



Planning &  
Infrastructure



## Compliance Audit Report

### Capital Wind Farm

February 2013



Cover Photograph: Turbines at Capital Wind Farm

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## **FOREWORD**

Wind farms will play an important part in the State's energy future. However, it is important the community has confidence these installations are operating in line with their consent conditions.

Although investigations conducted by the Department of Planning and Infrastructure to date have found the NSW Government approved wind farms to be complying with noise limits, the Department has continued to receive noise complaints from nearby residents.

In early 2012, the Minister for Planning and Infrastructure asked the Department to commission an independent compliance audit of operational wind farms in NSW, to gauge whether they are meeting their consent conditions.

The wind farm audits cover the Cullerin Range, Woodlawn and Capital wind farms in southern NSW, which are the State's three operational NSW Government approved wind farms.

An independent specialist noise consultant was commissioned to audit compliance against the noise limits and the Department's Compliance Unit audited compliance against other consent conditions including those relating to visual amenity, flora and fauna impacts, shadow flicker, community contributions and radio/television interference.

Key stakeholders were consulted as part of the audit process including local residents, local councils, the Environment Protection Authority and the wind farm operators. Consultation with local residents included the distribution of a survey questionnaire, meetings with residents and a telephone contact line.

A separate audit report has been prepared for each of the three wind farms and a fourth report prepared describing the community consultation undertaken in association with the audits. All the reports are publicly available on the Department's website at [www.planning.nsw.gov.au](http://www.planning.nsw.gov.au).

## EXECUTIVE SUMMARY

### Wind farm compliance audits

The NSW government commissioned independent compliance audits of the State's three government-approved wind farms that are currently in operation, namely Cullerin Range, Woodlawn and Capital, which are all located in southern NSW.

The compliance audits were conducted by the Department of Planning and Infrastructure. The purpose of the audits was to evaluate compliance of the wind farms with their respective approval conditions relating to wind farm operation. Compliance with conditions relating to design and construction of the wind farms is outside the scope of the audits.

Due to the highly specialised nature of monitoring wind farm noise and analysing noise monitoring data, the Department engaged the services of a specialist, independent acoustical consultant, Renzo Tonin & Associates, to audit compliance with the noise criteria.

The audits also addressed compliance with other operational conditions relating to issues such as visual amenity, flora and fauna impacts, aircraft movements, shadow flicker and television reception.

### Capital wind farm audit

This report addresses the compliance audit of Capital Wind Farm against the operational conditions in the then Minister's Project Approval (MP05\_0179) issued on 7 November 2006. Separate reports address the audits of the other two wind farms.

The audit findings are based on evidence gained during the audit, including through reviewing relevant documentation, noise monitoring and analysis by the acoustical specialist, a site inspection, interviews with the proponent's representatives and survey responses/interviews with nearby residents.

Continuous noise monitoring over a period of 4 weeks was undertaken at six locations in the vicinity of Capital wind farm using unattended monitors. Further, shorter term attended monitoring was undertaken at each of these locations to supplement the unattended monitoring results.

### Community Consultation

The Department conducted active community consultation in association with the three wind farm audits, including the following activities:

- Placing information about the wind farm audits on the Department's website
- Issuing all land owners within 4km of a wind farm with a survey questionnaire relating to the operation and performance of the wind farm
- Conducting face-to-face meetings with those who indicated in their survey responses that they wished to speak with the auditors
- Reviewing responses to the surveys and reporting on the outcomes of the consultation.

Those matters raised by residents that fell within the scope of the audit are addressed in the audit findings.

A comprehensive report on the Department's community consultation has been published to complement the audit reports and is available at [www.planning.nsw.gov.au](http://www.planning.nsw.gov.au).

## **Audit findings**

The audit found Capital wind farm to have a high standard of compliance with the key operational conditions of approval.

The independent acoustical specialist also found Capital wind farm to be compliant with the noise criteria at all residential properties that were monitored during the period of the audit.

The audit identified four non-noise related non-compliances, relating to the public availability of documents, commencement of operation, bird and bat monitoring and landscaping.

The audit also made a number of observations and recommendations to improve environmental performance or community access to information. The observations addressed issues such as making documents available on the web, complaints management, noise mitigation for a new dwelling and landscaping.

## **Acknowledgements**

The auditors wish to acknowledge the residents in the vicinity of Capital wind farm who allowed noise monitoring for this audit to be undertaken on their properties. The auditors also wish to acknowledge those residents who responded to the community survey questionnaire and who spoke candidly with the auditors under the community consultation activities associated with this audit.

The auditors also wish to acknowledge the co-operation afforded to them by the proponent, Infigen Energy, during the audit process.

## ABBREVIATIONS

Department	Department of Planning and Infrastructure
Director-General	Director-General of the Department of Planning and Infrastructure
EA	Environmental Assessment
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
Minister	Minister for Planning & Infrastructure
OEMP	Operation Environmental Management Plan
Proponent	Infigen
the Act	<i>Environmental Planning and Assessment Act 1979</i>

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## 1 INTRODUCTION

### 1.1 Background

For projects approved by the Minister for Planning and Infrastructure, the Department is responsible for monitoring compliance with, and enforcement of, the Minister's conditions of approval. The Department's compliance activities are carried out in accordance with its Compliance Policy and associated guidelines, available on the Department's website.

Compliance auditing is one of a number of methods used by the Department to monitor compliance. This report addresses the recently completed compliance audit of Capital Wind Farm.

This is one of three compliance audits of the State's operational NSW government approved wind farms, all in southern NSW. The other two wind farms audited under this campaign were Cullerin Range and Woodlawn.

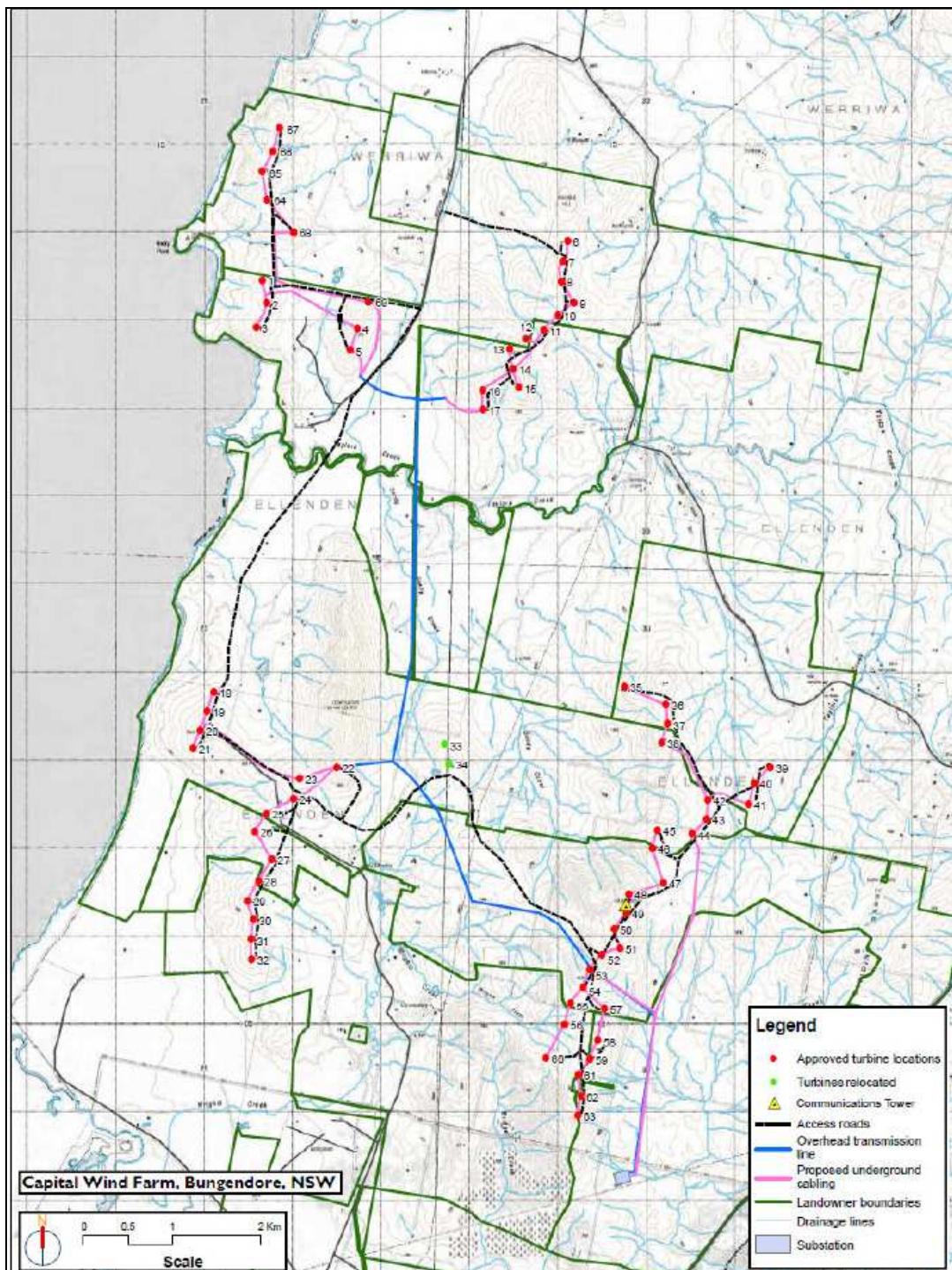
The audit evaluated compliance of Capital wind farm against the conditions of approval relating to its operation. The audit paid particular attention to evaluating compliance with noise criteria, but also addressed other operational requirements including visual impacts, flora and fauna impacts, aircraft movements and television reception.

This report has been prepared to present the findings of the compliance audit described herein and no responsibility is accepted for its use in any other context or for any other purpose.

### 1.2 Description of Project

#### 1.2.1 Location

Capital wind farm is located in the Southern Tablelands of NSW approximately 40 kilometres north-east of Canberra and 50 kilometres south of Goulburn. The three groups of turbines span an area of approximately 11km north-to-south and 7km east-to-west between Lake George and the Tarago-Bungendore Road, approximately mid-way between Tarago to the north-east and Bungendore to the south west.



**Figure 1. Location of Capital** (Source: Woodlawn Wind Farm Modifications – Supplementary Statement of Environmental Effects, Chapter 1, August 2010)

### 1.2.2 Operation

The Capital Wind Farm consists of 67 wind turbines, each with an external kiosk transformer nearby and is capable of generating up to 140 megawatts (MW) of electricity.

The wind turbines are located in three groups, namely, Grosses Hill Group to the north, Ellenden Group to the south-west and Hammonds Hill Group to the south-east.

An aerial photograph showing the locations of the wind turbine structures and the noise monitoring points used in this audit is provided at Figure 1 of the Noise Compliance Report in **Appendix C**.

The electricity generated will be exported via a double circuit 33 kV transmission line at the Capital Wind Farm substation connecting into the Kangaroo Valley to Canberra 330 kV transmission line.

The wind farm commenced operation in 2009.

### **1.3 Statutory framework**

The Capital Wind Farm was approved by the then Minister for Planning on 7 November 2006 pursuant to section 75J of the *Environmental Planning and Assessment Act 1979* ("the Act") subject to conditions.

A copy of the project approval is provided at **Appendix G**. The project approval and assessment reports are available on the Department's website at: [http://majorprojects.planning.nsw.gov.au/index.pl?action=view\\_job&job\\_id=670](http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=670).

At the time of the audit, the wind farm was not required to have an environment protection licence issued by the Environment Protection Authority (EPA).

### **1.4 Key issues**

The principal environmental issue for wind farm operation is noise impacts on neighbouring land uses. Wind turbine noise is generated primarily from the movement of turbine blades through the air, but may also arise from mechanical noise in the gearbox or bearings of the nacelle. Further noise can be emitted as a "hum" from the electrical substation associated with the wind farm.

Other environmental issues associated with wind farm operation can include visual amenity impacts of the turbine structures, birds and bats being struck by the turbine blades, shadow flicker where the turbine blades come between the sun and a receiver when the sun is low in the sky, and telecommunications interference.

All the above potential environmental impacts are covered by this audit because they are addressed by conditions of the Capital wind farm project approval.

## 2 AUDIT PROCESS

### 2.1 Objectives

The objectives of this compliance audit were to:

- evaluate the project's compliance with the audit criteria (operational compliance against the Minister's conditions of approval and the proponent's Statement of Commitments);
- present the findings of the audit;
- make recommendations in response to any non-compliances found or observations made by the audit.

### 2.2 Scope

The scope of the audit is limited to evaluating compliance of the Capital wind farm with its respective approval conditions relating to wind farm operation. Compliance with conditions relating to design and construction is outside the scope of the audit.

The audit findings are made only in respect of verifiable evidence obtained during the audit process. Any allegations made to the auditors during the audit process are not addressed in the audit findings unless those allegations were within the scope of the audit and were verified by audit evidence.

The audit period, i.e., the period over which compliance was evaluated, varies depending on the audit criteria. For noise compliance, the audit period was the period during which noise monitoring data was obtained during the audit. For compliance with non-noise conditions, the audit period was the period covered by the audit evidence and may be any time between commencement of operation and the completion of the audit.

The scope of this compliance audit does not extend to the investigation of alleged non-compliance. Any alleged non-compliance found by the audit would be assessed and, if necessary, investigated outside the audit process in accordance with the Department's published Compliance Policy and Breach Management Guidelines.

### 2.3 Methodology

The methodology employed by the Department's compliance audits is consistent with the auditing principles set out in the relevant Australian and New Zealand Standard: *AS/NZS ISO 19011:2003 Guidelines for quality and/or environmental management systems auditing*.

The methodology for this compliance audit involved the following key tasks:

- Tender process and engagement of independent acoustical specialist
- Information and documentation review
- Noise monitoring and analysis
- Site inspection and meetings with proponent
- Evaluation of compliance against the audit criteria
- Preparation and review of draft report.

These tasks are described below.

### **2.3.1 *Independent acoustical specialist***

In recognition of the need for specialist acoustical expertise to evaluate compliance with the noise criteria, the Department conducted a NSW Government tendering process for an independent specialist with the necessary expertise to conduct the required noise monitoring, data analysis and evaluation of compliance.

The successful tenderer was Renzo Tonin & Associates, a company that demonstrated complete independence from the three wind farms to be audited and their operators, together with the required level of expertise to conduct the audits with a high degree of competence and integrity.

The acoustical specialist reviewed noise data and wind farm operational records that had been provided by the Proponent, conducted (attended and unattended) noise monitoring at six monitoring locations, analysed the noise monitoring data and evaluated compliance with the noise criteria.

The work of the acoustical specialist was conducted in close consultation with, and overseen by, the Department's Technical Specialist on noise.

Further, the acoustical specialist's principal, Mr Renzo Tonin, signed an oath confirming his independence (see **Appendix D**).

### **2.3.2 *Information and documentation review***

The independent acoustical specialist reviewed noise compliance monitoring provided by the proponent, prior to conducting its own monitoring.

To support the noise monitoring conducted under the audit, the acoustical specialist obtained and reviewed all relevant wind farm operating data for the period during which noise monitoring was undertaken, together with operating data for other times to gauge whether the wind farm was operating normally during the monitoring period.

To assist evaluation of compliance with non-noise approval conditions, the Department obtained relevant reports and information from the Department's files or the proponent.

### **2.3.3 *Noise monitoring and analysis***

The independent acoustical specialist conducted the following activities relating to noise monitoring and analysis:

- reviewed noise data and wind farm operational records that had been provided by the Proponent on request
- conducted continuous noise monitoring over a period of 4 weeks from Monday 16 July 2012 to Monday 13 August 2012, at the six residential locations in the vicinity of the wind farm to which the noise criteria in the consent apply (Lakoona, Widgemoore, La Granja, The Patch, Wroxham and Grantham Park) using unattended monitors
- conducted further short term attended noise monitoring at above four locations to supplement the unattended monitoring results
- analysed the noise monitoring data and evaluated compliance with the noise criteria.

The wind farm audits were timed to ensure noise monitoring occurred during the cooler months of the year as these months generally present worst case conditions for noise impacts on residences from the operation of wind turbines.

The duration of 4 weeks was chosen for the continuous noise monitoring on the basis that the independent specialist required at least 2 weeks' of data to conduct a meaningful assessment of compliance with the noise criteria.

### **2.3.4 Site inspection and meetings with proponent**

The Department conducted a site inspection and held meetings with the proponent on 1 August 2012. The inspection included a full inspection of the entire wind farm site together with an inspection of the office, control room and substation. Meetings were held with the proponent on the day of the inspection and an audit checklist subsequently completed by the proponent.

The site inspection included an inspection of the noise monitoring equipment and locations used for the audit and visits to several residences in the vicinity of the wind farm turbines.

### **2.3.5 Evaluation of compliance against the audit criteria**

Compliance with the audit criteria was evaluated in two ways. Evaluation against the noise criteria was conducted by the acoustical specialist following analysis of the noise monitoring data obtained during the audit.

For evaluation against the non-noise conditions, the Department completed an audit checklist, which is provided at **Appendix B**.

### **2.3.6 Preparation and review of draft report**

The draft audit report was forwarded to the proponent for comment on matters of fact and these comments (see **Appendix F**) have been considered in finalising the audit report.

## **2.4 Audit criteria**

The audit criteria for this audit are the conditions of the approval (MP05\_0179) relating to the operation of Capital Wind Farm. A copy of the approval is provided at **Appendix G** and those conditions forming the audit criteria are listed in the audit checklist at **Appendix B**.

It should be noted that Condition 2 of the approval requires the project to be carried out generally in accordance with the project's environmental assessment, the proponent's Statement of Commitments and the proponent's submissions report. These documents were therefore taken to form a component of the audit criteria and were reviewed as appropriately related to the audit scope.

## **2.5 Audit team**

The team for this audit consisted of the following Departmental officers:

- Rob Sherry – Lead Auditor

Representatives from Palerang Shire Council, Goulburn Mulwaree Council and the EPA were invited to be Observers. Goulburn Mulwaree Council attended however the other stakeholders were unavailable at the time of the audit.

The noise compliance monitoring, analysis and evaluation were conducted by the following staff from the acoustical specialist:

- Renzo Tonin
- William Chan
- Ariel Michael

The noise compliance monitoring, analysis and evaluation were overseen by the Department's Technical Specialist for noise, Jeff Parnell.

### 3 COMMUNITY CONSULTATION

The Department undertook community consultation in association with the three wind farm compliance audits. Community consultation included the distribution of community survey questionnaires to all land owners within 4 km of each of the wind farms and providing the opportunity for questionnaire recipients to meet with the audit team to discuss compliance related issues.

Of the 78 survey questionnaires sent to residents within 4km of Capital wind farm, 35 were completed and returned. It should be noted that a wide range of issues were raised in the questionnaire responses and subsequent face to face discussions with the auditors – many falling outside the scope of the audit. Those matters that fell within the scope of the audit and are addressed in the audit findings (Section 5) relate to:

- Noise
- Off site landscaping
- Bird and bat surveys
- Television reception
- Complaints management

A separate report has been prepared that describes the community consultation undertaken by the Department in association with the three wind farm audits, the range of issues raised by community members and the Department's responses to the issues raised. See the Department's publication *Community Consultation associated with Compliance Audits of Cullerin Range, Woodlawn and Capital Wind Farms* which is available on the Department's website.

### 4 WIND FARM GUIDELINES

The Department has prepared the *Draft NSW Planning Guidelines: Wind Farms* to ensure effective consultation with local communities and to deliver improved consistency, transparency and rigour in the planning assessment process.

Information collected during the wind farm audits has been considered in the finalisation of the Guidelines.

## 5 AUDIT FINDINGS

### 5.1 Presentation of audit findings

#### 5.1.1 Categories of findings

This report categorises the audit findings as either **compliant** or **non-compliant**. In addition, for some items that were otherwise found to be compliant, the auditors identified potential opportunities for improved environmental performance or community access to information – these items are identified as **observations**. The audit report includes required actions for the proponent to address any non-compliances and recommended actions to address any observations.

#### 5.1.2 Significance-rating of non-compliances

The level of significance of non-compliances found by the Department's audits are estimated as high, moderate or low according to the following qualitative risk assessment process.

Non-compliances are assessed against two criteria: the “likelihood of impact occurring” and the “estimated level of impact”.

The *likelihood of impact occurring* is assessed as “almost certain”, “likely” or “unlikely” by considering factors including the past performance of the project (from recent audits, inspections and reports from other authorities), monitoring and reporting conducted by the proponent as required by conditions of approval and the general performance of the project measured by this audit.

The *estimated level of impact* is assessed by considering the nature and scale of the potential impact with level of sensitivity of the receiving environment to the impact.

After these assessments are made, the information is transferred into the significance-rating matrix shown in **Table 1**.

**Table 1:** Significance-rating of non-compliances

<i>Likelihood of impact occurring</i>	<i>Estimated level of impact</i>		
	High	Moderate	Low
Almost certain	High	High	Moderate
Likely	High	Moderate	Low
Unlikely	Moderate	Low	Low

A non-compliance rated as high significance (red code) suggests that it is associated with a high impact risk and needs to be addressed as a priority. A non-compliance rated as moderate significance (orange code) may still carry a significant impact risk but can be given a lower priority than a highly significant matter. A non-compliance of low significance (yellow code) will still need to be addressed on a routine basis.

Some non-compliances relate to administrative and reporting matters with little direct impact on the environment or communities, but are still important to the integrity of the regulatory system. Non-compliances in this category are given a blue code.

## 5.2 Overview of findings

The audit found Capital wind farm to have a high standard of compliance with the key operational conditions of approval.

The independent acoustical specialist also found Capital wind farm to be compliant with the noise criteria at all residential properties monitored during the period of the audit. A copy of the Noise Compliance Report prepared by the independent specialist is provided at **Appendix C**.

Overall, the audit identified four non-compliances, relating to commencement of operation, public availability of information, bird and bat reporting and landscaping of residential properties. These matters were assessed to be of low significance (yellow code) or administrative in nature (blue code).

The audit also made five observations, with recommendations to improve environmental performance or community access to information.

The findings are further detailed in the following sections.

## 5.3 Compliance with noise limits

### 5.3.1 Noise limits

The operational noise criteria are specified by Condition 53 of approval, as follows:

*53. Noise generated from the Development must not exceed the equivalent noise level ( $L_{Aeq,10}$ ) adjusted for any tonality as presented in the tables below.*

10m (height)wind speed (m/s)	Noise level $L_{Aeq}$ (10 minute) – at receiver locations*			
	Property described in the EA as Luckdale (G2)	Property described in the EA as Widgemore (G6)	Property described in the EA as La Granja (G10)	Property described in the EA as The Patch (H15)
4	35	35	35	35
5	36	35	35	35
6	38	35	35	35
7	38	35	36	35
8	39	35	37	35
9	39	35	37	35
10	39	35	37	35
11	39	35	37	35
12	39	35	37	35

10m (height)wind speed (m/s)	Noise level $L_{Aeq}$ (10 minute) – at receiver locations*			
	Property described in the EA as Wroxham (H24)	Property described in the EA as (E7)		
4	35	35		
5	35	35		
6	35	35		
7	35	36		
8	35	36		
9	35	37		
10	35	37		
11	35	37		
12	35	37		

*\*Receiver locations as identified in the Environmental Assessment – Capital Wind Farm Environmental Assessment prepared by Connell Wagner PPI dated February 2006. If compliance assessments are required at other non-associated residences as identified in the Environmental Assessment, the applicable noise limits are  $L_{Aeq\ 10\ minute}$  35 dB(A) where the predicted level is below  $L_{Aeq\ 10\ minute}$  35 dB(A), and the predicted level is above  $L_{Aeq\ 10\ minute}$  35 dB(A). The predicted levels are identified in the aforementioned Environmental Assessment.*

However, there are two key factors relating to the noise criteria that present difficulties for measuring compliance. These are discussed below.

- The noise criteria in the approval relate to noise from the development. It is not possible to directly measure noise from the development because the total noise level measured includes noise from other sources, particularly noise from wind blowing through vegetation (wind noise).
- The noise criteria relate to wind speed measured at 10m height, however the approval has no requirement to measure wind speed at 10m height. There are no meteorological masts serving Capital wind farm which presents a difficulty in acquiring wind speed data. The wind data used in this assessment is provided by the nacelle anemometer on wind turbine generator (WTG) 13, extrapolated to wind speed at a 10m height. This introduces a further variable in determining compliance.

Because of the above mentioned difficulties, any compliance assessment against the noise criteria cannot be definitive and an approximation only. This compliance audit used methodologies for approximation of wind speed and adjustment of the measured noise levels to estimate compliance with the noise criteria. However it would be reasonable to place a higher level of certainty concerning compliance on the noise levels for lower wind speeds of 4-5m/s rather than the estimated levels at higher wind speeds.

Further discussion of the methodologies for estimation of compliance is provided in the Noise Compliance Report at **Appendix C**.

### **5.3.2 Unattended monitoring**

The primary source of noise data for this audit came from monitors placed at each monitoring location for a period of four weeks. These monitors recorded noise levels continuously and were therefore “unattended”.

The unattended monitoring was conducted from Monday 16 July 2012 to Monday 13 August 2012 inclusive, at the six properties identified in the approval, being Lakoona (G4), Widgemore (G6), Granja (G10), The Patch (H15), Wroxham (H24) and Grantham Park (G7). Photographs of the noise monitors set up at the unattended monitoring locations are provided in **Appendix A** and in the Noise Compliance Report at **Appendix C**.

All of these monitoring locations are on properties that are not associated with the wind farm.

### **5.3.3 Attended monitoring**

Noise data and observations from attended monitoring are able to supplement the data gained from the continuous, unattended monitoring. An advantage of attended monitoring is that the attendant can gain an appreciation of the acoustic environment and note the prevalence of non-wind farm noise such as barking dogs, birds, insects and traffic and train noise. Importantly, the attendant can also note the level of audibility of the wind turbines.

Attended noise monitoring was also used to determine whether the measured noise levels needed to be modified (increased) where noise is deemed to be tonal, low frequency, impulsive or intermittent. Condition 56 of the approval requires such adjustment to the

measured noise levels in accordance with the “modification factors” described in the *NSW Industrial Noise Policy (NSW EPA, January 2000)*.

### 5.3.4 **Findings of noise monitoring**

Following analysis of the noise monitoring data, the independent specialist found that the noise levels measured at all the above monitoring locations complied with the approval conditions.

A full report on the independent specialist’s noise monitoring, assessment and findings on compliance is provided at **Appendix C**. A summary of the findings for each monitoring point is provided below.

#### *Lakoona (G4)*

Lakoona is located to the north of the Grosses Hill Group of turbines, approximately 2km from the nearest turbine and approximately 2km from the eastern shore of Lake George. The noise criteria applying to this location are provided in **Table 2**, together with the measured total noise levels and the estimated levels of noise from the wind farm for the purpose of compliance assessment.

**Table 2: Lakoona compliance assessment**

10m Wind Speed m/s	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Criteria	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Measured (total noise)	25.1	28.0	30.3	32.1	33.6	34.8	36.0	37.1	38.4	39.9	41.7	43.9	46.8	50.2
Estimated Capital noise	25.1	28.0	30.3	32.1	33.1	33.6	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1

The “Measured” row represents the sum of noise from the turbines and the wind related noise from vegetation.

The independent specialist stated that a reasonable assessment of compliance can be made at the lower wind speeds of up to 5m/s where wind noise is expected to be at a minimum. The measured levels at these speeds were therefore not adjusted. For wind speeds above 5m/s, the measured levels were adjusted by the increases in noise levels with increasing wind speed predicted by the project’s environmental assessment.

The resulting “Estimated” row can then be compared with the “Criteria” to assess compliance, with the finding that compliance is demonstrated at all wind speeds.

Two attended noise surveys were conducted at Lakoona between 11.50pm and 12.10am on the night of Monday 16 July 2012 and between 8.40pm and 9.00pm on Monday 30 July 2012. Despite wind speeds being very low and negligible power being generated by the wind farm on both these occasions, an analysis was performed of the modification factors referred to in Condition 56 with the conclusion that there were no corrections required for tonal, low frequency, impulsive or intermittent noise.

#### *Widgemoore (G6)*

Widgemoore is also located generally to the north of the Grosses Hill Group of turbines but approximately 2km further to the east of the Lakoona monitoring point. The nearest turbine is approximately 1.6km to the SSW of this monitoring location. The noise criteria applying to this location are provided in **Table 3**, together with the measured total noise levels and the estimated levels of noise from the wind farm for the purpose of compliance assessment.

**Table 3: Widgemore compliance assessment**

10m Wind Speed m/s	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Criteria	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Measured (total noise)	26.9	28.1	29.5	31.1	32.8	34.7	36.7	38.7	40.9	43.1	45.3	47.5	49.8	52.0
Estimated Capital noise	<b>26.9</b>	<b>28.1</b>	<b>29.5</b>	<b>31.1</b>	<b>32.6</b>	<b>32.6</b>	<b>33.1</b>							

The “Measured” row represents the sum of noise from the turbines and the wind related noise from vegetation.

The independent specialist stated that a reasonable assessment of compliance can be made at the lower wind speeds of up to 5m/s where wind noise is expected to be at a minimum. The measured levels at these speeds were therefore not adjusted. For wind speeds above 5m/s, the measured levels were adjusted by the increases in noise levels with increasing wind speed predicted by the project’s environmental assessment.

The resulting “Estimated” row can then be compared with the “Criteria” to assess compliance, with the finding that compliance is demonstrated at all wind speeds.

An attended noise survey was conducted between 11.10pm and 11.30pm on Monday 16 July 2012. At this time the wind speed and output generated by the wind farm were low, however the monitoring location was downwind of the turbines. A low level turbine noise could be heard together with noise from sheep. An analysis was performed of the modification factors referred to in Condition 56 with the conclusion that there were no corrections required for tonal, low frequency, impulsive or intermittent noise.

#### *La Granja (G10)*

La Granja is located to the south-east of the Grosses Hill group of turbines, approximately 1.6km from the nearest turbine. The noise criteria applying to this location are provided in **Table 4**, together with the measured total noise levels and the estimated levels of noise from the wind farm for the purpose of compliance assessment.

**Table 4: La Granja compliance assessment**

10m Wind Speed m/s	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Criteria	35.0	35.0	35.0	35.0	35.0	36.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0
Measured (total noise)	28.6	30.9	32.7	34.2	35.5	36.6	37.7	38.6	39.7	40.9	42.2	43.9	45.9	48.3
Estimated Capital noise	<b>28.6</b>	<b>30.9</b>	<b>32.7</b>	<b>34.2</b>	<b>35.7</b>	<b>36.2</b>	<b>36.2</b>	<b>36.7</b>						

The “Measured” row represents the sum of noise from the turbines and the wind related noise from vegetation.

The independent specialist stated that a reasonable assessment of compliance can be made at the lower wind speeds of up to 5m/s where wind noise is expected to be at a minimum. The measured levels at these speeds were therefore not adjusted. For wind speeds above 5m/s, the measured levels were adjusted by the increases in noise levels with increasing wind speed predicted by the project’s environmental assessment.

The resulting “Estimated” row can then be compared with the “Criteria” to assess compliance, with the finding that compliance is demonstrated at all wind speeds.

The estimated levels indicate an exceedance of 0.7 dB(A) for a wind speed of 6 m/s and 0.2 dB(A) for a wind speed of 7 m/s. Due to the level of uncertainty in estimating the noise levels attributable to the wind farm as described in section 5.3.1 of this report, particularly at wind speeds above 5m/s, these apparent exceedances are regarded as insignificant and it would be unreasonable to describe them as non-compliant with the noise criteria.

An attended noise survey was conducted between 10.30pm and 10.50pm on Monday 16 July 2012. At this time the wind speed and output generated by the wind farm were low, however the monitoring location was downwind of the turbines. Weather conditions were calm and cricket noise predominated. The swishing sound of Capital turbines to the north-west was audible. An analysis was performed of the modification factors referred to in Condition 56 with the conclusion that there were no corrections required for tonal, low frequency, impulsive or intermittent noise.

### *The Patch (H15)*

The Patch is located between the Hammonds Hill Group of turbines and the Bungendore Road, approximately 2.3km west of the nearest wind turbine. The noise criteria applying to this location are provided in **Table 5**, together with the measured total noise levels and the estimated levels of noise from the wind farm for the purpose of compliance assessment.

**Table 5: The Patch compliance assessment**

10m Wind Speed m/s	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Criteria	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Measured (total noise)	28.2	30.2	31.9	33.5	34.8	36.0	37.0	37.9	38.6	39.3	39.8	40.2	40.5	40.8
Estimated Capital noise	<b>28.2</b>	<b>30.2</b>	<b>31.9</b>	<b>33.5</b>	<b>35.0</b>	<b>35.5</b>	<b>35.5</b>	<b>36.0</b>						

The “Measured” row represents the sum of noise from the turbines and the wind related noise from vegetation.

The independent specialist stated that a reasonable assessment of compliance can be made at the lower wind speeds of up to 5m/s where wind noise is expected to be at a minimum. The measured levels at these speeds were therefore not adjusted. For wind speeds above 5m/s, the measured levels were adjusted by the increases in noise levels with increasing wind speed predicted by the project’s environmental assessment.

The resulting “Estimated” row can then be compared with the “Criteria” to assess compliance, with the finding that compliance is demonstrated at all wind speeds. The estimated levels indicate an exceedance of 0.5 dB(A) for wind speeds of 7m/s and 8m/s, and an exceedance of 1dB(A) for wind speeds 9m/s and above. Because of the level of uncertainty in estimating the noise levels attributable to the wind farm as described in section 5.3.1 of this report, particularly at wind speeds above 5m/s, these apparent exceedances are regarded as insignificant and it would be unreasonable to describe them as non-compliant with the noise criteria. The independent specialist has therefore found compliance to be demonstrated at all wind speeds for this monitoring location.

An attended noise survey was conducted between 9.00pm and 9.20pm on Monday 16 July 2012. At this time the wind speed and output generated by the wind farm were low, however the monitoring location was downwind of the turbines. There was a 2.5m/s wind at the measurement location. Sounds of crickets dominated and there was no swishing evident, only a wind-like sound. An intermittent unidentified tone at 400Hz was also noted. An analysis was performed of the modification factors referred to in Condition 56 with the

conclusion that there were no corrections required for tonal, low frequency, impulsive or intermittent noise.

#### *Wroxham (H24)*

Wroxham is located to the NNE of the Hammonds Hill Group of wind turbines, approximately 1.5km from the nearest wind turbine. This location is also approximately 2.6km from the southern-most turbine of Woodlawn wind farm and measured noise levels could be expected to include a component from Woodlawn.

The noise criteria for this location are provided in **Table 6**, together with the measured noise levels and the noise levels reduced for the estimated contributions of wind noise and Woodlawn wind farm noise.

**Table 6: Wroxham compliance assessment**

10m Wind Speed m/s	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Criteria	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Measured (total noise)	30.4	32.6	34.3	35.6	36.6	37.4	38.2	38.9	39.7	40.8	42.2	44.0	46.3	49.2
Estimated total turbine noise	27.3	28.9	31.0	33.3	34.3	35.3	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
Estimated Capital noise		30.5	32.3	33.8	34.3	34.3	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8

As this monitoring location receives a component of noise from Woodlawn wind farm, the “Measured” row represents the sum of noise from the Capital turbines, wind related noise from vegetation and noise from Woodlawn turbines.

For wind speeds above 5m/s, the measured levels were adjusted by the increases in noise levels with increasing wind speed predicted by the project’s environmental assessment. Therefore the noise levels in the “Estimated total turbine noise” row represent cumulative total noise from Capital and Woodlawn wind farms minus wind noise.

From this a correction value is subtracted for the Woodlawn wind farm contribution, arriving at the estimated noise from Capital wind farm in the bottom row. This row can then be compared with the “Criteria” to assess compliance, with the finding that compliance is demonstrated at all wind speeds.

An attended noise survey was conducted between 9.50pm and 10.10pm on Monday 16 July 2012 on the roadside at the entrance to the property. There was a 3.9m/s wind at the measurement location. Sounds of crickets dominated together with intermittent sounds of cows, sheep and other unknown animals. An analysis was performed of the modification factors referred to in Condition 56 with the conclusion that there were no corrections required for tonal, low frequency, impulsive or intermittent noise.

#### *Grantham Park (E7)*

Grantham Park is located approximately mid-way between the southern-most turbines of the Ellenden and Hammonds Hill Groups of turbines, approximately 1.4km south-east of the nearest wind turbine. The noise criteria applying to this location are provided in **Table 7**, together with the measured total noise levels and the estimated levels of noise from the wind farm for the purpose of compliance assessment.

**Table 7: Grantham Park compliance assessment**

10m Wind Speed m/s	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Criteria	35.0	35.0	35.0	35.0	35.0	36.0	36.0	37.0	37.0	37.0	37.0			
Measured (total noise)	27.6	30.0	31.9	33.4	34.8	36.2	37.6	39.3	41.3	43.7	46.8	50.6	55.3	61.0
Estimated Capital noise	<b>27.6</b>	<b>30.0</b>	<b>31.9</b>	<b>33.4</b>	<b>34.9</b>	<b>34.9</b>	<b>35.4</b>	<b>35.9</b>	<b>35.9</b>	<b>35.9</b>	<b>35.9</b>			

The “Measured” row represents the sum of noise from the turbines and the wind related noise from vegetation.

The independent specialist stated that a reasonable assessment of compliance can be made at the lower wind speeds of up to 5m/s where wind noise is expected to be at a minimum. The measured levels at these speeds were therefore not adjusted. For wind speeds above 5m/s, the measured levels were adjusted by the increases in noise levels with increasing wind speed predicted by the project’s environmental assessment.

The resulting “Estimated” row can then be compared with the “Criteria” to assess compliance, with the finding that compliance is demonstrated at all wind speeds.

An attended noise survey was conducted between 9.30pm and 9.50pm on Monday 13 August 2012. Weather conditions were calm and animal noise and the Capital turbines to the north-east were audible. An analysis was performed of the modification factors referred to in Condition 56 with the conclusion that there were no corrections required for tonal, low frequency, impulsive or intermittent noise.

### 5.3.5 Noise measurements at Capital Substation

The independent specialist conducted a noise survey at the Capital wind farm substation, on the morning of Tuesday 17 July. During the survey the output generated was 37.5MW, wind speed was 4.4m/s at 10m height and wind direction 284 degrees. Therefore the output was medium and not conducive to a worst case condition. The noise data indicated spectral peaks associated with transformer noise (100Hz and 200Hz) and cooling fan noise (315Hz). There were no other audible noise sources at the substation during the visit, however there was a diesel generator which is understood to operate only when there is a power cut.

The combined sound power level of the three transformers at the substation was measured at approximately 89dB(A) re  $10^{-12}$  watt, which is significantly less than the value of 100dB(A) assumed in the Environmental Assessment.

The independent specialist also noted that at The Patch (H15), which is the closest residential location to the substation where noise measurement were undertaken for this audit, there were no tonal components at the frequencies noted above nor was there any audible noise which would have been identifiable as transformer noise.

## 5.4 Findings related to non-noise conditions

This section addresses only those matters where the audit found non-compliance, made observations or considered the matter significant enough to warrant a comment. Matters addressed by the audit but not described in this section were found to be compliant and satisfactorily managed by the proponent.

All matters addressed in the non-noise component of this audit are detailed in the Audit Checklist at **Appendix B**.

#### **5.4.1 Communication and consultation**

Condition 37 of the approval requires the Proponent to make all documents relevant to the approval, with the exception of that information that may be legitimately claimed as of a confidential commercial nature, publicly available at a location on the development site convenient for inspection by visitors.

The audit found that some documents were available for inspection by the public at the front counter of the Capital substation office, however this arrangement was not convenient for inspection by visitors. This is because the access to the site is prohibited by a sign at the gate from the Tarago Road and there was no telephone number provided to effect entry to the site. This arrangement was found to place the Proponent in **non-compliance** with Condition 37. The audit requires that convenient access be made available for visitors to inspect publicly available documents, within one month from the date of this report.

This non-compliance was assessed in accordance with the significance-rating procedure described in Section 5.1. The assessment considered this to be largely an administrative matter, giving it a blue code rating.

The auditors also made an **observation** that public access to relevant documents could be improved by posting them on the project's web site. A recommendation has been made that all documents relative to the consent except those of a confidential commercial nature, be posted on the project's web site within one month from the date of this report.

#### **5.4.2 Complaints management**

Condition 40 addresses the need for the Proponent to keep a complaints register which records details of complaints and any action taken by the Proponent including any follow-up contact with the complainants.

The complaints register was sighted by the auditors, who found that actions recorded against a number of complaints was "responded by email" or "added to complaint register" with no indication of the nature of any action taken specific to the complaint.

The audit has made an **observation** in relation to this issue, with a recommendation that the management of complaints be reviewed to ensure complaint details, any action taken, any follow-up contact with the complainant and any reasons for no action taken be fully recorded in the complaints register, commencing on the date of issue of this report.

The Department's community consultation also received some responses indicating that it was difficult to find the 24-hour telephone contact line required by Condition 40. However, the audit found the appropriate contact details on the Inflegen Energy website, accessed by typing Capital Wind Farm into an internet search engine.

It is further noted that a complainant reported that email address for complaints was inoperative in early October 2012, which was confirmed by the Department. This was rectified when the Department brought the issue to the proponent's attention and the proponent has indicated it will run regular checks of the email address in the future.

#### **5.4.3 Commencement of operation**

Condition 31 states that operation of the wind farm must not commence until written approval of the OEMP has been received from the Director General. The audit found evidence that operation commenced in October 2009, however the Director General's conditional approval of the OEMP was issued on 1 December 2009. The conditional approval required revision of the OEMP and the revised OEMP was received by the

Department on 18 January 2010. Upon receipt of approval, the Proponent must supply a copy of the OEMP to the DEC and Councils as soon as practicable.

The commencement of operation prior to approval of the OEMP was found to place the proponent in **non-compliance** with Condition 31. This non-compliance was assessed in accordance with the significance-rating procedure described in Section 5.1. The assessment considered the likelihood of impact occurring as a result of this non-compliance to be low (unlikely) and the level of impact to be low. Therefore the overall significance rating of this non-compliance is assessed to be **low** (yellow code).

As the breach cannot now be rectified or remedied, the audit has not proposed any action except for the Department to address the breach in accordance with the Compliance Policy.

#### **5.4.4 Bird and bat monitoring**

Condition 35 requires the proponent to prepare annual reports commencing 12 months from the start of operation, describing the activities undertaken within the Bird and Bat Adaptive Management Program, including the outcomes of bird and bat monitoring

Operation commenced in October 2009 and the first annual report should have been received by December 2010. The first annual report was received on 3 August 2011 for the period up to July 2011.

Further, the report does not include bird and bat monitoring results for the period between October 2009 and March 2010.

The lateness of the first report and the failure to include bird and bat monitoring results for the period between October 2009 and March 2010 were found to be **non-compliant** with Condition 35. This non-compliance was assessed in accordance with the significance-rating procedure described in Section 5.1. The assessment considered the likelihood of impact occurring as a result of this non-compliance to be low (unlikely) and the level of impact to be low. Therefore the overall significance rating of this non-compliance is assessed to be **low** (yellow code).

In its comments on the draft audit report, the Proponent indicated that bird and bat monitoring did not commence before March 2010.

In addition, during the Department's community consultation associated with the wind farm audits, one resident alleged that the results of bird and bat monitoring carried out on their property had not been provided to them. This was not verified by the audit, however the matter falls within the previous observation and recommended action concerning public access to documents via the project's website.

#### **5.4.5 Off-Site Landscaping**

Condition 43 requires an Off-Site Landscape Sub Plan to address visual impacts of the proposed development for any owner of an existing or approved residential dwelling with views of turbine(s) located within four kilometres of their dwelling. The proponent advised that the plan has been fully implemented and landscaping completed.

The audit noted that the proponent was not able to provide evidence of residents acknowledging completion of landscaping works and has made an **observation** that for any future landscaping works under this Plan, the proponent seeks signed documents from residents acknowledging completion of landscaping works. This would enable the proponent to verify such works have been undertaken.

Condition 45 requires Off-Site Landscape Sub Plan to be fully implemented within 18 months of commencement of wind farm operation. The audit noted the proponent had been in lengthy negotiations with one owner with an agreement dated 11 May 2012 not yet implemented. Although this condition is identified as **non-compliant**, it is recognised that the proponent may have taken reasonable steps to negotiate measures with landowners within the specified period. This non-compliance was assessed in accordance with the significance-rating procedure described in Section 5.1. The assessment considered the likelihood of impact occurring as a result of this non-compliance to be low (unlikely) and the level of impact to be moderate. Therefore the overall significance rating of this non-compliance is assessed to be **low** (yellow code).

The audit requires implementation to be finalised within 3 months from the date of this report.

#### **5.4.6 Noise mitigation – vacant lots**

Condition 60 requires the Proponent to provide noise mitigation measures to no more than one residence built on any vacant lot legally existing at the time of the consent, upon which a residential dwelling would be permissible at the same date, if noise levels from the wind farm at the residence would exceed the SA Guidelines.

The Proponent advised the auditors it was aware of a new residence is currently under construction which is sited approximately 800 metres from a turbine and acknowledged that the new dwelling met the criteria for this condition. Following the site inspection, the proponent met with the owner of the dwelling under construction to ascertain whether noise mitigation measures might be required. The proponent advised that the dwelling is being constructed using techniques including insulation and double glazing which should act as noise barriers.

This matter is recorded as an **observation** with a recommendation that the proponent reassesses the dwelling upon completion and provides the Department with a timetable for installation of noise mitigation measures if required under the condition, within six months from the date of this report.

#### **5.4.7 Soil and water management**

Condition 33 requires an Operation Soil and Water Management Sub Plan to be prepared as part of the OEMP, which includes the use of appropriate containment facilities for chemical storage in the control room, bunding around the substation transformer and padmount transformers, and facilities building to prevent discharge to the ground.

The audit made an **observation** of a number of unbunded oil containers containing liquid outside these areas and made the recommendation that all oil containers be provided with permanent or portable bunding (such as spill containment pallets) within one month from the date of this report.

#### **5.4.8 Television reception**

Condition 72 addresses the issue of potential interference to television reception. One of the requirements is for the Proponent, if requested by an owner, to assess the quality of television reception prior to development commencing and reassess the electromagnetic interference to television reception during the first six months of operation.

During the Department's community consultation associated with the wind farm audits, one resident indicated that the new television antenna installed by the wind farm had lost reception from Canberra. This was not verified by the audit and may be due to factors outside the wind farm's influence. However it is recommended that the Proponent

addresses and maintains records of its actions in relation to any requests by owners concerning television reception.

## 5.5 Summary of findings

### 5.5.1 Non-compliances

The audit found four non-compliances with the project approval, summarised in **Table 8**.

**Table 8: Non-compliances and required actions**

Reference No.	Condition	Non-compliance	Required Action
N1	37	The arrangement for documents to be available for inspection by the public at the front counter of the Capital substation office was not convenient for visitors. This is because the access to the site was prohibited by a sign at the gate from the Tarago Road and there was no telephone number provided to effect entry to the site.	Make convenient access for visitors to inspect publicly available documents.  <i>Due date:</i> One month from the date of this report.
N2	31	Commencement of operation prior to approval of the OEMP.	The Department is to address the breach in accordance with the Compliance Policy.
N3	35	The lateness of the first bird and bat annual report and the failure to include bird and bat monitoring results for the period between October 2009 and March 2010.	Ensure future bird and bat monitoring reports are in accordance with approval conditions.  <i>Due date:</i> Ongoing.
N4	45	Off-Site Landscape Sub Plan not fully implemented within 18 months of commencement of wind farm operation. (It is recognised that the proponent may have taken reasonable steps to negotiate measures with landowners within the specified period.)	Finalise implementation of the Off-Site Landscape Sub Plan.  <i>Due date:</i> Three months from the date of this report.

### 5.5.2 Observations and recommended actions

The audit made five observations in relation to matters that were otherwise compliant but with the potential for improved environmental performance or community access to information. A list of the observations is provided in **Table 9**.

**Table 9: Observations and recommended actions**

Reference No.	Condition	Observation	Recommended Action
O1	37	Public access to relevant documents could be improved by posting them on the project's web site.	<p>Post all documents relative to the consent except those of a confidential commercial nature, on the project's web site.</p> <p><i>Due date:</i> One month from the date of this report.</p>
O2	40	On the project's complaints register, actions recorded against a number of complaints was "responded by email" or "added to complaint register" with no indication of the nature of any action taken specific to the complaint.	<p>Review the management of complaints to ensure complaint details, any action taken, any follow-up contact with the complainant and any reasons for no action taken be fully recorded in the complaints register.</p> <p><i>Due date:</i> Immediately from the date of this report.</p>
O3	43	The proponent was not able to provide evidence of residents acknowledging completion of landscaping works.	<p>Seek signed documents from residents acknowledging completion of any future landscaping works.</p> <p><i>Due date:</i> Immediately from the date of this report.</p>
O4	60	<p>The Proponent advised the auditors it was aware of a new residence is currently under construction which is sited approximately 800 metres from a turbine constructed since development of the wind farm and had not addressed its potential for noise mitigation measures to be provided under this condition.</p> <p>(Following the site inspection, the proponent advised the auditors that it met with the owner of the dwelling</p>	<p>Reassess the dwelling upon its completion and provide the Department with a timetable for installation of noise mitigation measures if required under the condition.</p> <p><i>Due date:</i> Six months from the date of this report.</p>

		under construction to ascertain whether noise mitigation measures might be required. The proponent advised that the dwelling is being constructed using techniques including insulation and double glazing which should act as noise barriers.)	
O5	33	A number of unbunded oil containers containing liquid were observed.	All oil containers to be provided with permanent or portable bunding (such as spill containment pallets).  <i>Due date:</i> One month from the date of this report.

### 5.5.3 ***Summary of actions arising from the audit***

The actions arising from this audit are summarised as follows.

#### *Public availability of documents*

- N1: Make convenient access for visitors to inspect publicly available documents within one month from the date of this report.
- O1: Post all documents relative to the consent except those of a confidential commercial nature, on the project's web site, within one month from the date of this report.

#### *Complaints management*

- O2: Review the management of complaints to ensure complaint details, any action taken, any follow-up contact with the complainant and any reasons for no action taken are fully recorded in the complaints register, immediately from the date of this report.

#### *Off-site landscaping*

- N4: Finalise implementation of the Off-Site Landscape Sub Plan, within three months from the date of this report.
- O3: Seek signed documents from residents acknowledging completion of any future landscaping works, immediately from the date of this report.

#### *Noise mitigation for new dwelling*

- O4: Reassess the dwelling upon completion and provide the Department with a timetable for installation of noise mitigation measures if required under the condition, within six months from the date of this report.

#### *Energy efficiency*

- O5: All oil containers to be provided with permanent or portable bunding (such as spill containment pallets), within one month from the date of this report.

## **6 PROPOSER'S COMMENTS ON DRAFT AUDIT REPORT**

The proponent was forwarded the draft audit report to provide comments on matters of fact and on any progress with the draft recommended actions. A copy of the proponent's comments, together with the auditors' responses, is provided at **Appendix F**.