

ELIZABETH MACARTHUR AGRICULTURAL  
INSTITUTE WELLS (EM23 - EM36)  
CONSTRUCTION NOISE MANAGEMENT PLAN

ACOUSTICS AND AIR

REPORT NO. 06159-D  
VERSION D

WILKINSON  MURRAY

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PREPARED FOR

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## 1 INTRODUCTION

AGL Gas Production (Camden) Pty Ltd is proposing to construct and operate 14 coal seam gas wells at the Elizabeth Macarthur Agricultural Institute (EMAI) site located to the west of Menangle (referred to as the EMAI project).

The purpose of the project is to extract the coal seam methane resource located in the underground coal seams of the Sydney Basin. The project includes the construction of gas wells, gathering systems, water transport lines and access roads.

An Environmental Assessment titled "*Environmental Assessment – Camden Gas Project Joint Venture Stage 2 Drilling Program, Elizabeth Macarthur Agricultural Institute Wells (EM23-EM36)*" was prepared for the project and submitted to the Department of Planning in July 2006 by AGL. An Approval was provided by the Minister of Planning in December 2006.

A Construction Noise Management Plan (CNMP) has been prepared for the EMAI Project, pursuant to Schedule 3 Condition 3 of the Project Approval (06\_0138). This CNMP indicates a number of generic management measures which will be used to minimise the effect of noise in the surrounding area. The CNMP also discusses noise monitoring procedures, auditing and reporting requirements and community consultation.

This CNMP addresses the management of construction associated with the construction of the gas wells and associated infrastructure.

The noise generating activities that are considered in the CNMP include the following activities:

- percussion drilling of wells;
- installation of well heads and casing;
- hydraulic fracturing of the coal seam; and
- earth moving activities associated construction of infrastructures i.e. drilling pads, gathering lines, access roads and rehabilitation.

## 2 OBJECTIVES OF CONSTRUCTION NOISE MANAGEMENT PLAN

The objectives of the CNMP are to:

- Ensure compliance with the Conditions of Consent and other legislation with regards to construction noise;
- Minimise construction noise emissions during construction and operations;
- Minimise complaints in respect of noise arising from works;
- Create an environment where site personnel and contractors are involved and encouraged in correct noise management practices through education and other programs; and
- Create a monitoring, auditing and reporting system to measure performance against the noise management objectives.

### 3 STRUCTURE

#### 3.1 Relationship with Other Environmental Documentation

The CNMP for the EMAI wells forms part of the Environment, Health and Safety Management Plans (EHSMP) for the Camden Gas Project. EHSMPs have been prepared for the Drilling, Completion and Testing Operations and Gas Gathering System Construction. The EHSMP describes the range of environmental responsibilities for the different phases of the Camden Gas Project.

These documents are part of AGL's Corporate Environmental Management System.

### 4 CONSULTATION, REVISION AND AMENDMENT

#### 4.1 CNMP Preparation and Consultation

Wilkinson Murray Pty Ltd (noise & vibration consultants) were engaged as expert consultants for the preparation of this CNMP.

This CNMP has been submitted to the Department of Planning (DoP) for review.

#### 4.2 Revision and Amendment

If the text or body of this CNMP is required to be updated at any stage during construction of the EMAI project, a revised copy of the CNMP will be forwarded to DoP for information.

### 5 DEFINITIONS

**EMAI** Elizabeth Macarthur Agricultural Institute.

**CNMP** Construction Noise Management Plan.

**DoP** Department of Planning.

**EMAI project** Construction of 14 coal seam gas wells (EM 23 – EM 36) and associated infrastructure at the Elizabeth Macarthur Agricultural Institute (EMAI) site located to the west of Menangle.

**L<sub>A10</sub>**. The L<sub>A10</sub> level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L<sub>A10</sub> level for 90% of the time. The L<sub>A10</sub> is a common noise descriptor for environmental noise and road traffic noise.

**L<sub>A90</sub>**. The L<sub>A90</sub> level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L<sub>A90</sub> level for 10% of the time. This measure is commonly referred to as the background noise level.

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

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

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

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

**SWL (Sound Power Level).** Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.

**SPL (Sound Pressure Level).** The level of noise, expressed in decibels, as measured by a standard sound level meter with a microphone.

**SLM (Sound Level meter).** An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.

## 6 REFERENCES

- *Environmental Assessment – Camden Gas Project Joint Venture Stage 2 Drilling Program, Elizabeth Macarthur Agricultural Institute Wells (EM23-EM36), 20 July 2006, prepared by HLA Envirosciences Pty Ltd*
- *Environment, Health and Safety Management Plan – Drilling, Completion Testing and Operation, prepared by AGL Gas Production (Camden) Pty Ltd*
- *Environment, Health and Safety Management Plan – Gas Gathering System Construction, prepared by AGL Gas Production (Camden) Pty Ltd*
- *NSW Industrial Noise Policy (INP), DEC January 2000.*
- *Environmental Criteria for Road Traffic Noise (ECRTN), DEC, May 1999.*
- *NSW Environmental Noise Control Manual or ENCM (DEC Ref. 94/31).*
- *Environmental Noise Management, Noise Guide for Local Government (DEC Ref.2004/59).*

## 7 BACKGROUND STUDIES

Background studies and assessment of potential noise impacts as a result of the construction of the EMAI project include:

- Camden Gas Project - Elizabeth Macarthur Agricultural Institute Wells. Construction & Operational Noise Assessment (Wilkinson Murray - July 2006)
- Camden Gas Project - Elizabeth Macarthur Agricultural Institute Wells. Addendum to Original Construction Noise Assessment (SIS Drilling) (Wilkinson Murray, 21 September 2006)

## 8 LEGISLATIVE AND OTHER REQUIREMENTS

### 8.1 Legislative Requirements

Legislation relating to the management of noise includes:

- Protection of the Environment Operations Act 1997 (POEO Act),
- Protection of the Environment Operations (General) Regulation 1998, and
- Protection of the Environment Operations (Noise Control) Regulation 2000.

### 8.2 Development Consent Conditions

The Conditions of Consent specifying the noise requirements with which AGL Gas Production (Camden) Pty Ltd must comply during its construction of the project are as follows:

#### Construction and Maintenance Hours

1. Except for the drilling (including well casing and grouting) of SIS wells EM32 and EM34, the Proponent shall comply with the construction and maintenance hours in Table 1:

Activity	Day	Time
Construction	Monday – Friday	7:00am to 6:00pm
	Saturday	8:00am to 1:00pm
	Sunday and Public Holidays	Nil
Planned maintenance activities	Monday – Friday	7:00am to 6:00pm
	Saturday	8:00am to 1:00pm
	Sunday and Public Holidays	Nil (unless inaudible at any residential receiver)

Table 1: Construction and Maintenance Hours for the Project

#### Notes:

- *Inaudible means that the construction activity cannot be heard by the human ear at the nearest affected residential receivers*
- *This condition does not apply to the delivery of material if that delivery is required by the police or other authorities for safety reasons; and/or the operation or personnel or equipment is endangered. In such circumstances, prior notification is to be provided to affected residents where possible.*

### Construction Noise Goals

2. The Proponent shall use its best endeavours to undertake construction activities to comply with the construction noise goals specified in Table 2.

Location	Day	Evening	Night
Any residential receiver	54	39	35

Table 2: Construction Noise Goals dB(A)  $L_{A10}(15 \text{ min})$

Note: See notes to condition 4

### Construction Noise Management Plan

3. The Proponent shall prepare and implement a Construction Noise Management Plan for construction of the project to the satisfaction of the Director-General. The plan shall be submitted to the Director-General prior to construction commencing and shall include:
- a detailed description of the measures that would be implemented to achieve the construction noise goals in condition 2;
  - a community notification protocol for the proposed construction activities (including any redrilling or re-fracking of wells);
  - a description of the measures that would be implemented where the construction noise goals in condition 2 are unlikely to be achieved or are not being achieved; and
  - details of who would be responsible for monitoring, reviewing and implementing the plan.

### Noise Monitoring Program

6. The Proponent shall prepare and implement a Noise Monitoring Program for the construction and operation of the project to the satisfaction of the Director-General. The Program shall be submitted to the Director-General prior to construction commencing and shall include a noise monitoring protocol for evaluating compliance with the construction noise goals and the operational noise impact assessment criteria in this approval.

## 9 TARGETS

The noise targets for this CNMP are summarised below (A glossary of terms is shown above):

The guidelines for this assessment are those in the *NSW Environmental Noise Control Manual or ENCM (DEC Ref. 94/31)*. Although officially superseded, the document offers guidelines for the assessment of construction noise at residences that are still recognised and considered relevant.

The guidelines used for the assessment of construction noise at residences specified in Chapter 171 of the *ENCM* are as follows:

- For construction periods of 4 weeks or less, the  $L_{A10}$  level should not exceed the background ( $L_{A90}$ ) level by more than 20dBA;
- For periods greater than 4 weeks and less than 26 weeks, the  $L_{A10}$  level should not exceed the background ( $L_{A90}$ ) level by more than 10dBA.

Although not explicitly stated in the *ENCM* it is considered that for periods greater than 26 weeks, the DEC would require that the  $L_{A10}$  level from construction works should not exceed the  $L_{A90}$  background level by more than 5dBA.

The detailed time-frame of the final construction program was not known at the time of the assessment; however, it is known that the construction of any particular well generally takes up to approximately one week to drill. The various contractors involved in the different construction phases – i.e. drilling contractor responsible for drilling phase at all well sites – will aim to carry out construction activity in a back-to-back fashion in order to maximise efficiency. For this reason, in the event of multiple well construction sites audible at one receiver, it was conservatively assumed for selecting the appropriate criteria that works at different wells occur straight after each other in a continuous manner.

The noise generated by construction equipment would rise and fall at any particular residence as works are sited at different well sites. However, considering the larger distances separating the identified receivers and the proposed wells, it is unlikely that noise from the construction of 4 or more different wells will be audible at any receiver location. Therefore, criteria for construction periods of 4 weeks or less have been adopted as the project-specific construction noise goals.

Guidelines for determining night time and evening construction noise criteria do not exist. Therefore, the intrusiveness criteria for operational noise derived from the DEC's *Industrial Noise Policy (INP)* are typically used.

The intrusiveness criterion requires that the  $L_{Aeq}$  operational noise emission level measured over a period of 15 minutes not exceed the RBL by more than 5dBA. In the case of construction noise, we will assume that the night time criterion requires that the  $L_{A10}$  noise emission level measured over a period of 15 minutes not exceed the RBL by more than 5dBA

It is accepted that for determining noise criteria, the  $L_{A90}$  background noise level should be quantified by the RBL value. In light of this consideration, Table 9-1 details the construction noise targets for the potentially affected residences in the vicinity of the project area. These targets are consistent with Condition 2 of the Planning Approval.

**Table 9-1 Construction Noise Criteria**

$L_{A10}$ Noise Criterion (dBA)		
Day (7am-6pm)	Evening (6pm-10pm)	Night (10pm-7am)
54	39	35

*Environmental Noise Management, Noise Guide for Local Government (DEC Ref.2004/59)* indicates that to protect against sleep disturbance, the  $L_{A1}$  noise level external to the facade of any residence from any construction event should not exceed the background noise level by more than 15dBA. Therefore, the  $L_{A1}$  sleep disturbance operational noise criterion external to residential facades for the potentially affected residences nearby is 45dBA.

## 10 CONSTRUCTION HOURS

The proposed construction hours are:

- Monday to Friday 7.00am-6.00pm
- Saturday 8.00am-1.00pm
- No construction work is to take place on Sundays or Public Holidays.

It is important to note that wells EM 32 and EM 34 are surface-to-inseam (SIS) wells which require 24-hour drilling due to the specialised equipment and construction methods involved.

The daytime construction noise target for all activities for the EMAI project is an  $L_{A10}$  level of 54dBA.

For evening and night time drilling works associated with the SIS wells the more stringent evening and night-time  $L_{A10}$  construction noise criterion of 39dBA and 35 dBA, respectively would apply.

The DEC also recommends that all “feasible and reasonable” steps should be taken to reduce noise levels from construction site equipment so as to minimise construction noise impacts to sensitive receivers.

Accordingly, although all well sites are at least 200 metres from any residences, it should be noted that Wells EM32 and EM34 requiring 24-hour drilling are located further away from the identified receivers (at least 1km).

## 11 PLANT

### 11.1 Introduction

In the EMAI EA, 9 daytime construction phases and 1 night time construction phase were identified as being representative of the periods during which the potential for noise impacts to residences would likely be greatest.

These significant phases of work and guidance as to the plant likely to be used at any one time are detailed below. The LA10 sound power level of the each item of plant is shown in brackets and as a conservative measure, the total sound power level detailed for each phase of construction represents the LA10 noise level presumed for all listed plant to be operating simultaneously.

### 11.2 Representative Day Time Construction Phases

#### **Phase D1 Excavation and earth moving associated with installation of gas gathering system and water pipes (Total SWL = 113dBA) (average of 1 ½ days per well)**

- 1 Chain Trencher (98dBA)
- 1 20-Tonne Excavator (112dBA)
- 1 Grader (107dBA)

#### **Phase D2 Excavation and earth moving associated with construction of access roads to well sites (Total SWL = 115dBA) (average of 1 day per well)**

- 1 20-Tonne Excavator (112dBA)
- 1 Tracked Excavator (109dBA)
- 1 Grader (107dBA)

#### **Phase D3 Excavation and earth moving associated with construction of wells (Total SWL = 115dBA) (average of 2 days per well)**

- 1 20-Tonne Excavator (112dBA)
- 1 Tracked Excavator (109dBA)
- 1 Grader (107dBA)

#### **Phase D4 Vertical Well drilling (Total SWL = 109dBA) (average of 7 days per well)**

- 1 Percussion Drilling Rig #15 (106dBA according to sound power report issued by Renzo Tonin & Associates Pty Ltd, document ref. TB696-01F03 (REV 1) dated 16 August 2004)
- 1 Trailer-Mounted Compressor (106dBA according to sound power report issued by Renzo Tonin & Associates Pty Ltd, document ref. TB696-01F02 (REV 1) dated 18 August 2004)

#### **Phase D5 Well logging (Total SWL = 87dBA) (average of 1/3 day per well)**

- 1 4WD Utility Vehicle (87dBA)

#### **Phase D6 Well perforating (Total SWL = 111dBA) (average of 1/3 day per well)**

- 1 20-Tonne Mobile Crane (109dBA)
- 1 logging unit (107dBA)

**Phase D7 Well fracking (Total SWL = 130dBA) (average ½ day set up, 2 hours fracking and ½ day rig down per well)**

- 2 High-Pressure 2000hp Truck-Mounted Compressors (124dBA each)
- 2 High-Pressure 1200hp Truck-Mounted Compressors (124dBA each)

**Phase D8 Workover (Total SWL = 106dBA) (average 1 ½ days per well)**

- 1 Work Over-Rig (106dBA)

**Phase D9 Directional Drilling (Total SWL = 110dBA)**

- 1 Trailer-Mounted Compressor (106dBA)
- 1 Drilling Rig (108dBA)

**11.3 Representative Night Time Construction Phases**

Wells EM 32 and EM 34 are surface-to-inseam (SIS) wells which require 24-hour drilling due to the specialised equipment and construction methods involved.

Attended noise monitoring of the drilling rig which would be used to drill these wells was carried out by Wilkinson Murray Pty Ltd (Ref: SIS Gas Well Drilling Noise Measurements, dated 8 September 2006). Typical daytime drilling operations (SWL - 110dBA) would consist of two mud pump units operating and for typical night time drilling operations (SWL - 106dBA) only one pump is required to operate.

Investigations have showed that noise originated from either ends of the mud pumps is considerably louder than that radiating from the sides of the units. Furthermore, it was observed that the end of the pump unit where the doors are located is quieter than the opposite end with only louvers. Therefore orientation the units may be beneficial in such a way that the louvers – and especially the ones with no door – are not directly facing the receiver(s) nearby.

**12 SENSITIVE RECEIVERS**

The construction activities for the EMAI project have the potential to impact upon 3 residences scattered along Remembrance Drive, Finns and Woodbridge Roads. As shown in Figure 12.1, Receiver 2 located directly to the east of the intersection of Cawdor Road and Remembrance Drive is found to be relatively close to proposed Wells EM35, EM29 and EM26. Similarly, Receiver 1 directly to the east of the intersection of Remembrance Drive and Finns Road is close to Wells EM23 and EM26. Finally, Receiver 3 located to the east of the EMAI area may be potentially impacted by Wells EM24 and EM25.

In addition, construction activities at EM34 have the potential to impact upon the South Camden residential area and Belgenny Homestead (see Figure 12.1).



Figure 12.1 Showing closest Residential Receivers relative to well locations.

### 13 RISK ASSESSMENT

The construction of the project will include mostly daytime with some night time works. An environmental risk assessment for construction of the EMAI project has been carried out. The risk assessment has identified the following key construction activities that could be considered a noise risks:

- Night time well drilling for wells EM32 and EM34; and
- Well fraccing (stimulation of coal seam by pumping sand and water) for all wells except EM 32 and EM 34.

These construction activities have been identified in the Camden Gas Project - Elizabeth Macarthur Agricultural Institute Wells Construction & Operational Noise Assessment (Wilkinson Murray - July 2006) as being activities where the construction noise target may be exceeded.

## 14 ENVIRONMENTAL MANAGEMENT MITIGATION MEASURES

This section describes a number of general mitigation measures which will be implemented project wide (Table14-1) based on the level of detail available at this time regarding the specific work sites and areas.

**Table 14-1 Noise Management Principles**

Environmental Procedure	Responsibility	Frequency
Ensure that all excavation equipment is well maintained. Carry out maintenance on equipment as required particularly whose levels exceed the target levels.	Site Manager	Ongoing
Limit construction works to 7.00am -6.00pm Monday to Friday and 8.00am-1.00pm Saturday except for SIS wells EM 32 and EM 34.	Site Manager	Ongoing
Apply all reasonable best practice noise mitigation and management measures.	Site Manager	Ongoing
All reasonable and feasible noise source controls to reduce noise from all plant and equipment shall be investigated and applied. Examples of appropriate noise source controls could include selection of quiet equipment, efficient silencers and low noise mufflers.	Site Manager	Ongoing
Maximise offset distance between noisy plant items and nearby noise sensitive receivers and orient equipment away from sensitive areas where practical (ie drilling rig).	Site Manager	Ongoing
Operate only one mud pump at night for wells EM 32 and EM 34.	Site Manager	Ongoing
Carry out environmental noise monitoring at worksites. Where the levels exceed the targets, implement further controls.	Site Manager	As required
Inform residence prior to commencing construction activities.	Site Manager	As required
Receive, record and investigate noise complaints.	Environmental Manager	Ongoing

## 15 NOISE MONITORING

The objective of the noise monitoring programmes is to provide monitoring information and advice to ensure that noise emission from the site is appropriately managed.

A Noise Monitoring Program for the EMAI Project has been developed (*Camden Gas Project EMAI Wells (EM 23 – EM 36) Noise Monitoring Program, Dec 2006*). The noise monitoring program has been submitted to the DoP for review.

## 16 INTERNAL AUDITS

Regular audits of work practices and on site equipment to identify where practices can be improved will be performed. This process will involve:

- Identifying the noise sources particular to the site;
- Random audits will be used to proactively anticipate noise issues and instigate a resolution process and to ensure that previously identified control measures continue to be implemented; and
- Regularly inspect and maintain on site equipment in good working order so as to generate less noise. This includes ensuring all noise reduction devices such as mufflers and silencers are fitted correctly and operative.

## 17 TRAINING AND AWARENESS

The site induction and ongoing health and safety and environment training programmes will reinforce to employees and contractors the need for controlling environmental performance at the site. Noise will be specifically addressed during the site induction and training will include familiarisation with site noise targets and environmental objectives. All site employees will have responsibility for managing noise from their work activities and working in a manner so as to minimise noise emissions.

## 18 NOTIFICATION OF CONSTRUCTION WORKS

To ensure the community is adequately informed about the timing and scope of site construction works leaflets/flyers will be prepared and letter boxed to surrounding residents to describe the scope and timing of the works and to provide contact details for further information.

In the event of a planned construction activity that has the potential to create significant noise in the local community (ie fracking), the following notification procedure will apply prior to the event occurring:

- Notification of the planned activity to the potentially affected residences via a letter box drop

Notification will include the schedule date, time and length of the planned activity, a description of the activity to be undertaken and details of a company contact details for further information.

This will be done in conjunction with notification of the community.

## 19 COMPLAINTS

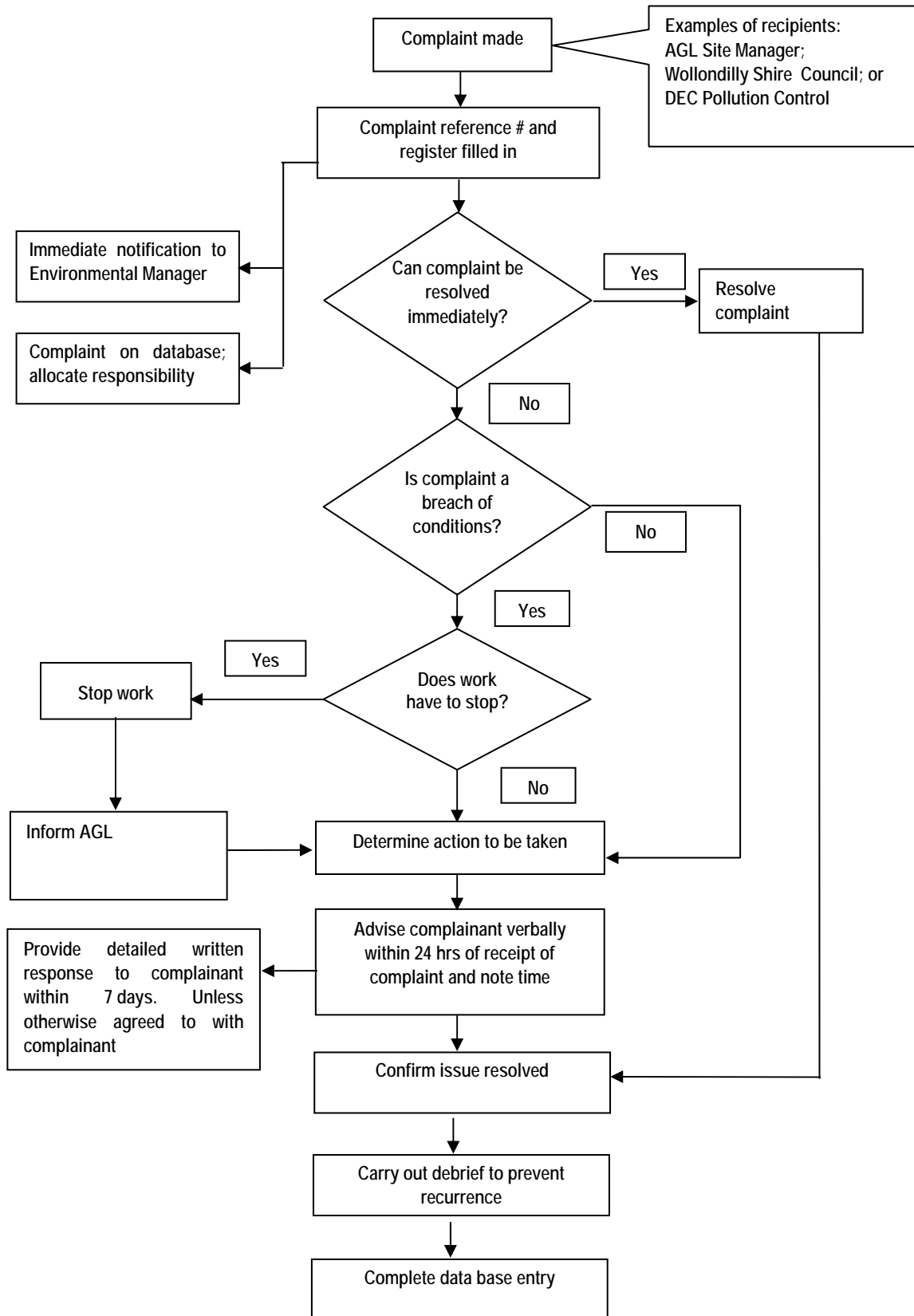
Any complaints received from Government Department Officers, interest groups or the general public shall be managed in a professional manner and will be recorded on the established Complaints Register. All complaints received shall be referred to the Community and Government Relations Officer and to the Site Manager who will adopt an appropriate course of action to manage and address the complainant's concerns in a timely manner.

Should complaints be received regarding the effect of noise from the construction activities, the complaint is to be investigated by the Site Manager. The investigation shall take the form of:

- Inspection of the location from which the complaint originated;
- Measurement of noise levels (as relevant);
- Comparison of the measured levels with the equivalent targets;
- Identification of engineering control or management procedure (if appropriate) to be adopted to reduce the levels at the complainant location;
- Monitoring after implementation of the control or procedure to establish the level of reduction obtained;
- Details of the complaint, including the date received, complainant and address and nature of complaint, is to be recorded in a complaints log and the investigation taken and results obtained should also be recorded.

This is shown in the flowchart overleaf.

### Complaints Handling Procedure



To ensure the community is adequately informed about the timing and scope of site construction works leaflets/flyers will be prepared and letter boxed to surrounding residents to describe the scope and timing of the works and to provide contact details for further information.

## 20 COMPLIANCE WITH MINISTER'S CONDITIONS OF APPROVAL

Relevant conditions of the Ministers Conditions of Approval are listed below in Table 21-1 with a cross reference to where the condition is addressed in this CNMP.

**Table 21-1 Cross reference to Approval Conditions.**

Approval Condition	Where the condition is addressed
1 Construction Hours	Section 10
2 Construction Noise Goals	Section 9
3 Construction Noise Management Plan	
3(a) Noise Mitigation	Section 14
3(b) Community Notification	Section 20
3(c) Noise Mitigation where constructions goals are unlikely to be achieved	Section 13 and 14
3(d) Who is Responsible to implement plan	Section 14
6 Noise Monitoring	Section 15

### Note

All materials specified by Wilkinson Murray Pty Limited have been selected solely on the basis of acoustic performance. Any other properties of these materials, such as fire rating, chemical properties etc. should be checked with the suppliers or other specialised bodies for fitness for a given purpose.

### Quality Assurance

We are committed to and have implemented AS/NZS ISO 9001:2000 "Quality Management Systems – Requirements". This management system has been externally certified and Licence No. QEC 13457 has been issued.

### AAAC

This firm is a member firm of the Association of Australian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.

Version	Status	Date	Prepared by	Checked by
A	Draft	13-12-2006	John Wassermann	Brian Clarke
B	Final	18-12-2006	John Wassermann	Brian Clarke
C	Final	19-12-2006	John Wassermann	Brian Clarke
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