Baiada Poultry Pty Limited

STATEMENT OF ENVIRONMENTAL EFFECTS

Section 96(2) Modification Application

APPENDIX I –

Noise Impact Assessment
(*Reverb Acoustics,* 2007)

Oakburn Processing Complex
Oxley Highway, Tamworth NSW

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REVERB ACOUSTICS

Noise and Vibration Consultants

Noise Impact Assessment
Proposed Upgrade to
Oakburn Processing Complex
Oxley Highway
Tamworth NSW

March 2007

Prepared for Baiada (Tamworth) Pty Limited
Report No. 06-1004-R1

Building Acoustics – Council/DEC Submissions - Modelling - Compliance - Certification

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TABLE OF CONTENTS

1 INTRODUCTION

Reverb Acoustics has been commissioned to conduct a noise impact assessment for a proposal to increase the approved capacity of Baiada's Oakburn Processing Complex (Stage 4 of DA53/97) in Tamworth, from 750 000 birds per week to 1 million birds per week.

The purpose of the assessment was to determine the noise impact, construction and operation of the complex would have on the surrounding rural environment and to ensure any noise control measures required for the complex are incorporated during the design stages. The assessment is to accompany and forms part of a Statement of Environmental Effects (SEE) required as part of a Section 96(2) Application to the Department of Planning (DoP).

2 TECHNICAL REFERENCE / DOCUMENTS

Beranek, L.L and Istvan, L.V. (1992). *Noise and Vibration Control Engineering.* John Wiley and Sons, Inc.

Bies, D.A. and Hansen, C.H. (1996). *Engineering Noise Control: Theory and Practice*. London, E & F.N. Spon.

Hassall, J.R. and Zaveri, K. (1988) *Brüel & Kjaer – Acoustic Noise Measurements.* Denmark, K. Larson and Son.

Harris, C.M. (ed) (1957). *Handbook of Noise Control.* New York, McGraw-Hill.

Peterson, A.P.G. (1980). *Handbook of Noise Measurement*. Massachusetts, Genrad Inc.

Sharland, I. (1998). *Woods Practical Guide to Noise Control.* England, Woods Acoustics

AS 1055.1.2.3-1997 *"Acoustics – Description and measurement of environmental noise"*.

NSW Environment Protection Authority (2000). *Industrial Noise Policy*

NSW Environment Protection Authority (1999). *Environmental Criteria for Road Traffic Noise*

NSW Environment Protection Authority (1992). *Environmental Noise Control Manual*

NSW Roads and Traffic Authority (2001). *Environmental Noise Management Manual*

HK Clarke & Associates Pty Ltd (1997). *A Noise Impact Assessment for the Proposed Poultry Processing Plant on the Oxley Highway, Tamworth.*

A Glossary of commonly used acoustical terms is presented in Appendix A to aid the reader in understanding the Report.

3 DESCRIPTION OF THE PROPOSAL

Baiada (Tamworth) Pty Limited are required to submit a Section 96(2) Application to DoP in order to increase the approved capacity of Baiada's Oakburn Processing Plant (Stage 4 of DA53/97), Oxley Highway, Tamworth, from 750 000 birds per week to 1 million birds per week. We understand that Stages 1, 2 and 3 of the Oakburn Complex, as approved under DA53/97 are adequate to process the additional capacity.

The Baiada processing complex that currently operates in Tamworth city will be closed and relocated to the Oakburn site to operate in conjunction with the rendering plant at the site. Potential noise sources, which may impact nearby neighbours, will include initial construction activities involving earthworks to level and prepare the site followed by construction of new buildings and associated access roads, etc. Once operation of the complex begins, noise impacts from plant and machinery, trucks are expected. Other noise sources include general site noise such as truck refrigeration units, employee vehicle movements, delivery vehicles, mechanical equipment and other maintenance and landscaping machinery. Of these, only the processing plant, rendering plant, refrigeration plant and truck movements are expected at night. With the exception of visitors' vehicles, all vehicles and trucks will enter and leave the site via a private access road to link with Goddard's Lane.

The assessment includes measurement of the existing acoustic environment by Reverb Acoustics and others, to provide baseline data and enable establishment of noise assessment criteria. Noise impacts from produce and commodity trucks are assessed at typical residences along the transport route. Plans supplied by Bath Stewart Associates show the layout of the site and the location of nearby land uses

4 BACKGROUND NOISE SURVEY

Consideration must be given to the extent of the existing acoustic environment and whether such levels are appropriate for the land use of the receiver area. Nearest residential receivers are as follows:

1. Girrawheen: Old Winton Road, 1700m west of the site.
2. Abbeylands: Bowler's Lane, 1400m north of the site.
3. The Billabong: Wallamore Road, 1800m east of the site.
4. Various Residences: New Winton Road (south of airport), 2400m south of the site.

Copies of Reverb Acoustics Calibration Certificates, for all monitoring equipment, are contained in Appendix C, while certificates for HK Clarke's instrumentation can be obtained upon request.

Background noise level surveys were conducted by HK Clarke & Associates in December 2005 at Girrawheen and in August 2006 in the residential area south of the airport along New Winton Road. Further attended background noise levels measurements were also conducted by Reverb Acoustics in January 2007 at Abbeylands and The Billabong. Table 1 shows a summary of results, with high wind/rain periods excluded prior to analysis, including the Rating Background Level (RBL) which was calculated from Assessment Background Levels (ABL's), for the day, evening and night periods, according to the procedures described in the Department of Environment and Conservation's (DEC's) Industrial Noise Policy and as detailed in Australian Standard AS1055-1997, "Acoustics - Description and Measurement of Environmental Noise, Part 1 General Procedures".

Table 1: Summary of Noise Monitoring Results, dB(A)

Background L90			Ambient Leq		
Day 7am-6pm	**Evening 6pm-10pm**	**Night 10pm-7am**	**Day 7am-6pm**	**Evening 6pm-10pm**	**Night 10pm-7am**
Girrahween					
30	30	31	52	52	46
Abbeylands					
32	31	29	48	46	46
The Billabong					
38	34	32	57	54	47
New Winton Road (south of airport)					
40	36	34	58	54	45
62dB(A),Leq(15hr) 55dB(A),Leq(9hr) 20m from Oxley Highway					

As can be seen by the above results, very similar and low Rating Background Levels have been determined for the day, evening and night periods, which is common in rural areas with little or no industrial activity during the day and some noise from insects, frogs, etc, at night.

5 CRITERIA

5.1 Road Traffic Noise

The Roads and Traffic Authority (RTA) base their assessment criteria on those outlined by the DEC. The DEC's Environmental Criteria for Road Traffic Noise (ECRTN) contains a number of criteria applied to a variety of road categories (freeway, collector and local roads) and situations (new, upgraded roads and new developments creating additional traffic on roads). Table 2 shows the relevant categories, taken from Table 1 of the ECRTN:

Table 2: - Extract from Table 1 of ECRTN Relevant Traffic Noise Criteria.

	Development Type	Day	Night	Where Criteria are Already Exceeded
7	Land use developments creating additional traffic on freeway/arterial roads	60 LAeq,15hr	55 LAeq,9hr	Designed not to lead to an increase in existing noise levels of more than 2dB
8	Land use developments creating additional traffic on collector roads	60 LAeq,1hr	55 LAeq,1hr	Designed not to lead to an increase in existing noise levels of more than 2dB
13	Land use developments creating additional traffic on local roads	55 LAeq,1hr	50 LAeq,1hr	Designed not to lead to an increase in existing noise levels of more than 2dB

Road categories are defined in the ECRTN as follows:

Freeway/arterial includes sub-arterial roads and refers to roads handling through traffic, with characteristically heavy and continuous traffic flows during peak periods. Through traffic is traffic passing through a locality bound for another locality.

Collector road refers to a road situated in a built up area that collects local traffic leaving a locality and connects to a sub-arterial road.

Local road-rural refers to a road situated in rural areas and handling local traffic with characteristically intermittent traffic flows.

Based on the above definitions, the Oxley Highway is classified as an arterial road.

5.2 Site Operation (Planning Noise Levels)

Noise from industrial noise sources scheduled under the Protection of Environment Operations Act is assessed using the DEC's INP. However, local Councils may also apply the criteria for land use planning, compliance and complaints management. The DEC's INP specifies two separate criteria designed to ensure existing and future developments meet environmental noise objectives. The first limits intrusive noise to 5dB(A) above the background noise level and the other applies to protection of amenity of particular land uses based on the existing (Leq) noise level from industrial and commercial noise sources. Project Specific Noise Levels are established for new developments by applying both criteria to the situation and adopting the more stringent of the two.

The existing L(A)eq for the receiver area is dominated by traffic on nearby roads and natural noise sources. Reference to Table 2.1 of the INP shows that the area is classified as rural, i.e. an area generally characterised by low background noise levels (except in the immediate vicinity of industrial noise sources). Industrial noise contributions are more than 6dB(A) below the recommended Leq, so the recommended Acceptable Noise Level (ANL) applies in this case, i.e. no ANL reduction required for industrial noise contributions. Table 2 below specifies the applicable base objectives for the proposed development.

Table 3 below specifies the applicable base objectives for the proposed development. In high traffic areas where the existing traffic noise levels are at least 10dB above the Acceptable Noise Level, the high traffic amenity criterion applies.

Table 3: - Base Noise Level Objectives

Period	Intrusiveness Criterion	Amenity Criterion
Girrawheen		
Day	35 (30+5)	50
Evening	35 (30+5)	45
Night	35 (30+5) #	40
Abbeylands		
Day	37 (32+5)	50
Evening	36 (31+5)	45
Night	35 (30+5) ##	40
The Billabong		
Day	43 (38+5)	50
Evening	39 (34+5)	45
Night	37 (32+5)	40
New Winton Road (south of airport)		
Day	45 (40+5)	50
Evening	41 (36+5)	45
Night	39 (34+5)	40
Receiver Type: Rural (See DEC's INP - Table 2.1)		

Page 5 of the DEC's *Application Notes-NSW Industrial Noise Policy* recommends that the intrusive noise level for evening be set no greater than the intrusive noise level for daytime and the intrusive noise level for night be set no greater than the intrusive noise level for evening.
Section B1.3.3 of the INP states that when the existing background level is below 30dB(A), the rating background noise level is set to 30dB(A).

Project specific noise levels, determined as the more stringent of the intrusiveness criterion and the amenity / high traffic criterion, are as follows:

Girrawheen
Day **35dB LAeq,15 Minute** 7am to 6pm Mon to Sat or 8am to 6pm Sun and Pub Hol.
Evening **35dB LAeq,15 Minute** 6pm to 10pm.
Night **35dB LAeq,15 Minute** 10pm to 7am Mon to Sat or 10pm to 8am Sun and Pub Hol.

Abbeylands
Day **37dB LAeq,15 Minute** 7am to 6pm Mon to Sat or 8am to 6pm Sun and Pub Hol.
Evening **36dB LAeq,15 Minute** 6pm to 10pm.
Night **35dB LAeq,15 Minute** 10pm to 7am Mon to Sat or 10pm to 8am Sun and Pub Hol.

The Billabong
Day **43dB LAeq,15 Minute** 7am to 6pm Mon to Sat or 8am to 6pm Sun and Pub Hol.
Evening **39dB LAeq,15 Minute** 6pm to 10pm.
Night **37dB LAeq,15 Minute** 10pm to 7am Mon to Sat or 10pm to 8am Sun and Pub Hol.

New Winton Road (south of airport)
Day **45dB LAeq,15 Minute** 7am to 6pm Mon to Sat or 8am to 6pm Sun and Pub Hol.
Evening **41dB LAeq,15 Minute** 6pm to 10pm.
Night **39dB LAeq,15 Minute** 10pm to 7am Mon to Sat or 10pm to 8am Sun and Pub Hol.

5.3 Construction

Activities required to construct the complex include removal of topsoil, establishment of access roads, together with construction of buildings. Significant construction is expected to occur on the site for approximately 60 weeks from commencement of earthworks to commissioning. Criteria applied to the assessment were sourced from Section 171 of the DEC's ENCM which specifies noise limits at the worst affected receivers as shown in Table 4 below.

Table 4: Construction Noise Criteria

Construction Period	Level Restrictions	Recommended Criteria
Girrawheen		
Less than 4 weeks	Existing Background + 20 dB	50
Less than 26 weeks	Existing Background + 10 dB	40
More than 26 weeks	Existing Background + 5 dB	35
Abbeylands		
Less than 4 weeks	Existing Background + 20 dB	52
Less than 26 weeks	Existing Background + 10 dB	42
More than 26 weeks	Existing Background + 5 dB	37
The Billabong		
Less than 4 weeks	Existing Background + 20 dB	58
Less than 26 weeks	Existing Background + 10 dB	48
More than 26 weeks	Existing Background + 5 dB	43
Airport South		
Less than 4 weeks	Existing Background + 20 dB	60
Less than 26 weeks	Existing Background + 10 dB	50
More than 26 weeks	Existing Background + 5 dB	45

Construction criteria are only applicable for the hours 7am to 6pm Monday to Friday and 8am to 1pm Saturday. Construction activities outside these times are required to meet normal planning levels applied to operation of an industrial development, which are likely to be significantly lower at night (10.00pm to 7.00am) and marginally lower during the day on weekends and public holidays.

6 METHODOLOGY

6.1 Traffic

Due to the non-continuous nature of traffic flow to and from the site, predicted traffic noise on nearby roads for arriving and departing vehicles, was calculated using the US EPA's Intermittent Traffic Noise calculation method. This method was adopted because of the relatively infrequent traffic movements associated with the development.

Equation 1 outlines the mathematical formula used in calculating the Leq,T noise level at a typical residence at varying distances from the transport route, for a typical day and a theoretical peak day in any maximum construction and production year.

$$L_{eq},T = L_b + 10\log\left[1 + \frac{ND}{T}\left(\frac{10^{(L\max - Lb)/10} - 1}{2.3} - \frac{\left(L_{\max} - L_b\right)}{10}\right)\right] \quad \text{..... Equation 1}$$

Where L_b is background noise level, dB(A)
L_{MAX} is vehicle noise, dB(A)
T is the time for each group of vehicles (min)
N is number of vehicle trips
D is duration of noise of each vehicle (min)

Typical vehicle noise levels were measured during our site visit to the existing processing complex in Tamworth and compared to data for previously measured trucks and vehicles contained in our library of technical data to ensure realistic values were used, while background noise levels are those described in Section 4. The Lmax vehicle noise levels used in Equation 1 are the maximum predicted noise levels produced at the facade of the residence by vehicles entering/departing the site and travelling on public roads.

6.2 Site Noise

Future noise sources on the site cannot be measured at this time, consequently noise levels produced by plant and machinery to be used on the site were measured at the existing processing plant at Tamworth and/or sourced from manufacturers' data and/or our library of technical data, which has been accumulated from measurements taken in many similar situations on other sites for others. All noise level measurements were taken with a Svan 912AE Sound and Vibration Analyser. This instrument is Type 1 accuracy, in accordance with the requirements of AS1259, and has the capability to measure steady, fluctuating, intermittent and/or impulsive sound, and to compute and display percentile noise levels for the measuring period.

A calibration signal was used to align the instrument train prior to measuring and checked at the conclusion. Difference in the two measurements was less than 0.5dB.

Each measurement was taken over a representative time period to include all aspects of machine/process operation, including additional start-up noise where applicable. Items of equipment, which produced a brief burst of noise, were measured for a similarly brief time period to ensure the results were not influenced by long periods of inactivity between operations.

Sound measurements were generally made around all sides of each machine, to enable the acoustic sound power (dB re 1pW) to be calculated. The sound power level of each item is then theoretically propagated to each receiver with allowances made for spherical spreading, directivity, molecular absorption, intervening topography or barriers and ground effects giving the received noise level at the receiver from that particular plant item.

Addition of the received Sound Pressure Level (SPL) for each of the individual operating sources gives the total SPL at each receiver, which is then compared to the relevant criterion. Where noise impacts above the criterion are identified, suitable noise control measures are implemented and reassessed to demonstrate satisfactory received noise levels.

The theoretical assessment is based on a worst-case scenario, where all fixed plant items are operating simultaneously in a location most exposed to the surrounding residences. In reality, most plant will be located behind structures, so actual received noise levels are expected to be less than the predictions shown in this report, or at worst equal to the predicted noise levels for only part of the time.

Calculations were performed with RTA Technology Environmental Noise Model computer software, which accepts information on ground type and topography, source and receiver locations, weather details and source sound power spectra. Ground contours were obtained from topographical maps. Results from the noise model are presented within this Report for various assessed situations.

6.2.1 Atmospheric Conditions

In the Tamworth region atmospheric conditions can exacerbate received noise levels for a percentage of the time. Temperature inversions may be expected in the area during the night and early morning at a frequency of greater than 30% of the time during winter and to a lesser degree in the warmer months. Inversion effects are strongest in the early hours of the morning but tend to weaken rapidly and may be considered to have completely dissipated by 9am or earlier. The ENM model was prepared for the following operating scenarios, as shown below:

1. Neutral atmospheric conditions for day/evening/night, i.e. no wind.
2. 3m/sec wind source to receiver (day).
3. F-class temperature inversion of 3°C/100m for night. (See Table C2, Appendix C-DEC's INP)

An F-class inversion, i.e. 3°C/100m, is typical in the Tamworth district and slightly weaker inversions are generally expected for coastal areas. Therefore, we have modelled this default inversion strength.

Wind in a particular direction causes increased received noise levels at downwind receivers, therefore the effect of noise enhancement due to wind has been considered, i.e. 3m/s source to receiver wind.

7 ANALYSIS AND DISCUSSION

7.1 Traffic Noise Assessment

Traffic due to the proposal travelling on the Oxley Highway is assessed separate to site noise and is subject to the criteria described in Section 5.1 of this Report. While noise emissions vary from one truck to another, an estimated average maximum truck sound power level of 108dB(A) has been used for a typical truck in fairly good condition operating at full power. Cars typically produce an average sound power of 92dB(A), however wide variations are noted particularly with smaller modern cars and larger V8 or diesel powered vehicles.

Table 5 shows daily traffic figures used for the assessment. It is assumed that more vehicles will visit the site between 7am and 10pm. Figures for the construction phase have been assumed based on typical construction projects of this size, while traffic movements for operation of the site are based on data supplied by Baiada (Tamworth) Pty Limited. One vehicle entering then leaving the site is considered to be 2 separate movements for the purposes of this assessment. We understand all trucks and cars will enter and leave the site via the internal access road off Goddard's Lane to link with the Oxley Highway, with the exception of visitors vehicles.

The number of employee/visitor vehicles visiting the site each day is 617, assuming a 30% car pool. It is further assumed the majority of vehicle movements will occur at the change of shift).

Live bird deliveries to the site are generally by B-doubles and articulated trucks with an expected 72 movements per day. Similarly, B-doubles and articulated trucks will dispatch stock, with an expected frequency of 29 movements per day (including the rendering plant).

Table 5: Vehicle Movements, Oxley Highway

Activity	**Operation (typical/peak)**		**Construction (peak)**	
Vehicle Type	**Cars**	**Trucks**	**Cars**	**Trucks**
Movements/day (7am-10pm)	385	65	80	30
Movements/night (10pm-7am)	232	36	-	-

Note: Hourly figures are taken at the busiest period, i.e. during change of shift, major concrete pour, etc.

Actual vehicle movements are expected to vary from day to day, particularly during construction. Peak construction traffic is expected to occur during large concrete pours or significant excavating or land filling, as concrete or dump trucks ferry material to or from the site. With care to ensure excavated and filled areas are balanced on the site, peak construction traffic will be limited to busy periods such as concrete pouring rather than the entire construction period. Construction traffic has been combined with the operational traffic at the complex.

Other vehicle movements during operation of the complex include private vehicles for occasional deliveries of maintenance, replacement equipment, etc. Approximately 385 vehicle movements and 65 truck movements are estimated during a typical day, with perhaps a further 25 vehicles (50 movements) and 5 trucks (10 movements) estimated during maintenance periods or other unusual circumstances. Worst case traffic noise generated by the proposal is therefore estimated to be 75 truck movements and 435 smaller vehicle movements per day.

The following Tables show results of traffic noise calculations, propagated to a theoretical facade at varying distances from Oxley Highway. Received noise is the combined noise impact from cars and trucks at the facade. Note that our calculations assume all vehicles will approach and depart the site from the same direction.

Table 6: Traffic Noise Calculations, dB(A) – 20 metres from Oxley Highway

Traffic and Receiver	Peak Operation (Day)		Peak Construction (Day)		Peak Operation (Night)	
Vehicle Type	Cars	Trucks	Cars	Trucks	Cars	Trucks
Movements per hour	435	75	80	30	232	36
Vehicle Sound Power	92	108	92	108	92	108
Distance to Receiver, m	20					
Received Noise Level	42.0	51.6	34.6	47.6	41.5	50.6
Combined	**52.1**		**47.8**		**51.1**	
Total Received	**53.5**				**51.1**	
Criterion	60dB(A),Leq (15hr)				55dB(A),Leq (9hr)	
Impact	**-**		**-**		**-**	
Sum current & future	**62.6**				**56.5**	
Criteria	**64 (62 + 2)**				**57 (55 + 2)**	
Noise level increase	**0.6**				**1.5**	
Acceptable	**Yes**				**Yes**	

Table 7: Traffic Noise Calculations, dB(A) – 50 metres from Oxley Highway

Traffic and Receiver	Peak Operation (Day)		Peak Construction (Day)		Peak Operation (Night)	
Vehicle Type	Cars	Trucks	Cars	Trucks	Cars	Trucks
Movements per hour	435	75	80	30	232	36
Vehicle Sound Power	92	108	92	108	92	108
Distance to Receiver, m	50					
Received Noise Level	38.0	47.6	30.7	43.7	37.5	46.7
Combined	**48.1**		**43.9**		**47.2**	
Total Received	**49.5**				**47.2**	
Criterion	60dB(A),Leq (15hr)				55dB(A),Leq (9hr)	
Impact	**-**		**-**		**-**	
Sum current & future	**59.5**				**53.2**	
Criteria	**61 (59 + 2)**				**54 (52 + 2)**	
Noise level increase	**0.5**				**1.2**	
Acceptable	**Yes**				**Yes**	

Table 8: Traffic Noise Calculations, dB(A) – 100 metres from Oxley Highway

Traffic and Receiver	Peak Operation (Day)		Peak Construction (Day)		Peak Operation (Night)	
Vehicle Type	Cars	Trucks	Cars	Trucks	Cars	Trucks
Movements per hour	435	75	80	30	232	36
Vehicle Sound Power	92	108	92	108	92	108
Distance to Receiver, m	100					
Received Noise Level	35.0	44.6	27.7	40.6	24.5	43.7
Combined	**45.1**		**40.9**		**44.2**	
Total Received	**46.5**				**44.2**	
Criterion	60dB(A),Leq (15hr)				55dB(A),Leq (9hr)	
Impact	**-**		**-**		**-**	
Sum current & future	**56.5**				**50.2**	
Criteria	**58 (56 + 2)**				**51 (49 + 2)**	
Noise level increase	**0.5**				**1.2**	
Acceptable	**Yes**				**Yes**	

The above calculations show that traffic noise levels as a result of the complex are compliant with the day and night criteria for any residence 20 metres or more either side of the transport route along the Oxley Highway, during both operation and construction periods. The DEC also requires that the combined impact from existing and future traffic must not raise the noise level by more than 2dB(A), where the criteria are already exceeded. As can be seen by the above results, traffic noise levels will only rise by 0.6dB(A) during the day and 1.5dB(A) at night. Traffic movements associated with operation and construction of the complex are therefore considered acceptable.

7.2 Construction / Operational Noise (Plant and Equipment)

The Acoustic Power Levels of plant and machinery proposed for the site during construction and operation, which were input into our computer model, are shown in Table 9. The Table gives the A-weighted sound power levels for each listed plant item, principally based on measurements during our site visit at the existing Out Street processing plant in Tamworth, and with reference to manufacturers' data or our library of technical data. Also shown is the number of plant operating at each location on the site. It should be noted that the new complex will have the following improvements incorporated into the design:

1. A tube style ice maker will not be utilised at the new complex.
2. There will be no truck staging area, i.e. no waiting.
3. All unloading and loading of live bird modules and loading of finished goods will occur within the building.
4. All refrigeration/air conditioning plant will be located in a shielded location between the existing rendering plant and the proposed complex.
5. B-double uncoupling will only occur on internal roadways.

Table 9: Operation Plant and Equipment – Day/Evening/Night

Machine/Process	Lw dB(A)	Plant Deck	Main Complex	Yard	Render Plant	Access Road
Mechanical Plant	**99**	1				
Render Plant	**97**				1	
Refrigerated Truck	**109**		2			
B-Double Truck	**108**		1	1	1	1
Boiler Burner Exhaust	**96**		1			
Fork Lift	**104**		2			

Additional plant and noise sources encountered on the site include compressors, split system air conditioners, pumps, small evaporate condensers, etc, all of which produce a sound power less than 90dB. Collectively, with up to 3 or 4 sources operating simultaneously on occasions, the sum could be as high as 95dB. This overall sum is at least 10dB below significant sources shown in Table 9, therefore they will not contribute or raise the sound level at nearby receivers.

Table 10 gives the A-weighted sound power levels for typical items of construction equipment. Also shown is the anticipated number of plant items operating on the site.

Table 10: Construction Plant and Equipment – Day

Plant Item	Lw dB(A)	No. Items
Excavator	106	2
Water Cart	113	1
Vibrating Roller	110	2
Bull Dozer	118	1
Render Plant	97	1
Concrete Agitator	107	2
Haul Truck	108	2
Framing Gun	107	2
Hammering	102	2

Tables 11 and 12 show predicted received noise levels at all nearby residential receivers under neutral and noise enhancing atmospheric conditions, during construction and operation of the complex, with no noise control in place.

Table 11: Received Noise Levels during Operation – No Noise Control

	Received Noise Levels, dB(A),Leq		
Residential Receiver	**Neutral Conditions # (Day/Even/Night)**	**3m/sec Wind Source to Rec (Day/Evening)**	**3°C/100m Inversion (Night)**
Girrawheen	24	27	26
Abbeylands	28	34	30
The Billabong	18	25	22
Airport South	21	24	22

No wind - 1°/100m temperature lapse.

Table 12: Received Noise Levels during Construction/Operation – No Noise Control

	Received Noise Levels, dB(A),Leq		
Residential Receiver	**Neutral Conditions # (Day)**	**3m/sec Wind Source to Rec (Day)**	**3°C/100m Inversion (Night)**
Girrawheen	34	37	-
Abbeylands	44	51	-
The Billabong	30	39	-
Airport South	29	32	-

No wind - 1º/100m temperature lapse.

Reference to the above Tables show no noise exceedances for and operation of the complex, during the day, evening or night at any receiver, under neutral (1º/100m temperature lapse) and noise enhancing (3m/s source to receiver wind for day and 3°/100m inversion at night) atmospheric conditions. Similarly, no noise exceedances during construction at the site are predicted during the day at Girrawheen, The Billabong or Southern Airport residences under neutral atmospheric conditions. However, exceedances of 7dB(A) are predicted at Abbeylands on occasion. Also, exceedances of 2dB(A)-14dB(A) may occur during construction under worst-case weather conditions (3m/s source to receiver wind) at all nearby receivers. We therefore strongly recommend that activities are closely monitored over the duration of the construction phase.

After earthworks are completed, average site noise will substantially reduce as steelwork erection and similar activities are conducted. All combustion engine plant, such as generators, compressors and welders, should be carefully checked to ensure they produce minimal noise, with particular attention to residential grade exhaust silencers and shielding around motors. Trucks and other machines should not be left idling unnecessarily, particularly when close to residences. Machines found to produce excessive noise compared to industry best practice should be removed from the site or stood down until repairs or modifications can be made.

Impact wrenches should be used sparingly, particularly in elevated locations, with hand tools or quiet hydraulic torque units preferred. Final stages of construction, such as electrical/mechanical fitting, glazing and painting, are expected to take a further couple of months but generate insignificant noise.

Table 13 shows some common construction equipment, together with noise control options and possible alternatives.

Table 13 - Noise Control, Common Noise Sources

Equipment / Process	Noise Source	Noise/Vibration Control	Possible Alternatives
Compressor Generator	Engine	Fit residential muffler. Acoustic enclosure.	Electric in preference to petrol/diesel. Plant to be Located outside building Use centralised generator system.
	Casing	Shielding around motor. Rubber tyred or stand on waffle pads and matting.	
Concrete breaking Drilling Core Holing	Hand piece	Fit silencer, reduces noise but not efficiency Enclosure / Screening	Use rotary drill or thermic lance (used to burn holes in and cut concrete) Laser cutting technology
	Bit	Use dampened bit to eliminate ringing. Once the surface is broken, noise is greatly reduced. Enclosure / Screening.	
	Air line	Seal air leaks, lag joints	
	Motor	Fit residential mufflers.	
Circular saw Angle grinder Brick saw	Vibration of blade/product.	Use sharp saws. Dampen blade. Clamp product.	Use handsaws where possible. Retro-fitting.
Hammering	Impact on nail		Screws
Brick bolster	Impact on brick	Rubber matting under brick	Cut bricks in a shielded area.
Rotary drills Boring	Drive motor and bit.	Acoustic screens and enclosures	Thermic lance Laser cutting technology.
Explosive tools (i.e. ramset gun)	Cartridge explosion	Use silenced gun	Drill fixing.
Material handling	Material impact	Cushioning by placing mattresses, foam, waffle matting on floor. Acoustic screening.	
Waste disposal	Dropping material in bin, trolley wheels.	Internally line bins and chutes with insertion rubber, conveyor belting, or similar. Use rubber tyred trolleys.	

Note: Generally, noise reductions of 7-10dB will be achieved with the use of barriers, 15-30dB by enclosures, 5-10dB from silencers and up to 20-25dB by substitution with an alternate process.

7.3 Cumulative Noise Impacts

To assess the cumulative noise impact on residential receivers involves superimposing future noise levels associated with the Oakburn Processing Complex on existing background and ambient noise levels. The two noise sources added together (Oakburn and background) would combine to raise the total noise level at the receiver.

Predicted Cumulative Noise Impacts at Residential Receivers would be calculated as follows:

Background Noise Level + Oakburn Noise Level = Total Noise at Residence

Existing noise levels, i.e. without the Oakburn Complex operating, are detailed in Section 4, while noise levels associated with future operation of the Oakburn Processing Complex are shown in Table 11.The noise level increase at nearest receivers is shown in Table 14 below.

Table 14: Increase in Background Noise level due to Oakburn Processing Complex

Location/Situation	Background Noise Level dB(A),L90	Oakburn Noise Level Night 3º/100m Inv db(A),Leq	Total Noise at Receiver dB(A),Leq
Girrawheen	31	26	32 (+1)
Abbeylands	29	30	33 (+4)
The Billabong	32	22	32 (0)
Airport South	34	22	34 (0)

As can be seen by the theoretical calculations in Table 14, the background noise level is predicted to increase by 1dB(A) and 4dB(A) at Girrawheen and Abbeylands under worst-case atmospheric conditions once the Oakburn Processing Complex begins operations, while no background noise level increases are expected at The Billabong and Airport South. It should be noted, however, that the combined noise impact at all receivers will be below the relevant criteria during all time periods at all receivers and is therefore considered acceptable.

8 CONCLUSION

An assessment into the potential acoustic impact from a proposal to increase Baiada's Oakburn Processing Plant from the approved capacity of 750 000 birds per week to 1 million birds per week has been completed.

Results show noise from operation of the site is not expected to exceed the relevant criterion at any receiver, under neutral and noise enhancing atmospheric conditions, during the day, evening or night.

Unloading and loading of live bird modules and loading of finished goods must occur within the building. To avoid waiting, no staging area is to be allocated for trucks.

A noise monitoring program, during commissioning, or in the early life of the site is recommended. This program will verify our predictions and in the unlikely event that complaints may arise, enable noise control strategies to be implemented, where required.

Traffic noise on the Oxley Highway will be within the criterion during operation and construction of the site at all nearby receivers and also at any receiver along the transport route, which is 20 metres or more from the road.

During construction the total impact at each residence is related to the received noise level and the duration of excessive noise. Machines and equipment are expected to be at least 1400 metres from the nearest residence and continue for more than 26 weeks, implying a background +5dB(A) criterion. Theoretical calculations indicate that exceedances are expected on occasion during construction of the complex. We therefore strongly recommend that activities are closely monitored over the duration of the construction phase.

To reduce the impact in the area during construction, we recommend that louder construction activities, in particular major earthworks, are restricted to the late morning and afternoon, when most people will be active or at work and background noise levels will be higher. Additionally, machines used on the site must be maintained in good condition to minimise source noise levels. Baiada management has also advised that no work will be scheduled on weekends or public holidays.

Where practical, machines should be operated at low speed or power and should be switched off when not being used rather than left idling for prolonged periods.

Once noisy construction activity commences, it should be completed with the minimum of undue delay. In any case, all reasonable attempts should be made to complete significant noisy activities within as short a time as possible.

Residents should be notified of the intended construction timetable and kept up to date as work progresses, particularly as work changes from one set of machines and processes to another. In particular, residents should understand how long they will be exposed to each source of noise and be given the opportunity to inspect plans of the completed development. Encouraging resident understanding and "participation" gives the local community a sense of ownership in the development and promotes a good working relationship with construction staff.

Baiada has advised that the site manager and construction company will take responsibility and be available to consult with residents and community representatives. Response to complaints or comments will be made in a timely manner and action will be reported to the concerned party. Consideration should be given to establishing and maintaining an easily accessible and well publicised complaints hotline, and develop a suitable complaints handling procedure to effectively deal with any issues.

In conclusion, construction and operation of the Oakburn site will not cause any long term excessive environmental noise at any residential properties. We therefore see no acoustic reason why the proposal should not proceed under the current design.

REVERB ACOUSTICS

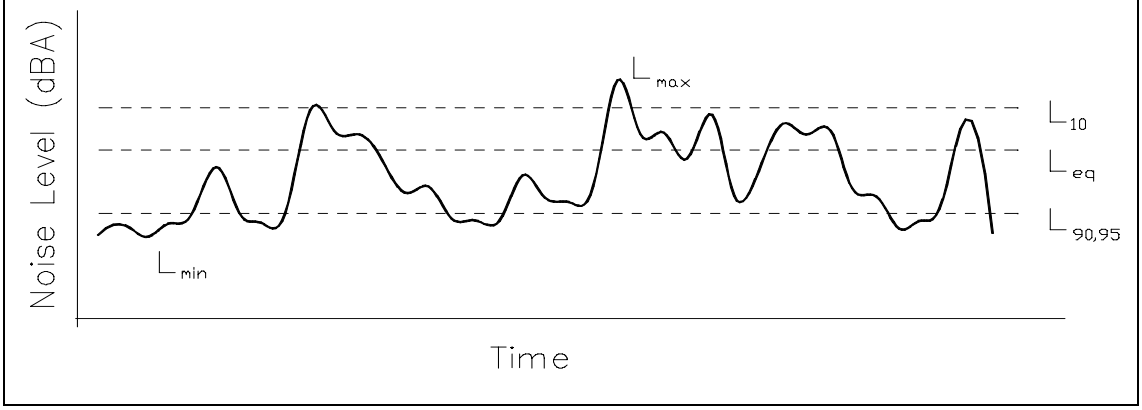
S. Brady.

Steve Brady A.A.A.S. M.A.S.A.
Principal Consultant

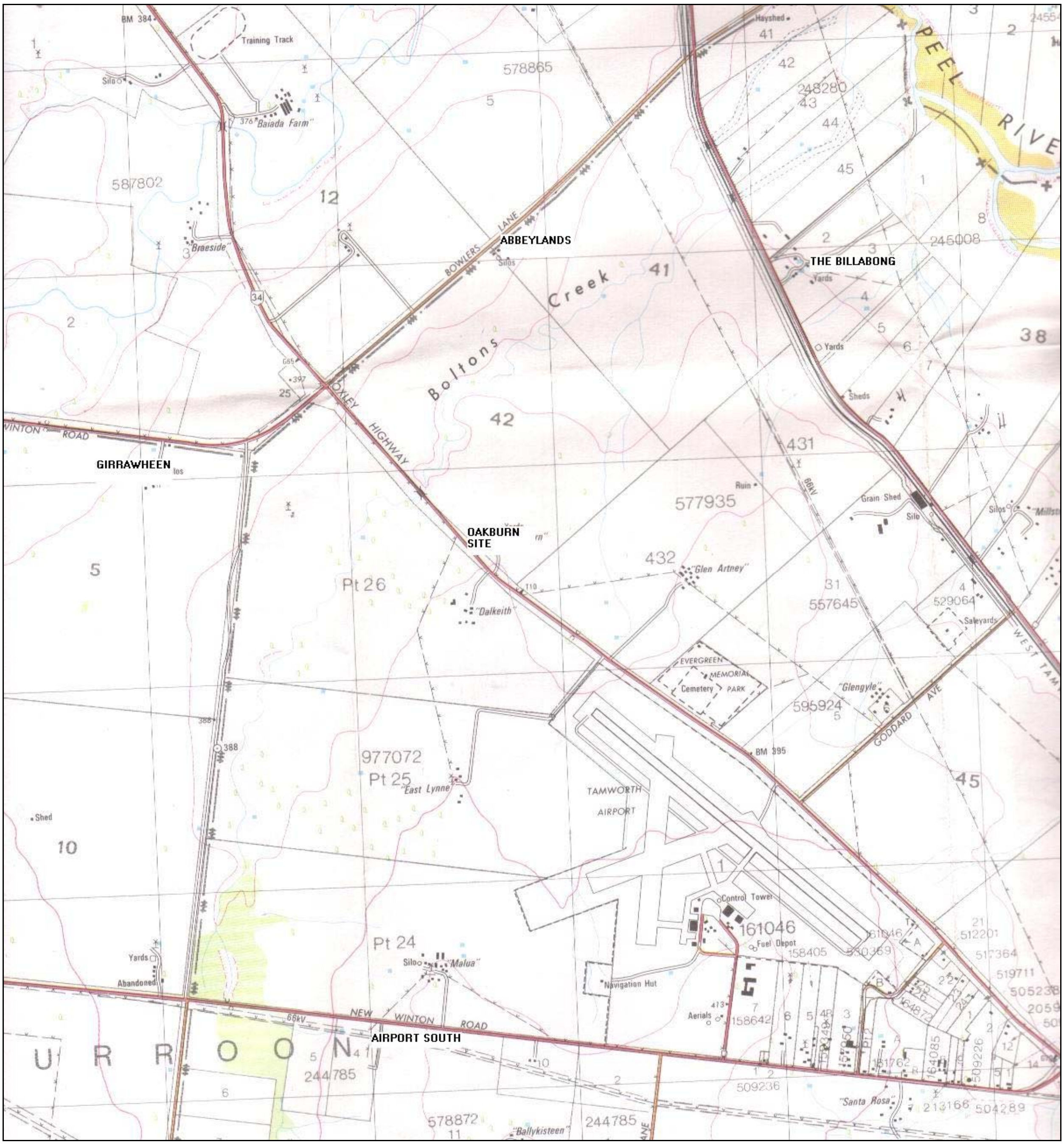
APPENDIX A
Definition of Acoustical Terms

Definition of Acoustical Terms

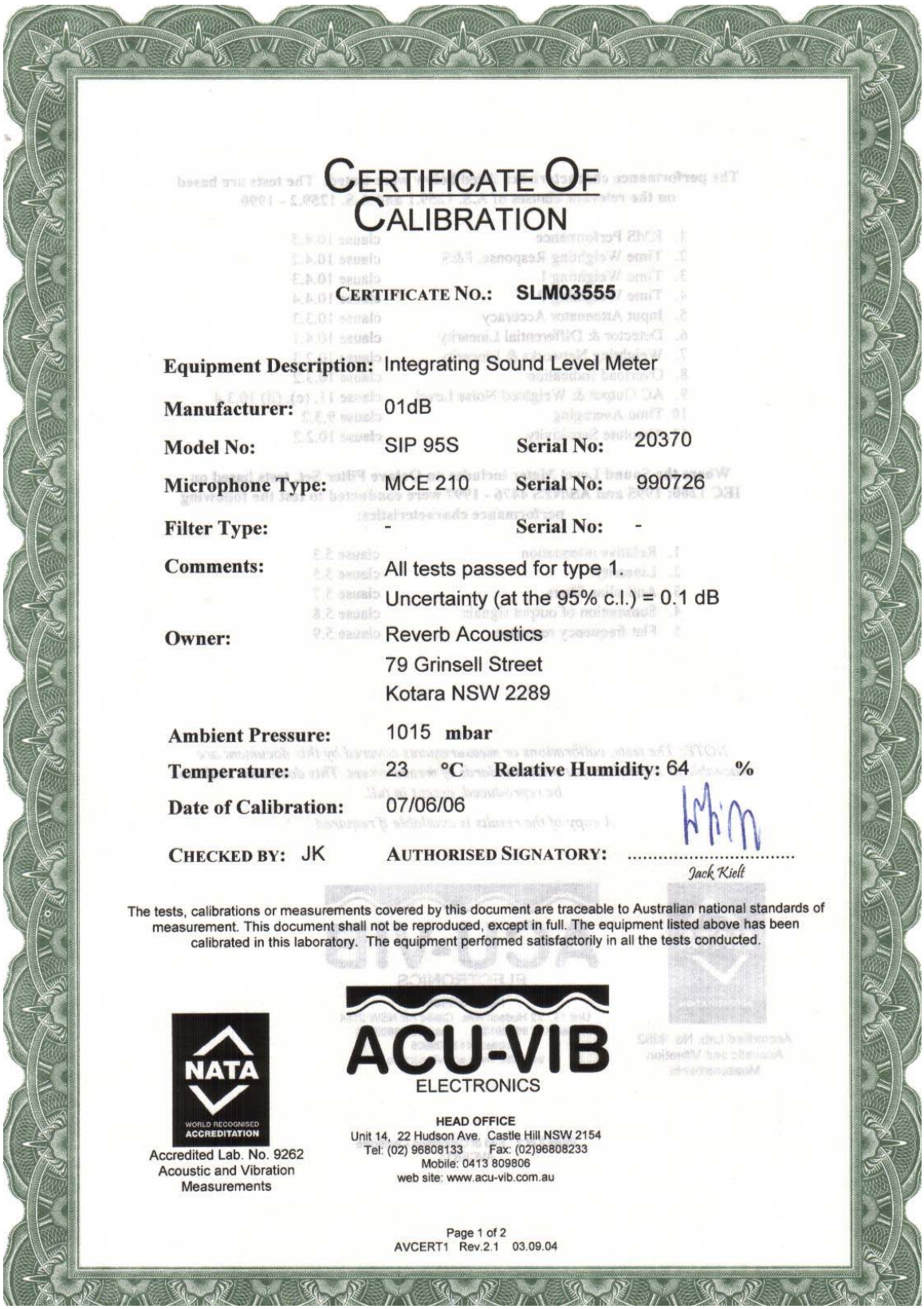
Term	Definition
dB(A)	A unit of measurement in decibels (A), of sound pressure level which has its frequency characteristics modified by a filter ("A-weighted") so as to more closely approximate the frequency response of the human ear.
ABL	*Assessment Background Level* – A single figure representing each individual assessment period (day, evening, night). Determined as the L90 of the L90's for each separate period.
RBL	*Rating Background Level* – The overall single figure background level for each assessment period (day, evening, night) over the entire monitoring period.
Leq	Equivalent Continuous Noise Level - which, lasting for as long as a given noise event has the same amount of acoustic energy as the given event.
L90	The noise level which is equalled or exceeded for 90% of the measurement period. An indicator of the mean minimum noise level, and is used in Australia as the descriptor for background or ambient noise (usually in dBA).
L10	The noise level which is equalled or exceeded for 10% of the measurement period. L_{10} is an indicator of the mean maximum noise level, and is generally used in Australia as the descriptor for intrusive noise (usually in dBA).



APPENDIX B
Location Plan


ABBEYLANDS
THE BILLABONG
GIRRAWHEEN
OAKBURN SITE
AIRPORT SOUTH
Training Track
Baiada Farm
Braeside
BOWLERS LANE
OXLEY HIGHWAY
Boltons Creek
PEEL RIVER
WINTON ROAD
NEW WINTON ROAD
Glen Artney
Dalkeith
East Lynne
Malua
EVERGREEN MEMORIAL PARK
Cemetery
TAMWORTH AIRPORT
Control Tower
Fuel Depot
Navigation Hut
Grain Shed
Glengyle
Saleyards
GODDARD AVE
Santa Rosa
Ballykisteen
Yards
Sheds
Silos
Abandoned
Shed
Aerials
Hayshed
Ruin

APPENDIX C
Calibration Certificates



CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM03555

Equipment Description:	Integrating Sound Level Meter		
Manufacturer:	01dB		
Model No:	SIP 95S	**Serial No:**	20370
Microphone Type:	MCE 210	**Serial No:**	990726
Filter Type:	-	**Serial No:**	-
Comments:	All tests passed for type 1. Uncertainty (at the 95% c.l.) = 0.1 dB		
Owner:	Reverb Acoustics 79 Grinsell Street Kotara NSW 2289		
Ambient Pressure:	1015 **mbar**		
Temperature:	23 **°C**	**Relative Humidity:** 64	**%**
Date of Calibration:	07/06/06		

CHECKED BY: JK **AUTHORISED SIGNATORY:** .....
Jack Kielt

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Page 1 of 2
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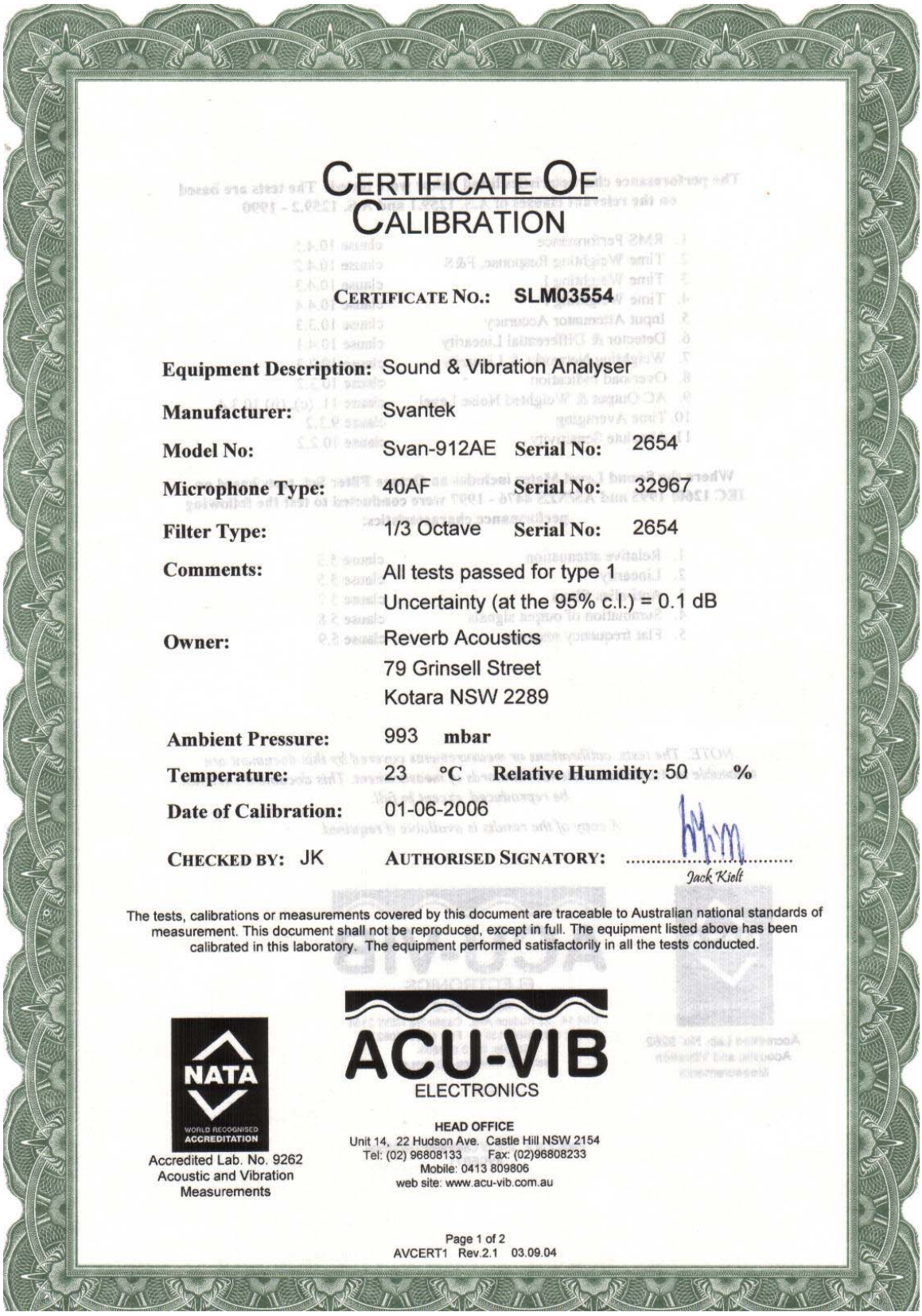

CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM03554

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-912AE	**Serial No:**	2654
Microphone Type:	40AF	**Serial No:**	32967
Filter Type:	1/3 Octave	**Serial No:**	2654
Comments:	All tests passed for type 1 Uncertainty (at the 95% c.l.) = 0.1 dB		
Owner:	Reverb Acoustics 79 Grinsell Street Kotara NSW 2289		
Ambient Pressure:	993 **mbar**		
Temperature:	23 **°C**	**Relative Humidity:**	50 **%**
Date of Calibration:	01-06-2006		
CHECKED BY: JK	**AUTHORISED SIGNATORY:** ..... Jack Kielt		

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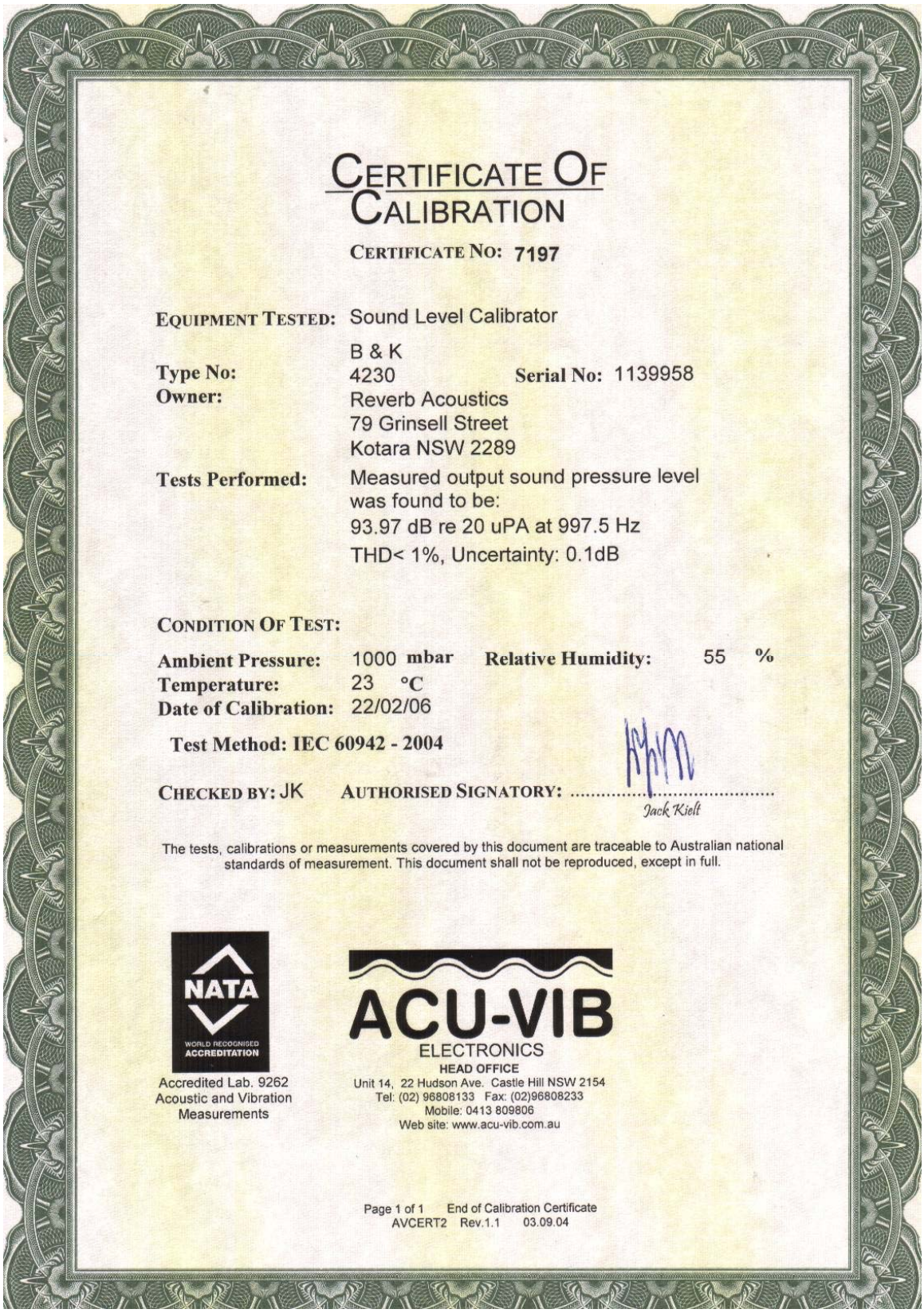

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: 7197

EQUIPMENT TESTED: Sound Level Calibrator

Type No: B & K 4230 **Serial No:** 1139958

Owner: Reverb Acoustics
79 Grinsell Street
Kotara NSW 2289

Tests Performed: Measured output sound pressure level was found to be:
93.97 dB re 20 uPA at 997.5 Hz
THD< 1%, Uncertainty: 0.1dB

CONDITION OF TEST:

Ambient Pressure: 1000 mbar **Relative Humidity:** 55 %
Temperature: 23 °C
Date of Calibration: 22/02/06

Test Method: IEC 60942 - 2004

CHECKED BY: JK **AUTHORISED SIGNATORY:** .....
Jack Kielt

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Page 1 of 1 End of Calibration Certificate
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