Wagerup Cogeneration Project

Alinta Cogeneration (Wagerup) Pty Ltd

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 1223
June 2006

ISBN. 0 7307 6864 3
ISSN. 1030 - 0120
Assessment No. 1643

Contents

1. Introduction and Background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment on the environmental factors relevant to the proposal by Alinta Cogeneration (Wagerup) Pty Ltd (Alinta) to construct a gas fired power station producing 350 megawatts (MW) of electrical power and 460 tonnes per hour of steam at the Alcoa Alumina Refinery at Wagerup.

The EPA recently assessed a proposal by Alcoa to increase production from the Wagerup Alumina Refinery to 4.7 million tonnes per annum (EPA, 2006). The Alcoa proposal included a 280 MW co-generation power station to provide steam to the refinery and power to the South West Interconnected System (SWIS). However, uncertainty over the timing of the refinery expansion and continued growth in electricity demand has lead Alinta to propose an alternative power station to be completed by October 2007.

Alinta proposes to build and operate a 350 MW open cycle power station to supply electricity to the SWIS, then add two Heat Recovery Steam Generators (HRSGs) at a later date to supply steam to the Wagerup refinery (to replace existing steam generation and/or allow for the Wagerup expansion).

Based on the information provided in the referral document the EPA considered that, while the proposal has the potential to affect the environment, it could be readily managed to meet the EPA's environmental objectives. Consequently, the proposal was advertised in *The West Australian* newspaper on 12 June 2006 advising that the EPA was assessing the proposal at the level of Assessment on Referral Information (ARI).

The proponent has submitted a referral document setting out the details of the proposal, potential environmental impacts and appropriate commitments to manage those impacts. The EPA notes that the proponent has consulted with relevant stakeholders. The EPA considers that the proposal as described can be managed in an acceptable manner, subject to these commitments and the EPA's recommended conditions being made legally binding.

The EPA has therefore determined under Section 40(1) of the Environmental Protection Act that the level of assessment for the proposal is ARI, and this report provides the EPA advice and recommendations in accordance with Section 44(1).

The proponent requested parallel processing of approvals under both Part IV and Part V of the *Environmental Protection Act 1986* (EP Act). As such, the EPA has liaised with the Department of Environment (DoE) to develop a draft Works Approval for publication with the EPA's Report and Recommendations.

Appendix 2 contains the draft Works Approval for the proposal. It is included as a matter of information only and does not form part of the EPA's Report and Recommendations. Matters covered in the Works Approval, and which have been taken into account by the EPA appear in the report itself.

2. The Proposal

The proposal being assessed in this report represents an alternative power station to be built instead of the one proposed by Alcoa at the Wagerup refinery.

Alinta proposes to construct a natural gas-fired power station of 350 MW nominal generating capacity. The facility would be located adjacent to Alcoa's alumina refinery at Wagerup (Figure 1) and the proposal would be implemented in two stages:

- Stage 1: open cycle gas turbines operating as a peak load power station.
- Stage 2: co-generation gas turbines operating as a base load power station.

The main components of Stage 1 would be:

- two natural gas-fired turbines, each of 175 MW nominal generating capacity;
- water treatment plant; and
- two 35 metre stacks.

Stage 2 would add:

- two HRSGs of nominally 430 tonnes per hour steam output (with auxiliary duct firing);
- two 50 metre HRSG stacks to replace the 35 metre stacks from Stage 1.

A detailed description of the proposal can be found in the proponent's referral document (SKM, 2006). The main characteristics of each stage of the proposal are summarised in the table below.

Table 1: Summary of key proposal characteristics

Element	Description
Project Purpose	To supply steam to the Alcoa alumina refinery and electricity to the south west interconnected system
Life of the Project	25 years (nominal)
Power Generating Capacity	350 megawatts (nominal)
Plant Facilities Gas turbine specifications Heat recovery steam generator (HRSG) Number of stacks Height of stacks	 2 × gas turbine of 175 megawatts nominal generating capacity fitted with dry low NO_x burners 2 × HRSGs with a capacity of 430 tonnes of steam per hour 4 (total) 35 metres (open cycle), 50 metres (co-generation)
Thermal Efficiency Thermal Efficiency (based on net higher heating value)	 approximately 30% (open cycle at 41 degrees Celsius and 40% relative humidity) and 74% (co-generation based on one GT and one HRSG fully fired at 18 degrees Celsius and 20% relative humidity)
Operating Hours	up to 1000 hours per annum per unit (open cycle) up to 8760 hours per annum per unit (co-generation)
Inputs Fuel	 approximately 3.4 petajoules of gas and 0.4 petajoules of distillate per annum (open cycle), approximately 31.8 petajoules of gas (co-generation)
Air Emissions Carbon dioxide equivalent (CO_{2e}) Oxides of nitrogen (NO_x)	 1 783 000 tonnes per annum 1331 tonnes per annum

The potential impacts of the proposal are discussed by the proponent in the referral document (SKM, 2006).

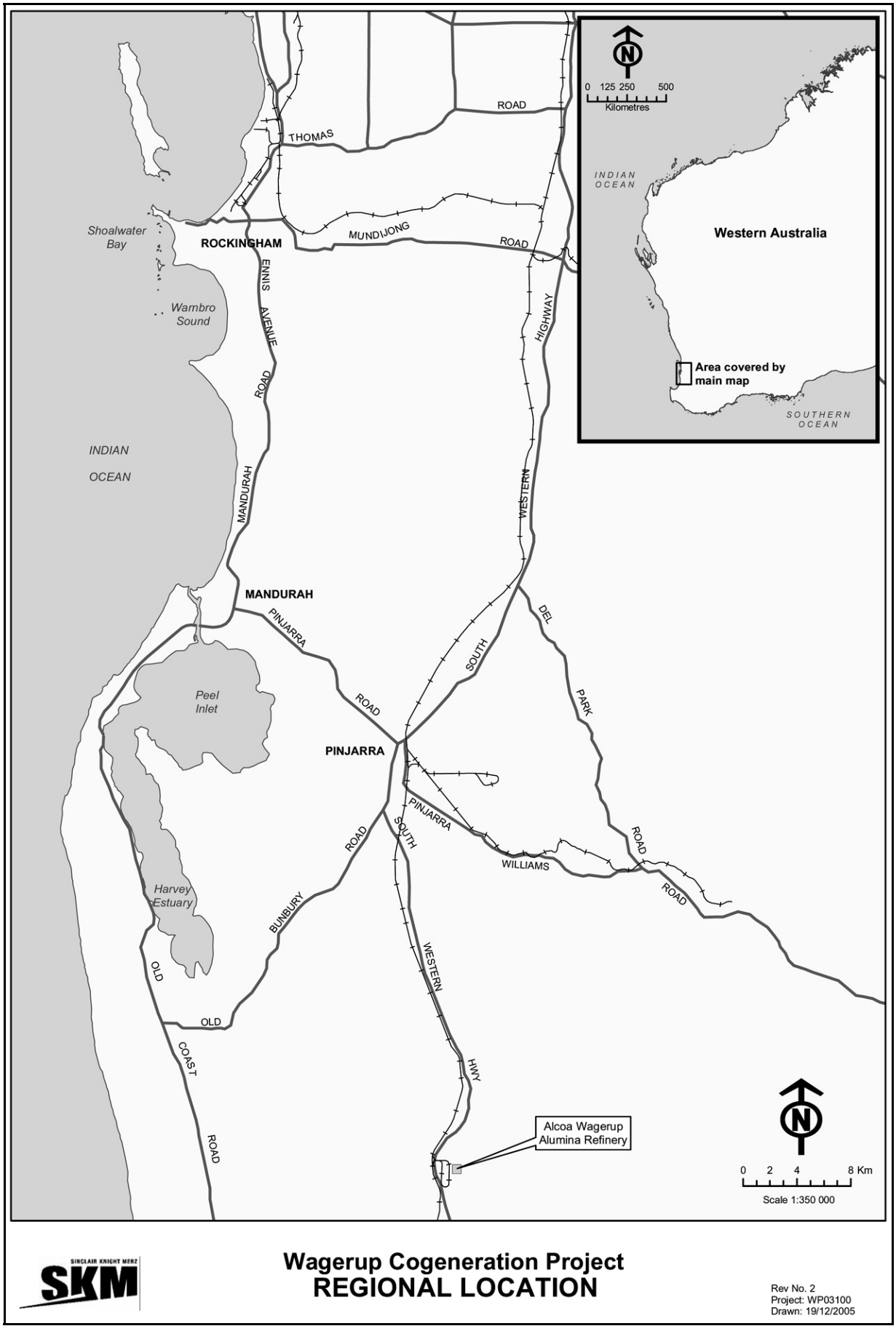

Figure 1: Regional Location (SKM, 2006)

3. Consultation

Section 6 of Alinta's referral document (SKM, 2006) details the consultation that has occurred with the following targeted group of stakeholders:

- Wagerup tripartite group
- Wagerup Community Consultation Network
- Shire of Waroona
- Shire of Harvey
- Local residents
- Department of Health
- Department of Industry and Resources
- Department of Land Information
- Water Corporation
- Department for Planning and Infrastructure
- Department of Conservation and Land Management
- Harvey Water
- Office of Energy
- Chamber of Commerce and Industry of WA - South West
- Chamber of Commerce and Industry of WA
- Peel Development Commission
- South West Development Commission
- Federal Member for Canning
- State Member of the Legislative Assembly for Collie-Wellington
- Conservation Council of Western Australia

A number of environmental issues were raised by the stakeholders during the consultation. Table 2 summarises the main issues raised and details the actions taken by Alinta to address the issues.

Table 2: Summary of issues raised during stakeholder consultation (SKM, 2006)

Issues raised	Stakeholders	Response
Licensing of the plant.	Wagerup Tripartite Group	Alinta will hold the operating licence for the plant.
Capacity of the proposed plant.	South West Development Commission, Local Residents	The project comprises construction of two 162MW gas turbines that will each have a 175.5MW peak capability.
The capacity of the gas turbine generators is different to that in the Alcoa Environmental Review and Management Program (ERMP).	Local Residents	The capacity of the gas turbine generators proposed in the ERMP was based on the cogeneration units currently being built at Pinjarra. Since submission of the ERMP, additional investigations by Alinta identified that this particular type of gas turbine would not be available in the timeframe required to meet Alinta's commitment to provide reserve generating capacity for the 2007/2008 summer.
Effect on air quality.	Local Residents	The proposed Alinta plant, in all operating modes, will not cause significant increases in ground-level concentrations of pollutants. Air emissions' modelling

Issues raised	Stakeholders	Response
		demonstrates that emissions will easily meet air quality guidelines. Alinta is confident that the proposal is safe from an environmental health perspective.
Computer modelling of air emissions is too uncertain to be used in an impact assessment.	Local Residents	Computer models represent our current best understanding of what happens to air emissions and how they impact on local and regional air quality. As such, there will always be room for improvement as our understanding develops with on-going research. However, the TAPM air quality model as used in the Alinta Wagerup Cogeneration Plant assessment, has been developed by the CSIRO Division of Atmospheric Research for regulatory use in Australia and arguably represents industry best practice. Most importantly, modelling results demonstrate that the contribution of the Alinta cogeneration plant to expected ground-level concentrations is not significant. Cogeneration is recommended as the most efficient and environmentally friendly means of generating power from fossil fuels. Under Stage Two, Scenario 1 development, displacement of existing Alcoa steam boilers by the proposed cogeneration plant will contribute to a reduction in total air emissions due to steam generation.
Why has PM_{10} been modelled but not $PM_{2.5}$.	Local Residents	The Alinta Wagerup assessment directly incorporated the results of the Alcoa Wagerup ERMP assessment, which addressed particulate matter as PM_{10}. $PM_{2.5}$ was not modelled as an individual compound as $PM_{2.5}$ concentrations are not significant and are independent of refinery activities. The relevant air quality standard for particulate matter is the Ambient Air Quality NEPM, which is in terms of PM_{10} (50µg/m^3, daily average). The Ambient Air Quality NEPM does include a $PM_{2.5}$ standard (25µg/m^3 daily average, 8µg/m^3 annual average), but this is an advisory reporting standard only, which is intended to assist in gathering information for a review of the NEPM. The $PM_{2.5}$ standard is not a health-based standard, and it is not appropriate for use in air quality assessments.
Effect on noise emissions.	Local Residents	Alinta is committed to developing a Noise Management Plan aimed at meeting regulatory requirements and ensuring that there will not be an increase in noise impacts from the proposed Alinta plant.
Separation distances between the proposed plant and residents.	Local Residents	Environmental Protection Authority Guidance Statement No. 3 "Separation Distances between Industrial and Sensitive Land Uses" recommends a buffer distance for Electric Power Generation Facilities of between 3,000m and 5,000m depending on the location and size of the facility. However, as stated on page five of the Guidance Statement, the distances provided are not intended to be absolute separation distances, rather they provide general guidance on separation distances in the absence of site-specific technical studies. Such technical studies, namely those related to air quality and noise, have been undertaken for the proposed Alinta Wagerup Cogeneration Project. The results of these studies demonstrate that existing separation distances between the proposed plant and sensitive land uses is adequate.
Additive effect to perceived existing issues.	Local Residents	The results of both air quality and noise studies indicate that the proposed Alinta cogeneration plant will not cause significant increases in ground-level concentrations of pollutants or noise emissions.
Impact on land values.	Local Residents	Alcoa's Land Management Plan provides opportunities for those living near the existing Refinery to relocate if they consider they are being impacted by the Refinery's operations. The results of both air quality and noise studies indicate that the proposed Alinta cogeneration plant will not cause significant increases in ground-level concentrations of pollutants or noise emissions.
Increased greenhouse gas emissions.	Local Residents	EPA Guidance Statement No.12 (EPA, 2002) recommends the adoption of strategies that reduce the greenhouse gas output or intensity per unit product from current or future activities over the lifecycle of the asset or activity. The synergistic linking of enterprises to reduce net greenhouse gas outputs, as achieved by cogeneration, is one such recommended strategy. In Stage One, greenhouse gas emissions compare favourably to the average emissions from other generators currently on the grid. In Stage Two (cogeneration) greenhouse gas emissions are well below the average emissions from other generators currently on the grid and significantly less than coal-fired plant.
Greenhouse gas emissions intensities are significantly lower than those presented for the Alcoa Pinjarra and Worsley cogeneration projects[1].	Wagerup Tripartite Group	Differences in greenhouse gas emissions intensities are primarily due to differences in Gas Turbine Generator technology.
Concern over perceived use of cooling towers.	Local Residents	Cooling towers have not been proposed as part of the Alinta Cogeneration Project. The generator air and machine bearing oil will be cooled using radiators, with air movement driven by fans. The radiators and fans will be located adjacent to the Gas Turbine Generators.
Impact on fauna.	Local Residents	Limited site clearing of replanted vegetation is required prior to construction of the

Issues raised	Stakeholders	Response
		proposed cogeneration plant. No fauna habitats have been identified on site.
Water use.	Local Residents	Water required during construction and operation will be drawn from sources utilised by the Alcoa Refinery. If the Wagerup Refinery expansion proceeds, additional water allocation may be required above Alcoa's existing surface water licence extraction limits. An Ecological Water Requirement study has been performed in the case that additional water would be required, the results of which are documented in the Alcoa ERMP (Alcoa, 2005a).
Wider community involvement in consultation.	Wagerup Tripartite Group, Local Residents	The stakeholder consultation strategy was specifically aligned to that used by Alcoa in recognition of the extensive consultation already undertaken for the Wagerup Unit Three Expansion (in which cogeneration was included as a power supply option). Minutes of the Tripartite Group meetings are published in the Harvey Reporter and posted on the DoE website, project information was provided in WagerUpdate 12 (with contact details for those wanting further information) and Alinta also attended the Wagerup combined refinery and mine site open day. A Community Information Sheet was also sent to residents in the Shire of Waroona and the town of Yarloop. Community information sessions were also held in Waroona and Yarloop. These sessions were advertised in the Harvey Reporter and the Community information Sheet.
Local employment opportunities.	Wagerup CCN, Local Residents	Local contractors will be invited to tender for construction work and locals will be able to express interest in contract work that they are qualified to undertake.
What is the approvals process (and opportunities to appeal).	Local Residents	While cogeneration was assessed as a potential option for providing steam in the Alcoa Environmental Review and Management Programme (ERMP) it should be noted that the Alinta Wagerup Cogeneration Project is the subject of a separate environmental referral and approvals process. Alinta referred the Wagerup Cogeneration Project to the Environmental Protection Authority (EPA) on 7 February 2006. Following assessment by the EPA a Bulletin will be published. A formal two week appeal period will occur after Bulletin publication. Based on consideration of recommendations made by the EPA the Minister for the Environment will determine whether the proposal can be implemented. In parallel to this process, Alinta has also lodged an application for Works Approval with the Department of Environment (DoE). A decision to issue a final Works Approval will not be made by the DoE until Ministerial Approval of the project is given.

The EPA considers that the consultation process has been appropriate and that reasonable steps have been taken to inform the community and stakeholders on the proposed development.

4. Relevant Environmental Factors

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

It is the EPA's opinion that the following environmental factors relevant to the proposal require evaluation in this report:

(a) Air quality;

(b) Greenhouse gas emissions; and

(c) Noise.

Details on the relevant environmental factors and their assessment are contained in Sections 4.1 - 4.3. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

4.1 Air quality

Description

The EPA's recent assessment of the Alcoa Wagerup expansion (EPA, 2006) provides details of Alcoa's existing and proposed refinery emissions (including Alcoa's proposed 280 MW co-generation power station) and the potential impacts in detail and should be read in conjunction with this report. Table 3 details the differences in emission rates between the Alcoa and the Alinta co-generation proposals. Alcoa's co-generation proposal has yet to receive environmental approval from the Minister for the Environment.

Table 3: Emission rates

	Emission rate (grams per second)			
Scenario	**SO_2**	**NO_X (as NO_2)**	**CO**	**PM_{10}**
Alcoa: 280MW co-generation proposal	0.6	30.8	7.6	-
Alinta Stage 1: 350MW open cycle	1.2	52.8	32.2	4.2
Alinta: Stage 2: 350MW co-generation	1.0	42.2	5.8	4.0

The main pollutant emitted from gas turbines is NO_X and the impact of the proposed Alinta plant was evaluated by air dispersion modelling to predict NO_2 ground level concentrations (GLCs) for a variety of scenarios including the existing and expanded refinery which emits about 32 grams per second on NO_X.

As was the case for the Alcoa co-generation facility, the maximum predicted GLCs of NO_2, at the Yarloop (and Hamel) townsites, are less than 25% of the 1 hour National Environment Protection Measure (NEPM) standard and less than 1% of the annual average NEPM standard.

Assessment

EPA objective

The EPA's objective for this factor is to ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of the people and land uses by meeting statutory requirements and acceptable standards.

EPA guidance statement number 15 *Guidance Statement for Emissions of Oxides of Nitrogen from Gas Turbines* provides assessment guidance and criteria for the management of NO_x emissions. For this proposal the relevant maximum emission level is 0.07 grams per cubic metre or 34 parts per million by volume (ppmv) NO_x at 15% dry oxygen and STP reference level (EPA, 2000a). This is an upper limit and the EPA considers that proponents should use best practicable technology to better these limits. As such, the EPA expects the best practice of low-NO_x burners to be installed in all gas turbines (EPA, 2002a).

The proponent advises that the NO_X emissions from the co-generation facility would be less than the EPA's guideline level of 34ppmv during normal operations. The co-generation facility would utilise dry low-NO_x burners. The EPA considers that the use of low-NO_x burners demonstrates the implementation of best practicable technology.

The EPA notes that the relevant criterion for ambient air quality is the NEPM standard of 0.12ppmv NO_2 (1 hour average) and 0.03ppmv NO_2 (annual average). This means that the cumulative effect of NO_2 emissions from the co-generation facility and Alcoa's refinery needs to be less than this standard.

Air dispersion modelling results provided in the referral document show that the change from the Alcoa to the Alinta co-generation facility results in only minor changes to the predicted ambient NO_2 levels in the area, and that the NEPM standard for cumulative NO_2 is not likely to be exceeded.

The DoE advised that an error in the wind data and the use of a non standard dispersion method meant that the Alinta predictions were not directly comparable with those undertaken by Alcoa during the ERMP process. However, the DoE was satisfied that the concentrations of pollutants would remain below the NEPM standard by a comfortable or large margin. The EPA notes the DoE's advice, and recognises that the use of different methods by proponents adds to confusion and lowers community confidence in predictions. As such, the EPA encourages Alinta to follow standard methodology for future proposals.

The EPA recognises the considerable community concern over air emissions from the Wagerup refinery and believes it is essential for Alinta to be able to accurately quantify its contribution to the air shed. As such, the EPA recommends that the proponent be required to design and implement a stack emissions monitoring strategy which includes characterisation of all constituents in the stack emissions in accordance with recommended condition 7 in Appendix 3 of this report.

Summary

Having particular regard to the:

- the DoE's advice on the results of the dispersion modelling, which indicates that it is unlikely that the NEPM ambient air quality standard would be exceeded by the proposed co-generation facility;
- installation of dry low-NO_x burners; and
- recommended condition 7, which requires the proponent to fully characterise stack air emissions,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor.

4.2 Greenhouse Gas Emissions

Description

Stage 1

The proposed open cycle plant has a net total energy efficiency of 30% (based on net higher heating value (HHV), modelled at 41 degrees Celsius and 40% relative humidity). The average carbon intensity of the electrical output is 0.643 tonnes carbon dioxide per megawatt hour (CO_{2e}/MWh).

Stage 2

The proposed co-generation plant has a net total energy efficiency of 74% (based on net higher heating value, modelled at 18 degrees Celsius and 70% relative humidity). World's best practice total efficiency for a combined cycle gas turbine (CCGT) plant adjusted for Australian conditions is 52% for a plant of capacity greater than 250MW (AGO, 2001). The reason for the difference in efficiency is that the recovered heat (steam) in the co-generation plant has not been used in a steam turbine (at about 36% efficiency) to produce extra electricity.

The proponent has apportioned the CO_{2e} emissions such that the average carbon intensity of the electrical output is 0.453 tonnes CO_{2e}/MWh. This can be compared with the average carbon intensity of Western Power's SWIS during the year 2002 which was 0.92 tonnes CO_{2e}/MWh.

Assessment

EPA objective

The EPA's objective for greenhouse gases is to ensure that:

- Best practicable measures are applied to maximise energy efficiency and minimise emissions;
- Comprehensive analysis is undertaken, where residual impacts occur, to identify and implement appropriate offsets; and
- Proponents undertake an on-going programme to monitor and report emissions and periodically assess opportunities to further reduce greenhouse gas emissions over time.

EPA guidance statement number 12 *Guidance Statement for Minimising Greenhouse Gas Emissions* outlines the EPA's expectations for the minimisation of greenhouse gas emissions from new proposals. The EPA expects the proponent to use best practicable measures to maximise energy efficiency and minimise greenhouse emissions to the lowest practicable level (EPA, 2002b).

Stage 1: open cycle peak load power station

The thermal efficiency of the power station is 30% and the carbon intensity is 0.643 tonnes CO_{2e}/MWhr. The EPA accepts that open cycle gas turbines represent best practice for peak load power stations.

Transition phase
In order to supply steam on a continuous basis (i.e. co-generation mode), the plant needs to be operating as a base load power station. However, the demand for electricity increases gradually and the proponent advises that they cannot practically jump from operating 1000 to 8760 hours per annum in one step. As such, a transition period is needed to allow Alinta to build its customer base.

While the EPA does not accept open cycle gas turbines to represent best practice for mid-merit or base load power stations, the EPA recognises that some allowance needs to be made for additional operating hours during the transition from peak to base load operation. As such, the EPA has recommended that the proponent be allowed a maximum of 15 500 additional operating hours per unit during the transition phase (see Schedule 1 in Appendix 3 of this report).

Stage 2: co-generation base load power station.
The EPA notes that the proponent has apportioned the CO_{2e} emissions to the electrical power generation such that the greenhouse intensity for the electricity produced is equivalent to a Combined Cycle Gas Turbine (CCGT) power station.

As a result, the EPA notes that the proposed co-generation facility has a greenhouse gas intensity of 0.453 tonnes CO_{2e}/MWhr which is 51% of the average greenhouse gas intensity of Western Power's operations and will result in a small net average reduction in the greenhouse gas intensity of the SWIS if constructed.

The EPA notes that the proponent has not committed to offsetting any of its carbon emissions. The EPA considers that the proposed co-generation facility represents the most efficient means of meeting the required demand for process steam and electricity and the EPA is satisfied that it represents best practice for the refinery expansion. Co-generation facilities are more efficient than open cycle gas turbines, steam turbines and CCGT plants and the EPA does not require offsets to recommend approval of this proposal. However the EPA would encourage the proponent to consider carbon sink projects during the life of the project.

The EPA recommends that the standard ministerial condition (i.e. Condition 6 in Appendix 3 of this report) applied to all proposals with large greenhouse gas inventories be imposed on the proposal. This condition requires a greenhouse gas emissions management plan to be prepared and implemented.

Summary
Having particular regard to:

- specifying maximum additional operating hours during the transition phase;
- the high thermal efficiency of the co-generation configuration; and
- the recommended condition requiring the development and implementation of a greenhouse gas management plan;

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor.

4.3 Noise

Description

For the proposed Wagerup refinery expansion, Alcoa committed to no increase in noise impact and since Alcoa was the proponent for both the refinery and the power station, Alcoa had the option of offsetting noise from the co-generation facility with noise reductions in other areas of the refinery.

However, since Alinta is the proponent for this proposal, Alinta needs to comply with the *Environmental Protection (Noise) Regulations 1997* which specify levels to be met for various land uses, the most stringent of which is the night time Assigned Level L_{A10} of 35 dB(A) for residential premises. Additionally a level of 65 dB(A) must be met at the boundary between Alinta's and Alcoa's industrial premises.

Currently the noise regulations are being exceeded by the Wagerup refinery. The proponent has undertaken noise modelling to predict likely noise levels from Stage 1 and indicative noise levels for Stage 2.

Assessment

EPA objective

The EPA's objective for this factor is to ensure that there is no further increase in noise impact, and to ensure that Alinta's project would not hinder Alcoa in reducing overall noise levels during the refinery expansion.

The EPA notes that since the noise regulations are already being exceeded, meeting the Assigned Level is not sufficient and Alinta must also ensure that they are not contributing to the exceedance.

Stage 1:

The modelling for Stage 1 predicts a likely L_{A10} noise level of 30.7 dB(A) at the most affected receptor (receptor 6). The level from the existing Wagerup refinery at receptor 6 is 47.2 dB(A) and as such the EPA is satisfied that noise from Stage 1 of the power station is unlikely to be discernable and would not increase existing noise levels.

Stage 2:

Since detailed noise data were not available for the HRSGs, the proponent has only undertaken indicative noise modelling for Stage 2 which predicts a level of around 35 dB(A) at receptor 6. While noise at this level is unlikely to be discernable against the existing refinery noise, the EPA believes that more accurate predictions are necessary to ensure that Stage 2 does not contribute to noise impact.

As such, the EPA has recommended a condition requiring the proponent to prepare a Noise Management Plan (NMP) prior to the implementation of Stage 2. The objective for the NMP is to ensure that there is no discernable increase in noise impact. The NMP would need to address:

- revised noise modelling using detailed design noise source data;
- ground truthing of noise predictions from Stage 1; and
- land use changes.

See recommended condition 8.1 of Appendix 3.

Summary
Having particular regard to the:

- predicted noise levels for Stage 1; and
- recommended condition for an NMP prior to implementation of Stage 2,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor.

5. Conditions and Commitments

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal and, following discussion with the proponent, the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are written in a form which makes them readily enforceable, but they do provide a clear statement of the action to be taken as part of the proponent's responsibility for, and commitment to, continuous improvement in environmental performance.

6. Conclusions

The EPA has considered the proposal by Alinta to construct and operate a co-generation facility at Wagerup

Air emissions
Predicted ground level concentrations of NO_2 from the cumulative air modelling for Alinta's co-generation facility are below the relevant NEPM standards. The EPA is also satisfied that the change from the Alcoa to the Alinta co-generation power station will not affect the EPA's conclusions of the recent Wagerup expansion assessment.

Greenhouse gas emissions
The EPA is aware that demand for electricity in Western Australia will continue to grow, and believes that the greenhouse intensity of new generation should be reduced as much as possible. The EPA notes that full implementation of this power station would reduce the greenhouse intensity of the SWIS.

Noise
The EPA is satisfied that implementation of Stage 1 would not increase noise impact to surrounding premises, however, the EPA has recommended a Noise Management Plan be prepared to ensure Stage 2 does not increase noise impact.

The EPA has concluded that the proposal is capable of being managed in an environmentally acceptable manner such that it is most unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation of the recommended conditions and proponent's commitments set out in Section 5.

7. Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposal being assessed is for the construction of a gas fired power station at Wagerup;
2. That the Minister considers the report on the relevant environmental factors as set out in Section 4;
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 3; and
4. That the Minister imposes the conditions and procedures recommended in Appendix 3 of this report.

Appendix 1

References

AGO, 2001. *Technical Guidelines- Generator Efficiency Standards.* Version 1.2, January 2001. Australian Greenhouse Office, Commonwealth Government of Australia, Canberra, ACT. Available: www.greenhouse.gov.au/pubs

EPA, 2000a. *Guidance for the Assessment of Environmental Factors: Guidance Statement for Emissions of Oxides of Nitrogen from Gas Turbines*. EPA Guidance Statement 15, May 2000. Environmental Protection Authority, Perth WA.

EPA, 2002a. *Strategic Planning for Future Power Generation: Pinjar Power Station Expansion; Kwinana/East Rockingham Power Station; Kemerton Power Station; New Bunbury Power Station; Collie Power Station Expansion*. EPA Bulletin 1067, September 2002. Environmental Protection Authority, Perth, WA.

EPA, 2002b. *Guidance for the Assessment of Environmental Factors: Guidance Statement for Minimising Greenhouse Gas Emissions* . EPA Guidance Statement 12, October 2002. Environmental Protection Authority, Perth WA.

EPA, 2006. *Wagerup Alumina Refinery – increase in production to 4.7mtpa; and Wagerup Cogeneration Project*. EPA Bulletin 1215, January 2006. Environmental Protection Authority, Perth, WA.

SKM 2006. *Wagerup Cogeneration Project*. Alinta Cogeneration (Wagerup) Pty Ltd, SKM, June 2006.

Appendix 2

Department of Environment: Draft Works Approval

WESTERN AUSTRALIA

DEPARTMENT OF ENVIRONMENT

Environmental Protection Act 1986

WORKS APPROVAL NUMBER: 4219 **FILE NUMBER: W20/06/0**

WORKS APPROVAL

NAME OF OCCUPIER:

Alinta Cogeneration (Wagerup) Pty Ltd

ADDRESS OF OCCUPIER

GPO Box W2030
PERTH WA 6846

NAME AND LOCATION OF PREMISES:

Wagerup Cogeneration Project
South West Highway
WAGERUP WA 6215

Environmental Protection Regulations 1987

CLASSIFICATION(S) OF PREMISES:

Schedule 1 - Category Number 52: Electric power generation

COMMENCEMENT DATE OF WORKS APPROVAL: XX/XX/XXXX

EXPIRY DATE OF WORKS APPROVAL: XX/XX/XXXX

CONDITIONS OF WORKS APPROVAL:

As described and attached:

DEFINITION(S)
GENERAL CONDITION(S) (2)
AIR POLLUTION CONTROL CONDITION(S) (1)

.....
Officer delegated under Section 20
of the *Environmental Protection Act 1986*

Date of Issue: XX/XX/XXXX

WESTERN AUSTRALIA

DEPARTMENT OF ENVIRONMENT

Environmental Protection Act 1986

WORKS APPROVAL NUMBER: 4219 **FILE NUMBER: W20/06/0**

CONDITIONS OF WORKS APPROVAL

DEFINITIONS

In these conditions of works approval, unless inconsistent with the text or subject matter:

"Director" means Director, Environmental Management Division, or other delegated officer, of the Department of Environment for and on behalf of the Chief Executive Officer as delegated under Section 20 of the *Environmental Protection Act 1986*;

"Director" or "Department of Environment" for the purpose of correspondence means:

The Manager Kwinana Peel Region Office Department of Environment PO Box 454 Kwinana WA 6966	Telephone: 9411 1777 Facsimile: 9419 5897 Emergency (a/h): 1800 018 800

"$ppm_{(v)}$" means parts per million by volume;

"g/sec" means grams per second;

"NO_x" means nitrogen oxides;

"premises" means Lot 203 (on Plan 14252 in certificate of title volume 1856 folio 410) within Alcoa's refinery premises at Wagerup, Western Australia;

"wet commissioning" means operation of equipment for the first time post construction for the purposes of commissioning, carrying out handling trials and performance tests that involves use or consumption of materials that would typically be utilised under normal operation;

"works approval holder" means Alinta Cogeneration (Wagerup) Pty Ltd as occupier of the premises.

GENERAL CONDITIONS

GENERAL CONSTRUCTION AND OPERATIONAL DESCRIPTION

1 The works approval holder shall construct and operate Stage One [*two 175 megawatt (nominal capacity) gas turbines*] of the works in accordance with:

(i) The works approval application form dated 7 February 2006,

(ii) The document titled: *Wagerup Cogeneration Project – Environmental Impact Statement*. This document having the reference code WP03100-EV-RP-0004 Rev 0 [*this document is to undergo revision*].

Where the details and commitments of the above documents are inconsistent with conditions attached to this works approval, the works approval conditions shall prevail.

SUBMISSION OF COMPLIANCE DOCUMENT

2(a) The works approval holder shall submit a Compliance Document to the Director following the completion of construction and wet commissioning of Stage One of the works outlined in the works approval application and supporting documentation, and prior to putting the same into ongoing operation.

2(b) The Compliance Document shall certify that the works were constructed in accordance with the conditions of works approval and documentation supporting the application to construct the works, and shall be signed by an authorised officer of Alinta Cogeneration (Wagerup) Pty Ltd with the printed name and position of that person within the company, and preferably will contain the Company seal.

AIR POLLUTION CONTROL CONDITIONS

DESIGN EMISSION CONSTRUCTION STANDARDS

3 The works approval holder shall design and construct the gas turbine generators to comply with the design NO_X emission concentrations shown in Column 1 of Table 1 for the gas turbine loads (percentage of capacity) shown in Column 2 of Table 1:

Table 1: Gas Turbine Generator Emission Performance

Column 1	**Column 2**
Design Emission Concentration*	**Gas Turbine Load (% of Capacity)**
80 $ppm_{(v)}$	20
25 $ppm_{(v)}$	65
20 $ppm_{(v)}$	100

*All concentrations relate to the following conditions: gas-fired operation, 15% oxygen reference level, dry

.....

Officer delegated under Section 20

of the *Environmental Protection Act 1986*

Date of Issue: XX/XX/XXXX

Appendix 3

Recommended Environmental Conditions and Proponent's Consolidated Commitments

RECOMMENDED CONDITIONS AND PROCEDURES

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF THE ENVIRONMENTAL PROTECTION ACT 1986)

WAGERUP COGENERATION PROJECT

Proposal: The construction, operation and maintenance of a co-generation facility of 350MW electrical output and 460 tonnes per hour of steam output at Wagerup, as documented in Schedule 1 of this Statement.

Proponent: Alinta Cogeneration (Wagerup) Pty Ltd

Proponent Address: GPO Box W2030
PERTH WA 6846

Assessment Number: 1643

Report of the Environmental Protection Authority: Bulletin 1223

The proposal referred to above may be implemented by the proponent subject to the following conditions:

1 Implementation

1-1 The proponent shall implement the proposal as documented in schedule 1 of this statement subject to the conditions of this statement.

2 Proponent Commitments

2-1 The proponent shall implement the environmental management commitments documented in schedule 2 of this statement, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

3 Proponent Nomination and Contact Details

3-1 The proponent for the time being nominated by the Minister for the Environment under section 38(6) or (7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal until such time as the Minister for the Environment has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person as the proponent for the proposal.

3-2 If the proponent wishes to relinquish the nomination, the proponent shall apply for the transfer of proponent and provide a letter with a copy of this statement endorsed by the proposed replacement proponent that the proposal will be carried out in accordance with this statement. Contact details and appropriate documentation on the capability of the proposed replacement proponent to carry out the proposal shall also be provided.

3-3 The nominated proponent shall notify the Department of Environment of any change of contact name and address within 60 days of such change.

4 Commencement and Time Limit of Approval

4-1 The proponent shall substantially commence the proposal within five years of the date of this statement or the approval granted in this statement shall lapse and be void.

Note: The Minister for the Environment will determine any dispute as to whether the proposal has been substantially commenced.

4-2 The proponent shall make application for any extension of approval for the substantial commencement of the proposal beyond five years from the date of this statement to the Minister for the Environment, prior to the expiration of the five-year period referred to in condition 4-1.

The application shall demonstrate that:

- the environmental factors of the proposal have not changed significantly;

- new, significant, environmental issues have not arisen; and

- all relevant government authorities have been consulted.

Note: The Minister for the Environment may consider the grant of an extension of the time limit of approval not exceeding five years for the substantial commencement of the proposal.

5 Compliance Audit and Performance Review

5-1 The proponent shall prepare an audit program and submit compliance reports to the Department of Environment which address:

- the status of implementation of the proposal as defined in schedule 1 of this statement;

- evidence of compliance with the conditions and commitments; and

- the performance of the environmental management plans and programs.

Note: Under sections 48(1) and 47(2) of the *Environmental Protection Act 1986*, the Chief Executive Officer of the Department of Environment is empowered to monitor

the compliance of the proponent with the statement and should directly receive the compliance documentation, including environmental management plans, related to the conditions, procedures and commitments contained in this statement.

5-2 The proponent shall submit a performance review report every five years after the start of operations, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority, which addresses:

- the major environmental issues associated with the project; the targets for those issues; the methodologies used to achieve these; and the key indicators of environmental performance measured against those targets;

- the level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best available technology where practicable;

- significant improvements gained in environmental management, including the use of external peer reviews;

- stakeholder and community consultation about environmental performance and the outcomes of that consultation, including a report of any on-going concerns being expressed; and

- the proposed environmental targets over the next five years, including improvements in technology and management processes.

5-3 The proponent may submit a report prepared by an auditor approved by the Department of Environment under the "Compliance Auditor Accreditation Scheme" to the Chief Executive Officer of the Department of Environment on each condition/commitment of this statement which requires the preparation of a management plan, programme, strategy or system, stating that the requirements of each condition/commitment have been fulfilled within the timeframe stated within each condition/commitment.

6 Greenhouse Gas Abatement

6-1 Prior to commencement of construction, the proponent shall develop a Greenhouse Gas Abatement Program to:

- ensure that the plant is designed and operated in a manner which achieves reductions in "greenhouse gas" emissions as far as practicable;

- provide for ongoing "greenhouse gas" emissions reductions over time;

- ensure that through the use of best practice, the total net "greenhouse gas" emissions and/or "greenhouse gas" emissions per unit of product from the project are minimised; and

- manage “greenhouse gas” emissions in accordance with the Framework Convention on Climate Change 1992, and consistent with the National Greenhouse Strategy;

to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

This Program shall include:

1. calculation of the “greenhouse gas” emissions associated with the proposal, as advised by the Environmental Protection Authority;

   Note: The current requirements of the Environmental Protection Authority are set out in: *Minimising Greenhouse Gas Emissions, Guidance for the Assessment of Environmental Factors, No. 12* published by the Environmental Protection Authority (October 2002). This document may be updated or replaced from time to time.

2. specific measures to minimise the total net “greenhouse gas” emissions and/or the “greenhouse gas” emissions per unit of product associated with the proposal using a combination of “no regrets” and “beyond no regrets” measures;

   Note: In (2) above, the following definitions apply:

   1. “no regrets” measures are those which can be implemented by a proponent and which are effectively cost-neutral.
   2. “beyond no regrets” measures are those which can be implemented by a proponent and which involve additional costs that are not expected to be recovered.

3. the implementation and ongoing review of “greenhouse gas” offset strategies with such offsets to remain in place for the life of the proposal;

4. estimation of the “greenhouse gas” efficiency of the project (per unit of product and/or other agreed performance indicators) and comparison with the efficiencies of other comparable projects producing a similar product, both within Australia and overseas;

5. implementation of thermal efficiency design and operating goals consistent with the Australian Greenhouse Office Technical Efficiency guidelines in design and operational management;

6. actions for the monitoring, regular auditing and annual reporting of “greenhouse gas” emissions and emission reduction strategies;

7. a target set by the proponent for the progressive reduction of total net “greenhouse gas” emissions and/or “greenhouse gas” emissions per unit of product and as a percentage of total emissions over time, and annual reporting of progress made in achieving this target. Consideration should be given to the use of renewable energy sources such as solar, wind or hydro power;

8. a program to achieve reduction in “greenhouse gas” emissions, consistent with the target referred to in (7) above;

9. entry, whether on a project-specific basis, company-wide arrangement or within an industrial grouping, as appropriate, into the Commonwealth Government’s “Greenhouse Challenge” voluntary cooperative agreement program.

   Components of the agreement program include:
   1. an inventory of emissions;
   2. opportunities for abating “greenhouse gas” emissions in the organisation;
   3. a “greenhouse gas” mitigation action plan;
   4. regular monitoring and reporting of performance; and
   5. independent performance verification.

10. Review of practices and available technology; and

11. “Continuous improvement approach” so that advances in technology and potential operational improvements of plant performance are adopted.

6-2 The proponent shall implement the Greenhouse Gas Abatement Program required by condition 6-1.

6-3 Prior to commencement of construction, the proponent shall make the Greenhouse Gas Abatement Program required by condition 6-1 publicly available in a manner approved by the Department of Environment.

7 Stack Emissions

7-1 Prior to construction of the co-generation facility, the proponent shall prepare a Stack Emissions Management Plan, to:

- ensure that best available practicable and efficient technologies are used to minimise total air emissions from the co-generation facility;

to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

This Plan shall address:

1 specific measures to minimise total air emissions from the co-generation facility to meet emission limits consistent with best practicable technology and current industry standards;

2 stack testing during commissioning of both Stage 1 and Stage 2 to fully characterise all constituents including minor emissions such as formaldehyde, acetaldehyde, toluene and benzene;

3 on going monitoring of air emissions; and

4 public reporting of air emissions and any complaints about air emissions.

7-2 The proponent shall implement the Stack Emissions Management Plan required by condition 7-1.

7-3 The proponent shall make the Stack Emissions Management Plan, required by condition 7-1 publicly available.

8 Noise

8-1 Prior to construction of Stage 2, the proponent shall prepare a Noise Management Plan, to ensure that the proposal will not increase noise impact, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

This Plan shall address:

1 revised noise modelling using detailed design noise source data;

2 ground truthing of noise predictions from Stage1; and

3 land use changes.

8-2 The proponent shall implement the Noise Management Plan required by condition 8-1.

8-3 The proponent shall make the Noise Management Plan, required by condition 8-1 publicly available.

Procedures

1 Where a condition states “to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority”, the Environmental Protection Authority will provide that advice to the Department of Environmental Protection for the preparation of written advice to the proponent.

2 The Environmental Protection Authority may seek advice from other agencies or organisations, as required, in order to provide its advice to the Department of Environment.

3 Where a condition lists advisory bodies, it is expected that the proponent will obtain the advice of those listed as part of its compliance reporting to the Department of Environment.

Notes

1 The Minister for the Environment will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environment over the fulfilment of the requirements of the conditions.

2 The proponent is required to apply for a Works Approval and Licence for this project under the provisions of Part V of the *Environmental Protection Act 1986*.

3 Within this statement, to “have in place” means to “prepare, implement and maintain for the duration of the proposal”.

Schedule 1

The Proposal (Assessment No. 1643)

Alinta Cogeneration (Wagerup) Pty Ltd propose to construct a natural gas-fired power station with a nominal generation capacity of 350 megawatts electrical output and 460 tonnes per hour of steam output on a site located at Alcoa's Wagerup alumina refinery (location shown in Figures 1 and 2). The proposal is to be implemented in two stages with a transition phase between Stage 1 and Stage 2.

Stage 1: open cycle peak load power station

Purpose: to supply electricity to the south west interconnected System (SWIS)

Life of project: approximately 25 years

Table 1 – Key Proposal Characteristics (Stage 1)

Element	Description
Power Generation	
Output	350 megawatts (nominal)
Plant Facilities	
Gas turbine specifications	2 × gas turbine of 175 megawatts nominal generating capacity fitted with dry low NO_x burners
Number of stacks	two
Height of stacks	35 metres
Thermal Efficiency (based on net higher heating value at 41 degrees Celsius and 40% relative humidity)	approximately 30%
Operating Hours	
Total per unit (gas and distillate)	up to 1000 hours a year
Distillate	up to 100 hours a year
Inputs	
Natural Gas	approximately 3.4 petajoules per annum
Distillate	approximately 0.4 petajoules per annum
Air Emissions	
Carbon dioxide equivalent (CO_{2e})	225 000 tonnes per annum
Oxides of nitrogen (NO_x)	1331 tonnes per annum

Transition phase: open cycle with increased operating hours

Once the proponent has advised the Environmental Protection Authority of its decision to develop Stage 2, the gas turbines may be operated in open cycle mode for a total of 15 500 hours per unit in addition to those hours allowed in Table 1. The transition phase is expected to last around three years and the proponent may apportion the 15 500 additional operating hours over these years as they see fit.

Stage 2: co-generation base load power station

Purpose: to supply power to the SWIS and steam to the Wagerup refinery.

Table 2 – Key Proposal Characteristics (Stage 2)

Element	Description
Generation	
Power output	350 megawatts (nominal)
Steam output	460 tonnes per hour (typical)
Plant Facilities	
Gas turbine specifications	2 × gas turbine of 175 megawatts nominal generating capacity fitted with dry low NO_x burners
Heat recovery steam generator (HRSG)	2 × HRSGs with a capacity of 430 tonnes per hour
Number of stacks	4 (including the two disconnected open cycle stacks)
Height of HRSG stacks	2 x 50 metres (co-generation), 2 x 35 metres (disconnected)
Thermal Efficiency (based on net higher heating value at 18 degrees Celsius and 20% relative humidity)	approximately 74% (based on one gas turbine and one HRSG fully fired)
Operating Hours	
Per unit	up to 8760 hours per annum
Inputs	
Natural Gas	approximately 31.8 petajoules per annum
Air Emissions	
Carbon dioxide equivalent (CO_{2e})	1 783 000 tonnes per annum
Oxides of nitrogen (NO_x)	1331 tonnes per annum

Figures (attached)

Figure 1 – Regional location
Figure 2 – Site layout

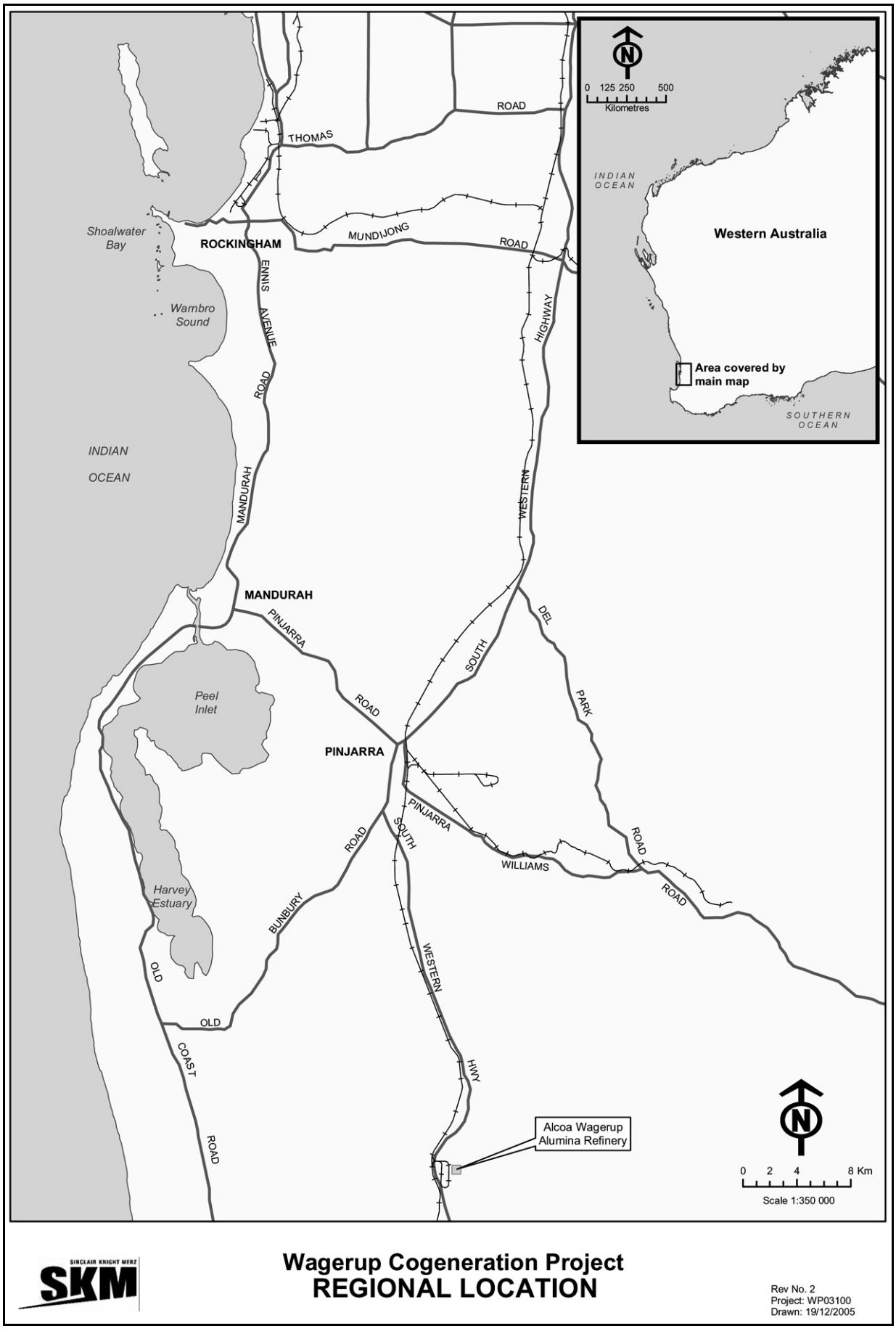

Figure 1 – Regional location

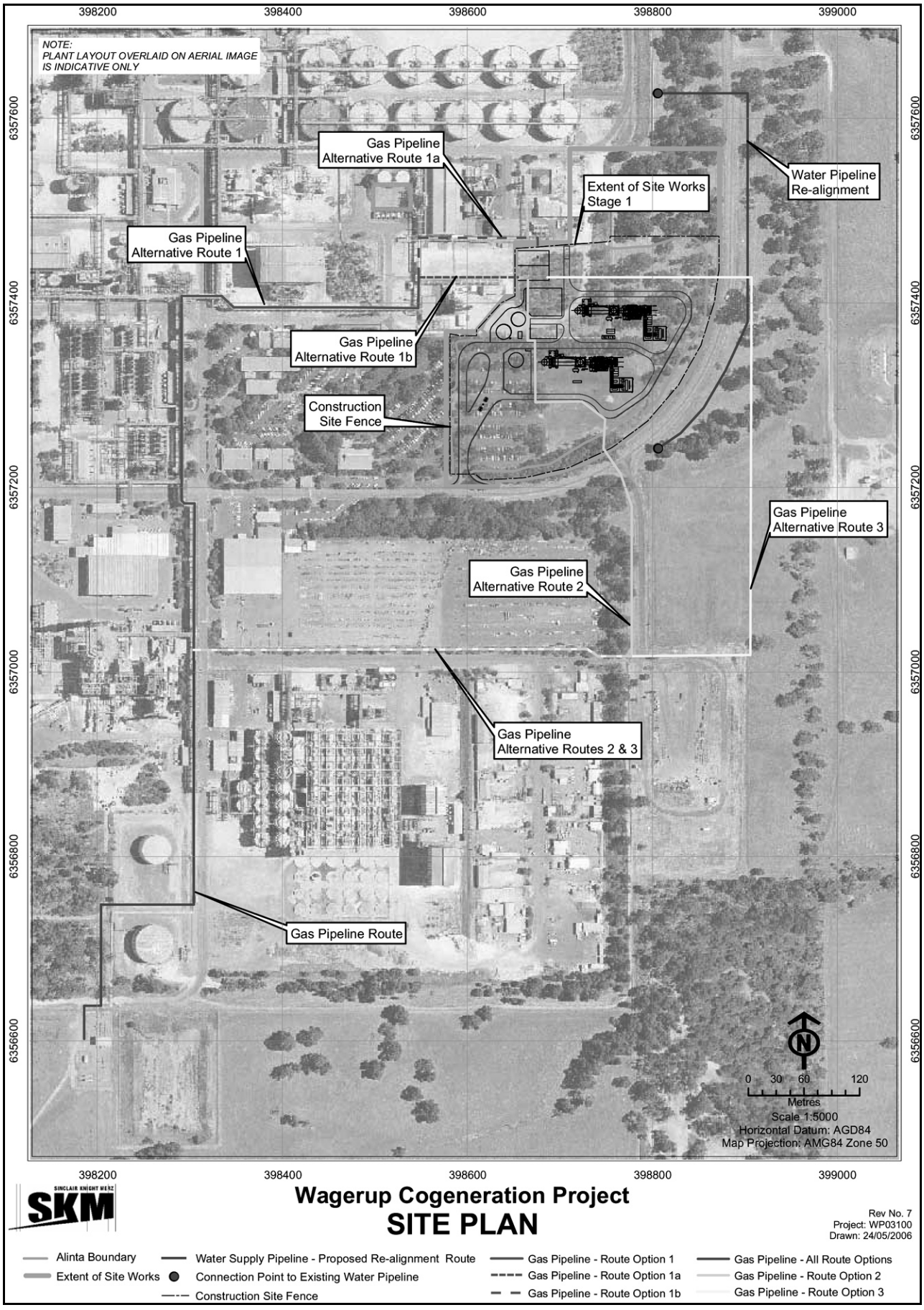

Figure 2 – Site layout