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16 April 2012

Mr Howard Reed
A/Director, Mining & Industry
Department of Planning
GPO Box 39
SYDNEY NSW 2001

Attention: Deana Burn

Dear Deana,

Response to submissions – development consent modification application for the Ashton Coal Mine – DA 309-11-2001 MOD 9

The Department has provided submissions on Ashton Coal Operations Pty Limited' (ACOL) application to modify DA 309-11-2001-i (MOD 9) from the following interested stakeholders:

- NSW Environment Protection Authority (EPA)
- NSW Office of Environment & Heritage (OEH)
- NSW Resources & Energy (DRE)
- NSW Transport Roads & Maritime Services (RMS)
- The United Mineworkers' Federation of Australia

The NSW Office of Water (NOW) did not provide a formal submission. However, NOW has indicated to the Department that the issues raised in its submission on a previous modification application (MOD 8) are equally relevant to the current application and should be considered.

The modification application (DA 309-11-2001-i MOD 9) is to allow the construction and operation of an upcast ventilation shaft and fans, mine service drop holes and support infrastructure. A detailed description of the proposed development was included in the Environmental Assessment (EA) provided in support of the modification application, which was publicly exhibited from 7 to 23 March 2012.

A response to each of the submissions is provided below.

Government Authorities

1. Environment Protection Authority (EPA)

The EPA has indicated it requires further information and clarification of a number of aspects of the noise impact assessment prior to it being able to recommend conditions of approval for the proposed development, including:

- Further analysis of wind speed and direction for day, evening and night periods (as per section 5.3 of the Industrial Noise Policy).
- Clarification or confirmation of construction equipment, activities and developed infrastructure noise source heights.
- Clarification or confirmation of construction equipment, activities and developed infrastructure sound power levels.
- Consideration of additional construction and operational noise sources not already included in the assessment (specifically diesel generators).
- Clarification of vehicle movements associated with the development (initial and ongoing).
- Clarification of construction time frames for the mine service drop holes.
- Consideration or clarification of noise impacts from construction traffic on surrounding public roads.
- Clarification or confirmation of predicted noise emission levels (including implementation of controls) considering potential amendment of noise source heights and sound power levels.
- Clarification or confirmation of noise emission levels under temperature inversion conditions.
- Consideration of noise emission levels from shaft lining activities.

Each of these issues is addressed in a revised Noise Impact Assessment (NIA) for the proposed development (included as Attachment 1) and briefly summarised below.

1.1 Wind speed and direction

A full analysis of wind speed and direction has been undertaken for previous noise studies at the Ashton coal mine and used in the NIA provided in the EA. A summary of this analysis has now been included in the revised NIA for the proposed development. The revised assessment report also includes an explanation of the derivation of wind vector components used in the noise model. (Note that a graphical representation of seasonal and annual wind roses was provided in the Air Quality Assessment in the EA).

A worst case scenario (noise enhancing westerly wind) was adopted in modelling the effects of wind vector on private residences. This scenario was applied to any period (daytime, evening and night-time) in which this wind could occur.

1.2 Noise source heights

The source heights of major noise generating equipment and activities required during construction and operation of the proposed development have been reviewed. This has resulted in increasing the noise source height of the ventilation fans from 2 to 3m (i.e., the average height of the fan evase outlet – refer EA Appendix 1) and the inclusion of additional noise sources with associated representative noise source heights into the noise model (i.e., heavy vehicles – 2m source height; diesel generators – 1m source height; concrete agitators – 2m source height).

1.3 Sound power levels

The sound power levels of major noise generating equipment and activities required during construction and operation of the proposed development have been reviewed. This has resulted in the inclusion of additional noise sources with associated representative sound power levels into the noise model (i.e., heavy vehicles – 88dB(A)$L_{eq(15min)}$ and 98dB(A)L_{max}; diesel generators – 86dB(A)$L_{eq(15min)}$; concrete agitators – 98dB(A)$L_{eq(15min)}$ and 105dB(A)L_{max}).

Sound power levels have been determined from manufacturer's specifications (including low frequency, tonal or impulsive characteristics) or from field measurement of similar equipment or activities. (Example indicative fan specifications are provided in attachment 2)

1.4 Inclusion of diesel generators

The revised NIA includes use of two diesel generators during construction. Up to two generators will be used to provide power during drilling of the 5.5m ventilation shaft and construction of the fans.

The use of diesel generators was not previously identified as a significant noise source as the potential impact was considered insignificant (in the context of other construction and mining related activities) due to the relatively minor sound power level (86db(A)$L_{eq(15min)}$ each). It should be noted that diesel generators are used in conjunction with other ongoing works at various locations around the mining operation, without any significant noise impact.

1.5 Predicted vehicle movements

The NIA has been revised to account for 30 daily heavy vehicle movements (worst case) during the construction and operation stages of the development.

1.6 Construction timeframes - mine service drop holes

Construction of each drop hole is expected to take up to about 20 days to complete, not a few days as reported in the NIA provided in the EA. (Noise generating construction activities will generally be restricted to day time hours only).

1.7 Noise impacts from construction vehicles on surrounding public roads

All traffic created during construction or operation will access the site from the New England Highway. According to the Traffic Impact Assessment in the EA, daily average vehicle movements on the New England Highway is 11,109 of which 17% is estimated to comprise heavy vehicle movements.

The maximum predicted daily traffic volume at any time during construction or operation of the project is estimated to be about 30 movements. The addition of 30 vehicle movements to existing New England Highway traffic volumes (i.e. a 0.3% increase to total vehicle movements) is not predicted to result in increased noise impacts at private residences, even if all vehicle movements generated by the development constitute heavy vehicles (i.e., a 2% increase in heavy vehicle movements).

1.8 Noise impacts for revised noise source heights and sound power levels

The revised noise source heights and sound power levels (including additional equipment and activities) have been remodeled to determine the noise impacts of the proposed development. The revised noise model includes the use of acoustical screening between the dominant noise sources and private residences, as described in the original assessment. The revised assessment indicates there is a marginal increase in mitigated noise levels of between 1 and 2dB(A) at private residences, but even with this increase noise levels at private residences are well below (> 7dB(A)) the existing consented noise impact criteria for the Ashton coal mine.

Notwithstanding, ACOL will monitor its offsite noise levels throughout the construction and operation of the proposed development (in accordance with the site wide noise management plan) to ensure that any construction and operational noise remains below its consented noise impact criteria.

1.9 Temperature inversion condition noise levels

Inversion conditions were only considered for the operation of the fans, as noise generating construction activities will generally be restricted to day time hours only.

The noise model adopted an inversion strength of 4.7°C/100 m based on previous (2006) investigations into the strength of inversions at the mine.

It is noted that the effect of a 3m/s wind on noise levels is approximately equivalent to a 7.5^0C/100 m inversion in the ENM noise model used to estimate offsite noise levels. Hence the results for a 3m/s source-receiver wind are higher than for a 4.7^0C/100m inversion.

1.10 *<u>Shaft lining noise levels</u>*

The noise associated with shaft lining activities has been reviewed and incorporated into the revised noise model. Based on field measurements at another NSW site the dominant noise source associated with shaft lining activities has been determined to be concrete agitators.

ACOL will ensure that the use of acoustic screening remains in place during the shaft lining activities.

2. Office of Environment & Heritage (OEH)

In its submission OEH has indicated that known Aboriginal objects associated with AHIMS site #32-3-0537 may have greater extents than currently understood and that ACOL holds an Aboriginal Heritage Impact Permit (AHIP #1331017) with specific conditions relating to test excavations, salvage and management of Aboriginal objects. Further, that the proposed development is unlikely to impact on threatened species, populations, ecosystems or their habitat.

Notwithstanding OEH has recommended the following conditions of approval to ensure potential impacts on Aboriginal objects and threatened species are appropriately mitigated and managed.

- Prior to construction ACOL conducts test excavations to test for the presence of objects in the development site in accordance with the 'code of practice for Archaeological investigation of Aboriginal Objects in NSW'.
- Any salvage conducted occurs in compliance with the salvage methodology contained within AHIP #1131017.
- Any threatened species, populations or communities, or habitat found on the development site are avoided or offset in accordance with OEH offsetting policy.

ACOL acknowledges the intent of the proposed conditions and commits to mitigating and managing its impacts in a responsible manner, but believes these requirements are already adequately covered by existing conditions of consent (DA 309-11-2001-i as modified), conditions of AHIP #1131017 and its onsite environmental management plans.

3. Resources & Energy (DRE)

In its submission DRE recommends the application be approved subject to conditions. These relate to the requirement for the currently approved Mining Operations Plan (MOP) for the mine to be amended to include the proposed development, and for activities required to construct and operate the infrastructure to be reported on in the Annual Environmental Management Report (AEMR), both of which it requires to be prepared to the satisfaction of the DRE. It should be noted that ACOL's existing consent already requires the MOP and AEMR to be prepared to the satisfaction of DRE.

ACOL acknowledge DRE's request and commits to amend the Ashton mine MOP in consultation with DRE and report on the activities carried out for the proposed development in future AEMRs.

4. Transport Roads & Maritime Services (RMS)

RMS raised no issues or objections in its submission but noted that access from the New England Highway is only allowed at the designated property access point (known locally as Dairy Lane).

5. Office of Water (NOW)

NOW's submission on the previous DA 309-11-2001-i MOD 8 application (concerning authorisation of goaf gas drainage wells) raised issues relating to water licensing and design and construction guideline requirements for bores. NOW has indicated these issues apply equally to the current modification application (MOD 9).

The 5.5m diameter ventilation shaft and (up to) 1m diameter mine service drop holes will be located in hard rock and will be constructed (in each case) to provide a lined and sealed (or cased and sealed) open conduit from the service to the underground workings. Consequently, the shaft and service drop holes will not be capable of drawing water even if water bearing strata is intersected. Notwithstanding, a small amount of water may be incidentally taken during drilling (reporting either to the mine workings in the case of the raise bore or to the surface in the case of the service drop holes) prior to lining and sealing. ACOL holds sufficient and appropriate Part 5 Water Act licences to account for any such incidental water take.

As the shaft and service drop holes will not be developed for the purpose of (or be capable of) supplying water, their design and construction does not fall under the jurisdiction of NOW. Rather, the design and construction of the shaft and service drop holes will be administered by DRE under relevant mine and mine safety legislation through the approval of an updated Mining Operations Plan.

Public / Special Interest Groups

6. The United Mineworkers' Federation of Australia

ACOL notes that the local branch of the United Mineworkers' Federation of Australia supports the proposed modification application.

If you require further clarification or additional information on any aspect of the proposed modification, I can be contacted on (02) 6576 1111, 0459 105 360 or via email at mmoore@ashtoncoal.com.au.

Yours faithfully

Michael Moore
Approvals Manager

Attachments:	1	Revised Noise Impact Assessment (April 2012)
	2	Indicative Fan Specifications (courtesy of FlaktWoods Group Australia)

ATTACHMENT 1

Project No: 11645

Noise Impact Assessment
Ashton Upcast Ventilation Shaft and Fans
Camberwell, NSW

Prepared for:

Wells Environmental Services
PO Box 205
East Maitland NSW 2323

Author:

……………………………………………
Neil Pennington
B.Sc., B. Math.(Hons), MAAS, MASA
Principal / Director

Review:

……………………………………………
Ross Hodge
B.Sc.(Hons)
Principal / Director

April 2012

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EXECUTIVE SUMMARY

A Noise Impact Assessment (NIA) has been prepared for the proposed construction and operation of a ventilation shaft and fans with associated access track and mine service shafts (drop-holes) at the Ashton Coal Project (ACP) near Camberwell, NSW.

The assessment is based on or refers to the Office of Environment and Heritage (OEH, formerly DECCW) *NSW Industrial Noise Policy* (2000). A brief summary of essential data, results and recommendations arising from this assessment is presented below. This report has been updated since exhibition of the EA to account for comments made by the EPA in its submission on the modification application.

Operational Noise Criteria

Construction and operation of the project will be required to satisfy the existing noise criteria, when considered cumulatively with all other ACP noise emissions.

Existing noise criteria are reproduced below.

Location	Day	Evening	Night	
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{A1(15min)}$
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternative noise limit.	38	38	36	46

Summary of Findings

The assessment has found that noise emissions from the raise-bore drilling of the 5.5m diameter ventilation shaft and operation of the ventilation fans would be sufficiently below the noise criteria that they would not contribute to any exceedance of the noise criteria.

During the brief period of drilling the ventilation shaft pilot hole, during daytime only, moderate (up to 3 dB) exceedances of the operational noise criterion have been predicted under worst case meteorological conditions. The following recommendation has been made to achieve noise levels sufficiently below the noise criterion that this activity would not contribute to any criterion exceedance.

Recommendation 1.
Site sheds or shipping containers should be placed east of the drill with the long side aligned on a north-south direction to act as a noise barrier to receivers in Camberwell village. Noise monitoring should be conducted during this activity to confirm compliance with the noise criterion.

No sleep disturbance impacts have been predicted at any receiver. Night time maximum noise levels 15 dB or more below the criterion have been predicted. Changes in off-site traffic noise levels due to vehicles associated with the project have also been found to be well below the level of perceptibility.

1.0 INTRODUCTION

1.1 The Proposal

Ashton Coal Operation Limited (ACOL) seeks project approval to install and operate a new upcast ventilation shaft and fans to meet future ventilation demands for their underground mining operation. The project will also require construction of access tracks and two mine service drop-holes for ballast and concrete. A detailed description is contained in the main volume of the Environmental Assessment (EA). Accordingly, a noise impact assessment (NIA) is required for inclusion with the (EA). This NIA has been conducted in accordance with relevant NSW Office of Heritage and Environment (OEH) policies and guidelines.

The project will comprise:

- Construction of access tracks;
- Drilling of a pilot hole to a depth of approximately 90m;
- Drilling a 5.5m diameter ventilation shaft by raise-bore methodology;
- Drilling of two 300mm diameter drop-holes; and
- Installation and operation of two exhaust fans with evasé (cone-shaped discharge plenum) fitted for noise reduction.

1.2 Study Area

The Ashton Coal Project (ACP) is located 14 km northwest of Singleton in the Hunter Valley of NSW within the Hunter coalfields of the Sydney Basin. The proposed ventilation fan site is located approximately 880m southwest of the village of Camberwell, on the southern side of the New England Highway. The locations of the ACP and the ventilation fan site are illustrated in **Figure 1**.

1.3 Surrounding Land Uses and Receivers

The village of Camberwell is located approximately 880m north east of the site. Given the localised position of the vent fan site, the nearest residences in Camberwell village are considered to have the greatest potential for noise impacts from the project. The nearest private Camberwell residence is located at least 1 km from the site. Representative non-mine related receivers considered in this assessment are listed in **Table 1** below and illustrated in **Figure 2**.

TABLE 1

Non-mine related receivers considered in this assessment.

Receiver	Owner / Description
35	De Jong, Meindert & Thelma Eileen
34	Oloffson, Torbjorn Anders and Diedre Ella
23	Lopes, Valda Kim
18	Turner, Sandra Phyllis
117	McInerney, John Charles and Judith

Figure 1. Project Site Location

Figure 2. Assessed Receiver Locations

2.0 THE EXISTING ENVIRONMENT

The existing meteorological and acoustic environments were studied and reported as part of the recent South East Open Cut (SEOC) EA. Meteorological data relevant to the current study are summarised below.

2.1 Meteorology

2.1.1 Wind Speed and Direction

Winds are an assessable feature of an area if the sum of wind vector components up to 3 m/s from a given direction occurs for more than 30%

of the time during the day, evening or night periods in any given season. Analysis of winds for the SEOC noise assessment did not separate the day, evening and night periods so any assessable wind is assumed to occur at all times of the day during the relevant season(s), as a worst case.

Wind roses were analysed as part of the SEOC project. The analysis procedure is explained in Appendix B including a replication of the information provided for the SEOC project. Wind roses are included in PAE Holmes' Air Quality Assessment for the modification (Appendix 4 to the EA).

Results of the analysis are summarised in **Table 2** with assessable winds (>30% occurrence of vector components 0.5-3 m/s) indicated in bold type. Wind directions selected for noise modelling are shaded grey. [NOTE: Since winds from each direction are also included as vector components for six 'side-band' directions, the total percentages for each season in Table 2 are significantly greater than 100%]

TABLE 2
Summary of wind vector components from 0.5 m/s to 3 m/s.

Direction	SEASON			
	Summer	Autumn	Winter	Spring
N	5.91%	20.30%	30.10%	17.20%
NNE	17.31%	22.70%	10.60%	18.00%
NE	44.77%	31.30%	12.10%	33.50%
ENE	53.65%	43.40%	21.10%	41.40%
E	41.86%	43.00%	21.20%	38.00%
ESE	43.87%	43.30%	21.70%	38.30%
SE	47.85%	44.30%	23.60%	40.40%
SSE	57.30%	47.00%	26.80%	45.50%
S	48.55%	38.90%	28.70%	42.00%
SSW	19.00%	27.40%	23.40%	25.30%
SW	7.40%	24.70%	34.90%	21.60%
WSW	8.00%	26.80%	38.40%	24.10%
W	6.97%	20.70%	31.20%	21.00%
WNW	6.06%	21.90%	25.10%	18.70%
NW	5.65%	21.80%	24.90%	18.40%
NNW	5.67%	24.00%	29.30%	19.00%
Calms	8.50%	14.50%	7.80%	6.90%

Point source modelling was conducted and it was found that winds from the west are worst case with respect to receivers in Table 1.

2.1.2 Temperature Inversions

A temperature inversion study was conducted by Spectrum Acoustics on the ACP site during August/September 2006, with five Gemini data loggers placed at various locations on the site and in Camberwell village to cover a total altitude separation of 79m. The tenth percentile inversion strength was found to be $4.7^0C/100m$. Since the construction (shaft drilling) stage of the project will occur only during daytime hours, this inversion strength was included in noise modelling for the operating ventilation fans only.

3.0 NOISE CRITERIA AND PREDICTED IMPACTS

3.1 Existing Noise Criteria

The proposed vent fan construction and operation will be required to satisfy the existing noise criteria, when considered cumulatively with all other ACOL noise emissions. Existing noise criteria are reproduced below.

Location	Day	Evening	Night	
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{A1(15min)}$
Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternative noise limit.	38	38	36	46

3.2 Noise Impact Assessment Procedure

The assessment of noise emissions was conducted using RTA Technology's Environmental Noise Model (ENM v3.06). Major noise producing items were modelled as point sources and noise contours were generated for the surrounding area. Point calculations were performed for the receivers in Table 1.

3.2.1 Noise Sources

Sound power levels of operational noise sources used in the modelling are shown below in **Table 3**.

TABLE 3
Modelled noise source sound power levels.

Noise source	Sound power level, dB(A)		Source Height, m
	$L_{eq(15\ min)}$	L_{max}	
Pilot/drop hole drill (300/370mm diam.)	114	N/A	2[1]
Raise-bore drill (5.5m diam.)[2]	97	N/A	2
Ventilation Fans (with evase)[3]	95	97	3
Heavy vehicle movement[4]	88	98	2
Sed dam / access road construction[5]	108	N/A	3
Diesel generator (x2)[6]	86 ea.	N/A	1
Concrete agitator[7]	98	105	2

[1] Approximate height of acoustic centre of standard drill rig.
[2] Noise data supplied by ACOL. Main noise generation is from power source at ground level.
[3] Based on noise data provided by Flakt Woods (Study ID: 222205).
[4] One road-going vehicle in a 15 minute period, during construction and fan operation.
[5] Combined small dozer, excavator, grader, tip-truck, water cart as measured at another site.
[6] As measured at other mine sites.
[7] As measured at a shaft-lining site near Narrabri NSW (Note: the agitator is the dominant source).

3.2.2 Modelled Scenarios

Noise modelling was conducted for the following adverse atmospheric conditions:

- *Adverse winds* – Air temperature 10^{0}C, 70% RH, 3m/s wind from West; and
- *Inversion* – Air temperature 5^{0}C, 85% RH, +4.7^{o}C/100m vertical temperature gradient (vent fans only).

Noise models were generated for the following scenarios using the Environmental Noise Model (ENM v3.06).

Scenario 1 – Pilot hole and drop-hole drilling and sediment dam construction* (daytime only).

Scenario 2 – Raise-bore reaming of the shaft (daytime only) and two diesel generators.

Scenario 3 – Operation of vent fans (24-hour) and occasional vehicle movements associated with the drop-holes[#].

* Given the proximity of sources to receivers and the dominance of the drill, the combined activity of pilot hole or drop-hole drilling and dam construction will be the worst case construction scenario.
[#] Activities associated with service drop-holes will occur during daytime only

3.3 Predicted Noise Levels

Predicted noise levels using the ENM point calculation mode are presented below for the modelled operational and meteorological scenarios.

3.3.1 Pilot Hole / Drop-Hole Drilling

Predicted noise levels for Scenario 1 (drop-hole or pilot hole drilling) under worst case conditions (West wind) are summarised in **Table 4**. .

TABLE 4
Predicted Scenario 1 intrusive noise levels.

Receiver	Predicted $L_{Aeq(15min)}$	Criterion
35	40	38
34	40	38
23	39	38
18	40	38
117	37	38

3.3.2 Discussion of Scenario 1 Results

The above results show that noise levels from the drill used to form the drop-holes / ventilation shaft pilot hole may exceed the site noise criterion by up to 2 dB in the absence of any noise control. It is noted that these smaller diameter holes would be drilled during daytime only and would be completed within a few weeks. Notwithstanding, reducing noise from the drill will be reasonably straightforward and should be implemented.

The construction site would contain at least one site shed or shipping container (2.4 – 3m high). This should be positioned immediately east of the drill, with its longer side aligned north-south as illustrated in **Figure 3**. Re-modelled noise levels are summarised in **Table 5**.

TABLE 5
Predicted Scenario 1 intrusive noise levels with noise control.

Receiver	Predicted $L_{Aeq(15min)}$	Criterion
35	29	38
34	30	38
23	30	38
18	31	38
117	28	38

The results in Table 5 show noise levels 6 dB or more below the site noise criterion. If the total noise level from ACOL sources other than the drill was less than the criterion, then the additional 31 dB(A) from the drill would not be sufficient to result in a criterion exceedance. If general ACOL noise levels were equal to, or greater than, the criterion then the additional 31 dB(A) from the drill would not increase the noise level by more than 0.5 dB. This level of increase is widely accepted as not being discernible by the human ear and is within the measurement error of a Type 1 (laboratory quality) sound level meter.

The predicted worst case noise level from sediment dam construction and the drill, with noise control in place, would therefore be sufficiently low that it would not lead to an exceedance of the site noise criterion, during its brief period of operation.

Figure 3. Recommended Temporary Barrier Locations

3.3.3 Raise-bore Drilling

Predicted noise levels for Scenario 2 (raise-bore drilling) under worst case conditions (West wind) are summarised in **Table 6**.

TABLE 6

Predicted Scenario 2 intrusive noise levels.

Receiver	Predicted $L_{Aeq(15min)}$	Criterion
35	30	38
34	28	38
23	28	38
18	31	38
117	26	38

As discussed in section 3.3.2 above, the predicted noise levels in Table 6 are sufficiently low that they would not contribute to an exceedance of the site noise criterion. Once the shaft is completed, they will be concrete-lined. This will involve the arrival and departure of one concrete truck at a time. The $L_{Aeq(15minute)}$ level of a concrete agitator is 1 dB greater than for the raise-bore drilling (see Table 3) and levels 1 dB higher than in

Table 6 may be expected. These noise levels would also not contribute to an exceedance of the site noise criterion.

3.3.4 Operations

Predicted noise levels for Scenario 3 (vent fan operation, occasional vehicle movements on access track and in relation to the service drop-holes) under worst case conditions (West wind and inversion) are summarised in **Table 7**. [Note: the ENM algorithms for the effects of winds and temperature inversions are such that a 3 m/s wind is approximately equivalent to a 7.5^0C/100m inversion. Results for a 3m/s source-receiver wind are therefore higher than for a 4.7^0C/100m inversion.]

TABLE 7
Predicted Scenario 3 intrusive noise levels.

Receiver	Predicted $L_{Aeq(15min)}$		Criterion
	Inversion	W wind	
35	<20	24	36
34	<20	24	36
23	20	25	36
18	21	30	36
117	<20	23	36

As with the previous results for the raise-bore drilling, the predicted noise levels in Table 7 for the continued operations are sufficiently low that they would not contribute to an exceedance of the site noise criterion.

3.4 Modifying Factor Corrections

A number of 'modifying factor' adjustments to predicted/modelled noise levels are defined in Table 4.1 in Chapter 4 of the INP (reproduced below as **Figure 4**).

A review of the spectral noise data for the various sources has revealed that there are no appreciable tonal, impulsive or intermittent components of the site noise emissions requiring numerical assessment. For example the manufacturer's data for the sound pressure level outside the fan evase casing is as follows:

Casing acoustic results

Inlet and outlet ducted

		Spectrum analysis (Hz) dB(lin)							
Spectrum description	*Global (dBA)*	*63*	*125*	*250*	*500*	*1000*	*2000*	*4000*	*8000*
SPL casing (NFS 31.021) without acoustic insulation	89	84	88	88	84	82	80	78	77

Source: Flakt Woods specification. Study ID 222205.

This is a broadband spectrum with no potentially annoying components as defined in the INP.

Low-frequency noise emissions must be assessed to determine whether the low-frequency modifying factor adjustment of + 5dB is applicable. In addition to the INP assessment of low-frequency noise in Figure 3, the

DP&I have advised that the low-frequency modifying factor is not applicable if the C-weighted noise level is less than approximately 55 dB(C).

A review of point calculation results at all assessed receivers over all modelled scenarios has found a maximum C-A weighted noise level difference of 8 dB. This is sufficiently below the trigger level of 15 dB for low frequency emissions that further quantitative assessment of modifying correction factors is not considered necessary.

Table 4.1. Modifying factor corrections

(See definitions in *Section 4.2*)

Factor	Assessment/ measurement	When to apply	Correction[1]	Comments
Tonal noise	One-third octave or narrow band analysis	Level of one-third octave band exceeds the level of the adjacent bands on both sides by: —**5 dB** or more if the centre frequency of the band containing the tone is above 400 Hz —**8 dB** or more if the centre frequency of the band containing the tone is 160 to 400 Hz inclusive —**15 dB** or more if the centre frequency of the band containing the tone is below 160 Hz	5 dB[2]	Narrow-band frequency analysis may be required to precisely detect occurrence
Low frequency noise	Measurement of C-weighted and A-weighted level	Measure/assess C- and A-weighted levels over same time period. Correction to be applied if the difference between the two levels is 15 dB or more	5 dB[2]	C-weighting is designed to be more responsive to low-frequency noise
Impulsive noise	A-weighted fast response and impulse response	If difference in A-weighted maximum noise levels between fast response and impulse response is greater than 2 dB	Apply difference in measured levels as the correction, up to a maximum of 5 dB.	Characterised by a short rise time of 35 milliseconds (ms) and decay time of 1.5 s
Intermittent noise	Subjectively assessed	Level varies by more than 5 dB	5 dB	Adjustment to be applied for **night-time only**.
Duration	Single-event noise duration may range from 1.5 min to 2.5 h	One event in any 24-hour period	0 to –20 dB(A)	The acceptable noise level may be increased by an adjustment depending on duration of noise. (See *Table 4.2*)
Maximum adjustment	Refer to individual modifying factors	Where two or more modifying factors are indicated	Maximum correction of 10 dB(A)[2] (excluding duration correction)	

Notes:

1. *Corrections to be added to the measured or predicted levels.*
2. *Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tone is in the low-frequency range.*

NSW industrial noise policy

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Figure 4. INP modifying factor corrections

3.5 Sleep Disturbance

Assessment of potential sleep disturbance during night time hours usually begins by considering the OEH recommendation that further assessment is required if maximum noise levels[1] (L_{Amax}) exceed the background level (L_{A90}) by more than 15 dB at a bedroom window. If this level is exceeded then further consideration of potential disturbance to sleep includes the nature and level of ambient noise in the area, with some guidance also offered in Appendix B of the OEH *Environmental Criteria for Road Traffic Noise* (ECRTN, 1999).

In this project only the ventilation fans would operate during the night. Noise emissions from fans are characteristically uniform in their noise emissions with very little variation about the mean levels. Further, the predicted noise levels in Table 7 were for worst case meteorological conditions so maximum noise levels would not exceed these values by more than a few decibels.

The sleep disturbance criterion is 46 dB(A) and maximum noise levels from the vent fan would be 15 dB or more below this level.

3.6 Traffic Noise

All traffic created by the project during construction or operation will access the site from the New England Highway. The Traffic Impact Assessment (TIA), provided by SKM, advised that the daily average of vehicles using the New England Highway was 11,109, 17% of which are heavy vehicles, that is, 1,889 heavy vehicles.

The maximum worst case traffic volume at any time is 30 heavy vehicle movements (15 vehicles) per day once every two weeks associated with concrete deliveries. The addition of 30 vehicle movements per day to the existing 1,889 heavy vehicle movements per day on the New England Highway constitutes an increase of less than 2%. This minor increase in movements, and the associated noise, will be imperceptible and further quantitative assessment of noise impacts is not considered necessary.

[1] The sleep disturbance criterion is technically the $L_{A1(1minute)}$ level. As this is the loudest 0.6s during a 15-minute period, the L_{Amax} level is usually adopted.

4.0 SUMMARY

A noise impact assessment of the proposed construction and operation of a ventilation shaft and fans with associated access track and mine service shafts (drop-holes) at the Ashton Coal Project (ACP) near Camberwell, NSW, has been conducted. The assessment has found that noise levels would be well below the site noise criterion, provided that noise control in the form of a temporary barrier is utilised during the brief period of drilling the ventilation shaft pilot hole and the two 300mm drop-holes.

Noise levels associated with off-site traffic generated by the project have been found to be insignificant and below the level of perceptibility.

With the adoption of the recommendation in this report, we see no acoustic reason why the project could not proceed.

APPENDIX A

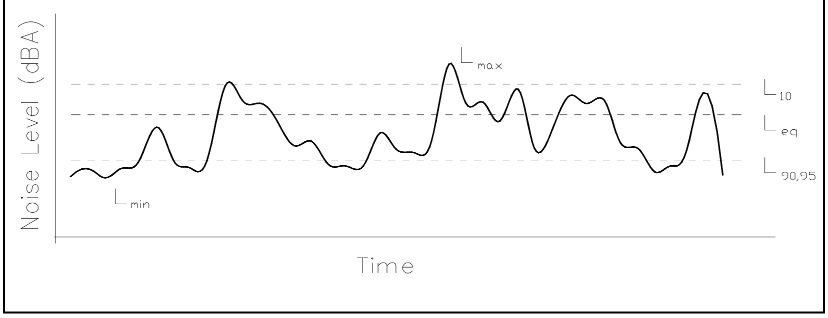
DESCRIPTION OF ACOUSTICAL TERMS

Table A1 contains a glossary of commonly used acoustic terms and is presented as an aid in understanding this report.

The descriptions in this section are not formal definitions of the terms. Formal definitions may be found in AS1633-1985 “Acoustics – Glossary of terms and related symbols”.

Table A1. Acoustical Terms

Term	Description
dB(A)	The quantitative measure of sound heard by the human ear, measured by the A-Scale Weighting Network of a sound level meter expressed in decibels (dB).
SPL	Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard.
STL	Sound Transmission Loss. The ability of a partition to attenuate sound, in dB.
Lw	Sound Power Level radiated by a noise source per unit time re 1pW.
Leq	Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period.
L1	Average Peak Noise Level - the level exceeded for 1% of the monitoring period.
L10	Average Maximum Noise Level - the level exceeded for 10% of the monitoring period.
L90	Average Minimum Noise Level - the level exceeded for 90% of the monitoring period and recognised as the Background Noise Level. In this instance, the L90 percentile level is representative of the noise level generated by the surrounds of the residential area.



APPENDIX B

WIND ROSE ASSESSMENT METHODOLOGY

The analysis of source-receiver wind speeds is explained with the aid of **Figure B1** below. For a complete year's wind data, each of the 16 compass directions was considered in turn as the primary (***P***) source-receiver direction. The percentage occurrence of winds from this direction up to 3m/s commenced the summation of total source-receiver wind vector components from this direction. The two neighbouring compass directions at + 22.5^0 and -22.5^0 were then considered. (As an example, if the current primary direction ***P*** is NE, then ***P***$+22.5^0$ is ENE and ***P***-22.5^0 is NNE).

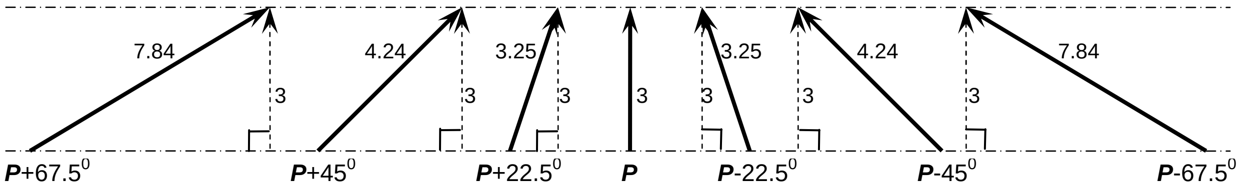


Figure B1. Source to receiver vector components (dotted) of all wind directions within P***±67.5⁰***.

Figure B1 shows that winds from ***P***$\pm22.5^0$ with total speed of 3.25 m/s have a vector component of 3 m/s parallel to ***P***. The percentage occurrences of winds up to 3.25 m/s from ***P***$\pm22.5^0$ were added to the summation for primary direction ***P***. Similarly, the percentage occurrences of winds up to 4.24 m/s from ***P***$\pm45^0$ were added to the summation. (In the above example, ***P***$+45^0$ would be East and ***P***-45^0 would be North).

Finally, Figure B1 shows that at ***P***$\pm67.5^0$ winds up to 7.84 m/s have components up to 3 m/s parallel to ***P***. Total wind speeds above 5 m/s are not considered in noise assessments, as this is the limit of noise measurement validity in AS 1055, so the percentage occurrences of winds up to 5 m/s from ***P***$\pm67.5^0$ were added to the summation. (In the above example, ***P***$+67.5^0$ would be ESE and ***P***-67.5^0 would be NNW).

This process was repeated for each of the 16 primary wind directions. Because the assessment of winds in each direction includes information from six 'side-band' directions, the results may bear little resemblance to wind roses of the same data set. Also, since winds from each direction may be included in the summation for up to seven primary directions, the seasonal percentages added over all directions will considerably exceed 100%. This method of wind assessment results in higher percentage wind occurrences from a greater number of directions than results from the OEH "Procedures to estimate the frequency of wind conditions that enhance noise levels" (Oct 2009).

ATTACHMENT 2

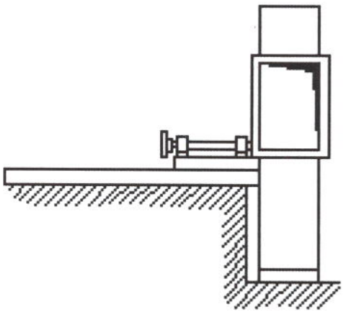
Ashton Coal
Study ID: 222205

Our ref.

FAN DESCRIPTION	Type:DY SL	Design temperature:20 °C	Arrangement:S8A
Nominal diameter:3060 mm	Rotating nominal speed:499 tr/min		Rotating maxi speed:500 tr/min

Installation conditions

Inlet pressure	**Total**
Ducted inlet	**Yes**
Inlet box	**No**
Outlet pressure	**Static**
Ducted outlet	**No**
Outlet pelican diffuser	**Yes**
Outlet diffuser	**Yes**
Diffuser velocity at max. flow	**11.4 m/s**
Performance control	**Speed**



S8A

Loads description

Heat coefficient ratio	**1.4**
On site barometric pressure	**101325 Pa**

Load number	**1**
Designation	
Inlet flow	**150 m3/s**
Inlet density	**1.2 kg/m3**
Inlet temperature	**20 °C**
Inlet pressure	**-2500 Pa**
Outlet pressure	**0 Pa**

Air performance results

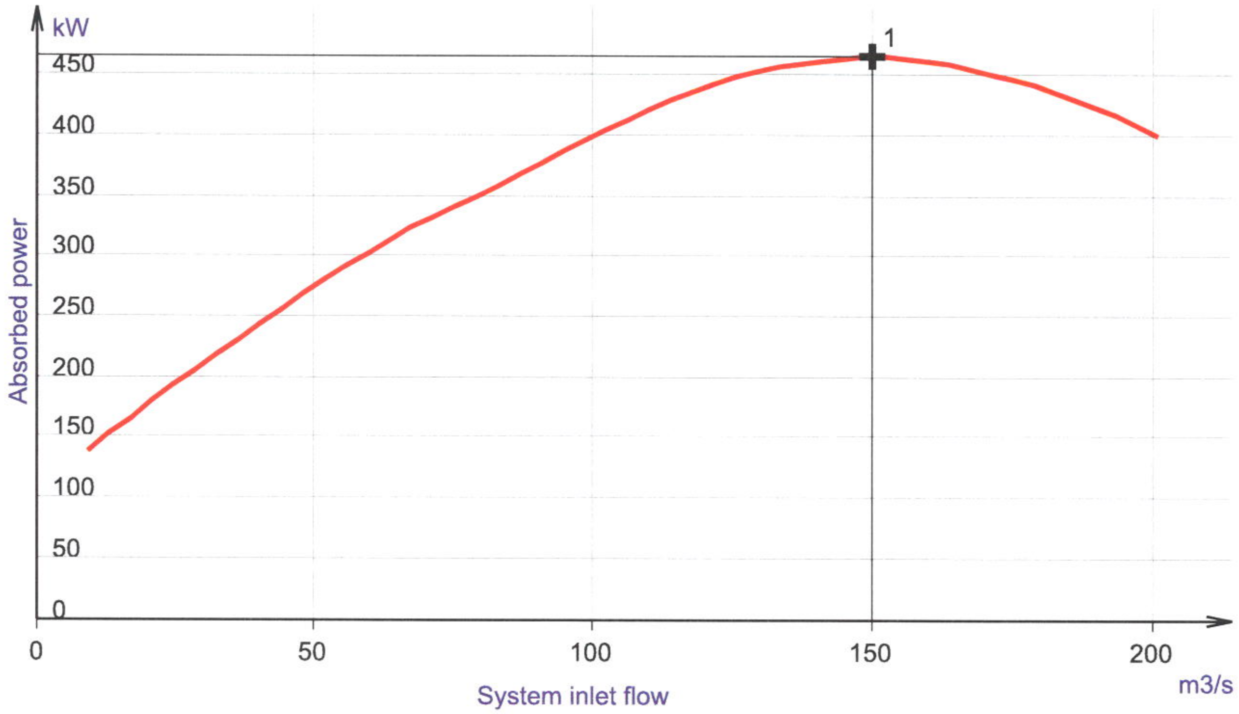
Blade	**type airfoil**
Impeller	**type single inlet**
Absorbed power at no flow and 20 °C	**172 kW**
Length of oulet diffuser	**3617.4 mm**
Outlet area of outlet diffuser	**12.9232 m2**
Length of Pelican diffusor	**965.2 mm**

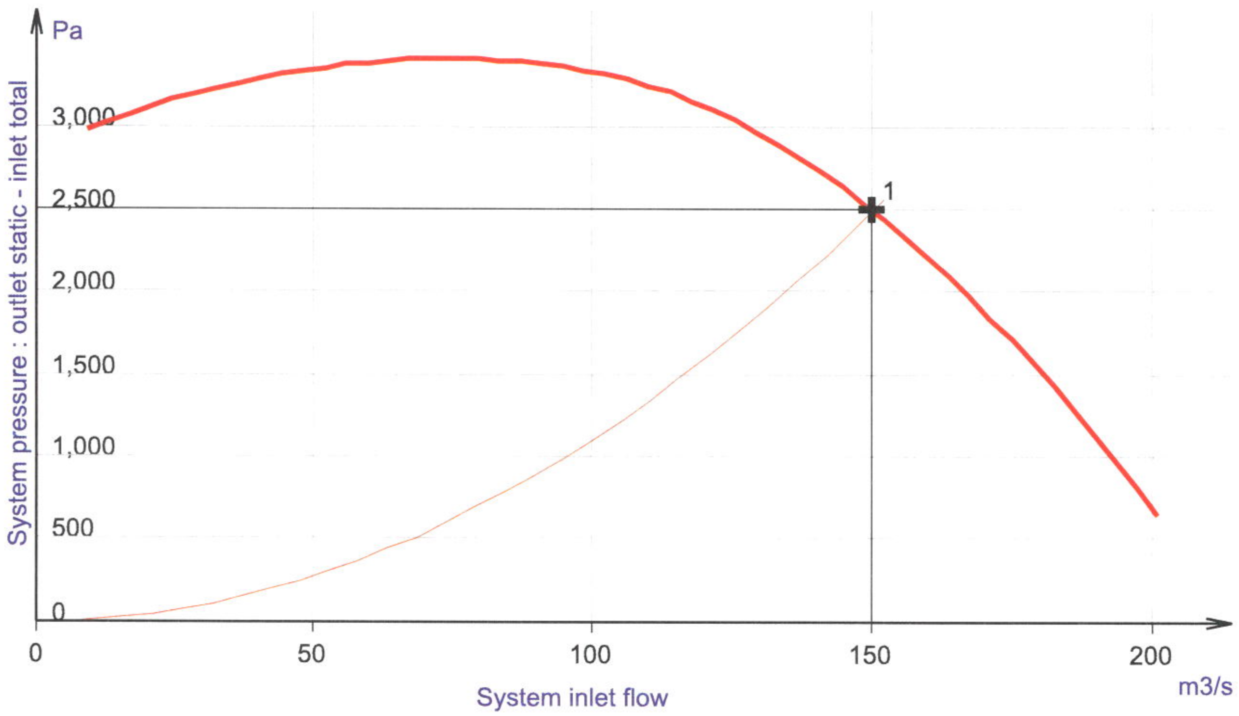
Load	**1**
Density at system inlet	**1.2 kg/m3**
Calculated pressure	**2624 Pa**
Absorbed power at operating temperature	**466 kW**
Fan efficiency	**83.8 %**
Static fan efficiency	**76.4 %**
Calculated speed	**499 tr/min**
Tolerance on flow	**Without negative tolerances**
Tolerance on pressure	**Without negative tolerances**
Tolerance on power	**Without negative tolerances**
Tolerance on efficiency	**Without negative tolerances**

Ashton Coal
Study ID: 222205

Our ref.

FAN DESCRIPTION	Type:DY SL	Design temperature:20 °C	Arrangement:S8A
Nominal diameter:3060 mm	Rotating nominal speed:499 tr/min		Rotating maxi speed:500 tr/min





Curves correspond to the following conditions at inlet

Specific weight	**1.2 kg/m3**
Temperature	**20 °C**
Static pressure	**-2721 Pa**
Curves plotted at	**499 tr/min**

Ashton Coal
Study ID: 222205
Our ref.

FAN DESCRIPTION	Type:DY SL	Design temperature:20 °C	Arrangement:S8A
Nominal diameter:3060 mm	Rotating nominal speed:499 tr/min		Rotating maxi speed:500 tr/min

Sound

Inlet spectrum results

		Spectrum analysis (Hz) dB(lin)							
Spectrum description	*Global (dBA)*	*63*	*125*	*250*	*500*	*1000*	*2000*	*4000*	*8000*
PWL at inlet	110	114	116	112	107	103	99	97	95

Outlet spectrum results

		Spectrum analysis (Hz) dB(lin)							
Spectrum description	*Global (dBA)*	*63*	*125*	*250*	*500*	*1000*	*2000*	*4000*	*8000*
PWL in duct at outlet	118	125	123	119	115	114	104	99	89

Casing noise

Calculation according to NFS 31-021 Lpc

Distance between the measurement point and the reference surface: d **1000 mm**

Casing acoustic results

Inlet and outlet ducted

		Spectrum analysis (Hz) dB(lin)							
Spectrum description	*Global (dBA)*	*63*	*125*	*250*	*500*	*1000*	*2000*	*4000*	*8000*
SPL casing (NFS 31.021) without acoustic insulation	89	84	88	88	84	82	80	78	77

FAN DESCRIPTION	Type:DY SL	Design temperature:20 °C	Arrangement:S8A
Nominal diameter:3060 mm	Rotating nominal speed:499 tr/min		Rotating maxi speed:500 tr/min

Impeller + Hub

Impeller

Thickness n°1	**6 mm**
Backplate type	**Bolted**
Thickness n°1	**20 mm**
Shroud type	**Single thickness**
Thickness n°1	**12 mm**

Blades

Material of blades	**S 355 K2+N**

Backplate

Material of the backplate	**S 355 K2+N**

Shroud

Material of the shroud	**S 355 K2+N**

Hub

Fabricated hub material	**Automatic**

Hub

Hub type	**Fabricated**
Material of the hub	**S 355 JO / S 355 K2+N**

Shaft + Bearings

Vibratory risk

Minimum required first critical speed coefficient	**Automatic**

Shaft

Shaft type	**Straight**
Designation of shaft material	**S 355 JO**
Shaft diameter at the impeller level	**215 mm**
Shaft diameter at the bearings level	**220 mm**
Minimum required first critical speed coefficient	**1.5**

Seal

Shaft seal type	**Technopal Cover plate (fitted on springs)**
Bearing housing designation	**244**

Bearings

Bearing type	**Roller**
Bearing lubrication	**Oil**
Material of bearing housing	**Cast iron**
Minimum bearing life time	**Technopal (80000 h)**

Coupling/Transmissions

Drive type	**Elastermeric**

Total rotor mass	**4245 kg**
Total rotor inertia (MR^2)	**3811.85 kg.m2**

Stator

Inlet Cone

Inlet cone material	**S 235 JR G2**
Inlet cone calculated thickness	**8 mm**

FAN DESCRIPTION	Type:DY SL	Design temperature:20 °C	Arrangement:S8A
Nominal diameter:3060 mm	Rotating nominal speed:499 tr/min		Rotating maxi speed:500 tr/min

Casing + Inlet Box

Scroll wearplate liners	**No**
Side plates liners	**No**

Ground fixing

Method of mounting casing and bearings to foundation	**Direct**

Casing

Calculated thickness of casing side plate	**8 mm**
Calculated thickness of casing scroll plate	**6 mm**

Casing + Inlet Box

Designation of casing (+ inlet box(es)) plates material	**S 235 JR G2**
Total casing mass	**6010 kg**
Total inlet cone(s) mass	**557 kg**

Pedestal

Pedestal material	**S 235 JR G2**
Total mass of the pedestal	**1330 kg**

FAN DESCRIPTION	Type:DY SL	Design temperature:20 °C	Arrangement:S8A
Nominal diameter:3060 mm	Rotating nominal speed:499 tr/min		Rotating maxi speed:500 tr/min

Fan results

Fan

Fan total mass **13025 kg**

Pelican diffusor results

Material **S 235 JR G2**

Thickness **6 mm**

Mass **826 kg**

Diffusor results

Material **S 235 JR G2**

Thickness **6 mm**

Mass **2925 kg**

FAN DESCRIPTION	Type:DY SL	Design temperature:20 °C	Arrangement:S8A
Nominal diameter:3060 mm	Rotating nominal speed:499 tr/min		Rotating maxi speed:500 tr/min

Technical conditions

Air performance

- The minimum required motor power at operating temperature is equal to 512 kW taking into account the dust content
- The motor must also take into account the gas temperature at starting and the starting time
- The fan should be started with inlet vanes or dampers closed.

Sound

- Tolerances : overall octive band +/- 3 dB, spectrum +/- 5 dB
- The fan sound powers levels do not take into account the motor noise
- The values of the acoustic pressures levels do not take into account the external emissions (background noise already existing where the fan is located, local reflection)
- The calculated sound pressures levels according NFS 31-021 do not take into account the motor noise

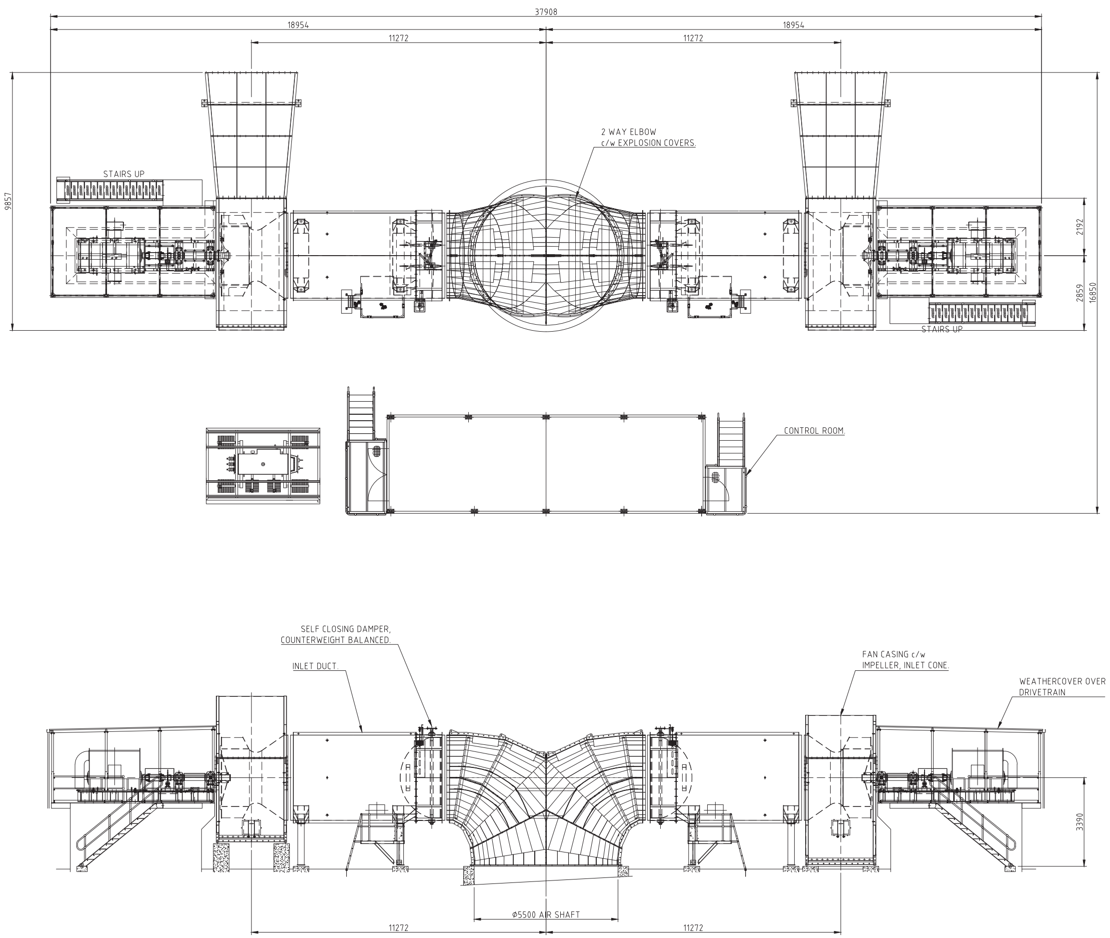
Impeller + Hub

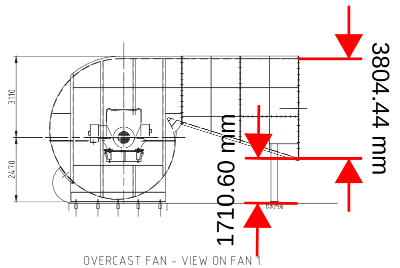
- Welding according standards NF EN 288-3 and ASME section 9
- Welders qualification according standards NF EN 287-1 and 2 and ASME section 9
- Unless otherwise specified, the rotor is designed for continuous operation or cyclic operation with a maximum of 5000 starts
- For a fan operating at variable speed, the number of large amplitude speed variations (greater or equal to 50% of maximum speed)is limited to 5000
- The rotor balancing is performed according standard ISO DIN 1940-1 quality 6.3

Shaft + Bearings + Stator

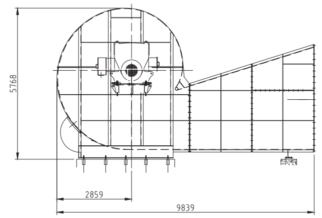
- The coupling saftey factor is equal to 1.5 (ratio maximum design torque to motor torque at operating speed)
- The coupling is designed for continuous operation with a variable speed motor. The harmonic torques of the driving device must be reduced to minimum values
- The brands and designations of some composents (bearings, couplings, actuators, etc) are given for reference only and may be changed at the final design stage
- Unless otherwise specified in the offer, pelican or other types of diffusors are not included in the scope of supply
- Calculations have been made taking into account a motor power equal to 512 kW. A higher value, for this power, may have an impact on the rotor design.
- The critical speed ratio is calculated with a radial stiffness of 3e9 N/m at bearing axis location.

PRELIMINARY DRAWING
NOT TO BE USED FOR CONSTRUCTION PURPOSES





OVERCAST FAN - VIEW ON FAN 1.



UNDERCAST FAN - VIEW ON FAN 2.

PRELIMINARY DRAWING
NOT TO BE USED FOR CONSTRUCTION PURPOSES

REV No	ZONE	DATE	DETAILS	BY
1		14/6/11	GENERAL UPDATE, DRAWN TO SCALE	C.C.

PAINTING AND SURFACE TREATMENT

OTHER THAN SHOWN SEPARATELY PAINTING SURFACE TREATMENT IS :

REFER TO COATING CARD

"INTERNAL" MEANS ALL PARTS IN THE GAS STREAM

REFERENCE LIST TO BE USED IN CONJUNCTION WITH THIS DRAWING

DRAWING No	TITLE	DRAWING No	TITLE

MATERIALS AND WORKSHOP

MATERIALS SHALL BE NEW, TO SPECIFICATION AND IN GOOD CONDITION.

WORKMANSHIP SHALL BE FIRST CLASS EMPLOYING "STATE OF THE ART" EQUIPMENT AND PROCESSES.

ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO RELEVANT AUSTRALIAN STANDARDS EXCEPT WHERE SHOWN SEPERATELY.

3RD ANGLE PROJECTION UNLESS SHOWN OTHERWISE

TOLERANCES EXCEPT SHOWN SEPARATELY

MACHINED SURFACES: DECIMALS ± 0.1 MM; INTEGERS ± 0.5 MM
SURFACES 1.6 OR N7
FINISH SHAFTS
OTHER 3.2 OR N8

FABRICATIONS: HOLE CENTERS UP TO 1000MM ± 2 MM, ABOVE 1000 MM ± 3 MM; OTHER DIMENSIONS UP TO 1000 MM ± 2 MM, ABOVE 1000 MM ± 3 MM

TOLERANCES: SHALL BE NON CUMULATIVE

TITLE: PRELIMINARY LAYOUT
DY 306 FANS
TWIN PA FANS

APPROVED	CHECKED	CUST. REF.			REV.
DRAWN C.C.	SCALE 1:100	OUR REF.	FlaktWoods FläktWoods Fans (Aust.) Pty.Ltd.	A1	1
DATE 30/5/11		SHEET 1 OF 1	DWG. No. DY-306-12589		