for later re-handling.

2.3.3 On-site Production of Domestic Coal

Up to 150,000 t of ROM coal per annum would be selectively hauled to the on-site mobile crusher for crushing and screening to produce domestic specification (15 to 35 millimetres) coal. The mobile crusher would be operated during the daytime hours only (i.e. 7.00 am to 6.00 pm).

2.3.4 On-site Production of Gravel Materials

Up to 90,000 m^3 per annum of gravel material would be produced by crushing and screening of suitable overburden (excavated from within the open cut extent) in the on-site mobile crusher at the MIA.

On-site gravel crushing and screening operations would be conducted during daytime hours only (i.e. 7.00 am to 6.00 pm).

2.3.5 Mine Infrastructure Area

A MIA would be constructed to the south of the Eastern Emplacement (Figures 2-1 to 2-4). The MIA would consist of ROM coal stockpiles and handling and crushing equipment, workshops, offices, water management structures and car parks.

An existing infrastructure area associated with the historical mining activities including laydown areas, electricity substation, workshops and sheds is located within the southern portion of the proposed Western Emplacement area. These facilities would be used during the first 12 to 18 months of the Project while the new MIA is constructed. Once the new facilities are commissioned, the existing infrastructure area would be decommissioned.

2.3.6 Mine Fleet

The mine fleet for the Project would vary according to the equipment requirements associated with the open cut mining operations.

The mining fleet would typically consist of hydraulic excavators and dump trucks, with a support fleet of dozers, scrapers, graders, front end loaders, drill rigs and water trucks.

The fleet list modelled for noise assessment purposes is provided in Section 5.4.

2.3.7 Indicative Mine Schedule

An indicative mine schedule for the Project is provided in Table 2-1.

The staging of the open cut mining operations would be determined by the requirements of the coal market, product specification and/or blending requirements. As these requirements are likely to vary over the life of the Project, the development sequence of the open cut and coal extraction rates may also vary.

Table 2-1 Indicative Mine Schedule

Project Year	Waste Rock (Mbcm)	ROM Coal (Mtpa)
1*	16.0	0
2	25.0	1.45
3	38.0	3.80
4	48.0	4.10
5	47.0	4.10
6	44.0	4.20
7	44.0	4.50
8	43.0	4.50
9	42.0	4.50
10	45.0	4.50
11	41.0	4.50
12	47.0	4.50
13	44.0	4.50
14	47.0	4.50
15	47.0	4.50
16	43.0	4.50
17	45.0	4.50
18	38.0	4.50
19	45.0	4.50
20	45.0	4.50
21	49.0	4.50
22	45.0	4.50
23	45.0	4.50
24	49.0	4.50
25	40.0	4.50
26	51.0	4.50
27	39.0	4.50
28	39.0	4.50
29	39.0	4.50
30	39.0	4.50

Source: Section 2 of the Main Report of the EIS.

* Assumed Project commencement date is 1 January 2014.

Note: Shaded rows indicate years modelled for operational noise assessment (see Section 5.1.1).

2.3.8 ROM Coal Transport

Sized ROM coal would be transported from the MIA to the Whitehaven CHPP by a haulage contractor using a fleet of on-highway trucks. Sized ROM coal transportation would occur 24 hours per day, 7 days per week.

The sized ROM coal would be transported from the MIA along Shannon Harbour Road to Blue Vale Road. The haulage trucks would then travel approximately 20 km along Blue Vale Road and the Kamilaroi Highway to the Whitehaven CHPP.

2.3.9 Private Haul Road and Highway Overpass

Whitehaven would construct a Private Haul Road and Highway Overpass between Blue Vale Road and the Whitehaven CHPP prior to the combined Vickery and Rocglen Coal Mines' ROM coal transport rate exceeding 3.5 Mtpa. The Private Haul Road and Highway Overpass would intersect with Blue Vale Road approximately 100 m prior to its intersection with the Kamilaroi Highway (Figure 2-5). The Private Haul Road would run parallel to the Kamilaroi Highway before crossing the highway south of the Whitehaven CHPP access road.

The Private Haul Road and Highway Overpass would allow haulage trucks to travel between the Project and the Whitehaven CHPP without interacting with traffic travelling on the Kamilaroi Highway.

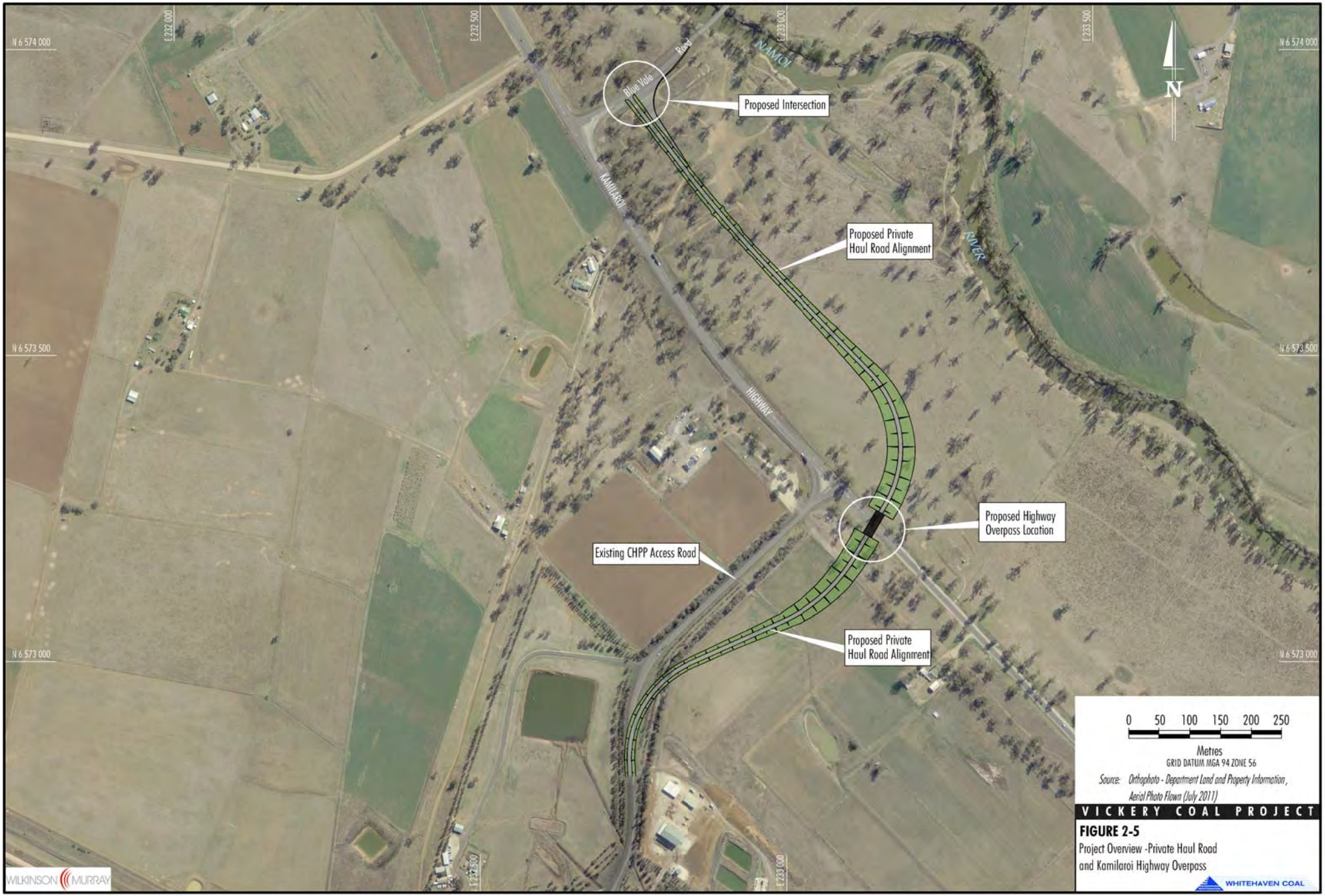
Associated benefits of the Private Haul Road and Highway Overpass would also include a reduction in heavy vehicle interaction with other vehicles on the Whitehaven CHPP access road and improved ROM coal transport efficiency through a reduction in travel time between the Project and the Whitehaven CHPP.

Access to the Private Haul Road would be restricted to contractor haulage trucks and Whitehaven vehicles. Appropriate signs and gates would be installed to prevent unauthorised access to the Private Haul Road.

The alignment of the Private Haul Road and Highway Overpass is shown on Figure 2-5. Detailed design of the infrastructure would be conducted in consultation with the NSW Roads and Maritime Service and Gunnedah Shire Council, and relevant approvals for the infrastructure and construction works would be obtained prior to construction.

2.3.10 ROM Coal Processing

Whitehaven currently operates a CHPP and rail load out facility approximately 5 km west of Gunnedah which processes ROM coal from the surrounding Whitehaven coal mining operations (namely the Tarrawonga, Rocglen and Sunnyside Coal Mines). The CHPP is approved under Development Consent (DA) 0079.2002.



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Sized ROM coal from the Project would be loaded onto trains (i.e. bypass) or crushed, screened and washed at the existing Whitehaven CHPP before being loaded onto trains for rail transport to Newcastle and export markets. No change to the approved Whitehaven CHPP operations would be required as a result of the Project.

2.3.11 Rail Movements

No change to the approved capacity of the Whitehaven CHPP would be required as a result of the Project, and therefore, no change to the existing Whitehaven CHPP rail movements would be required for the Project. Potential rail noise impacts are discussed in Section 6.2.

2.3.12 Domestic Coal and Gravel Materials Transport

Up to 150,000 t of domestic specification coal and 90,000 m^3 of gravel would be directly collected at the mine facilities area by customers.

On-site domestic coal and gravel transportation would be conducted during daytime hours only (i.e. 7.00 am to 6.00 pm).

2.3.13 Contingency Development Schedule

In order to accommodate possible changes in market conditions and/or potential delays in the commissioning of the Boggabri and Tarrawonga coal processing and rail facilities (which are related to Whitehaven's overall product coal supply chain), Whitehaven has developed a contingency development schedule for the Project which involves a more gradual ramp up in the ROM coal production rate during the initial years of the mine life.

Should the contingency development schedule be required, mining operations in the initial years would be at a reduced rate (i.e. 2 Mtpa or less) and would only occur in the western portion of the Project mining area. In addition, rather than immediately commencing construction of the MIA following Project approval, the existing Vickery infrastructure area would be upgraded to include ROM coal crushing and screening facilities, a truck loadout facility and associated mining and water management infrastructure. These facilities would be temporary as they are located partially in the proposed Western Emplacement area and partially within the planned open cut. Once the open cut development encroaches on this location, the MIA would be constructed and commissioned on the eastern side of the Project area.

3 NOISE RECEIVERS & SURROUNDING LAND USES

3.1 Mine Site

Land use in the local area is dominated by agricultural operations and open cut coal mining. Land use within the Project site includes areas of native woodland vegetation, cleared grazing land on unimproved pastures and previously disturbed mining areas.

State-owned forestry (Vickery State Forest and Kelvin State Forest) and another coal mining operation (Rocglen Coal Mine) occur to the east of the Project. The Canyon Coal Mine which ceased operation in 2009 is located north of the Project boundary. Additionally, the Vickery South Coal Exploration Project is situated immediately south of the Project.

The Project is bounded to the east by the Vickery State Forest. To the north, south, east and west of the Project there are a range of mine-owned and private rural receivers, all of which have been considered in this assessment. These receivers are listed in Table 3-1 and shown on Figure 3-1. The land ownership relating to these receivers are listed in Figure 3-2. Eastings and Northings are in Map Grid of Australia (MGA) 84 coordinates, Zone 56.

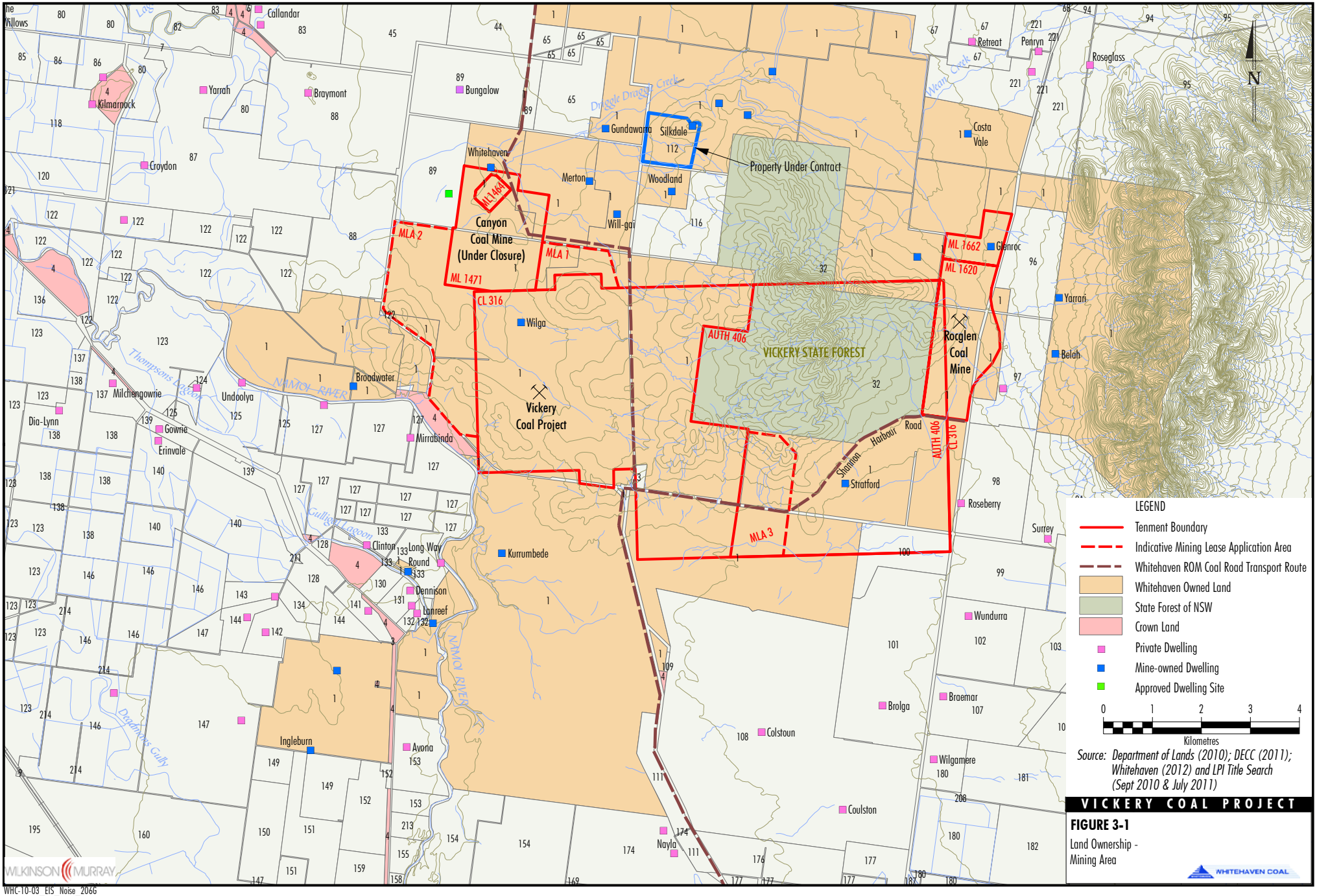
Table 3-1 Receivers Considered in this Assessment (Mine Site)

Land Ownership Number	Dwelling Name	Ownership	Easting	Northing
67	Retreat	Richard Lindsay Penrose, Katriona Ann Penrose (Joint tenants)	239019.6	6599961
83a	Callandar	Robert Peter McGregor	224469.1	6600621
83b	-	Robert Peter McGregor	224507.3	6600300
86	-	Peter J Watson Holdings Pty Ltd	221297.4	6599230
87a	Croydon	David Sinclair Riley	222138.8	6597432
87b	Yarrah	David Sinclair Riley	223342.1	6598974
88	Braymont	Michael John Maunder, Jodie Helen Maunder (Joint tenants)	225481	6598912
89a	Bungalow	Keith Alexander Blanch, Cormaree Blanch (Joint tenants)	228572.2	6598981
89b	(Approved Dwelling location)	Keith Alexander Blanch, Cormaree Blanch (Joint tenants)	228412	6596679
94	Surrey	Rodney James Barnes, Angela Barnes (Tenants in Common, Equal shares)	240572	6589817
95	Roseglass	Christiaan Wynand Harmse, Maria Jacomina Harmse (Joint tenants)	241424.7	6599480
98	Roseberry	Ronald Stanley Rennick	238777	6590513
99	Carlton	Wallace Noel Sales, Kaye Elizabeth Sales (Joint tenants)	241599.1	6588816
101	Brolga	Warren Franklin Nicholls, Susan Elizabeth Nicholls (Joint tenants)	237191.7	6586408
102	Wundurra	James Christopher Meyers, Jeanette Elizabeth Meyers (Joint tenants)	238969	6588240
103	-	Keith Gascoyne Perrett	241327	6586074
107	Braemar	John Charles Wise, Linda Dorothy Miller (Joint tenants)	238432.5	6586589

Land Ownership Number	Dwelling Name	Ownership	Easting	Northing
108a	Coulston	Anthony Charles Wannan, Pauline May Winter (Joint tenants)	234749	6585833
108b	Coulston	Anthony Charles Wannan, Pauline May Winter (Joint tenants)	236383	6584213
112*	Silkdale	Neil Phillip Jackson, Sharon Ann Jackson (Join tenants)	233317.8	6598234
118	Kilmarnock	Andrew David Watson	221075.1	6598682
122	-	Nadewar Pty Limited	221722.1	6596321
124	-	John Peter Carrigan	223204.7	6592888
125	Undoolya	Stephen Maunder, Anita Jane Maunder (Joint tenants)	224131	6592990
127a	-	James Karl Barlow	225798	6592545
127b	Mirrabinda	James Karl Barlow	227605	6591919
127c	-	James Karl Barlow	228176	6589289
131a	Dennison	Brian John Keeler, Denise Patricia Keeler (Joint tenants)	227557	6588760
131b	-	Brian John Keeler, Denise Patricia Keeler (Joint tenants)	227591	6588442
132	Lanreef	Eric James Hannan, Carol Anne Hannan (Joint tennants, Estate perpetual lease)	227712	6588287
133a	Clinton	Grant Archie McIlveen	226673	6589692
137	Milchengowrie	Anthony Clarence Carrigan, Georgina Therese Carrigan (Tenants in Common, Equal shares)	221496	6592978
138	Dia-Lynn	Anthony Clarence Carrigan	220402	6592427
139	Gowrie	Kenneth Leslie Crawford, Susan Ruth Crawford (Tenants in Common, Equal shares)	222442.3	6592051
140	Erinvale	David Alexander Watt, Janet Elizabeth Watt (Tenants in Common, Equal shares)	222424.8	6591809
141	-	Dee Micheal Heinemann, Amanda Maree Heinemann (Joint tenants)	226706	6588335
142	-	Timothy Bligh Roberts, Anne Roberts (Joint tenants)	224612	6587903
143	-	Scott Llewellyn Johns	224798.4	6588624
144	-	Errol Frederick Darley, Jennifer Therese Darley (Joint tenants)	224236.8	6588209
146	-	Graeme Charles Carrigan	221518	6586661
147	-	Trevor John Loveridge, Colleen Loveridge (Tenants in common, Equal shares)	224118	6586104
153	Avona	Robert George Mansfield, Heather Kaye Mansfield (Joint tenants)	227491	6585556
174b	-	Selkirk Pastoral Co Pty Limited	233060.4	6583473
180	Wilgamere	Richard James Fitzpatrick, Pamela Frances Fitzpatrick (Joint tenants)	238238.2	6585305
221a	Penryn	Margaret Eleanor Geddes	240377.6	6599756
221b	-	Margaret Eleanor Geddes	240241	6599341
1t	Gundawarra	Whitehaven Coal Mining Pty Limited	231546.6	6598184
1f	Whitehaven	Whitehaven Coal Mining Pty Limited	229210	6597383
1g	-	Whitehaven Coal Mining Pty Limited	237902.4	6595557
1i	Costa Vale	Whitehaven Coal Mining Pty Limited	238935.6	6598071
1l	Stratford	Whitehaven Coal Mining Pty Limited	236481.5	6590901
1m	Belah	Whitehaven Coal Mining Pty Limited	240613.3	6593728

Land Ownership Number	Dwelling Name	Ownership	Easting	Northing
1n	Yarrari	Whitehaven Coal Mining Pty Limited	240812.8	6594725
1o	Glenroc	Whitehaven Coal Mining Pty Limited	239389.7	6595641
1u	Broadwater	Whitehaven Coal Mining Pty Limited	226463	6592907
1v	Kurrumbede	Whitehaven Coal Mining Pty Limited	229422.6	6589512
1w	-	Whitehaven Coal Mining Pty Limited	228029	6588088
1x	Will-Gai	Whitehaven Coal Mining Pty Limited	231783	6596438
1y	-	Whitehaven Coal Mining Pty Limited	226067	6587121
1z	Long Way Round	Whitehaven Coal Mining Pty Limited	227515	6589145
1aa	-	Whitehaven Coal Mining Pty Limited	233860.8	6598699
1ab	-	Whitehaven Coal Mining Pty Limited	234446.8	6598461
1ac	-	Whitehaven Coal Mining Pty Limited	234948.4	6599352
1ad	Merton	Whitehaven Coal Mining Pty Limited	231215	6597109
1ae	Woodland	Whitehaven Coal Mining Pty Limited	232894	6596895
1af	Ingleburn	Whitehaven Coal Mining Pty Limited	225528	6585491

* Property under contract for purchase by Whitehaven.



Source: Department of Lands (2010); DECC (2011); Whitehaven (2012) and LPI Title Search (Sept 2010 & July 2011)

VICKERY COAL PROJECT

FIGURE 3-1

Land Ownership - Mining Area

WILKINSON MURRAY

WHITEHAVEN COAL

WHC-10-03_EIS_Noise_206G

REFERENCE No.	LANDHOLDER	REFERENCE No.	LANDHOLDER
1	Whitehaven Coal Mining Pty Ltd	130	HM Cassidy
3	Gunnedah Shire Council	131	BJ & DP Keeler
4	The State of New South Wales	132	EJ & CA Hannan
6	Narrabri Shire Council	133	GA Mcilveen
7	The Council of the Shire of Namoi	134	TB Roberts
9	The Commissioner for Railways	136	EF Darley
32	State Forests of NSW	137	AC & GT Carrigan
39	DV Gillham	138	AC Carrigan
44	RR & PL Crosby	139	KL & SR Crawford
45	RP & RD Mcgregor	140	DA & JE Watt
65	TR Hall & AI Myers Johnson	141	DM & AM Heinemann
67	RL & KA Penrose	142	TB & A Roberts
68	PG & IL Capel	143	SL Johns
78	JM & NM Mckechnie	144	EF & JT Darley
79	KD Gillham	146	GC Carrigan
80	A D Watson Holdings Pty Ltd	147	TJ & C Loveridge
82	EC & JE Clarke	149	PJ Loveridge
83	RP Mcgregor	150	TJ Loveridge
85	Kilmarnock (Boggabri) Pty Ltd	151	LG Sims
86	PJ Watson Holdings Pty Ltd	152	CJ Sims
87	DS Riley	153	RG & HK Mansfield
88	MJ & JH Maunder	154	MM & SM Dawson
89	KA & C Blanch	155	M & GO Jensen
94	RJ & A Barnes	157	IK, KD, PRB & JE Mcarthur
95	CW & MJ Harmse	158	BC Martin & LD Curran
96	GJ Rennick	159	IE Sims
97	RS & GJ Rennick	160	RS Blackmore
98	RS Rennick	161	PRB& JE Mcarthur
99	WN & KE Sales	168	GW & GN Thibault
100	C Mckillop Laurie	169	WJ & SL Evans
101	WF & SE Nicholls	174	Selkirk Pastoral Co Pty Limited
102	JC & JE Meyers	176	WM & KL Campbell
103	KG Perrett	177	South Weroona Pty Limited
104	DA & RK Torrens	178	BA & D Edwards
105	JC & MA King	180	RJ & PF Fitzpatrick
106	MJ Pickett	181	M & TC Clifton
107	JC Wise & LD Miller	182	DJ & DA Shaw
108	AC Wannan & PM Winter	183	GL Knapman
109	Namoi Valley Coal Pty Limited	184	JR & JE Floyd
111	RB Kelly	187	BJ, LA, AJ & MA Thibault
112	NP & SA Jackson (Under Contract)	195	DW & KA Rolinson
116	C R & C P Stewart Investments Pty Limited	197	CAL & CG Boileau
118	AD Watson	199	RP & SM Urquhart
120	Nambarloo Pty Limited	200	DK & BM Swain
122	Nandewar Pty Limited	208	O Gremmer
123	Primeag Australia Limited	211	LJ Carrigan
124	JP Carrigan	213	Damilabe Pty Ltd
125	S & AJ Maunder	214	GC Carrigan GM Carrigan
127	JK Barlow	221	ME Geddes
128	GA & TJ Mcilveen		

Source: LPI (2010 & 2011)

VICKERY COAL PROJECT

FIGURE 3-2

Relevant Land Ownership List - Mining Area

WILKINSON MURRAY

WHITEHAVEN COAL

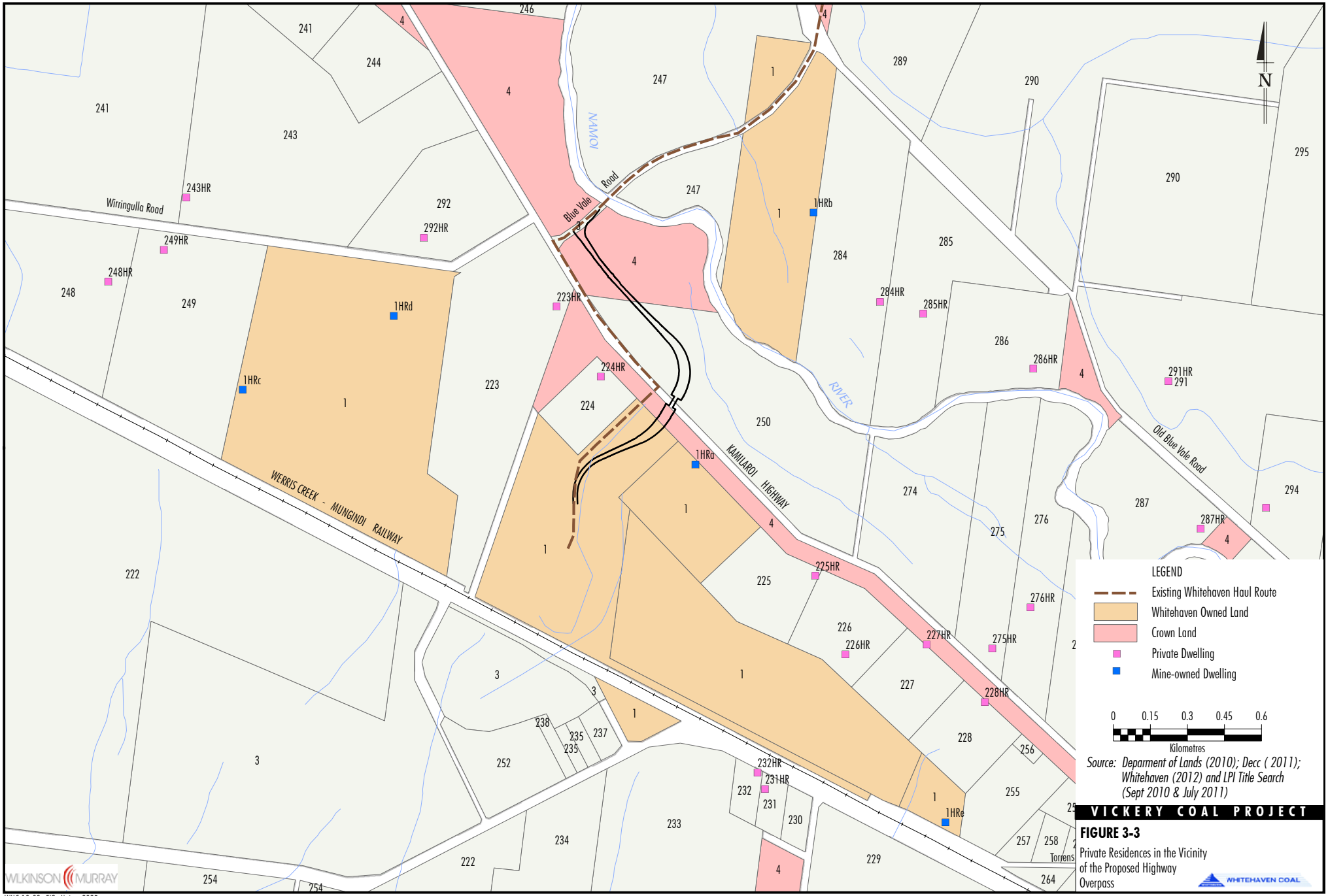
WHC-10-03_EIS_App Noise_001D

3.2 Blue Vale Road, Private Haul Road and Highway Overpass

To transport the sized ROM coal from the infrastructure area along Shannon Harbour Road to the Whitehaven CHPP, haulage trucks would travel approximately 20 km along Blue Vale Road. The receivers along Blue Vale Road that are most potentially impacted by traffic noise associated with the Project are shown on Figure 1-1. Additionally, Table 3-2 includes the receivers in close proximity to the proposed Private Haul Road and Highway Overpass (Figures 3-3 and 3-4).

Table 3-2 Receivers Considered in this Assessment (Private Haul Road and Highway Overpass)

Receiver ID	Dwelling Name	Ownership	Easting	Northing
223	Longlands	RW Tibbs	232670.4	6573612
224	Cedar Vale	TD & PA Burns, GR & KL Harris	232849.6	6573328
225	-	JC & DL Wilkinson	233716.9	6572521
226	-	CJ & WD Jaeger	233838.8	6572203
227	Portland	PA & DL Rankin	234167.1	6572243
228	-	RS & CA Brown	234402.1	6572009
243	-	RT Dugan	231172.6	6574053
248	-	SV Wicks	230856.7	6573713
249	-	KB Hill	231081.4	6573841
275	Maxvale	JI Knebel	234432.4	6572226
276	-	BA & K Edmonston	234587.1	6572393
284	-	RI & JE Horne	233978.7	6573631
285	Leigh Cross	WH & SGBA Heath	234153.5	6573583
286	-	RF & CC Wall	234599	6573361
287	Fingal	SM & RL Middleton	235275	6572712
291	-	PA Ryman	235144.8	6573311
292	-	RI & JR Paterson	232133.1	6573891
1HRa	Olive View	Whitehaven Coal Mining Pty Limited	233231.6	6572972
1HRb	-	Whitehaven Coal Mining Pty Limited	233709.5	6573992
1HRc	-	Whitehaven Coal Mining Pty Limited	231401.1	6573275
1HRd	Wirringulla	Whitehaven Coal Mining Pty Limited	232011.4	6573573



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REFERENCE No.	LANDHOLDER
1	Whitehaven Coal Mining Pty Ltd
3	Gunnedah Shire Council
3	The Council of The Shire Of Gunnedah
4	The State of New South Wales
222	Wallaroy Crescent Pty Limited Chamberlain Avenue Pty Limited
223	RW Tibbs
224	TD & PA Burns, GR & KL Harris
225	JC & DL Wilkinson
226	CJ & WD Jaeger
227	PA & DL Rankin
228	RS & CA Brown
229	North West Projects (NSW) Pty Limited
230	WP Small
231	JB & DA Tibbett
232	CBC Finlay & KM Hunt
233	GS & HA Finlay
234	Pryde and Scott Investments Pty Limited
235	Pryde's Tucker Bag Pty Ltd
237	Manildra Flour Mills Retirement Fund Pty Limited
238	CJ & S Beattie Pty Limited
241	CJ & PA Waters
243	RT Dugan
244	PJ & D Fuller
246	RO & AF Cochrane
247	BD Kelly
248	SV Wicks
249	KB Hill
250	PJ Hedges
252	Blackjack Carbon Pty Limited
253	TM Bruce
254	AG, KJ, MA & SL Kennedy
255	Mackellar Equipment Hire Pty Ltd
256	GH & TG Foster
257	KJR Barnard & JE Niquet
258	North West Scrap Metal Pty Limited
259	OD & BJ Dennis
274	TB & AK Donoghue
275	JI Knebel
276	BA & K Edmonston
277	EC Riordan
278	VV Snape
279	PD Jones
284	RI & JE Horne
285	WH & SGBA Heath
286	RF & CC Wall
287	SM & RL Middleton
288	MJ Furner & A Ogi
289	RN Thomson
290	Gunnible Pastoral Company Pty Limited
291	PA Ryman
292	RI & JR Paterson

Source: LPI (2010 & 2011)

VICKERY COAL PROJECT

FIGURE 3-4

Relevant Land Ownership List - Highway Overpass

WILKINSON MURRAY

WHITEHAVEN COAL

WHC-10-03_EIS_App Noise_002B

4 OPERATIONAL NOISE ASSESSMENT CRITERIA

4.1 Background Noise Survey

A background noise survey was conducted by Wilkinson Murray over a 4 week period between Monday, 21 November and Tuesday, 20 December 2011. The survey was carried out at three locations representative of the residential receivers potentially most impacted by noise from the mine. The intent of the background noise survey is to establish background noise levels which would be used to define Project-specific noise criteria.

4.1.1 Background Noise Monitoring Locations

The three background noise survey sites are listed in Table 4-1 and shown in Figure 3-1. The rationale behind the selection of the sites is also provided in Table 4-1.

Table 4-1 Noise Monitoring Sites

Receiver ID	Dwelling Name	Rationale
127b	Mirrabinda	Derivation of operational noise criteria for the residential receivers south-west of the Project.
1u	Broadwater	Derivation of operational noise criteria for the residential receivers west of the Project.
1x	Will-Gai	Derivation of operational noise criteria for the residential receivers north of the Project.

4.1.2 Monitoring and Analysis Procedures

The noise monitoring equipment used for these measurements consisted of environmental noise loggers set to A-weighted, fast response, continuously monitoring over 15-minute sampling periods. This equipment is capable of remotely monitoring and storing noise level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift was noted.

The logger determines L_{A1}, L_{A10}, L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1}, L_{A10} and L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see Appendix A for definitions). The L_{A1} is indicative of maximum noise levels due to individual noise events such as the occasional pass-by of a heavy vehicle. This is used for assessment of sleep disturbance. The L_{A90} level is normally taken as the background noise level during the relevant period.

To describe background noise levels, the measure currently recommended by the *NSW Industrial Noise Policy* (INP) (Environment Protection Agency [EPA], 2000) is the Rating Background Level (RBL). This is based on the L_{A90} as defined in the INP. An RBL was established for each of the three assessment periods, namely the day, evening and night-time periods. A glossary of terms is provided in Appendix A.

Meteorological data for the relevant periods were obtained from the nearest weather station at Gunnedah. Periods in which it was likely to be raining, or when wind speeds exceeded 5 metres per second (m/s) at microphone height, were excluded from analysis, in accordance with the INP.

A series of attended measurements were also conducted to supplement the logger measurements. One 15-minute measurement was conducted at each site for each assessment period on the day the loggers were installed. The attended measurements were conducted in order to qualify the various sources affecting the local background noise environment.

4.1.3 Summary of Monitoring Results

The results of the attended and logger measurements are summarised in Table 4-2 and Table 4-3. Logger measurements are shown in graphical form in Appendix B. Note that where recorded noise levels are very low (below 30 A-weighted decibels [dBA]) the attended results are likely to be more accurate due to noise floor limitations in the logger.

Table 4-2 Summary of Attended Monitoring Results (Monday, 21 November 2011)

Rec ID	Dwelling Name	Measured $L_{A90,15min}$ (dBA)			Review
		Day	Evening	Night	
127b	Mirrabinda	26	28	33	Distant Kamilaroi Highway traffic, rustling foliage and distant birds dominated the day and evening L_{A90} levels. The night-time L_{A90} level was dominated by rustling foliage.
1u	Broadwater	24	30	32	Distant Kamilaroi Highway traffic and distant birds dominated the day and evening L_{A90} levels. The night-time L_{A90} level was dominated by rustling foliage. Tarrawonga Coal Mine or Boggabri Coal Mine audible at times during the night measurement and estimated to range 20-25 dBA.
1x	Will-Gai	31	38	35	The measured L_{A90} level was dominated by birds during the day. The evening and night L_{A90} levels were dominated by insects and rustling foliage. Tarrawonga Coal Mine or Boggabri Coal Mine audible at times during the night measurement and estimated to range 25-30 dBA.

Notes:
Day: the period from 7.00 am to 6.00 pm Monday to Saturday; or 8:00 am to 6.00 pm on Sundays and public holidays.
Evening: the period from 6.00 pm to 10.00 pm.
Night: the remaining periods.

Table 4-3 Summary of Logger Survey Results

Rec ID	Dwelling Name	Monitoring period	Measured Background Noise Levels (dBA)		
			Day	Evening	Night
127b	Mirrabinda	2 Dec – 19 Dec 2011	29	32	33
1u	Broadwater	21 Nov – 20 Dec 2011	28	32	33
1x	Will-Gai	21 Nov – 19 Dec 2011	28	35	35

Notes:
Day: the period from 7.00 am to 6.00 pm. Note: Assessment period in INP does not specify Sundays.
Evening: the period from 6.00 pm to 10.00 pm.
Night: the remaining periods.

Based on the attended measurements, L_{A90} levels generated by existing industrial noise and traffic noise were observed to be well below 30 dBA. For this reason, it is believed that the measured background levels above 30 dBA are dominated by insects (which are relatively loud during the late spring and summer months), birds and rustling foliage.

In accordance with the INP, the RBL is the overall single-figure background noise level for each period of the day. It is reasonable to assume that RBLs can be lower than 30 dBA during other periods of the year with calm weather conditions and when noise generated by the local fauna is relatively quiet. Therefore, in accordance with the INP, for the purpose of this noise assessment the existing RBLs for day, evening and night periods are assumed to be 30 dBA.

4.2 Intrusiveness and Amenity Criteria

The INP specifies two noise criteria:

- an intrusiveness criterion which requires that the $L_{Aeq,15min}$ from a specific industrial source should not exceed the background noise level by more than 5 dBA; and
- an amenity criterion which aims to maintain noise amenity over the whole daytime, evening or night-time period where it is subjected to cumulative noise from a number of industrial sources.

Based on the existing RBL for day, evening and night periods being assumed to be 30 dBA, the intrusiveness criterion is 35 dBA $L_{Aeq,15min}$ for all privately-owned receivers.

The amenity criteria are relevant in the context of controlling cumulative noise impacts resulting from the concurrent operation of the Project and the other potential sources of industrial noise (for example, the Tarrawonga Coal Mine located approximately 10 km north of the Project [Figure 1-1]). The amenity criteria set upper limits to control the total $L_{Aeq,Period}$ noise levels at a given receiver from all industrial sources over day, evening and night periods. In this case, the surrounding receivers are situated in an area which would be classified as “Rural” under the INP, and the relevant recommended “acceptable” amenity criteria for $L_{Aeq,Period}$ are 50 dBA, 45 dBA and 40 dBA for daytime, evening and night-time periods, respectively.

In addition, the INP also stipulates a recommended “maximum” amenity level of 5 dBA above the “acceptable” levels.

The INP describes the 'Project-specific criteria' as being the lower (i.e. more stringent) of the intrusiveness and amenity criteria. Consistent with this approach, this assessment uses the intrusiveness criterion to assess noise from the Project, and the amenity criteria to assess cumulative noise.

In view of the above, Table 4-4 summarises the criteria used in this assessment.

Table 4-4 Project Criteria Summary

Criteria Type	Receiver Number	Receiver Description	Day	Evening	Night-time
INP Intrusive	All	Residential receivers	35 $L_{Aeq,15min}$ (dBA)	35 $L_{Aeq,15min}$ (dBA)	35 $L_{Aeq,15min}$ (dBA)
INP Amenity	All	Residential receivers	50 $L_{Aeq,Period}$ (dBA) recommended acceptable 55 $L_{Aeq,Period}$ (dBA) recommended maximum	45 $L_{Aeq,Period}$ (dBA) recommended acceptable 50 $L_{Aeq,Period}$ (dBA) recommended maximum	40 $L_{Aeq,Period}$ (dBA) recommended acceptable 45 $L_{Aeq,Period}$ (dBA) recommended maximum

Notes:
Day: the period from 7.00 am to 6.00 pm.
Evening: the period from 6.00 pm to 10.00 pm.
Night: the remaining periods.

4.3 Assessment Methodology

The INP states that intrusiveness and amenity criteria have been developed to protect at least 90% of the population living in the vicinity of the industrial noise sources from the adverse effects of noise for at least 90% of the time (EPA, 2000). Provided the criteria in the INP are achieved, it is unlikely that most people would consider the resultant noise levels excessive.

In those cases where the criteria are not achieved, it does not automatically follow that all people exposed to the noise would find the noise unacceptable. In subjective terms, exceedances of the Project-specific noise assessment criteria can generally be described as follows:

- Negligible noise level increase <1 dBA (not noticeable by all people).
- Marginal noise level increase 1 dBA to 2 dBA (not noticeable by most people).
- Moderate noise level increase 3 dBA to 5 dBA (not noticeable by some people but may be noticeable by others).
- Appreciable noise level increase >5 dBA (noticeable by most people).

In view of the above**,** Table 4-5 presents the methodology for assessing noise levels which may exceed the INP project specific noise assessment criteria.

Table 4-5 Project Noise Impact Assessment Methodology

Assessment Criteria	Noise Criteria	Noise Management Zone		Noise Affectation Zone
		Marginal	Moderate	
Intrusiveness $L_{Aeq,15min}$	Refer Table 4-4	1 dBA to 2 dBA above Project-specific criteria	3 dBA to 5 dBA above Project-specific criteria	> 5 dBA above Project-specific criteria
Amenity $L_{Aeq,Period}$	Refer Table 4-4			

4.4 Sleep Disturbance Criterion

To help protect residents from sleep disturbance, the EPA recommends that 1-minute L_{A1} noise levels (effectively, the L_{Amax} maximum noise level) should not exceed the background noise level (assessed by the RBL) by more than 15 dBA when measured or predicted at the location of a building façade. The "sleep disturbance" criterion is only applicable to night-time (10.00 pm to 7.00 am) operations.

On the basis that the RBL in the area can be assumed to be 30 dBA, the sleep disturbance criterion when assessed external to the residence is 45 dBA $L_{A1,1min}$.

5 OPERATIONAL NOISE ASSESSMENT

5.1 Noise Modelling Methodology

Operational noise levels at nearby receivers have been calculated using the Environmental Noise Model (a proprietary computer program from RTA Technology Pty Ltd). This modelling software is recommended by the INP and has been previously accepted by the EPA for use in environmental noise assessments. The assessment models the total noise at each receiver from the operation of the Project. Total predicted operational noise levels are then compared with the operational noise criteria presented in Table 4-4.

5.1.1 Noise Assessment Scenarios

Noise modelling was undertaken for the day, evening and night operating scenarios for mining Years 2, 7, 17 and 26. These Project Years were selected for the following reasons:

- Project Year 2 (Figure 2-1) considers mining operations in the south-western portion of the Project open cut pit area, waste rock emplacement at the Western Emplacement, and a limited amount of shielding from the relatively small Western Emplacement.
- Project Year 7 (Figure 2-2) considers mining operations in the north-western and central portions of the Project open cut pit area, and waste rock emplacement at the Western and Eastern Emplacements (at their maximum heights).
- Project Year 17 (Figure 2-3) considers mining operations in the north-western and eastern portions of the Project open cut pit area, and waste rock emplacement at the Western Emplacement.
- Project Year 26 (Figure 2-4) considers mining operations in the northern and southern portions of the Project open cut pit area, and waste rock emplacement at the Western Emplacement.

5.1.2 Meteorological Environment for Noise Assessment Purposes

The INP generally directs the use of a single set of adverse meteorological data in the assessment of noise impacts (EPA, 2000). However, for noise modelling in this and other projects (see Wilkinson Murray [2011]), Wilkinson Murray has adopted the more rigorous approach of predicting noise levels at nearby receivers for a range of meteorological conditions based on meteorological data obtained from the locality. The noise modelling presented in this assessment is based on data provided by PAEHolmes (2012) from their CALMET model at a location indicative of the Project area for the period from 1 March 2011 to 29 February 2012. CALMET data developed for the Project have been used as it includes a contiguous dataset of wind speed, direction and temperature inversion (based on sigma theta data) which is not available from the local weather stations. Statistical occurrences of meteorological conditions are used to calculate a 10^{th} percentile exceedance noise level (i.e. the level that is exceeded 10% of the time), which is then compared with relevant criteria.

This alternative assessment procedure involves significantly greater computational complexity than the use of a single set of meteorological conditions. However, Wilkinson Murray believes it provides a more rigorous method of assessing noise exposure, and one that is more easily understood by the community. The approach of using the 10^{th} percentile calculated noise level as a measure of noise impacts has been considered acceptable by the DP&I and the EPA for previous similar mining project assessments.

The data for wind direction and wind speed are classified into eight directional intervals and five speed intervals (between 0.5 m/s and 3 m/s - with all other instances of wind speed described as “calm”) in accordance with the INP.

Stability class data provided by PAEHolmes (2012) were resolved into Pasquil-Gifford stability classes using the CALMET modelling package. However, the CALMET-generated data are only available in a six class system (i.e. A-F), where the F class also includes occurrences of G category stability class. Wilkinson Murray resolved G class data from the CALPUFF data generally in accordance with Table E6 of Appendix E of the INP by identifying recorded instances of F class during night periods for which the wind speed was less than 2 m/s.

Based on this analysis, temperature inversions with a strength of up to 4 degrees Celsius (°C)/100 m combined with winds of up to 3 m/s were included within the meteorological conditions modelled for the Project.

The above procedure considers all meteorological conditions at all receivers, and the conditions which determine the 10th percentile noise level would differ between receivers.

In accordance with the EPA’s (2000) INP Application Notes, noise levels at nearby receivers were also predicted for calm meteorological conditions.

5.2 Investigation of Feasible and Reasonable Noise Mitigation Measures

The modelled scenarios presented in this report represent the culmination of several iterative noise modelling investigations designed to determine feasible and reasonable noise mitigation measures. The iterative steps undertaken are described below.

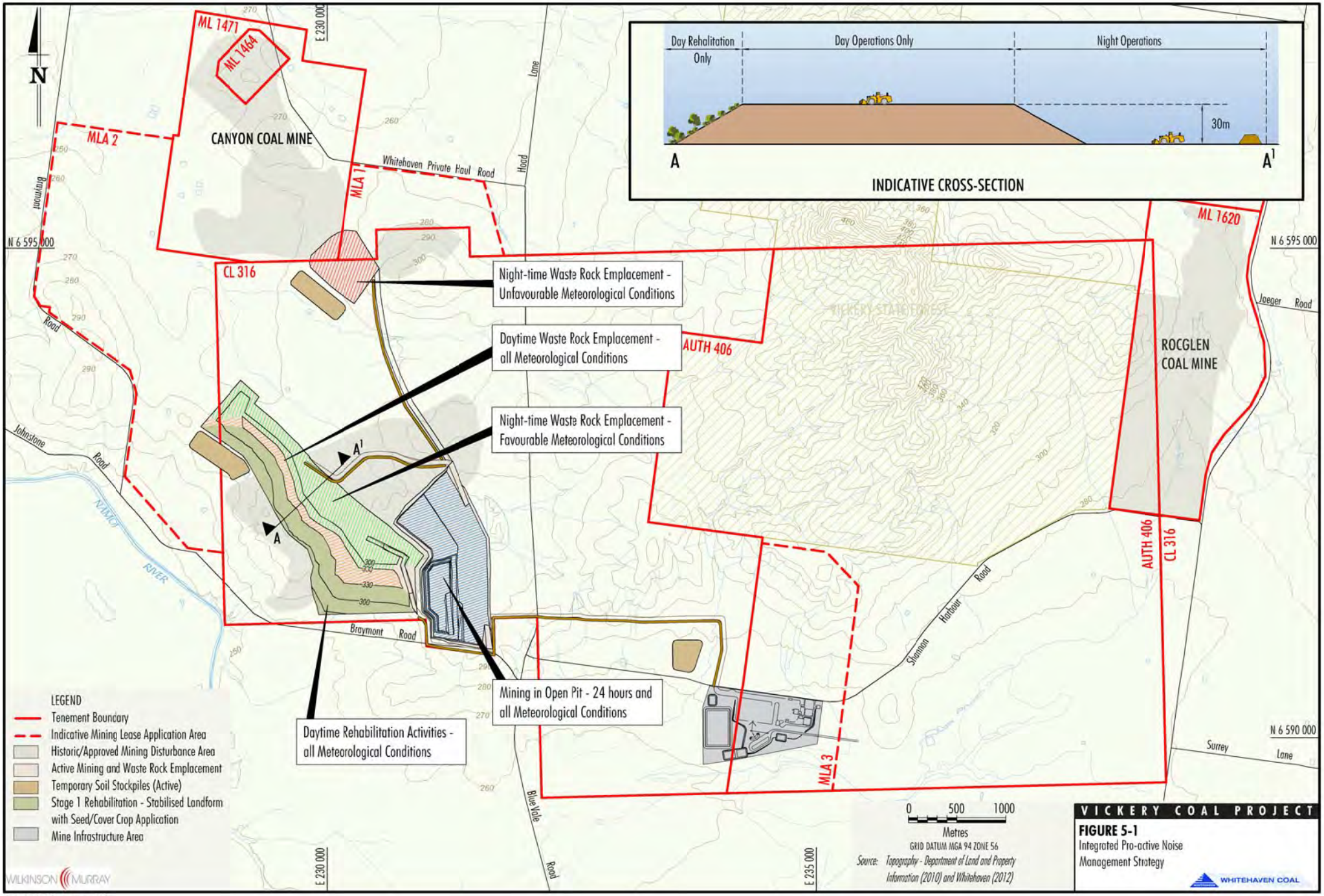
1. Preliminary noise modelling of scenarios representative of the maximum noise emissions from the Project to identify the potential for noise exceedances. As a result of this preliminary modelling, significant modifications to the mine plan were undertaken in order to improve acoustic performance, including:
    a. Treatment of a selection of mobile plant items to reduce emitted noise levels.
    b. Acoustic bunds along the exposed sections of haul roads.
    c. Early development of the southern and western limits of the Western Emplacement during daytime operations to shield night-time operations.
    d. Development of separate day and evening/night-time scenarios, with waste rock emplacement occurring in less exposed locations and cessation of some mobile equipment during the evening/night-time.
    e. Use of a pro-active noise management system (Section 5.3).
2. Evaluation of various combinations of noise management and mitigation measures to assess their relative effectiveness.
3. Review of the effectiveness of these measures and assessment of their feasibility by Whitehaven.
4. Adoption by Whitehaven of management and mitigation measures to appreciably reduce noise emissions associated with the Project.

Table 5-1 provides a summary of the specific mitigation measures committed to by Whitehaven during the development of the Project noise assessment in order to reduce potential noise emissions from the Project. Whilst some specific measures are proposed for scenarios Year 2 and 7, similar measures would be implemented in other years in accordance with the pro-active noise management system (Section 5.3).

The proposed mitigation measures result in the restriction of evening/night-time operations, including the use of alternative waste rock emplacement areas at night and the cessation of the rehabilitation fleet.

Table 5-1 Specific Mitigation Measures

Project Year when Applicable	Specific Mitigation Measures
Project Year 2	Western Emplacement fleet would, as a matter of priority, build and maintain a two-level emplacement area with the lower bench at least 30 m below the exposed area (the top) such that the lower bench is shielded from receivers to the south-west by the top of the emplacement area (Figure 5-1).
Project Year 2	Relocation of the waste emplacement fleet during the evening and night periods from the exposed area (the top) of the Western Emplacement to a bench at least 30 m below the top of the Western Emplacement such that the top of the emplacement area provides shielding to the receivers to the south-west.
Project Years 2 and 7	Real-time monitoring and forecasting system, incorporating noise and meteorological monitoring, with the purpose of anticipating upcoming periods of adverse weather conditions that may generate evening and/or night-time noise exceedances at a selection of receivers located to the south-west of the mine. Such a system would allow the mine operators to relocate the Western Emplacement fleet to the northernmost portion of the Western Emplacement in order to target compliance with the Project-specific noise criteria despite the adverse weather conditions. Details regarding the identified adverse weather conditions are provided in Section 5.3.
Project Year 7	Installation of a 10 m high bund along the exposed sections of the southern haul road route used to transport waste material to the Western Emplacement. Those sections run south and south-west of the open cut pit area.
Project Year 7	Installation of a 10 m high bund along the exposed sections of the northern haul road route used to transport waste material to the northern portion of the Western Emplacement during the identified adverse weather conditions. Those sections run from the northern end of the pit area to the Northern Emplacement area.
All Project Life	Noise control implemented on a selection of mobile plant (e.g. extra quiet mobile plant models) to reduce emitted noise levels. Details regarding the treated plant are provided in Section 5.4.
All Project Life	Installation of a 10 m high bund along the southern and western sides of the main truck haul road running from the open cut pit area to the infrastructure area.
All Project Life	Modified alignment of the main truck haul road running from the open cut pit area to the infrastructure area (in particular, relocating the haul route closer to the Eastern Emplacement, away from receivers to the south-west).
All Project Life	Cessation of the rehabilitation fleet (dozers, scrapers and water carts) during evening and night-time periods.
All Project Life	Enclose of ROM coal crushing/screen infrastructure (i.e. in a shed) in the MIA.



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5.3 Integrated Pro-active Noise Management – Evening and Night-time Operations during Identified Adverse Weather Conditions

It is proposed to have a real-time monitoring and forecasting system in-place to assist with managing noise levels during upcoming periods of adverse weather conditions. This system would be used throughout the Project life. Adverse conditions would be identified by a combination of noise and meteorological monitoring and meteorological forecasting, where noise monitoring indicates the trend in actual noise levels at a location and meteorological monitoring and forecasting indicates the likelihood that the current trend would continue or intensify over the ensuing period.

This assessment integrates pro-active noise management scenarios into the Year 2 and 7 modelling scenarios. These scenarios have been developed to target compliance with Project-specific criteria at receivers 131a, 131b, 132 and 133a (all located to the south-west of the Project).

In the event that the real-time monitoring and meteorological forecasting system predicts that elevated noise levels at receivers to the south-west may occur in Project Years 2 and 7, mine operators would relocate the Western Emplacement fleet to the north-eastern most portion of the Western Emplacement (as shown in Figure 5-1 for Year 2). In parallel, the western margin of the Western Emplacement would continue to be constructed during the day.

It should be noted that, whilst the modelling assessment has focused on Years 2 and 7 in the early years of the Project, the proactive noise management would be used for all stages of the Project to assist with the management of noise.

The proportion of time when such relocation would be necessary has been estimated from calculated noise levels under various meteorological conditions.

The adverse weather conditions predicted to require a change in operations are summarised in Table 5-2. Each condition consists of a combination of wind speed, wind direction and temperature inversion. Most of the identified weather conditions consist of northerly, north-easterly and easterly winds with temperature inversions of 3 or 4°C/100 m.

Table 5-2 Adverse Weather Conditions Triggering Change in Mine Operations

Project Years when Applicable	Time Period	Wind Direction	Wind Speed	Temperature Inversion
Year 2	Evening	0 degrees (i.e. N winds)	All wind speeds >0.5 m/s and <=3 m/s	4°C/100 m
			All wind speeds >1 m/s and <=3 m/s	3°C/100 m
			All wind speeds >2.5 m/s and <=3 m/s	No temperature inversion
		45 degrees (i.e. NE winds)	All wind speeds >0.5 m/s and <=3 m/s	4°C/100 m
			All wind speeds >1 m/s and <=3 m/s	3°C/100 m
			All wind speeds >2 m/s and <=3 m/s	No temperature inversion
		90 degrees (i.e. E winds)	All wind speeds >0.5 m/s and <=3 m/s	4°C/100 m
			All wind speeds >1.5 m/s and <=3 m/s	3°C/100 m
			All wind speeds >2.5 m/s and <=3 m/s	No temperature inversion
	Night	0 degrees (i.e. N winds)	All wind speeds >0.5 m/s and <=3 m/s	4°C/100 m
			All wind speeds >0.5 m/s and <=3 m/s	3°C/100 m
			All wind speeds >2.5 m/s and <=3 m/s	No temperature inversion
		45 degrees (i.e. NE winds)	All wind speeds >0.5 m/s and <=3 m/s	4°C/100 m
			All wind speeds >0.5 m/s and <=3 m/s	3°C/100 m
			All wind speeds >2 m/s and <=3 m/s	No temperature inversion
		90 degrees (i.e. E winds)	All wind speeds >0.5 m/s and <=3 m/s	4°C/100 m
			All wind speeds >1 m/s and <=3 m/s	3°C/100 m
			All wind speeds >2.5 m/s and <=3 m/s	No temperature inversion
		135 degrees (i.e. SE winds)	All wind speeds >1.5 m/s and <=3 m/s	4°C/100 m
		315 degrees (i.e. NW winds)	All wind speeds >1 m/s and <=3 m/s	4°C/100 m
Year 7	Evening	0 degrees (i.e. N winds)	All wind speeds >0.5 m/s and <=3 m/s	4°C/100 m
			All wind speeds >1 m/s and <=3 m/s	3°C/100 m
			All wind speeds >2.5 m/s and <=3 m/s	No temperature inversion
		45 degrees (i.e. NE winds)	All wind speeds >0.5 m/s and <=3 m/s	4°C/100 m
			All wind speeds >1 m/s and <=3 m/s	3°C/100 m
			All wind speeds >2 m/s and <=3 m/s	No temperature inversion
		90 degrees (i.e. E winds)	All wind speeds >0.5 m/s and <=3 m/s	4°C/100 m
			All wind speeds >1 m/s and <=3 m/s	3°C/100 m
			All wind speeds >2.5 m/s and <=3 m/s	No temperature inversion
	Night	0 degrees (i.e. N winds)	All wind speeds >0.5 m/s and <=3 m/s	4°C/100 m
			All wind speeds >0.5 m/s and <=3 m/s	3°C/100 m
			All wind speeds >2 m/s and <=3 m/s	No temperature inversion
		45 degrees (i.e. NE winds)	All wind speeds >0.5 m/s and <=3 m/s	4°C/100 m
			All wind speeds >0.5 m/s and <=3 m/s	3°C/100 m
			All wind speeds >1.5 m/s and <=3 m/s	No temperature inversion
		90 degrees (i.e. E winds)	All wind speeds >0.5 m/s and <=3 m/s	4°C/100 m
			All wind speeds >0.5 m/s and <=3 m/s	3°C/100 m
			All wind speeds >2 m/s and <=3 m/s	No temperature inversion
		135 degrees (i.e. SE winds)	All wind speeds >1 m/s and <=3 m/s	4°C/100 m
		315 degrees (i.e. NW winds)	All wind speeds >0.5 m/s and <=3 m/s	4°C/100 m

Notes:
Evening: the period from 6.00 pm to 10.00 pm.
Night: the period from 10.00 pm to 7.00 am.
Wind direction of 0 degrees refers to all directions >=337.5 degrees and <22.5 degrees.
Wind direction of 45 degrees refers to all directions >=22.5 degrees and <67.5 degrees.
Wind direction of 90 degrees refers to all directions >=67.5 degrees and <112.5 degrees.
Wind direction of 135 degrees refers to all directions >=112.5 degrees and <157.5 degrees.
Wind direction of 315 degrees refers to all directions >=292.5 degrees and <337.5 degrees.
Temperature inversion of 0 degrees/100 m corresponds to all stability classes except F and G.
Temperature inversion of 3 degrees/100 m corresponds to an F stability class.
Temperature inversion of 4 degrees/100 m corresponds to a G stability class.

Based on PAEHolmes' CALMET model dataset, those trigger meteorological conditions are predicted to occur approximately 14% to 35% of the time in evening period (depending on the season) and approximately 20% to 44% of the time at night (depending on the season). They are also expected to occur less frequently in summer and more frequently in winter when temperature inversions are more likely to take place.

Table 5-3 provides a summary of the percentage of time trigger meteorological conditions are expected to occur in each season and across relevant Project Years.

Table 5-3 Trigger Meteorological Conditions – Percentage of Time

Project Year when Applicable	Time Period	Season			
		Winter	Autumn	Summer	Spring
Project Year 2	Evening	34.8%	23.9%	13.7%	24.5%
	Night	45.5%	36.2%	11.4%	18.8%
Project Year 7	Evening	35.1%	23.9%	14.3%	26.1%
	Night	51.9%	48.3%	13.9%	21.4%

5.4 Fleet List and Sound Power Levels

Table 5-4 presents the schedule of equipment, plant sound power levels (SWL) and the period of operation of plant (i.e. day/evening/night) used in the noise modelling. The SWLs given in Table 5-4 are conservative in that they are based on plant operating at maximum capacity for an entire 15 minutes. The SWL of plant mitigated with noise controls are indicated in **bold** typeface.

No low frequency or tonal impacts are predicted at the receivers near the Project, and as such, no modifying factor adjustments to the SWL for the plant are considered to be required.

Table 5-4 Indicative Equipment Sound Power Levels

Fleet / Infrastructure Item	Model	Location / Function	Number of Equipment				Period	Sound Power Level L_{Aeq} (dBA)	Reference
			Year 2	Year 7	Year 17	Year 26		On Grade / on Incline	
Haul Trucks	CAT789 x 2	Haul roads (coal)	4	5	5	5	Day, evening, night	**113.5 / 116.5**	Wilkinson Murray & manufacturer's specifications provided by Whitehaven
	CAT789 x 2	Haul roads (waste rock)	7	13	6	6	Day, evening, night	**113.5 / 116.5**	Wilkinson Murray & manufacturer's specifications provided by Whitehaven
	CAT793 x 2	Haul roads (waste rock)	15	13	21	20	Day, evening, night	**115 / 118**	Wilkinson Murray & manufacturer's specifications provided by Whitehaven
	CAT777 x 2	Haul roads	2	2	2	2	Day, evening, night	**110 / 114**	Wilkinson Murray & manufacturer's specifications provided by Whitehaven
Dozers	D11T	Waste rock emplacement	2	3	4	4	Day, evening, night	**116**	Wilkinson Murray
	D11T	Waste rock removal	1	1	0	0	Day, evening, night	**116**	Wilkinson Murray
	D11T	Coal removal	0	0	0	1	Day, evening, night	**116**	Wilkinson Murray
	D10T	Waste rock emplacement	2	1	0	1	Day, evening, night	**116**	Wilkinson Murray
	D10T	Waste rock removal	1	4	3	2	Day, evening, night	**116**	Wilkinson Murray
	D10T	Coal removal	1	1	2	2	Day, evening, night	**116**	Wilkinson Murray
	D10T	Infrastructure area	0	1	1	1	Day, evening, night	**116**	Wilkinson Murray
	D9	Rehabilitation	2	2	2	2	Day	**114**	Wilkinson Murray
Excavators	CAT6030 (RH340B)	Waste rock removal	1	2	1	1	Day, evening, night	**115**	Wilkinson Murray
	CAT6030 (RH340B)	Waste rock emplacement	0	0	0	1	Day, evening, night	**115**	Wilkinson Murray
	CAT6030 (RH340B)	Coal removal	1	1	2	1	Day, evening, night	**115**	Wilkinson Murray
	CAT6060 (RH340B)	Waste rock removal	3	4	4	4	Day, evening, night	**117**	Wilkinson Murray

Table 5-4 (Continued) Indicative Equipment Sound Power Levels

Loaders	CAT994	Infrastructure area	1	1	1	1	Day, evening, night	**113**	Wilkinson Murray
	CAT994	Waste rock removal	1	1	1	1	Day, evening, night	**113**	Wilkinson Murray
Drills	DM45	Waste rock blasting	3	4	4	4	Day, evening, night	**114**	Wilkinson Murray
Graders	16M	Haul roads	3	4	4	4	Day, evening, night	108	Wilkinson Murray
Scrapers	CAT637	Rehabilitation	4	4	4	4	Day	115	Wilkinson Murray
Water Carts	-	Haul roads	2	3	3	3	Day, evening, night	**108/111**	Wilkinson Murray
	-	Rehabilitation	1	1	1	1	Day	**108/111**	Wilkinson Murray
Light Plant	-	All active areas	11	15	15	15	Evening, night	104	Wilkinson Murray
Pump	-	Coal mining	0	1	2	1	Day, evening, night	100	Wilkinson Murray
Primary Crusher	-	Infrastructure area	1	1	1	1	Day, evening, night	**109**	Wilkinson Murray
Mobile Crusher	-	Infrastructure area	1	1	1	1	Day	**109**	Wilkinson Murray
Loadout Bin	-	Infrastructure area	1	1	1	1	Day, evening, night	110	Wilkinson Murray
Secondary Screen	-	Infrastructure area	1	1	1	1	Day, evening, night	**109**	Wilkinson Murray
Contractor Road Truck	-	Infrastructure area	1	1	1	1	Day, evening, night	113	Wilkinson Murray

Note: Sound power levels indicated in **bold** typeface indicate plant mitigated with noise controls.

5.5 Predicted Operational Noise Levels from the Project

The predicted $L_{Aeq,15min}$ operational noise levels at each receiver are presented in Table 5-5. Results are presented for each of Years 2, 7, 17 and 26 for both calm and relevant meteorological conditions (Section 5.1.2).

Noise predictions under relevant weather conditions are provided as 10th percentile $L_{Aeq,15min}$ noise levels for all receivers, with the exception of receivers 131a, 131b, 132 and 133a for Years 2 and 7 in the evening and night periods.

For these receivers, because Whitehaven would alter its operations during adverse weather conditions (conditions provided in Table 5-2) during the evening and night periods, only the maximum noise levels corresponding to the remaining evening and night-time meteorological conditions are provided. In addition, Wilkinson Murray has also modelled the alternate scenario where waste rock emplacement activities are relocated to the north-easternmost portion of the Western Emplacement. No additional 10th percentile noise level exceedances occur under this scenario at any receiver.

Indicative noise contours representing the noise levels for all years is presented in Figure C-1, Appendix C.

Within Table 5-5, predicted operational noise levels at privately-owned receivers in excess of the 35 dBA $L_{Aeq,15min}$ noise criterion are shown in grey. The mine-owned receivers are included in Table 5-5 for the purpose of information only.

The results in Table 5-5 may be summarised as follows:

Calm Isothermal Meteorological Conditions (Night)

- During periods of calm isothermal meteorological conditions at night, operational noise from the Project would comply with the 35 dBA $L_{Aeq,15min}$ criterion at all privately-owned receivers.

Tenth Percentile Meteorological Conditions (day, evening and night)

- Daytime noise levels are predicted to exceed the 35 dBA $L_{Aeq,15min}$ criterion at receivers 89b (approved dwelling location), 127a, 127b and 127c. However, in most instances, operational noise from the Project at nearby receivers would be highest during evening and night-time periods due mainly to the prevalence of temperature inversions.
- Exceedances of the 35 dBA $L_{Aeq,15min}$ criterion by greater than 5 dBA are predicted for privately-owned receivers 89b and 127b.
- Exceedances of the 35 dBA $L_{Aeq,15min}$ criterion by between 3-5 dBA are predicted for privately-owned receivers 127a and 127c.
- Exceedances of the 35 dBA $L_{Aeq,15min}$ criterion by between 1-2 dBA are predicted for privately-owned receivers 89a and 112.

It is important to note that Whitehaven is intending to enter into a noise or purchase agreement with receivers 89b (and 89a), 127a, 127b and 127c. At the time of writing, receiver 112 was under contract for purchase by Whitehaven, and Whitehaven has entered into negotiations with the owners of receivers 127a, 127b and 127c.

Table 5-5 - Predicted $L_{Aeq,15min}$ Operational Noise Levels from Project

Receiver ID	$L_{Aeq,15min}$ Noise Level (dBA)																Noise Criterion (dBA)
	Year 2				Year 7				Year 17				Year 26				
	Night (Calm)	Day (P10)	Evening (P10)	Night (P10)	Night (Calm)	Day (P10)	Evening (P10)	Night (P10)	Night (Calm)	Day (P10)	Evening (P10)	Night (P10)	Night (Calm)	Day (P10)	Evening (P10)	Night (P10)	
67	20	23	24	23	<20	24	24	24	<20	24	24	24	<20	24	25	24	35
83a	<20	24	22	23	<20	27	27	27	<20	27	27	27	<20	27	27	28	35
83b	<20	25	22	23	<20	27	28	28	<20	27	27	28	<20	27	27	28	35
87a	<20	25	26	27	<20	27	28	28	<20	26	26	27	<20	26	27	27	35
87b	<20	26	26	26	<20	28	28	29	<20	27	27	28	<20	27	28	28	35
86	<20	<20	<20	<20	<20	21	21	21	<20	<20	<20	<20	<20	<20	<20	<20	35
88	<20	28	27	28	20	30	31	31	<20	29	30	31	<20	30	30	31	35
89a	<20	29	27	29	23	32	33	34	26	34	35	36	<20	34	35	36	35
89b	30	37	37	39	28	38	40	41	31	40	42	44	21	36	38	40	35
94	<20	25	25	25	<20	28	28	29	<20	26	27	27	<20	29	29	29	35
95	<20	22	22	22	<20	23	23	22	<20	23	23	22	<20	23	23	23	35
98	<20	28	29	29	22	32	33	33	<20	30	32	31	<20	32	33	33	35
99	<20	23	23	23	<20	27	26	26	<20	24	25	25	<20	27	27	27	35
101	<20	27	28	28	22	31	32	32	20	29	30	30	<20	29	30	31	35
102	<20	26	26	26	21	30	30	30	<20	28	28	28	<20	29	30	30	35
103	<20	21	21	21	<20	25	25	25	<20	24	24	24	<20	25	25	25	35
107	<20	25	26	26	21	30	30	30	<20	27	28	28	<20	28	29	29	35
108a	<20	29	31	32	24	32	34	35	22	31	33	34	21	30	32	33	35
108b	<20	25	26	26	<20	29	29	30	<20	27	28	29	<20	27	28	28	35
112*	22	31	31	32	24	32	33	34	27	34	35	36	25	34	35	37	35
118	<20	22	24	24	<20	25	26	26	<20	25	24	25	<20	25	25	25	35
122	<20	25	27	27	<20	27	28	28	<20	27	27	27	<20	26	27	27	35
124	<20	31	31	31	<20	30	31	32	<20	28	30	30	<20	27	29	30	35

Receiver ID	$L_{Aeq,15min}$ Noise Level (dBA)																Noise Criterion (dBA)
	Year 2				Year 7				Year 17				Year 26				
	Night (Calm)	Day (P10)	Evening (P10)	Night (P10)	Night (Calm)	Day (P10)	Evening (P10)	Night (P10)	Night (Calm)	Day (P10)	Evening (P10)	Night (P10)	Night (Calm)	Day (P10)	Evening (P10)	Night (P10)	
125	<20	33	33	34	21	31	33	34	<20	30	31	32	<20	28	31	31	35
127a	<20	38	37	38	26	34	37	39	22	33	34	35	<20	31	33	34	35
127b	25	44	41	42	30	38	42	43	21	37	37	38	<20	30	38	39	35
127c	22	37	39	40	27	33	39	39	<20	32	36	36	<20	26	35	35	35
131a	<20	35	35 [2]	35 [2]	25	31	35 [2]	35 [2]	<20	30	34	35	<20	26	33	34	35
131b	<20	34	35 [2]	35 [2]	25	31	35 [2]	35 [2]	<20	29	34	35	<20	26	33	33	35
132	<20	34	35 [2]	35 [2]	25	31	35 [2]	35 [2]	<20	29	34	35	<20	27	32	33	35
133a	<20	35	35 [2]	35 [2]	25	31	35 [2]	35 [2]	<20	30	34	35	<20	25	33	34	35
137	<20	27	28	28	<20	27	28	29	<20	26	27	27	<20	26	27	27	35
138	<20	25	26	26	<20	26	27	27	<20	25	25	26	<20	24	25	25	35
139	<20	29	29	30	<20	28	30	30	<20	26	28	28	<20	26	27	28	35
140	<20	29	29	30	<20	28	29	30	<20	26	28	28	<20	26	27	28	35
141	<20	32	34	35	23	29	34	35	<20	28	32	33	<20	26	31	32	35
142	<20	28	30	31	<20	27	30	31	<20	25	29	29	<20	25	28	28	35
143	<20	30	31	32	21	28	31	32	<20	26	30	30	<20	25	29	29	35
144	<20	28	30	30	<20	27	30	30	<20	25	29	29	<20	24	28	28	35
146	<20	23	25	25	<20	23	25	25	<20	23	25	25	<20	21	23	23	35
147	<20	25	27	28	<20	25	28	28	<20	23	26	27	<20	23	25	26	35
153	<20	28	30	31	20	28	31	31	<20	26	30	30	<20	25	28	29	35
174b	<20	26	28	28	<20	29	30	30	<20	28	29	30	<20	26	28	28	35
180	<20	24	25	25	<20	28	29	29	<20	26	27	27	<20	26	27	27	35
221a	<20	23	23	23	<20	23	23	23	<20	23	23	23	<20	24	24	23	35
221b	<20	23	23	22	<20	23	23	23	<20	23	24	23	<20	24	24	23	35
1f	27	35	35	37	27	36	38	39	34	40	41	42	25	38	41	42	35
1g	<20	25	26	25	<20	26	27	27	<20	27	28	28	<20	28	29	29	35

Receiver ID	$L_{Aeq,15min}$ Noise Level (dBA)																Noise Criterion (dBA)
	Year 2				Year 7				Year 17				Year 26				
	Night (Calm)	Day (P10)	Evening (P10)	Night (P10)	Night (Calm)	Day (P10)	Evening (P10)	Night (P10)	Night (Calm)	Day (P10)	Evening (P10)	Night (P10)	Night (Calm)	Day (P10)	Evening (P10)	Night (P10)	
1i	<20	25	25	24	<20	25	25	24	<20	25	26	25	<20	26	26	26	35
1l	24	32	33	33	30	43	43	43	27	38	39	39	28	39	41	41	35
1m	<20	25	26	25	<20	28	28	28	<20	26	27	27	<20	28	29	28	35
1n	<20	24	25	24	<20	27	27	27	<20	26	26	26	<20	27	28	27	35
1o	<20	25	26	25	<20	26	26	26	<20	26	27	26	<20	27	27	27	35
1t	21	31	31	33	24	33	35	36	30	36	37	38	24	35	37	39	35
1u	22	42	39	40	28	37	40	41	24	36	35	36	<20	31	35	36	35
1v	25	41	42	43	30	36	42	43	22	35	38	39	21	29	37	38	35
1w	<20	34	36	37	25	31	36	37	<20	30	34	35	<20	27	33	33	35
1x	26	36	37	39	28	37	40	41	37	41	43	44	32	41	43	44	35
1y	<20	29	31	32	21	27	31	32	<20	26	30	30	<20	25	28	29	35
1z	20	35	37	38	26	31	37	38	<20	31	35	35	<20	25	33	34	35
1aa	<20	28	26	27	20	28	29	31	23	29	30	31	21	30	31	31	35
1ab	<20	25	23	24	21	26	26	27	25	29	30	30	20	30	30	30	35
1ac	<20	23	21	23	<20	24	25	26	<20	27	27	28	<20	27	27	28	35
1ad	25	34	35	37	27	36	37	39	36	39	41	42	28	38	39	41	35
1ae	22	33	34	35	27	34	36	37	32	37	38	39	28	37	38	39	35
1af	<20	25	28	28	<20	26	28	29	<20	24	27	28	<20	23	26	27	35

* Property under contract for purchase by Whitehaven.

Notes:
1. Noise levels predicted to result under 10th percentile meteorological conditions as described in Section 5.1.2 (indicated by 'P10').
2. Noise level predicted to result under worst meteorological condition excluding trigger conditions for integrated proactive noise management and/or 10th percentile results for the alternative scenario where waste emplacement operations occur to the north-west of the Western Emplacement (Section 5.3). Noise level predictions in the absence of proactive noise management at these receivers are presented in Appendix D.
3. Noise levels predicted to result under calm isothermal meteorological conditions (indicated by 'Calm').
4. Greyed out levels indicate exceedances of 35 dBA $L_{Aeq,15min}$ noise criterion at privately-owned receivers.

A summary of those receivers predicted to exceed criteria is provided in Table 5-6. The receivers are segregated according to the DP&I "Noise Management Zone" (receivers exposed to noise exceedances of between 1 to 5 dBA) and "Noise Affectation Zone" (receivers exposed to noise >5 dBA above the noise criterion) classifications.

Table 5-6 Summary of Potential Exceedances

Noise Management Zone		Noise Affectation Zone
1 to 2 dBA exceedance	**3 to 5 dBA exceedance**	**> 5 dBA exceedance**
Receivers 89a and 112*	Receivers 127a and 127c	Receivers 89b, and 127b

* Property under contract for purchase by Whitehaven.

Section 5.11 provides a description of Whitehaven's obligations with respect to these zones of management and affectation. As shown in Table 5-6, noise levels after the implementation of noise mitigation measures are predicted to exceed criteria at a total of three privately-owned properties. Noise levels are predicted to exceed the intrusiveness criterion at two of these properties. Daytime exceedances are anticipated at two of the properties, with the exception of 112. This relatively limited number of exceedances indicates that, with the implementation of proposed mitigation (including real-time measurement), noise from the Project is being managed to the maximum extent possible, and no other measures would be of material benefit, including limiting operations to daytime only.

5.6 Contingency Development Schedule

As described in Section 2.3.13, Whitehaven may consider a contingency development schedule.

Wilkinson Murray has assessed potential noise impacts associated with a contingency development schedule and it was found that it would result in no additional noise impacts at privately-owned receivers in comparison with the results predicted for the base-case scenario (Section 5.5). Details regarding the contingency development schedule noise assessment are included in Appendix E.

5.7 Vacant Land Noise Assessment

The noise assessment assumes the presence of noise criteria that apply to "more than 25% of any privately-owned land". This is consistent with recent conditions of approval (e.g. the existing Tarrawonga Coal Mine Development Consent [DA 88-4-2005 MOD 1, Schedule 3, Condition 2]).

Wilkinson Murray has reviewed potential impacts on private vacant land and concluded that greater than 25% of vacant property 116 is predicted to be affected by Project noise in excess of 40 dBA $L_{Aeq,15\ minute}$. In addition, vacant property 65 is predicted to exceed the criterion of 35 dBA $L_{Aeq,15\ minute}$ by between 1 and 5 dBA for greater than 25% of the property.

5.8 Cumulative Noise Assessment

If approved, the Project would operate concurrently with the Rocglen Coal Mine Extension Project, the Tarrawonga Coal Project, the Boggabri Coal Continuation Project and the Maules Creek Coal Project. In this event, receivers may potentially be exposed to noise from all five industrial sources simultaneously.

It should be noted that the Maules Creek Coal Project (located some 20 km north-west of the Project) is expected to have a negligible impact on the receivers in the vicinity of the Project and therefore the cumulative assessment does not include the Maules Creek Coal Project.

The assessment of cumulative impacts considers the total and relative noise contributions from the Project, and the following adjacent mines (all shown on Figure 1-1):

- Rocglen Coal Extension – open cut coal mine approved to haul up to 1.5 Mtpa of ROM coal along the Approved Whitehaven ROM coal road transport route. Project Approval 10_0015, approved in 2011.
- Tarrawonga Coal Project – open cut coal mine approved to haul up to 2 Mtpa of ROM coal. Approval of Tarrawonga Coal Project currently being sought, existing operations approved under DA-88-4-2005.
- Boggabri Coal Continuation Project – open cut coal mine approved to extract up to 8.6 Mtpa ROM coal. Project Approval 09_0182, approved 2012.

The contribution of noise from the Rocglen Coal Extension, Tarrawonga Coal and Boggabri Coal Continuation Projects has been taken from predictions of noise emissions included in the following documents:

- *Tarrawonga Coal Project Environmental Assessment* prepared by Wilkinson Murray (2011).
- *Acoustic Impact Assessment Continuation of Boggabri Coal Mine Environmental Assessment* prepared by Bridges Acoustics (2010).
- *Noise and Vibration Impact Assessment Rocglen Coal Mine Extension Project* prepared by Spectrum Acoustics (2010).

The methodology used for assessment of cumulative impacts was to logarithmically sum the predicted night-time noise levels for the Project, Rocglen Coal Extension Project, Boggabri Coal Continuation Project and Tarrawonga Coal Project for key receivers. The overall cumulative noise levels are then reported against the night-time amenity criterion (Table 4-4).

The assessment of cumulative noise impacts is undertaken in consideration of the average L_{Aeq} noise level over the entire night period (10.00 pm to 7.00 am, a period of 9 hours), rather than the 10th percentile $L_{Aeq,15min}$ noise level within that period as is required for the assessment of intrusive noise impacts (Section 5.5). Correspondingly, the $L_{Aeq,9\ hr}$ noise descriptor is used to assess cumulative impacts.

The Tarrawonga Coal Project is scheduled to commence operations in January 2013 while the Rocglen Coal Extension Project commenced operations in 2012. For the purposes of cumulative assessment, the closest available corresponding noise prediction years for the three projects were selected. Given the noise predictions available for the Rocglen Coal Extension, Boggabri Coal Continuation and Tarrawonga Coal Projects, predicted noise levels from Years 2, 7 and 17 of the Project were separately summed with Years 1 and 5 of the Rocglen Coal Extension Project, Years 2, 4 and 16 of the Tarrawonga Coal Project, and Years 1, 10 and 21 of the Boggabri Coal Continuation noise impact assessments, respectively.

It should be noted that Year 26 of the Project has not been considered for the cumulative noise assessment as neither Rocglen Coal Extension Project nor Tarrawonga Coal Project would have approval to continue operations up to that year. Therefore, the earlier Years 2, 7 and 17 are expected to be worst-case from a cumulative perspective.

The summation of the various noise predictions used for cumulative assessment is summarised below:

- Cumulative Year 2 = Year 2 Project + Year 1 Rocglen Coal Extension Project + Year 2 Tarrawonga Coal Project + Year 1 Boggabri Coal Continuation Project.
- Cumulative Year 7 = Year 7 Project + Year 5 Rocglen Coal Extension Project + Year 4 Tarrawonga Coal Project + Year 10 Boggabri Coal Continuation Project.
- Cumulative Year 17 = Year 17 Project + Year 16 Tarrawonga Coal Project + Year 21 Boggabri Coal Continuation Project.

The assessment of cumulative impacts was undertaken for all receivers at which there is predicted noise level data for the Project and at least one of the Rocglen Coal Extension, Tarrawonga Coal or Boggabri Coal Continuation Projects. In addition, other receivers which are deemed to be potentially affected by more than one project were also included. Noise predictions for those receivers were based on point source calculations, where available, or noise contours from the abovementioned documents. The predicted cumulative noise levels are presented in Table 5-7.

The predicted Project noise levels relate to the $L_{Aeq,9\ hr}$ noise level averaged over all recorded meteorological conditions over all night periods within the worst case season (e.g. autumn, winter, spring, summer). The night-time period was selected as it is the worst-case period in terms of the predicted Project noise levels, and therefore there is more potential for the Project to contribute to cumulative noise issues in this period.

Table 5-7 Predicted Night-time Cumulative $L_{Aeq,9hr}$ Operational Noise from the Project, Boggabri Coal Continuation Project, Tarrawonga Coal Project and Rocglen Coal Extension Project

Receiver ID	Night-time $L_{Aeq,9\ hr}$ Noise Level (dBA)														Recommended Acceptable Criterion LAeq,9 hr (dBA)	Recommended Maximum Criterion LAeq,9 hr (dBA)
	Project			Tarrawonga Coal Project			Boggabri Coal Continuation Project			Rocglen Coal Extension Project		Cumulative Noise				
	Year 2	Year 7	Year 17	Year 2	Year 4	Year 16	Year 1	Year 10	Year 21	Year 1	Year 5	Year 2	Year 7	Year 17		
67	21	22	22	23	23	22	<32	<31	<31	31	29	<35	<34	<32	40	45
83a	21	26	26	31	31	29	<32	<31	<31	-	-	<35	<35	<34	40	45
83b	22	27	27	30	31	29	<32	<31	<31	-	-	<35	<35	<34	40	45
86	15	20	17	26	26	24	<32	<31	<31	-	-	<33	<32	<32	40	45
87a	26	27	26	25	25	22	<32	<31	<31	-	-	<34	<33	<33	40	45
87b	25	28	26	27	27	25	<32	<31	<31	-	-	<34	<34	<33	40	45
88	27	30	30	29	29	27	<32	<31	<31	-	-	<35	<35	<34	40	45
89a	28	33	34	30	30	29	<32	<31	<31	-	-	<35	<36	<37	40	45
89b	37	39	42	28	28	27	<32	<31	<31	-	-	<39	<40	42	40	45
94	24	27	25	-	-	-	-	-	-	29	31	30	32	25	40	45
95	20	20	20	21	21	20	<32	<31	<31	29	29	<34	<34	<32	40	45
98	27	31	29	-	-	-	-	-	-	33	33	34	35	29	40	45
99	22	24	23	-	-	-	-	-	-	26	27	27	29	23	40	45
101	27	30	28	-	-	-	-	-	-	<32	<32	<33	<34	28	40	45
102	25	29	26	-	-	-	-	-	-	28	28	30	31	26	40	45
107	24	29	26	-	-	-	-	-	-	<32	<32	<33	<34	26	40	45
112*	31	32	34	28	28	29	<32	<31	<31	-	-	<35	<35	<37	40	45
118	23	25	24	20	20	17	<32	<31	<31	-	-	<33	<32	<32	40	45
122	26	28	26	24	24	20	<32	<31	<31	-	-	<34	<33	<32	40	45

Receiver ID	Night-time $L_{Aeq,9\ hr}$ Noise Level (dBA)														Recommended Acceptable Criterion LAeq,9 hr (dBA)	Recommended Maximum Criterion LAeq,9 hr (dBA)
	Project			Tarrawonga Coal Project			Boggabri Coal Continuation Project			Rocglen Coal Extension Project		Cumulative Noise				
	Year 2	Year 7	Year 17	Year 2	Year 4	Year 16	Year 1	Year 10	Year 21	Year 1	Year 5	Year 2	Year 7	Year 17		
127a	36	37	34	<24	<24	<20	<30	<30	<30	-	-	<37	<38	<35	40	45
127b	40	42	37	<24	<24	<20	<30	<30	<30	-	-	40	42	<38	40	45
127c	38	38	35	<24	<24	<20	<30	<30	<30	-	-	<38	<38	<36	40	45
221a	20	21	21	22	22	20	<32	<31	<31	30	30	<35	<34	<32	40	45
221b	21	21	21	21	22	20	<32	<31	<31	30	30	<35	<34	<32	40	45
1f	36	37	41	28	28	27	<32	<31	<31	-	-	<38	<39	41	40	45
1g	23	24	25	21	21	20	<32	<31	<31	49	50	49	50	<32	40	45
1i	22	22	23	22	22	20	<32	<31	<31	38	33	<39	<36	<32	40	45
1l	31	39	36	-	-	-	-	-	-	34	34	36	40	36	40	45
1m	24	26	24	-	-	-	-	-	-	41	44	41	44	24	40	45
1n	22	25	23	-	-	-	-	-	-	40	44	40	44	23	40	45
1o	23	24	24	-	-	-	-	-	-	49	47	49	47	24	40	45
1t	31	34	37	28	28	26	<32	<31	<31	-	-	<35	<36	<38	40	45
1x	37	39	42	25	25	24	<32	<31	<31	-	-	<38	<40	<43	40	45
1aa	26	29	30	27	28	28	<32	<31	<31	-	-	<34	<34	<34	40	45
1ab	23	26	29	26	27	27	<32	<31	<31	<32	<32	<36	<36	<34	40	45
1ac	21	24	26	26	27	25	<32	<31	<31	<32	<32	<36	<36	<33	40	45
1ad	35	37	41	26	26	25	<32	<31	<31	-	-	<37	<38	41	40	45
1ae	33	35	37	25	25	24	<32	<31	<31	-	-	<36	<37	<38	40	45

* Property under contract for purchase by Whitehaven.

Notes: 1. $L_{Aeq,9\ hr}$ refers to the L_{eq} noise level measured over the entire night period (10.00 pm-7.00 am).

2. Greyed out levels indicate exceedances at privately-owned receivers of night-time 40 dBA $L_{Aeq,Period}$ cumulative noise criterion.

Table 5-7 indicates that night-time cumulative noise levels would comply with the recommended acceptable amenity criterion (40 dBA $L_{Aeq,9hr}$) at all but two privately-owned receivers. A marginal 2 dBA exceedance of the amenity criterion is predicted at receivers 89b and 127b (primarily due to noise from the Project). Night-time cumulative noise levels are predicted to comply with the recommended maximum amenity criterion of 45 dBA $L_{Aeq,9hr}$ at all receivers.

It is important to note that Whitehaven is intending to enter into a noise or purchase agreement with receivers 127a, 127b and 127c.

As indicated in Table 5-6, receivers 89b and 127b have been identified as falling within the Project's Noise Affectation Zone. However, as explained in Section 5.5, Whitehaven is intending to enter into a noise or purchase agreement with receivers 89b (and 89a), 127a, 127b and 127c. At the time of writing Whitehaven has entered into negotiations with the owners of receivers 127a, 127b and 127c. Receiver 112 is under contract for purchase by Whitehaven.

5.9 Potential for Sleep Disturbance

The noise model was also used to analyse potential L_{Amax} likely to arise from the Project's night-time operations. The instantaneous noise sources and their typical L_{Amax} SWL that may have the potential to disturb sleep can be summarised as follows:

- Plant reversing alarms 115 dBA L_{Amax}
- Loaders dumping 118 dBA L_{Amax}
- Primary crusher dumping 119 dBA L_{Amax}
- Dozer Track noise 120 dBA L_{Amax}
- Engine noise as trucks pass at-grade 118 dBA L_{Amax}
- Engine noise as trucks ascend inclines 121 dBA L_{Amax}

The predicted night-time L_{Amax} noise levels at receivers surrounding the Project are indicated in Table 5-8. L_{Amax} noise levels are conservatively compared with the $L_{A1,1min}$ criterion of 45 dBA for this assessment. Mine-owned receivers are included for the purpose of information only.

These L_{Amax} predictions were modelled using the same plant locations used for the modelling of operational noise impacts. The predictions are based on a typical adverse weather condition of no wind and a temperature inversion of $4^{o}C/100$ m.

Table 5-8 indicates that L_{Amax} noise levels due to night operations from the Project are predicted to be below the sleep disturbance criterion at all privately-owned receivers.

Table 5-8 L_{Amax} Levels from Night-time Operations at the Project

Receiver ID	Year 2	Year 7	Year 17	Year 26	Criterion ($L_{A1,1min}$ dBA)
67	24	25	25	25	45
83a	24	28	28	29	45
83b	24	29	29	29	45
86	21	23	22	20	45
87a	28	29	28	28	45
87b	27	30	29	29	45
88	29	32	32	32	45
89a	30	35	37	37	45
89b	40	42	45	41	45
94	26	30	28	30	45
95	23	23	23	24	45
98	32	35	33	34	45
99	24	27	26	28	45
101	29	33	31	32	45
102	27	32	29	31	45
103	22	26	25	26	45
107	27	31	29	30	45
108a	32	36	34	34	45
108b	27	31	30	29	45
112*	33	35	37	38	45
118	25	27	26	26	45
122	28	29	28	28	45
124	32	33	31	31	45
125	35	35	33	32	45
127a	39	40	36	35	45
127b	43	44	40	40	45
127c	41	40	37	36	45
131a	36	36	36	35	45
131b	36	36	36	34	45
132	36	36	36	34	45
133a	36	36	36	35	45
137	29	30	28	28	45
138	27	28	27	26	45
139	31	31	29	29	45
140	31	31	29	29	45
141	36	36	34	33	45
142	32	32	30	29	45
143	33	33	31	30	45
144	31	31	30	29	45
146	26	26	26	24	45
147	29	29	28	27	45
153	32	32	31	30	45
174b	29	31	31	29	45
180	26	30	28	28	45
221a	24	24	24	24	45
221b	23	24	24	24	45
1f	38	40	43	42	45
1g	26	29	29	30	45
1i	25	26	26	27	45
1l	35	45	43	44	45

Receiver ID	Year 2	Year 7	Year 17	Year 26	Criterion ($L_{A1,1min}$ dBA)
1m	26	29	28	29	45
1n	25	28	27	28	45
1o	26	27	27	28	45
1t	34	37	39	40	45
1u	41	42	38	37	45
1v	44	44	40	39	45
1w	38	38	36	34	45
1x	40	42	46	45	45
1y	33	33	31	30	45
1z	39	39	36	35	45
1aa	28	32	32	32	45
1ab	25	28	31	31	45
1ac	24	27	29	29	45
1ad	38	40	44	42	45
1ae	36	38	40	40	45
1af	29	30	29	28	45

* Property under contract for purchase by Whitehaven.

5.10 Construction Noise

Construction/development activities associated with the Project are described in Section 2.2. Construction of the North-west Drainage Line Diversion and the water and electricity supply infrastructure are not expected to be material from a construction noise perspective, and have not been considered further. The four major construction activities that have been identified as being potential for intrusive noise (and their expected durations) are:

- Construction of the MIA (approximately 12 months).
- Relocation of Blue Vale Road (approximately 12 months).
- Relocation of Braymont Road (approximately 1-2 months).
- Private Haul Road and Highway Overpass (approximately 3-6 months).

All of these construction activities would commence with an earthmoving phase, followed by installation activities relevant to the particular construction type.

However, because of the large fleet items used, earthmoving works are expected to have the highest potential for off-site noise impact and are therefore assessed in the construction noise assessment. Earthmoving works would require additional mobile plants including dozers, scrapers, graders, compactors and water trucks.

The earthmoving fleet is expected to be the same for all four construction areas. An indicative earthmoving fleet comprises:

- four 637 scrapers (each having a SWL of 115 dBA);
- two D9 dozers (each having a SWL of 114 dBA);
- four water trucks (each having a SWL of 110 dBA);
- two compactors (each having a SWL of 112 dBA); and
- two 16M graders (each having a SWL of 108 dBA).

The estimated total SWL from the concurrent operation of all construction plant is 124 dBA. It should be considered that this total SWL is conservative as the entire construction fleet would not always operate concurrently. Construction/development activities would generally be undertaken during daytime hours.

Noise from earthmoving works associated with the construction of the MIA, Private Haul Road and Highway Overpass and the relocation of Blue Vale and Braymont Roads was predicted using the Environmental Noise Model.

5.10.1 Construction Noise in the Vicinity of the Project

As perceived from receivers in the vicinity of the Project, noise from activities associated with the construction of the MIA and the relocation of Blue Vale and Braymont Roads would largely be indistinguishable from operational mining activities given that similar plant would be deployed and that construction activities would occur in areas adjacent to operational mining activities.

Therefore, the INP intrusiveness noise criterion of 35 dBA (Table 4-4) is used to assess compliance of construction noise in the vicinity of the mine site.

There would be some overlap between the commencement of mining operations and construction of the MIA and relocation of Blue Vale and Braymont Road. As such, predicted construction noise levels have been combined with the Year 2 daytime operational noise levels, with the combined noise level compared against the INP intrusiveness noise criteria. However, this is conservative as the Year 2 operational noise modelling includes the use of the MIA.

Works associated with the relocation of Blue Vale Road would take place along the whole length of the relocated road section and for this reason two scenarios have been assessed to address works at the northern end and the southern end of the work area respectively. Similarly, construction works associated with the relocation of Braymont Road would take place along the whole length of the relocation road section and for this reason the assessment has considered the worst case scenario where works take place at the westernmost end of the work area.

Table 5-9 provides the predicted construction noise levels for all receivers in the vicinity of the Project. The noise predictions are given as daytime levels resulting under 10th percentile meteorological conditions. Mine-owned receivers are included for the purpose of information only.

Table 5-9 Construction Noise Modelling Results

Receiver ID	$L_{Aeq,15\ min}$ Noise Level (dBA)							
	Construction only				Combined Year 2 and Construction			
	Relocation of Blue Vale Road (North)	Relocation of Blue Vale Road (South)	Construc-tion of MIA	Relocation of Braymont Road	Relocation of Blue Vale Road (North)	Relocation of Blue Vale Road (South)	Construc-tion of MIA	Relocation of Braymont Road
67	20	<20	<20	<20	25	24	24	23
83a	<20	<20	<20	<20	24	24	24	25
83b	<20	<20	<20	<20	25	25	25	26
86	<20	<20	<20	<20	<20	<20	<20	<20
87a	<20	<20	<20	<20	25	25	25	26
87b	<20	<20	<20	<20	26	26	26	26
88	<20	<20	<20	<20	28	28	28	29
89a	<20	<20	<20	21	30	29	29	30
89b	26	<20	<20	26	37	37	37	37
94	<20	<20	21	<20	25	25	26	25
95	<20	<20	<20	<20	24	23	23	22
98	<20	<20	28	<20	29	28	31	28
99	<20	<20	<20	<20	24	23	24	24
101	<20	<20	<20	<20	27	27	28	27
102	<20	<20	<20	<20	26	26	26	26
103	<20	<20	<20	<20	22	22	22	21
107	<20	<20	<20	<20	25	25	26	25
108a	<20	22	<20	<20	29	30	30	30
108b	<20	<20	<20	<20	25	25	25	25
112*	37	<20	<20	22	38	31	31	32
118	<20	<20	<20	<20	22	22	22	23
122	<20	<20	<20	<20	25	25	25	26
124	<20	<20	<20	<20	31	31	31	31
125	<20	<20	<20	<20	33	33	33	33
127a	21	<20	<20	<20	38	38	38	38
127b	<20	<20	22	30	44	44	44	44
127c	21	21	<20	26	37	37	37	37
131a	<20	<20	<20	22	35	35	35	35
131b	<20	<20	<20	21	34	34	34	34
132	<20	<20	<20	21	34	34	34	34
133a	<20	<20	<20	21	35	35	35	35
137	<20	<20	<20	<20	27	27	27	27
138	<20	<20	<20	<20	25	25	25	25
139	<20	<20	<20	<20	29	29	29	29
140	<20	<20	<20	<20	29	29	29	29
141	<20	<20	<20	<20	32	32	32	32
142	<20	<20	<20	<20	28	28	28	28
143	<20	<20	<20	<20	30	30	30	30
144	<20	<20	<20	<20	28	28	28	28

Receiver ID	$L_{Aeq,15\ min}$ Noise Level (dBA)							
	Construction only				Combined Year 2 and Construction			
	Relocation of Blue Vale Road (North)	Relocation of Blue Vale Road (South)	Construc-tion of MIA	Relocation of Braymont Road	Relocation of Blue Vale Road (North)	Relocation of Blue Vale Road (South)	Construc-tion of MIA	Relocation of Braymont Road
146	<20	<20	<20	<20	23	23	23	23
147	<20	<20	<20	<20	25	25	25	25
153	<20	<20	<20	<20	28	28	28	28
174b	<20	<20	<20	<20	26	27	26	26
180	<20	<20	<20	<20	24	24	25	24
221b	<20	<20	<20	<20	25	24	24	23
221a	<20	<20	<20	<20	24	24	24	23
1f	34	20	<20	24	38	35	35	36
1g	25	<20	<20	<20	28	26	26	25
1i	22	<20	<20	<20	27	26	26	25
1l	<20	20	31	<20	32	32	34	32
1m	20	<20	21	<20	27	26	27	26
1n	20	<20	<20	<20	26	25	25	25
1o	22	<20	<20	<20	27	26	26	25
1t	27	<20	<20	<20	32	31	31	31
1u	<20	<20	<20	28	42	42	42	42
1v	23	27	<20	31	41	41	41	41
1w	<20	<20	<20	20	34	34	34	34
1x	42	<20	<20	<20	43	36	36	36
1y	<20	<20	<20	<20	29	29	29	29
1z	<20	<20	<20	23	35	35	35	36
1aa	25	<20	<20	<20	29	28	28	28
1ab	26	<20	<20	<20	28	25	25	25
1ac	24	<20	<20	<20	26	24	24	23
1ad	33	<20	<20	<20	37	34	34	34
1af	35	<20	<20	22	37	33	33	33
1af	<20	<20	<20	<20	26	25	25	25

* Property under contract for purchase by Whitehaven.

Notes 1. Noise levels predicted to result under 10th percentile meteorological conditions during the day as described in Section 5.1.2.

2 Combined levels are conservative as they result from adding 10th percentile operational levels to 10th percentile operational levels (as opposed to 10th percentile of the combined levels).

3. Greyed out levels indicate exceedances at privately-owned receivers of 'noise affected' level.

The results of Table 5-9 indicate that construction noise levels would exceed the intrusiveness criteria at five privately-owned receivers, namely receivers 89b, 112, 127a, 127b and 127c. Exceedances at receivers 89b, 127a, 127b and 127c are due to operational noise levels and construction does not contribute to the combined levels. Construction noise levels would however trigger an additional daytime exceedance of 3 dBA for Year 2 at receiver 112. For this reason, noise management measures addressing exceedances of operational noise (Section 5.11) should be considered during the day at receiver 112.

It is important to note that, due to predicted exceedances of the relevant criteria due to operational noise (Section 5.5), Whitehaven is intending to enter into a noise or purchase agreement with receivers 89b, 127a, 127b and 127c. At the time of writing, Whitehaven has entered into negotiations with the owners of receivers 127a, 127b and 127c. Receiver 112 is under contract for purchase by Whitehaven.

5.10.2 Construction Noise Associated with Private Haul Road and Highway Overpass

As construction noise associated with the Private Haul Road and Highway Overpass would be distinct to operational noise levels (i.e. this would occur some 20 km to the south), this construction noise has been assessed against the recommended noise management levels described in the *Interim Construction Noise Guideline* (NSW Department of Environment and Climate Change [DECC], 2009), provided in Table 5-10.

Table 5-10 Construction Noise Guidelines within Recommended Standard Hours

Time of Day	Management Level $L_{Aeq,15\ min}$	How to Apply
Recommended Standard Hours: Monday to Friday 7.00 am to 6.00 pm Saturday 8.00 am to 1.00 pm	Noise affected RBL + 10 dBA	The noise affected level represents the point above which there may be some community reaction to noise: • Where the predicted or measured $L_{Aeq.\ 5\ min}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
No work on Sundays or public holidays	Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise: • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences. 2. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

Source: DECC (2009).

RBLs in the area were established as part of a statement of Environmental Effects for the Whitehaven CHPP (Whitehaven, 2008). RBLs were defined at 33 dBA in the vicinity of the overpass.

Based on the existing RBL for daytime being assumed to be 33 dBA, the 'noise affected' level is 43 dBA $L_{Aeq,15min}$ for all privately-owned receivers.

Table 5-11 shows predicted noise levels due to construction of the Private Haul Road and Highway Overpass.

Table 5-11 Construction Noise Modelling Results – Private Haul Road and Highway Overpass

Receiver ID	$L_{Aeq,15\ min}$ Noise Level (dBA)
	Private Haul Road and Highway Overpass
223	49
224	56
225	40
226	36
227	35
228	33
243	31
248	29
249	31
275	33
276	34
284	43
285	41
286	36
287	30
291	32
292	39
1HRa	52
1HRb	44
1HRc	32
1HRd	38

Notes:
1. Noise levels predicted to result under 10th percentile meteorological conditions during the day as described in Section 5.1.2.
2. Greyed out levels indicate exceedances at privately-owned receivers of 'noise affected' level.

The results of Table 5-11 indicate that these noise levels would not exceed the 'highly noise affected' noise level in the *Interim Construction Noise Guideline* (DECC, 2009) at any of the identified privately-owned receivers.

The construction noise levels are expected to exceed the 'noise affected' level at two privately-owned receivers, namely receivers 223 and 224. Exceedances range 9-16 dBA for the receivers to the west of highway (receivers 223 and 224). It is important to note that receivers 223 and 224 are located relatively close to the Kamilaroi Highway and are therefore exposed to existing traffic noise which may make construction noise levels less intrusive.

In accordance with the *Interim Construction Noise Guideline,* Whitehaven would inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details of Whitehaven personnel.

5.11 Noise Management Measures

This section outlines the approach by which Whitehaven would manage noise impacts from its proposed operations. Central to the approach is the classification of potentially impacted receivers into the Noise Affectation Zone and Noise Management Zone.

5.11.1 Noise Management Zone

Receivers expected to be exposed to operational noise levels of between 1 to 5 dBA above the Project-specific noise criterion (35 dBA $L_{Aeq,15min}$) are said to fall within the Noise Management Zone. Depending on the extent of the exceedance of the Project-specific criteria, noise impacts at receivers within the Noise Management Zone could range from negligible to moderate (in terms of the perceived noise level). For noise sensitive receivers falling within the Noise Management Zone, it is recommended that management procedures be implemented including:

- noise monitoring on-site and within the community;
- prompt response to any community issues of concern or complaints;
- refinement of on-site noise mitigation measures and mine operating procedures;
- discussions with relevant landowners to assess concerns; and
- implementation of feasible and reasonable acoustical mitigation at receivers.

5.11.2 Noise Affectation Zone

Receivers expected to be exposed to operational noise levels in excess of 5 dBA above the Project-specific noise criterion are said to fall within the Noise Affectation Zone. Exposure to noise levels corresponding to this zone may be considered unacceptable by some landowners, particularly at night-time. For noise receivers located within this zone, it is recommended that Whitehaven considers adopting the following management measures:

- discussions with relevant landowners to assess concerns and define responses;
- implementation of acoustical mitigation at receivers; and
- enter into negotiated agreements with landowners (including acquisition).

5.11.3 Real-time Noise Monitoring and Predictive Meteorological Forecasting System

As described in Section 5-3, it is proposed to have a real-time monitoring and forecasting system in place with the purpose of anticipating upcoming periods of evening and night-time adverse weather conditions that may cause elevated noise levels at receivers to the south-west of the mine (particularly receivers 131a, 131b, 132 and 133a).

Real-time noise monitors would be installed at relevant reference locations to assist with noise management and to facilitate the implementation of real-time noise controls. A Noise Management Programme would be prepared to include details of noise level ‘triggers’ that would result in operational noise controls being invoked.

This system would predict meteorological conditions for the coming day to determine, in advance, where the risk of noise-enhancing weather conditions may occur (e.g. based on wind speed, direction and atmospheric stability). The predictive meteorological forecasting system would be used as part of the integrated proactive management system (Section 5.3) and in conjunction with the real-time noise monitoring system, providing an alert for the appropriate personnel to review the real-time data and manage the intensity and/or location of activities for that day as may be required.

For example, in the event that noise level triggers are exceeded, or adverse weather conditions are forecast, in Project Years 1-7, the mine operators would relocate the Western Emplacement fleet to the most northeast portion of the Western Emplacement.

5.11.4 Other Management Measures

In addition, a number of general noise management measures would be undertaken.

- Contractors, including all personnel and sub-contractors, would undergo environmental training on noise control and awareness of noise issues. This training would take place before the commencement of work by any contractor, or sub-contractor, whose work is likely to create intrusive noise.
- The SWL of mobile mining equipment would be periodically tested in accordance with International Standards Organisation 6395:1988 *Acoustics – Measurement of exterior noise emitted by earth-moving machinery – Dynamic test conditions*.
- Site equipment selection would include consideration of SWL and equipment would be maintained in good order.
- The contractors would be required to pay due attention to adverse weather conditions and make modifications to the work programme where necessary.
- All complaints would be registered and responded to in accordance with the complaints procedures in the Environmental Management System.
- Long-term monitoring of emitted noise levels would be undertaken during mining operations to verify compliance with noise criteria and to assess the need, if any, for additional noise attenuation measures.
- Attended noise monitoring would be undertaken regularly to allow Project noise levels to be checked for compliance against relevant criteria.

6 TRANSPORTATION NOISE

6.1 Road Traffic Noise

6.1.1 Introduction

A ROM coal transportation route is approved which generally runs north to south between the Tarrawonga Coal Mine and the Whitehaven CHPP along Blue Vale Road, and currently passes through the Project. This route currently allows:

- Transportation of Tarrawonga Coal Mine ROM coal at a rate of up to 2 Mtpa.
- Transportation of Rocglen Coal Mine ROM coal at a rate of up to 1.5 Mtpa.

The Tarrawonga and Rocglen approvals have limitations on night-time trucking, with the last truck leaving no later than 9.15 pm and the first no earlier than 7.00 am.

In accordance with the Tarrawonga Coal Project, ROM coal transportation from the Tarrawonga Coal Mine along the ROM coal transportation route would cease and would instead be transported to the Boggabri Coal Mine infrastructure area. ROM coal transportation from both the Project and the Rocglen Coal Mine would not exceed 4.5 Mtpa of total ROM coal transported from the two mines to the Whitehaven CHPP.

In order to avoid coal trucks using the Kamilaroi Highway, a new Private Haul Road and Highway Overpass linking Blue Vale Road and the CHPP is proposed.

ROM Coal is proposed to be transported from the Project to the CHPP 24 hours per day via Blue Vale Road and the new Highway Overpass.

In addition, the section of Blue Vale Road within the Project boundary would be relocated to follow the eastern boundary of the proposed mining area, adjacent to Vickery State Forest. In relation to the relocation of Blue Vale Road, there are no private receivers in close proximity to Blue Vale Road in this section, and hence there would be no acoustic impact at any receivers from this proposed realignment. Similarly, the relocation of Braymont Road would not change road noise levels at private receiver locations. These aspects are not investigated further.

6.1.2 Road Traffic Noise Criteria

Criteria for assessment of noise from traffic on public roads are set out in the *Road Noise Policy* (RNP). The Kamilaroi Highway would clearly be considered as an “arterial” or “sub-arterial” road under this policy. The Approved ROM Coal Road Transport Route along Blue Vale Road has previously been identified as a ‘principal haulage route’ (Spectrum Acoustics, 2005) and, for the purpose of noise assessment, the *RNP* considers this to be equivalent to an arterial/sub-arterial road.

The relevant criteria are set out in Table 6-1.

Table 6-1 Criteria for Traffic Noise – Receivers

Type of Development	Noise Level Criterion		Where Criteria are already Exceeded
	Day	Night	
Land use developments with potential to create additional traffic on existing arterial roads (or sub-arterial roads)	$L_{Aeq,15hr}$ 60 dBA	$L_{Aeq,9hr}$ 55 dBA	In all cases, the redevelopment should be designed so as not to increase existing noise levels by more than 2 dB. Where feasible and reasonable, noise levels from existing roads should be reduced to meet the noise criteria. In many instances this may be achievable only through long-term strategies.

6.1.3 Road Traffic Volumes

Table 6-2 presents the existing average weekday traffic volumes measured on public roads between the Project and the Whitehaven CHPP. Figure 6-1 shows the relevant traffic count locations.

Table 6-2 Existing Average Weekday Traffic Volumes (incl. Tarrawonga Coal Transport)

Traffic Count Location	Road	Road Category Type	Existing Traffic 2010 All Traffic including Tarrawonga Coal Mine			
			Day		Night	
			Light	Heavy	Light	Heavy
3	Blue Vale Road south of Shannon Harbour Road	Principal Haulage Route	105	298	38	39
2	Blue Vale Road northeast of Kamilaroi Highway	Principal Haulage Route	814	579	98	24
8	Kamilaroi Highway between Blue Vale Road and CHPP	Arterial road	1840	1029	171	147

Table 6-3 summarises how the traffic not associated with the Project would change over time on the surrounding road network. The traffic generated by the Project including construction, employee vehicles and deliveries, and its distribution on the surrounding road network is summarised in Table 6-4. It is important to note that the figures shown for Years 7 and 17 assume the presence of the Private Haul Road and Highway Overpass.

Projected traffic volumes associated with the Project are expected to impact on Blue Vale Road and the Kamilaroi Highway. Impacts on the other roads surrounding the site are expected to be negligible and as such, only Blue Vale Road and the Kamilaroi Highway are addressed in the road traffic noise assessment.

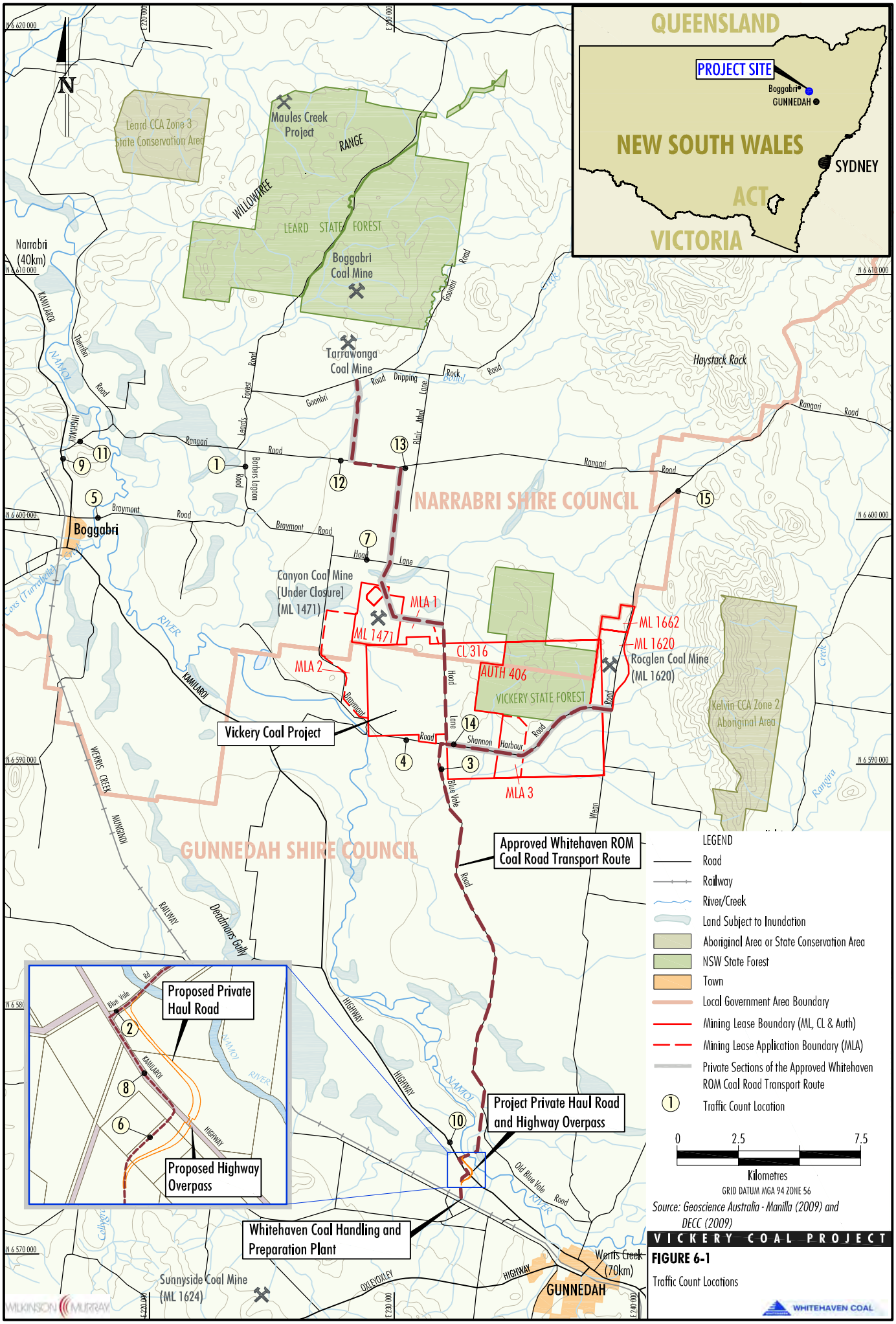

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Table 6-3 Average Weekday Non-Project Traffic Volumes

Road Name	Year 1				Year 7				Year 17			
	Day (7.00 am-10.00 pm)		Night (10.00 pm-7.00 am)		Day (7.00 am-10.00 pm)		Night (10.00 pm-7.00 am)		Day (7.00 am-10.00 pm)		Night (10.00 pm-7.00 am)	
	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
Blue Vale Road (south of Shannon Harbour Road)	223	338	62	55	133	1	47	40	133	1	47	40
Blue Vale Road (northeast of Kamilaroi Highway)	953	626	124	40	904	305	114	25	973	332	123	25
Kamilaroi Highway	2011	1091	201	165	2023	798	195	157	2194	871	211	168

Table 6-4 Average Weekday Project-Related Traffic Volumes

Road Name	Year 1				Year 7				Year 17			
	Day (7.00 am-10.00 pm)		Night (10.00 pm-7.00 am)		Day (7.00 am-10.00 pm)		Night (10.00 pm-7.00 am)		Day (7.00 am-10.00 pm)		Night (10.00 pm-7.00 am)	
	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
Blue Vale Road (north of Highway Overpass)	143	15	60	1	293	468	81	253	293	468	81	253
Blue Vale Road (between Highway Overpass and Kamilaroi Highway)	159	15	60	1	293	49	81	2	293	49	81	2
Kamilaroi Highway (south of Blue Vale Road)	159	15	60	1	293	49	81	2	293	49	81	2
Highway Overpass haulage route	-	-	-	-	0	419	0	251	0	419	0	251

6.1.4 Road Traffic Noise Impact - Blue Vale Road

There are two principal receivers along Blue Vale Road between Old Blue Vale Road and Shannon Harbour Road. Whilst Project-related traffic remains constant, non-Project traffic diminishes further north along Blue Vale Road as the predominant movements are to the south towards Gunnedah.

The closest residential receiver on Blue Vale Road south of Shannon Harbour Road is the Weroona receiver approximately 280 m from Blue Vale Road (Figure 1-1). The closest residential receiver on Blue Vale Road north-east of the Kamilaroi Highway is the Brooklyn receiver approximately 90 m from Blue Vale Road (Figure 1-1).

Based on the traffic data presented in Tables 6-2, 6-3 and 6-4 calculated traffic noise levels at the Weroona and Brooklyn receivers have been predicted and are presented in Tables 6-5 and 6-6 respectively. If the predicted traffic noise levels at the Weroona and Brooklyn receivers meet the proposed criteria then the criteria would be met at all other receivers along the road.

Table 6-5 Calculated Traffic Noise Levels at the Weroona Receiver (along Blue Vale Road south of Shannon Harbour Road)

	Existing (2010)		Year 1		Year 7		Year 17	
	Day $L_{Aeq,15hr}$	Night $L_{Aeq,9hr}$	Day $L_{Aeq,15hr}$	Night $L_{Aeq,9hr}$	Day $L_{Aeq,15hr}$	Night $L_{Aeq,9hr}$	Day $L_{Aeq,15hr}$	Night $L_{Aeq,9hr}$
Non – Project Traffic Noise	42	36	42	37	30	36	30	36
Project Traffic Noise	n/a	n/a	33	29	44	43	44	43
Total	42	36	43	38	44	44	44	44
Criteria	60	55	60	55	60	55	60	55
Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The traffic noise levels along Blue Vale Road south of Shannon Harbour Road are dominated by the Project during Years 7 and 17. However, the predicted traffic noise levels at the Weroona receiver are well within the relevant road traffic noise criteria.

Table 6-6 Calculated Traffic Noise Levels at the Brooklyn Receiver (along Blue Vale Road north-east of Kamilaroi Highway)

	Existing (2010)		Year 1		Year 7		Year 17	
	Day $L_{Aeq,15hr}$	Night $L_{Aeq,9hr}$	Day $L_{Aeq,15hr}$	Night $L_{Aeq,9hr}$	Day $L_{Aeq,15hr}$	Night $L_{Aeq,9hr}$	Day $L_{Aeq,15hr}$	Night $L_{Aeq,9hr}$
Non – Project Traffic Noise	53	42	53	44	51	43	51	43
Project Traffic Noise	n/a	n/a	40	37	51	50	51	50
Total	53	42	53	45	54	51	54	51
Criteria	60	55	60	55	60	55	60	55
Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The night-time traffic noise levels along Blue Vale Road in the southern section north-east of the Kamilaroi Highway are dominated by the Project during Years 7 and 17. However, the total traffic noise levels are within the relevant road traffic noise criteria. In addition, the maximum increase in noise level compared with existing levels is 9 dBA (at night, for the Brooklyn receiver), which is within the maximum "relative increase" criterion of 12 dBA as set out in the *RNP*.

6.1.5 Road Traffic Noise Impact - Kamilaroi Highway

There are residential receivers on the Kamilaroi Highway between Blue Vale Road and the CHPP. The closest residential receiver on the Kamilaroi Highway would be the Longlands receiver (receiver 223, Figure 3-3) approximately 70 m from the road.

During the early years of the Project, it is proposed to build a section of private road to the north of the existing highway, which would require a Highway Overpass immediately to the east of the existing intersection with the CHPP access road, to separate the ROM coal traffic from the Kamilaroi Highway. The Highway Overpass alignment and surrounding receivers are shown in Figure 3-3.

This section of private road would relocate Project sized ROM coal haulage trucks further from the existing receivers on the south-west side of the existing highway, but would move it closer to some receivers to the north-east approximately 900 m from the highway. It would also elevate the noise of trucks approximately 7 m above the existing highway level to allow sufficient clearance below. The speed limit would be 60 kilometres per hour (km/hr) compared with 100 km/hr for the Kamilaroi Highway.

Since the road is technically a Private Haul Road, it would normally be assessed against the criteria for industrial noise in the INP. Assuming background noise levels of less than 30 dBA at night, the criterion would be $L_{Aeq,15min}$ of 35 dBA at night. However, because the Private Haul Road is being constructed to improve safety and in its absence the trucks would have to use the existing Kamilaroi Highway, which is adjacent, it is considered more appropriate to consider the total traffic noise at the surrounding receivers in relation to the *RNP*. Noise from the Highway Overpass alone should achieve the criteria for a new arterial road (55 dBA $L_{Aeq,15hr}$ in the daytime and 50 dBA $L_{Aeq,9hr}$ at night) and the combined noise should meet the criteria for land use developments as discussed above in Table 6-1.

6.1.6 Road Traffic Noise Impact – Year 1

In Year 1 of the Project the Highway Overpass would not have been constructed, and noise impact is assessed in terms of an increase in traffic volumes on the existing Kamilaroi Highway.

Traffic noise levels at the closest residential receiver, namely the Longlands receiver (receiver 223), have been calculated and are presented in Table 6-7. If the predicted traffic noise levels at the Longlands receiver meets the proposed criteria then the criteria would be met at all other receivers along the road.

Table 6-7 Calculated Traffic Noise Levels at the Longlands Receiver (along Kamilaroi Highway)

	Existing (2010)		Year 1	
	Day $L_{Aeq,15hr}$	**Night** $L_{Aeq,9hr}$	**Day** $L_{Aeq,15hr}$	**Night** $L_{Aeq,9hr}$
Non – Project Traffic Noise	58	50	57	50
Project Traffic Noise	n/a	n/a	42	38
Total	58	50	57	50
Criteria	60	55	60	55
Compliance	Yes	Yes	Yes	Yes

The traffic noise levels along Kamilaroi Highway are dominated by the non-Project traffic in Year 1.

6.1.7 Road Traffic Noise Impact - Private Haul Road and Highway Overpass

Once the Highway Overpass is built, Table 6-8 considers the potential noise impact from haul trucks using the Highway Overpass. The nearby receivers are shown in Figure 3-3. However, this assessment focuses on those closer receivers to the east (receivers 1HRa, 1HRb, 225, 284, 285 and 286) and also those to the west (receivers 223, 224 and 292). Satisfying the criteria at these receivers would ensure compliance at the remaining receivers.

Table 6-8 Calculated Traffic Noise Levels at the Closest Receivers to the Highway Overpass (Assessment according to *RNP*)

Receiver ID	Year 7						Year 17					
	Non-Project Traffic		Project Traffic		Total Traffic		Non-Project Traffic		Project Traffic		Total Traffic	
	Day $L_{Aeq,15hr}$	Night $L_{Aeq,9hr}$	Day $L_{Aeq,15hr}$	Night $L_{Aeq,9hr}$	Day $L_{Aeq,15hr}$	Night $L_{Aeq,9hr}$	Day $L_{Aeq,15hr}$	Night $L_{Aeq,9hr}$	Day $L_{Aeq,15hr}$	Night $L_{Aeq,9hr}$	Day $L_{Aeq,15hr}$	Night $L_{Aeq,9hr}$
223	55	50	48	46	56	51	56	50	48	46	56	52
224	54	48	48	47	55	51	54	48	48	47	55	51
225	54	48	44	39	54	49	54	48	44	39	54	49
284	44	38	40	40	46	42	44	38	40	40	46	42
285	43	38	39	38	45	41	44	38	39	38	45	41
286	42	36	37	35	43	39	42	37	37	35	43	39
292	48	42	40	39	48	44	48	42	40	39	49	44
1HRa	55	49	48	46	56	51	55	50	48	46	56	51
1HRb	45	39	44	43	48	45	46	39	44	43	48	45

The combined noise from all traffic (Project and non-Project traffic on Blue Vale Road, south-west of the Highway Overpass, Kamilaroi Highway and the Highway Overpass) meet the 60 dBA daytime road noise criterion and 55 dBA night-time road noise criterion. In addition, noise from the Highway Overpass alone is within the criteria for a new arterial road, of 55 dBA daytime and 50 dBA at night.

It is recommended that drivers are trained not to use engine brakes along the Highway Overpass. The separation from the Kamilaroi Highway would most likely eliminate any requirement for use of engine brakes, as trucks and other vehicles would be separated.

For information purposes the noise levels from the Highway Overpass have also been compared to the INP intrusiveness criterion of 35 dBA ($L_{Aeq,15min}$). This INP assessment conservatively assumes a total of eight truck movements in a 15 minute period. Also, for comparison purposes, the same number of truck movements has been modelled along the portion of the existing haulage route being bypassed by the proposed Highway Overpass (i.e. Blue Vale Road south of the Highway Overpass, the Kamilaroi Highway between Blue Vale Road and the CHPP access road, and the CHPP access road north of the Highway Overpass). The INP assessment results are presented in Table 6-9.

Table 6-9 Calculated Traffic Noise Levels at the Closest Receivers to Highway Overpass (Assessment according to INP)

Receiver ID	LAeq,15min Noise Predictions							
	Overpass Alignment	Existing Alignment	Non-Project Traffic (Night)		Cumulative Overpass Alignment + Non-Project Traffic (Night)		Cumulative Existing Alignment + Non-Project Traffic (Night)	
			Year 7	Year 17	Year 7	Year 17	Year 7	Year 17
223	44	51	50	50	51	51	54	54
224	46	50	48	48	50	50	52	52
225	35	34	48	48	48	48	48	48
284	36	35	38	38	40	40	40	40
285	34	33	38	38	39	39	39	39
286	31	30	36	37	37	38	37	38
292	36	39	42	42	43	43	44	44
1HRa	46	43	49	50	51	51	50	51
1HRb	37	36	39	39	41	41	41	41

Note: Greyed out levels indicate exceedances at privately-owned residences of INP intrusiveness criterion (35 dBA). This is only relevant for Project traffic noise.

The predicted noise levels exceed the 35 dBA night-time noise limit at one private receiver located to the east where the overpass would be closer relative to the Kamillaroi Highway (receiver 284). Predicted levels would however only increase by a marginal 1 dBA when compared with the existing route.

Predicted noise levels exceeding 35 dBA are also expected at three receivers located to the west (receivers 223, 224 and 292). However, all three receivers would experience a decrease in noise levels as the Highway Overpass would move haul truck movements further away.

6.1.8 Conclusion

The traffic noise study has found that noise levels resulting from the Project would be within recommended criteria at all receivers. Noise levels due to traffic on the proposed Highway Overpass would be generally similar to or less than those from equivalent traffic on the existing Kamilaroi Highway, with a maximum increase at private receivers of 1 dBA.

6.2 Rail Noise

6.2.1 Introduction

Project product coal would be transported via rail from the Whitehaven CHPP rail loop to the port of Newcastle. Although no change to the approved capacity of the Whitehaven CHPP, and therefore, no change to the existing Whitehaven CHPP rail movements are expected for the Project, two additional train movements per day may be required for the Project. Consequently, a rail noise assessment was undertaken for the Werris Creek Mungindi Railway.

6.2.2 Rail Noise Criteria

Australian Rail Track Corporation (ARTC) operates the Werris Creek Mungindi Railway. Noise emissions from railways operated by ARTC are regulated via ARTC's Environment Protection Licence (EPL) 3142. EPL Section L6 does not nominate specific environmental noise limits but notes that:

> *It is an objective of this Licence to progressively reduce noise levels to the goals of 65 dB(A)Leq, (day time from 7am – 10pm), 60 dB(A)Leq, (night time from 10pm – 7am) and 85dB(A) (24 hr) max pass-by noise, at one metre from the façade of affected residential properties through the implementation of the Pollution Reduction Programs.*

Based on the information presented above, the following noise criteria have been adopted for the Project:

- $L_{Aeq,9\ hour}$ = 60 dBA;
- $L_{Aeq,15\ hour}$ = 65 dBA; and
- L_{Amax} = 85 dBA.

In addition, the NSW EPA's rail noise requirements "Environment Assessment Requirements for Rail Traffic - Generating Developments" provides alternative rail noise assessment criteria. Rail noise assessment trigger levels are presented in Table 6-10.

Table 6-10 EPA Rail Noise Assessment Trigger Levels

Descriptor	Rail Traffic Noise Goal
$L_{Aeq,24\ hour}$	60 dBA
Maximum Pass-by L_{Amax} (95th percentile)	85 dBA

Note: 95th percentile equates to the 5% exceedance value.

The EPA's rail noise assessment trigger levels are similar to the ARTC's EPL noise goals; however the EPA trigger levels have an averaging period of 24 hours, rather than daytime (15 hours) and night-time (9 hours) for the ARTC's goals. The EPA rail noise assessment requirements also provide:

> *Where the cumulative noise level exceeds the noise assessment trigger levels, and project-related noise increases are predicted, all feasible and reasonable noise mitigation measures should be implemented. As a general principle, where the reduction of existing noise levels can be achieved through feasible and reasonable measures, a reduction in noise levels to meet the noise assessment trigger levels is the primary objective. In all cases where the LAeq noise level increases are more than 2dB(A), strong justification should be provided as to why it is not feasible or reasonable to reduce the increase.*

In addition, the EPA's rail noise assessment requirements provide guidance in relation to the geographical extent of rail noise assessment which should be undertaken for a rail traffic generating development (such as the Project):

> *Ideally, the geographical extent of the rail noise assessment should be to where project/related rail noise increases are less than 0.5dB. This roughly equates to where project/related rail traffic represents less than 10% of total line/corridor rail traffic.*

At the time of writing, the EPA had released the *Draft Rail Infrastructure Noise Guideline* (EPA, 2012) as a draft for consultation. The *Draft Rail Infrastructure Noise Guideline* provides the following criteria for rail traffic generating developments:

- $L_{Aeq,9\ hour}$ = 55 dBA;
- $L_{Aeq,15\ hour}$ = 60 dBA; and
- L_{Amax} (95th percentile) = 80 dBA.

Consideration of the *Draft Rail Infrastructure Noise Guideline* has been incorporated in the assessment of potential rail noise impacts for completeness and is presented in Appendix F.

6.2.3 Rail Noise Impacts

The Werris Creek Mungindi Railway starts at the major rail centre of Werris Creek, and heads north to Moree en-route to the remote town of Mungindi, on the Queensland border. Along the line are the towns of Boggabri, Gunnedah and Curlewis.

Considering the extra two train movements added to the approved Whitehaven CHPP rail movements, the Project will generate a maximum of four rail movements per day from the Whitehaven CHPP to Werris Creek and along the Main Northern Rail Line to the port of Newcastle. Although the Whitehaven CHPP already involves two passbys per day (one during the day; and one at night) (*Whitehaven CHPP/Rail Loading Facility Statement of Environmental Effects*, Whitehaven, 2008), these movements are conservatively counted as being part of the Project.

Tables 6-11 displays the existing/approved, proposed and Project rail passbys on the Werris Creek Mungindi Railway between the Whitehaven CHPP near Gunnedah to Werris Creek.

Table 6-11 Werris Creek Mungindi Railway, Train Movements between Whitehaven CHPP and Werris Creek

Scenario	Train	Loco Configuration	Daily Train Numbers – Passbys		
			Day	Night	24 hour
Existing/Approved	Boggabri Coal Mine[1]	3 x 82 Class Locomotives	1.6	1	2.6
	Narrabri Coal Mine Stage 1[2]	3 x 82 Class Locomotives	4	0	4
	Cotton, Grain, General Freight[3]	2 x 82 Class Locomotives	5.6	3.4	9
	Narrabri Coal Mine Stage 2[4]	3 x 82 Class Locomotives	6	4	10
	Passenger[3]	XPT Passenger	2	0	2
	Boggabri Coal Continuation[4]	3 x 82 Class Locomotives	2	1	3
	Total		**21.2**	**9.4**	**30.6**
Proposed	Maules Creek Coal Project[4]	3 x 82 Class Locomotives	6	4	10
	Tarrawonga Coal Project[5]	3 x 82 Class Locomotives	3	1	4
	Total		**9**	**5**	**14**
Project	Whitehaven CHPP Coal (Vickery)	3 x 82 Class Locomotives	2	2	4

1 Hansen Bailey (2011) *Continuation of Boggabri Coal Mine Environmental Assessment*.

2 Narrabri Coal Pty Ltd (2007) *Narrabri Coal Mine Stage 1 Project Environmental Assessment*.

3 KMH Environmental (2011) *Burilda Passing loop Review of Environmental Factors*.

4 Bridges Acoustics (2011) *Acoustic Impact Assessment Maules Creek Coal Project Environmental Assessment.*

5 Wilkinson Murray (2011) *Tarrawonga Coal Project Environmental Assessment Noise and Blasting Impact Assessment.*

As can be seen from Table 6-11, the Project contribution to 24 hour rail traffic on the Werris Creek Mungindi Railway (between Whitehaven CHPP and Werris Creek) would be approximately 13% of existing/approved rail movements and approximately 9% of existing/approved plus proposed rail movements. Considering that east of Werris Creek, train movements include rail traffic from the Cobar/Parkes and Armidale/Tamworth rail lines; extending the Project rail noise assessment to Werris Creek is considered to be generally consistent with the EPA requirements for geographic extent of rail noise assessments for rail traffic generating development (i.e. assessment extends to where Project rail traffic represents less than 10% of total line/corridor rail traffic).

Using the above data on train movements, it is possible to calculate the distance from the rail line at which ARTC criteria are exceeded using predicted energy average L_{Aeq} and Sound Exposure Level (SEL) noise levels from the RailCorp NSW standard rail noise database for passenger trains, locomotives and freight wagons. The database levels are adjusted for speed, number of locomotives, length of trains and audible wheel defects, with no allowance for shielding. A façade correction of 2 dBA is also applied.

Distances at which the ARTC and EPA criteria are exceeded for both existing and proposed movements for the Boggabri Rail Spur to the Whitehaven CHPP are illustrated in Table 6-12.

Table 6-12 Criteria Offset Distances: Train Movements between Whitehaven CHPP and Werris Creek

Period	Criterion (dBA)	Distance from Track (m)		
		Existing / Approved Movements	Existing / Approved Plus Proposed Movements	Existing / Approved, Proposed plus Project
L_{Aeq},Day (7.00 am-10.00 pm)	65	<14	<18	<19
L_{Aeq},Night (10.00 pm-7.00 am)	60	<25	<33	<34
L_{Aeq},24 hour (24 hour)	60	<28	<36	<38
L_{Amax},Passby Noise (24 hours)	85	<25	<25	<25

Table 6-12 shows that for the Werris Creek Mungindi Railway between the Whitehaven CHPP Gunnedah and Werris Creek:

- The maximum increase in distance from the track to meet the ARTC criteria as a result of the Project rail movements, compared with the existing/approved plus proposed movements is 1 m for daytime operations and 1 m for operations at night.
- The maximum increase in distance from the track to meet the EPA criteria as a result of the Project only rail movements, compared with the existing/approved plus proposed movements is 2 m for 24 hour operations.
- There is no change in the maximum passby noise.

6.2.4 Conclusion

It is concluded from the rail noise assessment presented above that the Project rail movements would result in a negligible increase in noise along the Werris Creek Mungindi Railway between the Whitehaven CHPP and Werris Creek, with any increase in rail noise being less than 2 dBA (which is the relevant threshold in the EPA rail noise assessment requirements).

The buffer distance from the rail line at which the relevant ARTC and EPA criteria would be met would extend away from the rail line by a negligible 2 m due to the Project. In addition L_{Amax} passby noise levels would not change due to the Project.

7 BLASTING ASSESSMENT

The removal of competent overburden (and interburden) material at the Project would be undertaken using a drill and blast programme.

A mixture of ANFO (dry holes) and emulsion blends (wet holes) explosives would continue to be used at the Project. Blast sizes would typically be up to 2,275 kg.

Blast designs and sizes would vary over the life of the Project and would depend on numerous factors including the depth of coal seams and the design of open cut benches.

Blasting at the Project would only occur between the hours of 9.00 am and 5.00 pm Monday to Saturday (excluding public holidays).

The number of blasts per week would typically be 5; however, up to 6 blasts per week may occur on some occasions.

At various stages in the Project life, some sections of Blue Vale Road and Braymont Road would be temporarily closed during blast events within 500 m of the public road. Areas of the Vickery State Forest would also be within 500 m of blasts.

7.1 Airblast Overpressure Noise and Vibration Criteria

7.1.1 Criteria for the Minimisation of Human Annoyance from Blasting

The EPA guideline *Assessing Vibration: a technical guideline* (NSW Department of Environment and Conservation, 2006) defers to the *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* prepared by the Australian and New Zealand Environment Council (1990). Human annoyance criteria for blasting for any privately-owned receivers or other sensitive location are:

- maximum overpressure due to blasting should not exceed 115 decibels (dB) for more than 5% of blasts in any year, and should not exceed 120 dB for any blast; and
- maximum peak particle ground velocity should not exceed 5 millimetres per second (mm/s) for more than 5% of blasts in any year, and should not exceed 10 mm/s for any blast.

7.1.2 Criteria for the Prevention of Structural Damage to Buildings

At sufficiently high levels, blast overpressure may in itself cause structural damage to some building elements such as windows.

Australian Standard (AS) AS 2187.2-2006 *Explosives - Storage and Use - Part 2 Use of explosives* indicates *From Australian and overseas research, damage (even of a cosmetic nature) has not been found to occur at airblast levels below 133dB*.

For assessment of damage due to ground vibration, *AS 2187.2-2006* recommends frequency-dependent criteria for vibration damage, derived from British Standard 7385-2 and United States Bureau of Mines Standard RI 8507. These are in practice less stringent than the human comfort criterion of 5 mm/s noted above, and hence need to be considered only in the case of mine-owned receivers. For the frequencies typical of blast vibration, a value of 10 mm/s peak particle velocity (PPV) represents a conservatively low estimate of the level above which structural damage may possibly occur.

7.2 Prediction of Airblast Overpressure and Vibration Levels

Airblast overpressure and ground vibration levels from blasting are related to the "scaled distance" from the blast, which is defined as:

- Scaled distance = D/W^(1/3) for airblast overpressure; and
- Scaled distance = D/W^(1/2) for ground vibration.

  where D is the distance from the blast in metres and W is the MIC of explosive, in kg ANFO equivalent.

Predictive curves relating scaled distance to overpressure and ground vibration levels have been derived from measurements conducted at numerous sites.

For this assessment, Wilkinson Murray has used data from over 7,600 records of blasts undertaken in the Hunter Valley, NSW to derive relationships between scaled distance and overpressure or vibration. These relationships are designed to predict not the mean level of overpressure or vibration, as in a standard "site law", but the 95th percentile value, representing the level which would be exceeded by only 5% of blasts, given the use of current blast practice and the current level of variability in overpressure or vibration for the same scaled distance.

The raw data, and the derived prediction curves, are shown in Appendix G.

For overpressure, a curvilinear relationship with log(Scaled Distance) was required to adequately explain the data:

Overpressure (dB) = 201.1 – 62.313 log(SD) + 10.79 (log(SD))^2

- where SD is the overpressure-scaled distance (as per formula given above).

For vibration, a linear relationship with log(Peak Particle Velocity) was derived:

Log (Peak Particle Velocity) = 3.015 - 1.4359 log(SD)

- where SD is the vibration-scaled distance (as per formula given above).

These formulae were used to predict vibration levels at all potentially-affected locations.

7.3 Predicted Overpressure and Vibration Levels

Based on the predictive equations outlined in Section 7.2, Table 7-1 indicates the range of 5% exceedance overpressure and ground vibration levels expected at the nearest mine-owned and privately-owned receivers resulting from the proposed blast MIC of 2,275 kg. The 5% exceedance levels are the levels that should be compared to the 5% exceedance criteria of 115 dBLinear (dBL) for overpressure and 5 mm/s for vibration. Peak or maximum blasting levels are not presented because these levels are typically caused by geological anomalies, which are unpredictable.

It is assumed that either of these general blast types may be required at any location, and hence potential impacts should be assessed on the basis of impacts expected from deep interburden/ overburden blasts, representing the potential maximum impact.

No exceedance of vibration criteria is predicted at any receiver.

Table 7-1 Predicted Overpressure and Vibration Levels Resulting from Blasting within Vickery Coal Project Pits (5% Exceedance Levels)

Direction and Closest Receiver ID	Years 1-10		Years 10-20		Year 20-30	
	Peak Overpressure, dBL	PPV Ground Vibration, mm/s	Peak Overpressure, dBL	PPV Ground Vibration, mm/s	Peak Overpressure, dBL	PPV Ground Vibration, mm/s
NW 88	111.1 to 111.5	0.5 to 0.8	111.1 to 111.5	0.5 to 0.9	111.2 to 111.5	0.4 to 0.9
SE 108a	111.2 to 111.7	0.5 to 1.0	111.1 to 111.9	0.5 to 1.1	111.1 to 112.4	0.5 to 1.4
W 127b	112.2 to **115.1**	1.4 to 3.5	111.7 to 114.4	1.0 to 2.9	111.7 to 114.0	1.0 to 2.6
SW 127c	111.9 to 113.6	1.2 to 2.3	111.6 to 112.5	0.9 to 1.5	111.4 to 112.8	0.8 to 1.7
N 1f	111.4 to 113.2	0.8 to 2.0	111.3 to 113.5	0.7 to 2.2	111.2 to 114.3	0.6 to 2.8
NE 1g	111.2 to 111.6	0.6 to 0.9	111.2 to 112.0	0.6 to 1.2	111.2 to 112.0	0.7 to 1.2
E 1l	111.4 to 112.8	0.8 to 1.7	111.4 to 114.3	0.8 to 2.9	111.4 to 114.3	0.8 to 2.9
N 1t	111.4 to 112.3	0.8 to 1.4	111.4 to 112.5	0.8 to 1.5	111.2 to 113.7	0.6 to 2.4
W 1u	111.6 to 113.7	1.0 to 2.3	111.3 to 113.5	0.7 to 2.2	111.4 to 113.2	0.8 to 2
SW 1v	112.5 to 115.8	1.5 to 4.1	111.9 to 113.5	1.2 to 2.2	111.6 to 114.4	1.0 to 2.9
N 1x	111.9 to 113.8	1.1 to 2.5	111.9 to 114.2	1.1 to 2.7	111.5 to 118.4	0.9 to 7.0
N 1ad	111.6 to 113.3	0.9 to 2.0	111.6 to 113.6	0.9 to 2.3	111.4 to 115.8	0.8 to 4.1
N 1ae	111.6 to 113.1	1.0 to 1.9	111.8 to 113.8	1.1 to 2.4	111.5 to 116.3	0.9 to 4.6

Notes: 1. Overpressure and ground vibration levels likely to result from typical and maximum MIC of 1,365 kg and 2,275 kg, respectively.
2. **Bold** indicates exceedance of either of the Human Annoyance (private receivers only).

At receiver 127b the 5% level is predicted as 115.8 dB. This receiver is also predicted to be affected by operational noise and it is expected Whitehaven would attempt to purchase this property or enter into an agreement with the owner. At the time of writing, Whitehaven has entered into negotiations with the owner of receivers 127a, 127b and 127c. In the absence of an agreement, to meet the overpressure limit of 115 dB at receiver 127b would require an MIC of 2,200 kg when blasting is proposed at the closest distance.

A grinding groove site (E228826, N6591320) was identified south-west of the proposed mine site as part of the Aboriginal cultural heritage assessment and was included in the vibration assessment. Vibration levels at the site were predicted to be below 5 mm/s during the entire Project life and therefore no vibration-induced damage is expected at the grinding groove site.

7.4 Potential Flyrock Impacts

Flyrock is any material ejected from the blast site by the force of the blast.

Flyrock would be managed through appropriate blast design in order to minimise flyrock risk to the public using Blue Vale Road, Braymont Road, parts of the Vickery State Forest and to nearby residential receivers and livestock.

Consistent with the advice of both the NSW Division of Resources and Energy (within the NSW Department of Trade and Investment, Regional Infrastructure and Services) and the appropriate roads authority (Gunnedah and Narrabri Shire Councils), the section of Blue Vale Road and Braymont Road within 500 m of blasting activities would be closed and public access restricted during blasting events by use of road closure signs and sentries at either end of the roadway.

All land within 500 m of proposed open cut areas is owned by Whitehaven (other than Blue Vale Road, Braymont Road and the Vickery State Forest). Areas outside of mining leases (or MLAs) are generally grazed by cattle.

7.5 Airblast Overpressure and Vibration Mitigation

Blast and vibration management would be conducted at the Project in accordance with a Blast Management Plan which would be prepared for the Project.

Consistent with advice previously received from the NSW Division of Resources and Energy and the appropriate roads authority (Gunnedah and Narrabri Shire Councils), the sections of Blue Vale Road, Braymont Road and the Vickery State Forest within 500 m of blasting activities would be closed and public access restricted during blasting events by use of road closure signs and sentries at either end of the roadway.

A Blast Management Plan would be prepared to include the above measures for the Project, and would also include procedures for the management of livestock in close proximity to blast events.

8 CONCLUSION

The Project is a proposed open cut mining operation located in the Gunnedah basin approximately 25 km north of Gunnedah in NSW. Mining activities are proposed to commence in 2014.

This assessment addresses potential noise and blasting impacts associated with the Project, which has a proposed life of 30 years.

8.1 Project Operational Noise

- Operational noise impacts were assessed for four years (Years 2, 7, 17 and 26), for different periods of the day (daytime, evening and night-time) and with regard for noise-enhancing meteorological conditions including winds of speeds of up to 3 m/s and temperature inversions of up to 4^{o}C/100 m.
- The 10th percentile methodology was used, whereby noise levels were predicted for a number of representative meteorological conditions experienced at the site and the 10th percentile exceedance level reported. For the Year 2 and 7 scenarios, the pro-active noise management system is proposed to be invoked under certain meteorological conditions. This system is proposed to achieve compliance with criteria at receivers to the south-west (131a, 131b, 132 and 133a).
- Initial modelling resulted in Whitehaven committing to various mitigation measures including:
  - Implementation of a pro-active noise management system, involving relocation of mobile equipment during adverse meteorological conditions, including:
    - relocation of the waste emplacement fleet during the evening and night periods in shielded areas of the Western Emplacement (Year 2); and
    - relocation of the Western Emplacement fleet to the northern-most portion of the Western Emplacement during adverse weather conditions that would otherwise generate exceedances of criteria at a selection of receivers located to the south-west of the mine (Years 2 and 7).
  - treatment of mobile plant to reduce emitted noise levels; and
  - acoustic bunds along the exposed sections of haul roads.
- With the above controls in-place, exceedances of the 35 dBA $L_{Aeq,15min}$ noise criterion are predicted for privately-owned receivers 89a, 89b, 112, 127a, 127b and 127c. Whitehaven is intending on entering a noise or purchase agreement with receivers 89b (and 89a), 127a, 127c and 127b. At the time of writing, Whitehaven has entered into negotiations with the owners of receivers 127a, 127b and 127c. Receiver 112 is under contract for purchase by Whitehaven.

8.2 Cumulative Noise

- Cumulative noise impacts resulting from the concurrent operation of the Project, Tarrawonga Coal Project, Boggabri Continuation Project and the Rocglen Coal Mine Extension Project were assessed against the INP recommended acceptable and recommended maximum amenity criteria.

- The assessment indicates that cumulative noise levels resulting from the concurrent operation of these Projects would comply with the night-time recommended acceptable amenity criterion (40 dBA) for all privately-owned receivers, with the exception of a marginal 2 dBA exceedance at receivers 89b and 127b. As noted above, Whitehaven is intending on entering a noise or purchase agreement with these receivers.

8.3 Sleep Disturbance

- Modelling of L_{Amax} noise levels at nearby receivers was undertaken for typical instantaneous mine-site noise sources, such as reversing alarms and shovel bucket scrapes. This analysis indicates that predicted noise levels would not exceed the 45 dBA $L_{A1,1\ min}$ criterion at privately owned receivers.

8.4 Construction Noise

- Assessment of the potential for noise impacts from construction associated with the MIA and the relocation of Blue Vale Road indicates that construction noise levels, when added to Year 2 operational noise levels, would trigger an exceedance (above INP intrusiveness criteria) at receiver 112. At the time of writing, receiver 112 was under contract for purchase by Whitehaven.
- Assessment of the potential for noise impacts from construction associated with the Private Haul Road and Highway Overpass indicates that construction noise levels are expected to exceed the 'noise affected' level at four privately-owned receivers, namely receivers 223 and 224. Whitehaven would inform the impacted residents of the nature of works to be carried out and the expected noise levels and duration of construction activity.

8.5 Transport Noise

- The traffic noise study has found that traffic noise levels on public roads in the vicinity of the Project as well as the proposed Highway Overpass would comply with the relevant road traffic noise criteria.
- For information purposes, the Highway Overpass has also been modelled in accordance with the INP. Changes in noise levels due to the Highway Overpass are limited, with most private receivers expected to experience a decrease in noise due to the coal trucks moving further away relative to the existing Kamilaroi Highway alignment.
- Sized ROM coal from the Project would be loaded onto trains (i.e. bypass) or crushed, screened and washed at the existing Whitehaven CHPP before being loaded onto trains for rail transport to Newcastle and export markets. Project rail movements would result in a negligible increase in noise along the Werris Creek Mungindi Railway between the Whitehaven CHPP and Werris Creek.

8.6 Blasting

- Blasting as proposed for the Project is not predicted to result in exceedance of relevant vibration criteria at any privately-owned receiver.
- Reductions in MIC in some areas of the open cut pit are proposed to achieve compliance with the human comfort airblast criterion for some privately-owned receivers.
- The sections of Blue Vale Road, Braymont Road and the Vickery State Forest within 500 m of blasting activities would be temporarily closed during blast events.

9 REFERENCES

Australian and New Zealand Environment Council (1990) *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration*.

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APPENDIX A

GLOSSARY OF TERMS & DEFINITIONS

GLOSSARY OF TERMS & DEFINITIONS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

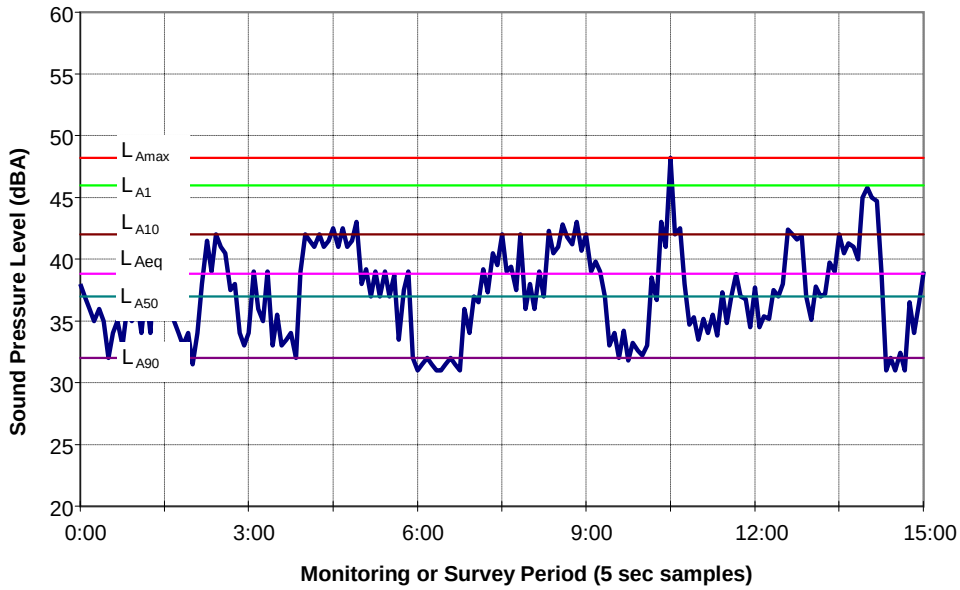
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

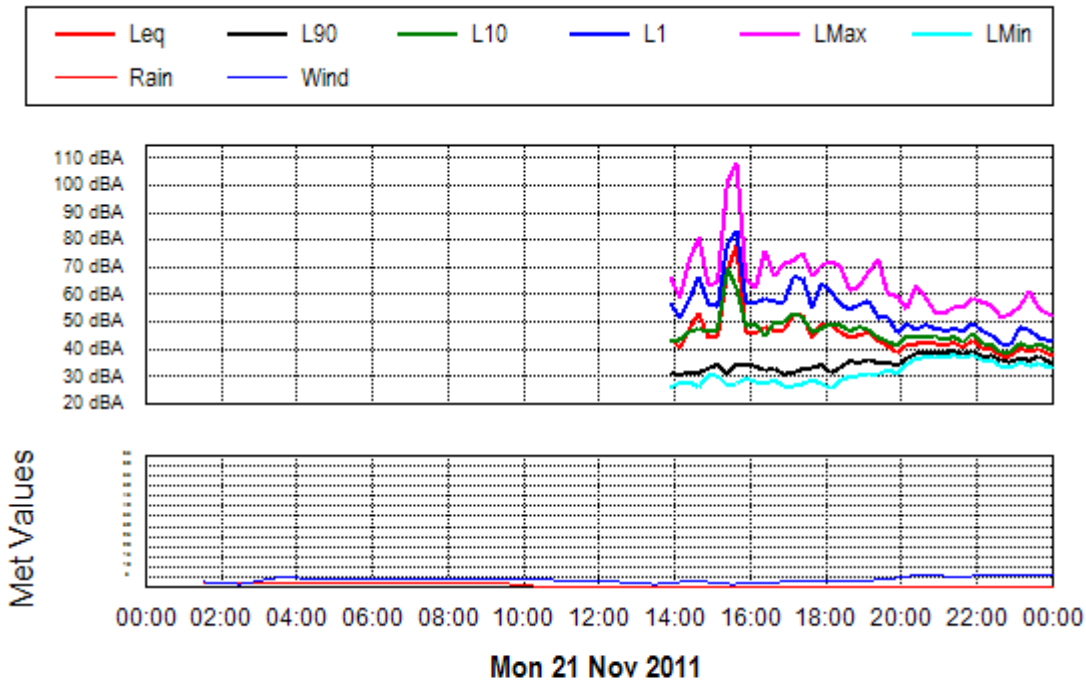
Typical Graph of Sound Pressure Level vs Time

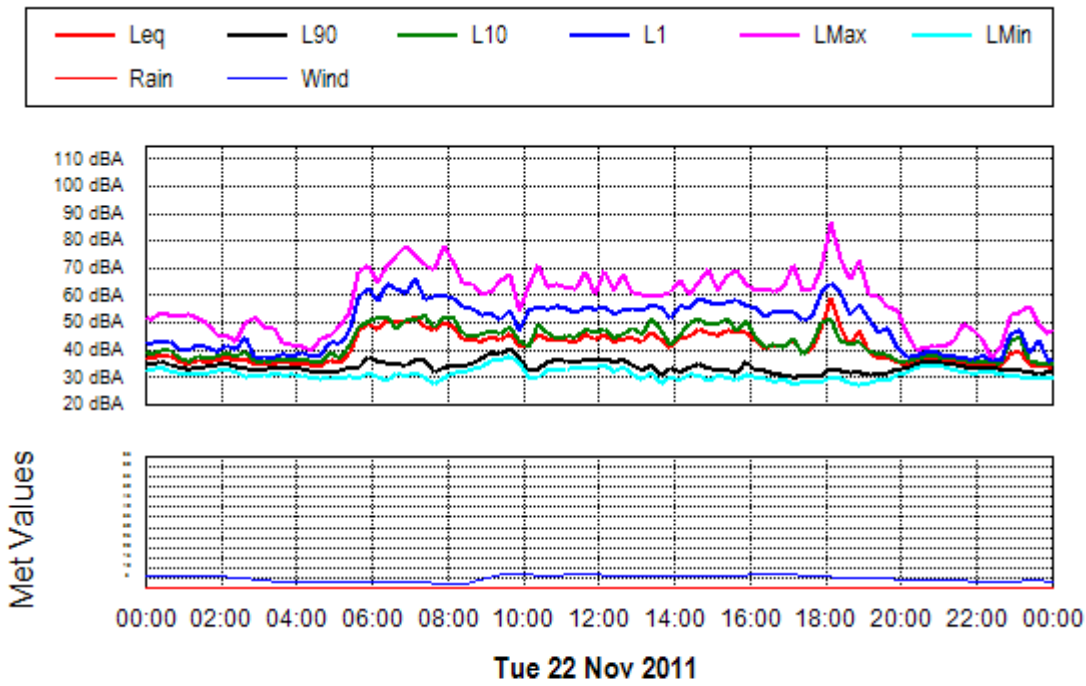


APPENDIX B

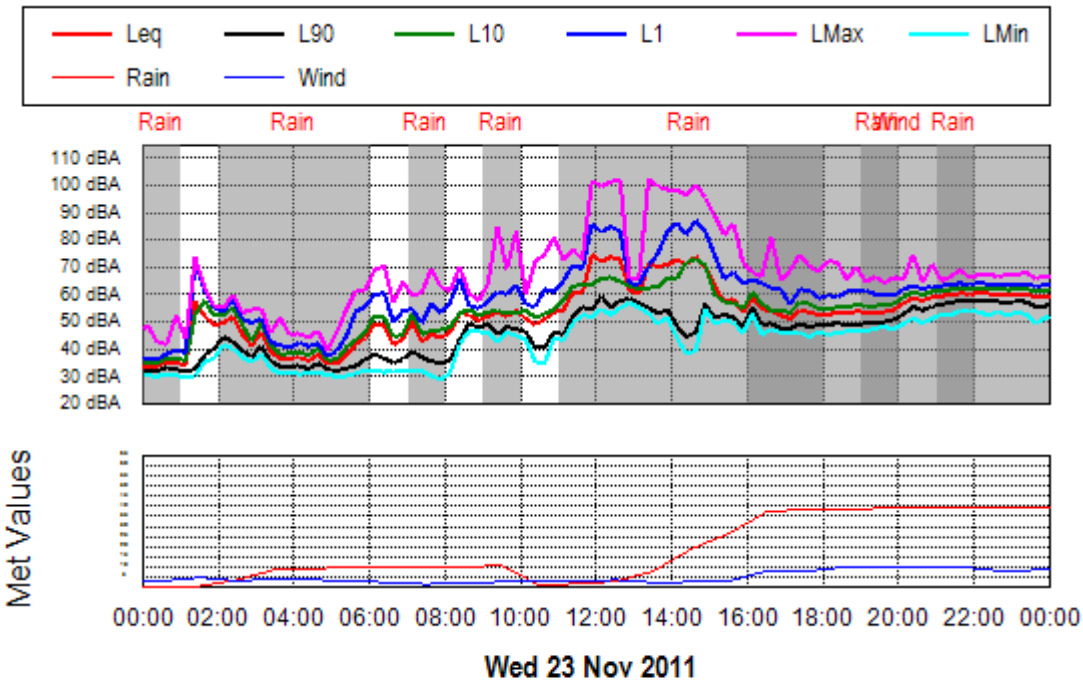
UNATTENDED NOISE MONITORING RESULTS

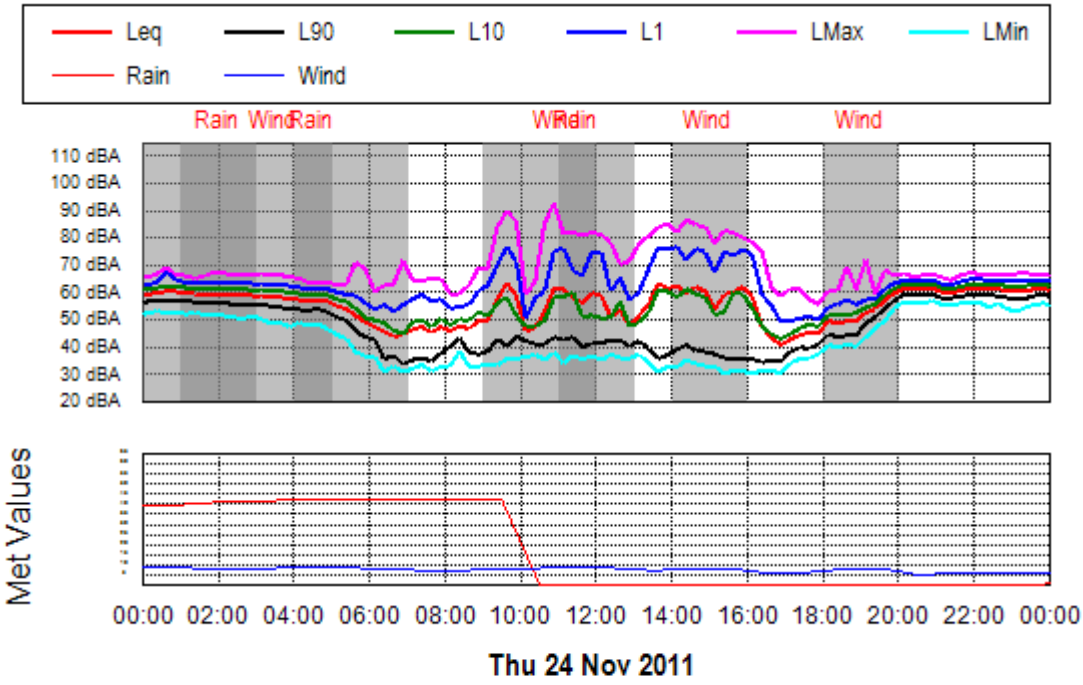
Project: Vickery Coal Project
Location: Will-Gai Residence



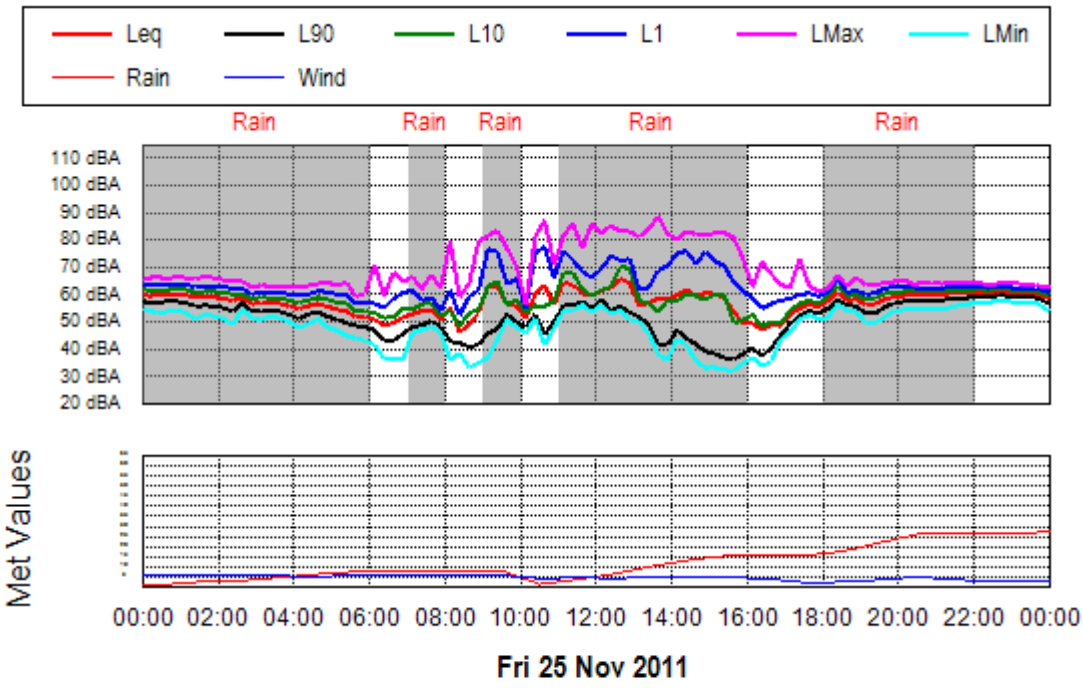


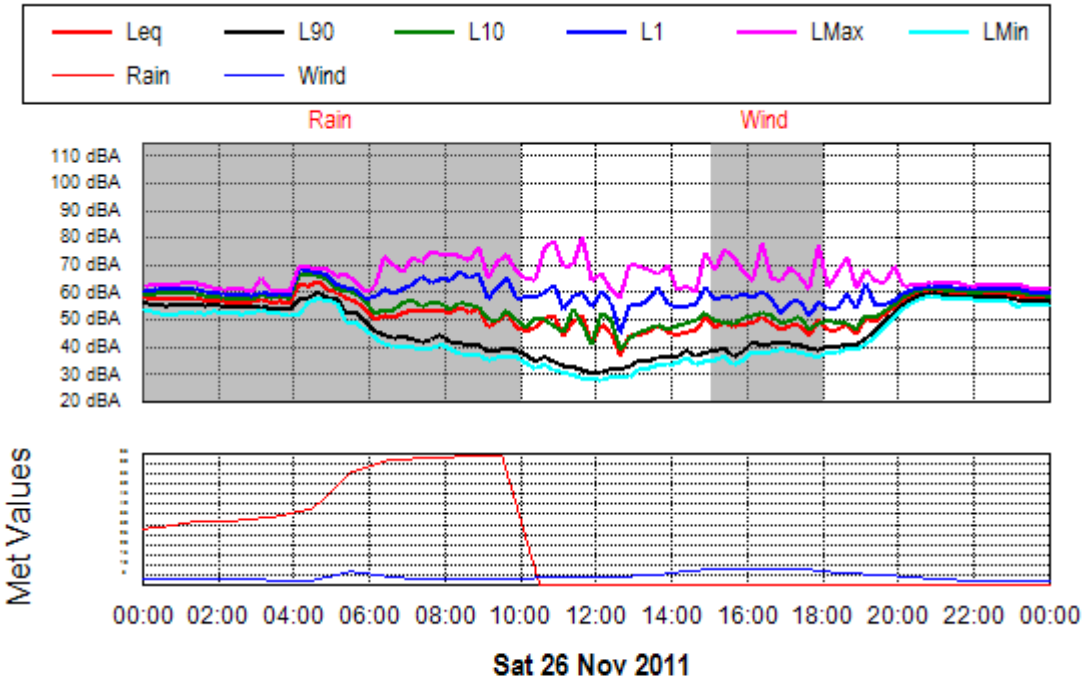
Project: Vickery Coal Project
Location: Will-Gai Residence



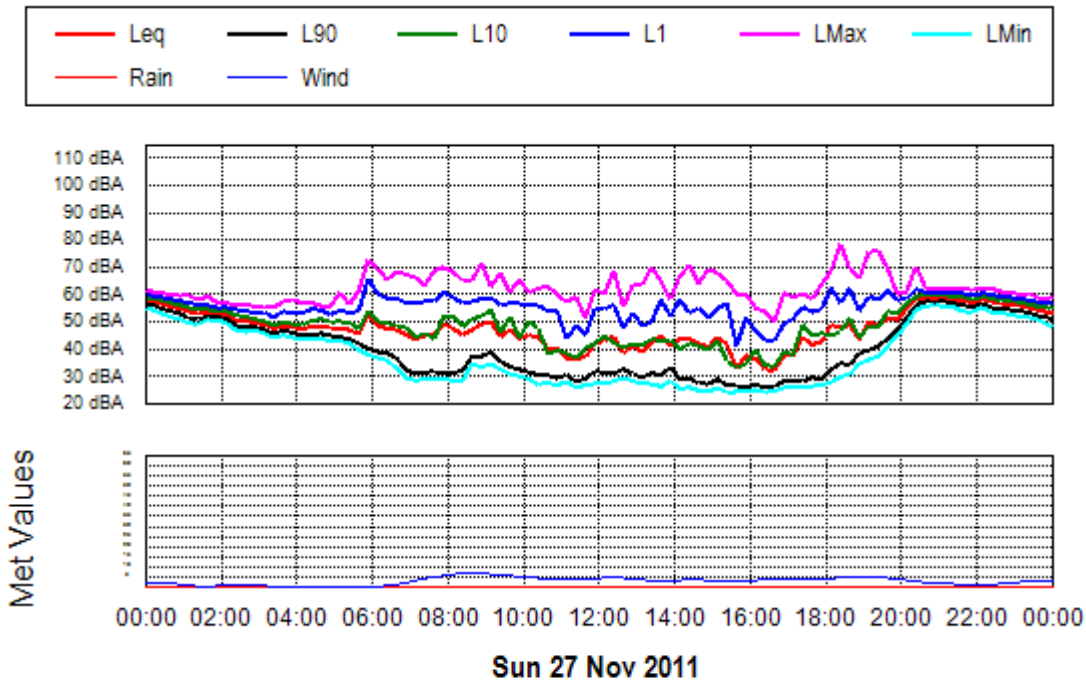


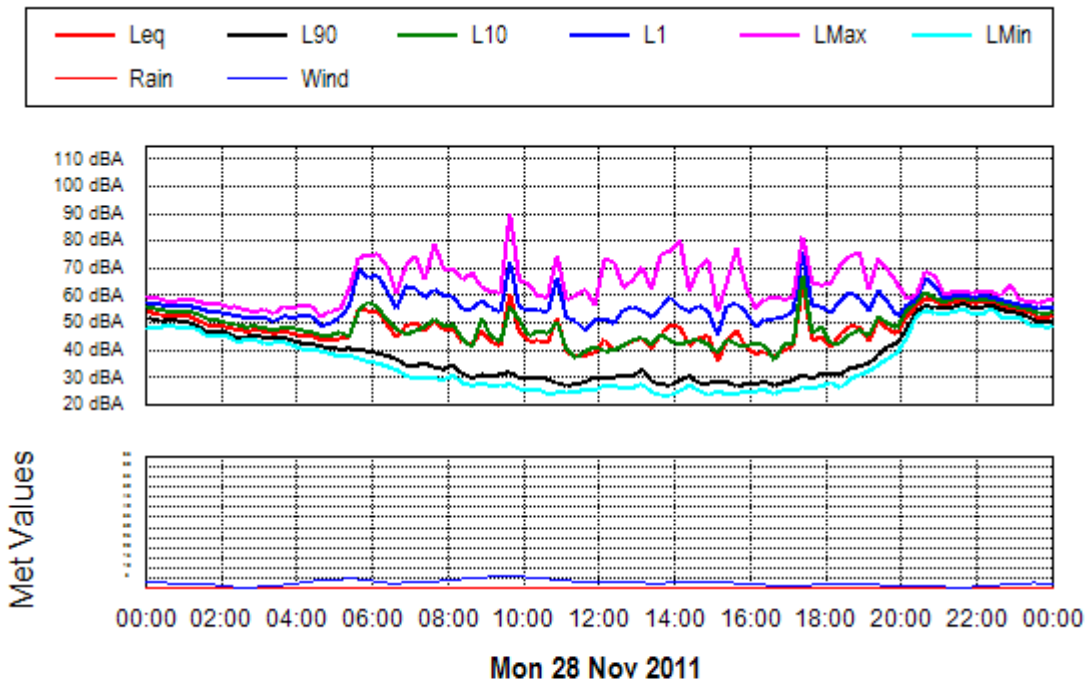
Project: Vickery Coal Project
Location: Will-Gai Residence



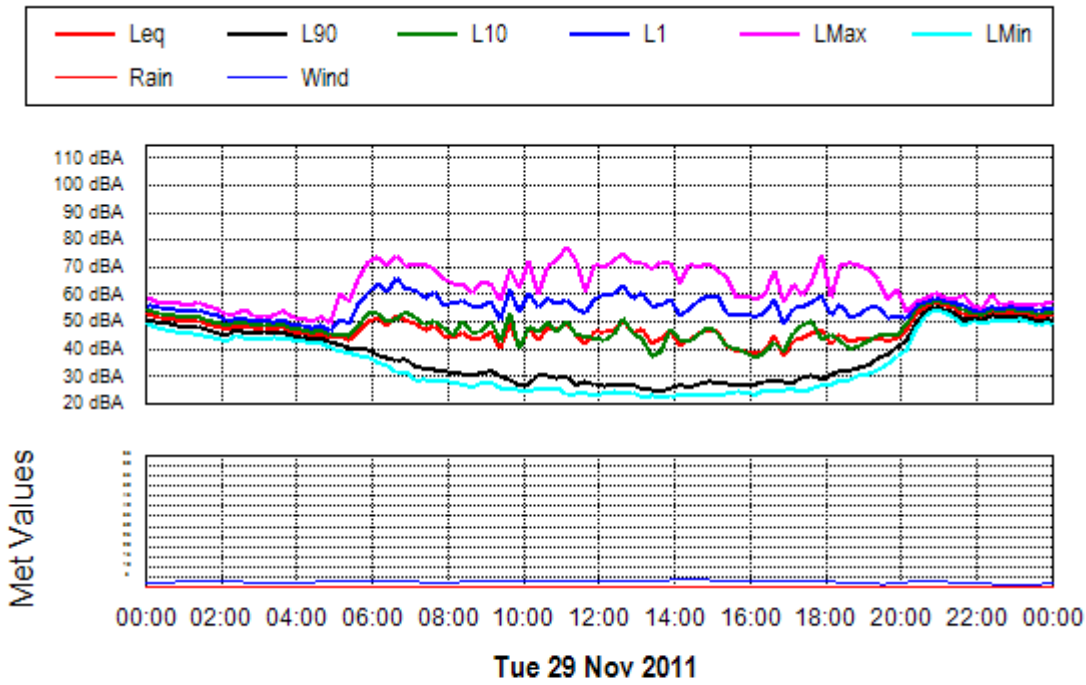


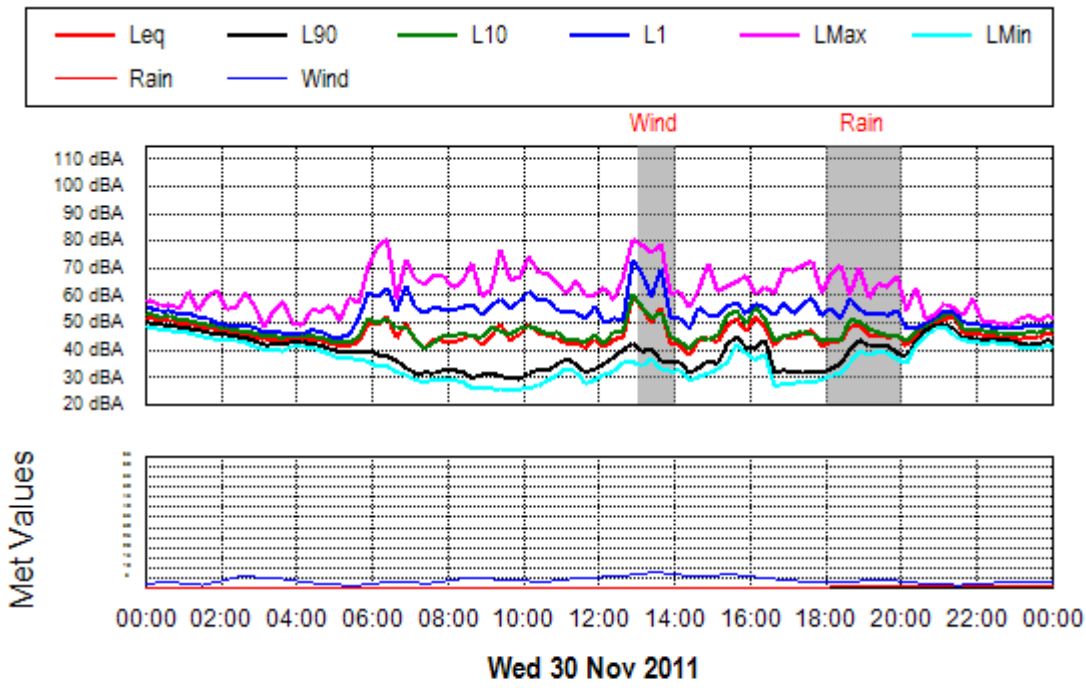
Project: Vickery Coal Project
Location: Will-Gai Residence



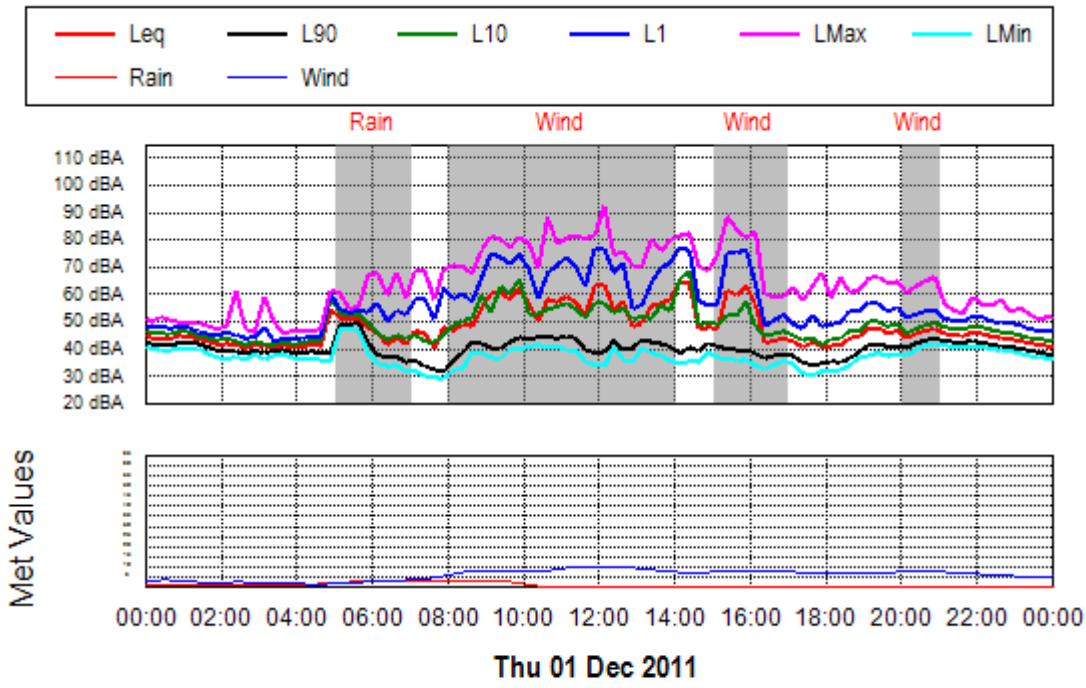


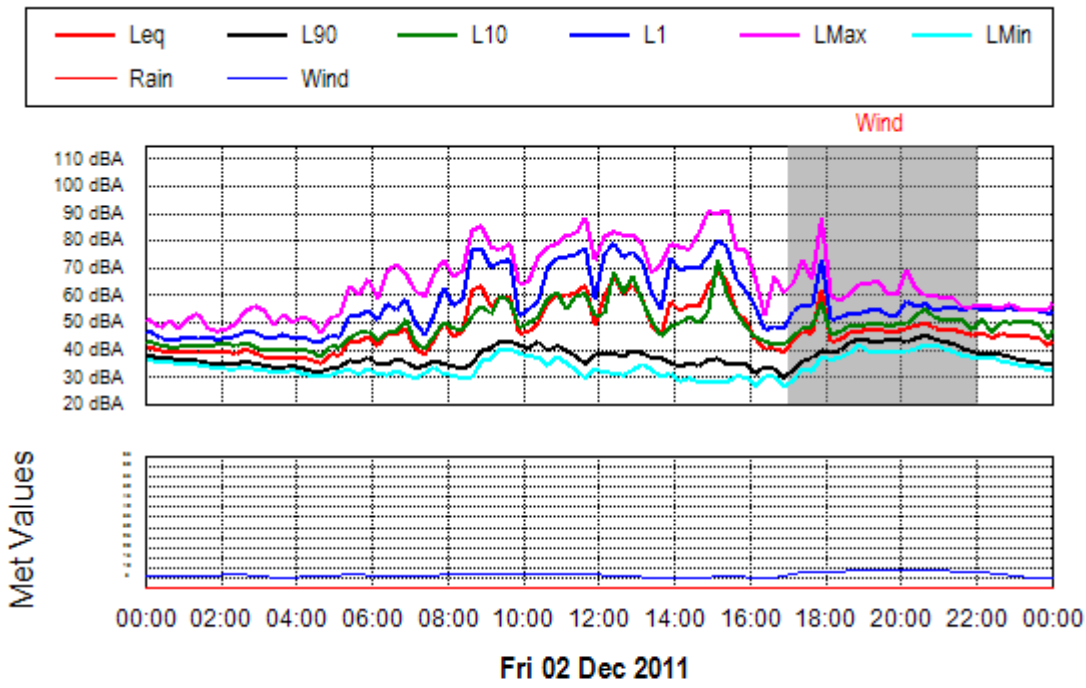
Project: Vickery Coal Project
Location: Will-Gai Residence





Project: Vickery Coal Project
Location: Will-Gai Residence





Project: Vickery Coal Project
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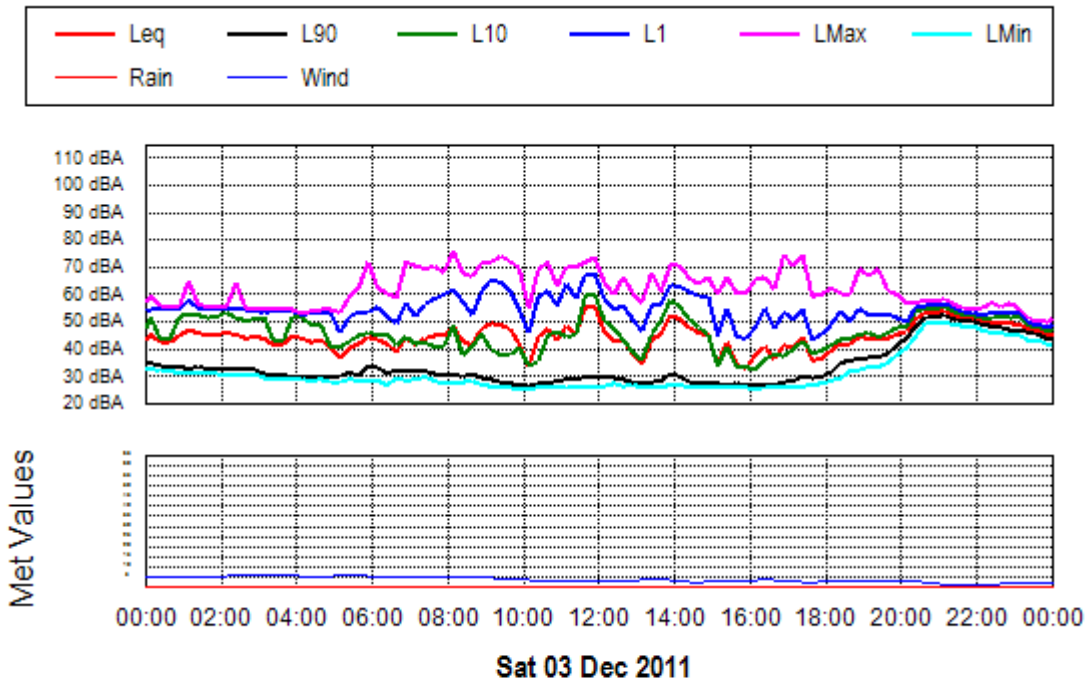

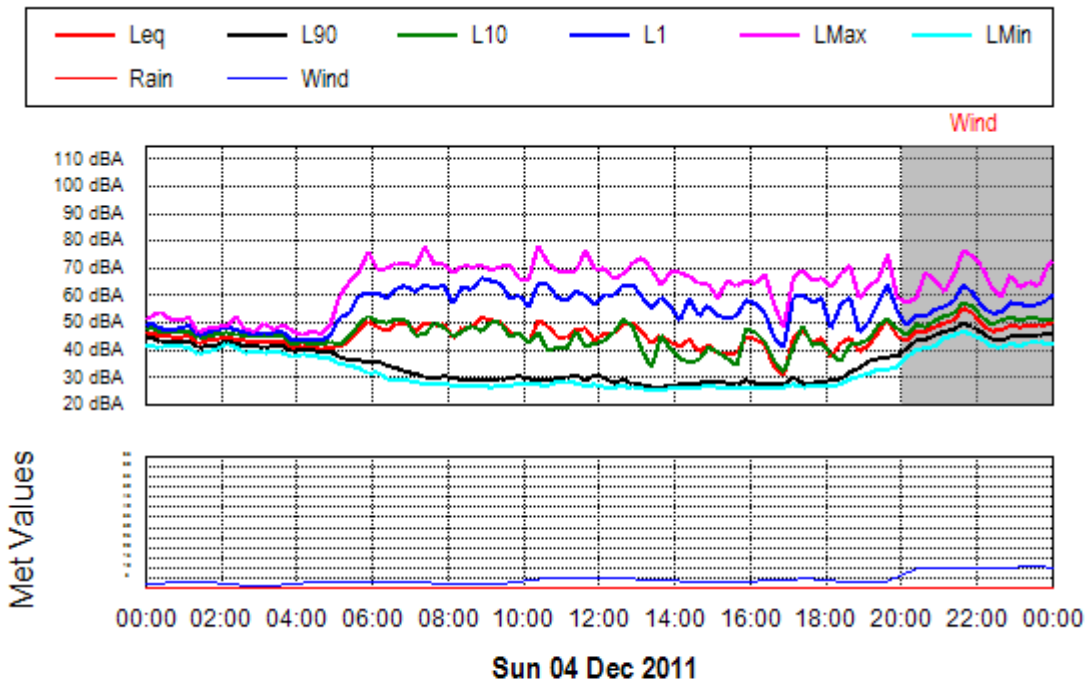

Project: Vickery Coal Project
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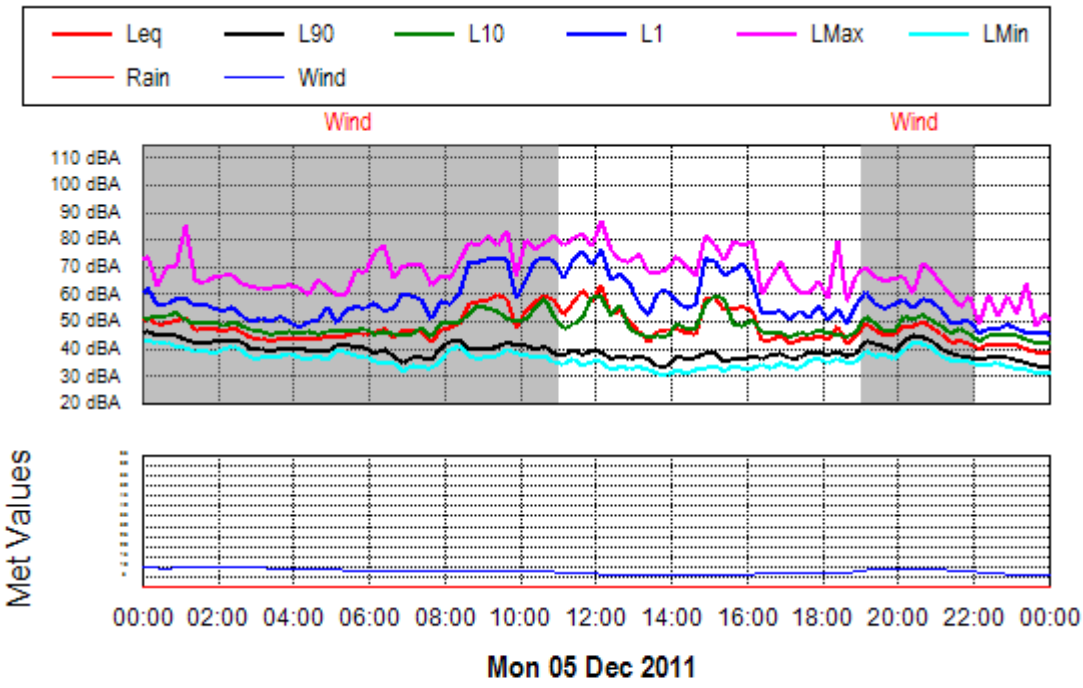

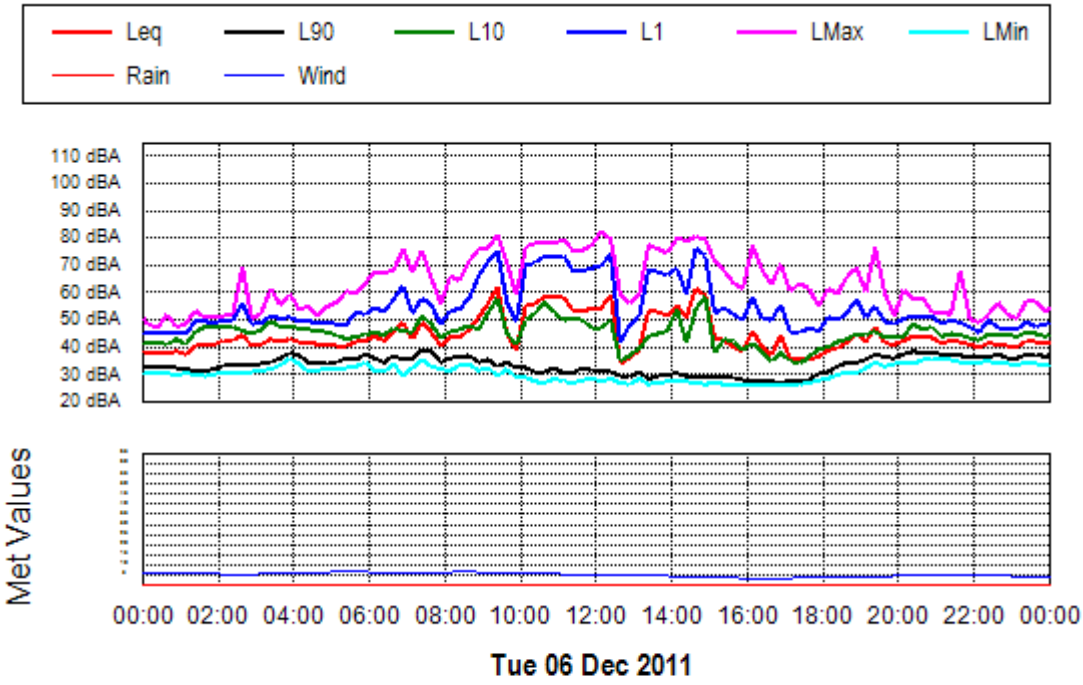

Project: Vickery Coal Project
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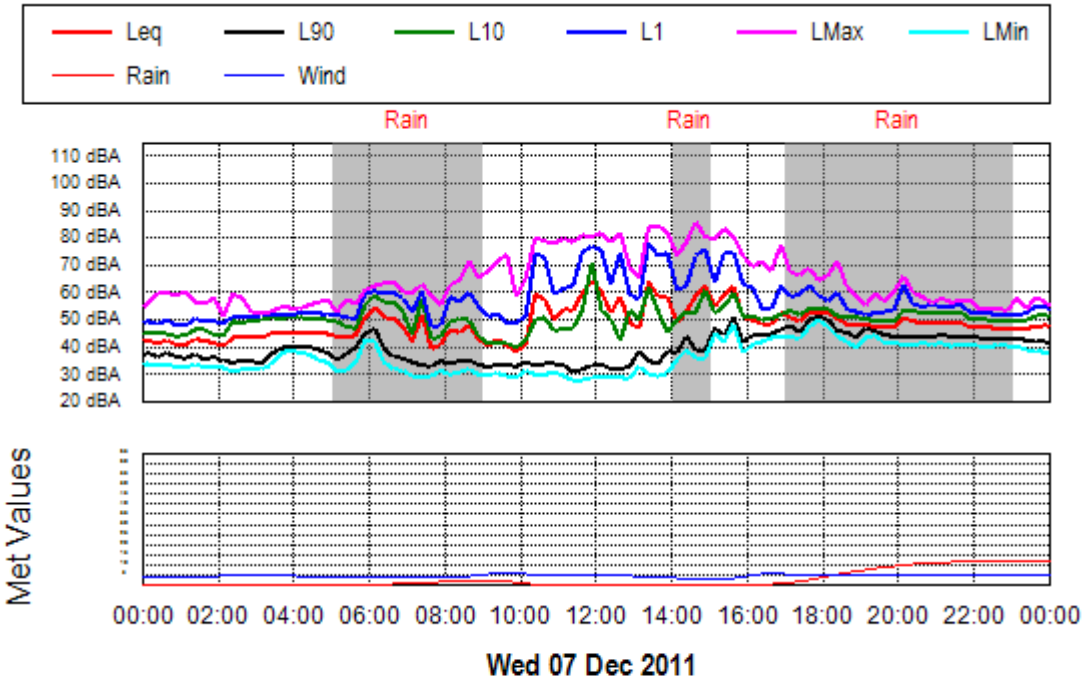

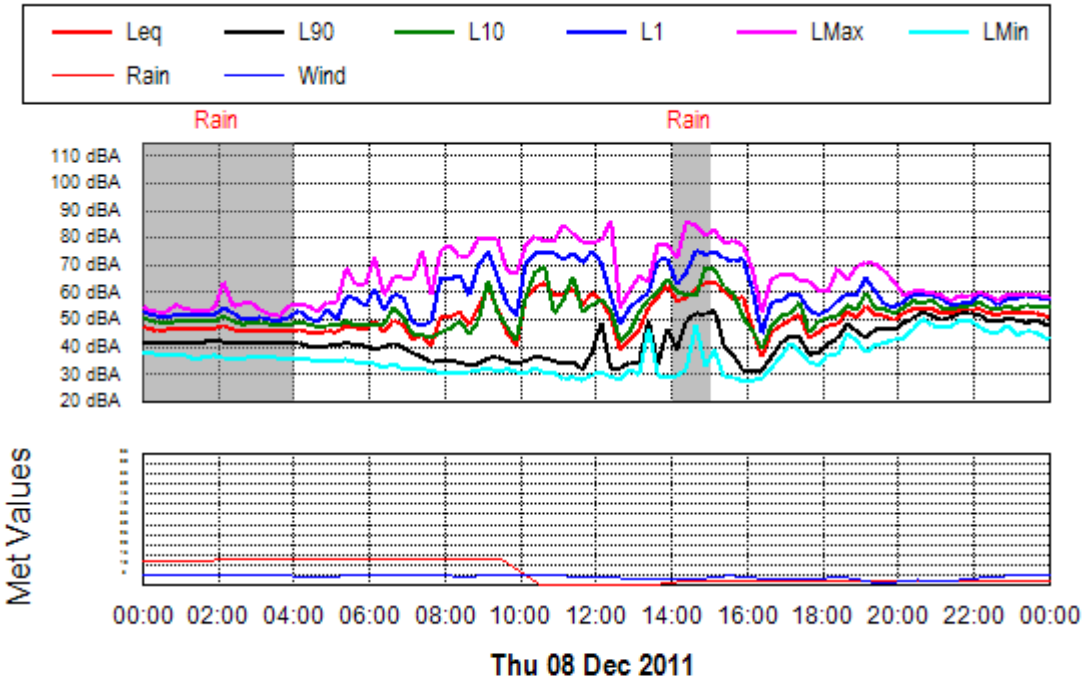

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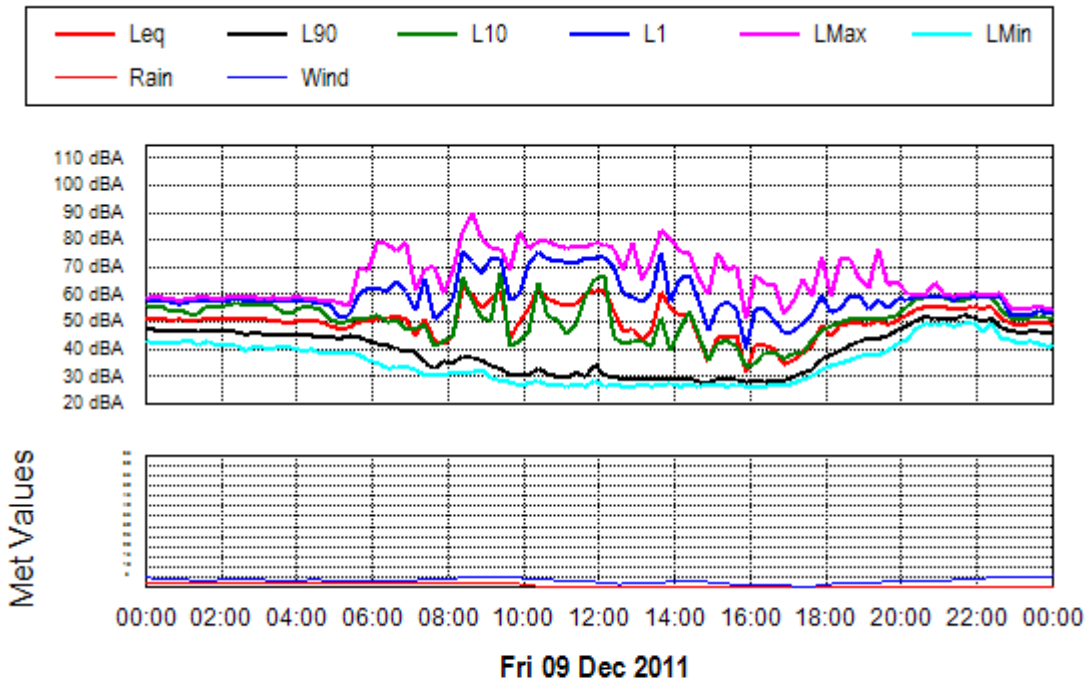

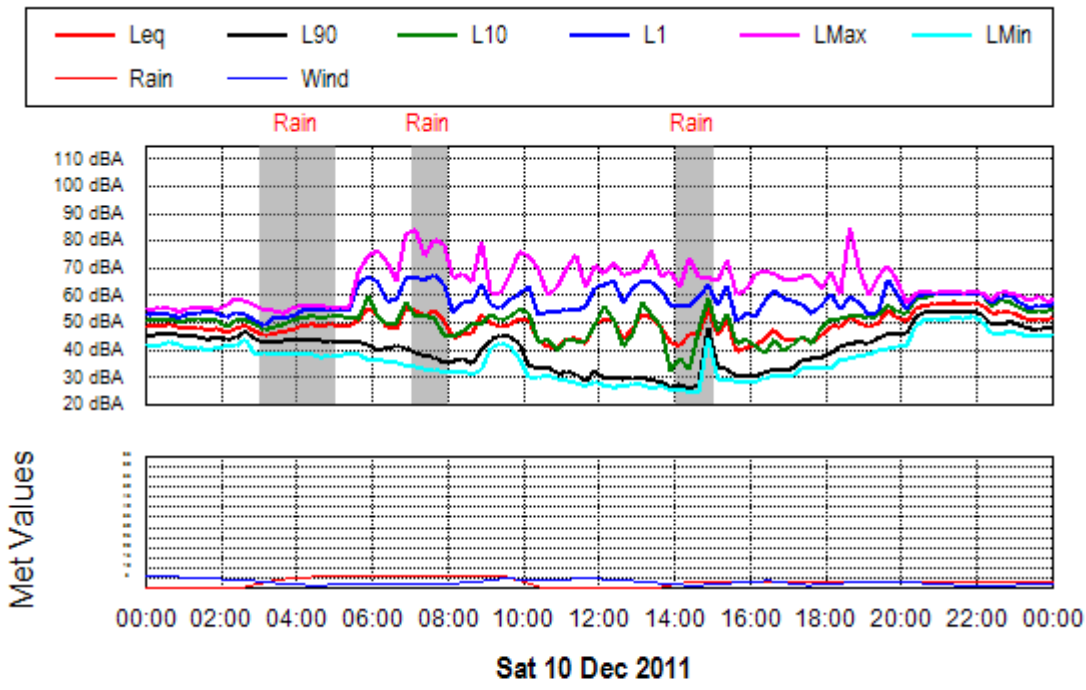

Project: Vickery Coal Project
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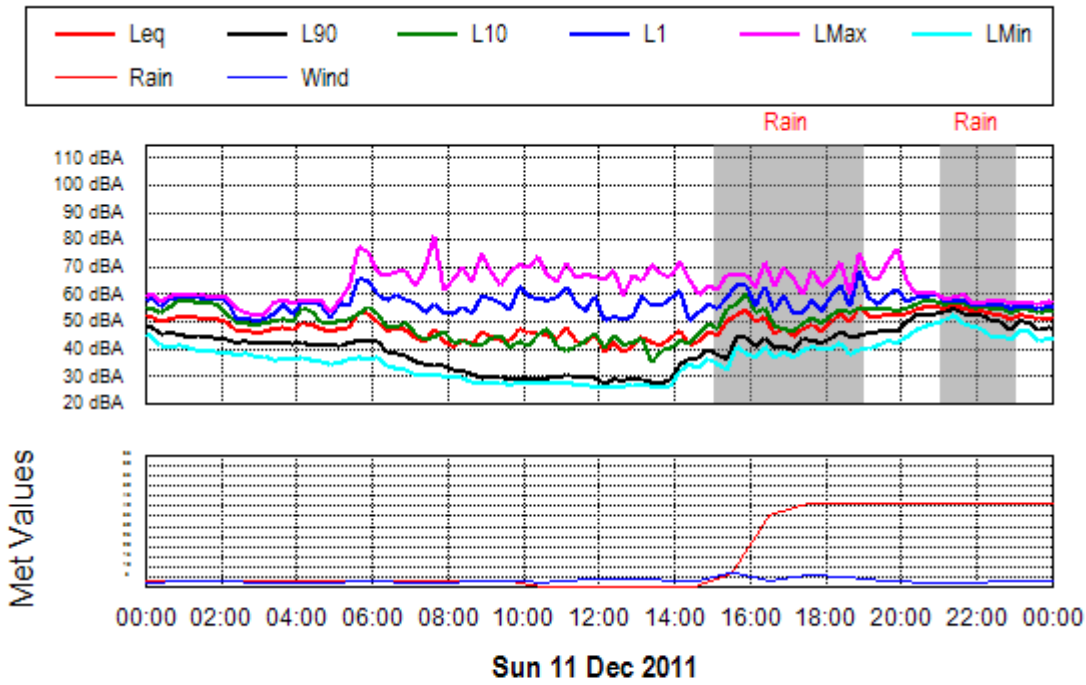

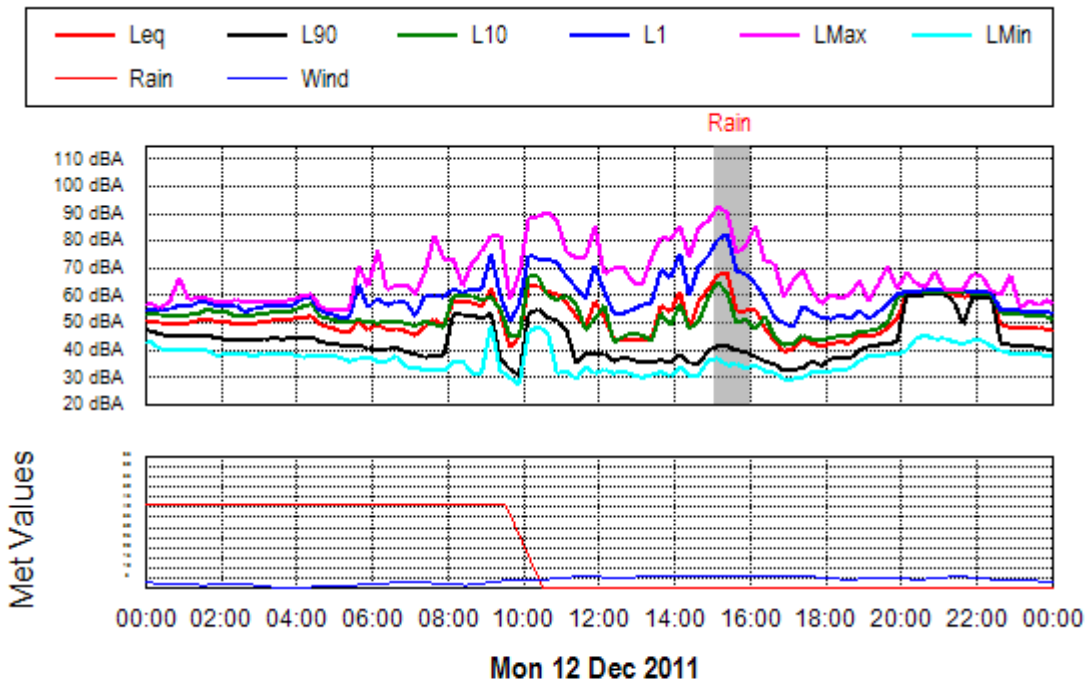

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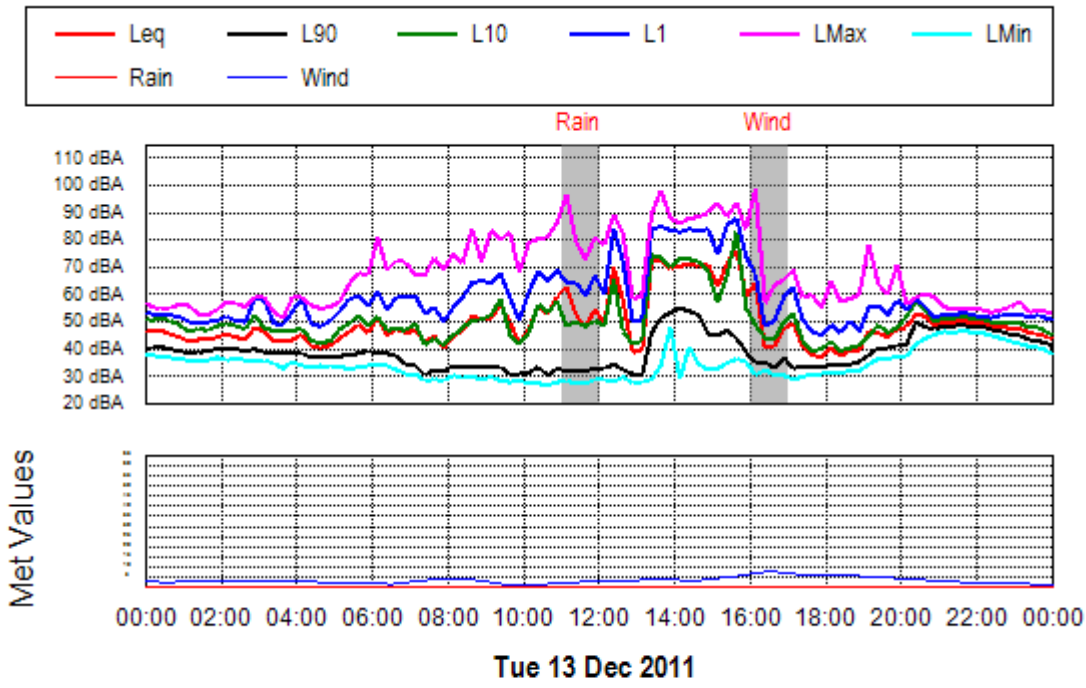
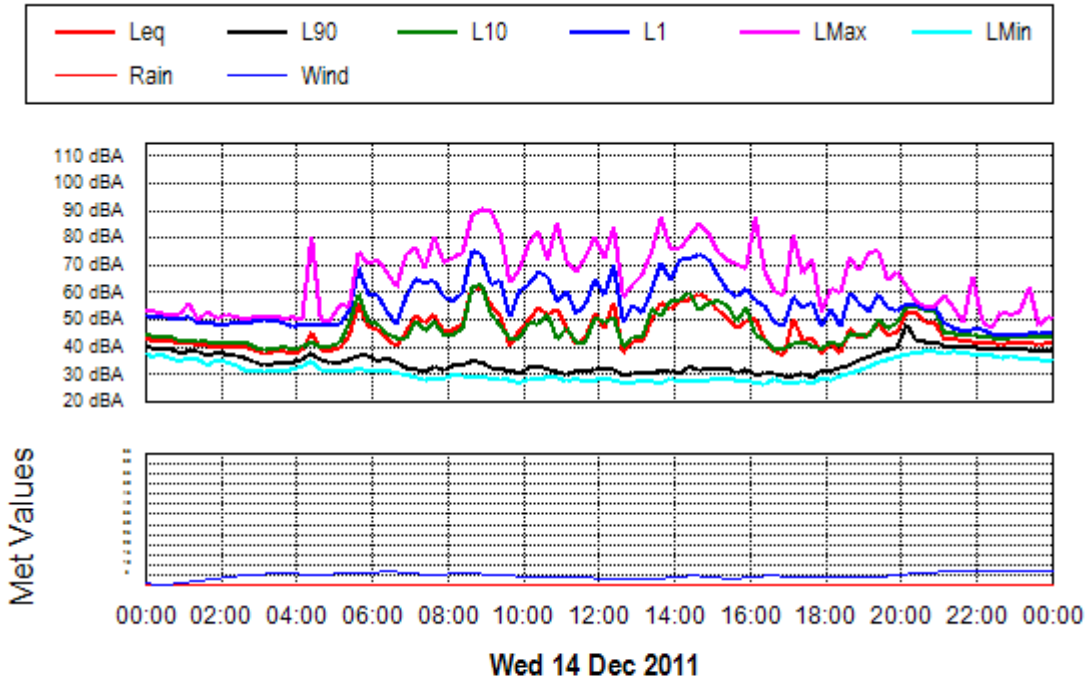
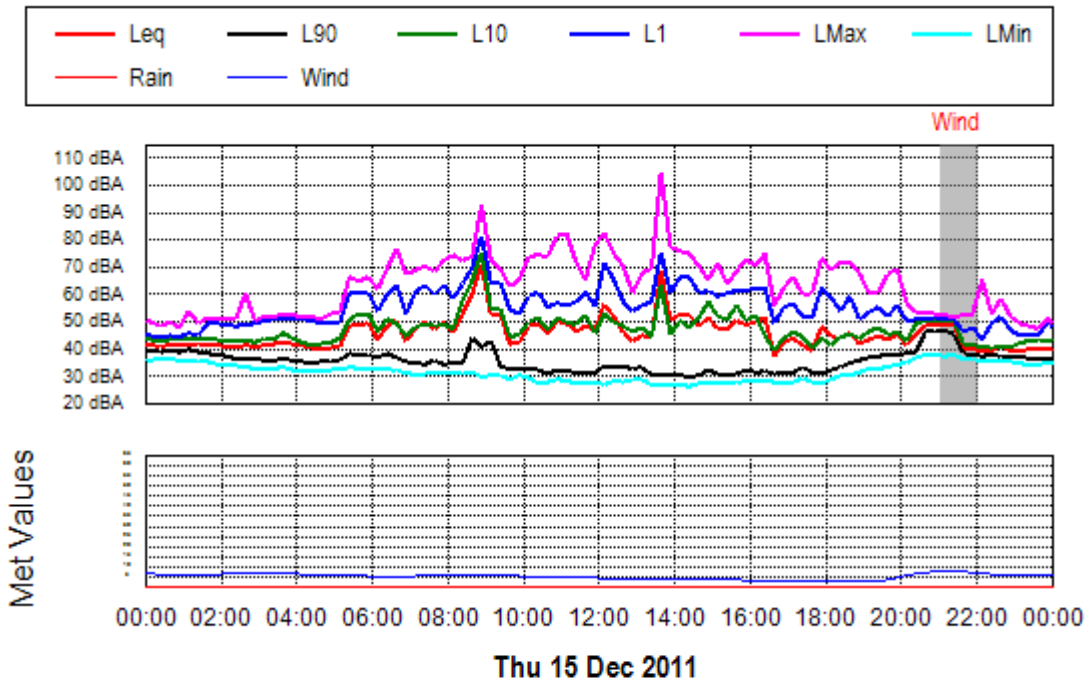
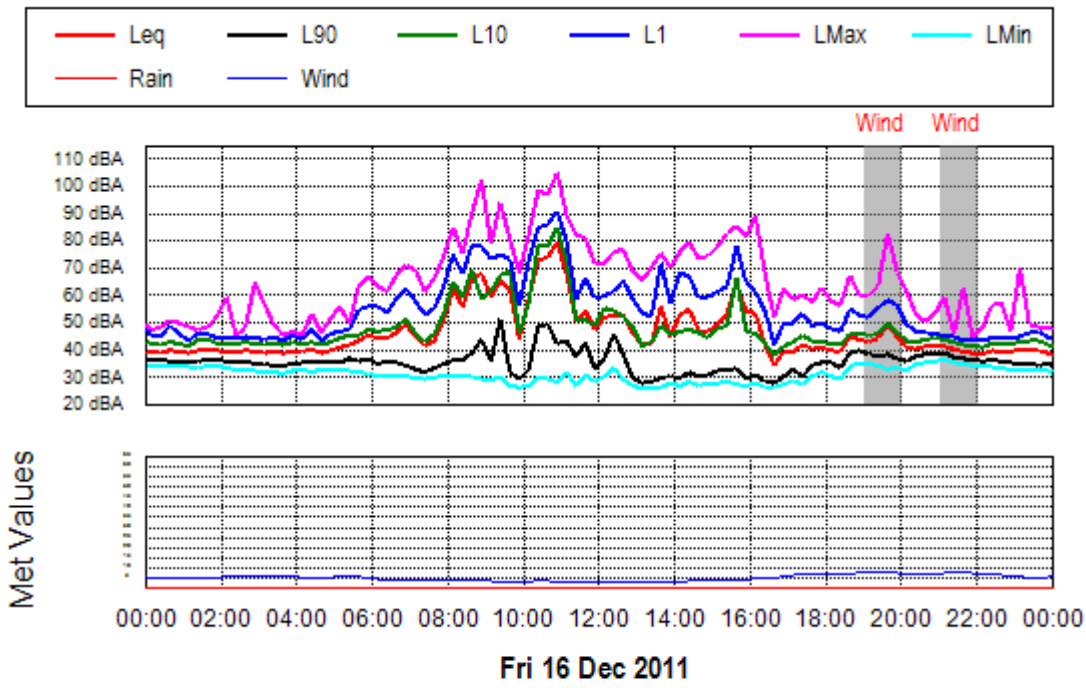




Project: Vickery Coal Project
Location: Will-Gai Residence





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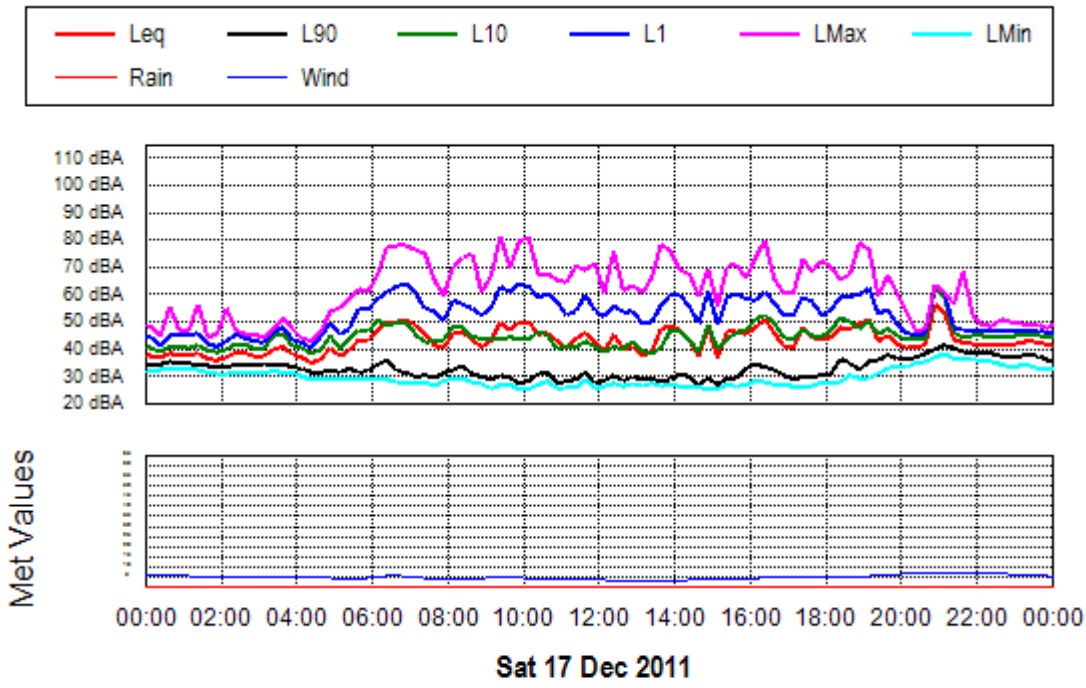
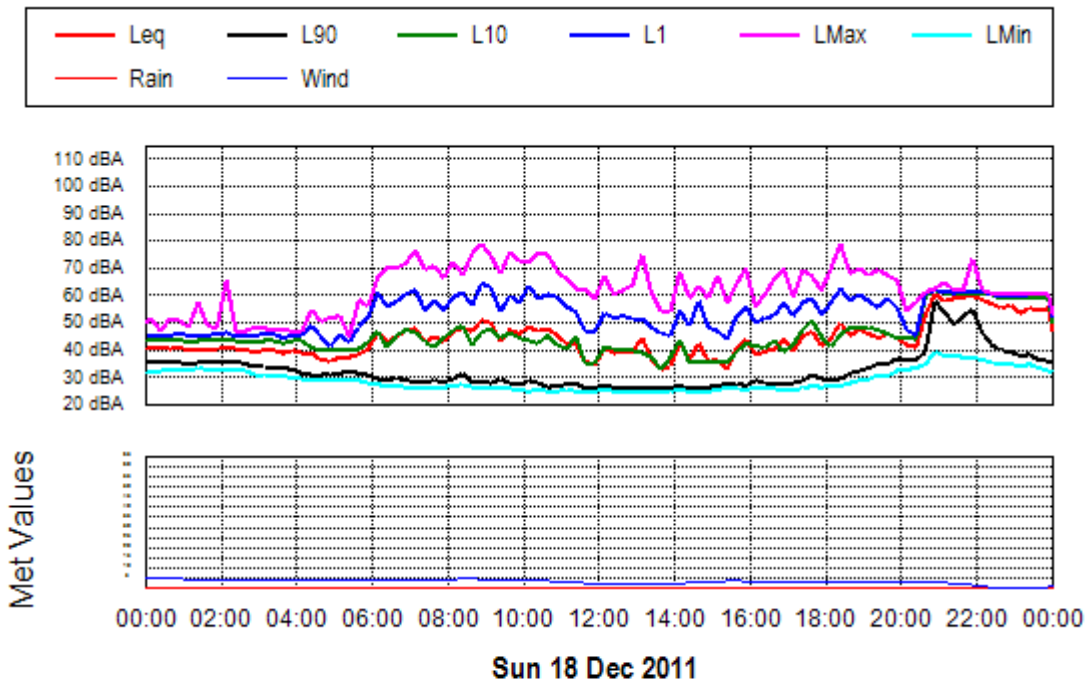
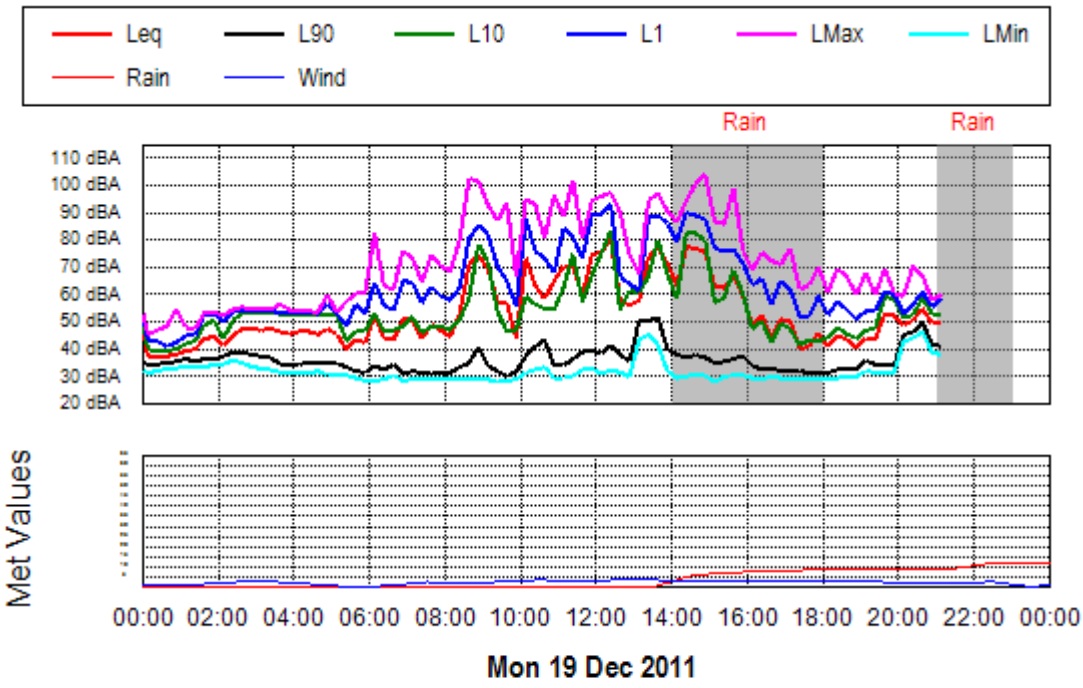
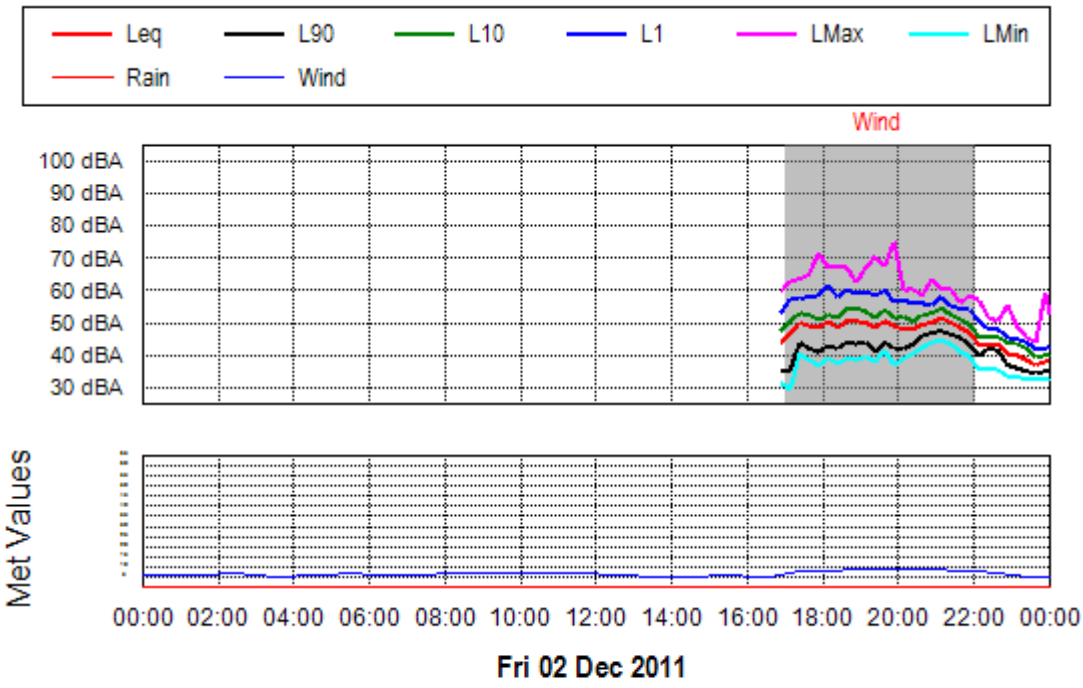


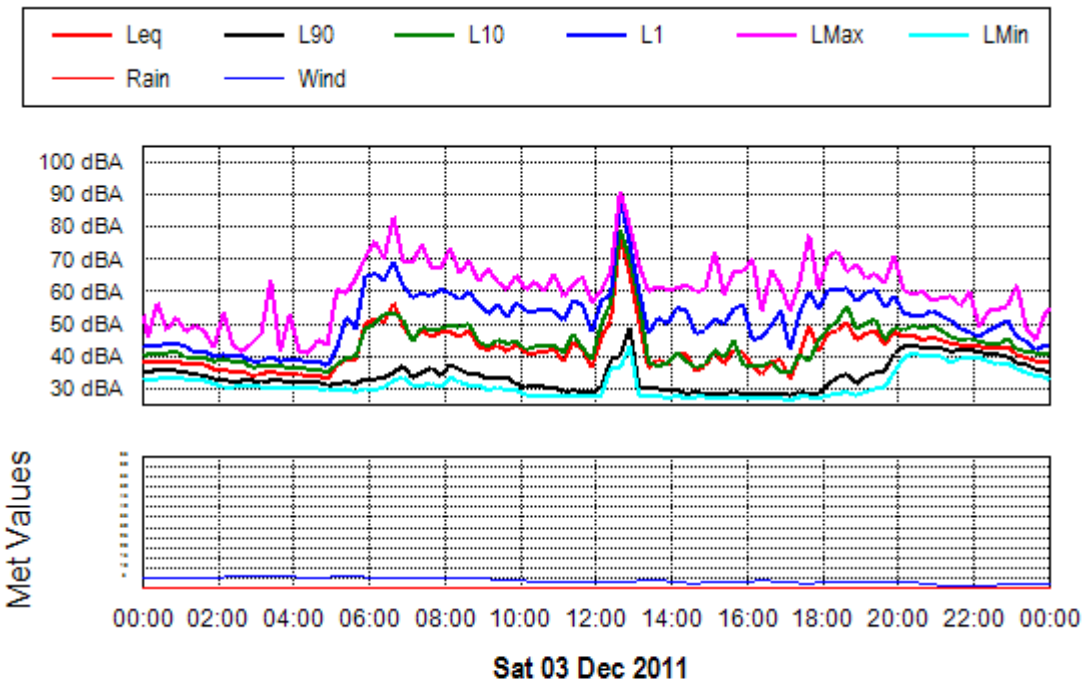


Project: Vickery Coal Project
Location: Will-Gai Residence

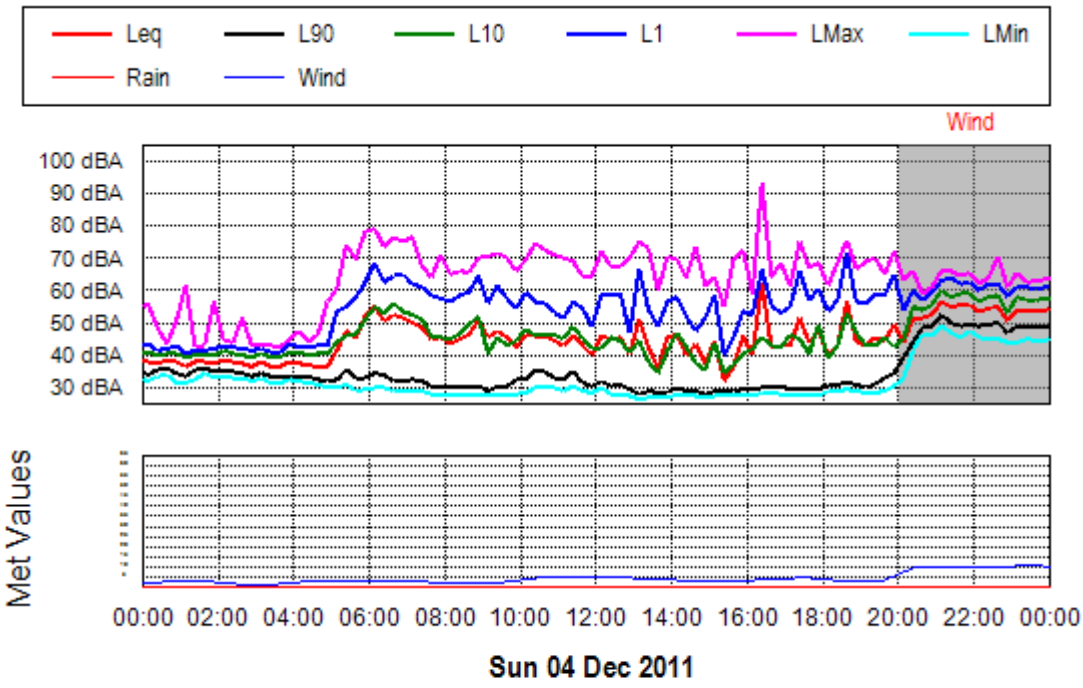


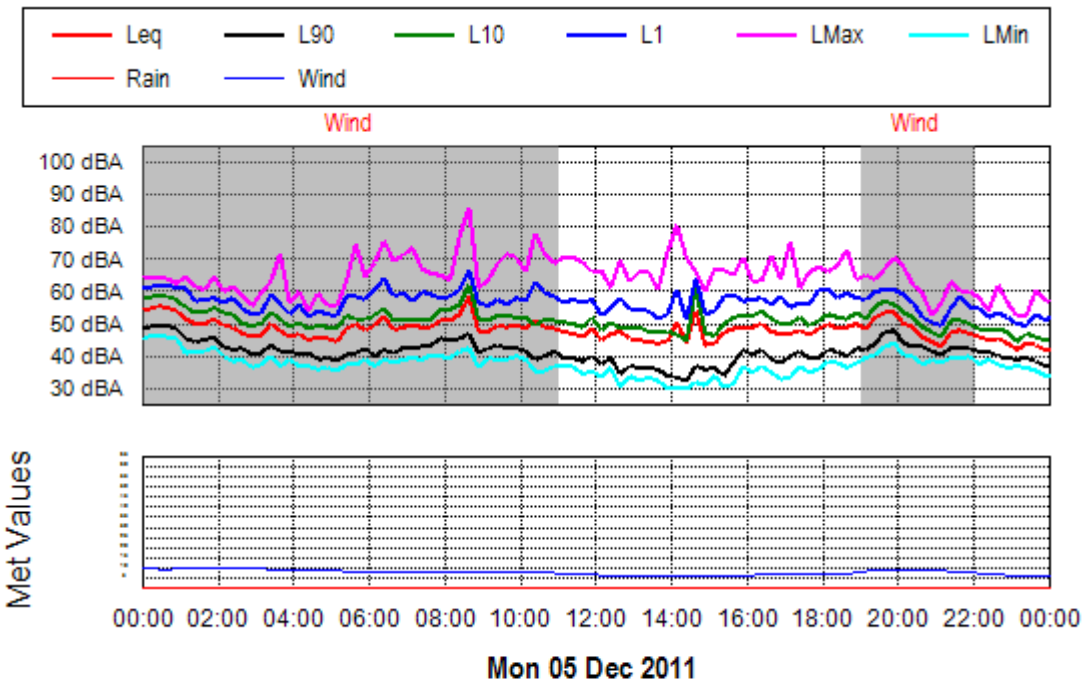
Project: Vickery Coal Project
Location: Mirrabinda Residence



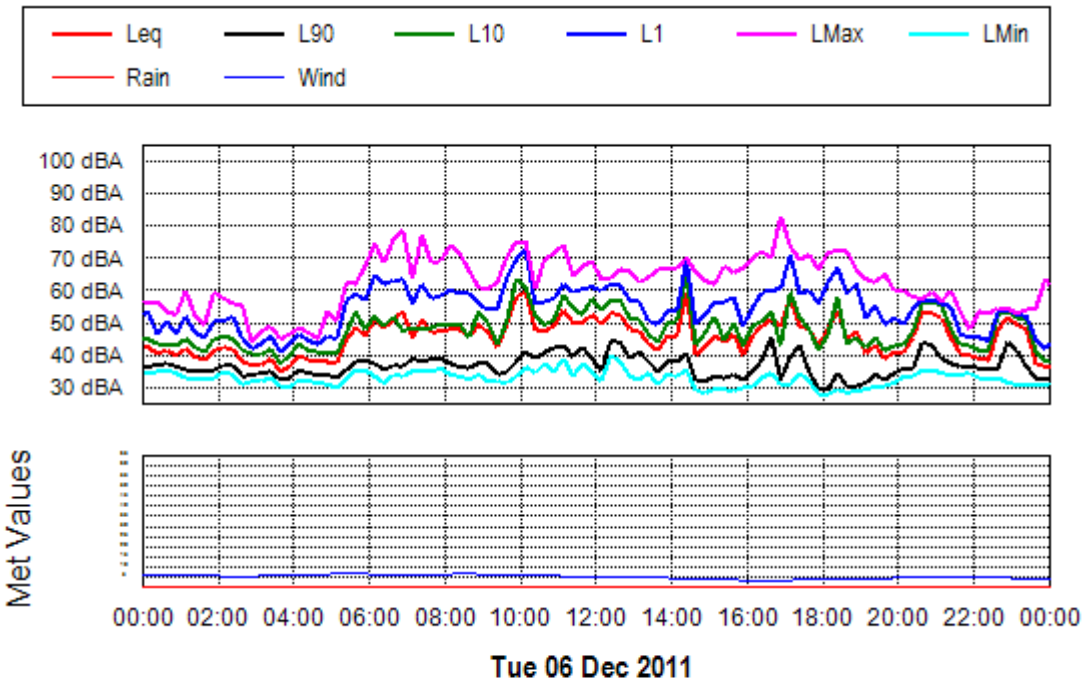


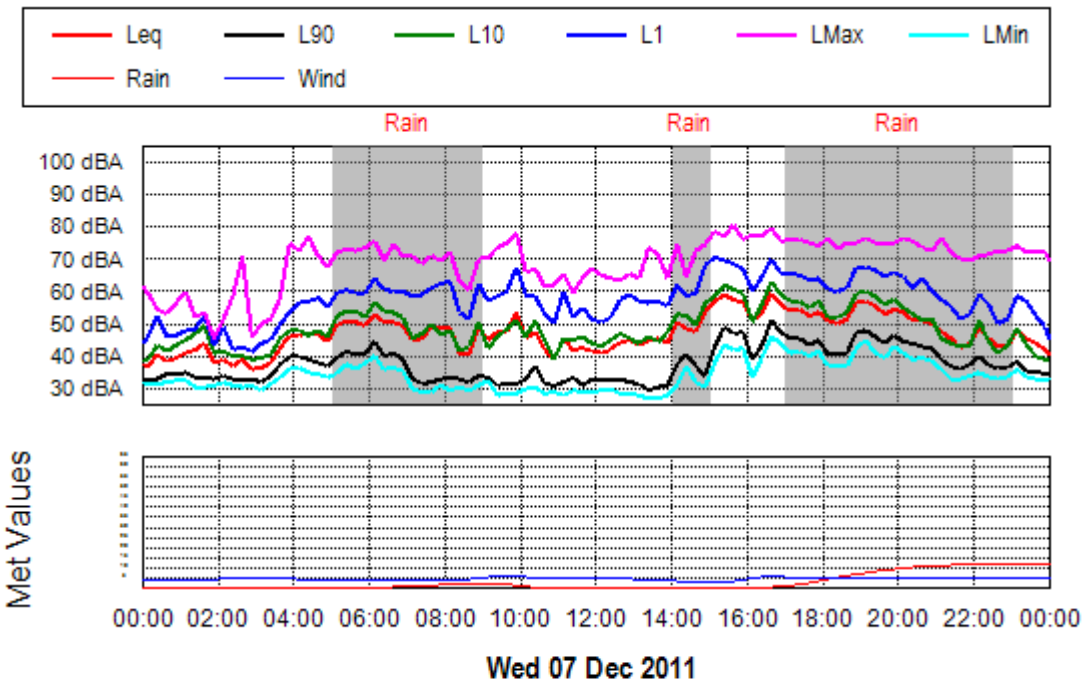
Project: Vickery Coal Project
Location: Mirrabinda Residence



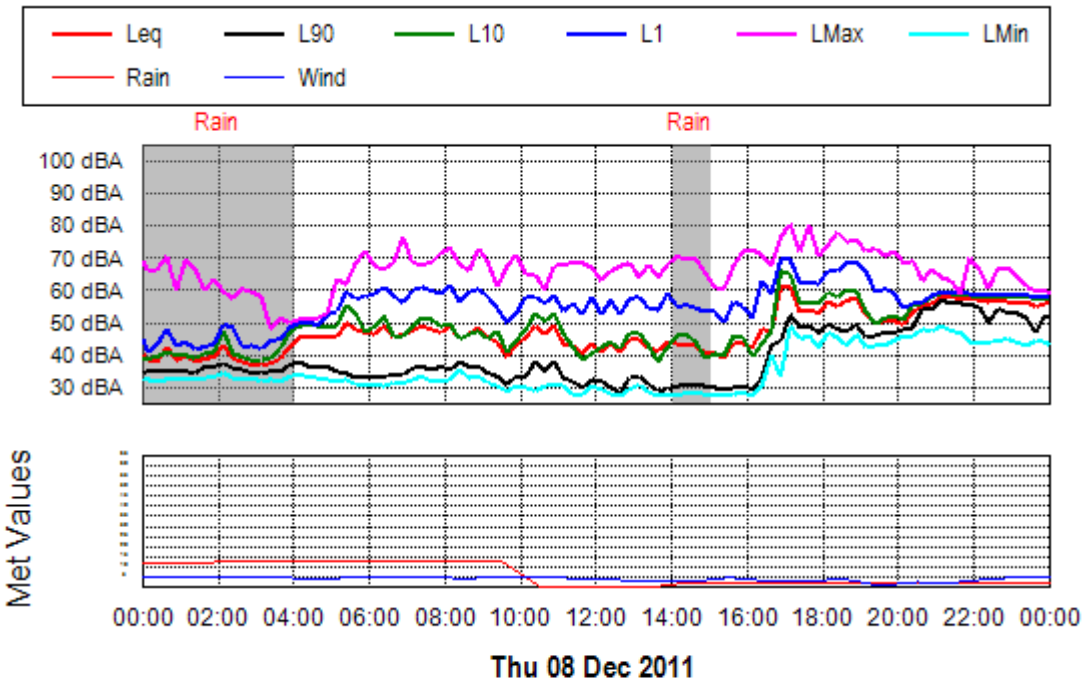


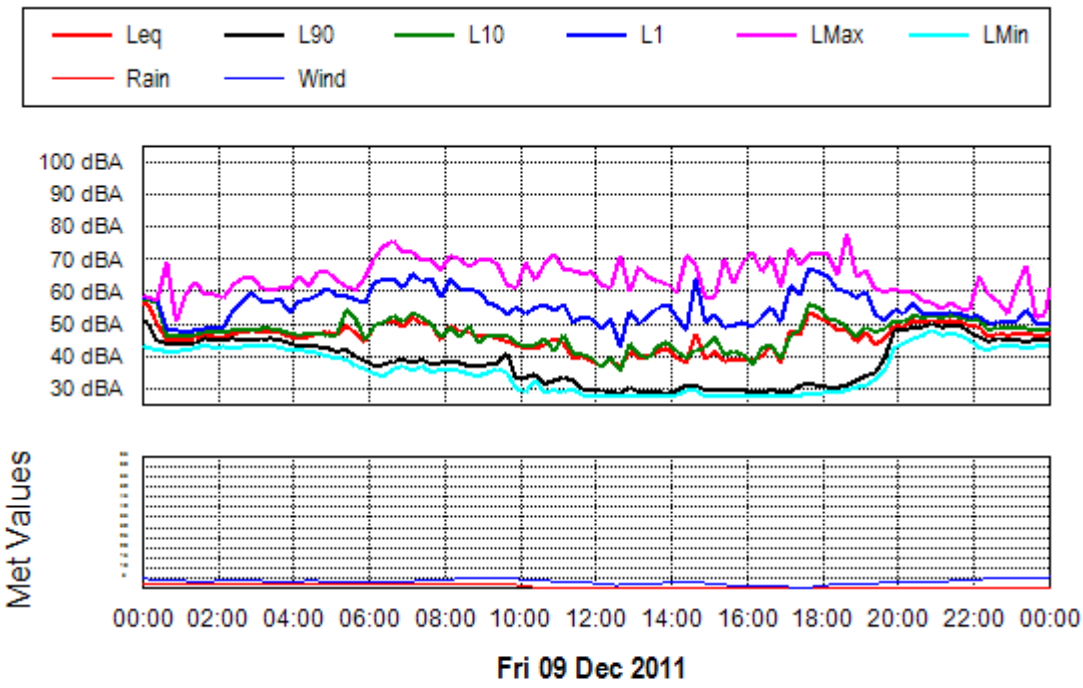
Project: Vickery Coal Project
Location: Mirrabinda Residence



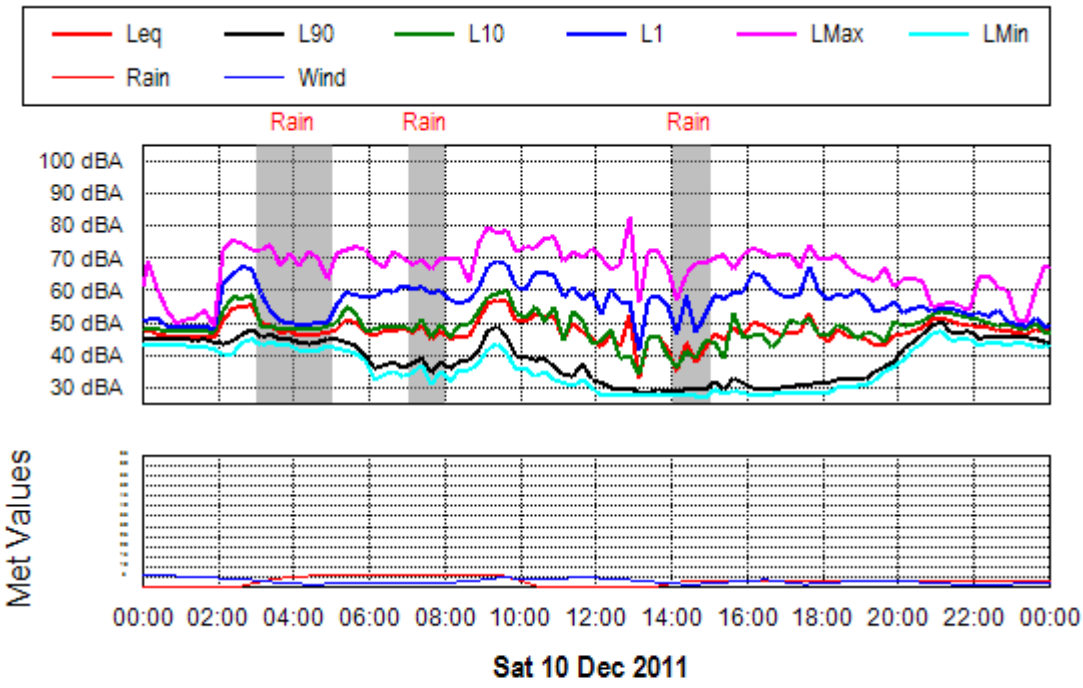


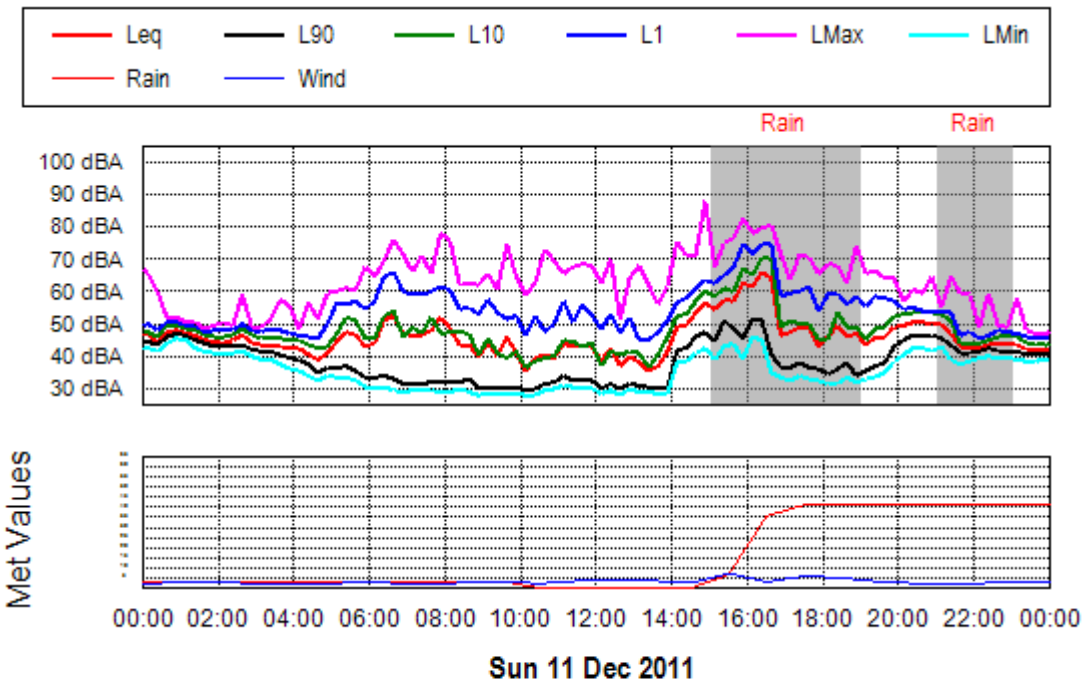
Project: Vickery Coal Project
Location: Mirrabinda Residence





Project: Vickery Coal Project
Location: Mirrabinda Residence





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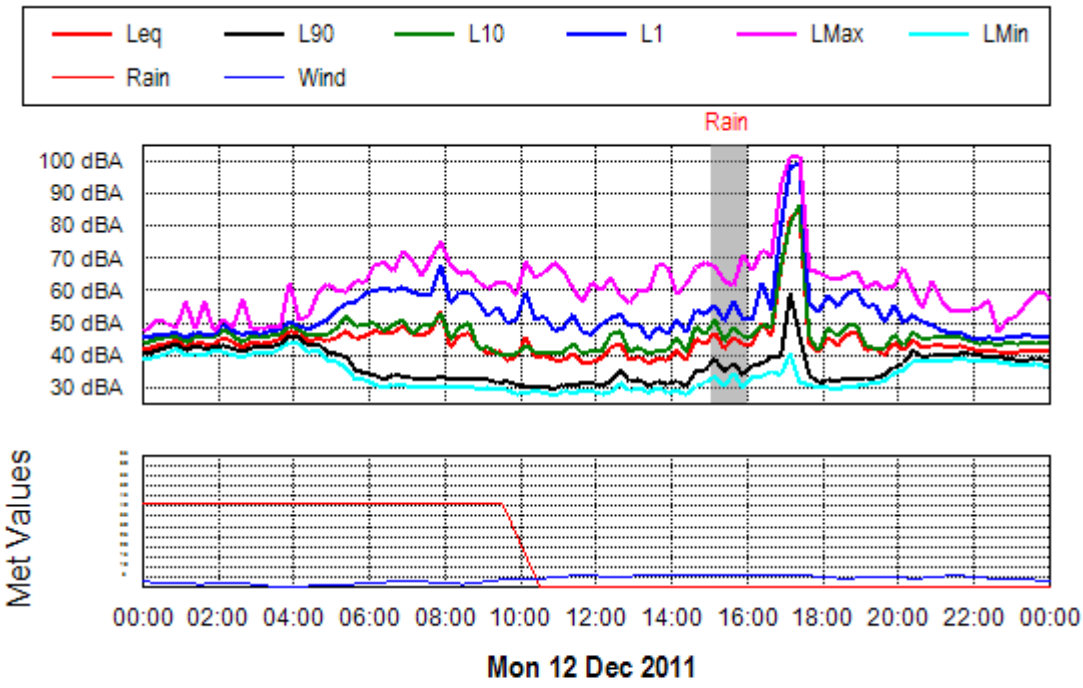

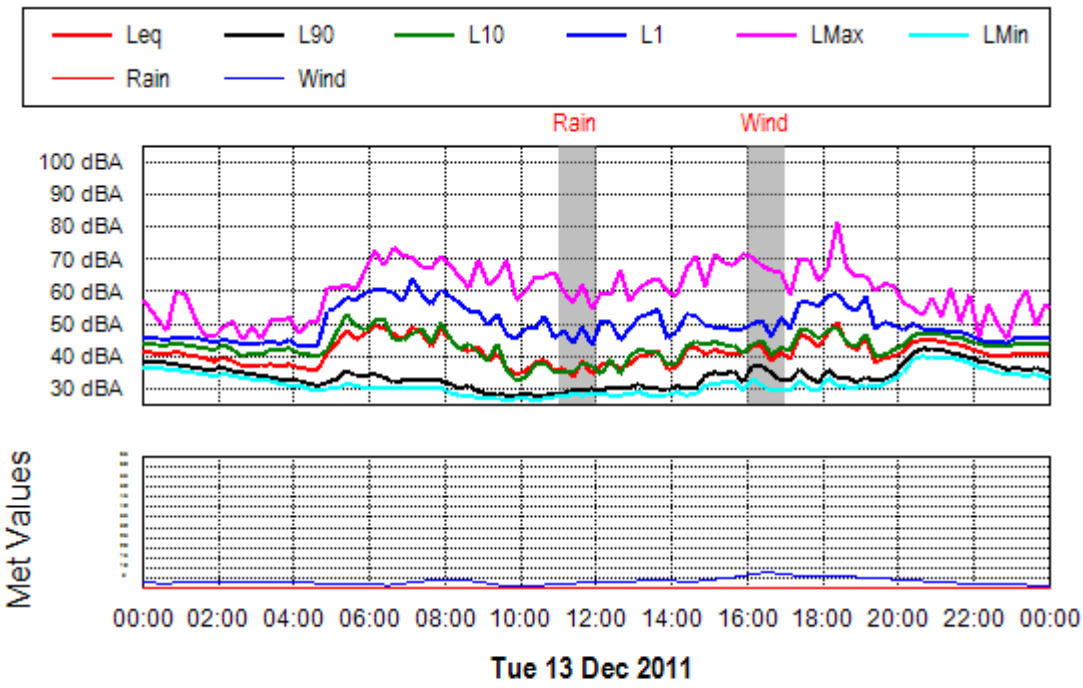

Project: Vickery Coal Project
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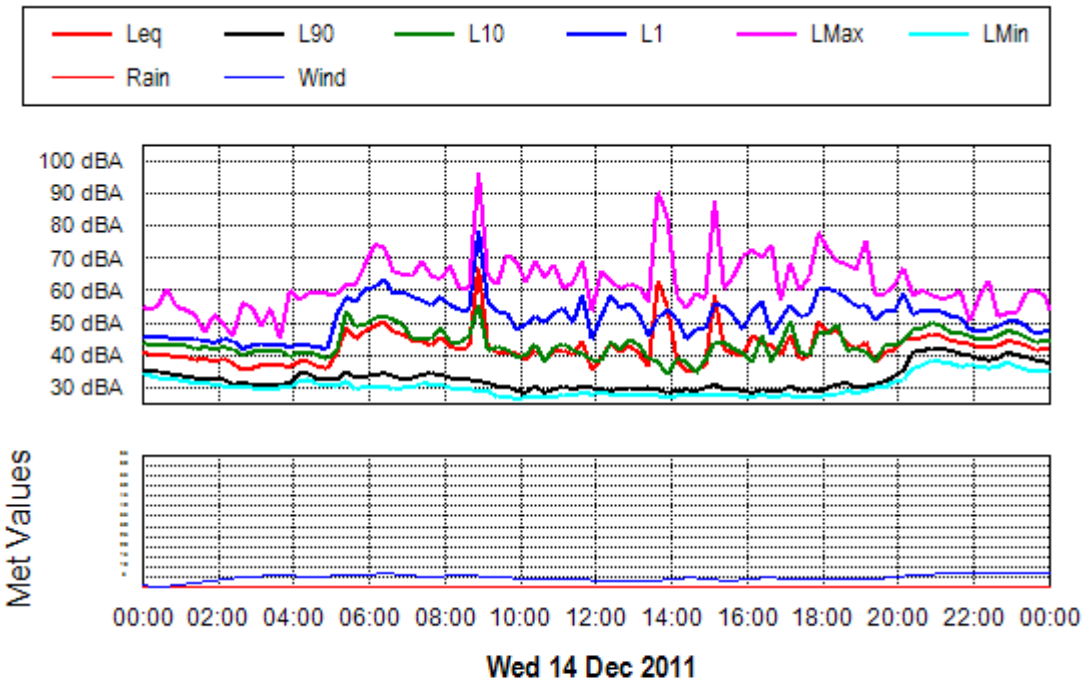

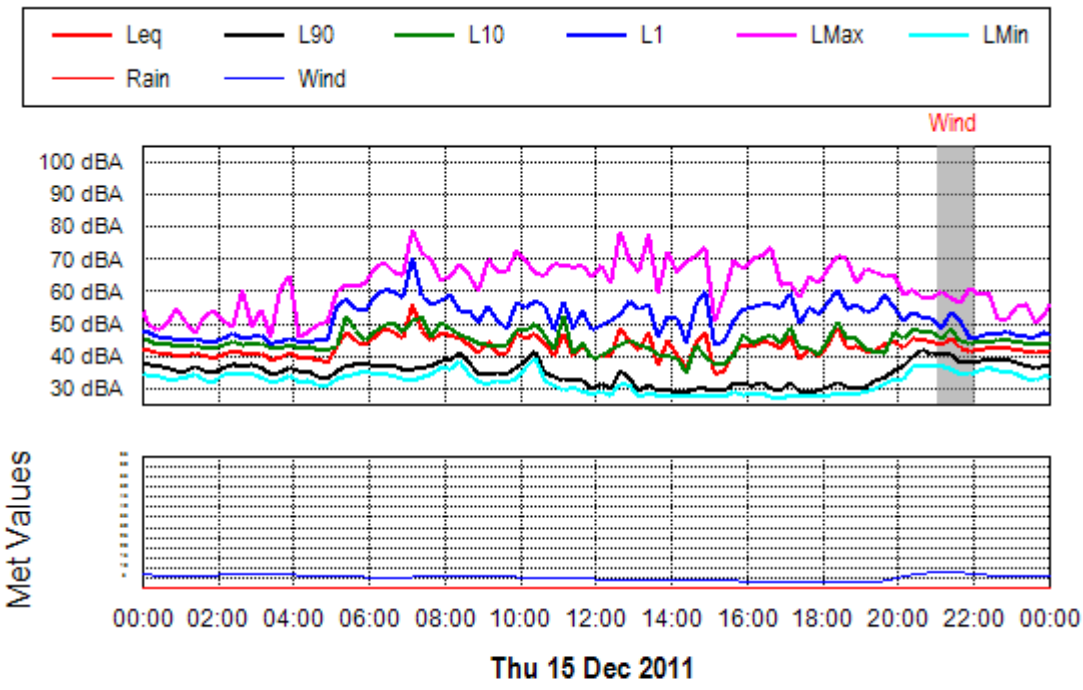

Project: Vickery Coal Project
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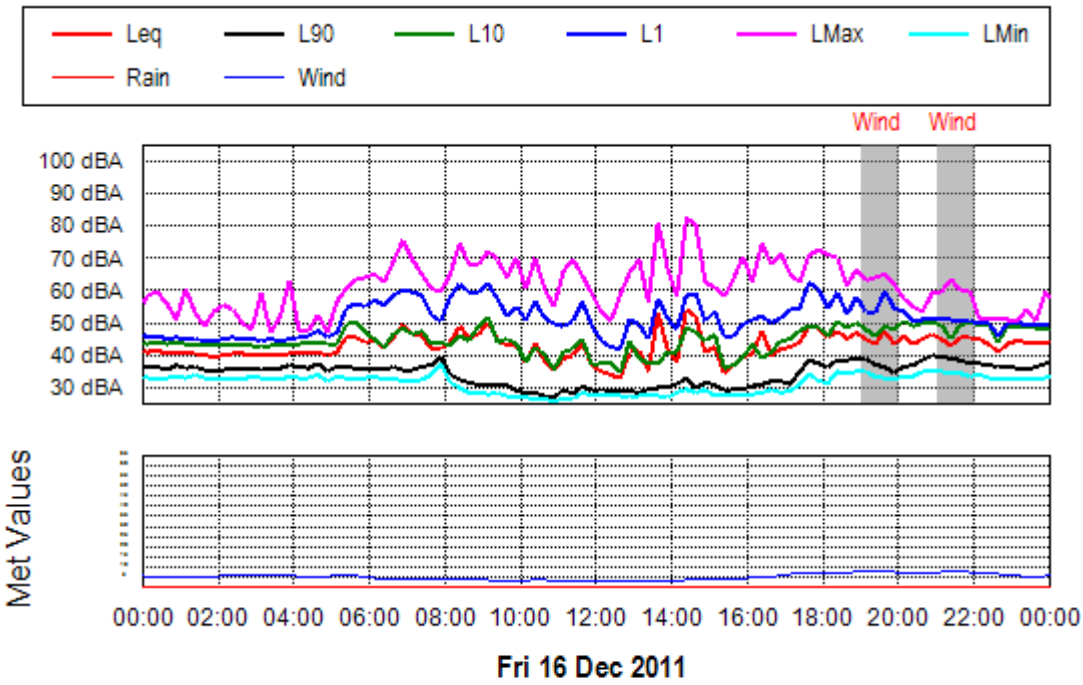

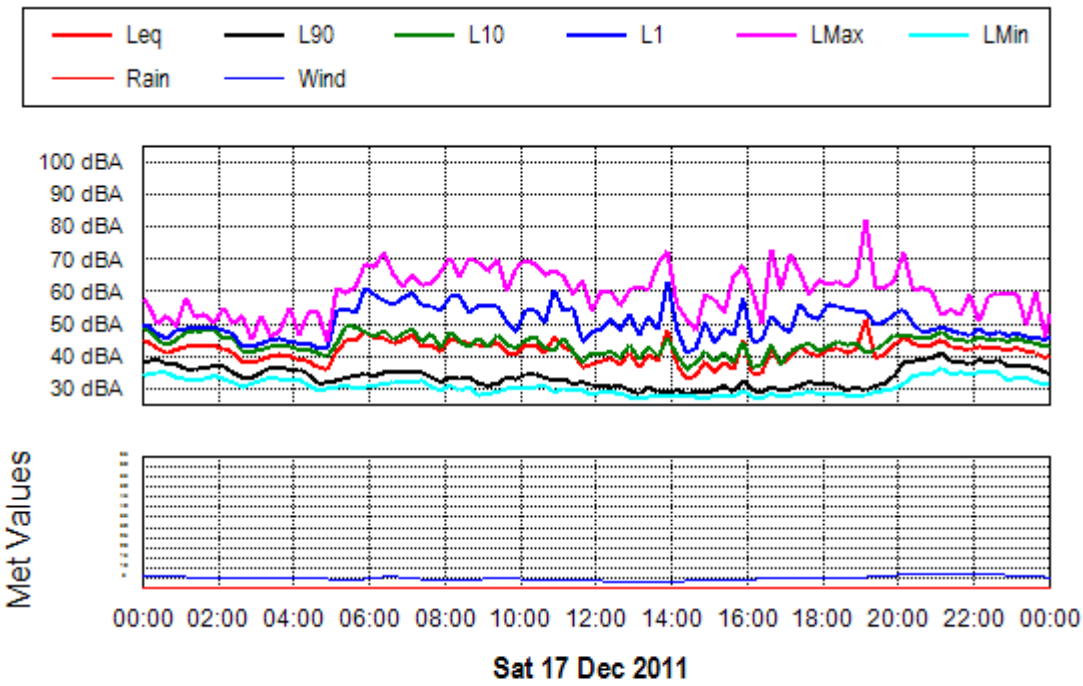

Project: Vickery Coal Project
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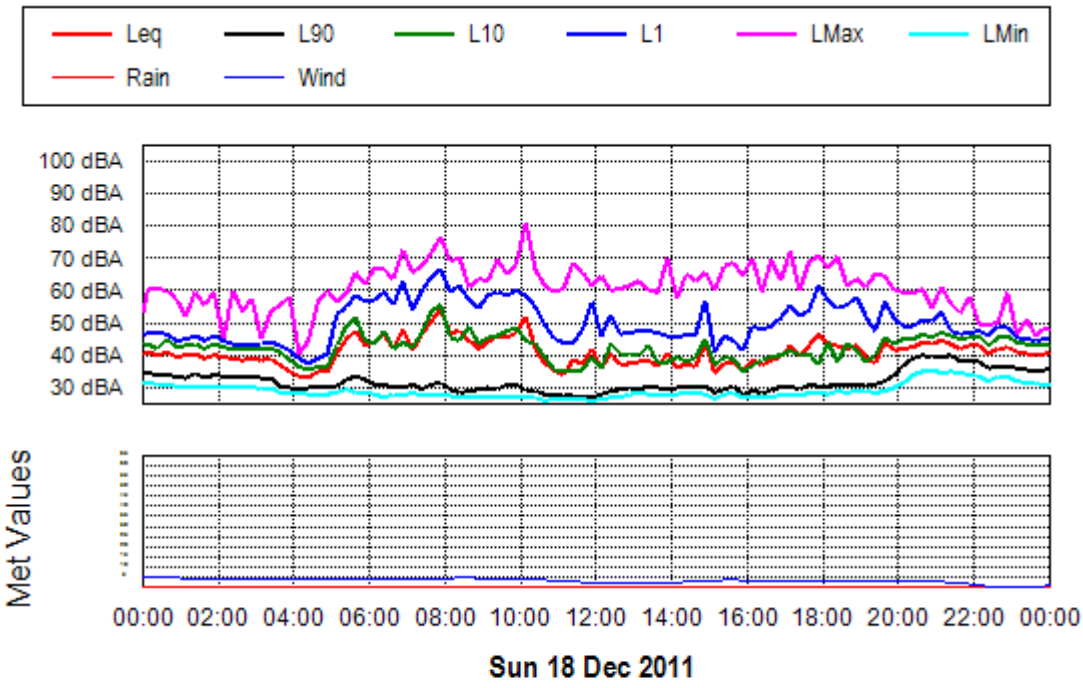
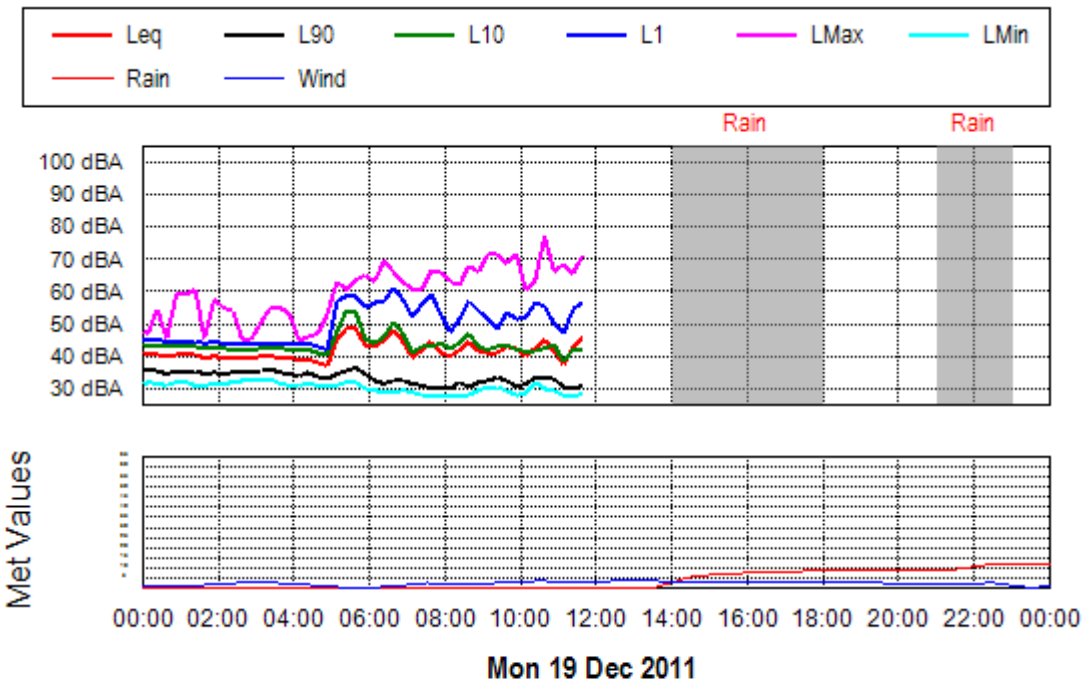
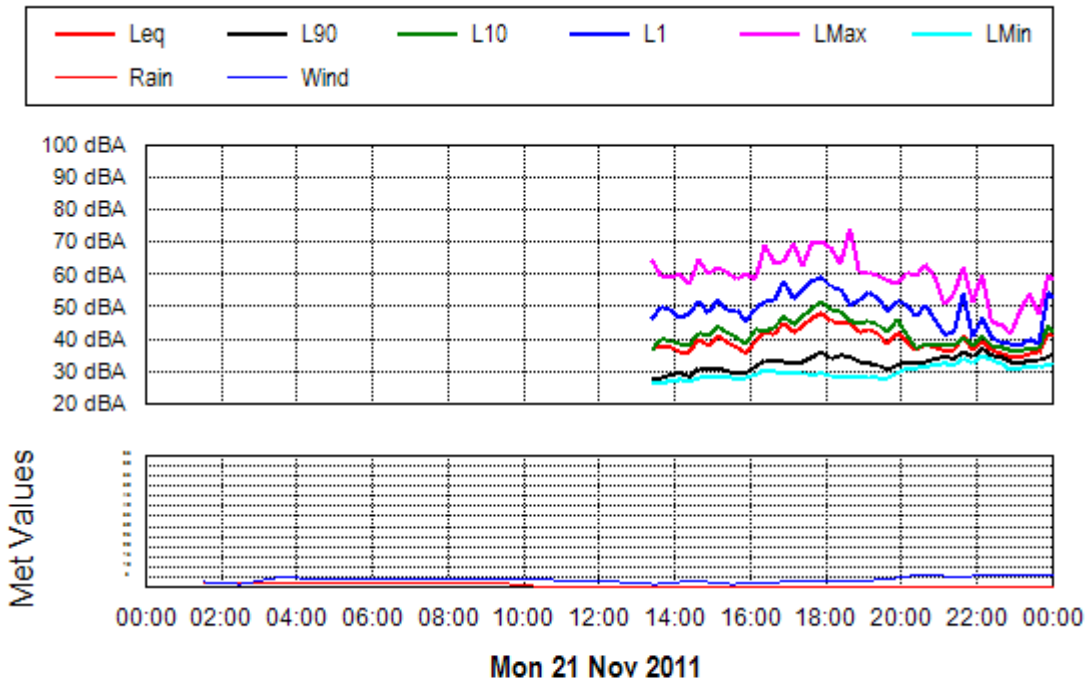
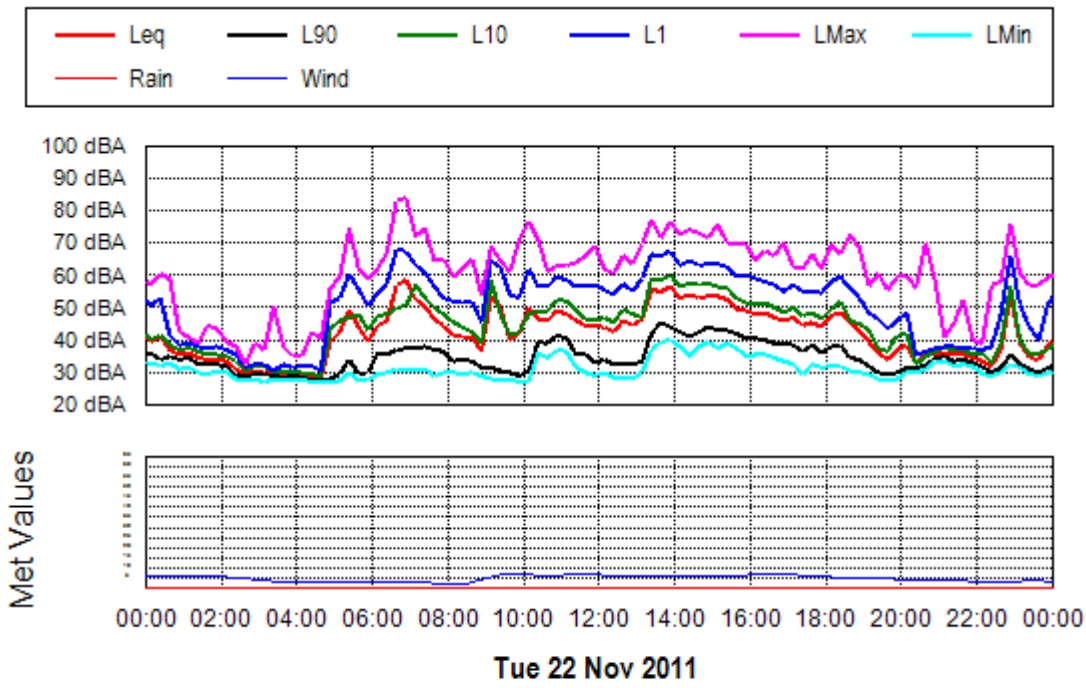




Project: Vickery Coal Project
Location: Broadwater Residence





Project: Vickery Coal Project
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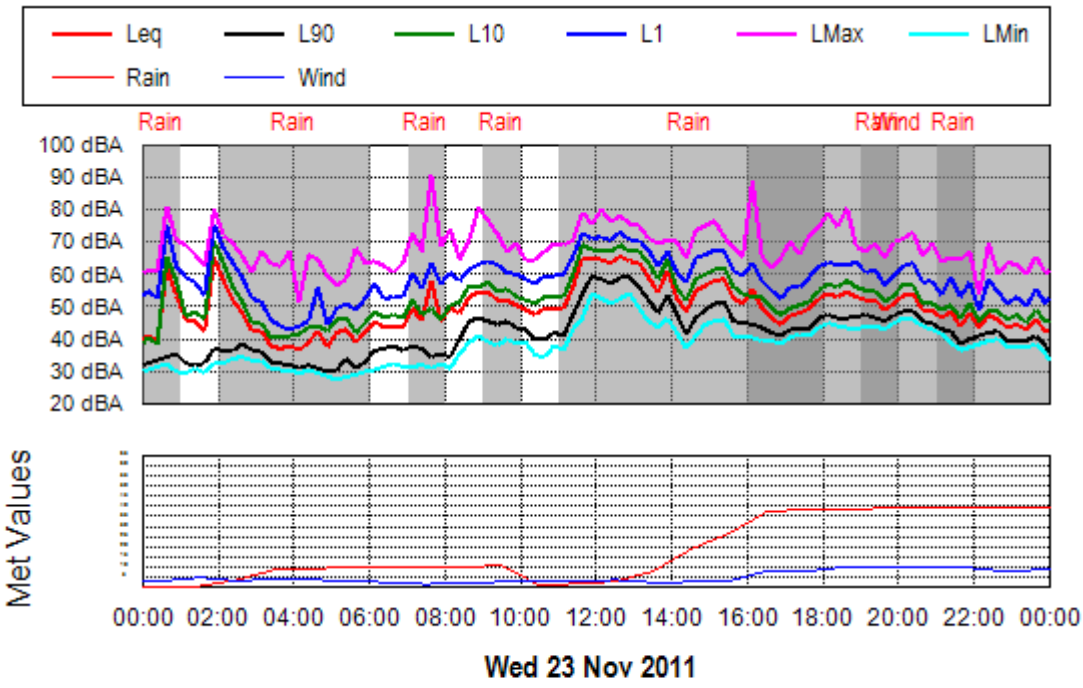

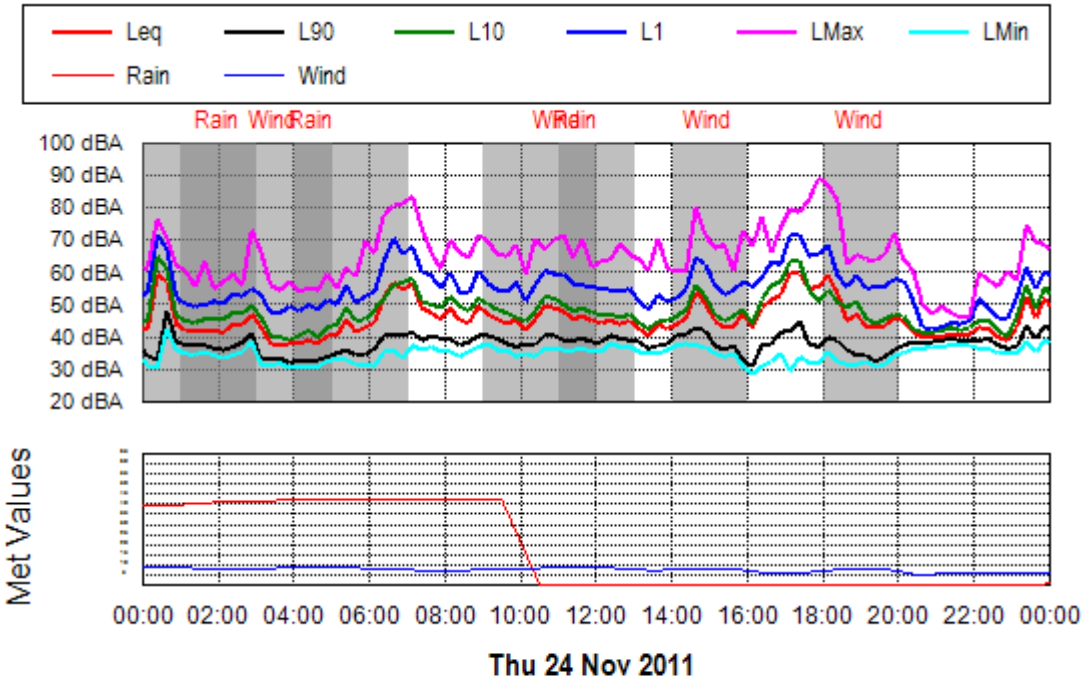

Project: Vickery Coal Project
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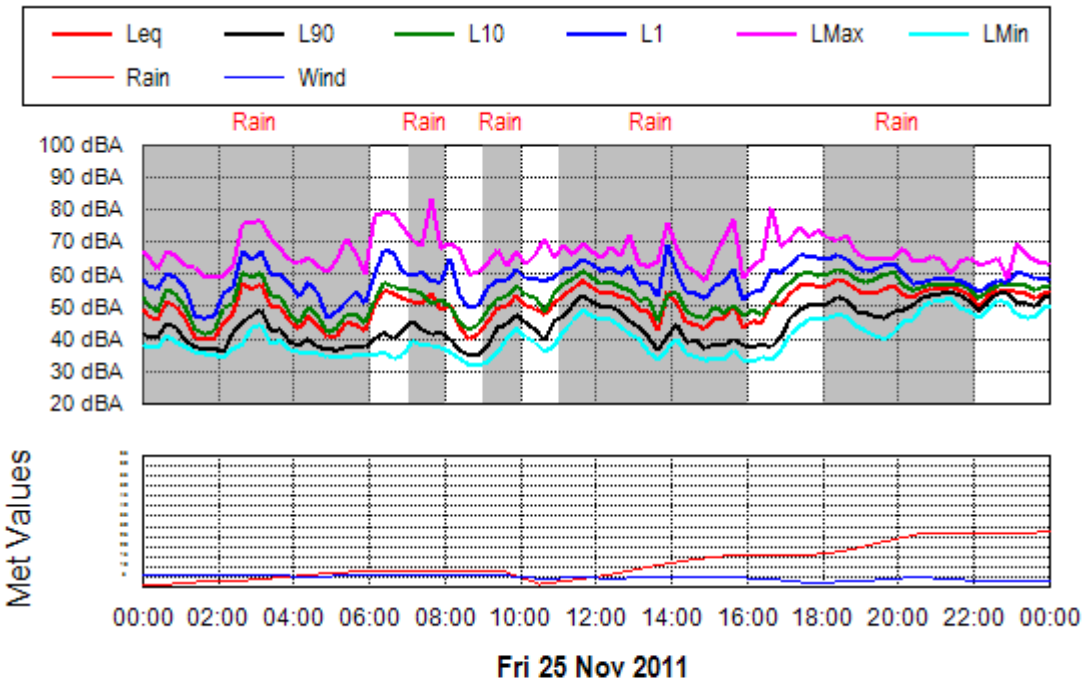

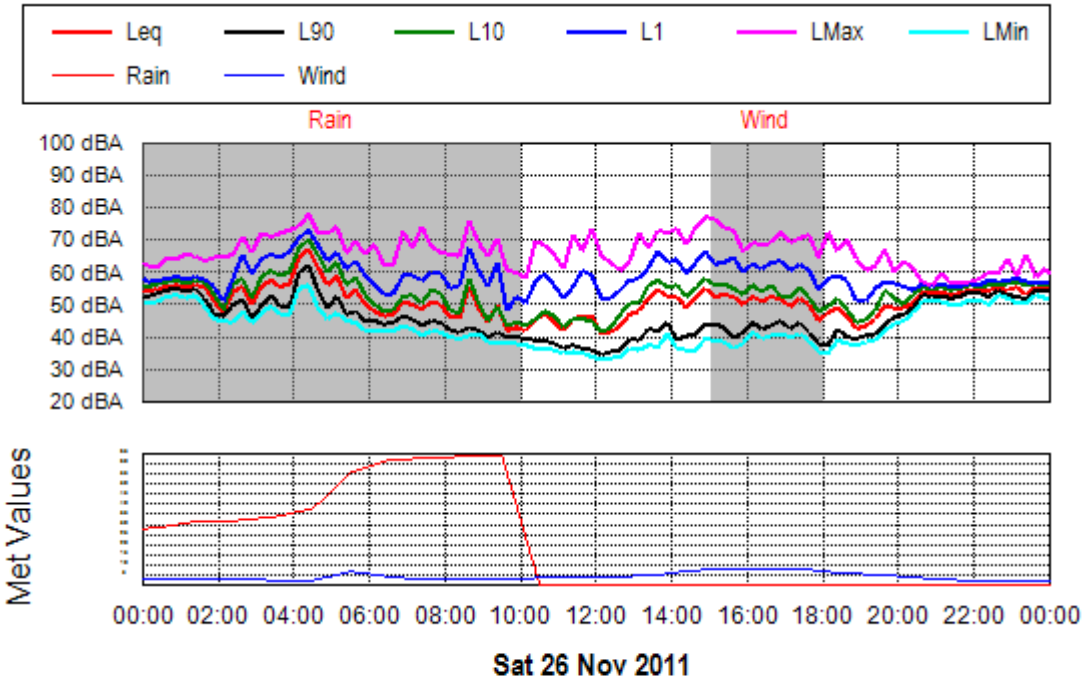

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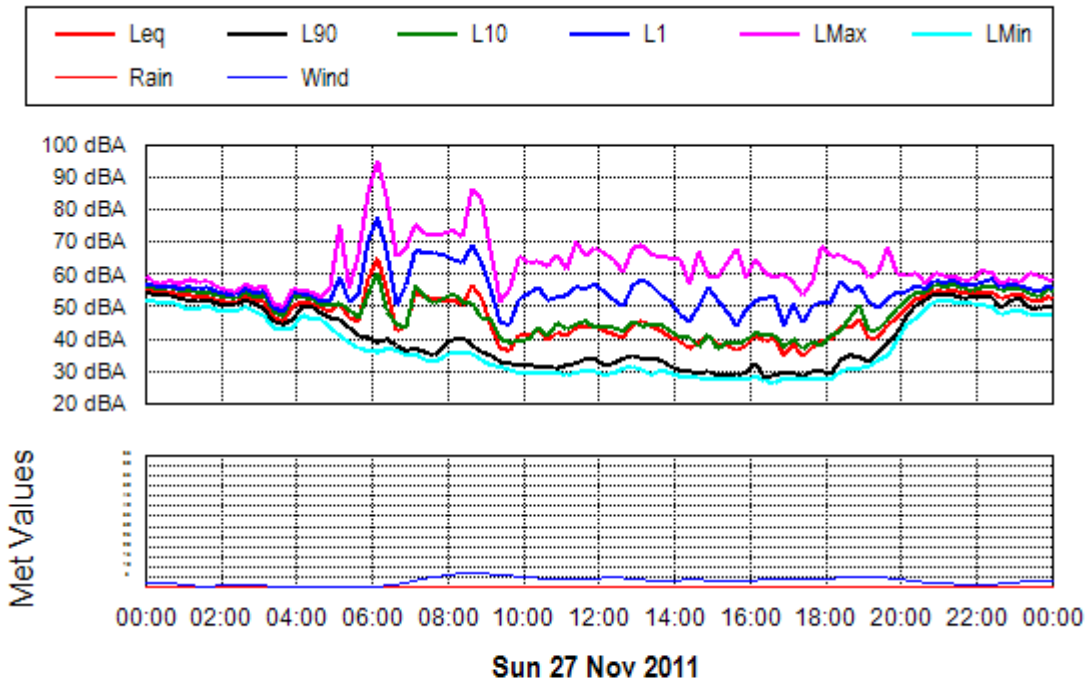

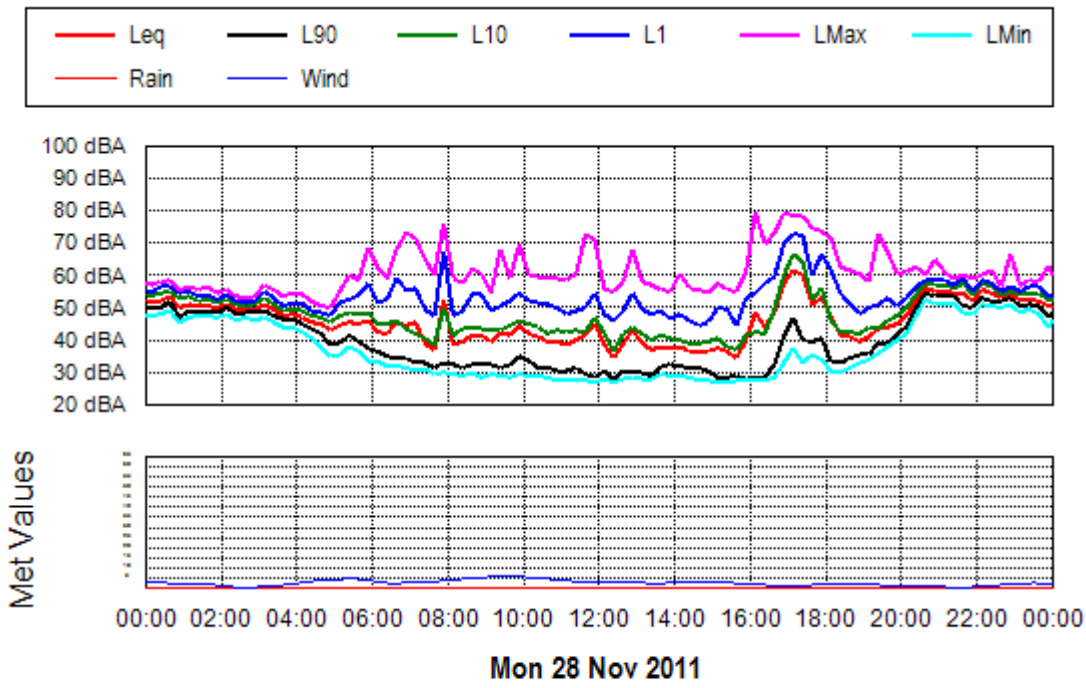

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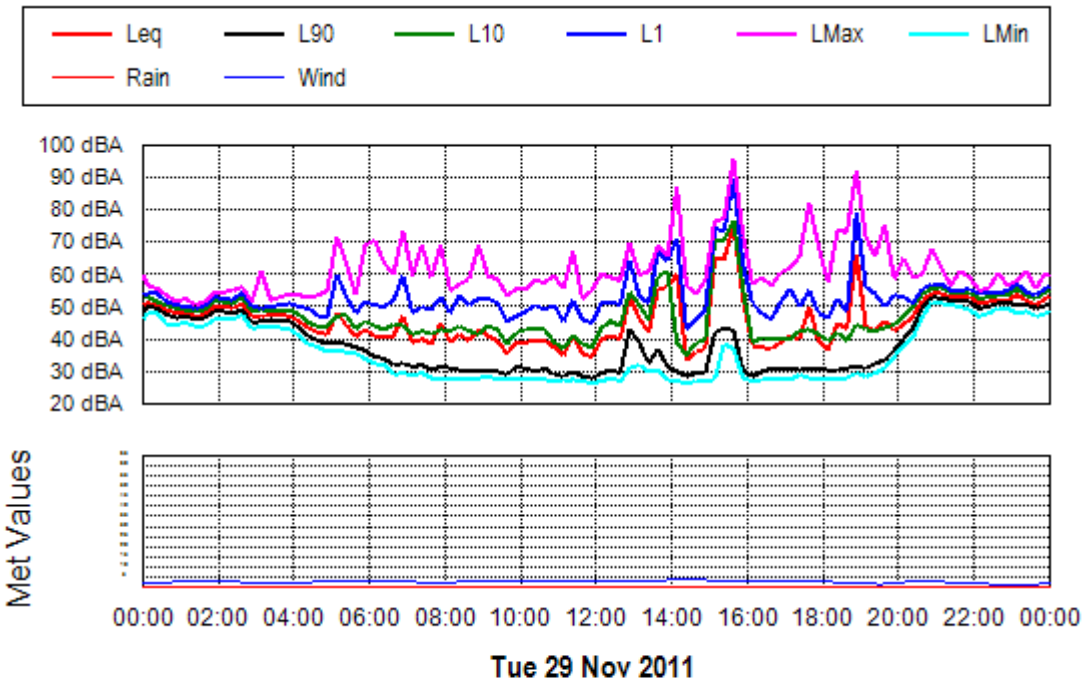

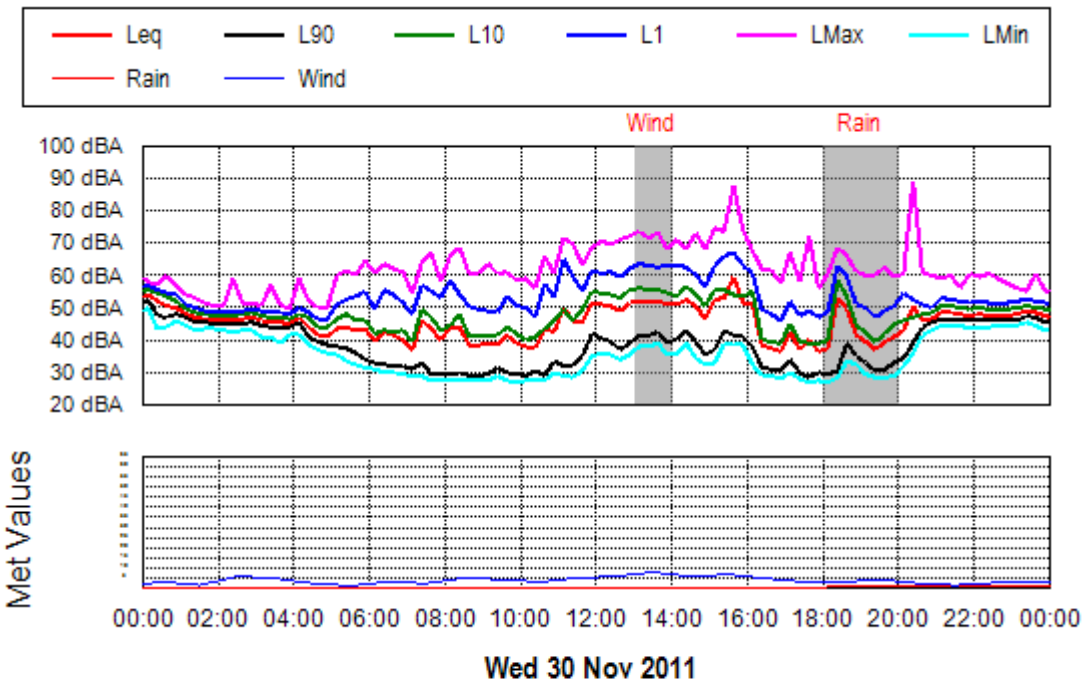

Project: Vickery Coal Project
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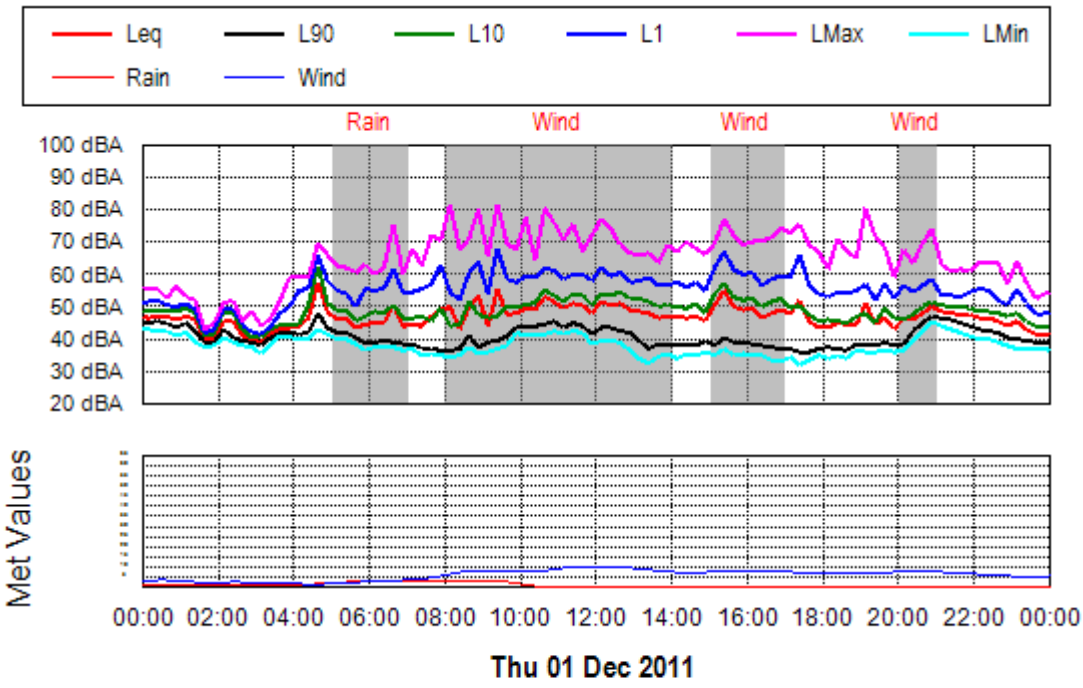
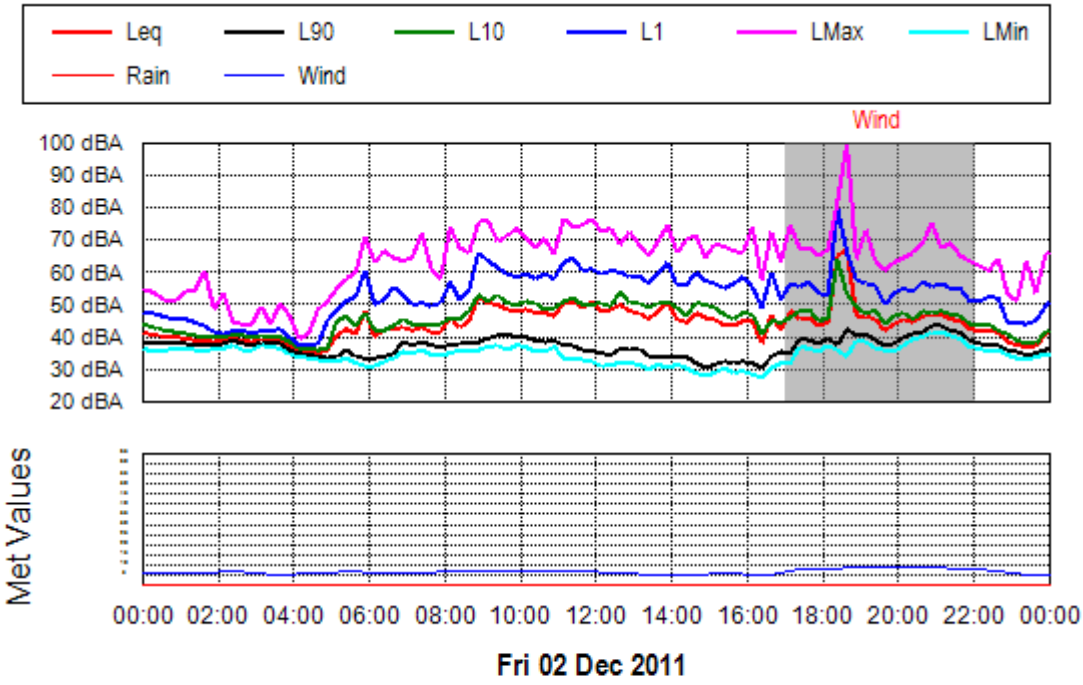
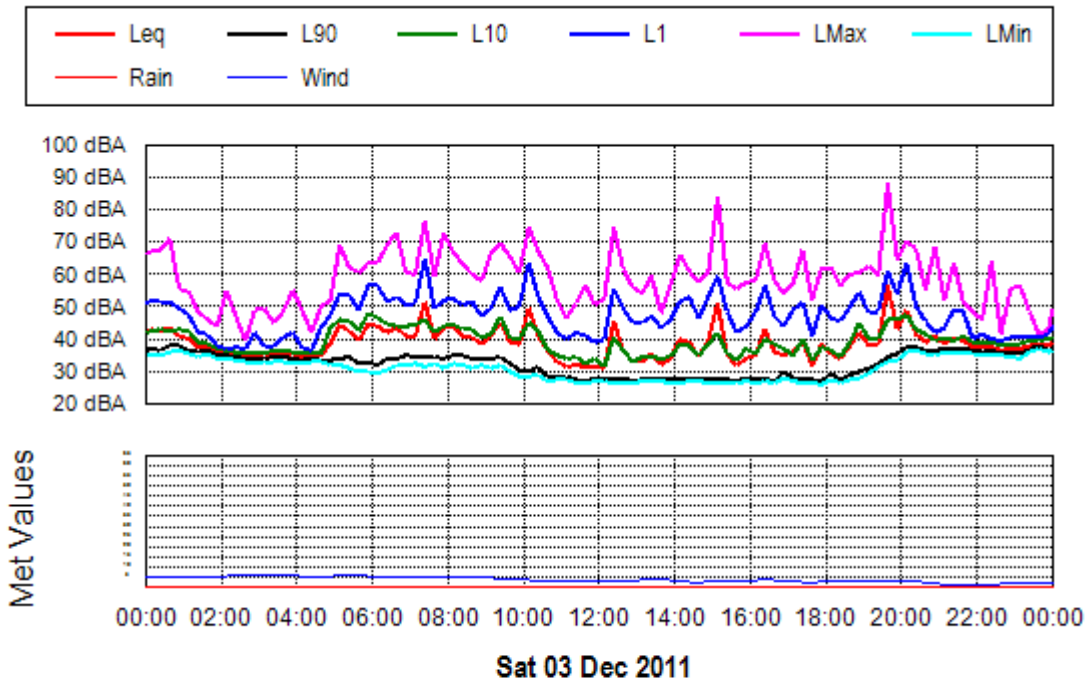
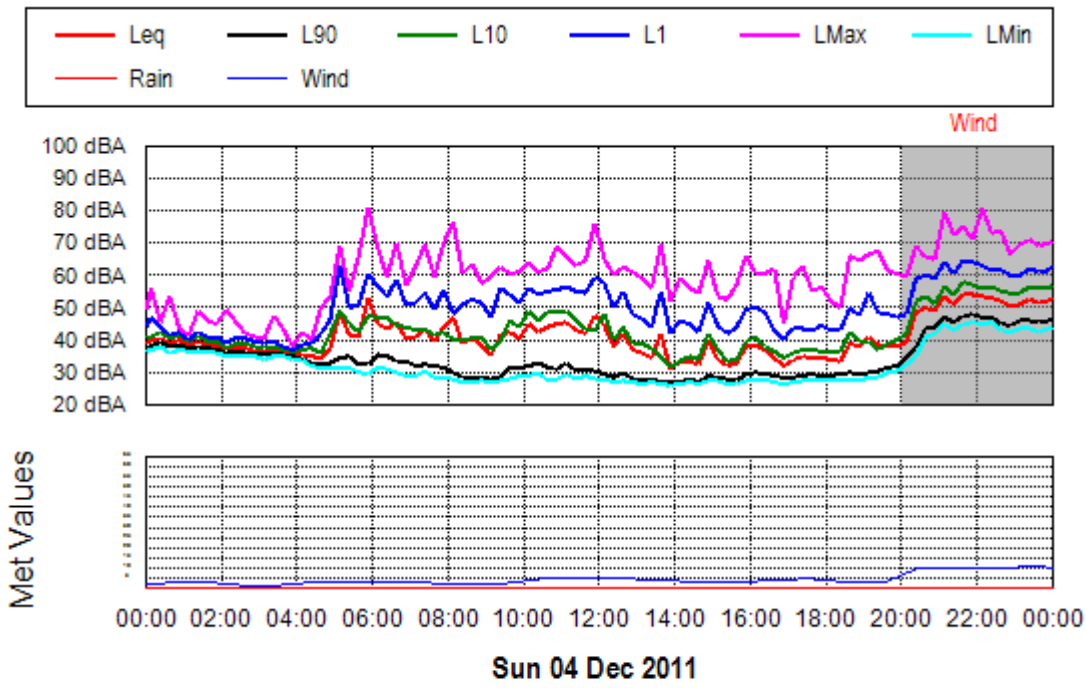




Project: Vickery Coal Project
Location: Broadwater Residence





Project: Vickery Coal Project
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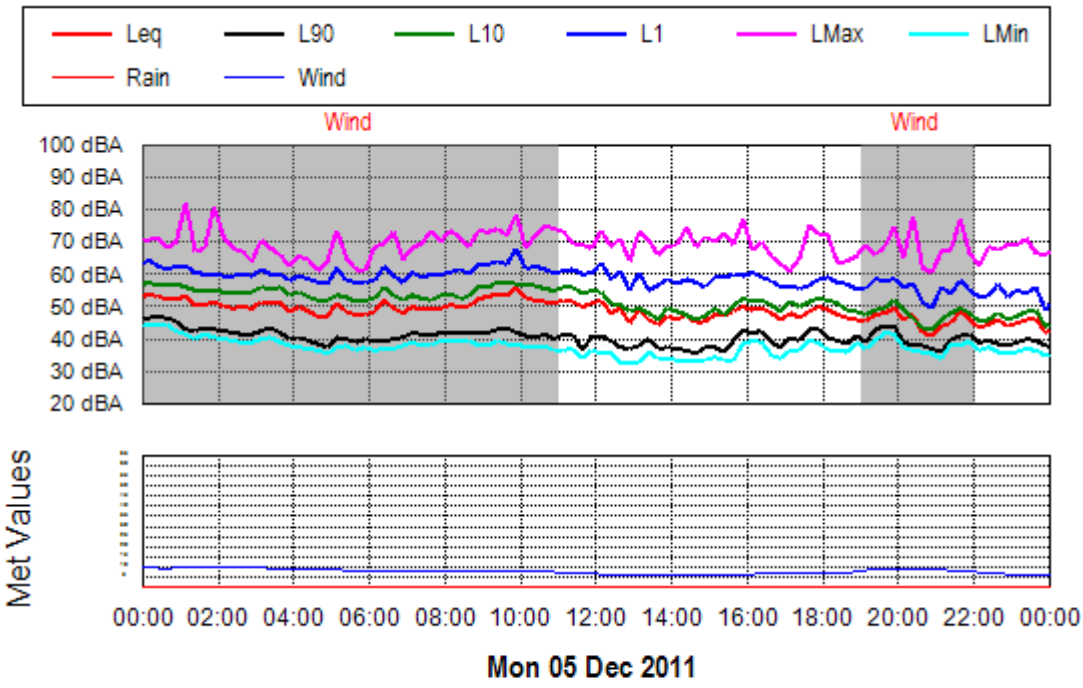
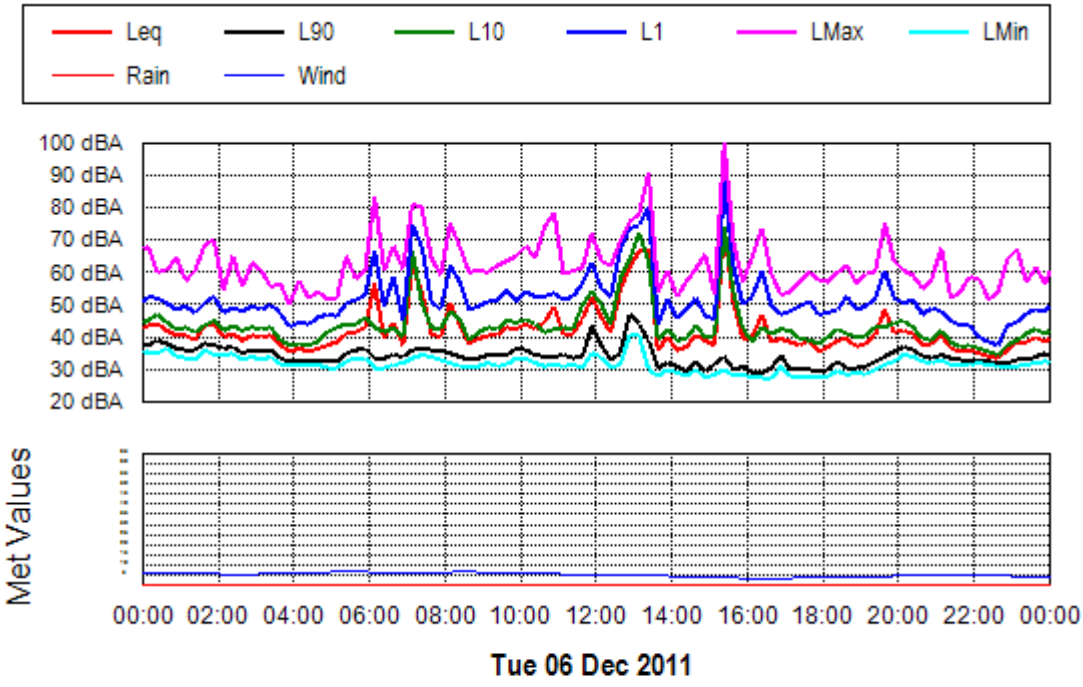
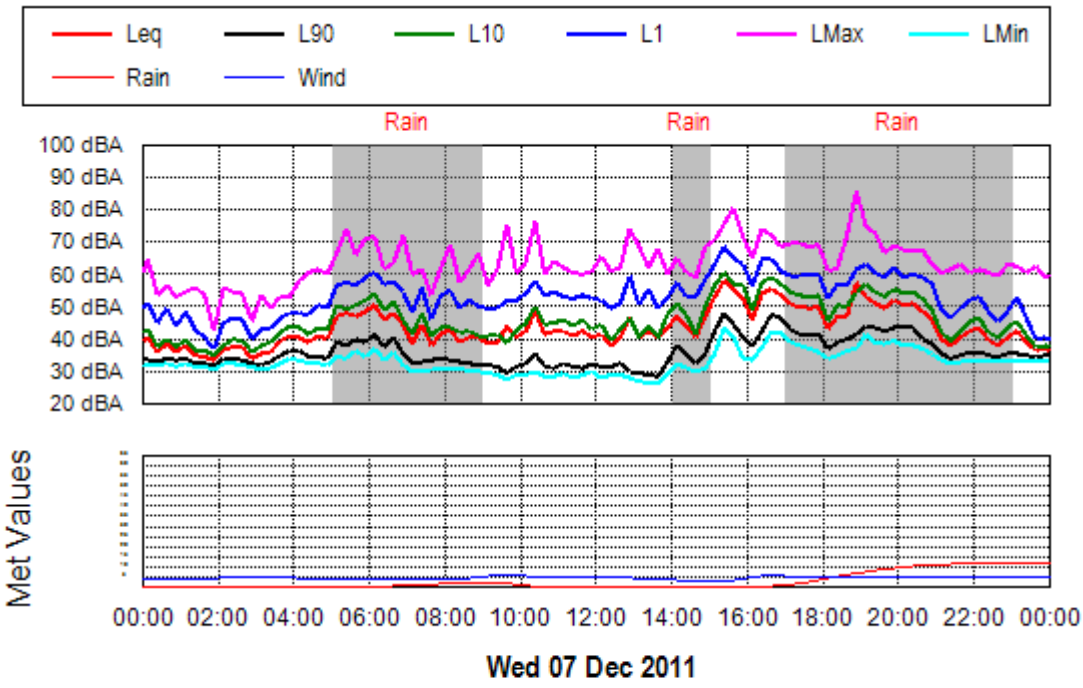
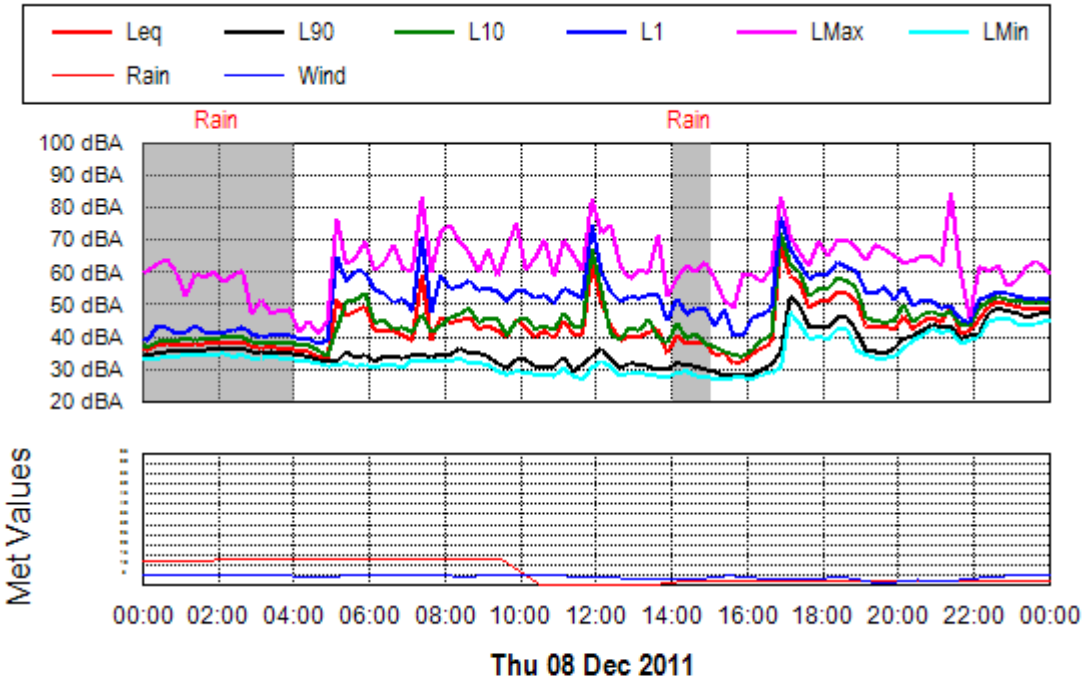


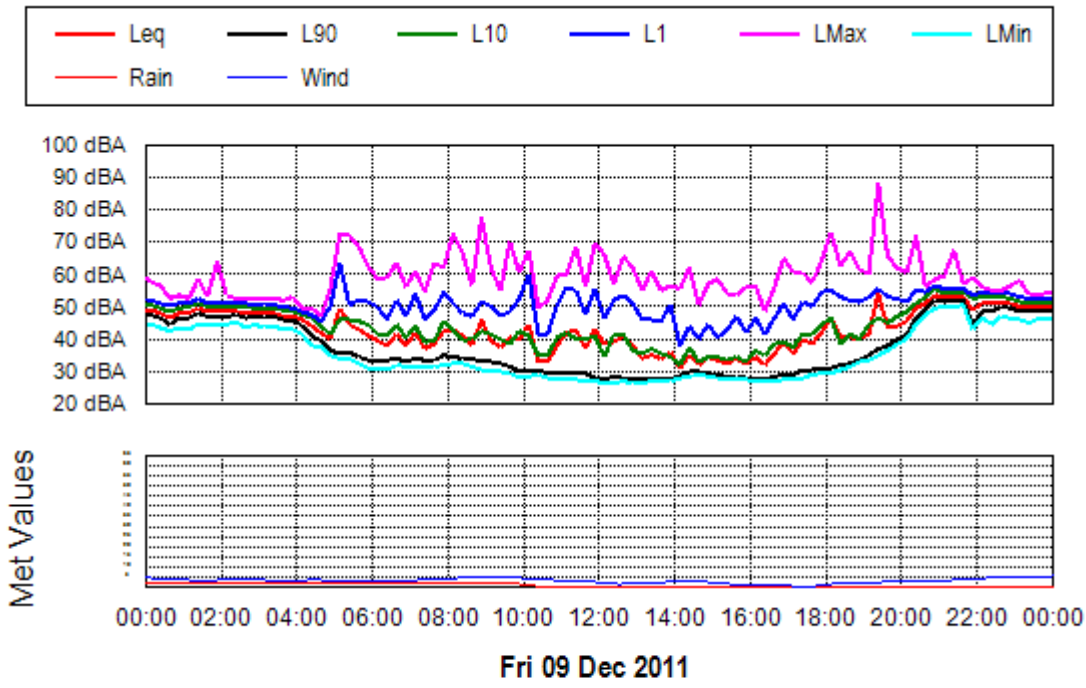


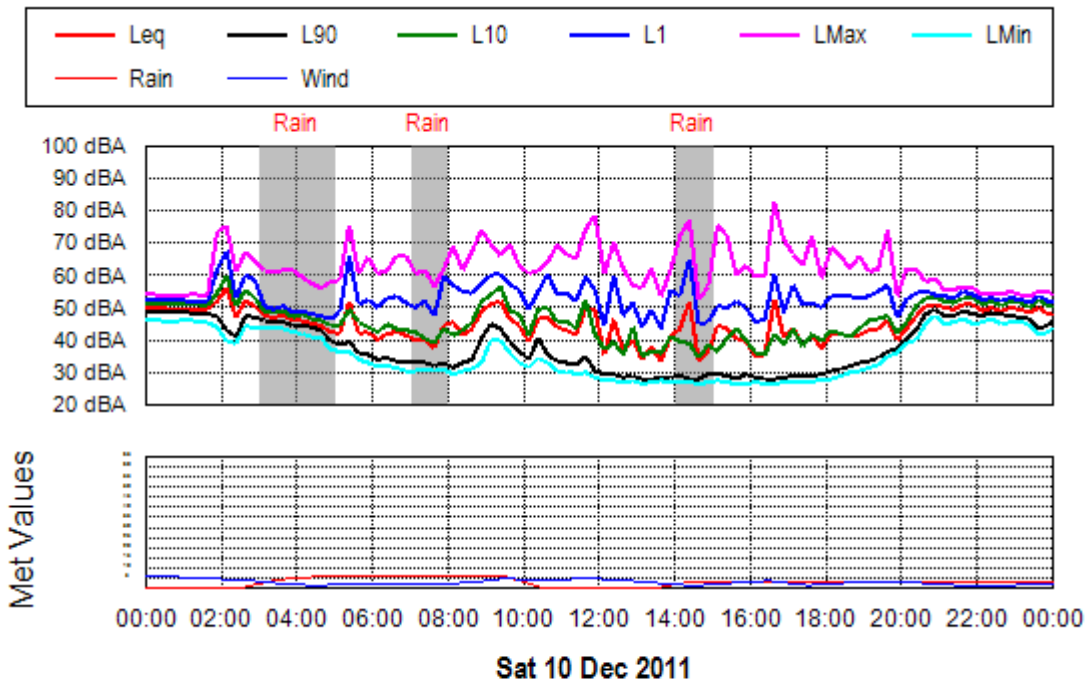
Project: Vickery Coal Project
Location: Broadwater Residence



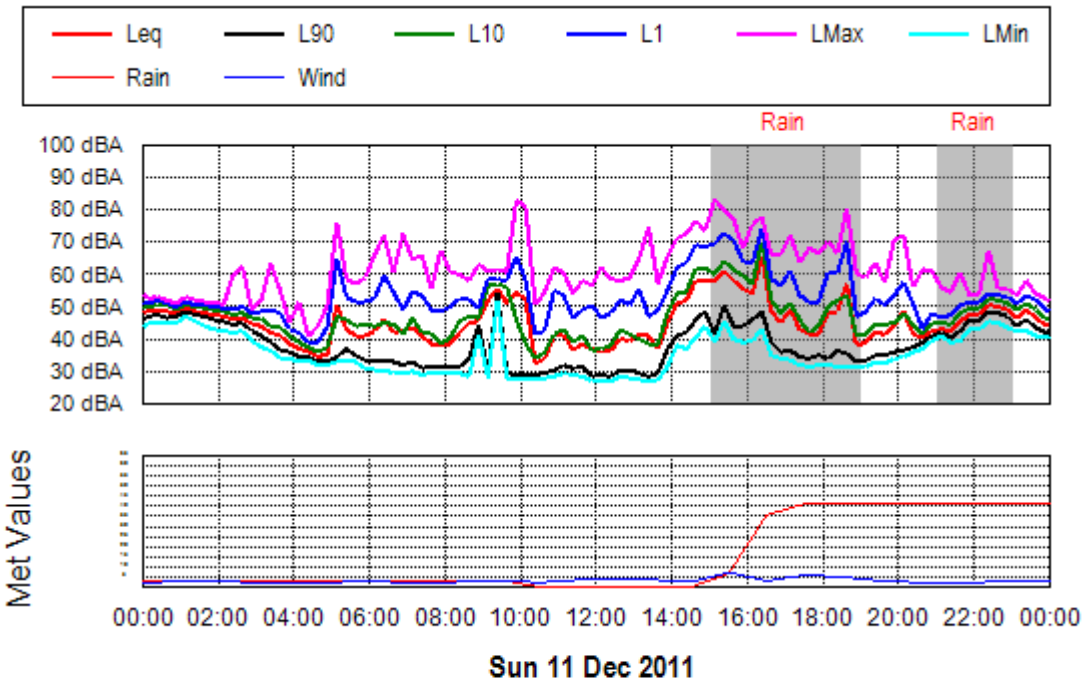


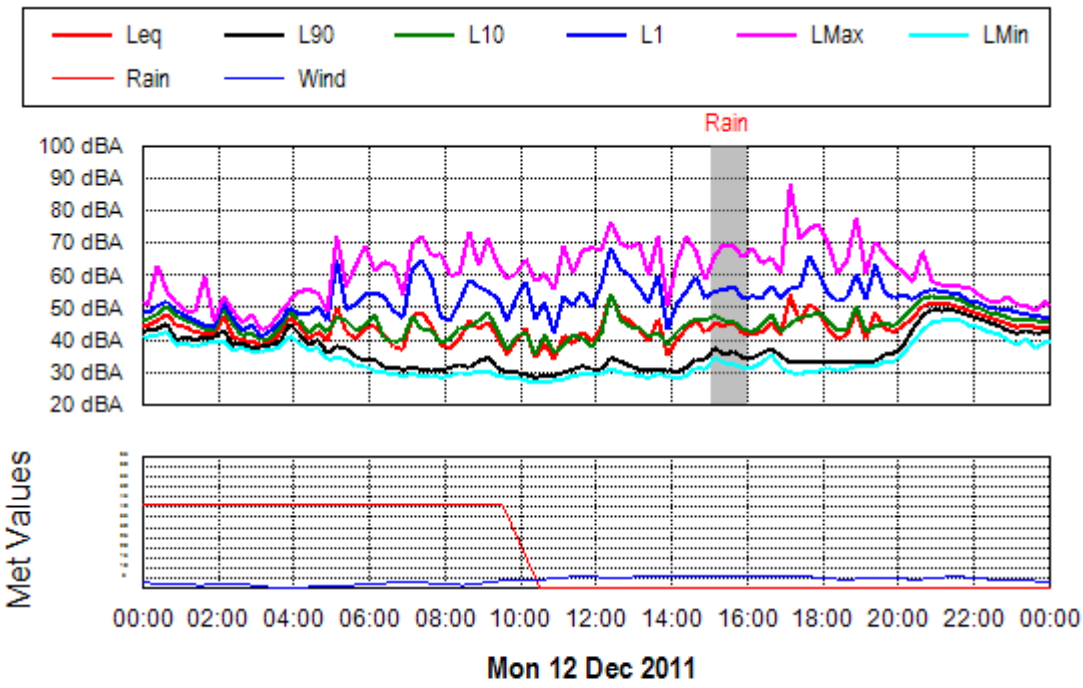
Project: Vickery Coal Project
Location: Broadwater Residence



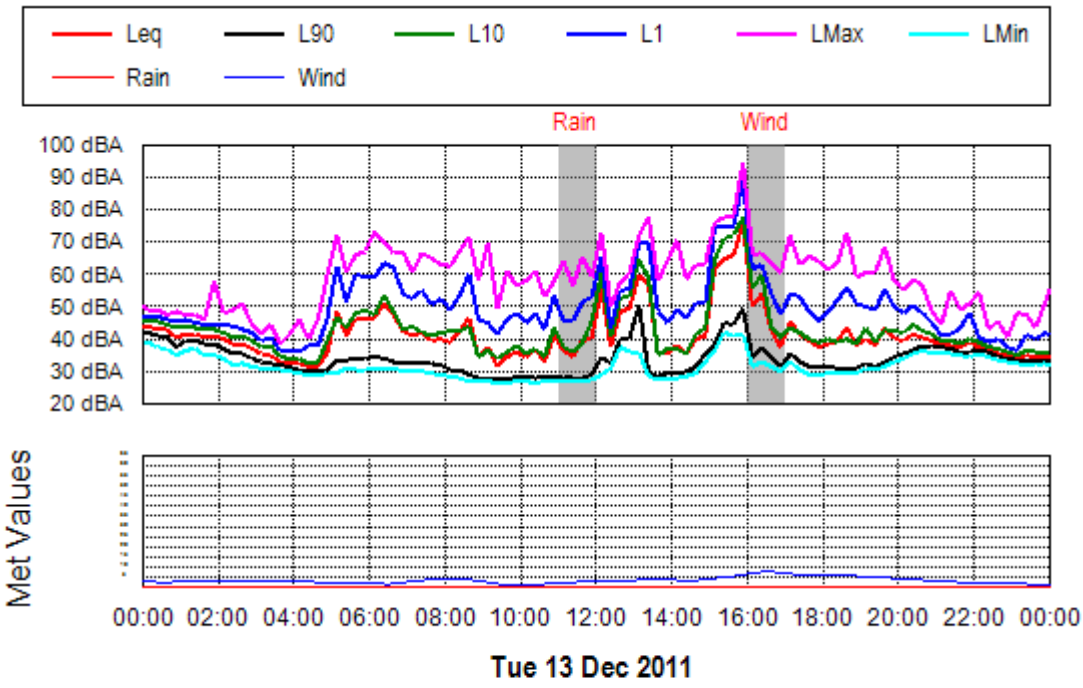


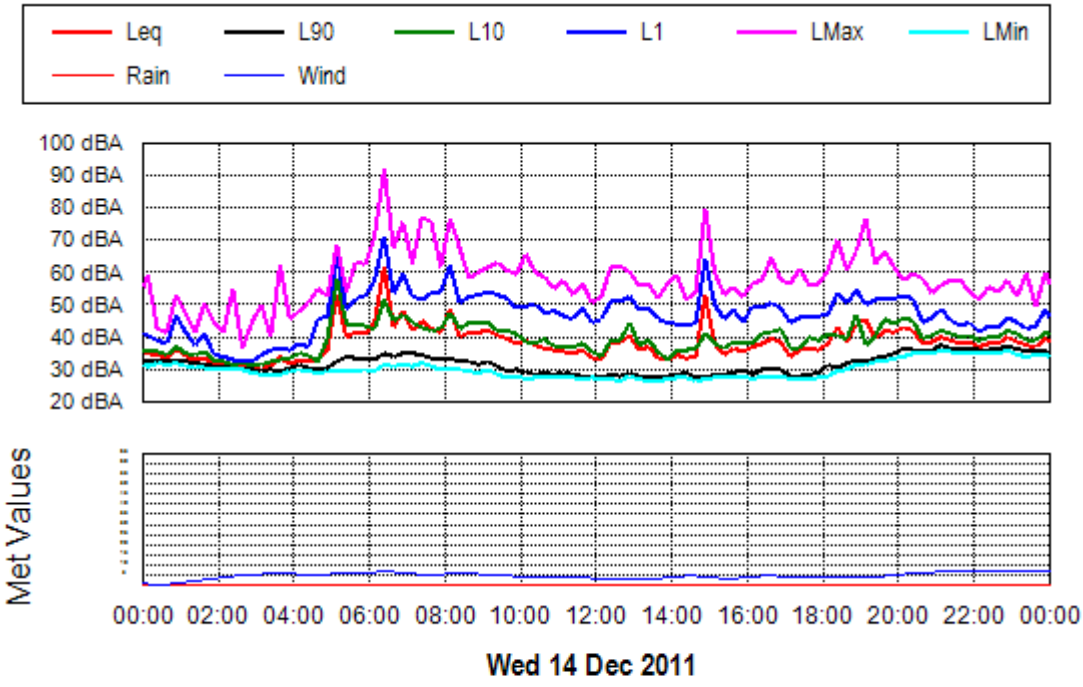
Project: Vickery Coal Project
Location: Broadwater Residence



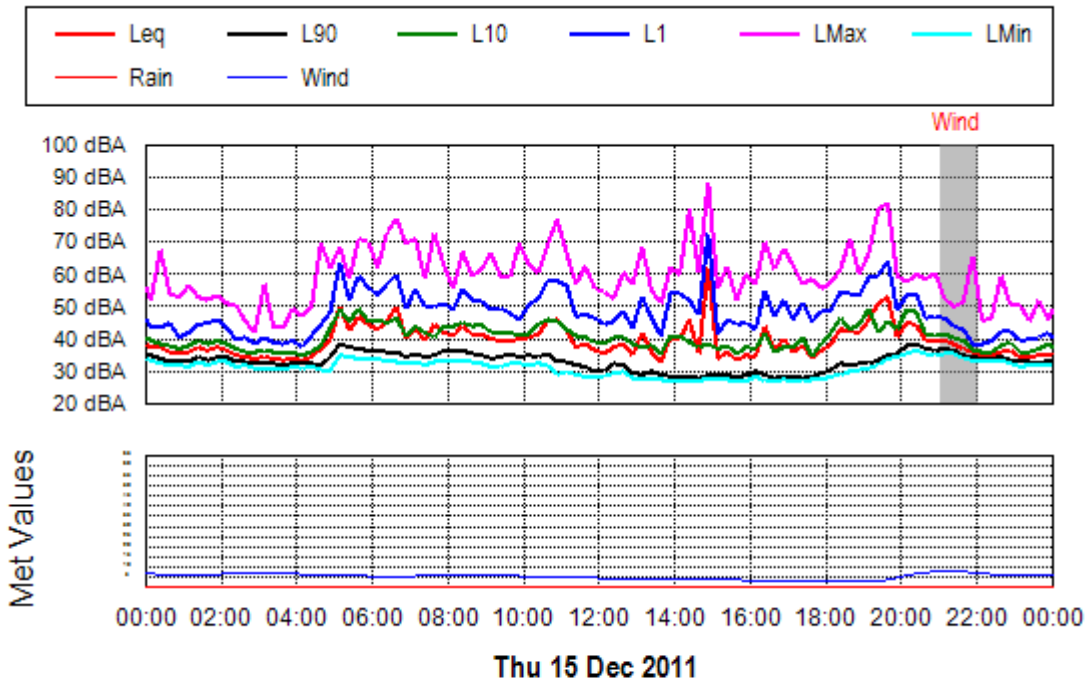


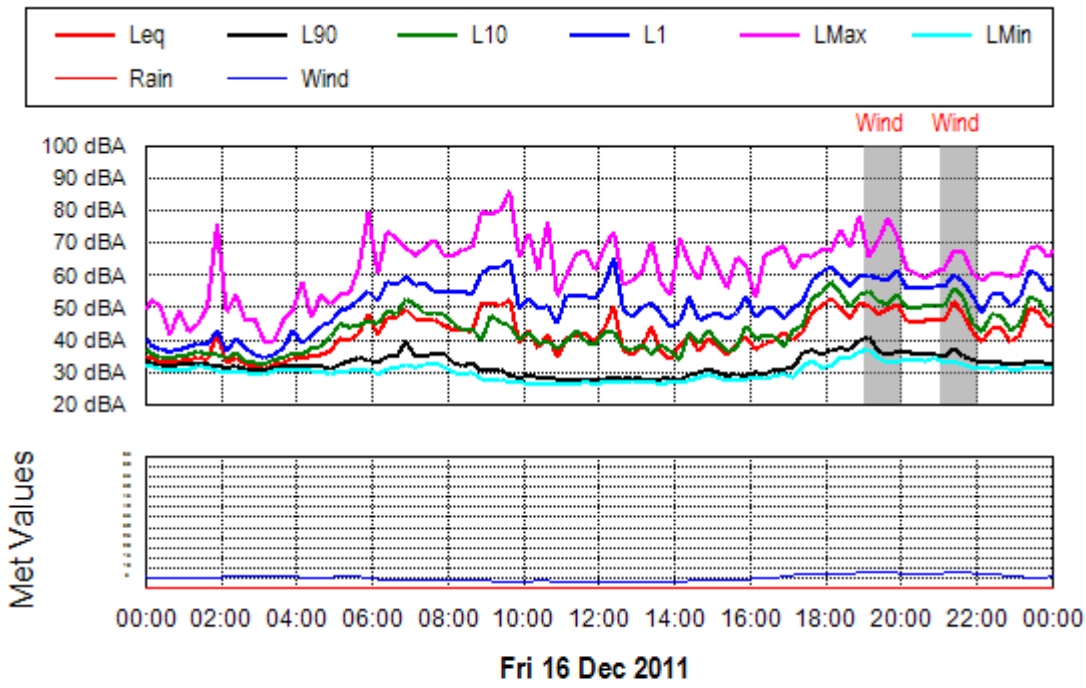
Project: Vickery Coal Project
Location: Broadwater Residence



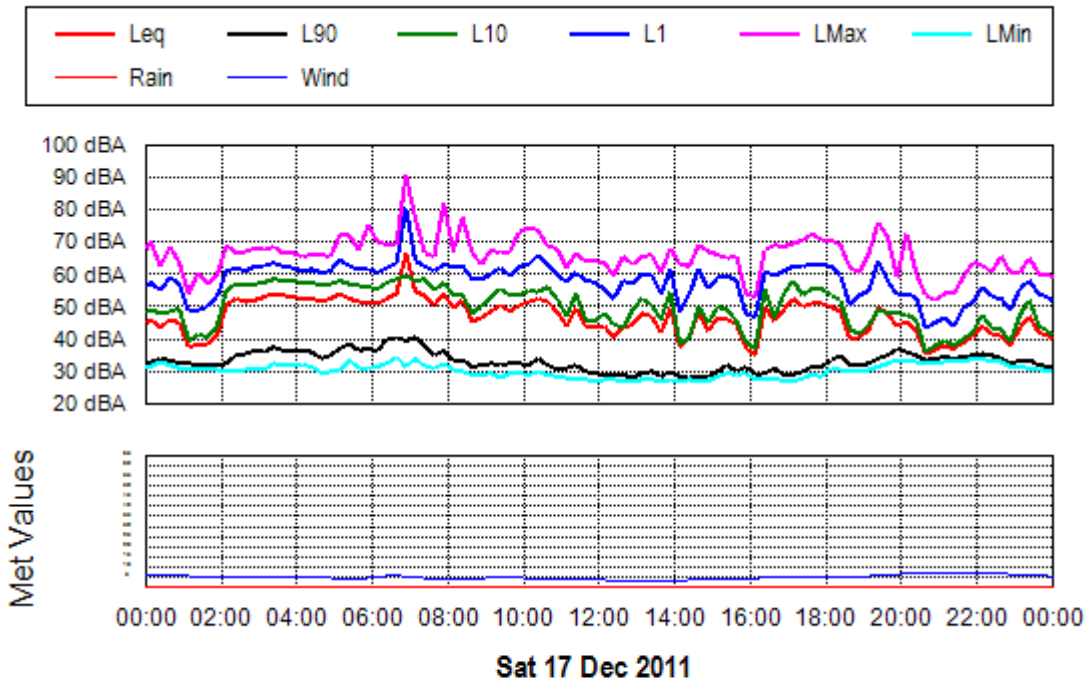


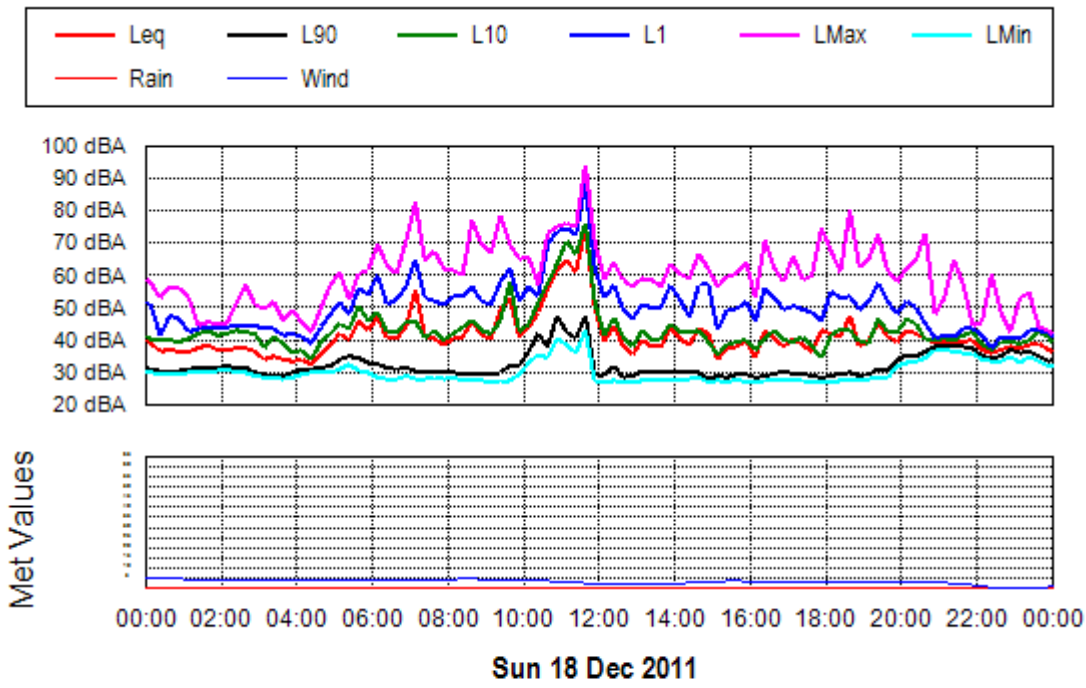
Project: Vickery Coal Project
Location: Broadwater Residence



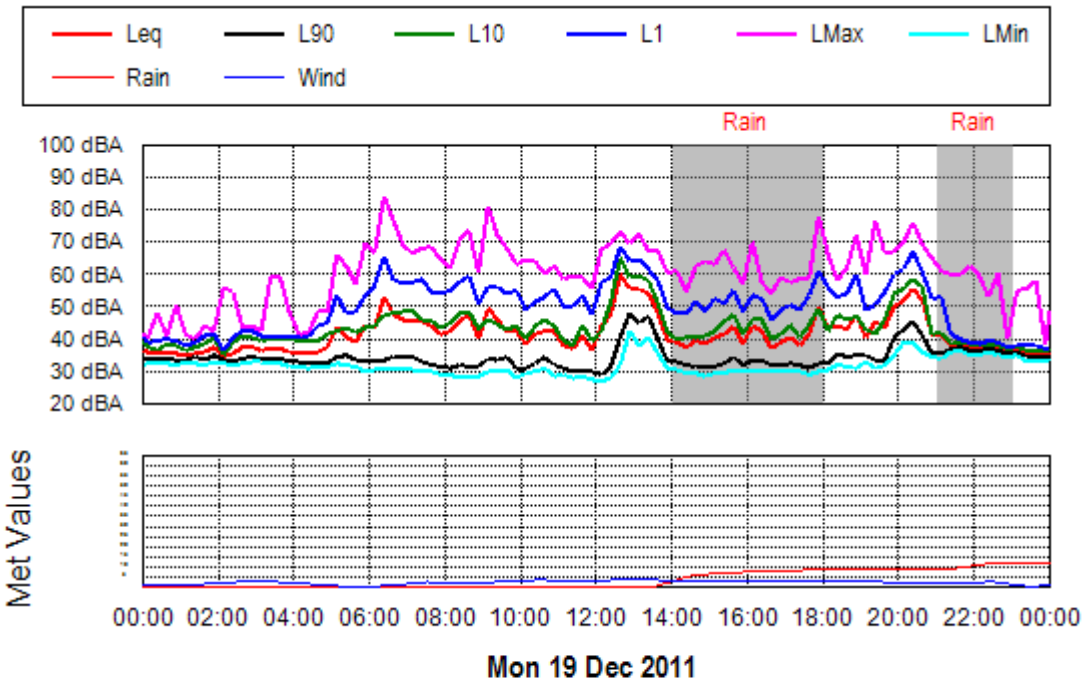


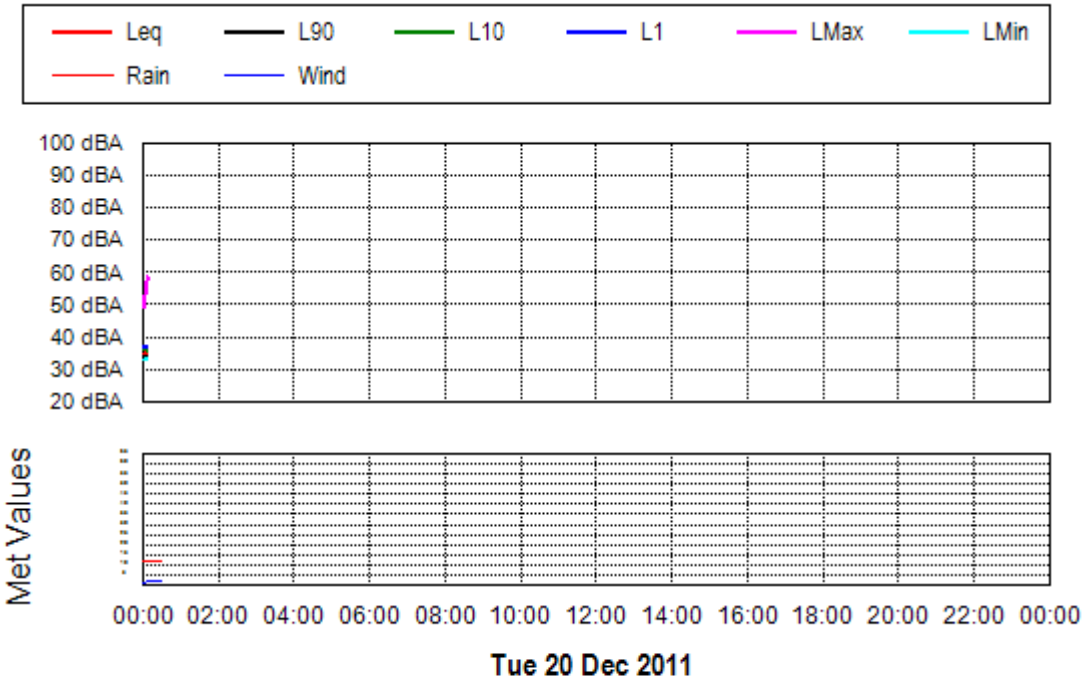
Project: Vickery Coal Project
Location: Broadwater Residence





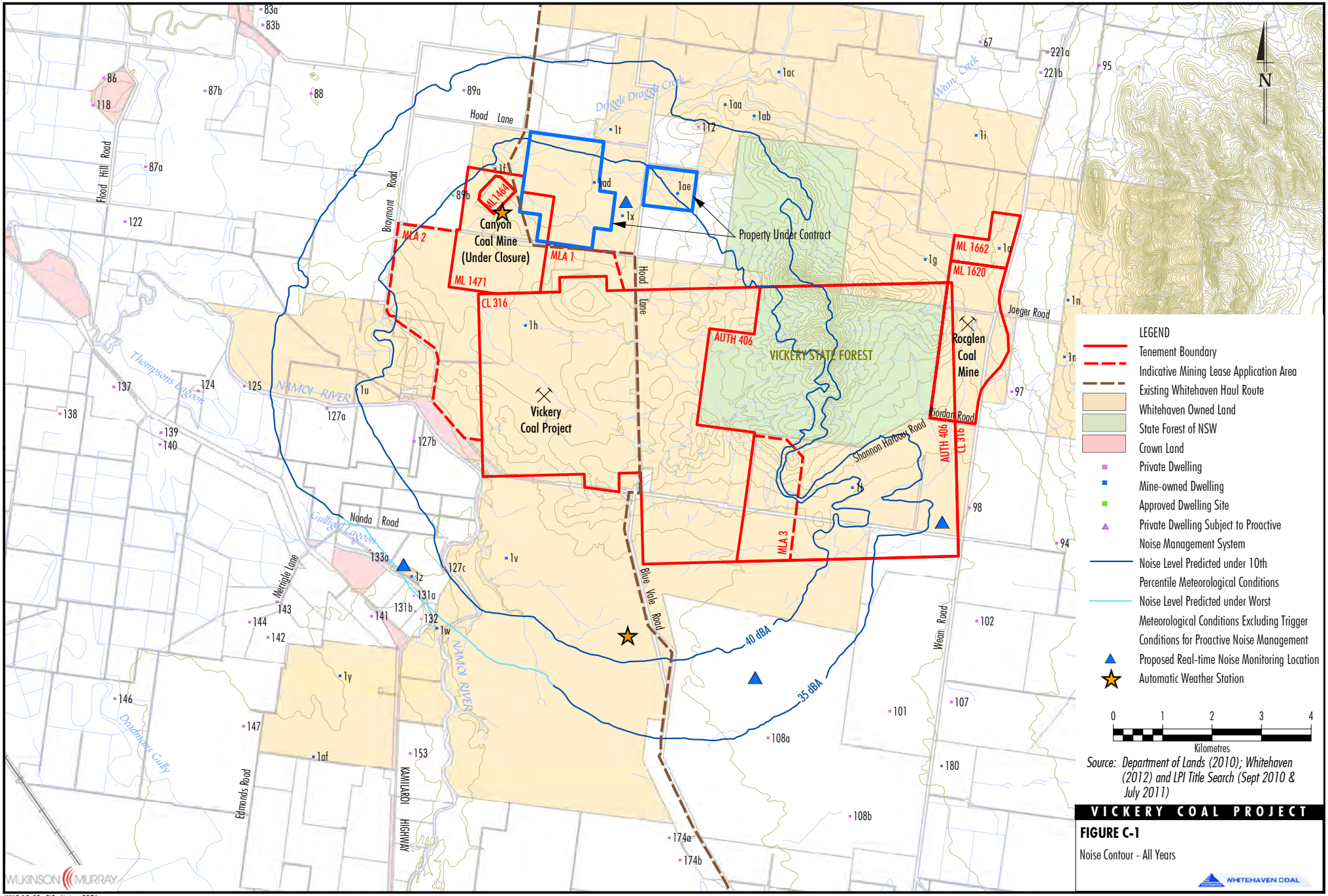
Project: Vickery Coal Project
Location: Broadwater Residence





APPENDIX C

NOISE CONTOURS



Source: Department of Lands (2010); Whitehaven (2012) and LPI Title Search (Sept 2010 & July 2011)

VICKERY COAL PROJECT

FIGURE C-1

Noise Contour - All Years

WHITEHAVEN COAL

WILKINSON MURRAY

WHC-10-03_EIS_Noise_207A

APPENDIX D

NOISE LEVELS PREDICTED AT RECEIVERS 131a, 131b, 132 & 133a UNDER 10th PERCENTILE METEOROLOGICAL CONDITIONS

Receiver ID	$L_{Aeq,15min}$ Noise Level (dBA)			
	Year 2		Year 7	
	Evening (P10)	Night (P10)	Evening (P10)	Night (P10)
131a	37	37	36	37
131b	36	36	36	36
132	36	36	36	36
133a	36	37	36	37

APPENDIX E

CONTINGENCY PROJECT DEVELOPMENT SCHEDULE

Introduction

The Contingency Project Development Schedule would involve a slow ramp up of mining operations where Whitehaven would use approximately 40% of the mining fleet required for full production (i.e. Year 17 or 26) and would use crushing and screening facilities at the Vickery Temporary Infrastructure Area (TIA) instead of the Mine Infrastructure Area (MIA).

Methodology

The changes in operations for the Contingency Project Development Schedule were predicted by:

- modelling the operations at the TIA in isolation;
- manipulating the model post-processing data from the base case Year 2 scenario to reduce the mine noise contribution in line with the 40% reduction and remove the MIA noise; and
- adding the TIA night time noise levels to the revised Year 2 mine scenario results.

The noise assessment of the Contingency Project Development Schedule only addressed key receivers located to the southwest of the Project and those most potentially exposed to noise generated by the TIA. If no additional noise impacts are found at those receivers then the same can be expected at all the other receivers identified as part of the Noise and Blasting Impact Assessment.

Revision of Year 2 Base Scenario Noise Contributions

The noise contribution from all separate noise sources of the Project Year 2 base scenario were examined and revised on the following basis:

- Removing noise contribution from the coal haul route section extending from the pit to the MIA.
- Removing noise contribution from all noise sources associated with the MIA.
- Reducing the number of truck movements on all haulage route sections by 40%.
- Removing the southernmost DM45 drilling rig, CAT6030 excavator, CAT6060 excavator and D11 dozer from the eastern bench (i.e. as part of the 40% reduction of the mine fleet).

Temporary Infrastructure Area

Table E-1 summarises the sound power levels (SWL) used for the TIA noise sources.

It should also be noted that predictions associated with the TIA assume a 6m high bund along the southern end of the TIA and the presence a 20m high western emplacement area directly west of the TIA providing some level of shielding to the southwest receivers. In addition, noise from the primary crusher and secondary screen would be enclosed to mitigate potential noise impacts.

Table E-1 TIA Plant Items and Sound Power Levels

Plant	SWL (dBA)
Primary Crusher (inside acoustic enclosure)	109
Secondary screen (inside acoustic enclosure)	109
Mobile crusher	113
Load Out Bin	110
On-highway truck cycle (pulling up, loading up and leaving)	109
CAT 994 FEL	113

Noise Predictions

Night time noise levels associated with the TIA were predicted in isolation and added to the Year 2 base scenario's revised noise contributions to arrive at overall noise predictions at the key receivers. Table E-2 presents the noise predictions.

Exceedances of the 35 dBA $L_{Aeq,15min}$ noise criterion are predicted at receivers 127a, 127b and 127c. These results are consistent with those predicted for the base-case scenario (Section 5.5 of report).

Table E-2 Night time Noise Predictions at Key Privately-owned Receivers

Receiver ID	$L_{Aeq,15min}$ Noise Level (dBA) [1]	
	Base Scenario Year 2 (Night)	Revised Scenario Year 2 + TIA (Night)
127a	38	37
127b	42	40
127c	40	39
131a	35 [2]	35 [2]
131b	35 [2]	34 [2]
132	35 [2]	34 [2]
133a	35 [2]	33 [2]
141	35	34

Notes:
1. Noise levels predicted to result under 10th percentile meteorological conditions as described in Section 5.1.2 of report, except where stated below.
2. Noise level predicted to result under worst meteorological condition excluding trigger conditions for integrated proactive noise management (Section 5.3 of report).
3. Greyed out levels indicate exceedances of 35dBA $L_{Aeq,15min}$ noise criterion for privately-owned receivers.

Conclusion

Results indicate that operation of the TIA, with mitigation, would result in noise levels equal to or less than those predicted for the base case Year 2 results.

WHC-10-03_EIS_App Noise_110A

Conclusion

Wilkinson Murray has assessed potential noise impacts associated with a Contingency Project Development Schedule. It was found that no additional noise impact would be generated during the Contingency Project Development Schedule of mining operations providing:

- the primary crusher is treated so as to reduce its SWL to 109dBA;
- the secondary screen is treated so as to reduce its SWL to 109dBA;
- a 6m bund is constructed along the southern end of the TIA;
- the TIA is only operated once the western emplacement area directly west of the TIA is at least 20m high; and
- the southernmost DM45 drilling rig, CAT6030 excavator, CAT6060 excavator and D11 dozer located on the eastern bench (shallowest part of the pit) are not operating as per the Year 2 base scenario.

APPENDIX F

RAIL NOISE ASSESSMENT CONSIDERING *DRAFT RAIL INFRASTRUCTURE NOISE GUIDELINE*

As mentioned in Section 6.2, at the time of writing, the OEH had released the *Draft Rail Infrastructure Noise Guideline* (OEH, 2012b) as a draft for consultation. The *Draft Rail Infrastructure Noise Guideline* provides the following criteria for rail traffic generating developments:

- $L_{Aeq,9\ hour}$ = 55 dBA;
- $L_{Aeq,15\ hour}$ = 60 dBA; and
- L_{Amax} (95th percentile) = 80 dBA.

Using the data on train movements provided Table 6-11 of the report, the distances from the rail line at which the *Draft Rail Infrastructure Noise Guideline* criteria are exceeded were calculated using the RailCorp NSW standard rail noise database and are summarised in Table F-1.

Table F-1 Criteria Offset Distances: Train Movements between Whitehaven CHPP to Werris Creek

Period	Criterion (dBA)	Distance from Track (m)		
		Existing /Approved Movements	Existing /Approved Plus Proposed Movements	Existing /Approved, Proposed Plus Project
L_{Aeq},Day (7.00 am-10.00 pm)	60	<45	<57	<60
L_{Aeq},Night (10.00 pm-7.00 am)	55	<80	<105	<110
L_{Amax},Passby Noise (24 hours)	80	<45	<45	<45

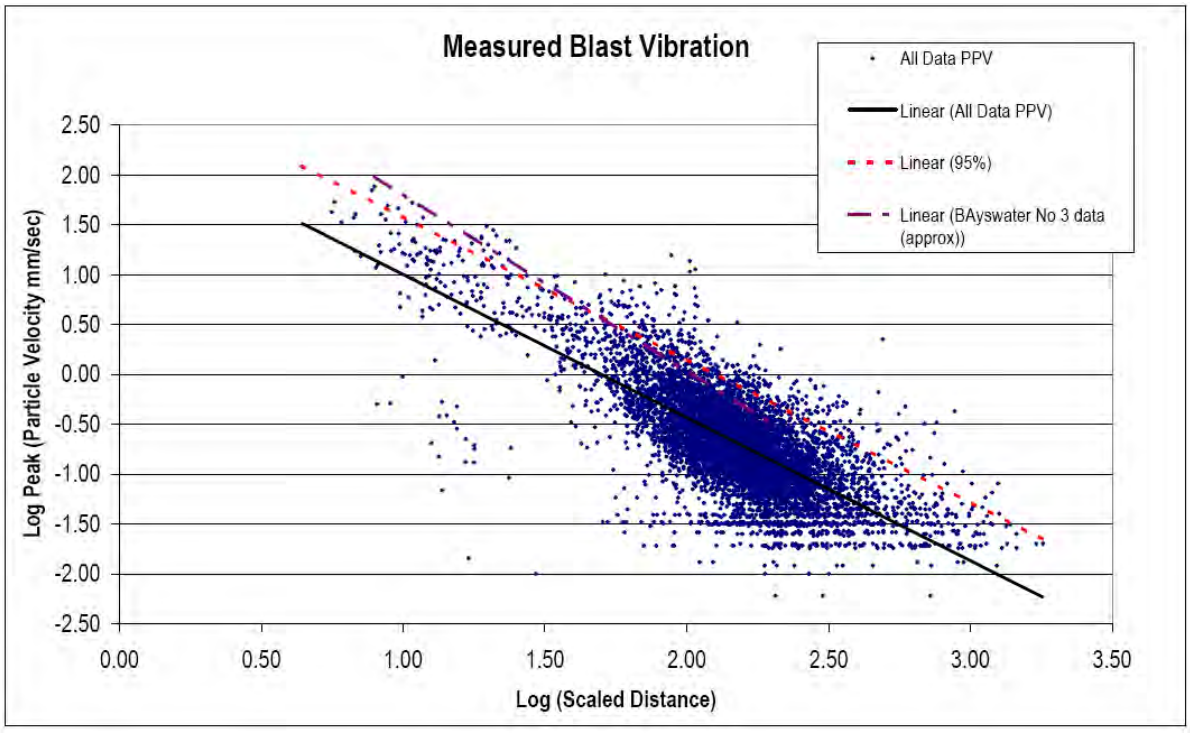
The buffer distance from the rail line at which the *Draft Rail Infrastructure Noise Guideline* criteria would be met would extend away from the rail line by a negligible 5m due to the Project. In addition, L_{Amax} passby noise levels would not change due to the Project.

APPENDIX G

BLASTING PREDICTION CURVES

For this study, Wilkinson Murray has derived predictive equations for vibration and overpressure using measurement data from approximately 7,000 blasts. Figure G.1 illustrates the measured data and associated linear trend lines for vibration.

Figure G.1 Measured Peak Particle Velocity from blasts at Mt Arthur North (logarithmic scale) and Comparison with Data from Bayswater No 3



The figure shows a revised best fit line, a 95 percentile line, and also the previously-adopted 95 percentile based on 1999 data from Bayswater No 3. The correlation with the old data is close, although the new 95 percentile shows slightly lower vibration levels at shorter scaled distance – in the order of 0.2 to 0.3millimetres per second (mm/s).

Figure G.2 shows data for overpressure. Analysis of these data showed that the relationship between measured peak overpressure and scaled distance is better defined with a polynomial equation (blue) at close range rather than a standard linear equation (red). At relatively low values of scaled distance, the new polynomial 95 percentile curve is approximately 5 decibels (dB) lower than the linear trend line derived from the previous Bayswater No 3 data.

Figure G.2 Measured Peak Overpressure from blasts at Mt Arthur North, and Comparison with Data from Bayswater No 3