

REPORT 10-8328-R1

Revision 0

Bayswater B Power Station Noise Impact Assessment Peer Review

PREPARED FOR

NSW Government Department of Planning
Major Infrastructure Assessments
23-33 Bridge Street
SYDNEY NSW 2001

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HEGGIES PTY LTD

ABN 29 001 584 612



Bayswater B Power Station

Noise Impact Assessment Peer Review

PREPARED BY:

Heggies Pty Ltd

2 Lincoln Street Lane Cove NSW 2066 Australia
(PO Box 176 Lane Cove NSW 1595 Australia)
Telephone 61 2 9427 8100 Facsimile 61 2 9427 8200
Email sydney@heggies.com Web www.heggies.com

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DOCUMENT CONTROL

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TABLE OF CONTENTS

1	INTRODUCTION	4
1.1	Technical Completeness and Mitigation Adequacy Assessment	4
2	EXISTING ENVIRONMENT	5
2.1	Concept Plan Approval – Project Design Background Noise Levels	6
3	CONSTRUCTION NOISE ASSESSMENT	6
3.1	Construction Noise Criteria	6
3.2	Construction Activities	6
3.3	Construction Noise Assessment	7
3.4	Concept Plan Approval – Project Design Construction Noise Levels	7
4	OPERATING NOISE ASSESSMENT	7
4.1	Operating Noise Criteria	7
4.2	Operating Activities	8
4.3	Operating Noise Assessment	8
4.4	Concept Plan Approval – Project Design Operating Noise Levels	9
5	CUMULATIVE NOISE ASSESSMENT	10
5.1	Cumulative Noise Amenity Criteria	10
5.2	Concept Plan Approval – Project Design Cumulative Noise Amenity Levels	11
6	OTHER ASSESSMENTS	11
6.1	Construction and Operating Vibration Assessment	11
6.2	Road Traffic Noise Assessment	11
6.3	Railway Traffic Noise	11
7	SUMMARY OF FINDINGS	11
7.1	Proposed Concept Plan Approval Conditions	11
Table 1	Environmental Assessment Requirements - Noise Impacts	4
Table 2	Noise Monitoring and Assessment Locality Summary	5
Table 3	Measured RBLs, LA90(15minute) and LAeq(15minute) Noise Level Summary (dBA re μ Pa)	5
Table 4	Intrusive LAeq(15minute) Construction Noise Management Levels (CNMLs) (dBA re 20 μ Pa)	6
Table 5	Construction Noise Management Levels (CNMLs) (dBA re 20 μ Pa)	7
Table 6	Project Specific Noise Levels and Sleep Disturbance Screening Levels (dBA re 20 μ Pa)	8
Table 7	Proponents Application of SoundPlan CONCAWE meteorological (MET) Categories	9
Table 8	Project Specific Noise Levels and Sleep Disturbance Screening Levels (dBA re 20 μ Pa)	10
Table 9	Rural Residential Acceptable Noise Amenity Levels (dBA re 20 μ Pa)	10
Appendix A	Construction Activities and Plant Equipment	
Appendix B	Coal Fired Equipment Sound Power Levels	
Appendix C	Gas Fired Equipment Sound Power Levels	
Appendix D	Proposed Concept Plan Approval Conditions	



1 INTRODUCTION

Macquarie Generation (MacGen) seeks Concept Plan Approval for the proposed Bayswater B Power Station (the Project) which is a critical infrastructure project. Heggies Pty Ltd has been engaged by the Department of Planning (DoP) to conduct a peer review of the noise impact assessment undertaken for the Project, including review and comment on:

- The technical adequacy and completeness of the Proponents' noise impact assessment including methodology and modelling assumptions;
- The adequacy of mitigation measures identified for the respective projects considering reasonable and feasible criteria; and
- Recommended conditions that may be applied to the projects to minimise, mitigate and/or manage noise amenity impacts to achieve regulatory and best practice standards.

The documents examined as part of this independent peer review include (but not limited to):

- Chapter 14 Noise - Bayswater B Power Station Environmental Assessment (EA), Main Report dated September 2009, prepared for Macquarie Generation by AECOM Australia Pty Ltd.
- Appendix E - Bayswater B Power Station, Noise and Vibration Assessment (NVA) dated September 2009, prepared for Macquarie Generation by AECOM Australia Pty Ltd

The scope of the review did not involve site inspection or vetting the Project noise model (or the like) but solely on the information presented in the Project EA.

1.1 Technical Completeness and Mitigation Adequacy Assessment

Technical completeness and mitigation adequacy has been generally determined by comparison to the Director General Environmental Assessment Requirements dated 4 July 2009 Noise Impacts as presented in EA Table 7-1 and reproduced as **Table 1**.

Table 1 Environmental Assessment Requirements - Noise Impacts

Issue Reference	Noise Impacts
DG-N1	The Environmental Assessment must include a comprehensive operational noise impact assessment for the project, prepared in accordance with <i>NSW Industrial Noise Policy</i> (EPA,2000) considering worst case operating scenarios and meteorological conditions, representative monitoring and receiver locations, and cumulative impacts from the adjacent Bayswater-Liddell generating complex, surrounding mining operations (as relevant) and the connection/upgrade of the Antiene coal conveyer.
DG-N2	The assessment must consider the potential for low frequency noise generation and peak noise events with the potential to cause sleep disturbance. The Environmental Assessment must also consider the potential for:
DG-N3	construction noise impacts consistent with the DECC's "construction noise existing guidelines" available electronically at http://www.environment.nsw.gov.au/noise/constructnoise/htm .
DG-N4	vibration impacts during construction and operation consistent with <i>Assessing Vibration: A Technical Guideline</i> (DECC, 2006); and
DG-N5	traffic generated noise during construction and operation consistent with <i>Environmental Criteria for Road Traffic Noise</i> (EPA, 1999)
DG-N6	The Environmental Assessment must include a framework for the mitigation, management and monitoring of noise impacts, particularly with respect to sensitive receptors likely to be significantly impacted by cumulative noise impacts in the local area.



In addition, the DECCW has specifically requested the following assessment requirements:

- Assessment requirements for potential noise from increased rail movements on the NSW Rail network can be provided if rail transport is proposed as part of the application.
- Cumulative noise and vibration impacts are to be assessed by consideration of noise from other premises.

2 EXISTING ENVIRONMENT

The Proponent has identified five residential assessment localities as summarised in **Table 2** together with nearest industrial premises generally in accordance with the requirements of the NSW Industrial Noise Policy (INP).

Table 2 Noise Monitoring and Assessment Locality Summary

ID	Monitoring Location	Locality	Receiver Description	Assessment Locations
R1	Lake Liddell Reserve, 400 Hebden Road	10 km East	Residential - next to Hebden Road	R1
R2	Lot 4 Antiene Estate, Off Pamger Drive	10 km North	Residential - next to the New England Highway	R2
R3	Side of Edderton Road (near farm houses)	11-13 km Northwest	Residential - next to Edderton Road	R3, R10, R11, R12
R4	Arrowfield Winery	8.5 km Southwest	Residential - next to the Gold Highway	R4, R9
R5	4 Pearse Road, Jerrys Plains	9 km South	Residential - next to the Golden Highway	R5, R6, R7, R8
IR1	Existing Bayswater Power Station	4 km East	Industrial - Bayswater Estate	IR1

The Proponent has not identified any residential receivers within 8 km of the Project site and therefore the five residential localities (12 assessment locations) together with the nearest industrial receiver appear adequate for noise assessment purposes.

Unattended noise logging was conducted in July 2009 for a period of up to 10 days at monitoring locations R1 to R5 together with operator-attended noise measurements. The Rating Background Levels (RBLs), operator-attended measured LA90(15minute) and estimated industrial LAeq(15minute) noise levels are summarised in **Table 3**.

Table 3 Measured RBLs, LA90(15minute) and LAeq(15minute) Noise Level Summary (dBA re μ Pa)

Location	Unattended Logger ¹ - Rating Background Levels (RBLs)			Operator-attended ¹ LA90(15minute)			Operator-Attended ¹ LAeq(15minute)		
	Daytime	Evening	Night	Daytime	Evening	Night	Daytime	Evening	Night
R1	36	40	42	36	-	40	34	-	33
R2	48	40	37	55	-	43	<30	-	<30
R3	31	30 ²	30 ²	39	-	41	<30	-	<30
R4	30 ²	30 ²	30 ²	48	-	29	<30	-	<30
R5	35	30 ²	30 ²	46	-	29	<30	-	<30

Note 1: Time periods as defined by NSW INP.

Note 2: Where the RBL is calculated to be less than 30 dBA, then the RBL is set to 30 dBA in accordance with the INP.



Comment: The Noise and Vibration Assessment (NVA) Appendices D and E show the background noise surveys coincided with periods of unstable weather, resulting in several periods of daytime and night-time noise logger data being discarded. In addition, some of the loggers appear to be have located near roadways and adjacent to building facades that may give rise to enhanced noise levels.

Moreover, only single 15minute daytime and night-time operator-attended noise measurements were conducted at locations R1 to R5 with the observed LAeq(15minute) level forming the basis for estimating the existing industrial amenity level (LAeq(period)) for each locality. Operator-attended noise measurements were not conducted in the evening.

By adopting a somewhat minimalist approach to the background noise monitoring programme it follows that the incomplete or uncertain noise logger data (not supported by an adequate number of operator-attended noise measurements) must be foregone and default background noise levels used in the absence of any alternative and reliable data source (ie other EA results or the like).

2.1 Concept Plan Approval – Project Design Background Noise Levels

Recommendation: Unless demonstrated by further background noise surveys conducted in accordance with the INP, the Proponent shall adopt an RBL of 30 dBA throughout the daytime, evening and night-time at all residential assessment locations. Project compliance with an intrusive criterion of 35 dBA (ie RBL plus 5 dBA) will also ensure Project's industrial amenity contribution is minimised to around 32 dBA.

3 CONSTRUCTION NOISE ASSESSMENT

3.1 Construction Noise Criteria

The Proponent has prepared a construction noise impact assessment generally in accordance with the DECCW's Interim Construction Noise Guideline (ICNG). The nominated Construction Noise Management Levels (CNMLs) are summarised in **Table 4**.

Table 4 Intrusive LAeq(15minute) Construction Noise Management Levels (CNMLs) (dBA re 20 µPa)

Location	Daytime ¹ CNML	Evening ¹ CNML	Night-time ¹ CNML
R1	46	41	41
R2	58	45	42
R3, R10, R11, R12	41	35	35
R4, R9	40	35	35
R5, R6, R7, R8	45	35	35
IR1	75	75	75

Note 1: Time periods as defined by DECCW ICNG.

Comment: Adopt an RBL of 30 dBA throughout the daytime, evening and night-time at all residential locations and associated modification of the proposed CNMLs.

3.2 Construction Activities

The Proponent has identified two construction phases namely, Site Preparation and Steel/Equipment Erection. The items of equipment and allocated sound power levels are summarised in **Appendix A** of this report.



Comment: The adopted construction scenarios appear appropriate for assessment purposes. The allocated sound power levels (SWLs) in some cases appear relatively high (ie compactor SWL 124 dBA). However, it is assumed that this is reflective of a conservative prediction assessment approach rather than an indication of anticipated poor noise performance (in practice).

3.3 Construction Noise Assessment

The NVA Section 7 presents the predicted construction noise levels to locations R1 to R11 under neutral weather conditions. The Proponent suggests that construction noise would increase by up to 6 dBA during noise enhancing weather and remain below the recommended CNMLs.

Comment: Construction activities would take place predominantly during the recommended standard working hours (7.00 am to 6.00 pm Monday to Friday and 8.00 am to 1.00 pm Saturday). However oversized loads and emergency work may need to be conducted outside the recommended standard working hours. The construction noise assessment demonstrates that the impact of any such activity beyond standard working hours is likely to be minimal.

3.4 Concept Plan Approval – Project Design Construction Noise Levels

Recommendation: Based on an RBL 30 dBA, the Proponent shall adopt the CNMLs as presented in **Table 5** together with the DECCW's sleep disturbance screening levels (SDSLs) for the purposes of construction noise impact.

Table 5 Construction Noise Management Levels (CNMLs) and SDSLs (dBA re 20 µPa)

Receiver Area	CNML - LAeq(15minute) ¹			LA1(60seconds) ¹
	Daytime	Evening	Night-time	Night-time
Residential	40	35	35	45
School (or the like)	Internal 45 LAeq(15minute) when in use			-
Place of Worship	Internal 45 LAeq(15minute) when in use			-
Passive Recreation	External 60 LAeq(15minute) when in use			-
Active Recreation	External 65 LAeq(15minute) when in use			-
Commercial	External 70 LAeq(15minute) when in use			-
Industrial	External 75 LAeq(15minute) when in use			-

Note 1: Time periods as defined by DECCW ICNG.

4 OPERATING NOISE ASSESSMENT

4.1 Operating Noise Criteria

The Proponent has prepared an operating noise impact assessment generally in accordance with the DECCW's INP. The nominated project specific noise levels (PSNLs) and sleep disturbance screening level (SDSLs) are summarised in **Table 6**.



Table 6 Project Specific Noise Levels and Sleep Disturbance Screening Levels (dBA re 20 µPa)

Receiver Area	Intrusive LAeq(15minute) ¹			Acceptable Amenity LAeq(period) ¹			LA1(60seconds) ¹
	Day	Evening	Night	Day	Evening	Night	Night
R1	41	41 ²	41 ²	50	45	40	55
R2	53	45	42	50	45	40	52
R3, R10, R11, R12	36	35	35	52	47	46	45
R4, R9	35	35	35	50	45	40	45
R5, R6, R7, R8	40	35	35	50	45	40	45
IR1	Intrusive noise not applicable			External 70 when in use			-

Note 1: Time periods as defined by NSW INP.

Note 2: Evening and night-time criteria determined in accordance with INP Application Notes.

Comment: Adopt an RBL of 30 dBA throughout the daytime, evening and night-time at all residential locations and associated modification of the proposed PSNLs and SDSLs.

4.2 Operating Activities

The Proponent has assessed both the Coal Fired and Gas Fired power station alternatives. Plant and equipment details for the Coal and Gas Fired stations are attached as **Appendices B** and **C** respectively to this report together with the allocated Sound Power Levels (SWLs) and supplementary calculations.

The Coal Fired equipment SWLs are of sufficient detail to determine the following:

- Unmitigated Coal Fire power station overall SWL 144 dBA
- Proposed ID Fan attenuation approximately 19 dBA
- Proposed building enclosure attenuation approximately 20 dBA
- Mitigated Coal Fired power station overall SWL 128 dBA

Similarly, the Gas Fired equipment SWLs are of sufficient detail to determine the following:

- Unmitigated Gas Fired power station overall SWL 158 dBA
- Compressor Inlet attenuation approximately 28 dBA
- Mitigated Gas Fired plant power station SWL 131 dBA

Comment: The proposed mitigation measures are reasonable and feasible for concept planning noise assessment purposes. There is potential for additional noise mitigation measures to be incorporated into the preferred station as determined during the project approval and detailed engineering design phase ie Forced Draft (FD) Fan and Primary Air (PA) Fan silencing.

4.3 Operating Noise Assessment

The NVA Section 8 presents the predicted operating noise levels to assessment Locations R1 to R12 under neutral and noise enhancing weather conditions which remain below the recommended PSNL of 35 dBA (and SDSL of 45 dBA). The highest predicted intrusive noise level is 33 dBA at receivers R5 to R8 under either source to receiver 3 m/s wind or temperature inversion and drainage (ie 3°C/100 m plus 2 m/s).

The Proponent notes the INP requirements with regard to modifying factor adjustments and at this stage the predicted levels exclude a 5 dBA penalty due to potential low frequency noise. The Proponent undertakes to address any potential low frequency noise during the preferred station project approval and detailed engineering design phase which is acceptable.



Comment: The INP requires an assessment of prevailing wind, temperature inversion (and combinations as appropriate) that have the potential to enhance noise emissions from the Project.

Initially the noise assessment relies on the meteorological analysis presented in EA's Air Quality Assessment with regard to frequency of occurrence of seasonal winds and atmospheric stability. However, the Proponent does not progress the analysis in accordance with the INP's requirements leading to the inappropriate conclusion that temperature inversions are not a feature of the area. The Bengalla meteorological tower is potentially an excellent source of air temperature data relevant to the Project locality. It is unfortunate that the observed temperature gradients over an extended period (from direct temperature measurements) have not been presented for this Project.

In any case, the Proponent has conferred with the DECCW in regard to this matter and advises assessable weather conditions are as follows:

- Source to receiver winds 3 m/s; and
- F-class atmospheric stability (ie temperature inversion range 1.5°C/100 m to 4°C/100 m).

It appears the Proponent has (perhaps not unreasonably) interpreted the DECCW's request to be generally equivalent to the INP's default meteorological parameters applicable to non-arid areas in the Hunter Valley, and applied the following noise enhancing weather conditions:

- Source to receiver winds 3 m/s; and
- F-class stability plus source to receiver winds 2 m/s.

The Project's SoundPlan noise model utilising the CONCAWE algorithms has relatively less flexibility to adjust meteorological parameters by comparison with alternative noise propagation algorithms. It is assumed (but not confirmed) that the Proponent has applied the SoundPlan CONCAWE meteorological (MET) categories as presented in **Table 7**.

Table 7 Proponents Application of SoundPlan CONCAWE meteorological (MET) Categories

MET Category	Description	Atmospheric Stability	Wind Speed (all directions)	Temperature, Relative Humidity
4	Calm	C, D, E	0 m/s	10°C, 70%
5 (or 6)	Wind	C, D, E	3 m/s	10°C, 70%
6	Inversion and Drainage	F, G	2 m/s	10°C, 70%

It should be noted that MET Category 6 results in the highest noise enhancement available within CONCAWE. However, experience suggests that MET Category 6 enhancement may marginally (say 2 dBA) understate the noise enhancement by comparison with the RTA's Environmental Noise Model (ENM) utilising a 3°C/100 m plus 2 m/s wind speed. Adding 2 dBA to the Proponents intrusive noise levels gives a maximum intrusive emission of 35 dBA under noise enhancing conditions and remains within the recommended PSNL of 35 dBA.

Furthermore, if the DECCW's intention for the Project was to apply 4°C/100 m plus 3 m/s wind speed then the Proponents highest intrusive noise level of 33 dBA may be understated by at least 4 dBA and therefore at least 2 dBA above the PSNL of 35 dBA.

4.4 Concept Plan Approval – Project Design Operating Noise Levels

Recommendation: Based on an RBL 30 dBA, the Proponent shall adopt the project specific noise levels (PSNLs) as presented in **Table 8** together with the DECCW's sleep disturbance screening levels (SDSLs) for the purposes of operating noise impact.



Table 8 Project Specific Noise Levels and Sleep Disturbance Screening Levels (dBA re 20 µPa)

Receiver Area	Intrusive LAeq(15minute) ^{1,4}			Acceptable Amenity LAeq(period) ^{1,4}			LA1(60seconds) ¹
	Daytime	Evening	Night-time	Daytime	Evening	Night-time	Night-time ³
Residential ²	35	35	35	32	32	32	45
School (or the like)	Intrusive noise not applicable			Internal 35 when in use			-
Place of Worship	Intrusive noise not applicable			Internal 40 when in use			
Passive Recreation	Intrusive noise not applicable			External 50 when in use			
Active Recreation	Intrusive noise not applicable			External 55 when in use			
Commercial	Intrusive noise not applicable			External 65 when in use			
Industrial	Intrusive noise not applicable			External 70 when in use			

Note 1: Time periods as defined by NSW INP.

Note 2: Measured at the most affected point within the residential boundary or at the most affected point within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary to determine compliance with the LAeq(15 minute) noise level.

Note 3: Measured at 1 metre from the dwelling facade to determine compliance with the LA1(1minute) noise level.

Note 4: Subject to the modification factors provided in Section 4 of the NSW Industrial Noise Policy where applicable.

The Proponent shall prepare a comprehensive meteorological assessment ideally based on temperature inversion measurements relevant to the local area or alternative reliable automatic weather station recordings guided by the requirements of the NSW INP as a basis for determining the relevant meteorological parameters (ie noise compliance design purposes) for the Project.

In the absence of such an assessment the Proponent shall design the Project to comply with the PNSLs and SDSLs as presented in **Table 8** under wind speeds and temperature inversion conditions as defined by the DoP in consultation with the DECCW.

The Proponent shall prepare a comprehensive plant and equipment sound power level and noise mitigation plan detailing all reasonable and feasible noise control and management measures necessary to demonstrate compliance with the PNSLs and SDSLs as presented in **Table 8** under the meteorological conditions determined for the Project.

The plan shall consider potential noise controls for all acoustically significant items of plant and equipment including (but not limited to) the Induced Draft (ID) Fan, Forced Draft (FD) Fan and Primary Air (PA) Fan as well as the sound transmission loss performance of the proposed building enclosures.

The plan shall also identify the effectiveness of the proposed noise mitigation measures in reducing potential low frequency noise emissions from the Project to the nearest noise sensitive receivers to the satisfaction of the DoP in consultation with the DECCW.

5 CUMULATIVE NOISE ASSESSMENT

5.1 Cumulative Noise Amenity Criteria

The INP provides cumulative noise assessment guidelines that address existing and successive industrial development by setting acceptable (and maximum) cumulative LAeq(period) amenity levels for all industrial (ie non-transport related) noise in a receiver area. The INP's acceptable the noise amenity levels for rural residential areas are presented in **Table 9**.

Table 9 Rural Residential Acceptable Noise Amenity Levels (dBA re 20 µPa)

Receiver Area	Acceptable Amenity LAeq(period) ¹		
	Day	Evening	Night
Rural Residential	50	45	40

Note 1: Time periods as defined by NSW INP.



Note, the INP does not set acceptable cumulative $L_{Aeq(15\text{minute})}$ intrusive criteria for all industrial noise sources in a receiver area, but rather seeks to control cumulative noise via its amenity criteria.

Comment: The Proponent has not conducted any appreciable cumulative noise amenity assessment but rather relies upon a relatively modest assessment of existing industrial amenity levels. As discussed in **Section 2** only single 15minute daytime and night-time operator-attended noise measurements were conducted at locations R1 to R5 with the observed $L_{Aeq(15\text{minute})}$ level forming the basis for the estimating the existing industrial amenity level ($L_{Aeq(\text{period})}$) for each locality. It was previously recommended that the observed amenity level be discarded and an RBL of 30 dBA be adopted throughout the daytime, evening and night-time at all residential assessment locations.

5.2 Concept Plan Approval – Project Design Cumulative Noise Amenity Levels

Recommendation: An RBL of 30 dBA produces a stringent intrusive criterion of 35 dBA. Project compliance with an intrusive criterion of 35 dBA will also ensure Project's industrial amenity contribution is minimised to around 32 dBA.

Notwithstanding the recommended PSNLs (and SDSLs) for the Project (in isolation) the Proponent shall prepare a comprehensive cumulative noise amenity assessment of existing, approved and the proposed Project in the vicinity of the Project site relative to the nearest sensitive receivers.

6 OTHER ASSESSMENTS

6.1 Construction and Operating Vibration Assessment

A qualitative assessment of construction and operating vibration impact has been generally carried-out with respect the DECCW's "*Assessing Vibration: A technical guideline*" with minimal potential impact at the nearest residential areas.

6.2 Road Traffic Noise Assessment

Off-site construction operating project generated traffic noise has been generally assessed in accordance with the DECCW's *Environmental Criteria for Road Traffic Noise* (ECRTN) with any impacts being acceptable.

6.3 Railway Traffic Noise

The Proponent advises the Antiene Rail Loop has current approval to accommodate the additional train movements associated with the Project. However, the Antiene Rail Unloader capacity is currently capped at 15 Mtpa and modification to the existing approval will be necessary.

7 SUMMARY OF FINDINGS

7.1 Proposed Concept Plan Approval Conditions

The proposed Concept Plan Approval Conditions with respect to noise and vibration emissions and monitoring requirements are attached as **Appendix D** to this report.

CONSTRUCTION ACTIVITIES AND PLANT EQUIPMENT

Equipment	Number of Modelled	Sound Power Level for 1 Unit LAeq dBA	Sound Power Level LAeq dBA
Site Preparation			
Batching Plant	1	121	121
Vibratory Pile Driver	2	105	108
Backhoe	1	85	85
Compactors	1	124	124
Concrete Truck	2	107	110
Grader	1	120	120
Flat Bed Truck	2	100	103
Dump Truck	2	107	110
Compressors	1	110	110
Total	13		127
Steel/Equipment Erection			
Crawler Cranes	2	115	118
Tower Cranes	1	108	108
Lorry Mounted Cranes	1	120	120
Flat Bed Truck	2	100	103
Heavy Haul Low Loader	2	107	110
Excavators	2	118	121
Man Lift	3	97	102
Generators	3	119	124
Grinder	1	106	106
Chipping Hammer/Chisel	1	119	119
Fork Lift	2	119	122
Total	20		129

Appendix B

Report 10-8328-R1 - Page 1 of 1

COAL FIRED EQUIPMENT SOUND POWER LEVELS

EQUIPMENT SOUND POWER LEVELS

Equipment	Sound Power Levels, Lw dB Octave Frequency Bands, Hz										
	Coal Fired Plant										
	31.5	63	125	250	500	1000	2000	4000	8000	Linear	A-weight
Steam Turbine Generator	116	122	120	115	111	107	104	96	90	125	113
Main Steam Boiler	125	124	119	113	112	110	108	108	109	129	117
Coal Pulverising Mill	99	99	99	95	93	90	89	84	75	105	96
Fabric Filter	99	99	99	95	93	90	89	84	75	105	96
Fabric Filter Air Blower	105	101	106	105	103	106	110	107	101	115	114
ID Fans ¹	122	118	116	112	113	114	113	113	115	126	121
FD Fans	126	127	128	129	129	129	127	123	122	137	134
Primary Air Fan	132	133	134	135	135	135	133	129	128	143	140
Air cooled Condenser	120	123	123	119	119	118	115	107	104	129	122
Air Compressors	103	99	104	103	101	104	109	106	99	114	113
Boiler Feed Pump	103	109	107	111	117	117	115	103	99	122	121
Generator Step Up Transformer	111	117	119	114	114	108	103	98	91	123	114
ACW Cooling Tower	110	113	113	110	107	103	100	97	89	118	109
Coal Stockyard and Reclaim	112	113	109	106	107	103	99	97	89	117	108
Coal Conveyor	88	90	88	81	93	87	84	75	68	97	93
Coal Plant Bulldozer	110	114	119	122	117	115	112	106	100	126	120
Stack	125	120	121	113	104	95	83	76	65	128	109
Ash Truck											
TOTAL Linear	135	135	136	136	136	136	134	130	129	144	
TOTAL A weighted	95	109	120	128	133	136	135	131	128		141

Note 1: Attenuated equipment, using Option 1 attenuator

Note 2: Attenuated equipment, using Option 2 attenuator

SILENCER ATTENUATION

Silencer Option	Attenuation, dB - Frequency in Octave Bands, Hz									
	32	63	125	250	500	1000	2000	4000	8000	
1	10	15	18	23	22	21	20	16	13	
2	14	21	26	34	33	32	31	29	27	

ADDITIONAL WORKINGS

Corrections	-39.4	-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1	Check	
Steam Turbine Generator	77	96	104	106	108	107	105	97	89	113	
Main Steam Boiler	86	98	103	104	109	110	109	109	108	117	
Coal Pulverising Mill	60	73	83	86	90	90	90	85	74	96	
Fabric Filter	60	73	83	86	90	90	90	85	74	96	
Fabric Filter Air Blower	66	75	90	96	100	106	111	108	100	114	
ID Fans ¹	83	92	100	103	110	114	114	114	114	121	
FD Fans	87	101	112	120	126	129	128	124	121	134	
Primary Air Fan	93	107	118	126	132	135	134	130	127	140	
Air cooled Condenser	81	97	107	110	116	118	116	108	103	122	
Air Compressors	64	73	88	94	98	104	110	107	98	113	
Boiler Feed Pump	64	83	91	102	114	117	116	104	98	121	
Generator Step Up Transformer	72	91	103	105	111	108	104	99	90	114	
ACW Cooling Tower	71	87	97	101	104	103	101	98	88	109	
Coal Stockyard and Reclaim	73	87	93	97	104	103	100	98	88	108	
Coal Conveyor	49	64	72	72	90	87	85	76	67	93	
Coal Plant Bulldozer	71	88	103	113	114	115	113	107	99	120	
Stack	86	94	105	104	101	95	84	77	64	109	
Ash Truck											
TOTAL A weighted	95	109	120	128	133	136	135	131	128	141	

EQUIPMENT INFORMATION

Equipment	Indoor or Outdoor	Number in Plant	Elevation (relative to site elevation 114m)	Sound Power Level LAeq dBA
Steam Turbine Generator	y	2	20	113
Main Steam Boiler	y	2	0-95	117
Coal Pulverising Mill		12	0	96
Fabric Filter			22	96
Fabric Filter Air Blower		8	0	114
ID Fans		4	0	140
FD Fans	y	4	0	134
Primary Air Fan	y	4	0	140
Air cooled Condenser		2	38	122
Air Compressors	y	4	0	113
Boiler Feed Pump	y	2	0	121
Generator Step Up Transformer		2	0	114
ACW Cooling Tower		3	7	109
Coal Stockyard and Reclaim		1	20	108
Coal Conveyor				
Coal Plant Bulldozer		1	20	120
Stack		1	250	109
Ash Truck				
			Unmitigated	144
			ID Fan Mitigation	141
			ID Fan plus Enclosure Mitigation	128

BUILDING ENCLOSURE

Note: Indoor equipment has been assumed to be located within a room with Rw45 hollow concrete block walls

Estimated A-weighted TL

Steam Turbine Generator	20	93
Main Steam Boiler	20	97
Coal Pulverising Mill		96
Fabric Filter		96
Fabric Filter Air Blower		114
ID Fans		140
FD Fans	20	114
Primary Air Fan	20	120
Air cooled Condenser		122
Air Compressors	20	93
Boiler Feed Pump	20	101
Generator Step Up Transformer		114
ACW Cooling Tower		109
Coal Stockyard and Reclaim		108
Coal Conveyor		0
Coal Plant Bulldozer		120
Stack		109
Ash Truck		
	Mitigation ID Fan plus Enclosure	128

Appendix C

Report 10-8328-R1

Page 1 of 1

GAS FIRED EQUIPMENT SOUND POWER LEVELS

EQUIPMENT SOUND POWER LEVELS

Equipment	Sound Power Levels, Lw dB Octave Frequency Bands, Hz										
	Gas Fired Plant										
	31.5	63	125	250	500	1000	2000	4000	8000	Linear	A-weight
Compressor Inlet ²	121	109	99	96	103	123	121	116	113	127	126
Gas Turbine	115	125	120	120	111	110	119	122	110	129	125
HRSG Stack	128	133	129	124	124	119	114	98	90	136	125
Air Cooled Condenser Gas	113	116	116	112	112	111	108	100	97	122	115
Auxiliary Cooling Tower	108	111	111	108	105	101	98	95	87	116	107
Fuel Gas Compressor	119	112	122	119	116	112	109	106	98	126	118
Boiler Feed Pump HP	88	94	92	96	102	102	100	88	84	107	106
Boiler Feed Pump IP	85	91	89	93	99	99	97	85	81	104	103
Generator Step Up Transformer	105	111	113	108	108	102	97	92	85	117	108
TOTAL Linear	130	134	131	127	125	125	124	123	115	138	
TOTAL A weighted	90	108	114	118	122	125	125	124	114		131

Note 1: Attenuated equipment, using Option 1 attenuator.

Note 2: Attenuated equipment, using Option 2 attenuator.

SILENCER ATTENUATION

Silencer Option	Attenuation, dB - Frequency in Octave Bands, Hz									
	32	63	125	250	500	1000	2000	4000	8000	
1	10	15	18	23	22	21	20	16	13	
2	14	21	26	34	33	32	31	29	27	
Corrections	-39.4	-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1	Check
Compressor Inlet ²	82	83	83	87	100	123	122	117	112	126
Gas Turbine	76	99	104	111	108	110	120	123	109	125
HRSG Stack	89	107	113	115	121	119	115	99	89	125
Air Cooled Condenser Gas	74	90	100	103	109	111	109	101	96	115
Auxiliary Cooling Tower	69	85	95	99	102	101	99	96	86	107
Fuel Gas Compressor	80	86	106	110	113	112	110	107	97	118
Boiler Feed Pump HP	49	68	76	87	99	102	101	89	83	106
Boiler Feed Pump IP	46	65	73	84	96	99	98	86	80	103
Generator Step Up Transformer	66	85	97	99	105	102	98	93	84	108
TOTAL A weighted	90	108	114	118	122	125	125	124	114	131

EQUIPMENT INFORMATION

Equipment	Indoor or Outdoor	Number in Plant	Elevation (relative to site elevation 114m)	Sound Power Level LAeq dBA
Gas Fired Power Station				
Compressor Inlet		5	18	158
Gas Turbine		5	0	125
HRSG Stack		5	55	125
Air Cooled Condenser Gas		5	18	115
Auxiliary Cooling Tower		1	7	107
Fuel Gas Compressor		3	0	118
Boiler Feed Pump HP		10	0	106
Boiler Feed Pump IP		10	0	103
Generator Step Up Transformer		5	0	108
			Unmitigated	158
			Compressor Mitigation	131

PROPOSED CONCEPT PLAN APPROVAL CONDITIONS

Project Design Background Noise Levels

Unless demonstrated by further background noise surveys conducted in accordance with the INP, the Proponent shall adopt an RBL of 30 dBA throughout the daytime, evening and night-time at all residential assessment locations.

Project Design Construction Noise Levels

The Proponent shall adopt the CNMLs as presented in **Table D1** together with the DECCW's sleep disturbance screening levels (SDSLs) for the purposes of construction noise impact.

Table D1 Construction Noise Management Levels (CNMLs) and SDSLs (dBA re 20 µPa)

Receiver Area	CNML - LAeq(15minute) ¹			LA1(60seconds) ¹
	Daytime	Evening	Night-time	Night-time
Residential	40	35	35	45
School (or the like)	Internal 45 LAeq(15minute) when in use			-
Place of Worship	Internal 45 LAeq(15minute) when in use			-
Passive Recreation	External 60 LAeq(15minute) when in use			-
Active Recreation	External 65 LAeq(15minute) when in use			-
Commercial	External 70 LAeq(15minute) when in use			-
Industrial	External 75 LAeq(15minute) when in use			-

Note 1: Time periods as defined by DECCW ICNG.

Project Design Operating Noise Levels

The Proponent shall adopt the project specific noise levels (PSNLs) as presented in **Table D2** together with the DECCW's sleep disturbance screening levels (SDSLs) for the purposes of operating noise impact.

Table D2 Project Specific Noise Levels and Sleep Disturbance Screening Levels (dBA re 20 µPa)

Receiver Area	Intrusive LAeq(15minute) ^{1,4}			Acceptable Amenity LAeq(period) ^{1,4}			LA1(60seconds) ¹
	Daytime	Evening	Night-time	Daytime	Evening	Night-time	Night-time ³
Residential ²	35	35	35	32	32	32	45
School (or the like)	Intrusive noise not applicable			Internal 35 when in use			-
Place of Worship	Intrusive noise not applicable			Internal 40 when in use			
Passive Recreation	Intrusive noise not applicable			External 50 when in use			
Active Recreation	Intrusive noise not applicable			External 55 when in use			
Commercial	Intrusive noise not applicable			External 65 when in use			
Industrial	Intrusive noise not applicable			External 70 when in use			

Note 1: Time periods as defined by NSW INP.

Note 2: Measured at the most affected point within the residential boundary or at the most affected point within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary to determine compliance with the LAeq(15 minute) noise level.

Note 3: Measured at 1 metre from the dwelling facade to determine compliance with the LA1(1minute) noise level.

Note 4: Subject to the modification factors provided in Section 4 of the NSW Industrial Noise Policy where applicable.

PROPOSED CONCEPT PLAN APPROVAL CONDITIONS

The Proponent shall prepare a comprehensive meteorological assessment ideally based on temperature inversion measurements relevant to the local area or alternative reliable automatic weather station recordings guided by the requirements of the NSW INP as a basis for determining the relevant meteorological parameters (ie noise compliance design purposes) for the Project.

In the absence of such an assessment the Proponent shall design the Project to comply with the PNSLs and SDSLs as presented in **Table D2** under wind speeds and temperature inversion conditions as defined by the DoP in consultation with the DECCW.

The Proponent shall prepare a comprehensive plant and equipment sound power level and noise mitigation plan detailing all reasonable and feasible noise control and management measures necessary to demonstrate compliance with the PNSLs and SDSLs as presented in **Table D2** under the meteorological conditions determined for the Project.

The plan shall consider potential noise controls for all acoustically significant items of plant and equipment including (but not limited to) the Induced Draft (ID) Fan, Forced Draft (FD) Fan and Primary Air (PA) Fan as well as the sound transmission loss performance of the proposed building enclosures.

The plan shall also identify the effectiveness of the proposed noise mitigation measures in reducing potential low frequency noise emissions from the Project to the nearest noise sensitive receivers to the satisfaction of the DoP in consultation with the DECCW.

Project Design Cumulative Amenity Noise Levels

The Proponent shall adopt the INP's acceptable the noise amenity levels for rural residential areas are presented in Table D3 for the purposes of cumulative noise amenity assessment.

Table D3 Rural Residential Acceptable Noise Amenity Levels (dBA re 20 µPa)

Receiver Area	Acceptable Amenity LAeq(period) ¹		
	Day	Evening	Night
Rural Residential	50	45	40

Note 1: Time periods as defined by NSW INP.

Notwithstanding the recommended PSNLs (and SDSLs) for the Project (in isolation) the Proponent shall prepare a comprehensive cumulative noise amenity assessment of existing, approved and the proposed Project in the vicinity of the Project site relative to the nearest sensitive receivers.